



European Network of
Transmission System Operators
for Electricity

NETWORK CODES CANONICAL EXTENSIONS SPECIFICATION

2026-09-10

ICTC APPROVED
VERSION 2.5.0

Copyright notice:

Copyright © ENTSO-E. All Rights Reserved.

This document and its whole translations may be copied and furnished to others, and derivative works that comment on or otherwise explain it or assist in its implementation may be prepared, copied, published and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice and this paragraph are included on all such copies and derivative works. However, this document itself may not be modified in any way, except for literal and whole translation into languages other than English and under all circumstances, the copyright notice or references to ENTSO-E may not be removed.

This document and the information contained herein is provided on an "as is" basis.

ENTSO-E DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

This document is maintained by the ENTSO-E CIM WG. Comments or remarks are to be provided at cim@entsoe.eu

NOTE CONCERNING WORDING USED IN THIS DOCUMENT

The force of the following words is modified by the requirement level of the document in which they are used.

- **SHALL:** This word, or the terms "REQUIRED" or "MUST", means that the definition is an absolute requirement of the specification.
- **SHALL NOT:** This phrase, or the phrase "MUST NOT", means that the definition is an absolute prohibition of the specification.
- **SHOULD:** This word, or the adjective "RECOMMENDED", means that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.
- **SHOULD NOT:** This phrase, or the phrase "NOT RECOMMENDED", means that there may exist valid reasons in particular circumstances when the particular behaviour is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behaviour described with this label.
- **MAY:** This word, or the adjective "OPTIONAL", means that an item is truly optional.

Revision History

Version	Date	Paragraph	Comments
1.0.0	2021-03-22		SOC approved.
2.1.0	2022-09-21		SOC approved.
2.2.0	2023-03-24		For review.
2.2.0	2023-04-20		For ICTC approval.
2.3.0-alpha	2024-02-17		For internal review.
2.3.0-beta	2024-03-20		For CIM WG review.
2.3.0-gamma	2024-04-09		For StG Strategy review.
2.3.1-alpha	2024-09-07		For CIM WG review.
2.3.2-alpha	2024-01-04		For CIM WG review.
2.4.0	2025-09-11		ICTC approval.
2.5.0	2026-08-05		For CIM WG review.
2.5.0	2026-09-10		ICTC approval.

34 CONTENTS

35	Copyright notice:.....	2
36	Revision History.....	3
37	CONTENTS	4
38	1 Introduction	52
39	2 Specification documents references	52
40	3 Network codes extensions	52
41	3.1 General.....	52
42	3.2 ExtNetworkCodesCIMVersion root class	52
43	3.3 Package ExtArea	53
44	3.3.1 General	53
45	3.3.2 (NC) OutageCoordinationRegion	57
46	3.3.3 (NC) OverlappingZone	58
47	3.3.4 (NC) Region	59
48	3.3.5 (NC) ScheduleResource	60
49	3.3.6 (NC) SchedulingArea	62
50	3.3.7 (NC) SensitivityArea	65
51	3.3.8 (NC) SubSchedulingArea	66
52	3.3.9 (NC) SynchronousArea	67
53	3.3.10 (NC) AreaBorderTerminal root class	68
54	3.3.11 (NC) BiddingZone	69
55	3.3.12 (NC) BiddingZoneBorder.....	70
56	3.3.13 (NC) CapacityCalculationRegion.....	72
57	3.3.14 (NC) ContingencyArea	73
58	3.3.15 (NC) EnergyCoordinationRegion.....	74
59	3.3.16 (NC) InfluenceArea	75
60	3.3.17 (NC) LoadFrequencyControlArea	76
61	3.3.18 (NC) LoadFrequencyControlBlock.....	78
62	3.3.19 (NC) MonitoringArea	79
63	3.3.20 (NC) ObservabilityArea	80
64	3.3.21 (NC) GridPowerCapacity.....	81
65	3.3.22 (NC) ClimateZone.....	83
66	3.3.23 (NC,new) CapacityCalculationKind enumeration	93
67	3.3.24 (NC,new) ClimateZoneClassificationKind enumeration.....	94
68	3.4 Assessed element extensions	94
69	3.4.1 General	94
70	3.4.2 (NC) AssessedElement.....	95
71	3.4.3 (NC) AssessedElementWithContingency root class.....	100
72	3.4.4 (NC) AssessedElementWithRemedialAction root class.....	101
73	3.4.5 (NC) SecuredExclusionReasonKind enumeration.....	102
74	3.4.6 (NC) ElementCombinationConstraintKind enumeration	102
75	3.4.7 (NC) CriticalElementKind enumeration.....	103
76	3.4.8 (NC) CrossBorderRelevance root class.....	103
77	3.5 Package ExtAvailabilitySchedule	104

78	3.5.1	General	104
79	3.5.2	(NC) AvailabilityEnabled	106
80	3.5.3	(NC) AvailabilityEquipment	107
81	3.5.4	(NC) AvailabilityExceptionalLimit	108
82	3.5.5	(NC) AvailabilityGroup	109
83	3.5.6	(NC) AvailabilityPowerSystemFunction	110
84	3.5.7	(NC) AvailabilityRemedialActionScheme	111
85	3.5.8	(NC) AvailabilitySchedule	111
86	3.5.9	(NC) AvailabilityContainer	113
87	3.5.10	(NC) AvailabilityFunctionKind enumeration	114
88	3.5.11	(NC) AvailabilityScheduleCauseKind enumeration	114
89	3.5.12	(NC) AvailabilityPlan	115
90	3.5.13	(NC) AvailabilityPlanVersion	116
91	3.5.14	(NC) AvailabilityPlanResponse root class	117
92	3.5.15	(NC) OutageRequest	117
93	3.5.16	(NC) OutageRequestVersion	119
94	3.5.17	(NC) RequestResponseKind enumeration	120
95	3.5.18	(NC) OutageResponse root class	120
96	3.5.19	(NC) OutageRequestResource root class	121
97	3.5.20	(NC) OutageDependency	122
98	3.5.21	(NC) OutageAvailability root class	123
99	3.6	Contingency extensions	123
100	3.6.1	General	123
101	3.6.2	(NC) ContingencyWithRemedialAction root class	124
102	3.6.3	(NC) ExceptionalContingency	125
103	3.6.4	(NC) ExtContingency root class	126
104	3.6.5	(NC) OrdinaryContingency	126
105	3.6.6	(NC) OutOfRangeContingency	127
106	3.6.7	(NC) ContingencyConditionKind enumeration	128
107	3.7	(CIM18) Package ExtDirectCurrent	128
108	3.7.1	General	128
109	3.7.2	(NC) DCSystemDirectionKind enumeration	130
110	3.7.3	(NC) DCSystemTransmissionKind enumeration	130
111	3.7.4	(NC) RampingPrincipleKind enumeration	131
112	3.7.5	(NC) ACTieCorridor	131
113	3.7.6	(NC) BipolarDCSystem	132
114	3.7.7	(NC) DCBiPole	133
115	3.7.8	(NC) DCBypassSwitch	134
116	3.7.9	(NC) DCCommutationSwitch	136
117	3.7.10	(NC) DCConverterParallelingSwitch	137
118	3.7.11	(NC) DCEarthReturnTransferSwitch	138
119	3.7.12	(NC) DCHarmonicFilter	139
120	3.7.13	(NC) DCHighSpeedSwitch	141
121	3.7.14	(NC) DCLineParallelingSwitch	142
122	3.7.15	(NC) DCMetallicReturnSwitch	143
123	3.7.16	(NC) DCNeutralBusGroundingSwitch	145

124	3.7.17	(NC) DCNeutralBusSwitch	146
125	3.7.18	(NC) DCPole.....	147
126	3.7.19	(NC) DCsmoothingReactor	149
127	3.7.20	(NC) DCsmoothingReactorArrester	150
128	3.7.21	(NC) DCSubstation	151
129	3.7.22	(NC) DCSubstationBipole	153
130	3.7.23	(NC) DCSubstationPole	154
131	3.7.24	(NC) DCSystem	155
132	3.7.25	(NC) DCTieCorridor	155
133	3.7.26	(NC) ExtDCConductinEquipment root class	157
134	3.7.27	(NC) ExtDCSwitch root class	157
135	3.7.28	(NC) MonopolarDCSystem.....	158
136	3.7.29	(NC) TieCorridor	159
137	3.8	Package ExtEquivalent	160
138	3.9	(CIM18) Package ExtFACTS	160
139	3.9.1	General	160
140	3.9.2	(NC) FACTSEquipment.....	161
141	3.9.3	(NC) LossCurve	163
142	3.9.4	(NC) ModularStaticSynchronousSeriesCompensator	164
143	3.9.5	(NC) StaticSynchronousCompensator	165
144	3.9.6	(NC) StaticVarCompensator.....	167
145	3.9.7	(NC) TCSCCompensationPoint root class	168
146	3.9.8	(NC) ThyristorControlledSeriesCompensator	169
147	3.9.9	Package ExtSSSC	171
148	3.10	Package ExtPowerShiftKey	177
149	3.10.1	General	177
150	3.10.2	(NC) AreaReserveResource	183
151	3.10.3	(NC) EnergyBlockComponent	185
152	3.10.4	(NC) EnergyBlockOrder	186
153	3.10.5	(NC) EnergyComponent.....	187
154	3.10.6	(NC) EnergyResourceGroupCapacity.....	188
155	3.10.7	(NC) EnergyResourceType	191
156	3.10.8	(NC) ExtEnergyConsumer root class.....	193
157	3.10.9	(NC) ExtGeneratingUnit root class	193
158	3.10.10	(NC) ExtHydroPump root class	195
159	3.10.11	(NC) ExtPowerElectronicsUnit root class	196
160	3.10.12	(NC) ProportionalEnergyComponent.....	197
161	3.10.13	(NC) EnergyKind enumeration	197
162	3.10.14	(NC) PowerShiftKeyKind enumeration	199
163	3.10.15	(NC) PowerShiftKeyDistribution	200
164	3.10.16	(NC) PowerShiftKeyStrategy	200
165	3.10.17	(NC) PowerBlockKind enumeration	202
166	3.10.18	(NC) MarketRegulationDirectionKind enumeration	202
167	3.10.19	(NC) BalancingReserveKind enumeration	202
168	3.11	Impact assessment matrix extensions	203
169	3.11.1	General	203

170	3.11.2	(NC) CalculationBasedImpactAssessmentMatrix	204
171	3.11.3	(NC) ConnectingImpactAssessmentMatrix	204
172	3.11.4	(NC) ImpactAssessmentMatrix	205
173	3.11.5	(NC) ListBasedImpactAssessmentMatrix	206
174	3.11.6	(NC) OutcomeValue root class	206
175	3.11.7	(NC) OwnerRemedialActionAssessment root class	207
176	3.11.8	(NC) RemedialActionOutcomeValue	207
177	3.11.9	(NC) RemedialActionScheduleOutcomeValue	208
178	3.11.10	(NC) OutcomeImpactAssessmentKind enumeration	209
179	3.12	Package ExtPowerTransferCorridor	209
180	3.12.1	General	209
181	3.12.2	(NC) Circuit	210
182	3.12.3	(NC) CircuitShare	211
183	3.12.4	(NC) ExceptionalPowerTransferCorridor	212
184	3.12.5	(NC) LineCircuit	213
185	3.12.6	(NC) OrdinaryPowerTransferCorridor	214
186	3.12.7	(NC) PowerTransferCorridor	215
187	3.12.8	(NC) PowerTransformerCircuit	216
188	3.12.9	(NC) PTCTriggeredEquipment	217
189	3.12.10	(NC) DirectCurrentCircuit	218
190	3.13	(CIM18) Package ExtProduction	219
191	3.13.1	General	219
192	3.13.2	(NC) GeothermalUnitKind enumeration	219
193	3.13.3	(NC) MarineUnitKind enumeration	220
194	3.13.4	(NC) NuclearReactorKind enumeration	220
195	3.13.5	(NC) PowerElectricalChemicalUnitKind enumeration	221
196	3.13.6	(NC) ElectricalChargingUnit	221
197	3.13.7	(NC) ExtNuclearGeneratingUnit root class	222
198	3.13.8	(NC) ExtReservoir root class	223
199	3.13.9	(NC) FlexibleEnergyUnit	223
200	3.13.10	(NC) FuelStorage	224
201	3.13.11	(NC) GeothermalGeneratingUnit	225
202	3.13.12	(NC) IndustryUnit	228
203	3.13.13	(NC) PowerElectricalChemicalUnit	231
204	3.13.14	(NC) PowerElectronicsMarineUnit	232
205	3.14	Remedial action extensions	234
206	3.14.1	General	234
207	3.14.2	(NC) CostSettledKind enumeration	237
208	3.14.3	(NC) ImpactAgreementKind enumeration	237
209	3.14.4	(deprecated,NC) BidDirectionKind enumeration	238
210	3.14.5	(NC) RelativeDirectionKind enumeration	238
211	3.14.6	(NC) RemedialActionScheduleResponseKind enumeration	238
212	3.14.7	(NC) RemedialActionKind enumeration	239
213	3.14.8	(NC) RemedialActionScheduleStatusKind enumeration	239
214	3.14.9	(NC) ValueOffsetKind enumeration	239
215	3.14.10	(NC) ACDCCConverterAction	240

216	3.14.11	(NC) AvailabilityRemedialAction	241
217	3.14.12	(NC) BatteryUnitAction	242
218	3.14.13	(NC) CountertradeRemedialAction	243
219	3.14.14	(NC) ControlFunctionBlockAction	245
220	3.14.15	(NC) EnergySourceModification	246
221	3.14.16	(NC) EquivalentInjectionAction	247
222	3.14.17	(NC) ExternalNetworkInjectionAction	248
223	3.14.18	(NC) GridStateAlteration	249
224	3.14.19	(NC) GridStateAlterationRemedialAction	251
225	3.14.20	(NC) GridStateIntensitySchedule	252
226	3.14.21	(NC) IntertemporalPropertyRange	253
227	3.14.22	(NC) LoadAction	254
228	3.14.23	(NC) PowerElectronicsConnectionAction	255
229	3.14.24	(cims) PropertyReference	256
230	3.14.25	(NC) QualitativeRemedialActionImpact	257
231	3.14.26	(NC) QuantitativeRemedialActionImpact	257
232	3.14.27	(NC) RedispatchScheduleAction	258
233	3.14.28	(NC) RedispatchRemedialAction	259
234	3.14.29	(NC) RegulatingControlAction	261
235	3.14.30	(NC) RemedialAction	262
236	3.14.31	(NC) RemedialActionCost root class	263
237	3.14.32	(NC) RemedialActionImpact root class	264
238	3.14.33	(NC) RemedialActionSchedule	265
239	3.14.34	(NC) RemedialActionScheduleResponse root class	266
240	3.14.35	(NC) RotatingMachineAction	267
241	3.14.36	(NC) SetPointAction	268
242	3.14.37	(NC) SchemeRemedialAction	269
243	3.14.38	(NC) ShuntCompensatorModification	271
244	3.14.39	(NC) StaticPropertyRange	272
245	3.14.40	(NC) StaticVarCompensatorAction	273
246	3.14.41	(NC) TapPositionAction	274
247	3.14.42	(NC) TopologyAction	275
248	3.14.43	(NC) RemedialActionDependency root class	276
249	3.14.44	(NC) BiddingZoneAction	277
250	3.14.45	(NC) RemedialActionScheduleGroup	278
251	3.14.46	(NC) RangeConstraint	278
252	3.14.47	(NC) RemedialActionDependencyKind enumeration	279
253	3.14.48	(NC) ShiftMethodKind enumeration	280
254	3.14.49	(NC) ProposingRemedialActionScheduleShare root class	280
255	3.14.50	(NC) CountertradeScheduleAction	281
256	3.14.51	(NC) PowerScheduleAction	282
257	3.14.52	(NC) PowerRemedialAction	283
258	3.14.53	(NC) EquipmentControllerAction	284
259	3.14.54	(NC) RemedialActionGroup	285
260	3.14.55	(NC) InServiceAction	286
261	3.14.56	(NC) RemedialActionScheduleDependency root class	287

262		3.14.57	(NC) RemedialActionScheduleDependencyKind enumeration	288
263		3.14.58	(NC) RejectionReasonKind enumeration	288
264	3.15	Package ExtRole		289
265		3.15.1	General	289
266		3.15.2	(NC) CoordinatedCapacityCalculator	290
267		3.15.3	(NC) ClosedDistributionSystemOperator	291
268		3.15.4	(NC) DirectCurrentSystemOperator	292
269		3.15.5	(NC) DistributionSystemOperator	294
270		3.15.6	(NC) EnergyAlignmentCoordinator	295
271		3.15.7	(NC) ExtOrganisationRole root class	296
272		3.15.8	(NC) LoadFrequencyControlOperator	296
273		3.15.9	(NC) OutageCoordinator	297
274		3.15.10	(NC) OutagePlanningAgent	298
275		3.15.11	(NC) SystemOperationOrganisationPost	299
276		3.15.12	(NC) SecurityCoordinator	300
277		3.15.13	(NC) SystemOperator	301
278		3.15.14	(NC) SystemOperationCoordinator	302
279		3.15.15	(NC) TransmissionSystemOperator	303
280	3.16	Security analysis result extensions		304
281		3.16.1	General	304
282		3.16.2	(NC) BaseCasePowerFlowResult	305
283		3.16.3	(NC) ContingencyPowerFlowResult	306
284		3.16.4	(NC) PowerFlowResult root class	307
285		3.16.5	(NC) RemedialActionApplied root class	308
286	3.17	(CIM18) Package ExtSecurityLimit		308
287		3.17.1	General	308
288		3.17.2	(NC) AmbientTemperatureDependencyCurve	311
289		3.17.3	(NC) BaseOverloadLimitCurve	312
290		3.17.4	(NC) DurationOverloadLimitCurve	312
291		3.17.5	(NC) LimitDependencyCurve	313
292		3.17.6	(NC) RecoveryOverloadLimitCurve	314
293		3.17.7	(NC) SolarRadiationDependencyCurve	315
294		3.17.8	(NC) VoltageAngleLimit	316
295		3.17.9	(NC) ExtOperationalLimitType root class	317
296		3.17.10	(NC) InfeedLimit	317
297		3.17.11	(NC) InfeedTerminal root class	318
298		3.17.12	(NC) BaseCaseCurrentLimit	319
299	3.18	Package ExtSensitivityMatrix		320
300		3.18.1	General	320
301		3.18.2	(NC) ControllableQuantity root class	320
302		3.18.3	(NC) ObservableQuantity root class	321
303		3.18.4	(NC) SensitivityFactor root class	321
304		3.18.5	(NC) SensitivityMatrix	322
305		3.18.6	(NC) ObservableQuantityKind enumeration	323
306		3.18.7	(NC) SensitivityMatrixKind enumeration	323
307	3.19	Package ExtSchedule		323

308	3.19.1	General	323
309	3.19.2	(NC) PowerShiftKeySchedule	332
310	3.19.3	(NC) BaseIrregularTimeSeries	333
311	3.19.4	(NC) BaseTimeSeries	334
312	3.19.5	(NC) EventSchedule	335
313	3.19.6	(NC) EventTimePoint root class	336
314	3.19.7	(NC) GenericValueSchedule	336
315	3.19.8	(NC) GenericValueTimePoint root class	337
316	3.19.9	(NC) MustRunSchedule	338
317	3.19.10	(NC) MustRunTimePoint root class	338
318	3.19.11	(NC) PowerSchedule	339
319	3.19.12	(NC) PowerTimePoint root class	340
320	3.19.13	(NC) BaseTimeSeriesKind enumeration	341
321	3.19.14	(NC) TimeSeriesInterpolationKind enumeration	342
322	3.19.15	(NC) GenericEnablingSchedule	342
323	3.19.16	(NC) GenericAvailableSchedule	343
324	3.19.17	(NC) EnablingTimePoint root class	344
325	3.19.18	(NC) AvailabilityTimePoint root class	344
326	3.19.19	(NC) ParticipationFactorTimePoint root class	345
327	3.19.20	(NC) GridPowerCapacitySchedule	345
328	3.19.21	(NC) GridPowerCapacityTimePoint root class	346
329	3.19.22	(NC) CostVolumePotentialSchedule	347
330	3.19.23	(NC) CostVolumePotentialTimePoint root class	348
331	3.19.24	(NC) ContingencySchedule	348
332	3.19.25	(NC) ContingencyTimePoint root class	349
333	3.19.26	(NC) AssessedElementSchedule	350
334	3.19.27	(NC) AssessedElementTimePoint root class	350
335	3.19.28	(NC) PowerBidScheduleTimePoint root class	352
336	3.19.29	(NC) PowerBidSchedule	353
337	3.19.30	(NC) PowerRemedialActionSchedule	354
338	3.19.31	(NC) PowerRemedialActionTimePoint root class	355
339	3.19.32	(NC) UnitCostSchedule	356
340	3.19.33	(NC) UnitCostTimePoint root class	357
341	3.19.34	(NC) BaseRegularIntervalSchedule	357
342	3.19.35	(NC) DayOfWeekKind enumeration	358
343	3.19.36	(NC) HourPattern	358
344	3.19.37	(NC) PeakKind enumeration	359
345	3.19.38	(NC) EnergyScenarioKind enumeration	359
346	3.19.39	(NC) HourPeriod root class	360
347	3.19.40	(NC) AssessedElementRegularSchedule	360
348	3.19.41	(NC) AssessedElementRegularTimePoint root class	361
349	3.19.42	(NC) VoltageAngleSchedule	362
350	3.19.43	(NC) VoltageAngleTimePoint root class	363
351	3.19.44	(NC) PowerScheduleKind enumeration	364
352	3.19.45	(NC) InfeedLimitSchedule	364
353	3.19.46	(NC) InfeedLimitTimePoint root class	365

354	3.19.47	(NC) RemedialActionSchemeSchedule	365
355	3.19.48	(NC) RemedialActionSchemeTimePoint root class	366
356	3.19.49	(NC) RemedialActionGroupSchedule	366
357	3.19.50	(NC) RemedialActionGroupTimePoint root class	367
358	3.19.51	(NC) GridStateAlterationSchedule	368
359	3.19.52	(NC) GridStateAlterationTimePoint root class	369
360	3.19.53	(NC) RegulatingControlRegularSchedule	369
361	3.19.54	(NC) TapChangerControlRegularSchedule	371
362	3.19.55	(NC) TapRegularSchedule	372
363	3.19.56	(NC) SwitchRegularSchedule	373
364	3.19.57	(NC) EnergyConnectionRegularSchedule	374
365	3.19.58	(NC) InServiceRegularSchedule	375
366	3.19.59	(NC) ControlAreaRegularSchedule	377
367	3.19.60	(NC) SynchronousMachineRegularSchedule	378
368	3.19.61	(NC) AsynchronousMachineRegularSchedule	379
369	3.19.62	(NC) ExternalNetworkInjectionRegularSchedule	380
370	3.19.63	(NC) EquivalentInjectionRegularSchedule	381
371	3.19.64	(NC) ACDCCConverterRegularSchedule	382
372	3.19.65	(NC) CsConverterRegularSchedule	384
373	3.19.66	(NC) VsConverterRegularSchedule	385
374	3.19.67	(NC) EquivalentInjectionSchedule	387
375	3.19.68	(NC) EnergyConnectionSchedule	388
376	3.19.69	(NC) TapSchedule	388
377	3.19.70	(NC) EquivalentInjectionTimePoint root class	389
378	3.19.71	(NC) RegulatingControlSchedule	390
379	3.19.72	(NC) TapChangerControlSchedule	391
380	3.19.73	(NC) RegulatingControlTimePoint root class	392
381	3.19.74	(NC) SwitchSchedule	392
382	3.19.75	(NC) InServiceSchedule	393
383	3.19.76	(NC) ControlAreaSchedule	394
384	3.19.77	(NC) SynchronousMachineSchedule	395
385	3.19.78	(NC) AsynchronousMachineSchedule	395
386	3.19.79	(NC) ExternalNetworkInjectionSchedule	396
387	3.19.80	(NC) VsConverterSchedule	397
388	3.19.81	(NC) CsConverterSchedule	398
389	3.19.82	(NC) ACDCTimePoint root class	399
390	3.19.83	(NC) VsConverterTimePoint	399
391	3.19.84	(NC) CsConverterTimePoint	400
392	3.19.85	(NC) TapScheduleTimePoint root class	401
393	3.19.86	(NC) EnergyConnectionTimePoint root class	401
394	3.19.87	(NC) SwitchTimePoint root class	402
395	3.19.88	(NC) InServiceTimePoint root class	402
396	3.19.89	(NC) ControlAreaTimePoint root class	403
397	3.19.90	(NC) SynchronousMachineTimePoint root class	403
398	3.19.91	(NC) AsynchronousMachineTimePoint root class	404
399	3.19.92	(NC) ExternalNetworkInjectionTimePoint root class	404

400	3.19.93	(NC) BatteryUnitSchedule	405
401	3.19.94	(NC) BatteryUnitTimePoint root class	405
402	3.19.95	(NC) VoltageLimitSchedule	406
403	3.19.96	(NC) ActivePowerLimitSchedule	407
404	3.19.97	(NC) ApparentPowerLimitSchedule	408
405	3.19.98	(NC) CurrentLimitSchedule	408
406	3.19.99	(NC) CurrentLimitTimePoint root class	409
407	3.19.100	(NC) ApparentPowerLimitTimePoint root class	410
408	3.19.101	(NC) ActivePowerLimitTimePoint root class	410
409	3.19.102	(NC) VoltageLimitTimePoint root class	410
410	3.19.103	(NC) ShuntCompensatorSchedule	411
411	3.19.104	(NC) ShuntCompensatorTimePoint root class	411
412	3.19.105	(NC) GeneratingUnitSchedule	412
413	3.19.106	(NC) GeneratingUnitTimePoint root class	413
414	3.19.107	(NC) StaticVarCompensatorSchedule	413
415	3.19.108	(NC) StaticVarCompensatorTimePoint root class	414
416	3.19.109	(NC) StageTriggerSchedule	415
417	3.19.110	(NC) StageTriggerTimePoint root class	415
418	3.19.111	(NC) GenericSequenceSchedule	416
419	3.19.112	(NC) SequenceTimePoint root class	417
420	3.19.113	(NC) BaseCaseCurrentLimitSchedule	417
421	3.19.114	(NC) BaseCaseCurrentLimitTimePoint root class	418
422	3.19.115	(NC) FuelStorageSchedule	418
423	3.19.116	(NC) FuelStorageTimePoint root class	419
424	3.19.117	(NC) ReservoirSchedule	420
425	3.19.118	(NC) ReservoirTimePoint root class	420
426	3.19.119	(NC) FuelStorageRegularSchedule	421
427	3.19.120	(NC) ReservoirRegularSchedule	422
428	3.19.121	(NC) EnergyResourceGroupCapacitySchedule	423
429	3.19.122	(NC) DCTieCorridorDirectionTimePoint root class	424
430	3.19.123	(NC) PowerBidDependency	424
431	3.19.124	(NC) EnergyResourceGroupCapacityTimePoint root class	425
432	3.19.125	(NC) ClimateZoneSchedule	426
433	3.19.126	(NC) ClimateZoneTimePoint root class	427
434	3.19.127	(NC) EnergyResourceGroupCapacityRegularSchedule	431
435	3.19.128	(NC) GridPowerCapacityRegularSchedule	433
436	3.19.129	(NC) AreaReserveResourceSchedule	434
437	3.19.130	(NC) AreaReserveResourceTimePoint root class	435
438	3.19.131	(NC) AreaReserveResourceRegularSchedule	436
439	3.19.132	(NC) ClimateZoneRegularSchedule	437
440	3.20	(CIM18) SIPS extensions	442
441	3.20.1	General	442
442	3.20.2	(NC) Gate	443
443	3.20.3	(NC) GateInputPin	444
444	3.20.4	(NC) GridStateAlterationCollection	445
445	3.20.5	(NC) MeasurementCalculator	446

446	3.20.6	(NC) MeasurementCalculatorInput	446
447	3.20.7	(NC) PinContingency	447
448	3.20.8	(NC) PinDCTerminal	448
449	3.20.9	(NC) PinEquipment	449
450	3.20.10	(NC) PinEquipmentTripping	450
451	3.20.11	(NC) PinGate	451
452	3.20.12	(NC) PinMeasurement	452
453	3.20.13	(NC) PinPowerTransferCorridor	453
454	3.20.14	(NC) PinTerminal	454
455	3.20.15	(NC) PinOperationalLimit	455
456	3.20.16	(NC) PTCActivePowerSupport root class	456
457	3.20.17	(NC) RemedialActionScheme	457
458	3.20.18	(NC) Stage	458
459	3.20.19	(NC) StageTrigger	459
460	3.20.20	(deprecated,NC) TriggerCondition	460
461	3.20.21	(NC) CalculationKind enumeration	461
462	3.20.22	(NC) GateLogicKind enumeration	461
463	3.20.23	(NC) LogicalOperatorsKind enumeration	461
464	3.20.24	(NC) PinDCTerminalKind enumeration	462
465	3.20.25	(NC) PinPowerTransferCorridorKind enumeration	462
466	3.20.26	(NC) PinTerminalKind enumeration	462
467	3.20.27	(NC) RemedialActionSchemeKind enumeration	462
468	3.21	Package ExtFaultsPRA	463
469	3.21.1	General	463
470	3.21.2	Package ExtFaultCause	463
471	3.21.3	Package ExtGridDisturbance	465
472	3.21.4	Package ExtFaultOutage	473
473	3.22	Package ExtPowerSystemProject	474
474	3.22.1	General	474
475	3.22.2	(NC) DifferenceModel	476
476	3.22.3	(NC) PowerSystemProject	477
477	3.22.4	(NC) PowerSystemProjectGroup root class	479
478	3.23	(CIM18) Package ExtReactiveCapabilityCurve	479
479	3.23.1	General	479
480	3.23.2	ExtReactiveCapabilityCurve root class	480
481	3.24	(CIM18) Package ExtProtection	481
482	3.24.1	General	481
483	3.24.2	(NC) AutomationBlockGroup root class	481
484	3.24.3	(NC) ProtectionFunction	482
485	3.24.4	(NC) ProtectionFunctionBlock	483
486	3.25	(CIM18) Package ExtControl	483
487	3.25.1	General	483
488	3.25.2	(NC) CompensatorControlModeKind enumeration	489
489	3.25.3	(NC) DCControlModeKind enumeration	489
490	3.25.4	(NC) InjectionControlModeKind enumeration	491
491	3.25.5	(NC) PowerFrequencyControlKind enumeration	491

492	3.25.6	(NC) RotatingMachineControlModeKind enumeration	491
493	3.25.7	(NC) SubstationControllerModeKind enumeration	491
494	3.25.8	(NC) TCSCControlModeKind enumeration	492
495	3.25.9	(NC) ACDCCConverterController	492
496	3.25.10	(NC) ACEmulationControlFunction	493
497	3.25.11	(NC) ACEmulationControlFunctionSchedule	495
498	3.25.12	(NC) ACEmulationControlFunctionTimePoint root class	496
499	3.25.13	(NC) ActivePowerControlFunction	496
500	3.25.14	(NC) ActivePowerControlFunctionSchedule	497
501	3.25.15	(NC) ActivePowerControlFunctionTimePoint root class	498
502	3.25.16	(NC) AreaInterchangeController	499
503	3.25.17	(NC) AutomationFunction	500
504	3.25.18	(NC) CompensatorController	501
505	3.25.19	(NC) ControlFunctionBlock	502
506	3.25.20	(NC) CurrentControlFunction	503
507	3.25.21	(NC) CurrentControlFunctionSchedule	504
508	3.25.22	(NC) CurrentControlFunctionTimePoint root class	505
509	3.25.23	(NC) CurrentDroopControlFunctionSchedule	505
510	3.25.24	(NC) CurrentDroopControlFunctionTimePoint root class	506
511	3.25.25	(NC) DCActivePowerControlFunction	507
512	3.25.26	(NC) DCActivePowerControlFunctionSchedule	508
513	3.25.27	(NC) DCActivePowerControlFunctionTimePoint root class	509
514	3.25.28	(NC) DCCurrentControlFunction	509
515	3.25.29	(NC) DCCurrentControlFunctionSchedule	510
516	3.25.30	(NC) DCCurrentControlFunctionTimePoint root class	511
517	3.25.31	(NC) DCExtinctionAngleControlFunction	512
518	3.25.32	(NC) DCExtinctionAngleControlFunctionSchedule	513
519	3.25.33	(NC) DCExtinctionAngleControlFunctionTimePoint root class	514
520	3.25.34	(NC) DCFiringAngleControlFunction	514
521	3.25.35	(NC) DCFiringAngleControlFunctionSchedule	515
522	3.25.36	(NC) DCFiringAngleControlFunctionTimePoint root class	516
523	3.25.37	(NC) DCPulseWidthModulationControlFunction	516
524	3.25.38	(NC) DCPulseWidthModulationControlFunctionSchedule	517
525	3.25.39	(NC) DCPulseWidthModulationControlFunctionTimePoint root	
526		class	518
527	3.25.40	(NC) DCVoltageControlFunction	519
528	3.25.41	(NC) DCVoltageControlFunctionSchedule	520
529	3.25.42	(NC) DCVoltageControlFunctionTimePoint root class	521
530	3.25.43	(NC) DirectCurrentBipoleController	521
531	3.25.44	(NC) DirectCurrentEquipmentController	522
532	3.25.45	(NC) DirectCurrentMasterController	524
533	3.25.46	(NC) DirectCurrentPoleController	525
534	3.25.47	(NC) DirectCurrentSubstationBipoleController	526
535	3.25.48	(NC) DirectCurrentSubstationController	528
536	3.25.49	(NC) DirectCurrentSubstationPoleController	529
537	3.25.50	(NC) EquipmentController	530

538	3.25.51	(NC) FrequencyControlFunction	531
539	3.25.52	(NC) FrequencyControlFunctionSchedule	532
540	3.25.53	(NC) FrequencyControlFunctionTimePoint root class	533
541	3.25.54	(NC) FrequencyMonitoringTerminal root class	534
542	3.25.55	(NC) FunctionBlock.....	534
543	3.25.56	(NC) FunctionInputVariable	535
544	3.25.57	(NC) FunctionOutputVariable	536
545	3.25.58	(NC) ImpedanceControlFunction	536
546	3.25.59	(NC) ImpedanceControlFunctionSchedule	537
547	3.25.60	(NC) ImpedanceControlFunctionTimePoint root class	538
548	3.25.61	(NC) InjectionController	539
549	3.25.62	(NC) PhaseControlFunction	540
550	3.25.63	(NC) PhaseControlFunctionSchedule	541
551	3.25.64	(NC) PhaseControlFunctionTimePoint root class	542
552	3.25.65	(NC) PowerElectronicsConnectionController	542
553	3.25.66	(NC) PowerElectronicsUnitController	543
554	3.25.67	(NC) PowerFactorControlFunction	545
555	3.25.68	(NC) PowerFactorControlFunctionSchedule	546
556	3.25.69	(NC) PowerFactorControlFunctionTimePoint root class	546
557	3.25.70	(NC) PowerFrequencyController	547
558	3.25.71	(NC) PowerPlantController	548
559	3.25.72	(NC) ReactivePowerControlFunction.....	549
560	3.25.73	(NC) ReactivePowerControlFunctionSchedule	550
561	3.25.74	(NC) ReactivePowerControlFunctionTimePoint root class	551
562	3.25.75	(NC) RotatingMachineController	552
563	3.25.76	(NC) ScheduleResourceController	553
564	3.25.77	(NC) StaticSynchronousSeriesCompensator	554
565	3.25.78	(NC) SubstationController	556
566	3.25.79	(NC) SystemControl.....	557
567	3.25.80	(NC) TapChangerController	558
568	3.25.81	(NC) TCSCController	559
569	3.25.82	(NC) UnifiedPowerFlowController	560
570	3.25.83	(NC) VoltageAngleControlFunction	561
571	3.25.84	(NC) VoltageAngleControlFunctionSchedule	562
572	3.25.85	(NC) VoltageAngleControlFunctionTimePoint root class	563
573	3.25.86	(NC) VoltageControlFunction	564
574	3.25.87	(NC) VoltageControlFunctionSchedule	565
575	3.25.88	(NC) VoltageControlFunctionTimePoint root class	565
576	3.25.89	(NC) VoltageInjectionControlFunctionSchedule.....	566
577	3.25.90	(NC) VoltageInjectionControlFunctionTimePoint root class	567
578	3.26	Package ExtGeneratingUnit	567
579	3.26.1	General	567
580	3.26.2	(NC) EquivalentGeneratingUnit.....	570
581	3.26.3	(NC) EquivalentPowerPlant	573
582	3.26.4	(NC) PowerPlant.....	574
583	3.26.5	(NC) EquivalentPowerElectronicsUnit	575

584	3.26.6	(NC) MobileElectricalUnit.....	576
585	3.26.7	(NC) CombinedCyclePlant	578
586	3.26.8	(NC) CogenerationPlant.....	579
587	3.26.9	(NC) CompressedAirEnergyStoragePlant.....	580
588	3.26.10	(NC) ThermalPowerPlant	581
589	3.26.11	(NC) ThermalGeneratingUnitDependency	582
590	3.26.12	(NC) CombinedCycleConfigurationKind enumeration	583
591	3.26.13	(NC) EnergyStoragePlant	583
592	3.26.14	(NC) ExtHydroPowerPlant root class	584
593	3.27	(CIM18) Package ExtDomain	585
594	3.27.1	General	585
595	3.27.2	(NC,new) MassFlowRate datatype	585
596	3.27.3	(European) URI primitive	585
597	3.27.4	(NC,new) CountPerArea datatype	585
598	3.27.5	(NC,new) Irradiance datatype	586
599	3.27.6	(NC,new) Irradiation datatype	586
600	3.28	Package ExtDCEquivalent	586
601	3.28.1	General	586
602	3.28.2	(NC) DCValve.....	588
603	3.28.3	(NC) EquivalentACDCCConverter	590
604	3.28.4	(NC) ACDCCConverterKind enumeration	592
605	3.28.5	(NC) ModularMultilevelConverterValve	592
606	3.28.6	(NC) ModularMultilevelConverterValveKind enumeration	594
607	3.28.7	(NC) ModularMultilevelConverter	594
608	3.28.8	(NC) DiodeValve.....	596
609	3.28.9	(NC) ThyristorValve	597
610	3.28.10	(NC) InsulatedGateBipolarTransistorValve	599
611	3.28.11	(NC) GateTurnOffThyristorValve	600
612	3.28.12	(NC) DCEquivalentInjection	601
613	3.28.13	(NC) ACDCCConverterControlStrategyKind enumeration	602
614	3.28.14	(NC) DCVoltageSource	603
615	3.28.15	ExtDCTerminal root class	604
616	3.28.16	(NC) DCTerminalPolarityKind enumeration	604
617	3.29	Package ExtConnectionPoint	604
618	3.29.1	General	604
619	3.29.2	(NC) PointOfCommonCoupling	607
620	3.29.3	(NC) GridConnectionPoint	608
621	3.29.4	(NC) EnergyExchangePoint	609
622	3.29.5	(NC,new) MeasurementPoint	610
623	3.29.6	(NC,new) AccountingPoint	612
624	3.29.7	(NC) CommonResponsibilityPoint	614
625	3.29.8	(geo,new) Geometry root class	615
626	3.29.9	(NC) BoundaryPoint.....	615
627	3.29.10	(NC) BoundaryPointBorderLink root class	617
628	3.29.11	(NC) BoundaryPointBorder	617
629	3.30	Package ExtDesignation	620

630	3.30.1	General	620
631	3.30.2	(NC) Designation	620
632	3.30.3	(NC) DesignationKind enumeration	621
633	3.30.4	(NC) DesignationType	623
634	3.30.5	(NC) UniquenessScopeKind enumeration	624
635	3.30.6	(NC) DesignationAuthority	624
636	3.30.7	(NC) Identity root class	626
637	3.30.8	(ConstrainedPrimitive) Language root class	626
638	3.31	Package ExtCrossZonalNetworkElement.....	626
639	3.31.1	General	626
640	3.31.2	(NC) CrossZonalNetworkElement root class	627
641	3.31.3	(NC) CrossZonalLine	628
642	3.31.4	(NC) CrossZonalPowerTransformer	628
643	3.31.5	(NC) CrossZonalDCPole	629
644	3.32	Package ExtCommon.....	629
645	3.32.1	General	629
646	3.32.2	(NC) PeerTemporalDependency root class	630
647	3.32.3	(NC) DependencyConstraintKind enumeration	632
648	3.32.4	(NC) ReferenceValueKind enumeration	633
649	3.32.5	(NC) RecordStatusKind enumeration	633
650	3.32.6	(NC) RecordVersion root class	634
651	3.33	(CIM18) Package ExtCore.....	634
652	3.34	(CIM18) Package ExtContingency	634
653			

654 List of figures

655	Figure 1 – Class diagram ExtArea::ExtOverlappingZone	53
656	Figure 2 – Class diagram ExtArea::ExtEnergyArea	54
657	Figure 3 – Class diagram ExtArea::ExtMonitoringArea	55
658	Figure 4 – Class diagram ExtArea::ExtGridPowerCapacity	56
659	Figure 5 – Class diagram ExtArea::ExtClimateZone	57
660	Figure 6 – Class diagram ExtAssessedElement::ExtAssessedElement.....	95
661	Figure 7 – Class diagram ExtAvailabilitySchedule::ExtAvailabilitySchedule	105
662	Figure 8 – Class diagram ExtAvailabilitySchedule::ExtOutageRequest.....	106
663	Figure 9 – Class diagram ExtAvailabilitySchedule::ExtAvailabilityPlan	106
664	Figure 10 – Class diagram ExtContingency::ExtContingency	124
665	Figure 11 – Class diagram ExtDirectCurent::ExtDirectCurrent.....	129
666	Figure 12 – Class diagram ExtDirectCurent::ExtDCEquipment	129
667	Figure 13 – Class diagram ExtDirectCurent::ExtDirectCurrentStructure	130
668	Figure 14 – Class diagram ExtEquivalent::ExtEquivalent	160
669	Figure 15 – Class diagram ExtFACTS::ExtFACTS.....	161
670	Figure 16 – Class diagram ExtSSSC::ExtSSSC	171
671	Figure 17 – Class diagram ExtPowerShiftKey::ExtBiddingZone	178

672	Figure 18 – Class diagram ExtPowerShiftKey::ExtScheduleResourceDELETE	179
673	Figure 19 – Class diagram ExtPowerShiftKey::ExtEnergyComponent	180
674	Figure 20 – Class diagram ExtPowerShiftKey::ExtPowerShiftKey	180
675	Figure 21 – Class diagram ExtPowerShiftKey::ExtPowerElectronics	181
676	Figure 22 – Class diagram ExtPowerShiftKey::ExtPowerShiftKeyDistribution	182
677	Figure 23 – Class diagram ExtPowerShiftKey::ExtAreaReserveResource	183
678	Figure 24 – Class diagram ExtImpactAssessmentMatrix::ImpactAssessmentMatrix	203
679	Figure 25 – Class diagram ExtPowerTransferCorridor::ExtPowerTransferCorridor	210
680	Figure 26 – Class diagram ExtProduction::ExtProduction	219
681	Figure 27 – Class diagram ExtRemedialAction::GridStateAlterationPart1	234
682	Figure 28 – Class diagram ExtRemedialAction::GridStateAlterationPart2	235
683	Figure 29 – Class diagram ExtRemedialAction::IntensityAndRange	236
684	Figure 30 – Class diagram ExtRemedialAction::RemedialAction	236
685	Figure 31 – Class diagram ExtRemedialAction::RemedialActionOverview	237
686	Figure 32 – Class diagram ExtRole::ExtPowerSystemOrganisationRole	289
687	Figure 33 – Class diagram ExtRole::ExtEnergyAreaRole	290
688	Figure 34 – Class diagram ExtSecurityAnalysisResult::SecurityAnalysisResult	305
689	Figure 35 – Class diagram ExtSecurityLimit::ExtVoltageAngleLimit	309
690	Figure 36 – Class diagram ExtSecurityLimit::ExtTemporaryLimits	309
691	Figure 37 – Class diagram ExtSecurityLimit::ExtThermalBehaviourLimit	310
692	Figure 38 – Class diagram ExtSecurityLimit::ExtMinimumLimit	310
693	Figure 39 – Class diagram ExtSensitivityMatrix::ExtSensitivityMatrix	320
694	Figure 40 – Class diagram ExtSchedule::ExtPowerSchedule	324
695	Figure 41 – Class diagram ExtSchedule::ExtEnabledSchedule	324
696	Figure 42 – Class diagram ExtSchedule::ExtPowerBidSchedule	325
697	Figure 43 – Class diagram ExtSchedule::ExtIrregularSchedule	325
698	Figure 44 – Class diagram ExtSchedule::ExtPowerShiftKeySchedule	326
699	Figure 45 – Class diagram ExtSchedule::ExtMustRunSchedule	327
700	Figure 46 – Class diagram ExtSchedule::ExtRegularSchedule	327
701	Figure 47 – Class diagram ExtSchedule::ExtSSHRegularSchedule	328
702	Figure 48 – Class diagram ExtSchedule::ExtSSHIrregularSchedule	328
703	Figure 49 – Class diagram ExtSchedule::ExtSequenceSchedule	329
704	Figure 50 – Class diagram ExtSchedule::ExtDCPoleSchedule	330
705	Figure 51 – Class diagram ExtSchedule::ExtCapacitySchedule	330
706	Figure 52 – Class diagram ExtSchedule::ExtClimateZoneSchedule	331
707	Figure 53 – Class diagram ExtSchedule::ExtResourceSchedule	332
708	Figure 54 – Class diagram ExtSIPS::ExtSIPS	442
709	Figure 55 – Class diagram ExtSIPS::ExtSIPSGate	443
710	Figure 56 – Class diagram ExtFaultCause::ExtFaultCause	463
711	Figure 57 – Class diagram ExtGridDisturbance::ExtGridDisturbance	465

712	Figure 58 – Class diagram ExtFaultOutage::ExtFaultOutage	473
713	Figure 59 – Class diagram ExtPowerSystemProject::ExtPowerSystemProject	476
714	Figure 60 – Class diagram ExtReactiveCapabilityCurve::ExtReactiveCapabilityCurve	480
715	Figure 61 – Class diagram ExtProtection::ExtProtection	481
716	Figure 62 – Class diagram ExtControl::ExtControlMain	484
717	Figure 63 – Class diagram ExtControl::ExtControlFunctionSchedule	485
718	Figure 64 – Class diagram ExtControl::ExtControlFunctionBlock	486
719	Figure 65 – Class diagram ExtControl::ExtEquipmentController	486
720	Figure 66 – Class diagram ExtControl::ExtPowerElectronicsControl	487
721	Figure 67 – Class diagram ExtControl::ExtDirectCurrentControl	488
722	Figure 68 – Class diagram ExtControl::ExtSystemControl	489
723	Figure 69 – Class diagram ExtGeneratingUnit::ExtEquivalentPowerPlant	568
724	Figure 70 – Class diagram ExtGeneratingUnit::ExtThermalPowerPlant	569
725	Figure 71 – Class diagram ExtGeneratingUnit::ExtHydroPowerPlant	570
726	Figure 72 – Class diagram ExtDomain::ExtDomain	585
727	Figure 73 – Class diagram ExtDCEquivalent::DCValvesAndConverters	587
728	Figure 74 – Class diagram ExtDCEquivalent::DCEquivalent	588
729	Figure 75 – Class diagram ExtConnectionPoint::ExtConnectionPoint	605
730	Figure 76 – Class diagram ExtConnectionPoint::ExtMeasurementPoint	606
731	Figure 77 – Class diagram ExtConnectionPoint::ExtBoundaryBorder	607
732	Figure 78 – Class diagram ExtConnectionPoint::ExtCommonResponsibilityPoint	607
733	Figure 79 – Class diagram ExtDesignation::ExtDesignation	620
734	Figure 80 – Class diagram	
735	ExtCrossZonalNetworkElement::ExtCrossZonalNetworkElement	627
736	Figure 81 – Class diagram ExtCommon::ExtRecord	630
737		
738	List of tables	
739	Table 1 – Attributes of ExtNetworkCodes::ExtNetworkCodesCIMVersion	52
740	Table 2 – Attributes of ExtArea::OutageCoordinationRegion	57
741	Table 3 – Association ends of ExtArea::OutageCoordinationRegion with other classes	58
742	Table 4 – Attributes of ExtArea::OverlappingZone	58
743	Table 5 – Association ends of ExtArea::OverlappingZone with other classes	59
744	Table 6 – Attributes of ExtArea::Region	59
745	Table 7 – Association ends of ExtArea::Region with other classes	60
746	Table 8 – Attributes of ExtArea::ScheduleResource	60
747	Table 9 – Association ends of ExtArea::ScheduleResource with other classes	61
748	Table 10 – Attributes of ExtArea::SchedulingArea	62
749	Table 11 – Association ends of ExtArea::SchedulingArea with other classes	63
750	Table 12 – Attributes of ExtArea::SensitivityArea	65
751	Table 13 – Association ends of ExtArea::SensitivityArea with other classes	65

752	Table 14 – Attributes of ExtArea::SubSchedulingArea	66
753	Table 15 – Association ends of ExtArea::SubSchedulingArea with other classes	66
754	Table 16 – Attributes of ExtArea::SynchronousArea	67
755	Table 17 – Association ends of ExtArea::SynchronousArea with other classes	68
756	Table 18 – Attributes of ExtArea::AreaBorderTerminal	68
757	Table 19 – Association ends of ExtArea::AreaBorderTerminal with other classes	69
758	Table 20 – Attributes of ExtArea::BiddingZone	69
759	Table 21 – Association ends of ExtArea::BiddingZone with other classes	69
760	Table 22 – Attributes of ExtArea::BiddingZoneBorder	70
761	Table 23 – Association ends of ExtArea::BiddingZoneBorder with other classes	71
762	Table 24 – Attributes of ExtArea::CapacityCalculationRegion	72
763	Table 25 – Association ends of ExtArea::CapacityCalculationRegion with other classes	72
764	Table 26 – Attributes of ExtArea::ContingencyArea	73
765	Table 27 – Association ends of ExtArea::ContingencyArea with other classes	74
766	Table 28 – Attributes of ExtArea::EnergyCoordinationRegion	74
767	Table 29 – Association ends of ExtArea::EnergyCoordinationRegion with other classes	75
768	Table 30 – Attributes of ExtArea::InfluenceArea	75
769	Table 31 – Association ends of ExtArea::InfluenceArea with other classes	76
770	Table 32 – Attributes of ExtArea::LoadFrequencyControlArea	77
771	Table 33 – Association ends of ExtArea::LoadFrequencyControlArea with other classes	78
772	Table 34 – Attributes of ExtArea::LoadFrequencyControlBlock	79
773	Table 35 – Association ends of ExtArea::LoadFrequencyControlBlock with other	
774	classes	79
775	Table 36 – Attributes of ExtArea::MonitoringArea	80
776	Table 37 – Association ends of ExtArea::MonitoringArea with other classes	80
777	Table 38 – Attributes of ExtArea::ObservabilityArea	80
778	Table 39 – Association ends of ExtArea::ObservabilityArea with other classes	81
779	Table 40 – Attributes of ExtArea::GridPowerCapacity	81
780	Table 41 – Association ends of ExtArea::GridPowerCapacity with other classes	82
781	Table 42 – Attributes of ExtArea::ClimateZone	83
782	Table 43 – Association ends of ExtArea::ClimateZone with other classes	93
783	Table 44 – Literals of ExtArea::CapacityCalculationKind	93
784	Table 45 – Literals of ExtArea::ClimateZoneClassificationKind	94
785	Table 46 – Attributes of ExtAssessedElement::AssessedElement	95
786	Table 47 – Association ends of ExtAssessedElement::AssessedElement with other	
787	classes	99
788	Table 48 – Attributes of ExtAssessedElement::AssessedElementWithContingency	100
789	Table 49 – Association ends of	
790	ExtAssessedElement::AssessedElementWithContingency with other classes	101
791	Table 50 – Attributes of ExtAssessedElement::AssessedElementWithRemedialAction	101

792	Table 51 – Association ends of	
793	ExtAssessedElement::AssessedElementWithRemedialAction with other classes	102
794	Table 52 – Literals of ExtAssessedElement::SecuredExclusionReasonKind	102
795	Table 53 – Literals of ExtAssessedElement::ElementCombinationConstraintKind	102
796	Table 54 – Literals of ExtAssessedElement::CriticalElementKind	103
797	Table 55 – Attributes of ExtAssessedElement::CrossBorderRelevance	103
798	Table 56 – Association ends of ExtAssessedElement::CrossBorderRelevance with	
799	other classes	103
800	Table 57 – Attributes of ExtAvailabilitySchedule::AvailabilityEnabled	107
801	Table 58 – Association ends of ExtAvailabilitySchedule::AvailabilityEnabled with other	
802	classes	107
803	Table 59 – Attributes of ExtAvailabilitySchedule::AvailabilityEquipment	107
804	Table 60 – Association ends of ExtAvailabilitySchedule::AvailabilityEquipment with	
805	other classes	108
806	Table 61 – Attributes of ExtAvailabilitySchedule::AvailabilityExceptionalLimit	108
807	Table 62 – Association ends of ExtAvailabilitySchedule::AvailabilityExceptionalLimit	
808	with other classes	109
809	Table 63 – Attributes of ExtAvailabilitySchedule::AvailabilityGroup	109
810	Table 64 – Association ends of ExtAvailabilitySchedule::AvailabilityGroup with other	
811	classes	109
812	Table 65 – Attributes of ExtAvailabilitySchedule::AvailabilityPowerSystemFunction	110
813	Table 66 – Association ends of	
814	ExtAvailabilitySchedule::AvailabilityPowerSystemFunction with other classes	110
815	Table 67 – Attributes of ExtAvailabilitySchedule::AvailabilityRemedialActionScheme	111
816	Table 68 – Association ends of	
817	ExtAvailabilitySchedule::AvailabilityRemedialActionScheme with other classes	111
818	Table 69 – Attributes of ExtAvailabilitySchedule::AvailabilitySchedule	112
819	Table 70 – Association ends of ExtAvailabilitySchedule::AvailabilitySchedule with other	
820	classes	112
821	Table 71 – Attributes of ExtAvailabilitySchedule::AvailabilityContainer	113
822	Table 72 – Association ends of ExtAvailabilitySchedule::AvailabilityContainer with	
823	other classes	114
824	Table 73 – Literals of ExtAvailabilitySchedule::AvailabilityFunctionKind	114
825	Table 74 – Literals of ExtAvailabilitySchedule::AvailabilityScheduleCauseKind	114
826	Table 75 – Attributes of ExtAvailabilitySchedule::AvailabilityPlan	115
827	Table 76 – Association ends of ExtAvailabilitySchedule::AvailabilityPlan with other	
828	classes	115
829	Table 77 – Attributes of ExtAvailabilitySchedule::AvailabilityPlanVersion	116
830	Table 78 – Association ends of ExtAvailabilitySchedule::AvailabilityPlanVersion with	
831	other classes	116
832	Table 79 – Attributes of ExtAvailabilitySchedule::AvailabilityPlanResponse	117
833	Table 80 – Association ends of ExtAvailabilitySchedule::AvailabilityPlanResponse with	
834	other classes	117
835	Table 81 – Attributes of ExtAvailabilitySchedule::OutageRequest	117

836	Table 82 – Association ends of ExtAvailabilitySchedule::OutageRequest with other	
837	classes	119
838	Table 83 – Attributes of ExtAvailabilitySchedule::OutageRequestVersion	119
839	Table 84 – Association ends of ExtAvailabilitySchedule::OutageRequestVersion with	
840	other classes	120
841	Table 85 – Literals of ExtAvailabilitySchedule::RequestResponseKind	120
842	Table 86 – Attributes of ExtAvailabilitySchedule::OutageResponse	120
843	Table 87 – Association ends of ExtAvailabilitySchedule::OutageResponse with other	
844	classes	121
845	Table 88 – Attributes of ExtAvailabilitySchedule::OutageRequestResource	121
846	Table 89 – Association ends of ExtAvailabilitySchedule::OutageRequestResource with	
847	other classes	121
848	Table 90 – Attributes of ExtAvailabilitySchedule::OutageDependency	122
849	Table 91 – Association ends of ExtAvailabilitySchedule::OutageDependency with other	
850	classes	122
851	Table 92 – Attributes of ExtAvailabilitySchedule::OutageAvailability	123
852	Table 93 – Association ends of ExtAvailabilitySchedule::OutageAvailability with other	
853	classes	123
854	Table 94 – Attributes of ExtContingency::ContingencyWithRemedialAction	124
855	Table 95 – Association ends of ExtContingency::ContingencyWithRemedialAction with	
856	other classes	125
857	Table 96 – Attributes of ExtContingency::ExceptionalContingency	125
858	Table 97 – Association ends of ExtContingency::ExceptionalContingency with other	
859	classes	126
860	Table 98 – Attributes of ExtContingency::ExtContingency	126
861	Table 99 – Attributes of ExtContingency::OrdinaryContingency	126
862	Table 100 – Association ends of ExtContingency::OrdinaryContingency with other	
863	classes	127
864	Table 101 – Attributes of ExtContingency::OutOfRangeContingency	127
865	Table 102 – Association ends of ExtContingency::OutOfRangeContingency with other	
866	classes	128
867	Table 103 – Literals of ExtContingency::ContingencyConditionKind	128
868	Table 104 – Literals of ExtDirectCurent::DCSystemDirectionKind	130
869	Table 105 – Literals of ExtDirectCurent::DCSystemTransmissionKind	131
870	Table 106 – Literals of ExtDirectCurent::RampingPrincipleKind	131
871	Table 107 – Attributes of ExtDirectCurent::ACTieCorridor	132
872	Table 108 – Association ends of ExtDirectCurent::ACTieCorridor with other classes	132
873	Table 109 – Attributes of ExtDirectCurent::BipolarDCSystem	133
874	Table 110 – Association ends of ExtDirectCurent::BipolarDCSystem with other classes	133
875	Table 111 – Attributes of ExtDirectCurent::DCBiPole	134
876	Table 112 – Association ends of ExtDirectCurent::DCBiPole with other classes	134
877	Table 113 – Attributes of ExtDirectCurent::DCBypassSwitch	134
878	Table 114 – Association ends of ExtDirectCurent::DCBypassSwitch with other classes	135

879	Table 115 – Attributes of ExtDirectCurent::DCCommutationSwitch	136
880	Table 116 – Association ends of ExtDirectCurent::DCCommutationSwitch with other	
881	classes	136
882	Table 117 – Attributes of ExtDirectCurent::DCConverterParallelingSwitch	137
883	Table 118 – Association ends of ExtDirectCurent::DCConverterParallelingSwitch with	
884	other classes	138
885	Table 119 – Attributes of ExtDirectCurent::DCEarthReturnTransferSwitch	138
886	Table 120 – Association ends of ExtDirectCurent::DCEarthReturnTransferSwitch with	
887	other classes	139
888	Table 121 – Attributes of ExtDirectCurent::DCHarmonicFilter	140
889	Table 122 – Association ends of ExtDirectCurent::DCHarmonicFilter with other classes	140
890	Table 123 – Attributes of ExtDirectCurent::DCHighSpeedSwitch	141
891	Table 124 – Association ends of ExtDirectCurent::DCHighSpeedSwitch with other	
892	classes	141
893	Table 125 – Attributes of ExtDirectCurent::DCLineParallelingSwitch	142
894	Table 126 – Association ends of ExtDirectCurent::DCLineParallelingSwitch with other	
895	classes	143
896	Table 127 – Attributes of ExtDirectCurent::DCMetalicReturnSwitch	143
897	Table 128 – Association ends of ExtDirectCurent::DCMetalicReturnSwitch with other	
898	classes	144
899	Table 129 – Attributes of ExtDirectCurent::DCNeutralBusGroundingSwitch	145
900	Table 130 – Association ends of ExtDirectCurent::DCNeutralBusGroundingSwitch with	
901	other classes	145
902	Table 131 – Attributes of ExtDirectCurent::DCNeutralBusSwitch	146
903	Table 132 – Association ends of ExtDirectCurent::DCNeutralBusSwitch with other	
904	classes	147
905	Table 133 – Attributes of ExtDirectCurent::DCPole	147
906	Table 134 – Association ends of ExtDirectCurent::DCPole with other classes	148
907	Table 135 – Attributes of ExtDirectCurent::DCSmoothingReactor	149
908	Table 136 – Association ends of ExtDirectCurent::DCSmoothingReactor with other	
909	classes	150
910	Table 137 – Attributes of ExtDirectCurent::DCSmoothingReactorArrester	150
911	Table 138 – Association ends of ExtDirectCurent::DCSmoothingReactorArrester with	
912	other classes	151
913	Table 139 – Attributes of ExtDirectCurent::DCSubstation	152
914	Table 140 – Association ends of ExtDirectCurent::DCSubstation with other classes	152
915	Table 141 – Attributes of ExtDirectCurent::DCSubstationBipole	153
916	Table 142 – Association ends of ExtDirectCurent::DCSubstationBipole with other	
917	classes	153
918	Table 143 – Attributes of ExtDirectCurent::DCSubstationPole	154
919	Table 144 – Association ends of ExtDirectCurent::DCSubstationPole with other classes	154
920	Table 145 – Attributes of ExtDirectCurent::DCSystem	155
921	Table 146 – Association ends of ExtDirectCurent::DCSystem with other classes	155

922	Table 147 – Attributes of ExtDirectCurent::DCTieCorridor	156
923	Table 148 – Association ends of ExtDirectCurent::DCTieCorridor with other classes	156
924	Table 149 – Attributes of ExtDirectCurent::ExtDCConductinEquipment	157
925	Table 150 – Attributes of ExtDirectCurent::ExtDCSwitch	157
926	Table 151 – Attributes of ExtDirectCurent::MonopolarDCSystem	158
927	Table 152 – Association ends of ExtDirectCurent::MonopolarDCSystem with other	
928	classes	158
929	Table 153 – Attributes of ExtDirectCurent::TieCorridor	159
930	Table 154 – Association ends of ExtDirectCurent::TieCorridor with other classes	159
931	Table 155 – Attributes of ExtFACTS::FACTSEquipment	161
932	Table 156 – Association ends of ExtFACTS::FACTSEquipment with other classes	162
933	Table 157 – Attributes of ExtFACTS::LossCurve	163
934	Table 158 – Association ends of ExtFACTS::LossCurve with other classes	163
935	Table 159 – Attributes of ExtFACTS::ModularStaticSynchronousSeriesCompensator	164
936	Table 160 – Association ends of	
937	ExtFACTS::ModularStaticSynchronousSeriesCompensator with other classes	165
938	Table 161 – Attributes of ExtFACTS::StaticSynchronousCompensator	165
939	Table 162 – Association ends of ExtFACTS::StaticSynchronousCompensator with	
940	other classes	166
941	Table 163 – Attributes of ExtFACTS::StaticVarCompensator	167
942	Table 164 – Association ends of ExtFACTS::StaticVarCompensator with other classes	168
943	Table 165 – Attributes of ExtFACTS::TCSCCompensationPoint	169
944	Table 166 – Association ends of ExtFACTS::TCSCCompensationPoint with other	
945	classes	169
946	Table 167 – Attributes of ExtFACTS::ThyristorControlledSeriesCompensator	169
947	Table 168 – Association ends of ExtFACTS::ThyristorControlledSeriesCompensator	
948	with other classes	170
949	Table 169 – Attributes of ExtSSSC::CurrentDroopControlFunction	172
950	Table 170 – Association ends of ExtSSSC::CurrentDroopControlFunction with other	
951	classes	172
952	Table 171 – Attributes of ExtSSSC::CurrentDroopOverride	173
953	Table 172 – Association ends of ExtSSSC::CurrentDroopOverride with other classes	173
954	Table 173 – Attributes of ExtSSSC::SSSCController	174
955	Table 174 – Association ends of ExtSSSC::SSSCController with other classes	174
956	Table 175 – Attributes of ExtSSSC::SSSCSimulationSettings	175
957	Table 176 – Association ends of ExtSSSC::SSSCSimulationSettings with other classes	176
958	Table 177 – Attributes of ExtSSSC::VoltageInjectionControlFunction	176
959	Table 178 – Association ends of ExtSSSC::VoltageInjectionControlFunction with other	
960	classes	176
961	Table 179 – Literals of ExtSSSC::SSSCControlModeKind	177
962	Table 180 – Attributes of ExtPowerShiftKey::AreaReserveResource	183
963	Table 181 – Association ends of ExtPowerShiftKey::AreaReserveResource with other	
964	classes	184

965	Table 182 – Attributes of ExtPowerShiftKey::EnergyBlockComponent	185
966	Table 183 – Association ends of ExtPowerShiftKey::EnergyBlockComponent with other	
967	classes	186
968	Table 184 – Attributes of ExtPowerShiftKey::EnergyBlockOrder	186
969	Table 185 – Association ends of ExtPowerShiftKey::EnergyBlockOrder with other	
970	classes	187
971	Table 186 – Attributes of ExtPowerShiftKey::EnergyComponent	187
972	Table 187 – Association ends of ExtPowerShiftKey::EnergyComponent with other	
973	classes	188
974	Table 188 – Attributes of ExtPowerShiftKey::EnergyResourceGroupCapacity	188
975	Table 189 – Association ends of ExtPowerShiftKey::EnergyResourceGroupCapacity	
976	with other classes	190
977	Table 190 – Attributes of ExtPowerShiftKey::EnergyResourceType	191
978	Table 191 – Association ends of ExtPowerShiftKey::EnergyResourceType with other	
979	classes	192
980	Table 192 – Attributes of ExtPowerShiftKey::ExtEnergyConsumer	193
981	Table 193 – Attributes of ExtPowerShiftKey::ExtGeneratingUnit	193
982	Table 194 – Attributes of ExtPowerShiftKey::ExtHydroPump	195
983	Table 195 – Attributes of ExtPowerShiftKey::ExtPowerElectronicsUnit	196
984	Table 196 – Attributes of ExtPowerShiftKey::ProportionalEnergyComponent	197
985	Table 197 – Association ends of ExtPowerShiftKey::ProportionalEnergyComponent	
986	with other classes	197
987	Table 198 – Literals of ExtPowerShiftKey::EnergyKind	198
988	Table 199 – Literals of ExtPowerShiftKey::PowerShiftKeyKind	199
989	Table 200 – Attributes of ExtPowerShiftKey::PowerShiftKeyDistribution	200
990	Table 201 – Association ends of ExtPowerShiftKey::PowerShiftKeyDistribution with	
991	other classes	200
992	Table 202 – Attributes of ExtPowerShiftKey::PowerShiftKeyStrategy	201
993	Table 203 – Association ends of ExtPowerShiftKey::PowerShiftKeyStrategy with other	
994	classes	201
995	Table 204 – Literals of ExtPowerShiftKey::PowerBlockKind	202
996	Table 205 – Literals of ExtPowerShiftKey::MarketRegulationDirectionKind	202
997	Table 206 – Literals of ExtPowerShiftKey::BalancingReserveKind	203
998	Table 207 – Attributes of	
999	ExtImpactAssessmentMatrix::CalculationBasedImpactAssessmentMatrix	204
1000	Table 208 – Association ends of	
1001	ExtImpactAssessmentMatrix::CalculationBasedImpactAssessmentMatrix with other	
1002	classes	204
1003	Table 209 – Attributes of	
1004	ExtImpactAssessmentMatrix::ConnectingImpactAssessmentMatrix	204
1005	Table 210 – Association ends of	
1006	ExtImpactAssessmentMatrix::ConnectingImpactAssessmentMatrix with other classes	205
1007	Table 211 – Attributes of ExtImpactAssessmentMatrix::ImpactAssessmentMatrix	205

1008	Table 212 – Association ends of	
1009	ExtImpactAssessmentMatrix::ImpactAssessmentMatrix with other classes	205
1010	Table 213 – Attributes of	
1011	ExtImpactAssessmentMatrix::ListBasedImpactAssessmentMatrix	206
1012	Table 214 – Association ends of	
1013	ExtImpactAssessmentMatrix::ListBasedImpactAssessmentMatrix with other classes	206
1014	Table 215 – Attributes of ExtImpactAssessmentMatrix::OutcomeValue	206
1015	Table 216 – Association ends of ExtImpactAssessmentMatrix::OutcomeValue with	
1016	other classes	207
1017	Table 217 – Attributes of	
1018	ExtImpactAssessmentMatrix::OwnerRemedialActionAssessment	207
1019	Table 218 – Association ends of	
1020	ExtImpactAssessmentMatrix::OwnerRemedialActionAssessment with other classes	207
1021	Table 219 – Attributes of ExtImpactAssessmentMatrix::RemedialActionOutcomeValue	208
1022	Table 220 – Association ends of	
1023	ExtImpactAssessmentMatrix::RemedialActionOutcomeValue with other classes	208
1024	Table 221 – Attributes of	
1025	ExtImpactAssessmentMatrix::RemedialActionScheduleOutcomeValue	208
1026	Table 222 – Association ends of	
1027	ExtImpactAssessmentMatrix::RemedialActionScheduleOutcomeValue with other	
1028	classes	209
1029	Table 223 – Literals of ExtImpactAssessmentMatrix::OutcomeImpactAssessmentKind	209
1030	Table 224 – Attributes of ExtPowerTransferCorridor::Circuit	210
1031	Table 225 – Association ends of ExtPowerTransferCorridor::Circuit with other classes	211
1032	Table 226 – Attributes of ExtPowerTransferCorridor::CircuitShare	211
1033	Table 227 – Association ends of ExtPowerTransferCorridor::CircuitShare with other	
1034	classes	212
1035	Table 228 – Attributes of	
1036	ExtPowerTransferCorridor::ExceptionalPowerTransferCorridor	212
1037	Table 229 – Association ends of	
1038	ExtPowerTransferCorridor::ExceptionalPowerTransferCorridor with other classes	212
1039	Table 230 – Attributes of ExtPowerTransferCorridor::LineCircuit	213
1040	Table 231 – Association ends of ExtPowerTransferCorridor::LineCircuit with other	
1041	classes	214
1042	Table 232 – Attributes of ExtPowerTransferCorridor::OrdinaryPowerTransferCorridor	214
1043	Table 233 – Association ends of	
1044	ExtPowerTransferCorridor::OrdinaryPowerTransferCorridor with other classes	214
1045	Table 234 – Attributes of ExtPowerTransferCorridor::PowerTransferCorridor	215
1046	Table 235 – Association ends of ExtPowerTransferCorridor::PowerTransferCorridor	
1047	with other classes	216
1048	Table 236 – Attributes of ExtPowerTransferCorridor::PowerTransformerCircuit	216
1049	Table 237 – Association ends of ExtPowerTransferCorridor::PowerTransformerCircuit	
1050	with other classes	217
1051	Table 238 – Attributes of ExtPowerTransferCorridor::PTCTriggeredEquipment	217
1052	Table 239 – Association ends of ExtPowerTransferCorridor::PTCTriggeredEquipment	
1053	with other classes	218

1054	Table 240 – Attributes of ExtPowerTransferCorridor::DirectCurrentCircuit	218
1055	Table 241 – Association ends of ExtPowerTransferCorridor::DirectCurrentCircuit with	
1056	other classes	218
1057	Table 242 – Literals of ExtProduction::GeothermalUnitKind	220
1058	Table 243 – Literals of ExtProduction::MarineUnitKind	220
1059	Table 244 – Literals of ExtProduction::NuclearReactorKind	220
1060	Table 245 – Literals of ExtProduction::PowerElectricalChemicalUnitKind	221
1061	Table 246 – Attributes of ExtProduction::ElectricalChargingUnit	221
1062	Table 247 – Association ends of ExtProduction::ElectricalChargingUnit with other	
1063	classes	222
1064	Table 248 – Attributes of ExtProduction::ExtNuclearGeneratingUnit	222
1065	Table 249 – Attributes of ExtProduction::ExtReservoir	223
1066	Table 250 – Attributes of ExtProduction::FlexibleEnergyUnit	223
1067	Table 251 – Association ends of ExtProduction::FlexibleEnergyUnit with other classes	224
1068	Table 252 – Attributes of ExtProduction::FuelStorage	225
1069	Table 253 – Association ends of ExtProduction::FuelStorage with other classes	225
1070	Table 254 – Attributes of ExtProduction::GeothermalGeneratingUnit	225
1071	Table 255 – Association ends of ExtProduction::GeothermalGeneratingUnit with other	
1072	classes	227
1073	Table 256 – Attributes of ExtProduction::IndustryUnit	228
1074	Table 257 – Association ends of ExtProduction::IndustryUnit with other classes	230
1075	Table 258 – Attributes of ExtProduction::PowerElectricalChemicalUnit	231
1076	Table 259 – Association ends of ExtProduction::PowerElectricalChemicalUnit with	
1077	other classes	232
1078	Table 260 – Attributes of ExtProduction::PowerElectronicsMarineUnit	232
1079	Table 261 – Association ends of ExtProduction::PowerElectronicsMarineUnit with other	
1080	classes	233
1081	Table 262 – Literals of ExtRemedialAction::CostSettledKind	237
1082	Table 263 – Literals of ExtRemedialAction::ImpactAgreementKind	237
1083	Table 264 – Literals of ExtRemedialAction::BidDirectionKind	238
1084	Table 265 – Literals of ExtRemedialAction::RelativeDirectionKind	238
1085	Table 266 – Literals of ExtRemedialAction::RemedialActionScheduleResponseKind	238
1086	Table 267 – Literals of ExtRemedialAction::RemedialActionKind	239
1087	Table 268 – Literals of ExtRemedialAction::RemedialActionScheduleStatusKind	239
1088	Table 269 – Literals of ExtRemedialAction::ValueOffsetKind	239
1089	Table 270 – Attributes of ExtRemedialAction::ACDCConverterAction	240
1090	Table 271 – Association ends of ExtRemedialAction::ACDCConverterAction with other	
1091	classes	240
1092	Table 272 – Attributes of ExtRemedialAction::AvailabilityRemedialAction	241
1093	Table 273 – Association ends of ExtRemedialAction::AvailabilityRemedialAction with	
1094	other classes	241
1095	Table 274 – Attributes of ExtRemedialAction::BatteryUnitAction	242

1096	Table 275 – Association ends of ExtRemedialAction::BatteryUnitAction with other	
1097	classes	243
1098	Table 276 – Attributes of ExtRemedialAction::CountertradeRemedialAction	243
1099	Table 277 – Association ends of ExtRemedialAction::CountertradeRemedialAction with	
1100	other classes	244
1101	Table 278 – Attributes of ExtRemedialAction::ControlFunctionBlockAction	245
1102	Table 279 – Association ends of ExtRemedialAction::ControlFunctionBlockAction with	
1103	other classes	246
1104	Table 280 – Attributes of ExtRemedialAction::EnergySourceModification	246
1105	Table 281 – Association ends of ExtRemedialAction::EnergySourceModification with	
1106	other classes	247
1107	Table 282 – Attributes of ExtRemedialAction::EquivalentInjectionAction	247
1108	Table 283 – Association ends of ExtRemedialAction::EquivalentInjectionAction with	
1109	other classes	248
1110	Table 284 – Attributes of ExtRemedialAction::ExternalNetworkInjectionAction	248
1111	Table 285 – Association ends of ExtRemedialAction::ExternalNetworkInjectionAction	
1112	with other classes	249
1113	Table 286 – Attributes of ExtRemedialAction::GridStateAlteration	249
1114	Table 287 – Association ends of ExtRemedialAction::GridStateAlteration with other	
1115	classes	250
1116	Table 288 – Attributes of ExtRemedialAction::GridStateAlterationRemedialAction	251
1117	Table 289 – Association ends of	
1118	ExtRemedialAction::GridStateAlterationRemedialAction with other classes	252
1119	Table 290 – Attributes of ExtRemedialAction::GridStateIntensitySchedule	253
1120	Table 291 – Association ends of ExtRemedialAction::GridStateIntensitySchedule with	
1121	other classes	253
1122	Table 292 – Attributes of ExtRemedialAction::IntertemporalPropertyRange	254
1123	Table 293 – Association ends of ExtRemedialAction::IntertemporalPropertyRange with	
1124	other classes	254
1125	Table 294 – Attributes of ExtRemedialAction::LoadAction	254
1126	Table 295 – Association ends of ExtRemedialAction::LoadAction with other classes	255
1127	Table 296 – Attributes of ExtRemedialAction::PowerElectronicsConnectionAction	255
1128	Table 297 – Association ends of	
1129	ExtRemedialAction::PowerElectronicsConnectionAction with other classes	256
1130	Table 298 – Association ends of ExtRemedialAction::PropertyReference with other	
1131	classes	257
1132	Table 299 – Attributes of ExtRemedialAction::QualitativeRemedialActionImpact	257
1133	Table 300 – Association ends of ExtRemedialAction::QualitativeRemedialActionImpact	
1134	with other classes	257
1135	Table 301 – Attributes of ExtRemedialAction::QuantitativeRemedialActionImpact	258
1136	Table 302 – Association ends of	
1137	ExtRemedialAction::QuantitativeRemedialActionImpact with other classes	258
1138	Table 303 – Attributes of ExtRemedialAction::RedispatchScheduleAction	258
1139	Table 304 – Association ends of ExtRemedialAction::RedispatchScheduleAction with	
1140	other classes	259

1141	Table 305 – Attributes of ExtRemedialAction::RedispatchRemedialAction	259
1142	Table 306 – Association ends of ExtRemedialAction::RedispatchRemedialAction with	
1143	other classes	260
1144	Table 307 – Attributes of ExtRemedialAction::RegulatingControlAction	261
1145	Table 308 – Association ends of ExtRemedialAction::RegulatingControlAction with	
1146	other classes	261
1147	Table 309 – Attributes of ExtRemedialAction::RemedialAction	262
1148	Table 310 – Association ends of ExtRemedialAction::RemedialAction with other	
1149	classes	263
1150	Table 311 – Attributes of ExtRemedialAction::RemedialActionCost	264
1151	Table 312 – Association ends of ExtRemedialAction::RemedialActionCost with other	
1152	classes	264
1153	Table 313 – Attributes of ExtRemedialAction::RemedialActionImpact	264
1154	Table 314 – Association ends of ExtRemedialAction::RemedialActionImpact with other	
1155	classes	265
1156	Table 315 – Attributes of ExtRemedialAction::RemedialActionSchedule	265
1157	Table 316 – Association ends of ExtRemedialAction::RemedialActionSchedule with	
1158	other classes	266
1159	Table 317 – Attributes of ExtRemedialAction::RemedialActionScheduleResponse	267
1160	Table 318 – Association ends of	
1161	ExtRemedialAction::RemedialActionScheduleResponse with other classes	267
1162	Table 319 – Attributes of ExtRemedialAction::RotatingMachineAction	267
1163	Table 320 – Association ends of ExtRemedialAction::RotatingMachineAction with other	
1164	classes	268
1165	Table 321 – Attributes of ExtRemedialAction::SetPointAction	268
1166	Table 322 – Association ends of ExtRemedialAction::SetPointAction with other classes	269
1167	Table 323 – Attributes of ExtRemedialAction::SchemeRemedialAction	269
1168	Table 324 – Association ends of ExtRemedialAction::SchemeRemedialAction with	
1169	other classes	270
1170	Table 325 – Attributes of ExtRemedialAction::ShuntCompensatorModification	271
1171	Table 326 – Association ends of ExtRemedialAction::ShuntCompensatorModification	
1172	with other classes	271
1173	Table 327 – Attributes of ExtRemedialAction::StaticPropertyRange	272
1174	Table 328 – Association ends of ExtRemedialAction::StaticPropertyRange with other	
1175	classes	272
1176	Table 329 – Attributes of ExtRemedialAction::StaticVarCompensatorAction	273
1177	Table 330 – Association ends of ExtRemedialAction::StaticVarCompensatorAction with	
1178	other classes	273
1179	Table 331 – Attributes of ExtRemedialAction::TapPositionAction	274
1180	Table 332 – Association ends of ExtRemedialAction::TapPositionAction with other	
1181	classes	274
1182	Table 333 – Attributes of ExtRemedialAction::TopologyAction	275
1183	Table 334 – Association ends of ExtRemedialAction::TopologyAction with other	
1184	classes	275

1185	Table 335 – Attributes of ExtRemedialAction::RemedialActionDependency	276
1186	Table 336 – Association ends of ExtRemedialAction::RemedialActionDependency with	
1187	other classes	276
1188	Table 337 – Attributes of ExtRemedialAction::BiddingZoneAction	277
1189	Table 338 – Association ends of ExtRemedialAction::BiddingZoneAction with other	
1190	classes	277
1191	Table 339 – Attributes of ExtRemedialAction::RemedialActionScheduleGroup	278
1192	Table 340 – Association ends of ExtRemedialAction::RemedialActionScheduleGroup	
1193	with other classes	278
1194	Table 341 – Attributes of ExtRemedialAction::RangeConstraint	278
1195	Table 342 – Association ends of ExtRemedialAction::RangeConstraint with other	
1196	classes	279
1197	Table 343 – Literals of ExtRemedialAction::RemedialActionDependencyKind	280
1198	Table 344 – Literals of ExtRemedialAction::ShiftMethodKind	280
1199	Table 345 – Attributes of ExtRemedialAction::ProposingRemedialActionScheduleShare	281
1200	Table 346 – Association ends of	
1201	ExtRemedialAction::ProposingRemedialActionScheduleShare with other classes	281
1202	Table 347 – Attributes of ExtRemedialAction::CountertradeScheduleAction	281
1203	Table 348 – Association ends of ExtRemedialAction::CountertradeScheduleAction with	
1204	other classes	282
1205	Table 349 – Attributes of ExtRemedialAction::PowerScheduleAction	282
1206	Table 350 – Association ends of ExtRemedialAction::PowerScheduleAction with other	
1207	classes	282
1208	Table 351 – Attributes of ExtRemedialAction::PowerRemedialAction	283
1209	Table 352 – Association ends of ExtRemedialAction::PowerRemedialAction with other	
1210	classes	283
1211	Table 353 – Attributes of ExtRemedialAction::EquipmentControllerAction	284
1212	Table 354 – Association ends of ExtRemedialAction::EquipmentControllerAction with	
1213	other classes	285
1214	Table 355 – Attributes of ExtRemedialAction::RemedialActionGroup	286
1215	Table 356 – Association ends of ExtRemedialAction::RemedialActionGroup with other	
1216	classes	286
1217	Table 357 – Attributes of ExtRemedialAction::InServiceAction	286
1218	Table 358 – Association ends of ExtRemedialAction::InServiceAction with other	
1219	classes	287
1220	Table 359 – Attributes of ExtRemedialAction::RemedialActionScheduleDependency	287
1221	Table 360 – Association ends of	
1222	ExtRemedialAction::RemedialActionScheduleDependency with other classes	288
1223	Table 361 – Literals of ExtRemedialAction::RemedialActionScheduleDependencyKind	288
1224	Table 362 – Literals of ExtRemedialAction::RejectionReasonKind	288
1225	Table 363 – Attributes of ExtRole::CoordinatedCapacityCalculator	290
1226	Table 364 – Association ends of ExtRole::CoordinatedCapacityCalculator with other	
1227	classes	291
1228	Table 365 – Attributes of ExtRole::ClosedDistributionSystemOperator	291

1229	Table 366 – Association ends of ExtRole::ClosedDistributionSystemOperator with other	
1230	classes	292
1231	Table 367 – Attributes of ExtRole::DirectCurrentSystemOperator	293
1232	Table 368 – Association ends of ExtRole::DirectCurrentSystemOperator with other	
1233	classes	293
1234	Table 369 – Attributes of ExtRole::DistributionSystemOperator	294
1235	Table 370 – Association ends of ExtRole::DistributionSystemOperator with other	
1236	classes	294
1237	Table 371 – Attributes of ExtRole::EnergyAlignmentCoordinator	295
1238	Table 372 – Association ends of ExtRole::EnergyAlignmentCoordinator with other	
1239	classes	296
1240	Table 373 – Attributes of ExtRole::ExtOrganisationRole	296
1241	Table 374 – Attributes of ExtRole::LoadFrequencyControlOperator	296
1242	Table 375 – Association ends of ExtRole::LoadFrequencyControlOperator with other	
1243	classes	297
1244	Table 376 – Attributes of ExtRole::OutageCoordinator	297
1245	Table 377 – Association ends of ExtRole::OutageCoordinator with other classes	298
1246	Table 378 – Attributes of ExtRole::OutagePlanningAgent	298
1247	Table 379 – Association ends of ExtRole::OutagePlanningAgent with other classes	299
1248	Table 380 – Attributes of ExtRole::SystemOperationOrganisationPost	299
1249	Table 381 – Association ends of ExtRole::SystemOperationOrganisationPost with other	
1250	classes	299
1251	Table 382 – Attributes of ExtRole::SecurityCoordinator	300
1252	Table 383 – Association ends of ExtRole::SecurityCoordinator with other classes	300
1253	Table 384 – Attributes of ExtRole::SystemOperator	301
1254	Table 385 – Association ends of ExtRole::SystemOperator with other classes	301
1255	Table 386 – Attributes of ExtRole::SystemOperationCoordinator	302
1256	Table 387 – Association ends of ExtRole::SystemOperationCoordinator with other	
1257	classes	303
1258	Table 388 – Attributes of ExtRole::TransmissionSystemOperator	303
1259	Table 389 – Association ends of ExtRole::TransmissionSystemOperator with other	
1260	classes	304
1261	Table 390 – Attributes of ExtSecurityAnalysisResult::BaseCasePowerFlowResult	305
1262	Table 391 – Association ends of	
1263	ExtSecurityAnalysisResult::BaseCasePowerFlowResult with other classes	306
1264	Table 392 – Attributes of ExtSecurityAnalysisResult::ContingencyPowerFlowResult	306
1265	Table 393 – Association ends of	
1266	ExtSecurityAnalysisResult::ContingencyPowerFlowResult with other classes	306
1267	Table 394 – Attributes of ExtSecurityAnalysisResult::PowerFlowResult	307
1268	Table 395 – Association ends of ExtSecurityAnalysisResult::PowerFlowResult with	
1269	other classes	308
1270	Table 396 – Attributes of ExtSecurityAnalysisResult::RemedialActionApplied	308
1271	Table 397 – Association ends of ExtSecurityAnalysisResult::RemedialActionApplied	
1272	with other classes	308

1273	Table 398 – Attributes of ExtSecurityLimit::AmbientTemperatureDependencyCurve	311
1274	Table 399 – Association ends of	
1275	ExtSecurityLimit::AmbientTemperatureDependencyCurve with other classes	311
1276	Table 400 – Attributes of ExtSecurityLimit::BaseOverloadLimitCurve	312
1277	Table 401 – Association ends of ExtSecurityLimit::BaseOverloadLimitCurve with other	
1278	classes	312
1279	Table 402 – Attributes of ExtSecurityLimit::DurationOverloadLimitCurve	313
1280	Table 403 – Association ends of ExtSecurityLimit::DurationOverloadLimitCurve with	
1281	other classes	313
1282	Table 404 – Attributes of ExtSecurityLimit::LimitDependencyCurve	314
1283	Table 405 – Association ends of ExtSecurityLimit::LimitDependencyCurve with other	
1284	classes	314
1285	Table 406 – Attributes of ExtSecurityLimit::RecoveryOverloadLimitCurve	314
1286	Table 407 – Association ends of ExtSecurityLimit::RecoveryOverloadLimitCurve with	
1287	other classes	315
1288	Table 408 – Attributes of ExtSecurityLimit::SolarRadiationDependencyCurve	315
1289	Table 409 – Association ends of ExtSecurityLimit::SolarRadiationDependencyCurve	
1290	with other classes	316
1291	Table 410 – Attributes of ExtSecurityLimit::VoltageAngleLimit	316
1292	Table 411 – Association ends of ExtSecurityLimit::VoltageAngleLimit with other	
1293	classes	317
1294	Table 412 – Attributes of ExtSecurityLimit::ExtOperationalLimitType	317
1295	Table 413 – Attributes of ExtSecurityLimit::InfeedLimit	318
1296	Table 414 – Association ends of ExtSecurityLimit::InfeedLimit with other classes	318
1297	Table 415 – Attributes of ExtSecurityLimit::InfeedTerminal	318
1298	Table 416 – Association ends of ExtSecurityLimit::InfeedTerminal with other classes	319
1299	Table 417 – Attributes of ExtSecurityLimit::BaseCaseCurrentLimit	319
1300	Table 418 – Association ends of ExtSecurityLimit::BaseCaseCurrentLimit with other	
1301	classes	319
1302	Table 419 – Attributes of ExtSensitivityMatrix::ControllableQuantity	321
1303	Table 420 – Association ends of ExtSensitivityMatrix::ControllableQuantity with other	
1304	classes	321
1305	Table 421 – Attributes of ExtSensitivityMatrix::ObservableQuantity	321
1306	Table 422 – Association ends of ExtSensitivityMatrix::ObservableQuantity with other	
1307	classes	321
1308	Table 423 – Attributes of ExtSensitivityMatrix::SensitivityFactor	322
1309	Table 424 – Association ends of ExtSensitivityMatrix::SensitivityFactor with other	
1310	classes	322
1311	Table 425 – Attributes of ExtSensitivityMatrix::SensitivityMatrix	322
1312	Table 426 – Association ends of ExtSensitivityMatrix::SensitivityMatrix with other	
1313	classes	322
1314	Table 427 – Literals of ExtSensitivityMatrix::ObservableQuantityKind	323
1315	Table 428 – Literals of ExtSensitivityMatrix::SensitivityMatrixKind	323
1316	Table 429 – Attributes of ExtSchedule::PowerShiftKeySchedule	332

1317	Table 430 – Association ends of ExtSchedule::PowerShiftKeySchedule with other	
1318	classes	333
1319	Table 431 – Attributes of ExtSchedule::BaseIrregularTimeSeries	333
1320	Table 432 – Association ends of ExtSchedule::BaseIrregularTimeSeries with other	
1321	classes	334
1322	Table 433 – Attributes of ExtSchedule::BaseTimeSeries	334
1323	Table 434 – Association ends of ExtSchedule::BaseTimeSeries with other classes	335
1324	Table 435 – Attributes of ExtSchedule::EventSchedule	335
1325	Table 436 – Association ends of ExtSchedule::EventSchedule with other classes	336
1326	Table 437 – Attributes of ExtSchedule::EventTimePoint	336
1327	Table 438 – Association ends of ExtSchedule::EventTimePoint with other classes	336
1328	Table 439 – Attributes of ExtSchedule::GenericValueSchedule	336
1329	Table 440 – Association ends of ExtSchedule::GenericValueSchedule with other	
1330	classes	337
1331	Table 441 – Attributes of ExtSchedule::GenericValueTimePoint	337
1332	Table 442 – Association ends of ExtSchedule::GenericValueTimePoint with other	
1333	classes	337
1334	Table 443 – Attributes of ExtSchedule::MustRunSchedule	338
1335	Table 444 – Association ends of ExtSchedule::MustRunSchedule with other classes	338
1336	Table 445 – Attributes of ExtSchedule::MustRunTimePoint	339
1337	Table 446 – Association ends of ExtSchedule::MustRunTimePoint with other classes	339
1338	Table 447 – Attributes of ExtSchedule::PowerSchedule	339
1339	Table 448 – Association ends of ExtSchedule::PowerSchedule with other classes	340
1340	Table 449 – Attributes of ExtSchedule::PowerTimePoint	341
1341	Table 450 – Association ends of ExtSchedule::PowerTimePoint with other classes	341
1342	Table 451 – Literals of ExtSchedule::BaseTimeSeriesKind	341
1343	Table 452 – Literals of ExtSchedule::TimeSeriesInterpolationKind	342
1344	Table 453 – Attributes of ExtSchedule::GenericEnablingSchedule	342
1345	Table 454 – Association ends of ExtSchedule::GenericEnablingSchedule with other	
1346	classes	343
1347	Table 455 – Attributes of ExtSchedule::GenericAvailableSchedule	343
1348	Table 456 – Association ends of ExtSchedule::GenericAvailableSchedule with other	
1349	classes	344
1350	Table 457 – Attributes of ExtSchedule::EnablingTimePoint	344
1351	Table 458 – Association ends of ExtSchedule::EnablingTimePoint with other classes	344
1352	Table 459 – Attributes of ExtSchedule::AvailabilityTimePoint	344
1353	Table 460 – Association ends of ExtSchedule::AvailabilityTimePoint with other classes	345
1354	Table 461 – Attributes of ExtSchedule::ParticipationFactorTimePoint	345
1355	Table 462 – Association ends of ExtSchedule::ParticipationFactorTimePoint with other	
1356	classes	345
1357	Table 463 – Attributes of ExtSchedule::GridPowerCapacitySchedule	345
1358	Table 464 – Association ends of ExtSchedule::GridPowerCapacitySchedule with other	
1359	classes	346

1360	Table 465 – Attributes of ExtSchedule::GridPowerCapacityTimePoint	346
1361	Table 466 – Association ends of ExtSchedule::GridPowerCapacityTimePoint with other	
1362	classes	347
1363	Table 467 – Attributes of ExtSchedule::CostVolumePotentialSchedule	347
1364	Table 468 – Association ends of ExtSchedule::CostVolumePotentialSchedule with	
1365	other classes	348
1366	Table 469 – Attributes of ExtSchedule::CostVolumePotentialTimePoint	348
1367	Table 470 – Association ends of ExtSchedule::CostVolumePotentialTimePoint with	
1368	other classes	348
1369	Table 471 – Attributes of ExtSchedule::ContingencySchedule	348
1370	Table 472 – Association ends of ExtSchedule::ContingencySchedule with other	
1371	classes	349
1372	Table 473 – Attributes of ExtSchedule::ContingencyTimePoint	349
1373	Table 474 – Association ends of ExtSchedule::ContingencyTimePoint with other	
1374	classes	349
1375	Table 475 – Attributes of ExtSchedule::AssessedElementSchedule	350
1376	Table 476 – Association ends of ExtSchedule::AssessedElementSchedule with other	
1377	classes	350
1378	Table 477 – Attributes of ExtSchedule::AssessedElementTimePoint	350
1379	Table 478 – Association ends of ExtSchedule::AssessedElementTimePoint with other	
1380	classes	352
1381	Table 479 – Attributes of ExtSchedule::PowerBidScheduleTimePoint	352
1382	Table 480 – Association ends of ExtSchedule::PowerBidScheduleTimePoint with other	
1383	classes	353
1384	Table 481 – Attributes of ExtSchedule::PowerBidSchedule	353
1385	Table 482 – Association ends of ExtSchedule::PowerBidSchedule with other classes	354
1386	Table 483 – Attributes of ExtSchedule::PowerRemedialActionSchedule	355
1387	Table 484 – Association ends of ExtSchedule::PowerRemedialActionSchedule with	
1388	other classes	355
1389	Table 485 – Attributes of ExtSchedule::PowerRemedialActionTimePoint	355
1390	Table 486 – Association ends of ExtSchedule::PowerRemedialActionTimePoint with	
1391	other classes	356
1392	Table 487 – Attributes of ExtSchedule::UnitCostSchedule	356
1393	Table 488 – Association ends of ExtSchedule::UnitCostSchedule with other classes	356
1394	Table 489 – Attributes of ExtSchedule::UnitCostTimePoint	357
1395	Table 490 – Association ends of ExtSchedule::UnitCostTimePoint with other classes	357
1396	Table 491 – Attributes of ExtSchedule::BaseRegularIntervalSchedule	357
1397	Table 492 – Association ends of ExtSchedule::BaseRegularIntervalSchedule with other	
1398	classes	358
1399	Table 493 – Literals of ExtSchedule::DayOfWeekKind	358
1400	Table 494 – Attributes of ExtSchedule::HourPattern	359
1401	Table 495 – Association ends of ExtSchedule::HourPattern with other classes	359
1402	Table 496 – Literals of ExtSchedule::PeakKind	359

1403	Table 497 – Literals of ExtSchedule::EnergyScenarioKind	359
1404	Table 498 – Attributes of ExtSchedule::HourPeriod	360
1405	Table 499 – Association ends of ExtSchedule::HourPeriod with other classes	360
1406	Table 500 – Attributes of ExtSchedule::AssessedElementRegularSchedule	360
1407	Table 501 – Association ends of ExtSchedule::AssessedElementRegularSchedule with	
1408	other classes	361
1409	Table 502 – Attributes of ExtSchedule::AssessedElementRegularTimePoint	361
1410	Table 503 – Association ends of ExtSchedule::AssessedElementRegularTimePoint	
1411	with other classes	362
1412	Table 504 – Attributes of ExtSchedule::VoltageAngleSchedule	362
1413	Table 505 – Association ends of ExtSchedule::VoltageAngleSchedule with other	
1414	classes	363
1415	Table 506 – Attributes of ExtSchedule::VoltageAngleTimePoint	363
1416	Table 507 – Association ends of ExtSchedule::VoltageAngleTimePoint with other	
1417	classes	363
1418	Table 508 – Literals of ExtSchedule::PowerScheduleKind	364
1419	Table 509 – Attributes of ExtSchedule::InfeedLimitSchedule	364
1420	Table 510 – Association ends of ExtSchedule::InfeedLimitSchedule with other classes	364
1421	Table 511 – Attributes of ExtSchedule::InfeedLimitTimePoint	365
1422	Table 512 – Association ends of ExtSchedule::InfeedLimitTimePoint with other classes	365
1423	Table 513 – Attributes of ExtSchedule::RemedialActionSchemeSchedule	365
1424	Table 514 – Association ends of ExtSchedule::RemedialActionSchemeSchedule with	
1425	other classes	366
1426	Table 515 – Attributes of ExtSchedule::RemedialActionSchemeTimePoint	366
1427	Table 516 – Association ends of ExtSchedule::RemedialActionSchemeTimePoint with	
1428	other classes	366
1429	Table 517 – Attributes of ExtSchedule::RemedialActionGroupSchedule	367
1430	Table 518 – Association ends of ExtSchedule::RemedialActionGroupSchedule with	
1431	other classes	367
1432	Table 519 – Attributes of ExtSchedule::RemedialActionGroupTimePoint	367
1433	Table 520 – Association ends of ExtSchedule::RemedialActionGroupTimePoint with	
1434	other classes	368
1435	Table 521 – Attributes of ExtSchedule::GridStateAlterationSchedule	368
1436	Table 522 – Association ends of ExtSchedule::GridStateAlterationSchedule with other	
1437	classes	368
1438	Table 523 – Attributes of ExtSchedule::GridStateAlterationTimePoint	369
1439	Table 524 – Association ends of ExtSchedule::GridStateAlterationTimePoint with other	
1440	classes	369
1441	Table 525 – Attributes of ExtSchedule::RegulatingControlRegularSchedule	369
1442	Table 526 – Association ends of ExtSchedule::RegulatingControlRegularSchedule with	
1443	other classes	370
1444	Table 527 – Attributes of ExtSchedule::TapChangerControlRegularSchedule	371
1445	Table 528 – Association ends of ExtSchedule::TapChangerControlRegularSchedule	
1446	with other classes	372

1447	Table 529 – Attributes of ExtSchedule::TapRegularSchedule	372
1448	Table 530 – Association ends of ExtSchedule::TapRegularSchedule with other classes	373
1449	Table 531 – Attributes of ExtSchedule::SwitchRegularSchedule	373
1450	Table 532 – Association ends of ExtSchedule::SwitchRegularSchedule with other	
1451	classes	374
1452	Table 533 – Attributes of ExtSchedule::EnergyConnectionRegularSchedule	374
1453	Table 534 – Association ends of ExtSchedule::EnergyConnectionRegularSchedule with	
1454	other classes	375
1455	Table 535 – Attributes of ExtSchedule::InServiceRegularSchedule	376
1456	Table 536 – Association ends of ExtSchedule::InServiceRegularSchedule with other	
1457	classes	376
1458	Table 537 – Attributes of ExtSchedule::ControlAreaRegularSchedule	377
1459	Table 538 – Association ends of ExtSchedule::ControlAreaRegularSchedule with other	
1460	classes	377
1461	Table 539 – Attributes of ExtSchedule::SynchronousMachineRegularSchedule	378
1462	Table 540 – Association ends of ExtSchedule::SynchronousMachineRegularSchedule	
1463	with other classes	378
1464	Table 541 – Attributes of ExtSchedule::AsynchronousMachineRegularSchedule	379
1465	Table 542 – Association ends of ExtSchedule::AsynchronousMachineRegularSchedule	
1466	with other classes	380
1467	Table 543 – Attributes of ExtSchedule::ExternalNetworkInjectionRegularSchedule	380
1468	Table 544 – Association ends of	
1469	ExtSchedule::ExternalNetworkInjectionRegularSchedule with other classes	381
1470	Table 545 – Attributes of ExtSchedule::EquivalentInjectionRegularSchedule	381
1471	Table 546 – Association ends of ExtSchedule::EquivalentInjectionRegularSchedule	
1472	with other classes	382
1473	Table 547 – Attributes of ExtSchedule::ACDCConverterRegularSchedule	383
1474	Table 548 – Association ends of ExtSchedule::ACDCConverterRegularSchedule with	
1475	other classes	383
1476	Table 549 – Attributes of ExtSchedule::CsConverterRegularSchedule	384
1477	Table 550 – Association ends of ExtSchedule::CsConverterRegularSchedule with other	
1478	classes	385
1479	Table 551 – Attributes of ExtSchedule::VsConverterRegularSchedule	385
1480	Table 552 – Association ends of ExtSchedule::VsConverterRegularSchedule with other	
1481	classes	386
1482	Table 553 – Attributes of ExtSchedule::EquivalentInjectionSchedule	387
1483	Table 554 – Association ends of ExtSchedule::EquivalentInjectionSchedule with other	
1484	classes	387
1485	Table 555 – Attributes of ExtSchedule::EnergyConnectionSchedule	388
1486	Table 556 – Association ends of ExtSchedule::EnergyConnectionSchedule with other	
1487	classes	388
1488	Table 557 – Attributes of ExtSchedule::TapSchedule	389
1489	Table 558 – Association ends of ExtSchedule::TapSchedule with other classes	389
1490	Table 559 – Attributes of ExtSchedule::EquivalentInjectionTimePoint	389

1491	Table 560 – Association ends of ExtSchedule::EquivalentInjectionTimePoint with other	
1492	classes	390
1493	Table 561 – Attributes of ExtSchedule::RegulatingControlSchedule	390
1494	Table 562 – Association ends of ExtSchedule::RegulatingControlSchedule with other	
1495	classes	390
1496	Table 563 – Attributes of ExtSchedule::TapChangerControlSchedule	391
1497	Table 564 – Association ends of ExtSchedule::TapChangerControlSchedule with other	
1498	classes	391
1499	Table 565 – Attributes of ExtSchedule::RegulatingControlTimePoint	392
1500	Table 566 – Association ends of ExtSchedule::RegulatingControlTimePoint with other	
1501	classes	392
1502	Table 567 – Attributes of ExtSchedule::SwitchSchedule	392
1503	Table 568 – Association ends of ExtSchedule::SwitchSchedule with other classes	393
1504	Table 569 – Attributes of ExtSchedule::InServiceSchedule	393
1505	Table 570 – Association ends of ExtSchedule::InServiceSchedule with other classes	393
1506	Table 571 – Attributes of ExtSchedule::ControlAreaSchedule	394
1507	Table 572 – Association ends of ExtSchedule::ControlAreaSchedule with other classes	394
1508	Table 573 – Attributes of ExtSchedule::SynchronousMachineSchedule	395
1509	Table 574 – Association ends of ExtSchedule::SynchronousMachineSchedule with	
1510	other classes	395
1511	Table 575 – Attributes of ExtSchedule::AsynchronousMachineSchedule	395
1512	Table 576 – Association ends of ExtSchedule::AsynchronousMachineSchedule with	
1513	other classes	396
1514	Table 577 – Attributes of ExtSchedule::ExternalNetworkInjectionSchedule	396
1515	Table 578 – Association ends of ExtSchedule::ExternalNetworkInjectionSchedule with	
1516	other classes	397
1517	Table 579 – Attributes of ExtSchedule::VsConverterSchedule	397
1518	Table 580 – Association ends of ExtSchedule::VsConverterSchedule with other	
1519	classes	398
1520	Table 581 – Attributes of ExtSchedule::CsConverterSchedule	398
1521	Table 582 – Association ends of ExtSchedule::CsConverterSchedule with other	
1522	classes	398
1523	Table 583 – Attributes of ExtSchedule::ACDCTimePoint	399
1524	Table 584 – Attributes of ExtSchedule::VsConverterTimePoint	399
1525	Table 585 – Association ends of ExtSchedule::VsConverterTimePoint with other	
1526	classes	400
1527	Table 586 – Attributes of ExtSchedule::CsConverterTimePoint	400
1528	Table 587 – Association ends of ExtSchedule::CsConverterTimePoint with other	
1529	classes	401
1530	Table 588 – Attributes of ExtSchedule::TapScheduleTimePoint	401
1531	Table 589 – Association ends of ExtSchedule::TapScheduleTimePoint with other	
1532	classes	401
1533	Table 590 – Attributes of ExtSchedule::EnergyConnectionTimePoint	402

1534	Table 591 – Association ends of ExtSchedule::EnergyConnectionTimePoint with other	
1535	classes	402
1536	Table 592 – Attributes of ExtSchedule::SwitchTimePoint	402
1537	Table 593 – Association ends of ExtSchedule::SwitchTimePoint with other classes	402
1538	Table 594 – Attributes of ExtSchedule::InServiceTimePoint	403
1539	Table 595 – Association ends of ExtSchedule::InServiceTimePoint with other classes	403
1540	Table 596 – Attributes of ExtSchedule::ControlAreaTimePoint	403
1541	Table 597 – Association ends of ExtSchedule::ControlAreaTimePoint with other	
1542	classes	403
1543	Table 598 – Attributes of ExtSchedule::SynchronousMachineTimePoint	403
1544	Table 599 – Association ends of ExtSchedule::SynchronousMachineTimePoint with	
1545	other classes	404
1546	Table 600 – Attributes of ExtSchedule::AsynchronousMachineTimePoint	404
1547	Table 601 – Association ends of ExtSchedule::AsynchronousMachineTimePoint with	
1548	other classes	404
1549	Table 602 – Attributes of ExtSchedule::ExternalNetworkInjectionTimePoint	404
1550	Table 603 – Association ends of ExtSchedule::ExternalNetworkInjectionTimePoint with	
1551	other classes	405
1552	Table 604 – Attributes of ExtSchedule::BatteryUnitSchedule	405
1553	Table 605 – Association ends of ExtSchedule::BatteryUnitSchedule with other classes	405
1554	Table 606 – Attributes of ExtSchedule::BatteryUnitTimePoint	406
1555	Table 607 – Association ends of ExtSchedule::BatteryUnitTimePoint with other classes	406
1556	Table 608 – Attributes of ExtSchedule::VoltageLimitSchedule	406
1557	Table 609 – Association ends of ExtSchedule::VoltageLimitSchedule with other classes	406
1558	Table 610 – Attributes of ExtSchedule::ActivePowerLimitSchedule	407
1559	Table 611 – Association ends of ExtSchedule::ActivePowerLimitSchedule with other	
1560	classes	407
1561	Table 612 – Attributes of ExtSchedule::ApparentPowerLimitSchedule	408
1562	Table 613 – Association ends of ExtSchedule::ApparentPowerLimitSchedule with other	
1563	classes	408
1564	Table 614 – Attributes of ExtSchedule::CurrentLimitSchedule	408
1565	Table 615 – Association ends of ExtSchedule::CurrentLimitSchedule with other classes	409
1566	Table 616 – Attributes of ExtSchedule::CurrentLimitTimePoint	409
1567	Table 617 – Association ends of ExtSchedule::CurrentLimitTimePoint with other	
1568	classes	409
1569	Table 618 – Attributes of ExtSchedule::ApparentPowerLimitTimePoint	410
1570	Table 619 – Association ends of ExtSchedule::ApparentPowerLimitTimePoint with	
1571	other classes	410
1572	Table 620 – Attributes of ExtSchedule::ActivePowerLimitTimePoint	410
1573	Table 621 – Association ends of ExtSchedule::ActivePowerLimitTimePoint with other	
1574	classes	410
1575	Table 622 – Attributes of ExtSchedule::VoltageLimitTimePoint	410

1576	Table 623 – Association ends of ExtSchedule::VoltageLimitTimePoint with other	
1577	classes	411
1578	Table 624 – Attributes of ExtSchedule::ShuntCompensatorSchedule	411
1579	Table 625 – Association ends of ExtSchedule::ShuntCompensatorSchedule with other	
1580	classes	411
1581	Table 626 – Attributes of ExtSchedule::ShuntCompensatorTimePoint	412
1582	Table 627 – Association ends of ExtSchedule::ShuntCompensatorTimePoint with other	
1583	classes	412
1584	Table 628 – Attributes of ExtSchedule::GeneratingUnitSchedule	412
1585	Table 629 – Association ends of ExtSchedule::GeneratingUnitSchedule with other	
1586	classes	413
1587	Table 630 – Attributes of ExtSchedule::GeneratingUnitTimePoint	413
1588	Table 631 – Association ends of ExtSchedule::GeneratingUnitTimePoint with other	
1589	classes	413
1590	Table 632 – Attributes of ExtSchedule::StaticVarCompensatorSchedule	414
1591	Table 633 – Association ends of ExtSchedule::StaticVarCompensatorSchedule with	
1592	other classes	414
1593	Table 634 – Attributes of ExtSchedule::StaticVarCompensatorTimePoint	414
1594	Table 635 – Association ends of ExtSchedule::StaticVarCompensatorTimePoint with	
1595	other classes	415
1596	Table 636 – Attributes of ExtSchedule::StageTriggerSchedule	415
1597	Table 637 – Association ends of ExtSchedule::StageTriggerSchedule with other	
1598	classes	415
1599	Table 638 – Attributes of ExtSchedule::StageTriggerTimePoint	416
1600	Table 639 – Association ends of ExtSchedule::StageTriggerTimePoint with other	
1601	classes	416
1602	Table 640 – Attributes of ExtSchedule::GenericSequenceSchedule	416
1603	Table 641 – Association ends of ExtSchedule::GenericSequenceSchedule with other	
1604	classes	417
1605	Table 642 – Attributes of ExtSchedule::SequenceTimePoint	417
1606	Table 643 – Association ends of ExtSchedule::SequenceTimePoint with other classes	417
1607	Table 644 – Attributes of ExtSchedule::BaseCaseCurrentLimitSchedule	417
1608	Table 645 – Association ends of ExtSchedule::BaseCaseCurrentLimitSchedule with	
1609	other classes	418
1610	Table 646 – Attributes of ExtSchedule::BaseCaseCurrentLimitTimePoint	418
1611	Table 647 – Association ends of ExtSchedule::BaseCaseCurrentLimitTimePoint with	
1612	other classes	418
1613	Table 648 – Attributes of ExtSchedule::FuelStorageSchedule	419
1614	Table 649 – Association ends of ExtSchedule::FuelStorageSchedule with other classes	419
1615	Table 650 – Attributes of ExtSchedule::FuelStorageTimePoint	419
1616	Table 651 – Association ends of ExtSchedule::FuelStorageTimePoint with other	
1617	classes	420
1618	Table 652 – Attributes of ExtSchedule::ReservoirSchedule	420
1619	Table 653 – Association ends of ExtSchedule::ReservoirSchedule with other classes	420

1620	Table 654 – Attributes of ExtSchedule::ReservoirTimePoint	421
1621	Table 655 – Association ends of ExtSchedule::ReservoirTimePoint with other classes	421
1622	Table 656 – Attributes of ExtSchedule::FuelStorageRegularSchedule	421
1623	Table 657 – Association ends of ExtSchedule::FuelStorageRegularSchedule with other	
1624	classes	422
1625	Table 658 – Attributes of ExtSchedule::ReservoirRegularSchedule	422
1626	Table 659 – Association ends of ExtSchedule::ReservoirRegularSchedule with other	
1627	classes	423
1628	Table 660 – Attributes of ExtSchedule::EnergyResourceGroupCapacitySchedule	423
1629	Table 661 – Association ends of	
1630	ExtSchedule::EnergyResourceGroupCapacitySchedule with other classes	423
1631	Table 662 – Attributes of ExtSchedule::DCTieCorridorDirectionTimePoint	424
1632	Table 663 – Association ends of ExtSchedule::DCTieCorridorDirectionTimePoint with	
1633	other classes	424
1634	Table 664 – Attributes of ExtSchedule::PowerBidDependency	425
1635	Table 665 – Association ends of ExtSchedule::PowerBidDependency with other	
1636	classes	425
1637	Table 666 – Attributes of ExtSchedule::EnergyResourceGroupCapacityTimePoint	425
1638	Table 667 – Association ends of	
1639	ExtSchedule::EnergyResourceGroupCapacityTimePoint with other classes	426
1640	Table 668 – Attributes of ExtSchedule::ClimateZoneSchedule	426
1641	Table 669 – Association ends of ExtSchedule::ClimateZoneSchedule with other	
1642	classes	427
1643	Table 670 – Attributes of ExtSchedule::ClimateZoneTimePoint	427
1644	Table 671 – Association ends of ExtSchedule::ClimateZoneTimePoint with other	
1645	classes	431
1646	Table 672 – Attributes of	
1647	ExtSchedule::EnergyResourceGroupCapacityRegularSchedule	431
1648	Table 673 – Association ends of	
1649	ExtSchedule::EnergyResourceGroupCapacityRegularSchedule with other classes	432
1650	Table 674 – Attributes of ExtSchedule::GridPowerCapacityRegularSchedule	433
1651	Table 675 – Association ends of ExtSchedule::GridPowerCapacityRegularSchedule	
1652	with other classes	434
1653	Table 676 – Attributes of ExtSchedule::AreaReserveResourceSchedule	434
1654	Table 677 – Association ends of ExtSchedule::AreaReserveResourceSchedule with	
1655	other classes	435
1656	Table 678 – Attributes of ExtSchedule::AreaReserveResourceTimePoint	435
1657	Table 679 – Association ends of ExtSchedule::AreaReserveResourceTimePoint with	
1658	other classes	436
1659	Table 680 – Attributes of ExtSchedule::AreaReserveResourceRegularSchedule	436
1660	Table 681 – Association ends of ExtSchedule::AreaReserveResourceRegularSchedule	
1661	with other classes	436
1662	Table 682 – Attributes of ExtSchedule::ClimateZoneRegularSchedule	437
1663	Table 683 – Association ends of ExtSchedule::ClimateZoneRegularSchedule with other	
1664	classes	441

1665	Table 684 – Attributes of ExtSIPS::Gate	443
1666	Table 685 – Association ends of ExtSIPS::Gate with other classes	443
1667	Table 686 – Attributes of ExtSIPS::GateInputPin.....	444
1668	Table 687 – Association ends of ExtSIPS::GateInputPin with other classes	445
1669	Table 688 – Attributes of ExtSIPS::GridStateAlterationCollection	445
1670	Table 689 – Association ends of ExtSIPS::GridStateAlterationCollection with other	
1671	classes	445
1672	Table 690 – Attributes of ExtSIPS::MeasurementCalculator	446
1673	Table 691 – Association ends of ExtSIPS::MeasurementCalculator with other classes	446
1674	Table 692 – Attributes of ExtSIPS::MeasurementCalculatorInput	447
1675	Table 693 – Association ends of ExtSIPS::MeasurementCalculatorInput with other	
1676	classes	447
1677	Table 694 – Attributes of ExtSIPS::PinContingency.....	447
1678	Table 695 – Association ends of ExtSIPS::PinContingency with other classes	448
1679	Table 696 – Attributes of ExtSIPS::PinDCTerminal	448
1680	Table 697 – Association ends of ExtSIPS::PinDCTerminal with other classes	449
1681	Table 698 – Attributes of ExtSIPS::PinEquipment	449
1682	Table 699 – Association ends of ExtSIPS::PinEquipment with other classes	450
1683	Table 700 – Attributes of ExtSIPS::PinEquipmentTripping.....	450
1684	Table 701 – Association ends of ExtSIPS::PinEquipmentTripping with other classes	451
1685	Table 702 – Attributes of ExtSIPS::PinGate	451
1686	Table 703 – Association ends of ExtSIPS::PinGate with other classes	452
1687	Table 704 – Attributes of ExtSIPS::PinMeasurement.....	452
1688	Table 705 – Association ends of ExtSIPS::PinMeasurement with other classes	453
1689	Table 706 – Attributes of ExtSIPS::PinPowerTransferCorridor	453
1690	Table 707 – Association ends of ExtSIPS::PinPowerTransferCorridor with other	
1691	classes	454
1692	Table 708 – Attributes of ExtSIPS::PinTerminal	454
1693	Table 709 – Association ends of ExtSIPS::PinTerminal with other classes	455
1694	Table 710 – Attributes of ExtSIPS::PinOperationalLimit	455
1695	Table 711 – Association ends of ExtSIPS::PinOperationalLimit with other classes	456
1696	Table 712 – Attributes of ExtSIPS::PTCActivePowerSupport.....	456
1697	Table 713 – Association ends of ExtSIPS::PTCActivePowerSupport with other classes	457
1698	Table 714 – Attributes of ExtSIPS::RemedialActionScheme	457
1699	Table 715 – Association ends of ExtSIPS::RemedialActionScheme with other classes	457
1700	Table 716 – Attributes of ExtSIPS::Stage	458
1701	Table 717 – Association ends of ExtSIPS::Stage with other classes	459
1702	Table 718 – Attributes of ExtSIPS::StageTrigger.....	459
1703	Table 719 – Association ends of ExtSIPS::StageTrigger with other classes	459
1704	Table 720 – Attributes of ExtSIPS::TriggerCondition	460
1705	Table 721 – Association ends of ExtSIPS::TriggerCondition with other classes	460

1706	Table 722 – Literals of ExtSIPS::CalculationKind	461
1707	Table 723 – Literals of ExtSIPS::GateLogicKind	461
1708	Table 724 – Literals of ExtSIPS::LogicalOperatorsKind	462
1709	Table 725 – Literals of ExtSIPS::PinDCTerminalKind	462
1710	Table 726 – Literals of ExtSIPS::PinPowerTransferCorridorKind	462
1711	Table 727 – Literals of ExtSIPS::PinTerminalKind	462
1712	Table 728 – Literals of ExtSIPS::RemedialActionSchemeKind	463
1713	Table 729 – Attributes of ExtFaultCause::FaultCause	464
1714	Table 730 – Association ends of ExtFaultCause::FaultCause with other classes	464
1715	Table 731 – Literals of ExtFaultCause::CertaintyLevelKind	464
1716	Table 732 – Literals of ExtGridDisturbance::FaultLocationTypeKind	465
1717	Table 733 – Attributes of ExtGridDisturbance::ExtFault	465
1718	Table 734 – Attributes of ExtGridDisturbance::ExtUnplannedOutage	467
1719	Table 735 – Association ends of ExtGridDisturbance::ExtUnplannedOutage with other	
1720	classes	468
1721	Table 736 – Attributes of ExtGridDisturbance::GridDisturbance	468
1722	Table 737 – Association ends of ExtGridDisturbance::GridDisturbance with other	
1723	classes	469
1724	Table 738 – Attributes of ExtGridDisturbance::Interruption	469
1725	Table 739 – Association ends of ExtGridDisturbance::Interruption with other classes	470
1726	Table 740 – Literals of ExtGridDisturbance::AutoReclosingKind	470
1727	Table 741 – Literals of ExtGridDisturbance::FaultCategoryKind	471
1728	Table 742 – Literals of ExtGridDisturbance::FaultKind	471
1729	Table 743 – Literals of ExtGridDisturbance::SystemUnitKind	472
1730	Table 744 – Literals of ExtGridDisturbance::TripKind	473
1731	Table 745 – Attributes of ExtFaultOutage::FaultOutage	474
1732	Table 746 – Association ends of ExtFaultOutage::FaultOutage with other classes	474
1733	Table 747 – Attributes of ExtPowerSystemProject::DifferenceModel	476
1734	Table 748 – Association ends of ExtPowerSystemProject::DifferenceModel with other	
1735	classes	477
1736	Table 749 – Attributes of ExtPowerSystemProject::PowerSystemProject	477
1737	Table 750 – Association ends of ExtPowerSystemProject::PowerSystemProject with	
1738	other classes	478
1739	Table 751 – Attributes of ExtPowerSystemProject::PowerSystemProjectGroup	479
1740	Table 752 – Association ends of ExtPowerSystemProject::PowerSystemProjectGroup	
1741	with other classes	479
1742	Table 753 – Attributes of ExtReactiveCapabilityCurve::ExtReactiveCapabilityCurve	480
1743	Table 754 – Attributes of ExtProtection::AutomationBlockGroup	481
1744	Table 755 – Association ends of ExtProtection::AutomationBlockGroup with other	
1745	classes	482
1746	Table 756 – Attributes of ExtProtection::ProtectionFunction	482
1747	Table 757 – Association ends of ExtProtection::ProtectionFunction with other classes	482

1748	Table 758 – Attributes of ExtProtection::ProtectionFunctionBlock	483
1749	Table 759 – Association ends of ExtProtection::ProtectionFunctionBlock with other	
1750	classes	483
1751	Table 760 – Literals of ExtControl::CompensatorControlModeKind	489
1752	Table 761 – Literals of ExtControl::DCCControlModeKind	489
1753	Table 762 – Literals of ExtControl::InjectionControlModeKind	491
1754	Table 763 – Literals of ExtControl::PowerFrequencyControlKind	491
1755	Table 764 – Literals of ExtControl::RotatingMachineControlModeKind	491
1756	Table 765 – Literals of ExtControl::SubstationControllerModeKind	492
1757	Table 766 – Literals of ExtControl::TCSCControlModeKind	492
1758	Table 767 – Attributes of ExtControl::ACDCCConverterController	492
1759	Table 768 – Association ends of ExtControl::ACDCCConverterController with other	
1760	classes	493
1761	Table 769 – Attributes of ExtControl::ACEmulationControlFunction	494
1762	Table 770 – Association ends of ExtControl::ACEmulationControlFunction with other	
1763	classes	494
1764	Table 771 – Attributes of ExtControl::ACEmulationControlFunctionSchedule	495
1765	Table 772 – Association ends of ExtControl::ACEmulationControlFunctionSchedule	
1766	with other classes	495
1767	Table 773 – Attributes of ExtControl::ACEmulationControlFunctionTimePoint	496
1768	Table 774 – Association ends of ExtControl::ACEmulationControlFunctionTimePoint	
1769	with other classes	496
1770	Table 775 – Attributes of ExtControl::ActivePowerControlFunction	496
1771	Table 776 – Association ends of ExtControl::ActivePowerControlFunction with other	
1772	classes	497
1773	Table 777 – Attributes of ExtControl::ActivePowerControlFunctionSchedule	497
1774	Table 778 – Association ends of ExtControl::ActivePowerControlFunctionSchedule with	
1775	other classes	498
1776	Table 779 – Attributes of ExtControl::ActivePowerControlFunctionTimePoint	498
1777	Table 780 – Association ends of ExtControl::ActivePowerControlFunctionTimePoint	
1778	with other classes	498
1779	Table 781 – Attributes of ExtControl::AreaInterchangeController	499
1780	Table 782 – Association ends of ExtControl::AreaInterchangeController with other	
1781	classes	499
1782	Table 783 – Attributes of ExtControl::AutomationFunction	500
1783	Table 784 – Association ends of ExtControl::AutomationFunction with other classes	500
1784	Table 785 – Attributes of ExtControl::CompensatorController	501
1785	Table 786 – Association ends of ExtControl::CompensatorController with other classes	501
1786	Table 787 – Attributes of ExtControl::ControlFunctionBlock	502
1787	Table 788 – Association ends of ExtControl::ControlFunctionBlock with other classes	503
1788	Table 789 – Attributes of ExtControl::CurrentControlFunction	503
1789	Table 790 – Association ends of ExtControl::CurrentControlFunction with other classes	504
1790	Table 791 – Attributes of ExtControl::CurrentControlFunctionSchedule	504

1791	Table 792 – Association ends of ExtControl::CurrentControlFunctionSchedule with	
1792	other classes	505
1793	Table 793 – Attributes of ExtControl::CurrentControlFunctionTimePoint	505
1794	Table 794 – Association ends of ExtControl::CurrentControlFunctionTimePoint with	
1795	other classes	505
1796	Table 795 – Attributes of ExtControl::CurrentDroopControlFunctionSchedule	505
1797	Table 796 – Association ends of ExtControl::CurrentDroopControlFunctionSchedule	
1798	with other classes	506
1799	Table 797 – Attributes of ExtControl::CurrentDroopControlFunctionTimePoint	506
1800	Table 798 – Association ends of ExtControl::CurrentDroopControlFunctionTimePoint	
1801	with other classes	507
1802	Table 799 – Attributes of ExtControl::DCActivePowerControlFunction	507
1803	Table 800 – Association ends of ExtControl::DCActivePowerControlFunction with other	
1804	classes	507
1805	Table 801 – Attributes of ExtControl::DCActivePowerControlFunctionSchedule	508
1806	Table 802 – Association ends of ExtControl::DCActivePowerControlFunctionSchedule	
1807	with other classes	508
1808	Table 803 – Attributes of ExtControl::DCActivePowerControlFunctionTimePoint	509
1809	Table 804 – Association ends of ExtControl::DCActivePowerControlFunctionTimePoint	
1810	with other classes	509
1811	Table 805 – Attributes of ExtControl::DCCurrentControlFunction	509
1812	Table 806 – Association ends of ExtControl::DCCurrentControlFunction with other	
1813	classes	510
1814	Table 807 – Attributes of ExtControl::DCCurrentControlFunctionSchedule	510
1815	Table 808 – Association ends of ExtControl::DCCurrentControlFunctionSchedule with	
1816	other classes	511
1817	Table 809 – Attributes of ExtControl::DCCurrentControlFunctionTimePoint	511
1818	Table 810 – Association ends of ExtControl::DCCurrentControlFunctionTimePoint with	
1819	other classes	512
1820	Table 811 – Attributes of ExtControl::DCExtinctionAngleControlFunction	512
1821	Table 812 – Association ends of ExtControl::DCExtinctionAngleControlFunction with	
1822	other classes	512
1823	Table 813 – Attributes of ExtControl::DCExtinctionAngleControlFunctionSchedule	513
1824	Table 814 – Association ends of	
1825	ExtControl::DCExtinctionAngleControlFunctionSchedule with other classes	513
1826	Table 815 – Attributes of ExtControl::DCExtinctionAngleControlFunctionTimePoint	514
1827	Table 816 – Association ends of	
1828	ExtControl::DCExtinctionAngleControlFunctionTimePoint with other classes	514
1829	Table 817 – Attributes of ExtControl::DCFiringAngleControlFunction	514
1830	Table 818 – Association ends of ExtControl::DCFiringAngleControlFunction with other	
1831	classes	515
1832	Table 819 – Attributes of ExtControl::DCFiringAngleControlFunctionSchedule	515
1833	Table 820 – Association ends of ExtControl::DCFiringAngleControlFunctionSchedule	
1834	with other classes	516
1835	Table 821 – Attributes of ExtControl::DCFiringAngleControlFunctionTimePoint	516

1836	Table 822 – Association ends of ExtControl::DCFiringAngleControlFunctionTimePoint	
1837	with other classes	516
1838	Table 823 – Attributes of ExtControl::DCPulseWidthModulationControlFunction	517
1839	Table 824 – Association ends of ExtControl::DCPulseWidthModulationControlFunction	
1840	with other classes	517
1841	Table 825 – Attributes of	
1842	ExtControl::DCPulseWidthModulationControlFunctionSchedule	518
1843	Table 826 – Association ends of	
1844	ExtControl::DCPulseWidthModulationControlFunctionSchedule with other classes	518
1845	Table 827 – Attributes of	
1846	ExtControl::DCPulseWidthModulationControlFunctionTimePoint	518
1847	Table 828 – Association ends of	
1848	ExtControl::DCPulseWidthModulationControlFunctionTimePoint with other classes	519
1849	Table 829 – Attributes of ExtControl::DCVoltageControlFunction	519
1850	Table 830 – Association ends of ExtControl::DCVoltageControlFunction with other	
1851	classes	519
1852	Table 831 – Attributes of ExtControl::DCVoltageControlFunctionSchedule	520
1853	Table 832 – Association ends of ExtControl::DCVoltageControlFunctionSchedule with	
1854	other classes	520
1855	Table 833 – Attributes of ExtControl::DCVoltageControlFunctionTimePoint	521
1856	Table 834 – Association ends of ExtControl::DCVoltageControlFunctionTimePoint with	
1857	other classes	521
1858	Table 835 – Attributes of ExtControl::DirectCurrentBipoleController	521
1859	Table 836 – Association ends of ExtControl::DirectCurrentBipoleController with other	
1860	classes	522
1861	Table 837 – Attributes of ExtControl::DirectCurrentEquipmentController	523
1862	Table 838 – Association ends of ExtControl::DirectCurrentEquipmentController with	
1863	other classes	523
1864	Table 839 – Attributes of ExtControl::DirectCurrentMasterController	524
1865	Table 840 – Association ends of ExtControl::DirectCurrentMasterController with other	
1866	classes	524
1867	Table 841 – Attributes of ExtControl::DirectCurrentPoleController	525
1868	Table 842 – Association ends of ExtControl::DirectCurrentPoleController with other	
1869	classes	526
1870	Table 843 – Attributes of ExtControl::DirectCurrentSubstationBipoleController	526
1871	Table 844 – Association ends of ExtControl::DirectCurrentSubstationBipoleController	
1872	with other classes	527
1873	Table 845 – Attributes of ExtControl::DirectCurrentSubstationController	528
1874	Table 846 – Association ends of ExtControl::DirectCurrentSubstationController with	
1875	other classes	528
1876	Table 847 – Attributes of ExtControl::DirectCurrentSubstationPoleController	529
1877	Table 848 – Association ends of ExtControl::DirectCurrentSubstationPoleController	
1878	with other classes	529
1879	Table 849 – Attributes of ExtControl::EquipmentController	530
1880	Table 850 – Association ends of ExtControl::EquipmentController with other classes	531

1881	Table 851 – Attributes of ExtControl::FrequencyControlFunction	531
1882	Table 852 – Association ends of ExtControl::FrequencyControlFunction with other	
1883	classes	532
1884	Table 853 – Attributes of ExtControl::FrequencyControlFunctionSchedule	532
1885	Table 854 – Association ends of ExtControl::FrequencyControlFunctionSchedule with	
1886	other classes	533
1887	Table 855 – Attributes of ExtControl::FrequencyControlFunctionTimePoint	533
1888	Table 856 – Association ends of ExtControl::FrequencyControlFunctionTimePoint with	
1889	other classes	533
1890	Table 857 – Attributes of ExtControl::FrequencyMonitoringTerminal	534
1891	Table 858 – Association ends of ExtControl::FrequencyMonitoringTerminal with other	
1892	classes	534
1893	Table 859 – Attributes of ExtControl::FunctionBlock	534
1894	Table 860 – Association ends of ExtControl::FunctionBlock with other classes	535
1895	Table 861 – Attributes of ExtControl::FunctionInputVariable	535
1896	Table 862 – Association ends of ExtControl::FunctionInputVariable with other classes	535
1897	Table 863 – Attributes of ExtControl::FunctionOutputVariable	536
1898	Table 864 – Association ends of ExtControl::FunctionOutputVariable with other classes	536
1899	Table 865 – Attributes of ExtControl::ImpedanceControlFunction	537
1900	Table 866 – Association ends of ExtControl::ImpedanceControlFunction with other	
1901	classes	537
1902	Table 867 – Attributes of ExtControl::ImpedanceControlFunctionSchedule	538
1903	Table 868 – Association ends of ExtControl::ImpedanceControlFunctionSchedule with	
1904	other classes	538
1905	Table 869 – Attributes of ExtControl::ImpedanceControlFunctionTimePoint	538
1906	Table 870 – Association ends of ExtControl::ImpedanceControlFunctionTimePoint with	
1907	other classes	539
1908	Table 871 – Attributes of ExtControl::InjectionController	539
1909	Table 872 – Association ends of ExtControl::InjectionController with other classes	539
1910	Table 873 – Attributes of ExtControl::PhaseControlFunction	540
1911	Table 874 – Association ends of ExtControl::PhaseControlFunction with other classes	541
1912	Table 875 – Attributes of ExtControl::PhaseControlFunctionSchedule	541
1913	Table 876 – Association ends of ExtControl::PhaseControlFunctionSchedule with other	
1914	classes	542
1915	Table 877 – Attributes of ExtControl::PhaseControlFunctionTimePoint	542
1916	Table 878 – Association ends of ExtControl::PhaseControlFunctionTimePoint with	
1917	other classes	542
1918	Table 879 – Attributes of ExtControl::PowerElectronicsConnectionController	542
1919	Table 880 – Association ends of ExtControl::PowerElectronicsConnectionController	
1920	with other classes	543
1921	Table 881 – Attributes of ExtControl::PowerElectronicsUnitController	544
1922	Table 882 – Association ends of ExtControl::PowerElectronicsUnitController with other	
1923	classes	544

1924	Table 883 – Attributes of ExtControl::PowerFactorControlFunction	545
1925	Table 884 – Association ends of ExtControl::PowerFactorControlFunction with other	
1926	classes	545
1927	Table 885 – Attributes of ExtControl::PowerFactorControlFunctionSchedule	546
1928	Table 886 – Association ends of ExtControl::PowerFactorControlFunctionSchedule	
1929	with other classes	546
1930	Table 887 – Attributes of ExtControl::PowerFactorControlFunctionTimePoint	547
1931	Table 888 – Association ends of ExtControl::PowerFactorControlFunctionTimePoint	
1932	with other classes	547
1933	Table 889 – Attributes of ExtControl::PowerFrequencyController	547
1934	Table 890 – Association ends of ExtControl::PowerFrequencyController with other	
1935	classes	548
1936	Table 891 – Attributes of ExtControl::PowerPlantController	548
1937	Table 892 – Association ends of ExtControl::PowerPlantController with other classes	549
1938	Table 893 – Attributes of ExtControl::ReactivePowerControlFunction	549
1939	Table 894 – Association ends of ExtControl::ReactivePowerControlFunction with other	
1940	classes	550
1941	Table 895 – Attributes of ExtControl::ReactivePowerControlFunctionSchedule	550
1942	Table 896 – Association ends of ExtControl::ReactivePowerControlFunctionSchedule	
1943	with other classes	551
1944	Table 897 – Attributes of ExtControl::ReactivePowerControlFunctionTimePoint	551
1945	Table 898 – Association ends of ExtControl::ReactivePowerControlFunctionTimePoint	
1946	with other classes	552
1947	Table 899 – Attributes of ExtControl::RotatingMachineController	552
1948	Table 900 – Association ends of ExtControl::RotatingMachineController with other	
1949	classes	552
1950	Table 901 – Attributes of ExtControl::ScheduleResourceController	553
1951	Table 902 – Association ends of ExtControl::ScheduleResourceController with other	
1952	classes	553
1953	Table 903 – Attributes of ExtControl::StaticSynchronousSeriesCompensator	554
1954	Table 904 – Association ends of ExtControl::StaticSynchronousSeriesCompensator	
1955	with other classes	555
1956	Table 905 – Attributes of ExtControl::SubstationController	556
1957	Table 906 – Association ends of ExtControl::SubstationController with other classes	556
1958	Table 907 – Attributes of ExtControl::SystemControl	557
1959	Table 908 – Association ends of ExtControl::SystemControl with other classes	557
1960	Table 909 – Attributes of ExtControl::TapChangerController	558
1961	Table 910 – Association ends of ExtControl::TapChangerController with other classes	558
1962	Table 911 – Attributes of ExtControl::TCSCController	559
1963	Table 912 – Association ends of ExtControl::TCSCController with other classes	560
1964	Table 913 – Attributes of ExtControl::UnifiedPowerFlowController	560
1965	Table 914 – Association ends of ExtControl::UnifiedPowerFlowController with other	
1966	classes	561

1967	Table 915 – Attributes of ExtControl::VoltageAngleControlFunction	561
1968	Table 916 – Association ends of ExtControl::VoltageAngleControlFunction with other	
1969	classes	562
1970	Table 917 – Attributes of ExtControl::VoltageAngleControlFunctionSchedule	562
1971	Table 918 – Association ends of ExtControl::VoltageAngleControlFunctionSchedule	
1972	with other classes	563
1973	Table 919 – Attributes of ExtControl::VoltageAngleControlFunctionTimePoint	563
1974	Table 920 – Association ends of ExtControl::VoltageAngleControlFunctionTimePoint	
1975	with other classes	563
1976	Table 921 – Attributes of ExtControl::VoltageControlFunction	564
1977	Table 922 – Association ends of ExtControl::VoltageControlFunction with other classes	564
1978	Table 923 – Attributes of ExtControl::VoltageControlFunctionSchedule	565
1979	Table 924 – Association ends of ExtControl::VoltageControlFunctionSchedule with	
1980	other classes	565
1981	Table 925 – Attributes of ExtControl::VoltageControlFunctionTimePoint	565
1982	Table 926 – Association ends of ExtControl::VoltageControlFunctionTimePoint with	
1983	other classes	566
1984	Table 927 – Attributes of ExtControl::VoltageInjectionControlFunctionSchedule	566
1985	Table 928 – Association ends of ExtControl::VoltageInjectionControlFunctionSchedule	
1986	with other classes	566
1987	Table 929 – Attributes of ExtControl::VoltageInjectionControlFunctionTimePoint	567
1988	Table 930 – Association ends of ExtControl::VoltageInjectionControlFunctionTimePoint	
1989	with other classes	567
1990	Table 931 – Attributes of ExtGeneratingUnit::EquivalentGeneratingUnit	570
1991	Table 932 – Association ends of ExtGeneratingUnit::EquivalentGeneratingUnit with	
1992	other classes	572
1993	Table 933 – Attributes of ExtGeneratingUnit::EquivalentPowerPlant	573
1994	Table 934 – Association ends of ExtGeneratingUnit::EquivalentPowerPlant with other	
1995	classes	573
1996	Table 935 – Attributes of ExtGeneratingUnit::PowerPlant	574
1997	Table 936 – Association ends of ExtGeneratingUnit::PowerPlant with other classes	574
1998	Table 937 – Attributes of ExtGeneratingUnit::EquivalentPowerElectronicsUnit	575
1999	Table 938 – Association ends of ExtGeneratingUnit::EquivalentPowerElectronicsUnit	
2000	with other classes	576
2001	Table 939 – Attributes of ExtGeneratingUnit::MobileElectricalUnit	577
2002	Table 940 – Association ends of ExtGeneratingUnit::MobileElectricalUnit with other	
2003	classes	577
2004	Table 941 – Attributes of ExtGeneratingUnit::CombinedCyclePlant	578
2005	Table 942 – Association ends of ExtGeneratingUnit::CombinedCyclePlant with other	
2006	classes	579
2007	Table 943 – Attributes of ExtGeneratingUnit::CogenerationPlant	579
2008	Table 944 – Association ends of ExtGeneratingUnit::CogenerationPlant with other	
2009	classes	580
2010	Table 945 – Attributes of ExtGeneratingUnit::CompressedAirEnergyStoragePlant	580

2011	Table 946 – Association ends of	
2012	ExtGeneratingUnit::CompressedAirEnergyStoragePlant with other classes	581
2013	Table 947 – Attributes of ExtGeneratingUnit::ThermalPowerPlant	581
2014	Table 948 – Association ends of ExtGeneratingUnit::ThermalPowerPlant with other	
2015	classes	582
2016	Table 949 – Attributes of ExtGeneratingUnit::ThermalGeneratingUnitDependency	582
2017	Table 950 – Association ends of	
2018	ExtGeneratingUnit::ThermalGeneratingUnitDependency with other classes	583
2019	Table 951 – Literals of ExtGeneratingUnit::CombinedCycleConfigurationKind	583
2020	Table 952 – Attributes of ExtGeneratingUnit::EnergyStoragePlant	583
2021	Table 953 – Association ends of ExtGeneratingUnit::EnergyStoragePlant with other	
2022	classes	584
2023	Table 954 – Attributes of ExtGeneratingUnit::ExtHydroPowerPlant	584
2024	Table 955 – Attributes of ExtDomain::MassFlowRate	585
2025	Table 956 – Attributes of ExtDomain::CountPerArea	586
2026	Table 957 – Attributes of ExtDomain::Irradiance	586
2027	Table 958 – Attributes of ExtDomain::Irradiation	586
2028	Table 959 – Attributes of ExtDCEquivalent::DCValve	589
2029	Table 960 – Association ends of ExtDCEquivalent::DCValve with other classes	589
2030	Table 961 – Attributes of ExtDCEquivalent::EquivalentACDCConverter	590
2031	Table 962 – Association ends of ExtDCEquivalent::EquivalentACDCConverter with	
2032	other classes	591
2033	Table 963 – Literals of ExtDCEquivalent::ACDCConverterKind	592
2034	Table 964 – Attributes of ExtDCEquivalent::ModularMultilevelConverterValve	592
2035	Table 965 – Association ends of ExtDCEquivalent::ModularMultilevelConverterValve	
2036	with other classes	593
2037	Table 966 – Literals of ExtDCEquivalent::ModularMultilevelConverterValveKind	594
2038	Table 967 – Attributes of ExtDCEquivalent::ModularMultilevelConverter	594
2039	Table 968 – Association ends of ExtDCEquivalent::ModularMultilevelConverter with	
2040	other classes	595
2041	Table 969 – Attributes of ExtDCEquivalent::DiodeValve	596
2042	Table 970 – Association ends of ExtDCEquivalent::DiodeValve with other classes	597
2043	Table 971 – Attributes of ExtDCEquivalent::ThyristorValve	598
2044	Table 972 – Association ends of ExtDCEquivalent::ThyristorValve with other classes	598
2045	Table 973 – Attributes of ExtDCEquivalent::InsulatedGateBipolarTransistorValve	599
2046	Table 974 – Association ends of	
2047	ExtDCEquivalent::InsulatedGateBipolarTransistorValve with other classes	599
2048	Table 975 – Attributes of ExtDCEquivalent::GateTurnOffThyristorValve	600
2049	Table 976 – Association ends of ExtDCEquivalent::GateTurnOffThyristorValve with	
2050	other classes	600
2051	Table 977 – Attributes of ExtDCEquivalent::DCEquivalentInjection	601
2052	Table 978 – Association ends of ExtDCEquivalent::DCEquivalentInjection with other	
2053	classes	602

2054	Table 979 – Literals of ExtDCEquivalent::ACDCConverterControlStrategyKind	602
2055	Table 980 – Attributes of ExtDCEquivalent::DCVoltageSource	603
2056	Table 981 – Association ends of ExtDCEquivalent::DCVoltageSource with other	
2057	classes	603
2058	Table 982 – Attributes of ExtDCEquivalent::ExtDCTerminal	604
2059	Table 983 – Literals of ExtDCEquivalent::DCTerminalPolarityKind	604
2060	Table 984 – Attributes of ExtConnectionPoint::PointOfCommonCoupling	608
2061	Table 985 – Association ends of ExtConnectionPoint::PointOfCommonCoupling with	
2062	other classes	608
2063	Table 986 – Attributes of ExtConnectionPoint::GridConnectionPoint	609
2064	Table 987 – Association ends of ExtConnectionPoint::GridConnectionPoint with other	
2065	classes	609
2066	Table 988 – Attributes of ExtConnectionPoint::EnergyExchangePoint	610
2067	Table 989 – Association ends of ExtConnectionPoint::EnergyExchangePoint with other	
2068	classes	610
2069	Table 990 – Attributes of ExtConnectionPoint::MeasurementPoint	611
2070	Table 991 – Association ends of ExtConnectionPoint::MeasurementPoint with other	
2071	classes	611
2072	Table 992 – Attributes of ExtConnectionPoint::AccountingPoint	612
2073	Table 993 – Association ends of ExtConnectionPoint::AccountingPoint with other	
2074	classes	614
2075	Table 994 – Attributes of ExtConnectionPoint::CommonResponsibilityPoint	614
2076	Table 995 – Association ends of ExtConnectionPoint::CommonResponsibilityPoint with	
2077	other classes	615
2078	Table 996 – Attributes of ExtConnectionPoint::BoundaryPoint	616
2079	Table 997 – Association ends of ExtConnectionPoint::BoundaryPoint with other	
2080	classes	616
2081	Table 998 – Attributes of ExtConnectionPoint::BoundaryPointBorderLink	617
2082	Table 999 – Association ends of ExtConnectionPoint::BoundaryPointBorderLink with	
2083	other classes	617
2084	Table 1000 – Attributes of ExtConnectionPoint::BoundaryPointBorder	618
2085	Table 1001 – Association ends of ExtConnectionPoint::BoundaryPointBorder with other	
2086	classes	619
2087	Table 1002 – Attributes of ExtDesignation::Designation	621
2088	Table 1003 – Association ends of ExtDesignation::Designation with other classes	621
2089	Table 1004 – Literals of ExtDesignation::DesignationKind	621
2090	Table 1005 – Attributes of ExtDesignation::DesignationType	623
2091	Table 1006 – Association ends of ExtDesignation::DesignationType with other classes	624
2092	Table 1007 – Literals of ExtDesignation::UniquenessScopeKind	624
2093	Table 1008 – Attributes of ExtDesignation::DesignationAuthority	625
2094	Table 1009 – Association ends of ExtDesignation::DesignationAuthority with other	
2095	classes	625
2096	Table 1010 – Attributes of ExtDesignation::Identity	626

2097	Table 1011 – Attributes of ExtCrossZonalNetworkElement::CrossZonalNetworkElement	627
2098	Table 1012 – Association ends of	
2099	ExtCrossZonalNetworkElement::CrossZonalNetworkElement with other classes	628
2100	Table 1013 – Attributes of ExtCrossZonalNetworkElement::CrossZonalLine	628
2101	Table 1014 – Association ends of ExtCrossZonalNetworkElement::CrossZonalLine with	
2102	other classes	628
2103	Table 1015 – Attributes of	
2104	ExtCrossZonalNetworkElement::CrossZonalPowerTransformer	628
2105	Table 1016 – Association ends of	
2106	ExtCrossZonalNetworkElement::CrossZonalPowerTransformer with other classes	629
2107	Table 1017 – Attributes of ExtCrossZonalNetworkElement::CrossZonalDCPole	629
2108	Table 1018 – Association ends of ExtCrossZonalNetworkElement::CrossZonalDCPole	
2109	with other classes	629
2110	Table 1019 – Attributes of ExtCommon::PeerTemporalDependency	630
2111	Table 1020 – Literals of ExtCommon::DependencyConstraintKind	632
2112	Table 1021 – Literals of ExtCommon::ReferenceValueKind	633
2113	Table 1022 – Literals of ExtCommon::RecordStatusKind	633
2114	Table 1023 – Attributes of ExtCommon::RecordVersion	634
2115	Table 1024 – Association ends of ExtCommon::RecordVersion with other classes	634
2116		

2117 1 Introduction

2118 This document describes CIM extensions that were designed for the purpose of network codes
2119 related exchanges. The set of profiles which use these extensions could be applied for other
2120 exchanges too. Therefore, the objective is to propose these extensions for appropriate
2121 standardisation in IEC.

2122 The Coordinated Security Analysis data exchange specification by ENTSO-E shall be used as
2123 a reference to understand the context, use cases and the terms and definitions considered while
2124 designing the canonical extensions.

2125 This document is describing extensions to support:

- 2126 - proper modelling required for CSA process, long-term network and market simulations,
- 2127 - be more explicit about various DER types, and,
- 2128 - uniformly support energy allocation to any kind of energy resource.

2129 2 Specification documents references

2130 The following specification documents, in whole or in part, are referenced in this document and
2131 are indispensable for its application. For dated references, only the edition cited applies. For
2132 undated references, the latest edition of the referenced document (including any amendments)
2133 applies.

- 2134 • ENTSO-E Regional Coordination Processes Data Exchange Specification;

2135 The class SimulationEvents is part of the IEC 61970-302:2024 and IEC 61970-457:2024 that is
2136 not part of CGMES 3.0 but will be included in upcoming version of CGMES. For technical reason
2137 this has not been tagged with the NC namespace because it is only referred to, not initiated.
2138 SimulationSetting profile is part of the header and metadata document.

2139 3 Network codes extensions

2140 3.1 General

2141 This package contains the extensions defined for the need of Network codes (NC) data
2142 exchanges.

2143 3.2 ExtNetworkCodesCIMVersion root class

2144 The version information assigned to the extensions defined for the need of network codes data
2145 exchanges.

2146 Table 1 shows all attributes of ExtNetworkCodesCIMVersion.

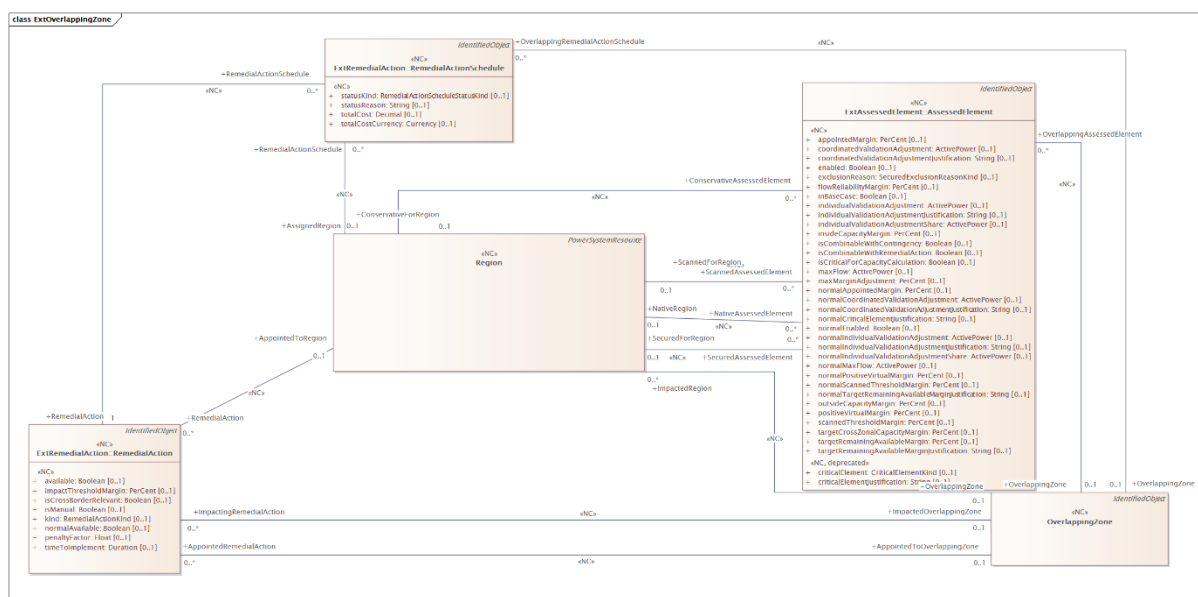
2147 **Table 1 – Attributes of ExtNetworkCodes::ExtNetworkCodesCIMVersion**

name	mult	type	description
date	0..1	Date	Date of the last canonical model update. Form is YYYY-MM-DD. For example, for 5 January 2009 it is 2009-01-05.
version	0..1	String	European namespace URI. The last two elements in the URI (http://iec.ch/TC57/CIM100-EuropeanExtension/yy/zzz#) indicate major and minor versions where: - yy - indicates a major version; - zzz - indicates a minor version.

2148

2149 **3.3 Package ExtArea**2150 **3.3.1 General**

2151 This package contains the extensions related to the areas.

2152 **Figure 1 – Class diagram ExtArea::ExtOverlappingZone**

2154 Figure 1: The diagram contains classes related to overlapping zone.

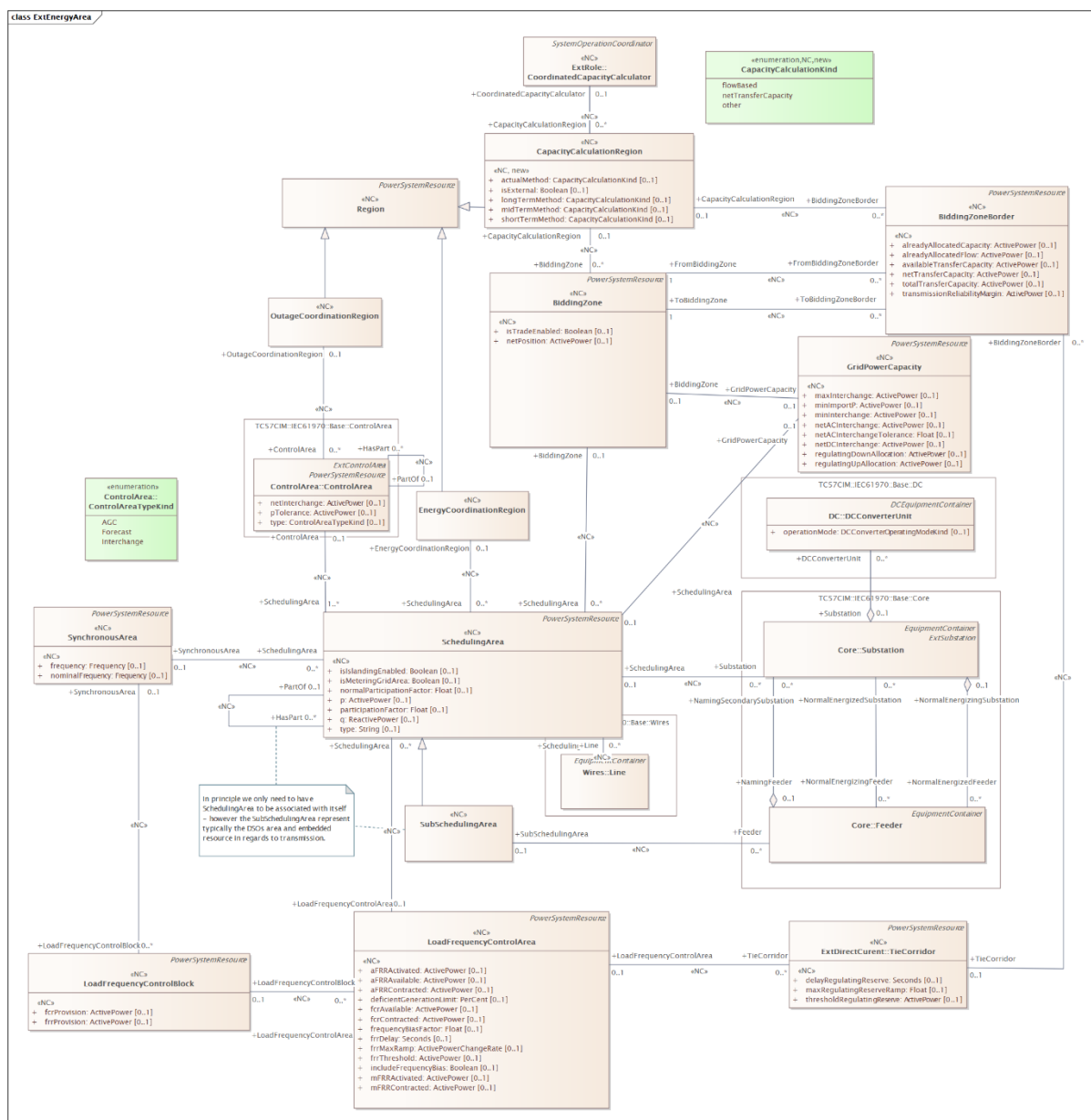


Figure 2 – Class diagram ExtArea::ExtEnergyArea

Figure 2: The diagram contains classes related to energy area.

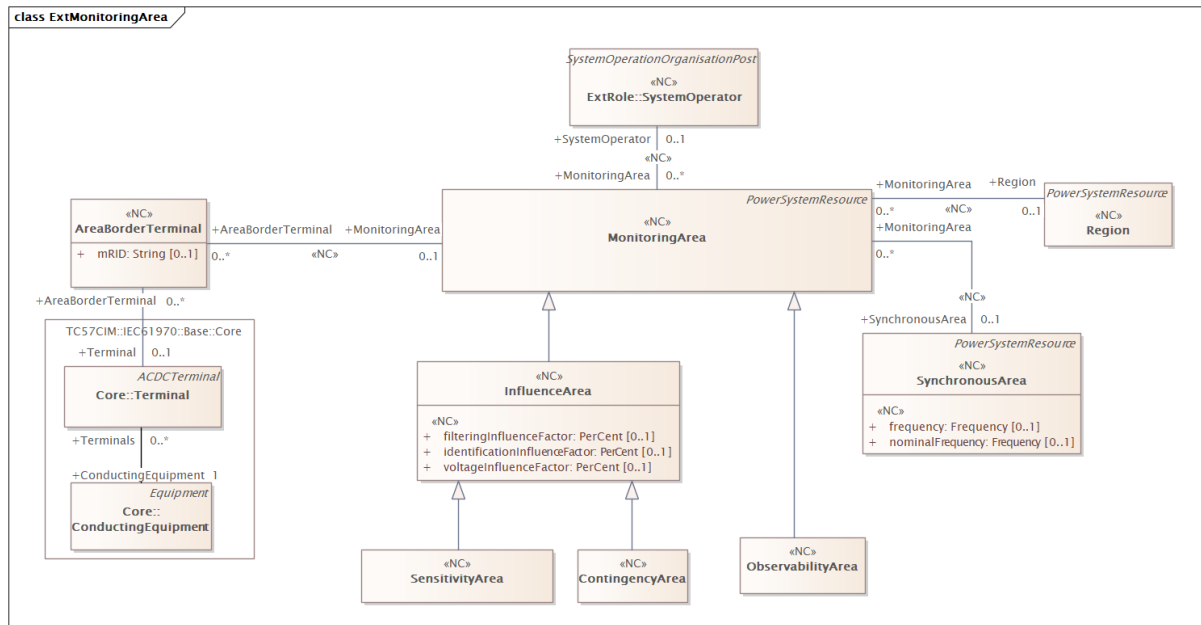


Figure 3 – Class diagram ExtArea::ExtMonitoringArea

Figure 3: The diagram contains classes related to monitoring area.

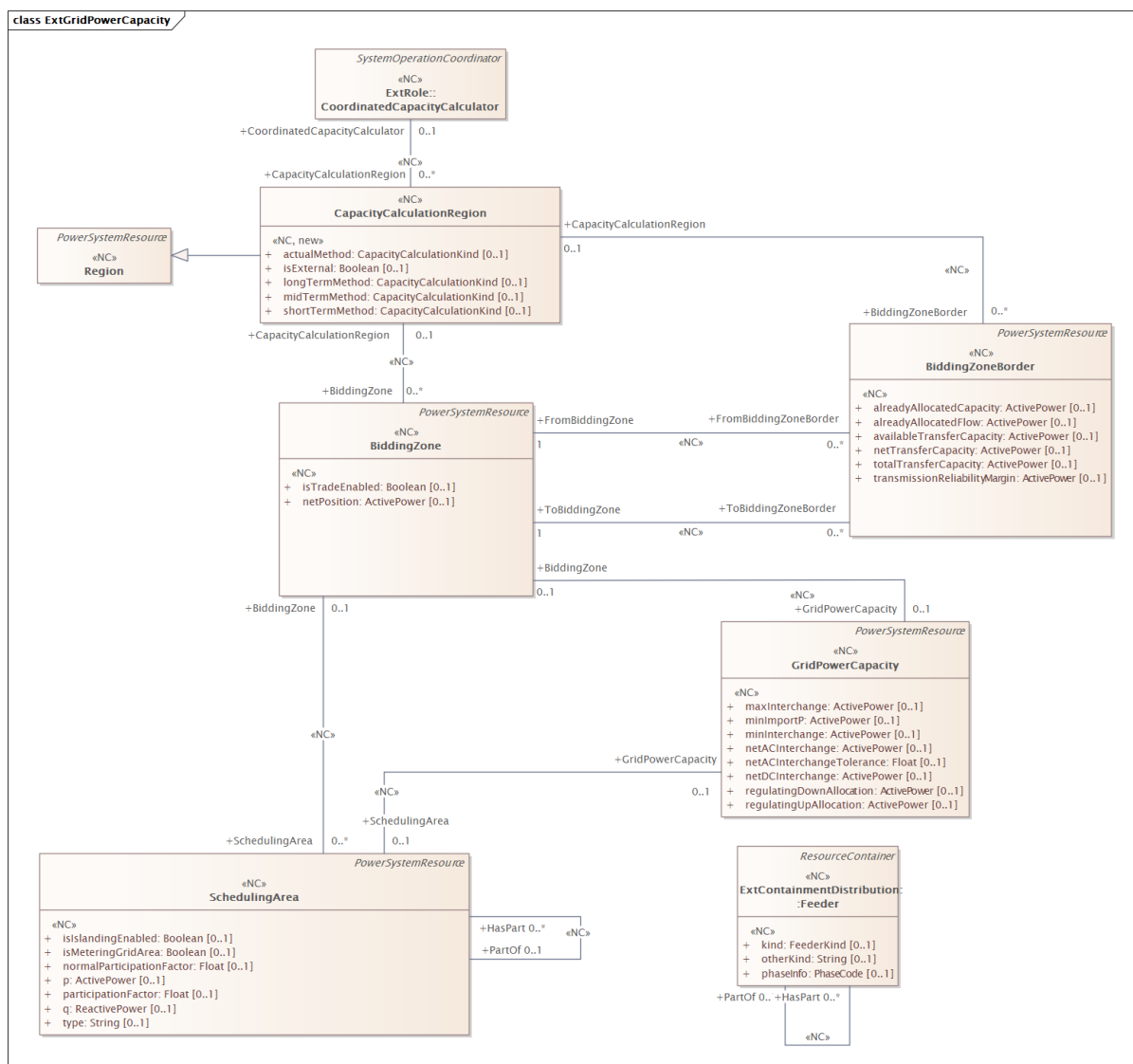


Figure 4 – Class diagram ExtArea::ExtGridPowerCapacity

Figure 4: The diagram includes classes relevant to modelling of power capacity.



2177 **Table 3 – Association ends of ExtArea::OutageCoordinationRegion with other classes**

mult from	name	mult to	type	description
0..1	ControlArea	0..*	ControlArea	(NC) The control area that is part of this outage coordination region.
0..1	OutagePlanningAgent	0..*	OutagePlanningAgent	(NC) Agent responsible for planning availability in this outage coordination region.
0..*	SecurityCoordinator	0..1	SecurityCoordinator	(NC) The security coordinator that is responsible for this outage coordination region.
0..*	OutageCoordinator	0..1	OutageCoordinator	(NC) The outage coordinator responsible for this outage coordination region.
0..1	ConservativeAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..1	RemedialAction	0..*	RemedialAction	(NC) inherited from: Region
0..1	SecuredAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) inherited from: Region
0..1	LimitViolation	0..*	PowerFlowResult	(NC) inherited from: Region
0..1	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: Region
0..*	OverlappingZone	0..1	OverlappingZone	(NC) inherited from: Region
0..1	ScannedAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..1	NativeAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2178

2179 **3.3.3 (NC) OverlappingZone**

2180 Inheritance path = IdentifiedObject : ExtEuIdentifiedObject : Identity

2181 A collection of all the overlapping cross border assessed elements which have the same sets of impacted and impacting regions.

2182 Table 4 shows all attributes of OverlappingZone.

2183 **Table 4 – Attributes of ExtArea::OverlappingZone**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 5 shows all association ends of OverlappingZone with other classes.

Table 5 – Association ends of ExtArea::OverlappingZone with other classes

mult from	name	mult to	type	description
0..1	ImpactingRemedialAction	0..*	RemedialAction	(NC) The remedial action that is impacting an overlapping zone.
0..1	AppointedRemedialAction	0..*	RemedialAction	(NC) The appointed remedial action that is appointed to an overlapping zone.
0..1	OverlappingAssessedElement	0..*	AssessedElement	(NC) The overlapping assessed element on which the physical flows are significantly impacted by electricity exchanges in two or more regions or by remedial actions from two or more regions.
0..1	OverlappingRemedialActionSchedule	0..*	RemedialActionSchedule	(NC) The remedial action schedule which is overlapping for this zone.
0..1	ImpactedRegion	0..*	Region	(NC) The region that is impacted by this overlapping zone.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.3.4 (NC) Region

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : Identity

A region where the system operator belongs to.

Table 6 shows all attributes of Region.

Table 6 – Attributes of ExtArea::Region

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 7 shows all association ends of Region with other classes.

2196

Table 7 – Association ends of ExtArea::Region with other classes

mult from	name	mult to	type	description
0..1	ConservativeAssessedElement	0..*	AssessedElement	(NC) The assessed element which is considered conservative for this region.
0..1	RemedialAction	0..*	RemedialAction	(NC) The remedial action which is considered in the region.
0..1	SecuredAssessedElement	0..*	AssessedElement	(NC) The assessed element secured for this region.
0..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) The remedial action schedule relevant for this region.
0..1	LimitViolation	0..*	PowerFlowResult	(NC) The limit violation reported by a region.
0..1	MonitoringArea	0..*	MonitoringArea	(NC) Monitoring area which belongs to a region.
0..*	OverlappingZone	0..1	OverlappingZone	(NC) The overlapping zone which is impacted by this region.
0..1	ScannedAssessedElement	0..*	AssessedElement	(NC) These are the scanned assessed elements for a region.
0..1	NativeAssessedElement	0..*	AssessedElement	(NC) The native assessed element for a native region.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2197

3.3.5 (NC) ScheduleResource

2199 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity
 2200 A schedule resource is a market-based method for handling participation of small units,
 2201 particularly located on the lower voltage level that is controlled by a Distributed System
 2202 Operator (DSO). It is a collection of units that can operate in the market by providing bids, offers
 2203 and a resulting committed operational schedule for the collection.

2204 Table 8 shows all attributes of ScheduleResource.

2205

Table 8 – Attributes of ExtArea::ScheduleResource

name	mult	type	description
participationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated

name	mult	type	description
			value (T) divided by sum of participation factors (PF), i.e. $V=T/\sum(PF)$. In the case of priority strategy, the item with the lowest number gets allocated energy first.
normalParticipationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\sum(PF)$. In the case of priority strategy, the item with the lowest number gets allocated energy first.
p	0..1	ActivePower	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 9 shows all association ends of ScheduleResource with other classes.

Table 9 – Association ends of ExtArea::ScheduleResource with other classes

mult from	name	mult to	type	description
0..1	GeneratingUnit	0..*	GeneratingUnit	(NC) The generating unit that relates to this schedule resource.
0..1	HydroPump	0..*	HydroPump	(NC) The hydro pump that relates to this schedule resource.
0..1	PowerElectronicsUnit	0..*	PowerElectronicsUnit	(NC) The power electronics unit that relates to this schedule resource.
0..1	RegisteredResource	0..1	RegisteredResource	(NC)
0..1	AreaReserveResource	0..1	AreaReserveResource	(NC) Area reserve resources representing the balancing reserve products provided through the schedule resource.
0..*	SchedulingArea	0..1	SchedulingArea	(NC) The scheduling area that has this schedule resource.
0..1	PowerSchedule	0..*	PowerSchedule	(NC) Power schedule which belongs to the schedule resource.
0..*	ResourceOf	0..1	ScheduleResource	(NC) The schedule resource that has this subschedule resource.
0..1	PowerShiftKeySchedule	0..*	PowerShiftKeySchedule	(NC) The Power Shift Key schedule for a schedule resource.
0..1	PowerBidSchedule	0..*	PowerBidSchedule	(NC) Power bid schedule which belongs to a schedule resource.

mult from	name	mult to	type	description
0..*	PrimaryEnergyResource Type	0..1	EnergyResourceType	(NC) The primary energy resource type represented by the schedule resource. Note: Where a schedule resource represents multiple energy resource types, the detailed resource model should be used to determine the individual contributions.
0..1	ScheduleResourceController	0..1	ScheduleResourceController	(NC) Schedule resource controller for this schedule resource.
0..1	MarketResourceProduct Relevance	0..*	MarketResourceProduct Eligibility	(NC,new)
0..1	EnergyResourceAvailability	0..*	EnergyResourceAvailability	
0..1	ResourceEnergyPriceSensitivity	0..*	ResourceEnergyPriceSensitivity	(NC,new)
0..1	SubScheduleResource	0..*	ScheduleResource	(NC) The subschedule resource that relates to the schedule resource.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2209

2210 **3.3.6 (NC) SchedulingArea**

2211 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

2212 An area where production and/or consumption of energy can be forecasted, scheduled and

2213 measured. The area is operated by only one system operator, typically a Transmission System

2214 Operator (TSO). The area can consist of a sub area, which has the same definition as the main

2215 area, but it can be operated by another system operator (typically Distributed System Operator

2216 (DSO) or a Closed Distributed System Operator (CDSO)). This includes microgrid concept. A

2217 substation is the smallest grouping that can be included in the area. The area size should be

2218 considered in terms of the possibility of accumulated reading (settlement metering) and the

2219 capability of operating as an island.

2220 Table 10 shows all attributes of SchedulingArea.

2221 **Table 10 – Attributes of ExtArea::SchedulingArea**

name	mult	type	description
isIslandingEnabled	0..1	Boolean	(NC) Identifies if the area can operate in island operation. If true, the area is enabled (capable) of operating as an electrical island. If false, the area does not have the capability or it is not enabled to operate as an electrical island.
isMeteringGridArea	0..1	Boolean	(NC) Identifies if the area is settlement metered for all import and export to the area. If true, the area is metered area. If false, it is not.

name	mult	type	description
normalParticipationFactor	0..1	Float	(NC) Normal participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(\text{PF})$. In the case of priority strategy, the item with the lowest number gets allocated energy first.
type	0..1	String	(NC) Type of scheduling area.
p	0..1	ActivePower	(NC) Netted active power representing production, consumption and import/export for the scheduling area. Load sign convention is used, i.e. positive value indicates flow into the area.
q	0..1	ReactivePower	(NC) Netted reactive power representing production, consumption and import/export for the scheduling area. Load sign convention is used, i.e. positive value indicates flow into the area.
participationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(\text{PF})$. In the case of priority strategy, the item with the lowest number gets allocated energy first.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 11 shows all association ends of SchedulingArea with other classes.

Table 11 – Association ends of ExtArea::SchedulingArea with other classes

mult from	name	mult to	type	description
0..1	Substation	0..*	Substation	(NC) The substation that is part of this scheduling area.
0..1	Line	0..*	Line	(NC) The line that is part of this scheduling area.
1..*	ControlArea	0..1	ControlArea	(NC) The control area for this scheduling area.

mult from	name	mult to	type	description
0..1	DCTieCorridor	0..1	DCTieCorridor	(NC) The DC tie corridor that is part of this scheduling area.
0..1	PowerSchedule	0..*	PowerSchedule	(NC) Power schedule which belongs to the scheduling area.
0..1	PowerShiftKeySchedule	0..*	PowerShiftKeySchedule	
0..1	HasPart	0..*	SchedulingArea	(NC) The scheduling area has these scheduling area parts.
0..1	ScheduleResource	0..*	ScheduleResource	(NC) The schedule resource that belongs to this scheduled area.
0..1	AreaReserveResource	0..*	AreaReserveResource	(NC) Area reserve resources made available within the scheduling area for the provision of balancing reserve products.
0..1	EnergyResourceGroupCapacity	0..*	EnergyResourceGroupCapacity	(NC) The Energy Resource Group Capacity belonging to a given energy scheduling area.
0..*	SynchronousArea	0..1	SynchronousArea	(NC) The synchronous area that has this scheduling area.
0..*	SystemOperator	0..1	SystemOperator	(NC) The system operator for this scheduling area.
0..*	LoadFrequencyControlArea	0..1	LoadFrequencyControlArea	(NC) The load frequency control area which has this scheduling area.
0..*	EnergyCoordinationRegion	0..1	EnergyCoordinationRegion	(NC) The energy coordination region that has this scheduling area.
0..*	BiddingZone	0..1	BiddingZone	(NC) The bidding zone related to this scheduling area.
0..1	PowerShiftKeyStrategy	0..*	PowerShiftKeyStrategy	(NC) Power Shift Key Strategy which has a scheduling area.
0..1	GridPowerCapacity	0..1	GridPowerCapacity	(NC) Grid Power capacity of this scheduling area.
1..1	SchedulingAreaExchangePoint	0..*	SchedulingAreaExchangePoint	(NC) The scheduling area exchange point for this scheduling area.
0..1	PowerLossFunction	0..*	PowerLossFunction	The power loss functions used to calculate the active power losses attributed to the scheduling area.
0..*	PartOf	0..1	SchedulingArea	(NC) The scheduling area is part of this scheduling area.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2225

2226 **3.3.7 (NC) SensitivityArea**

2227 Inheritance path = [InfluenceArea](#) : [MonitoringArea](#) : PowerSystemResource : IdentifiedObject :
 2228 ExtEulIdentifiedObject : Identity

2229 A monitoring area that defines the required observability area given by the sensitivity factors.

2230 Table 12 shows all attributes of SensitivityArea.

2231 **Table 12 – Attributes of ExtArea::SensitivityArea**

name	mult	type	description
identificationInfluenceFactor	0..1	PerCent	(NC) inherited from: InfluenceArea
filteringInfluenceFactor	0..1	PerCent	(NC) inherited from: InfluenceArea
voltageInfluenceFactor	0..1	PerCent	(NC) inherited from: InfluenceArea
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

2232

2233 Table 13 shows all association ends of SensitivityArea with other classes.

2234 **Table 13 – Association ends of ExtArea::SensitivityArea with other classes**

mult from	name	mult to	type	description
0..1	QuantitativeRemedialActionImpact	0..*	QuantitativeRemedialActionImpact	(NC) Quantitative remedial action impact when the remedial action is influencing equipment included in the sensitivity area.
0..*	SynchronousArea	0..1	SynchronousArea	(NC) inherited from: MonitoringArea
0..*	Region	0..1	Region	(NC) inherited from: MonitoringArea
0..1	AreaBorderTerminal	0..*	AreaBorderTerminal	(NC) inherited from: MonitoringArea
0..*	SystemOperator	0..1	SystemOperator	(NC) inherited from: MonitoringArea
0..1	PowerFrequencyController	0..1	PowerFrequencyController	(NC) inherited from: MonitoringArea
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2235

2236 **3.3.8 (NC) SubSchedulingArea**

2237 Inheritance path = [SchedulingArea](#) : PowerSystemResource : IdentifiedObject :
2238 ExtEulIdentifiedObject : Identity

2239 An area that is a part of another scheduling area. Typically part of a Transmission System
2240 Operator (TSO) scheduling area operated by a Distributed System Operator (DSO) or a Close
2241 Distributed System Operator (CDSO). This includes microgrid concept. A sub scheduling area
2242 can contain other sub areas. A sub scheduling area leaf will form the smallest entity of any
2243 given energy area.

2244 Table 14 shows all attributes of SubSchedulingArea.

2245 **Table 14 – Attributes of ExtArea::SubSchedulingArea**

name	mult	type	description
isIslandingEnabled	0..1	Boolean	(NC) inherited from: SchedulingArea
isMeteringGridArea	0..1	Boolean	(NC) inherited from: SchedulingArea
normalParticipationFactor	0..1	Float	(NC) inherited from: SchedulingArea
type	0..1	String	(NC) inherited from: SchedulingArea
p	0..1	ActivePower	(NC) inherited from: SchedulingArea
q	0..1	ReactivePower	(NC) inherited from: SchedulingArea
participationFactor	0..1	Float	(NC) inherited from: SchedulingArea
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

2246
2247 Table 15 shows all association ends of SubSchedulingArea with other classes.

2248 **Table 15 – Association ends of ExtArea::SubSchedulingArea with other classes**

mult from	name	mult to	type	description
0..1	Feeder	0..*	Feeder	(NC) The feeder that is part of this subscheduling area.
0..1	SecondarySubstation	0..*	SecondarySubstation	(NC) The secondary substation that is connected to this subscheduling area.
0..1	Substation	0..*	Substation	(NC) inherited from: SchedulingArea
0..1	Line	0..*	Line	(NC) inherited from: SchedulingArea
1..*	ControlArea	0..1	ControlArea	(NC) inherited from: SchedulingArea
0..1	DCTieCorridor	0..1	DCTieCorridor	(NC) inherited from: SchedulingArea
0..1	PowerSchedule	0..*	PowerSchedule	(NC) inherited from: SchedulingArea
0..1	PowerShiftKeySchedule	0..*	PowerShiftKeySchedule	inherited from: SchedulingArea
0..1	HasPart	0..*	SchedulingArea	(NC) inherited from: SchedulingArea
0..1	ScheduleResource	0..*	ScheduleResource	(NC) inherited from: SchedulingArea
0..1	AreaReserveResource	0..*	AreaReserveResource	(NC) inherited from: SchedulingArea

mult from	name	mult to	type	description
0..1	EnergyResourceGroupCapacity	0..*	EnergyResourceGroupCapacity	(NC) inherited from: SchedulingArea
0..*	SynchronousArea	0..1	SynchronousArea	(NC) inherited from: SchedulingArea
0..*	SystemOperator	0..1	SystemOperator	(NC) inherited from: SchedulingArea
0..*	LoadFrequencyControlArea	0..1	LoadFrequencyControlArea	(NC) inherited from: SchedulingArea
0..*	EnergyCoordinationRegion	0..1	EnergyCoordinationRegion	(NC) inherited from: SchedulingArea
0..*	BiddingZone	0..1	BiddingZone	(NC) inherited from: SchedulingArea
0..1	PowerShiftKeyStrategy	0..*	PowerShiftKeyStrategy	(NC) inherited from: SchedulingArea
0..1	GridPowerCapacity	0..1	GridPowerCapacity	(NC) inherited from: SchedulingArea
1..1	SchedulingAreaExchangePoint	0..*	SchedulingAreaExchangePoint	(NC) inherited from: SchedulingArea
0..1	PowerLossFunction	0..*	PowerLossFunction	inherited from: SchedulingArea
0..*	PartOf	0..1	SchedulingArea	(NC) inherited from: SchedulingArea
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2249

2250 **3.3.9 (NC) SynchronousArea**

2251 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

2252 A synchronous area is an electrical area covered by interconnect with a common system frequency in a steady-state.

2253 Table 16 shows all attributes of SynchronousArea.

2254 **Table 16 – Attributes of ExtArea::SynchronousArea**

2255

name	mult	type	description
frequency	0..1	Frequency	(NC) The frequency of the electrical power system that can be measured in all network areas of the synchronous system under the assumption of a coherent value for the system in the time frame of seconds (with minor differences between different measurement locations only).
nominalFrequency	0..1	Frequency	(NC) The nominal frequency for the Synchronous Area, e.g. 50 Hz for Europe.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 17 shows all association ends of SynchronousArea with other classes.

Table 17 – Association ends of ExtArea::SynchronousArea with other classes

mult from	name	mult to	type	description
0..1	SchedulingArea	0..*	SchedulingArea	(NC) The scheduling area that is part of this synchronous area.
0..1	MonitoringArea	0..*	MonitoringArea	(NC) The monitoring area that is part of this synchronous area.
0..1	LoadFrequencyControlBlock	0..*	LoadFrequencyControlBlock	(NC) The load frequency control block that is part of this synchronous area.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.3.10 (NC) AreaBorderTerminal root class

Area border terminal defines the terminals that are defining a monitoring area.

Table 18 shows all attributes of AreaBorderTerminal.

Table 18 – Attributes of ExtArea::AreaBorderTerminal

name	mult	type	description
mRID	0..1	String	Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

Table 19 shows all association ends of AreaBorderTerminal with other classes.

2266 **Table 19 – Association ends of ExtArea::AreaBorderTerminal with other classes**

mult from	name	mult to	type	description
0..*	Terminal	0..1	Terminal	The Terminal that is part of an AreaBorderTerminal.
0..*	MonitoringArea	0..1	MonitoringArea	(NC) The MonitoringArea defined by this AreaBorderTerminal.

2267

2268 **3.3.11 (NC) BiddingZone**

2269 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity
 2270 A bidding zone is a market-based method for handling power transmission congestion. It
 2271 consists of scheduling areas that include the relevant production (supply) and consumption
 2272 (demand) to form an electrical area with the same market price without capacity allocation.
 2273 Table 20 shows all attributes of BiddingZone.

2274 **Table 20 – Attributes of ExtArea::BiddingZone**

name	mult	type	description
isTradeEnabled	0..1	Boolean	(NC) Identifies the mechanism for determining the energy price for a given bidding zone. If true, the bid and the offer is expected to be provided for the bidding zone to create the market price. If false, other mechanism determines the price of energy for a given bidding zone, e.g. virtual bidding zone.
netPosition	0..1	ActivePower	(NC) Net position is the netted sum of electricity exports and imports for each market time unit for a bidding zone.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

2275

2276 Table 21 shows all association ends of BiddingZone with other classes.

2277 **Table 21 – Association ends of ExtArea::BiddingZone with other classes**

mult from	name	mult to	type	description
0..1	SchedulingArea	0..*	SchedulingArea	(NC) The scheduling area that has bidding zone.
0..*	CapacityCalculationRegion	0..1	CapacityCalculationRegion	(NC) The capacity calculation region related to this bidding zone.
0..1	GridPowerCapacity	0..1	GridPowerCapacity	(NC) Grid Power capacity which is associated to the bidding zone.
1..1	FromBiddingZoneBorder	0..*	BiddingZoneBorder	(NC) The from side of the border.
1..1	ToBiddingZoneBorder	0..*	BiddingZoneBorder	(NC) The to side of the border.
0..1	PowerRemedialAction	0..*	PowerRemedialAction	(NC) The power remedial action applied to this BiddingZone.

mult from	name	mult to	type	description
1..1	BiddingZoneAction	0..*	BiddingZoneAction	(NC) The bidding zone action that relates to this bidding zone.
0..1	AreaInterchangeController	0..1	AreaInterchangeController	(NC) Area interchange controller for this bidding zone.
0..1	PowerSchedule	0..*	PowerSchedule	(NC) Power schedule which belongs to the power bidding zone.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2278

2279

3.3.12 (NC) BiddingZoneBorder

2280

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

2281

A unidirectional interface between two adjacent Bidding Zones, representing the available transmission capacity from the Bidding Zone defined by the association FromBiddingZone (source) to the Bidding Zone defined by the association ToBiddingZone (sink). It defines the capacity constraints and market-based allocation mechanisms for cross-zonal electricity exchange in the specified direction, considering potential transmission congestion and market price differences.

2282

2283

2284

2285

2286

2287

Table 22 shows all attributes of BiddingZoneBorder.

2288

Table 22 – Attributes of ExtArea::BiddingZoneBorder

name	mult	type	description
transmissionReliabilityMargin	0..1	ActivePower	(NC) Transmission Reliability Margin (TRM) is the minimum reserve that system operators must have available at their connections so that they can help other countries to which their system is directly or indirectly connected, if necessary.
totalTransferCapacity	0..1	ActivePower	(NC) Total Transfer Capacity (TTC) is the maximum exchange program between two areas compatible with operational security standards applicable at each system if future network conditions, generation and load patterns were perfectly known in advance.
netTransferCapacity	0..1	ActivePower	(NC) Net Transfer Capacity (NTC) is defined as $NTC = TTC - TRM$ and corresponds to the maximum exchange between two areas compatible with operational security limits applicable in both areas and taking into account the technical uncertainties on future network conditions.
alreadyAllocatedCapacity	0..1	ActivePower	(NC) Already Allocated Capacity (AAC) means the total amount of allocated transmission rights i.e. transmission capacity reserved by virtue of historical long-term contracts and the previously held transmission capacity reservation auctions.

name	mult	type	description
availableTransferCapacity	0..1	ActivePower	(NC) Available Transfer Capacity (ATC) means the transmission capacity that remains available, after allocation procedure, to be used under the physical conditions of the transmission system. ATC value is defined as: $ATC = NTC - AAC$.
alreadyAllocatedFlow	0..1	ActivePower	(NC) The maximum allowed flow on the collection of interconnection between two bidding zones.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 23 shows all association ends of BiddingZoneBorder with other classes.

Table 23 – Association ends of ExtArea::BiddingZoneBorder with other classes

mult from	name	mult to	type	description
0..*	FromBiddingZone	1..1	BiddingZone	(NC) The bidding zone for the from side.
0..*	ToBiddingZone	1..1	BiddingZone	(NC) The bidding zone for the to side.
0..1	PowerSchedule	0..*	PowerSchedule	(NC) Power schedule which has bidding zone border.
0..1	CrossBorderRelevance	0..*	CrossBorderRelevance	(NC) Cross border relevant combination for this bidding zone border.
0..*	CapacityCalculationRegion	0..1	CapacityCalculationRegion	(NC) The capacity calculation region for which the capacity is derived from.
0..*	TieCorridor	0..1	TieCorridor	(NC) Tie corridor for a given bidding zone border.
0..1	AreaInterchangeController	0..1	AreaInterchangeController	(NC) Area interchange controller that relates to this bidding zone border.
0..1	PowerRemedialAction	0..*	PowerRemedialAction	(NC) Power remedial action applied to this Bidding Zone Border.
2..?	CrossZonalNetworkElement	0..*	CrossZonalNetworkElement	(NC) A network element participating in the transfer of electrical power between two bidding zones and associated with the two opposite directional BiddingZoneBorder instances representing that bidding zone pair.
0..1	DCTieCorridor	0..1	DCTieCorridor	(NC) The DC tie corridor which includes the bidding zone border.
1..1	DCTieCorridorDirectionTimePoint	0..*	DCTieCorridorDirectionTimePoint	(NC) The DC tie corridor time point related to the bidding zone border.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2292

2293 **3.3.13 (NC) CapacityCalculationRegion**2294 Inheritance path = [Region](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

2295 Capacity calculation region is a coherent part of the interconnected system that is used for calculating the transmission capacity for a bidding zone or between bidding zones.

2296 Table 24 shows all attributes of CapacityCalculationRegion.

2297 **Table 24 – Attributes of ExtArea::CapacityCalculationRegion**

name	mult	type	description
longTermMethod	0..1	CapacityCalculationKind	(NC,new) Long term method used for the capacity calculation. Normally performed for long term periods ahead of the market closure.
midTermMethod	0..1	CapacityCalculationKind	(NC,new) Mid term method used for the capacity calculation. Normally performed for mid-term periods ahead of the market closure.
isExternal	0..1	Boolean	(NC,new) If true the capacity calculation region is considered external, meaning that bidding zones included in that region are considered outside of the scope of the study, but has influence due to the external flows. If false the capacity calculation region is in the scope of the study.
actualMethod	0..1	CapacityCalculationKind	(NC,new) Actual method used for the capacity calculation.
shortTermMethod	0..1	CapacityCalculationKind	(NC,new) Short term method used for the capacity calculation. Normally performed for mid-term periods ahead of the market closure.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

2300

2301 Table 25 shows all association ends of CapacityCalculationRegion with other classes.

2302 **Table 25 – Association ends of ExtArea::CapacityCalculationRegion with other classes**

mult from	name	mult to	type	description
0..1	BiddingZoneBorder	0..*	BiddingZoneBorder	(NC) The bidding zone border on which the capacity is calculated.

mult from	name	mult to	type	description
0..1	BiddingZone	0..*	BiddingZone	(NC) The bidding zone for this capacity calculation region.
0..*	SecurityCoordinator	0..1	SecurityCoordinator	(NC) The security coordinator responsible for the capacity calculation region.
0..*	CoordinatedCapacityCalculator	0..1	CoordinatedCapacityCalculator	(NC) Coordinated capacity calculator responsible for the capacity calculation of the region.
0..1	ConservativeAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..1	RemedialAction	0..*	RemedialAction	(NC) inherited from: Region
0..1	SecuredAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) inherited from: Region
0..1	LimitViolation	0..*	PowerFlowResult	(NC) inherited from: Region
0..1	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: Region
0..*	OverlappingZone	0..1	OverlappingZone	(NC) inherited from: Region
0..1	ScannedAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..1	NativeAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2303

2304

3.3.14 (NC) ContingencyArea

2305 Inheritance path = [InfluenceArea](#) : [MonitoringArea](#) : PowerSystemResource : IdentifiedObject :
 2306 ExtEuIdentifiedObject : Identity

2307 A monitoring area that defines the required contingency elements. This includes elements that
 2308 are part of the external contingency list.

2309 Table 26 shows all attributes of ContingencyArea.

2310

Table 26 – Attributes of ExtArea::ContingencyArea

name	mult	type	description
identificationInfluenceFactor	0..1	PerCent	(NC) inherited from: InfluenceArea
filteringInfluenceFactor	0..1	PerCent	(NC) inherited from: InfluenceArea
voltageInfluenceFactor	0..1	PerCent	(NC) inherited from: InfluenceArea
aliasName	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 27 shows all association ends of ContingencyArea with other classes.

Table 27 – Association ends of ExtArea::ContingencyArea with other classes

mult from	name	mult to	type	description
0..*	SynchronousArea	0..1	SynchronousArea	(NC) inherited from: MonitoringArea
0..*	Region	0..1	Region	(NC) inherited from: MonitoringArea
0..1	AreaBorderTerminal	0..*	AreaBorderTerminal	(NC) inherited from: MonitoringArea
0..*	SystemOperator	0..1	SystemOperator	(NC) inherited from: MonitoringArea
0..1	PowerFrequencyController	0..1	PowerFrequencyController	(NC) inherited from: MonitoringArea
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.3.15 (NC) EnergyCoordinationRegion

Inheritance path = [Region](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

A region that has a common organisation or a service that is responsible for alignment of forecast and scheduling of energy.

Table 28 shows all attributes of EnergyCoordinationRegion.

Table 28 – Attributes of ExtArea::EnergyCoordinationRegion

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
identifier	0..1	NullCIM	inherited from: Identity

Table 29 shows all association ends of EnergyCoordinationRegion with other classes.

Table 29 – Association ends of ExtArea::EnergyCoordinationRegion with other classes

mult from	name	mult to	type	description
0..1	SchedulingArea	0..*	SchedulingArea	(NC) The scheduling area that is part of this energy coordination region.
0..*	EnergyAlignmentCoordinator	0..1	EnergyAlignmentCoordinator	(NC) The energy alignment coordinator that operates this energy coordination region.
0..1	ConservativeAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..1	RemedialAction	0..*	RemedialAction	(NC) inherited from: Region
0..1	SecuredAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) inherited from: Region
0..1	LimitViolation	0..*	PowerFlowResult	(NC) inherited from: Region
0..1	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: Region
0..*	OverlappingZone	0..1	OverlappingZone	(NC) inherited from: Region
0..1	ScannedAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..1	NativeAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.3.16 (NC) InfluenceArea

Inheritance path = [MonitoringArea](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

Influence area is a monitoring area that is defined by calculating the equipment that is affected by the influence factors.

Table 30 shows all attributes of InfluenceArea.

Table 30 – Attributes of ExtArea::InfluenceArea

name	mult	type	description
identificationInfluenceFactor	0..1	PerCent	(NC) Power flow identification influence factor of a network element that is normalised in order to take into account potential impacts induced by

name	mult	type	description
			differences in Permanently Admissible Transmission Loading (PATL) values. This is referred as identification influence threshold in CSA methodology. The allowed value range is [0,100].
filteringInfluenceFactor	0..1	PerCent	(NC) Power flow filtering influence factor of a network element not normalised. This is referred as power flow influence threshold in CSA methodology. The allowed value range is [0,100].
voltageInfluenceFactor	0..1	PerCent	(NC) Voltage influence factor of a network element as defined in the CSA methodology. The allowed value range is [0,100].
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 31 shows all association ends of InfluenceArea with other classes.

Table 31 – Association ends of ExtArea::InfluenceArea with other classes

mult from	name	mult to	type	description
0..*	SynchronousArea	0..1	SynchronousArea	(NC) inherited from: MonitoringArea
0..*	Region	0..1	Region	(NC) inherited from: MonitoringArea
0..1	AreaBorderTerminal	0..*	AreaBorderTerminal	(NC) inherited from: MonitoringArea
0..*	SystemOperator	0..1	SystemOperator	(NC) inherited from: MonitoringArea
0..1	PowerFrequencyController	0..1	PowerFrequencyController	(NC) inherited from: MonitoringArea
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.3.17 (NC) LoadFrequencyControlArea

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

2339 A part of a synchronous area or an entire synchronous area, physically demarcated by points
 2340 of measurement at interconnectors to other load frequency control (LFC) areas, operated by
 2341 one or more TSOs fulfilling the obligations of load-frequency control.
 2342 Table 32 shows all attributes of LoadFrequencyControlArea.

2343 **Table 32 – Attributes of ExtArea::LoadFrequencyControlArea**

name	mult	type	description
deficientGenerationLimit	0..1	PerCent	(NC) Percentage of average dispatch target plus average regulation used to calculate Deficient Generation Limit. The value shall be a positive value between 0 and 100.
frequencyBiasFactor	0..1	Float	(NC) Frequency bias in MW/Hz.
includeFrequencyBias	0..1	Boolean	(NC) True means the frequency bias that is taken into consideration in the frequency bias computation.
frrDelay	0..1	Seconds	(NC) FRR delay expressed in seconds. Must be a positive multiple of AGC's cycle duration.
frrMaxRamp	0..1	ActivePowerChangeRate	(NC) Maximum authorized ramp for both FRR dispatching and ramp to zero.
frrThreshold	0..1	ActivePower	(NC) Authorized threshold for both FRR dispatching and ramp to zero.
fcrContracted	0..1	ActivePower	(NC) The contracted active power capacity for Frequency Containment Reserves (FCR). Represents the portion of FCR provision secured through contracts, tenders, or other procurement mechanisms, available for activation when needed.
fcrAvailable	0..1	ActivePower	(NC) The actual available active power capacity at a given time that can deliver Frequency Containment Reserves (FCR), considering unit status, technical constraints, and system conditions. This is the calculated reserves in real-time or operation planning.
aFRRContracted	0..1	ActivePower	(NC) The contracted active power capacity for automatic Frequency Restoration Reserves (aFRR). Represents the portion of aFRR provision secured through procurement arrangements (market-based or bilateral), available to the Automatic Generation Control (AGC) process for activation.
aFRRAvailable	0..1	ActivePower	(NC) The actual available active power capacity that can deliver automatic Frequency Restoration Reserves (aFRR) at a given moment, considering online resources, Automatic Generation Control (AGC) participation, and technical limits. Reflects the true operational flexibility available to respond automatically to frequency deviations.
aFRRActivated	0..1	ActivePower	(NC) The real-time or in simulation active power delivered as automatic Frequency Restoration Reserves (aFRR), automatically activated by the automatic generation control (AGC) system to restore frequency and area control error (ACE). Represents the actual MW change at that instant.
mFRRContracted	0..1	ActivePower	(NC) The contracted active power capacity for manual Frequency Restoration Reserves (mFRR). Represents the portion of Frequency Restoration Reserves (FRR) provision secured by the system operator through procurement

name	mult	type	description
			mechanisms (market/bilateral) and made available for manual activation when needed.
mFRRActivated	0..1	ActivePower	(NC) The real-time or in simulation active power delivered as Frequency Restoration Reserves (mFRR), manually activated by the system operator or a central dispatch system to restore system frequency and area control error (ACE).
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 33 shows all association ends of LoadFrequencyControlArea with other classes.

Table 33 – Association ends of ExtArea::LoadFrequencyControlArea with other classes

mult from	name	mult to	type	description
0..1	SchedulingArea	0..*	SchedulingArea	(NC) The scheduling area that is part of this load frequency control area.
0..*	LoadFrequencyControlBlock	0..1	LoadFrequencyControlBlock	(NC) The load frequency control block that has this load frequency control area.
0..*	FrequencyControlOperator	0..1	LoadFrequencyControlOperator	(NC) The frequency control operator that operates this frequency control area.
0..1	TieCorridor	0..*	TieCorridor	(NC) TieCorridor controlled by the LoadFrequencyControlArea.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.3.18 (NC) LoadFrequencyControlBlock

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : Identity

A part of a synchronous area or an entire synchronous area, physically demarcated by points of measurement at interconnectors to other load frequency control (LFC) blocks, consisting of one or more LFC areas, operated by one or more TSOs fulfilling the obligations of load-frequency control.

Table 34 shows all attributes of LoadFrequencyControlBlock.

2355

Table 34 – Attributes of ExtArea::LoadFrequencyControlBlock

name	mult	type	description
fcrProvision	0..1	ActivePower	(NC) The required active power capacity reserved for Frequency Containment Reserves (FCR) in accordance with dimensioning rules. Represents the LFC Block obligation, independent of contracting arrangements.
frrProvision	0..1	ActivePower	(NC) The required active power capacity reserved for Frequency Restoration Reserves (FRR) as determined by dimensioning rules. Represents the obligation of an LFC Block to ensure sufficient FRR capacity for system frequency restoration.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

2356

2357

Table 35 shows all association ends of LoadFrequencyControlBlock with other classes.

2358

Table 35 – Association ends of ExtArea::LoadFrequencyControlBlock with other classes

2359

mult from	name	mult to	type	description
0..*	SynchronousArea	0..1	SynchronousArea	(NC) The synchronous area that has this load frequency control block.
0..1	LoadFrequencyControlArea	0..*	LoadFrequencyControlArea	(NC) The load frequency control area that is part of this load frequency control block.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2360

2361

3.3.19 (NC) MonitoringArea

2362

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

2363

A coherent part of the interconnected electrical power system, that includes the system operators' responsibility area and the surrounding parts of other system operators' responsibility area, that need to be monitored for security assessment.

2365

Table 36 shows all attributes of MonitoringArea.

2366

2367

Table 36 – Attributes of ExtArea::MonitoringArea

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

2368

2369

Table 37 shows all association ends of MonitoringArea with other classes.

2370

Table 37 – Association ends of ExtArea::MonitoringArea with other classes

mult from	name	mult to	type	description
0..*	SynchronousArea	0..1	SynchronousArea	(NC) The synchronous area that has this monitoring area.
0..*	Region	0..1	Region	(NC) Region that has monitoring areas.
0..1	AreaBorderTerminal	0..*	AreaBorderTerminal	(NC) The AreaBorderTerminal which defines the MonitoringArea.
0..*	SystemOperator	0..1	SystemOperator	(NC) The system operator that operates this monitoring area.
0..1	PowerFrequencyController	0..1	PowerFrequencyController	(NC) Power frequency controller that applied to this monitoring area.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2371

2372

3.3.20 (NC) ObservabilityArea

2373

Inheritance path = [MonitoringArea](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

2374

2375

A monitoring area that is given by a real time measurement.

2376

Table 38 shows all attributes of ObservabilityArea.

2377

Table 38 – Attributes of ExtArea::ObservabilityArea

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 39 shows all association ends of ObservabilityArea with other classes.

Table 39 – Association ends of ExtArea::ObservabilityArea with other classes

mult from	name	mult to	type	description
0..*	SynchronousArea	0..1	SynchronousArea	(NC) inherited from: MonitoringArea
0..*	Region	0..1	Region	(NC) inherited from: MonitoringArea
0..1	AreaBorderTerminal	0..*	AreaBorderTerminal	(NC) inherited from: MonitoringArea
0..*	SystemOperator	0..1	SystemOperator	(NC) inherited from: MonitoringArea
0..1	PowerFrequencyController	0..1	PowerFrequencyController	(NC) inherited from: MonitoringArea
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.3.21 (NC) GridPowerCapacity

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity
Grid power capacity defines the active power capacity that can be imported, exported, generated, consumed, or transferred within a defined power system area, or a combination of multiple areas (e.g. a bidding zone), considering relevant grid constraints required for secure and reliable operation.

Note: Grid power capacity represents a power system or network-constrained capacity, not the technical installed capacity of individual resources or groups of resources. It may describe limits on generation, consumption, import, export, or power transfer resulting from operational security limits, network constraints, capacity allocation, forecasted grid availability, planned outages, remedial actions, or market-relevant transmission limitations.

Table 40 shows all attributes of GridPowerCapacity.

Table 40 – Attributes of ExtArea::GridPowerCapacity

name	mult	type	description
maxInterchange	0..1	ActivePower	(NC) Maximum total active power (AC and DC) that the net position for the bidding zone can have to maintain operational security. Positive sign means flow into the bidding zone.

name	mult	type	description
minImportP	0..1	ActivePower	(NC) Minimum imported active power requirement.
minInterchange	0..1	ActivePower	(NC) Minimum total active power (AC and DC) that the net position for the bidding zone can have to maintain operational security. Negative sign means flow out of the bidding zone.
netACInterchange	0..1	ActivePower	(NC) The netted aggregation of all AC external schedules of an area. Positive sign means flow into the area (Import).
netACInterchangeTolerance	0..1	Float	(NC) The area AC Net Position tolerance.
netDCInterchange	0..1	ActivePower	(NC) The netted aggregation of all DC external schedules of an area. Positive sign means flow into the area.
regulatingUpAllocation	0..1	ActivePower	(NC) The balancing capacity allocated for regulating up, by increasing the production, decreasing the direct current export, increasing direct current import or reducing the consumption of energy in the bidding zone. This must be a positive number.
regulatingDownAllocation	0..1	ActivePower	(NC) The balancing capacity allocated for regulating down, by decreasing the production, increasing the direct current export, decreasing direct current import or increasing the consumption of energy in the bidding zone. This must be a positive number.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 41 shows all association ends of GridPowerCapacity with other classes.

Table 41 – Association ends of ExtArea::GridPowerCapacity with other classes

mult from	name	mult to	type	description
0..1	SchedulingArea	0..1	SchedulingArea	(NC) Scheduling area that has grid power capacity.
1..1	GridPowerCapacityRegularSchedule	0..*	GridPowerCapacityRegularSchedule	(NC) The regular schedule for this grid power capacity.
0..1	BiddingZone	0..1	BiddingZone	(NC) Bidding zone which has a grid power capacity.
0..1	GridPowerCapacitySchedule	0..*	GridPowerCapacitySchedule	(NC) Grid Power Capacity schedule which contains information on the referred bidding zone.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2398

2399 **3.3.22 (NC) ClimateZone**

2400 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

2401 A geographically defined area characterised according to a climate classification and used as
2402 a spatial reference for representative meteorological, hydrological and marine conditions
2403 relevant to energy production, consumption and resource availability.2404 Note: ClimateZone provides selected climatological normal values as structured information
2405 and may reference time series for detailed climate, weather, hydrological and marine data. A
2406 normal value represents a climatological reference condition for the area. Time series may
2407 represent observed, historical, modelled, forecast, scenario or climatological data. Reference
2408 period, scenario, source, calculation method and other provenance information are represented
2409 separately.2410 ClimateZone may be used to associate energy resources and energy-system studies with
2411 climate-dependent conditions such as temperature, wind, solar irradiance, precipitation, snow,
2412 hydro inflow, extreme weather, waves, sea ice and sea currents.2413 Example: Climate study zones defined in the Pan-European Climate Database (PECD) for
2414 European energy-system modelling.

2415 Table 42 shows all attributes of ClimateZone.

2416

Table 42 – Attributes of ExtArea::ClimateZone

name	mult	type	description
windSpeedAt10m	0..n	Speed	(NC) The wind speed at 10 metres above ground level for the corresponding time interval.
normalAnnualMinTempAt2m	0..1	Temperature	(NC) The climatological normal of the minimum air temperature at 2 metres above ground level occurring during an annual period. Note: This represents an annual extreme minimum rather than the normal mean of daily minimum temperatures.
code	0..1	String	(NC) The code or identifier assigned to the ClimateZone by the selected climate classification scheme. Note: The interpretation of the code depends on ClimateZone.classificationKind. The code should conform to the identification or naming convention defined by the corresponding classification scheme. Example: "Dfb" or "Cfb" for Köppen-Geiger, or a zone code defined by PECD or a national classification.
ref	0..1	URI	(NC) A URI identifying the ClimateZone within the applicable climate classification scheme. Note: The URI identifies the classified zone or concept rather than the classification scheme itself. It may be used as an alternative to code when the classification is published as linked data or another URI-based controlled vocabulary. Both code and ref may be provided

name	mult	type	description
			when the classification defines both representations. Example: "https://example.org/climate/pecd/zone-12" as an illustrative URI identifying a climate zone within a PECD classification.
surfacePressure	0..n	Pressure	(NC) The atmospheric pressure at the surface for the corresponding time interval. Note: Surface pressure may be relevant when determining air density for wind-energy calculations.
classificationKind	0..1	ClimateZoneClassificationKind	(NC) The kind of climate classification scheme according to which the ClimateZone is defined. Note: The attribute identifies the classification scheme and not the code or identifier of the ClimateZone within that scheme. When the classification scheme is not explicitly represented by ClimateZoneClassificationKind, classificationKind shall be set to other and otherClassification shall identify the scheme.
otherClassification	0..1	String	(NC) The name or identifier of the climate classification scheme when ClimateZone.classificationKind equals other. Note: This attribute shall only be used when ClimateZone.classificationKind is set to other. It identifies the classification scheme that is not explicitly represented by ClimateZoneClassificationKind. The value should be sufficiently descriptive to identify the scheme. Example: "Trewartha Climate Classification", "Holdridge Life Zones", "Thornthwaite Climate Classification", "Company Internal Climate Zones".
normalTempAt2m	0..1	Temperature	(NC) The climatological normal air temperature at 2 metres above ground level. Note: Two metres above ground is the standard reference height for near-surface air temperature.
sunshineDuration	0..n	Hours	(NC) The duration of sunshine during the corresponding time interval.
normalAnnualMaxTempAt2m	0..1	Temperature	(NC) The climatological normal of the maximum air temperature at 2 metres above ground level occurring during an annual period. Note: This represents an annual extreme maximum rather than the normal mean of daily maximum temperatures.
maxTempAt2m	0..n	Temperature	(NC) The maximum air temperature at 2 metres above ground level during the corresponding time interval. Note: This time series is intended for datasets providing maximum temperature directly.
normalDewPointTempAt2m	0..1	Temperature	(NC) The climatological normal dew-point temperature at 2 metres above ground level. Note: Dew-point temperature indicates atmospheric moisture content and may be used together with air temperature to derive relative humidity and icing conditions.
dewPointTempAt2m	0..n	Temperature	(NC) The dew-point temperature at 2 metres above ground level for the corresponding time interval.

name	mult	type	description
relativeHumidityAt2m	0..n	PerCent	(NC) The relative humidity at 2 metres above ground level for the corresponding time interval.
windDirectionAt100m	0..n	AngleDegrees	(NC) The wind direction at 100 metres above ground level for the corresponding time interval. Note: Meteorological wind direction normally identifies the direction from which the wind originates.
normalRelativeHumidityAt2m	0..1	PerCent	(NC) The climatological normal relative humidity at 2 metres above ground level.
cloudCover	0..n	PerCent	(NC) The proportion of the sky covered by cloud for the corresponding time interval.
windSpeedAt100m	0..n	Speed	(NC) The wind speed at 100 metres above ground level for the corresponding time interval.
normalWindSpeedAt10m	0..1	Speed	(NC) The climatological normal wind speed at 10 metres above ground level. Note: Ten metres above ground is the conventional reference height for near-surface meteorological wind observations.
normalAnnualMaxWindGustAt10m	0..1	Speed	(NC) The climatological normal of the maximum wind gust at 10 metres above ground level occurring during an annual period. Note: This value characterises exposure to strong short-duration wind events rather than the normal wind resource. Example: A value of 31 m/s indicates that the climatological normal annual maximum gust is approximately 31 m/s.
windGustAt10m	0..n	Speed	(NC) The maximum wind gust at 10 metres above ground level during the corresponding time interval. Note: The time interval over which the gust maximum applies is defined by the associated Schedule and TimePoint.
normalWindSpeedAt100m	0..1	Speed	(NC) The climatological normal wind speed at 100 metres above ground level. Note: Wind speed at 100 metres is commonly available in meteorological and energy datasets and provides a useful indication of the wind resource for electricity generation.
tempAt2m	0..n	Temperature	(NC) The air temperature at 2 metres above ground level for the corresponding time interval.
windDirectionAt10m	0..n	AngleDegrees	(NC) The wind direction at 10 metres above ground level for the corresponding time interval. Note: Meteorological wind direction normally identifies the direction from which the wind originates. No corresponding normal attribute is defined because a single average direction may be misleading for multimodal wind regimes.
snowfall	0..n	Length	(NC) The solid precipitation received during the corresponding time interval, expressed as its equivalent amount of liquid water.
normalAnnualMaxDailyPrecipitation	0..1	Length	(NC) The climatological normal of the maximum precipitation accumulated during a single day within an annual period. Note: This value provides an indication of exposure to extreme precipitation that is not represented by normalAnnualPrecipitation alone.

name	mult	type	description
			Example: A value of 85 mm indicates that the normal annual maximum one-day precipitation is approximately 85 mm.
normalMaxSnowWater	0..1	Length	(NC) The climatological normal of the maximum amount of water stored in the snowpack during the seasonal cycle. Note: Snow water represents the water content of the snowpack expressed as an equivalent depth of liquid water. The value characterises seasonal snow storage and is more hydrologically meaningful than physical snow depth. Example: 450 mm indicates that the normal seasonal maximum snowpack contains an amount of water equivalent to a 450 mm layer of liquid water.
normalAnnualSnowfall	0..1	Length	(NC) The climatological normal amount of solid precipitation received during an annual period, expressed as its equivalent amount of liquid water. Note: The value represents water input from snowfall rather than physical snow depth. Example: 500 mm means that the annual snowfall normally contains an amount of water equivalent to a 500 mm layer of liquid water.
precipitation	0..n	Length	(NC) The total precipitation received during the corresponding time interval. Note: The value represents accumulated precipitation expressed as an equivalent depth of water.
normalAnnualSnowmelt	0..1	Length	(NC) The climatological normal amount of water released by melting snow during an annual period. Note: Snowmelt is expressed as the equivalent depth of liquid water produced from the snowpack.
snowWater	0..n	Length	(NC) The amount of water stored in the snowpack at the corresponding time, expressed as an equivalent depth of liquid water. Example: January = 180 mm, March = 430 mm, May = 160 mm, June = 0 mm.
normalAnnualRainfall	0..1	Length	(NC) The climatological normal amount of liquid precipitation received during an annual period.
snowmelt	0..n	Length	(NC) The amount of water released by melting snow during the corresponding time interval, expressed as an equivalent depth of liquid water.
directSolarIrradiance	0..n	Irradiance	(NC) The direct solar irradiance for the corresponding time interval.
rainfall	0..n	Length	(NC) The amount of liquid precipitation received during the corresponding time interval. Note: The value represents accumulated rainfall expressed as an equivalent depth of water.
normalAnnualPrecipitation	0..1	Length	(NC) The climatological normal total precipitation received during an annual period. Note: Precipitation includes liquid and solid precipitation and is expressed as an equivalent depth of water over the area.

name	mult	type	description
			Example: 1100 mm represents an annual precipitation volume equivalent to 1100 litres of water per square metre.
normalAnnualDiffuseSolarIrradiation	0..1	Irradiation	(NC) The climatological normal total diffuse solar energy received per unit area during an annual period. Note: The orientation of the applicable reference surface is defined by the data specification or provenance information.
normalAnnualGlobalSolarIrradiation	0..1	Irradiation	(NC) The climatological normal total global solar energy received per unit area during an annual period. Note: Global solar irradiation includes direct and diffuse solar radiation incident on the applicable reference surface. For a horizontal reference surface it corresponds to global horizontal irradiation. Example: A value may be expressed as annual solar energy per square metre, such as MJ/m ² or an equivalent unit.
diffuseSolarIrradiance	0..n	Irradiance	(NC) The diffuse solar irradiance for the corresponding time interval.
normalAnnualDirectSolarIrradiation	0..1	Irradiation	(NC) The climatological normal total direct solar energy received per unit area during an annual period. Note: The orientation of the applicable reference surface is defined by the data specification or provenance information.
globalSolarIrradiance	0..n	Irradiance	(NC) The global solar irradiance for the corresponding time interval. Note: Global solar irradiance represents the total direct and diffuse solar power incident per unit area on the applicable reference surface. It may be used as an environmental input for applications such as photovoltaic production and thermal rating of overhead conductors. The orientation of the reference surface is defined by the applicable dataset or provenance information.
minTempAt2m	0..n	Temperature	(NC) The minimum air temperature at 2 metres above ground level during the corresponding time interval. Note: This time series is intended for datasets providing minimum temperature directly, for example daily minimum temperature. It is not required when the minimum can appropriately be derived from tempAt2m.
normalAnnualSunshineDuration	0..1	Hours	(NC) The climatological normal total duration of sunshine during an annual period. Example: 1650 h represents approximately 1650 hours of sunshine during a normal year.
normalSurfacePressure	0..1	Pressure	(NC) The climatological normal atmospheric pressure at the surface.
normalAnnualHydroInflow	0..1	RealEnergy	(NC) The climatological normal energy equivalent of natural hydro inflow associated with hydro resources in the ClimateZone during an annual period. Note: The value represents the potential energy associated with natural inflow and not generated electrical energy. This representation is intended for aggregated power-system and adequacy

name	mult	type	description
			studies where hydro inflow is expressed as an energy quantity. Example: The value may represent the annual energy equivalent of natural inflow to reservoir hydropower resources within the ClimateZone.
normalCloudCover	0..1	PerCent	(NC) The climatological normal proportion of the sky covered by cloud.
hydroInflow	0..n	RealEnergy	(NC) The energy equivalent of natural hydro inflow associated with hydro resources in the ClimateZone during the corresponding time interval. Note: The value represents inflow energy for the interval. For example, a weekly TimePoint may contain the natural hydro inflow energy for that week.
normalAnnualRunoff	0..1	Length	(NC) The climatological normal runoff during an annual period, expressed as an equivalent depth of water over the area. Note: Runoff represents water leaving the land surface and subsurface drainage system after precipitation, snowmelt, evaporation, infiltration and storage effects.
runoff	0..n	Length	(NC) The runoff during the corresponding time interval, expressed as an equivalent depth of water over the area.
normalAnnualEvaporation	0..1	Length	(NC) The climatological normal amount of water returned to the atmosphere through evaporation and evapotranspiration during an annual period, expressed as an equivalent depth of water.
evaporation	0..n	Length	(NC) The evaporation and evapotranspiration during the corresponding time interval, expressed as an equivalent depth of water. Note: The sign convention, where relevant, is defined by the applicable data specification.
normalAnnualPotentialEvaporation	0..1	Length	(NC) The climatological normal potential amount of water that could be returned to the atmosphere by evaporation during an annual period, expressed as an equivalent depth of water. Note: Potential evaporation represents atmospheric evaporative demand and is not limited by actual water availability.
potentialEvaporation	0..n	Length	(NC) The potential evaporation during the corresponding time interval, expressed as an equivalent depth of water.
normalAnnualFrostDays	0..1	Decimal	(NC) The climatological normal number of frost days during an annual period. Note: The threshold used to define a frost day is determined by the applicable meteorological specification, normally using minimum air temperature.
frostDays	0..n	Decimal	(NC) The number of frost days within the corresponding time interval.
normalAnnualIcingDays	0..1	Decimal	(NC) The climatological normal number of days during an annual period with meteorological conditions producing significant icing. Note: The criteria defining an icing day are provided by the applicable data specification or provenance information. The attribute may be used to characterise climate-related availability

name	mult	type	description
			risk for overhead lines, wind turbines and other exposed equipment.
icingDays	0..n	Decimal	(NC) The number of days meeting the applicable icing criterion within the corresponding time interval.
normalAnnualFreezingPrecipitationDays	0..1	Decimal	(NC) The climatological normal number of days during an annual period with freezing precipitation.
freezingPrecipitationDays	0..n	Decimal	(NC) The number of days with freezing precipitation within the corresponding time interval.
normalAnnualHailDays	0..1	Decimal	(NC) The climatological normal number of days during an annual period on which hail occurs.
hailDays	0..n	Decimal	(NC) The number of days on which hail occurs within the corresponding time interval.
normalAnnualThunderDays	0..1	Decimal	(NC) The climatological normal number of days during an annual period on which thunder is observed.
thunderDays	0..n	Decimal	(NC) The number of days on which thunder is observed within the corresponding time interval.
normalAnnualLightningDensity	0..1	CountPerArea	(NC) The climatological normal number of lightning events per unit area during an annual period. Note: The definition of a lightning event, for example a flash or ground strike, is determined by the applicable data specification. Example: 1.5 flashes/km2 indicates that an average of 1.5 lightning flashes per square kilometre occurs during a normal year.
lightningDensity	0..n	CountPerArea	(NC) The number of lightning events per unit area occurring during the corresponding time interval.
normalAnnualHotDays	0..1	Decimal	(NC) The climatological normal number of hot days during an annual period. Note: A hot day is defined using the threshold specified by the applicable climate dataset or scenario. The threshold may be an absolute temperature or a percentile relative to the local climatology.
hotDays	0..n	Decimal	(NC) The number of days meeting the applicable hot-day criterion within the corresponding time interval.
normalAnnualHeatwaveDays	0..1	Decimal	(NC) The climatological normal number of days during an annual period occurring as part of a heatwave. Note: A heatwave represents unusually high temperature persisting for a defined minimum duration. The temperature criteria and minimum duration are specified by the applicable climate dataset or scenario.
heatwaveDays	0..n	Decimal	(NC) The number of days occurring as part of a heatwave within the corresponding time interval.
normalAnnualTropicalNights	0..1	Decimal	(NC) The climatological normal number of tropical nights during an annual period. Note: A tropical night is a night for which the minimum air temperature remains above the applicable threshold. A threshold of 20 degC is commonly used in European climate indicators,

name	mult	type	description
			but the applicable threshold is defined by the dataset or scenario.
tropicalNights	0..n	Decimal	(NC) The number of nights meeting the applicable tropical-night criterion within the corresponding time interval.
normalSeaSurfaceTemp	0..1	Temperature	(NC) The climatological normal sea-surface temperature within a marine ClimateZone.
seaSurfaceTemp	0..n	Temperature	(NC) The sea-surface temperature for the corresponding time interval.
normalSignificantWaveHeight	0..1	Length	(NC) The climatological normal significant wave height within a marine ClimateZone. Note: Significant wave height is a statistical representation of sea state commonly approximated as the mean height of the highest one-third of waves. Example: A value of 2.1 m represents a climate where the normal significant wave height is approximately 2.1 metres.
normalAnnualMaxSignificantWaveHeight	0..1	Length	(NC) The climatological normal of the maximum significant wave height occurring during an annual period. Note: This value characterises exposure to severe sea states relevant to accessibility, equipment loading and availability of offshore resources.
significantWaveHeight	0..n	Length	(NC) The significant wave height for the corresponding time interval.
normalWavePeriod	0..1	Seconds	(NC) The climatological normal representative wave period within a marine ClimateZone. Note: The precise wave-period statistic, such as mean or peak period, is determined by the applicable data specification.
wavePeriod	0..n	Seconds	(NC) The representative wave period for the corresponding time interval.
waveDirection	0..n	AngleDegrees	(NC) The direction from which waves propagate for the corresponding time interval. Note: No corresponding normal value is defined because a single average direction may not meaningfully represent a multi-directional sea state.
normalMaxSeaIceThickness	0..1	Length	(NC) The climatological normal maximum sea-ice thickness during the seasonal cycle within a marine ClimateZone. Note: This attribute is primarily relevant for high-latitude offshore areas and may be used when assessing accessibility and availability of offshore resources. Example: 0.8 m indicates that the normal seasonal maximum sea-ice thickness is approximately 0.8 metres.
seaIceThickness	0..n	Length	(NC) The sea-ice thickness for the corresponding time interval.
normalAnnualSeaIceDays	0..1	Decimal	(NC) The climatological normal number of days during an annual period for which sea ice is present within the ClimateZone. Note: The minimum ice concentration or other criterion used to determine sea-ice presence is defined by the applicable data specification.

name	mult	type	description
seaIceConcentration	0..n	PerCent	(NC) The proportion of the sea surface covered by sea ice for the corresponding time interval. Note: Sea-ice concentration provides the time-dependent information needed to determine sea-ice presence and extent. It replaces a simple integer seaIce value, which cannot distinguish between partial and complete ice coverage.
normalSeaCurrentSpeed	0..1	Speed	(NC) The climatological normal speed of the sea-water current within the ClimateZone. Note: Sea-current speed depends on depth. The applicable depth or vertical reference is defined by the source dataset or provenance information.
normalMaxSeaCurrentSpeed	0..1	Speed	(NC) The climatological normal maximum sea-current speed within the ClimateZone. Note: The value characterises strong current conditions relevant to marine-energy resource potential and equipment loading. The applicable depth and method for determining the maximum are defined by the source dataset or provenance information.
seaCurrentSpeed	0..n	Speed	(NC) The speed of the sea-water current for the corresponding time interval. Note: The applicable depth or vertical reference is defined by the source dataset or provenance information.
seaCurrentDirection	0..n	AngleDegrees	(NC) The direction of the sea-water current for the corresponding time interval. Note: Current direction normally identifies the direction towards which the water is moving, unlike meteorological wind direction, which identifies the direction from which the wind originates.
normalPopulationWeightedTempAt2m	0..1	Temperature	(NC) The climatological normal population-weighted air temperature at 2 metres above ground level. Note: Population-weighted temperature is a spatially aggregated temperature in which locations with a higher population are given greater weight. It provides a representative temperature for the conditions experienced by the population and is particularly relevant for energy-demand modelling. The population dataset, weighting method and other provenance information are represented separately.
populationWeightedTempAt2m	0..n	Temperature	(NC) The population-weighted air temperature at 2 metres above ground level for the corresponding time interval. Note: The value is derived by spatially weighting the air temperature within the represented area by the population distribution. It may be used for modelling temperature-dependent energy consumption, including heating and cooling demand. The population dataset and weighting method are identified through the applicable provenance information.
fireWeatherIndex	0..n	Decimal	(NC) A fire-weather index indicating the meteorological conditions relevant to wildfire danger for the corresponding time interval. Note: The applicable fire-weather index methodology and classification are identified through the associated data provenance. The

name	mult	type	description
			CIM model does not prescribe a specific wildfire classification. The Canadian Fire Weather Index (FWI) System, as used by European Forest Fire Information System (EFFIS), is one example. In this system, the index combines fuel-moisture and fire-behaviour components derived from temperature, relative humidity, wind speed and precipitation. Higher values indicate conditions increasingly favourable to intense wildfire. Example: Using the EFFIS classification: "5.0" (Very low), "10.0" (Low), "15.0" (Moderate), "37.77" (High), "40.01" (Very high), "55.55" (Extreme).
droughtCode	0..n	Decimal	(NC) The Drought Code for the corresponding time interval. Note: The Drought Code is a component of the Canadian Fire Weather Index System representing the moisture condition of deep, compact organic fuel layers. It is particularly useful for representing the cumulative effect of prolonged dry conditions and seasonal drought on wildfire potential. Higher values indicate drier conditions. The attribute is used when the applicable wildfire methodology provides a Drought Code. Example: Values such as "15", "300" and "600" represent progressively drier conditions in the Drought Code scale. No universal low, moderate or high classification is implied by these example values; interpretation is provided by the applicable methodology and provenance.
normalAnnualExtremeFireDangerDays	0..1	Decimal	(NC) The climatological normal number of days during an annual period classified as having extreme fire danger. Note: The criterion for extreme fire danger is determined by the applicable wildfire index and classification identified through the data provenance. The CIM model does not prescribe a specific threshold. Example: When the European Forest Fire Information System (EFFIS) classification is applied, extreme fire danger corresponds to an Canadian Fire Weather Index (FWI) of 50 or greater. A value of "18.5" therefore indicates a climatological normal of 18.5 days per year with FWI greater than or equal to 50.
avalancheDangerIndex	0..n	Decimal	(NC) An index representing the avalanche danger for the corresponding time interval. Note: The applicable avalanche danger methodology and classification are identified through the associated data provenance. The CIM model does not prescribe a particular avalanche danger scale. Where the index represents categorical danger levels, the numerical values shall not be assumed to form a linear scale. Example: Using the European Avalanche Danger Scale: "1" (Low), "2" (Moderate), "3" (Considerable), "4" (High), "5" (Very high).
normalAnnualHighAvalancheDangerDays	0..1	Decimal	(NC) The climatological normal number of days during an annual period classified as having high avalanche danger. Note: The criterion for high avalanche danger is determined by the applicable avalanche methodology and classification identified through

name	mult	type	description
			data provenance. The CIM model does not prescribe a particular threshold. Example: "8.5" when high avalanche danger is defined as EAWS danger level 4 or 5.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 43 shows all association ends of ClimateZone with other classes.

Table 43 – Association ends of ExtArea::ClimateZone with other classes

mult from	name	mult to	type	description
0..1	EnergyResourceGroupCapacity	0..*	EnergyResourceGroupCapacity	(NC) The Energy Resource Group Capacity that has this climate zone.
0..1	ClimateZoneRegularSchedule	0..*	ClimateZoneRegularSchedule	(NC) The climate zone regular schedule for this climate zone.
0..1	ClimateZoneSchedule	0..*	ClimateZoneSchedule	(NC) The climate zone schedule for the climate zone.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.3.23 (NC,new) CapacityCalculationKind enumeration

Kinds of calculation methods.

Table 44 shows all literals of CapacityCalculationKind.

Table 44 – Literals of ExtArea::CapacityCalculationKind

literal	value	description
flowBased		Flow based method.
netTransferCapacity		Net transfer capacity calculation method.
other		Other calculation method.

2426 **3.3.24 (NC,new) ClimateZoneClassificationKind enumeration**

2427 The kind of classification scheme used to define a climate zone.

2428 Note: The classification kind identifies the methodology or controlled classification system
 2429 according to which the climate zone is defined. It does not identify the climate category, code
 2430 or identifier assigned to the zone within that classification. The category, code or identifier
 2431 defined by the selected classification scheme is provided separately.

2432 Table 45 shows all literals of ClimateZoneClassificationKind.

2433 **Table 45 – Literals of ExtArea::ClimateZoneClassificationKind**

literal	value	description
pecd		The climate-zone classification defined by the Pan-European Climate Database (PECD) for climate and energy-system studies. Note: PECD climate zones support the spatial aggregation of climate variables and renewable-energy data used in European power-system studies. The applicable PECD version should be identified separately when relevant.
koppenGeiger		The Köppen-Geiger climate classification. Note: The Köppen-Geiger classification categorises climates principally from long-term temperature and precipitation conditions and their seasonal distribution. Climate categories are represented by codes such as Cfb, Dfb or ET.
national		A climate classification established or adopted by a national authority. Note: National classifications may be established for building regulation, infrastructure design, agriculture, environmental assessment, energy planning or another nationally defined purpose. The responsible authority and classification version should be identifiable when relevant.
regional		A climate classification established or adopted for a geographical region. Note: A regional classification may be established by a sub-national, multi-national or other regional authority or organisation and may cover an area that does not correspond to national boundaries.
other		A climate classification scheme other than those explicitly represented by ClimateZoneClassificationKind. Note: The classification scheme should be identified using ClimateZone.otherClassification. The issuing organisation and applicable version should be identifiable when relevant.

2434

2435 **3.4 Assessed element extensions**2436 **3.4.1 General**

2437 This package contains the extensions related to the assessed element.

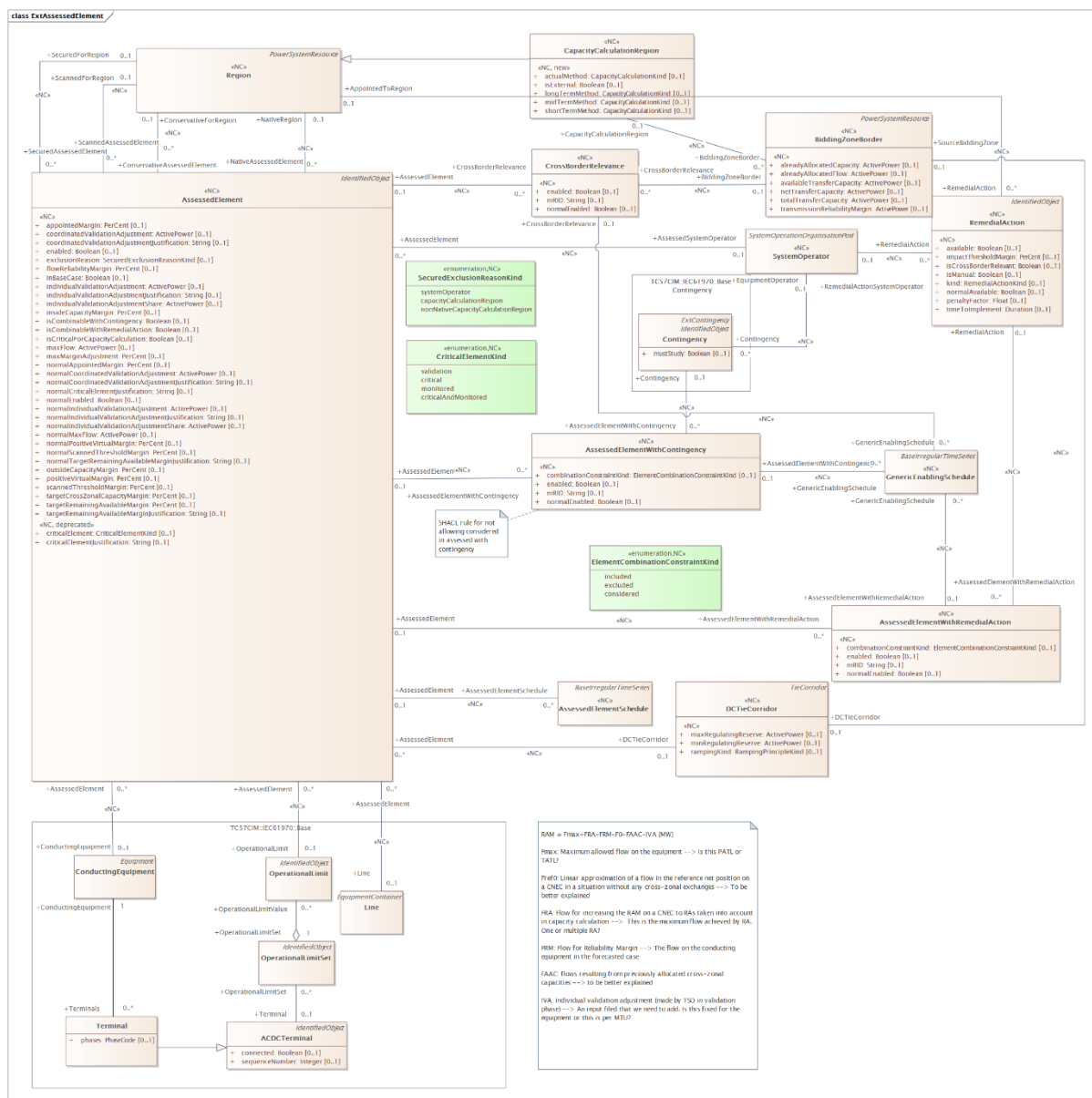


Figure 6 – Class diagram ExtAssessedElement::ExtAssessedElement

Figure 6: The diagram contains classes related to assessed element.

3.4.2 (NC) AssessedElement

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject : Identity

Assessed element is a network element for which the electrical state is evaluated in the regional or cross-regional process and which value is expected to fulfil regional rules function of the operational security limits.

The measurements and limits are as defined in the steady state hypothesis.

Table 46 shows all attributes of AssessedElement.

Table 46 – Attributes of ExtAssessedElement::AssessedElement

name	mult	type	description
inBaseCase	0..1	Boolean	(NC) Indicates if the assessed element is scanned in the base case. In case of a base case overload, the assessed element is

name	mult	type	description
			considered as a limiting element for the optimization process. True means that the assessed element is scanned in the base case. False means it is not scanned in the base case.
maxFlow	0..1	ActivePower	(NC) Maximum flow on a conducting equipment or a collection of conducting equipment forming a power transfer corridor. For assessed element that becomes critical due to contingency, this value represents the maximum flow with remedial action taken into consideration.
targetCrossZonalCapacityMargin	0..1	PerCent	(NC) Agreed target margin for the cross zonal capacity trading given by the percentage of a zero exchange situation flow (Net position equals zero) and maximum flow. In other words, when bidding zone exchange equals 0 MW commercially (in the market), the assessed element (ConductingEquipment or PowerTransferCorridor) should be loaded less than maximum loading (100%) minus the target. e.g. If the target is 70%, the loading must be less than 30%. The allowed value range is [0,100].
insideCapacityMargin	0..1	PerCent	(NC) Percentage of the maximum flow (margin) from coordinated capacity calculation, i.e. capacity available for cross-zonal trade within the considered coordination area. The allowed value range is [0,100].
outsideCapacityMargin	0..1	PerCent	(NC) Percentage of the maximum flow (margin) capacity calculation, i.e. the capacity available for cross-zonal trade outside the considered coordination area. The allowed value range is [0,100].
criticalElement	0..1	CriticalElementKind	(deprecated,NC) Indicates the type of the critical element.
maxMarginAdjustment	0..1	PerCent	(NC) Maximum adjustment, relative to maximum flow allowed for exceeding the maximum flow of this assessed element. The allowed value range is [0,100].
flowReliabilityMargin	0..1	PerCent	(NC) Percentage of the maximum flow (margin) reserved to anticipate forecasting errors. The allowed value range is [0,100].
targetRemainingAvailableMargin	0..1	PerCent	(NC) Target for the remaining available margin as a percentage of maximum flow. The allowed value range is [0,100].
normalEnabled	0..1	Boolean	(NC) If true, the assessed element shall be considered under normal operating conditions.
enabled	0..1	Boolean	(NC) If true, the assessed element is enabled, otherwise it is disabled.
normalMaxFlow	0..1	ActivePower	(NC) Maximum flow on a conducting equipment or a collection of conducting equipment forming a power transfer corridor under normal operating conditions. For assessed elements that become critical due to contingency, this value represents the maximum flow with remedial action taken into consideration.
normalAppointedMargin	0..1	PerCent	(NC) The normal percentage (appointed to a region) of the remaining margin obtained in the grid model to reach its current limit under normal

name	mult	type	description
			operating conditions. The maximum percentage shall by default be 10% of the remaining margin. It is only used when an assessed element is considered conservative for a region. The allowed value range is [0,100].
normalPositiveVirtualMargin	0..1	PerCent	(NC) A positive margin that defines the overload allowed in a solution for the assessed element for a normal situation. The margin represents influences that can be solved by the System Operators using available remedial action which is not cross-border relevant remedial action. All relevant operational limits (e.g. PATL, TATL, etc) are modified by this margin value. The attribute represents the increase. The allowed value range is [0,100].
positiveVirtualMargin	0..1	PerCent	(NC) A positive margin that defines the overload allowed in a solution for the assessed element for the current situation. The margin represents influences that can be solved by the System Operators using available remedial action which is not cross-border relevant remedial action. All relevant operational limits (e.g. PATL, TATL, etc) are modified by this margin value. The attribute represents the increase. The allowed value range is [0,100].
exclusionReason	0..1	SecuredExclusionReasonKind	(NC) Reason for not associating this assessed element with a secured region.
scannedThresholdMargin	0..1	PerCent	(NC) Threshold percentage that a scanned element can be overloaded, on a given element, on top of any overload prior to optimisation (default= 5%). e.g. Initial loading of the element is 110%, with a 5% scanned threshold margin, the new maximum is 115% of the limit (e.g. PATL, TATL, etc). The allowed value range is [0,100].
isCombinableWithRemedialAction	0..1	Boolean	(NC) Defines if the AssessedElement is available to be combined with RemedialAction. If true, this AssessedElement can be included in various combinations not defined in the data exchange in an explicit way. If false, this assessed element is not to be considered in any combination with remedial actions and contingencies except for the exclusive combination. If not provided, the default meaning is true, i.e. the assessed element is combinable.
isCombinableWithContingency	0..1	Boolean	(NC) Defines if the AssessedElement is available to be combined with Contingency. If true, this AssessedElement can be included in various combinations not defined in the data exchange in an explicit way. If false, this assessed element is not to be considered in any combination with remedial actions and contingencies except for the exclusive combination. If not provided, the default meaning is true, i.e. the assessed element is combinable.
normalScannedThresholdMargin	0..1	PerCent	(NC) Normal threshold percentage that a scanned element can be overloaded, on a given element, on top of any overload prior to optimisation (default= 5%). e.g. Initial loading of the element is 110%, with a 5% scanned threshold margin, the new maximum is 115% of the limit (e.g. PATL, TATL, etc).

name	mult	type	description
			The allowed value range is [0,100].
appointedMargin	0..1	PerCent	(NC) The percentage (appointed to a region) of the remaining margin obtained in the grid model to reach its current limit under normal operating conditions. The maximum percentage shall by default be 10% of the remaining margin. It is only used when an assessed element is considered conservative for a region. The allowed value range is [0,100].
individualValidationAdjustment	0..1	ActivePower	(NC) Positive value calculated and provided by System Operators from their individual validation process for the reduction of Remaining Available Margin (RAM) in order to ensure grid security.
coordinatedValidationAdjustment	0..1	ActivePower	(NC) Positive value calculated and provided by the Coordinated Capacity Calculator (CCC) for the reduction of Remaining Available Margin (RAM) in order to ensure grid security.
individualValidationAdjustmentShare	0..1	ActivePower	(NC) Positive value expressed calculated by the Coordinated Capacity Calculator (CCC) based on the provided Individual Validation Adjustment (IVA) by System Operators in order to show the actual reduction of Remaining Available Margin (RAM). Individual Validation Adjustment Share is a positive non-zero value. It is equal or less than the Individual Validation Adjustment value.
individualValidationAdjustmentJustification	0..1	String	(NC) Free text description provided by System Operators for justifying the reduction of Remaining Available Margin (RAM) by means of Individual Validation Adjustment (IVA). This justification is not intended for any application processing purpose, it should only be used for reporting.
coordinatedValidationAdjustmentJustification	0..1	String	(NC) Free text description provided by the coordinated capacity calculator (CCC) for justifying the reduction of Remaining Available Margin (RAM) by means of Coordinated Validation Adjustment (CVA). This justification is not intended for any application processing purpose, it should only be used for reporting.
criticalElementJustification	0..1	String	(deprecated,NC) Free text describing the justification of critical element categorization (e.g. the use of the kind). This justification is not intended for any application processing purpose, it should only be used for reporting.
targetRemainingAvailableMarginJustification	0..1	String	(NC) Free text describing the justification for the target Remaining Available Margin (RAM). This justification is not intended for any application processing purpose, it should only be used for reporting.
normalIndividualValidationAdjustment	0..1	ActivePower	(NC) Normal positive value calculated and provided by System Operators from their individual validation process for the reduction of Remaining Available Margin (RAM) in order to ensure grid security.
normalCoordinatedValidationAdjustment	0..1	ActivePower	(NC) Normal positive value calculated and provided by the Coordinated Capacity Calculator (CCC) for the reduction of Remaining Available Margin (RAM) in order to ensure grid security.
normalIndividualValidationAdjustmentShare	0..1	ActivePower	(NC) Normal positive value expressed calculated by the Coordinated Capacity Calculator (CCC) based on the provided Individual Validation Adjustment (IVA) by System Operators in order

name	mult	type	description
			to show the actual reduction of Remaining Available Margin (RAM). Individual Validation Adjustment Share is a positive non-zero value. It is equal or less than the Individual Validation Adjustment value.
normalIndividualValidationAdjustmentJustification	0..1	String	(NC) Normal free text description provided by System Operators for justifying the reduction of Remaining Available Margin (RAM) by means of Individual Validation Adjustment (IVA). This justification is not intended for any application processing purpose, it should only be used for reporting.
normalCoordinatedValidationAdjustmentJustification	0..1	String	(NC) Normal free text description provided by the coordinated capacity calculator (CCC) for justifying the reduction of Remaining Available Margin (RAM) by means of Coordinated Validation Adjustment (CVA). This justification is not intended for any application processing purpose, it should only be used for reporting.
normalCriticalElementJustification	0..1	String	(NC) Normal free text describing the justification of critical element categorization (e.g. the use of the kind). This justification is not intended for any application processing purpose, it should only be used for reporting.
normalTargetRemainingAvailableMarginJustification	0..1	String	(NC) Normal free text describing the justification for the target Remaining Available Margin (RAM). This justification is not intended for any application processing purpose, it should only be used for reporting.
isCriticalForCapacityCalculation	0..1	Boolean	(NC) Indicates whether the capacity calculation process is using the element or not.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 47 shows all association ends of AssessedElement with other classes.

Table 47 – Association ends of ExtAssessedElement::AssessedElement with other classes

mult from	name	mult to	type	description
0..*	ConductingEquipment	0..1	ConductingEquipment	(NC) The conducting equipment that is designated as an assessed element, i.e. the equipment that is assessed.
0..*	Line	0..1	Line	(NC) The line that is designated as an assessed element, i.e. the equipment that is assessed.
0..*	OperationalLimit	0..1	OperationalLimit	(NC) The terminal limit that is being assessed against.
0..*	ScannedForRegion	0..1	Region	(NC) This is the region in which this assessed element is scanned.

mult from	name	mult to	type	description
0..*	NativeRegion	0..1	Region	(NC) The native region for an assessed element.
0..*	AssessedSystemOperator	0..1	SystemOperator	(NC) A system operator that assesses the element.
0..1	AssessedElementWithContingency	0..*	AssessedElementWithContingency	(NC) The contingency and assessed element combination to be simulated for this assessed element.
0..*	AssessedPowerTransferCorridor	0..1	PowerTransferCorridor	(NC) The power transfer corridor that is designated as an assessed element.
0..1	AssessedElementSchedule	0..*	AssessedElementSchedule	(NC) Assessed element schedule for an assessed element.
0..*	OverlappingZone	0..1	OverlappingZone	(NC) The overlapping zone grouping the overlapping assessed elements.
0..*	ConservativeForRegion	0..1	Region	(NC) This is the region where the element is considered conservative.
0..*	SecuredForRegion	0..1	Region	(NC) This is the region where the element is secured.
0..1	ObservableQuantity	0..*	ObservableQuantity	(NC) The observable quantity for this assessed element with contingency.
0..1	AssessedElementWithRemedialAction	0..*	AssessedElementWithRemedialAction	(NC) The assessed element and remedial action combination to be simulated for this assessed element.
0..*	DCTieCorridor	0..1	DCTieCorridor	(NC) The DC tie corridor that is assessed.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) Availability enabled describes the enabling or disabling of this assessed element.
0..1	AssessedElementRegularSchedule	0..*	AssessedElementRegularSchedule	(NC) Regular schedule that belongs to an assessed element.
0..1	CrossBorderRelevance	0..*	CrossBorderRelevance	(NC) The Bidding zone border for which this assessed element is cross border relevant.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2453

2454 **3.4.3 (NC) AssessedElementWithContingency root class**

2455 Combination of an assessed element and a contingency.

2456 Table 48 shows all attributes of AssessedElementWithContingency.

2457 **Table 48 – Attributes of ExtAssessedElement::AssessedElementWithContingency**

name	mult	type	description
enabled	0..1	Boolean	(NC) If true, the assessed element with contingency is enabled, otherwise it is disabled.
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC

name	mult	type	description
			4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
combinationConstraintKind	0..1	ElementCombinationConstraintKind	(NC) Defines the combination constraint of the AssessedElement and Contingency. If included, this assessed element is only assessed for this contingency. Else if excluded, this assessed element should not be assessed for this contingency. Considered shall not be used for this combination.
normalEnabled	0..1	Boolean	(NC) If true, the assessed element with contingency is enabled, otherwise it is disabled under normal operating conditions.

Table 49 shows all association ends of AssessedElementWithContingency with other classes.

**Table 49 – Association ends of
ExtAssessedElement::AssessedElementWithContingency with other classes**

mult from	name	mult to	type	description
0..*	Contingency	0..1	Contingency	(NC) The contingency defined for this contingency and assessed element combination.
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) Enabling schedule which belongs to the assessed element with contingency.
0..*	AssessedElement	0..1	AssessedElement	(NC) The assessed element defined for this contingency and assessed element combination.

3.4.4 (NC) AssessedElementWithRemedialAction root class

Combination of an assessed element and a remedial action

Table 50 shows all attributes of AssessedElementWithRemedialAction.

Table 50 – Attributes of ExtAssessedElement::AssessedElementWithRemedialAction

name	mult	type	description
enabled	0..1	Boolean	(NC) If true, the assessed element with remedial action is enabled, otherwise it is disabled.
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
combinationConstraintKind	0..1	ElementCombinationConstraintKind	(NC) Defines the combination constraint of the AssessedElement and Remedial Action. If included, this remedial action is only assessed for this assessed element. Else if excluded, this remedial action should not be used for this assessed element. Else if considered, this

name	mult	type	description
			remedial action can be considered for this assessed element.
normalEnabled	0..1	Boolean	(NC) If true, the assessed element with remedial action is enabled, otherwise it is disabled under normal operating conditions.

Table 51 shows all association ends of AssessedElementWithRemedialAction with other classes.

Table 51 – Association ends of ExtAssessedElement::AssessedElementWithRemedialAction with other classes

mult from	name	mult to	type	description
0..*	AssessedElement	0..1	AssessedElement	(NC) The assessed element defined for this assessed element and remedial action combination.
0..*	RemedialAction	0..1	RemedialAction	(NC) The remedial action defined for this assessed element and remedial action combination.
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) Enabling schedule which belongs to the assessed element with remedial action.

3.4.5 (NC) SecuredExclusionReasonKind enumeration

The kind of secured exclusion reason.

Table 52 shows all literals of SecuredExclusionReasonKind.

Table 52 – Literals of ExtAssessedElement::SecuredExclusionReasonKind

literal	value	description
systemOperator		The network element that is going to be assessed is excluded for being secured by the system operator.
capacityCalculationRegion		The network element that is going to be assessed is excluded for being secured by the capacity calculation region.
nonNativeCapacityCalculationRegion		The network element that is going to be assessed is excluded for being secured for the native capacity calculation region since it would be secured for a non native capacity calculation region.

3.4.6 (NC) ElementCombinationConstraintKind enumeration

Kind of constraint for an element combination.

Table 53 shows all literals of ElementCombinationConstraintKind.

Table 53 – Literals of ExtAssessedElement::ElementCombinationConstraintKind

literal	value	description
included		Element combination is included.
excluded		Element combination is excluded.
considered		Element combination can be considered.

2483 **3.4.7 (NC) CriticalElementKind enumeration**

2484 The kind of critical element.

2485 Table 54 shows all literals of CriticalElementKind.

2486 **Table 54 – Literals of ExtAssessedElement::CriticalElementKind**

literal	value	description
validation		Network element should be assessed according to the methodology.
critical		Network element is considered to be critical according to the methodology.
monitored		Network element is considered to be monitored under contingency.
criticalAndMonitored		Network element is considered to be Critical Network Element monitored under Contingency (CNEC).

2487

2488 **3.4.8 (NC) CrossBorderRelevance root class**

2489 Combination of an assessed element and one or more bidding zone border that are affected by the assessment.

2491 Table 55 shows all attributes of CrossBorderRelevance.

2492 **Table 55 – Attributes of ExtAssessedElement::CrossBorderRelevance**

name	mult	type	description
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
normalEnabled	0..1	Boolean	(NC) If true, the cross border relevance shall be considered under normal operating conditions.
enabled	0..1	Boolean	(NC) If true, the cross border relevance is enabled, otherwise it is disabled.

2493

2494 Table 56 shows all association ends of CrossBorderRelevance with other classes.

2495 **Table 56 – Association ends of ExtAssessedElement::CrossBorderRelevance with other classes**

mult from	name	mult to	type	description
0..*	AssessedElement	0..1	AssessedElement	(NC) Assessed element which is cross border relevant.
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) Enabling schedule which belongs to the cross border relevant.
0..*	BiddingZoneBorder	0..1	BiddingZoneBorder	(NC) Bidding zone border relevant for this combination.

2497

2498 3.5 Package ExtAvailabilitySchedule

2499 3.5.1 General

2500 This package contains the CIM extensions required to describe outage planning, availability
2501 planning, and availability remedial actions in accordance with the roles and responsibilities
2502 defined by the EU Network Codes and Guidelines, in particular the System Operation Guideline
2503 (SO GL).

2504 It enables the representation of outage requests initiated by Outage Planning Agents, the
2505 controlled revision of those requests, structured responses from affected parties, and the
2506 modelling of dependencies between outages that influence system planning. The package also
2507 supports the establishment and revision of AvailabilityPlans and AvailabilitySchedules by the
2508 System Operator, including changes introduced through operational availability remedial
2509 actions.

2510 Role concepts are included to distinguish between the Outage Planning Agent, responsible for
2511 submitting and updating outage requests, the System Operator, responsible for establishing
2512 and maintaining availability plans and schedules, and the Outage Coordinator, responsible for
2513 coordinating affected parties, assessing dependencies, collecting responses, approving plans
2514 where applicable, and determining system-wide equipment availability.

2515 These extensions support regulatory alignment with SO GL, including Articles 80–87, promote
2516 interoperability between grid actors (TSOs, DSOs, SGUs, RSCs and other affected parties),
2517 ensure traceability of requests, decisions and revisions, and provide a harmonised data model
2518 for coordinated outage planning, availability planning, and operational availability management
2519 across the European power system.

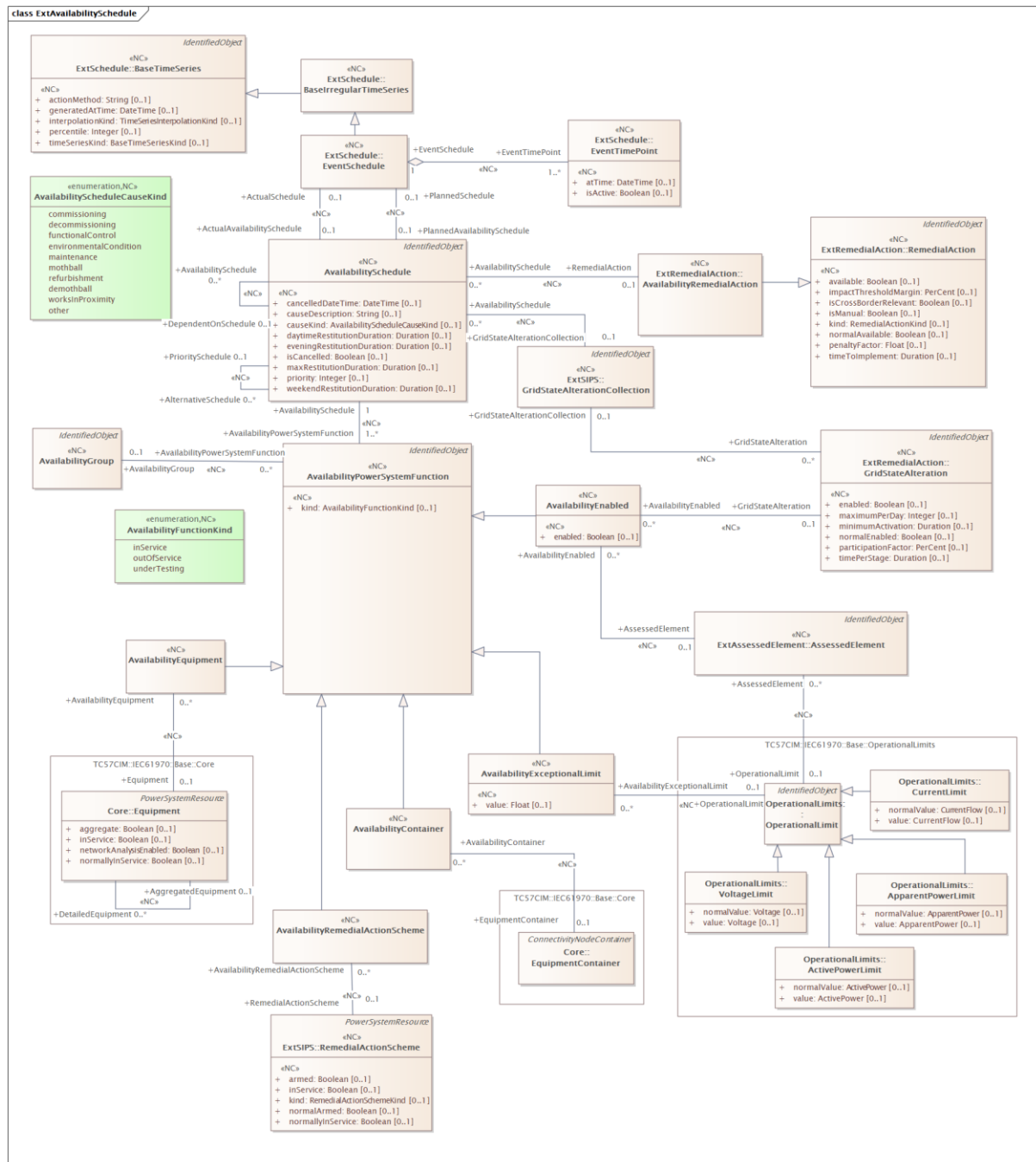


Figure 7 – Class diagram ExtAvailabilitySchedule::ExtAvailabilitySchedule

Figure 7: The diagram contains classes related to availability schedule.

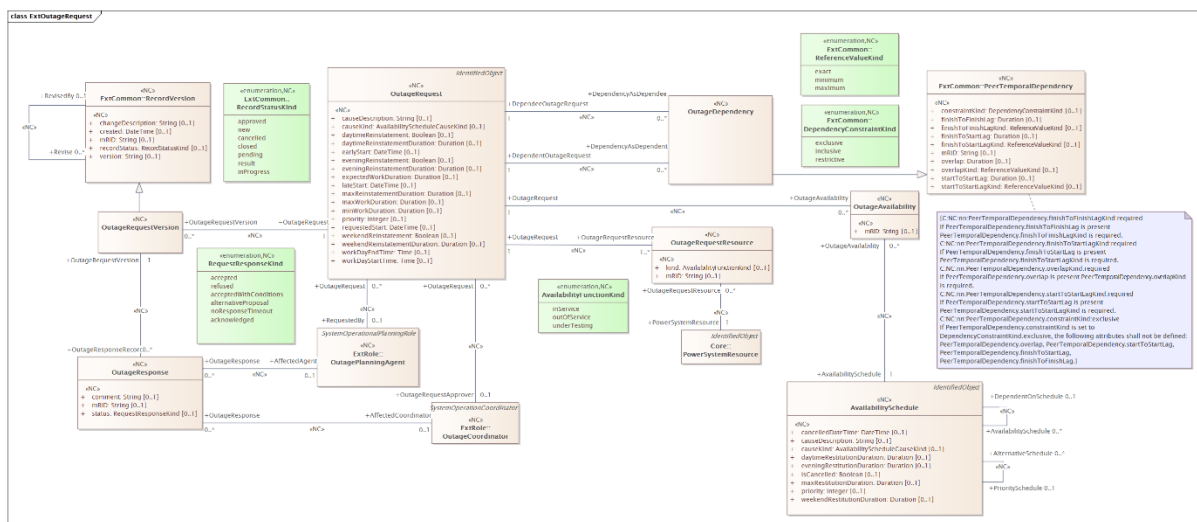


Figure 8 – Class diagram ExtAvailabilitySchedule::ExtOutageRequest

Figure 8: The diagram includes classes relevant to modelling of outage request.

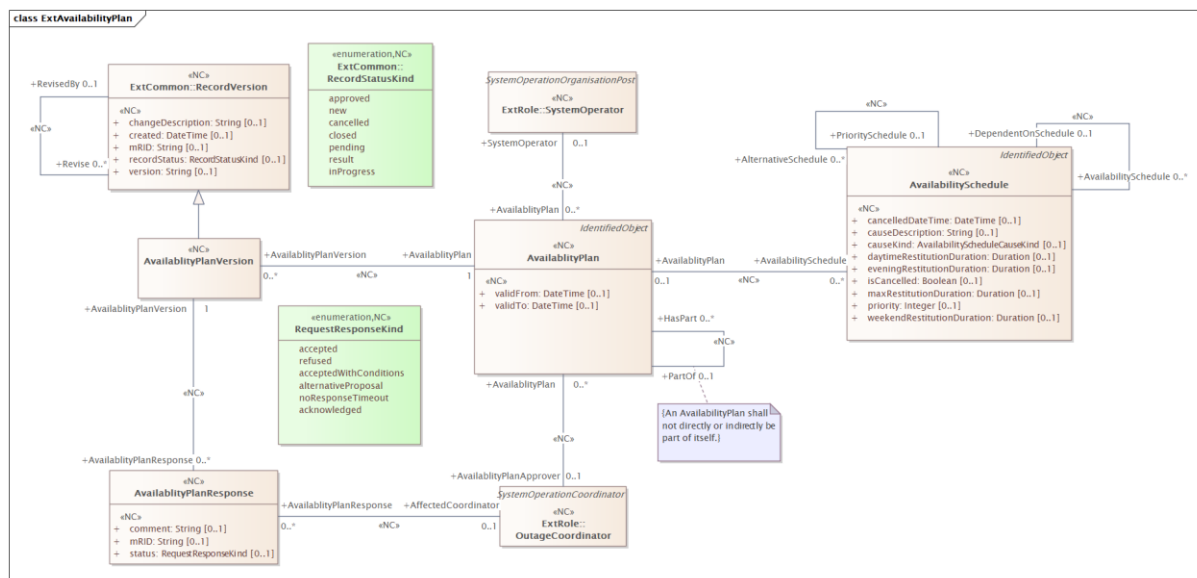


Figure 9 – Class diagram ExtAvailabilitySchedule::ExtAvailabilityPlan

Figure 9: The diagram includes classes relevant to modelling of availability plan.

3.5.2 (NC) AvailabilityEnabled

Inheritance path = [AvailabilityPowerSystemFunction](#) : IdentifiedObject : ExtEuIdentifiedObject : Identity

Availability enabled is enabling or disabling grid state alteration (e.g. tap position action) or assessed element that is related to the availability schedule. For instance, the cancellation of availability schedule can lead to changes in the assessed element. This is done by enabling one assessment and disabling another.

Table 57 shows all attributes of AvailabilityEnabled.

2537

Table 57 – Attributes of ExtAvailabilitySchedule::AvailabilityEnabled

name	mult	type	description
enabled	0..1	Boolean	(NC) Instruction to enable or disable alteration and assessment.
kind	0..1	AvailabilityFunctionKind	(NC) inherited from: AvailabilityPowerSystemFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

2538

2539

Table 58 shows all association ends of AvailabilityEnabled with other classes.

2540

Table 58 – Association ends of ExtAvailabilitySchedule::AvailabilityEnabled with other classes

2541

mult from	name	mult to	type	description
0..*	AssessedElement	0..1	AssessedElement	(NC) Assessed element that is affected by the availability given by this availability enabling.
0..*	GridStateAlteration	0..1	GridStateAlteration	(NC) Grid state alteration that is affected by the availability given by this availability enabling.
0..*	AvailabilityGroup	0..1	AvailabilityGroup	(NC) inherited from: AvailabilityPowerSystemFunction
1..*	AvailabilitySchedule	1..1	AvailabilitySchedule	(NC) inherited from: AvailabilityPowerSystemFunction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2542

2543

3.5.3 (NC) AvailabilityEquipment

2544

Inheritance path = [AvailabilityPowerSystemFunction](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

2545

2546

Availability equipment serves for associating an equipment with an availability schedule. For instance, putting in or out of service an ACLineSegment in combination with other availability functions with the same availability schedule.

2547

2548

2549

Table 59 shows all attributes of AvailabilityEquipment.

2550

Table 59 – Attributes of ExtAvailabilitySchedule::AvailabilityEquipment

name	mult	type	description
kind	0..1	AvailabilityFunctionKind	(NC) inherited from: AvailabilityPowerSystemFunction

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 60 shows all association ends of AvailabilityEquipment with other classes.

Table 60 – Association ends of ExtAvailabilitySchedule::AvailabilityEquipment with other classes

mult from	name	mult to	type	description
0..*	Equipment	0..1	Equipment	(NC) Equipment that is affected by the availability given by this availability equipment.
0..*	AvailabilityGroup	0..1	AvailabilityGroup	(NC) inherited from: AvailabilityPowerSystemFunction
1..*	AvailabilitySchedule	1..1	AvailabilitySchedule	(NC) inherited from: AvailabilityPowerSystemFunction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.5.4 (NC) AvailabilityExceptionalLimit

Inheritance path = [AvailabilityPowerSystemFunction](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Availability exceptional limit serves for associating an operational limit restriction with an availability schedule. For instance, enabling or disabling the current limit on ACLineSegment terminal in combination with other availability functions with the same availability schedule or de-rating due to fault.

Table 61 shows all attributes of AvailabilityExceptionalLimit.

Table 61 – Attributes of ExtAvailabilitySchedule::AvailabilityExceptionalLimit

name	mult	type	description
value	0..1	Float	(NC) Value for the referred operational limit.
kind	0..1	AvailabilityFunctionKind	(NC) inherited from: AvailabilityPowerSystemFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 62 shows all association ends of AvailabilityExceptionalLimit with other classes.

Table 62 – Association ends of ExtAvailabilitySchedule::AvailabilityExceptionalLimit with other classes

mult from	name	mult to	type	description
0..*	OperationalLimit	0..1	OperationalLimit	(NC) Operational limit that is constrained by this availability exceptional limit.
0..*	AvailabilityGroup	0..1	AvailabilityGroup	(NC) inherited from: AvailabilityPowerSystemFunction
1..*	AvailabilitySchedule	1..1	AvailabilitySchedule	(NC) inherited from: AvailabilityPowerSystemFunction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.5.5 (NC) AvailabilityGroup

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

Container to link relevant equipment that is affected by (un)availability schedule across availability coordinator (e.g. TSO-TSO, TSO-DSO or DSO-DSO).

Table 63 shows all attributes of AvailabilityGroup.

Table 63 – Attributes of ExtAvailabilitySchedule::AvailabilityGroup

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 64 shows all association ends of AvailabilityGroup with other classes.

Table 64 – Association ends of ExtAvailabilitySchedule::AvailabilityGroup with other classes

mult from	name	mult to	type	description
0..1	AvailabilityPowerSystem Function	0..*	AvailabilityPowerSystem Function	(NC) All availability power system functions linked through mutual dependency with other availability power system functions controlled by other system operators.

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2580

2581 **3.5.6 (NC) AvailabilityPowerSystemFunction**

2582 Inheritance path = IdentifiedObject : ExtEuIdentifiedObject : Identity

2583 Availability power system function describes the power system function that has a non-normal
 2584 availability in the associated availability schedule. The availability of the function is needed as
 2585 part of a power flow solution. This function is the cause and not the effect of the availability, if
 2586 the effect can be calculated through power flow. For instance if only the step-up transformer for
 2587 a generator is not available, the power flow will calculate that the generator is de-energized
 2588 (outage). If both are tagged as not available it will not be possible to investigate remedial action
 2589 for connecting the generator. It is expected that the power flow function is able to perform simple
 2590 topology changes affected by a function taken out of service, e.g. open switches on both end
 2591 of a ACLineSegment when the ACLineSegment is taken out of service. More complex changes,
 2592 like change regulation set point, must be described in the linked GridStateAlterationCollection.
 2593 Table 65 shows all attributes of AvailabilityPowerSystemFunction.

2594 **Table 65 – Attributes of ExtAvailabilitySchedule::AvailabilityPowerSystemFunction**

name	mult	type	description
kind	0..1	AvailabilityFunctionKind	(NC) Kind of availability that affect the power system function.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

2595

2596 Table 66 shows all association ends of AvailabilityPowerSystemFunction with other classes.

2597 **Table 66 – Association ends of**2598 **ExtAvailabilitySchedule::AvailabilityPowerSystemFunction with other classes**

mult from	name	mult to	type	description
0..*	AvailabilityGroup	0..1	AvailabilityGroup	(NC) Grouping for all availability power system functions (controlled by all relevant system operators) that have the same availability schedule.
1..*	AvailabilitySchedule	1..1	AvailabilitySchedule	(NC) Availability schedule for this availability power system function.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2599

2600 **3.5.7 (NC) AvailabilityRemedialActionScheme**

2601 Inheritance path = [AvailabilityPowerSystemFunction](#) : IdentifiedObject : ExtEulIdentifiedObject :
 2602 Identity

2603 Availability remedial action scheme serves for associating a remedial action scheme with an
 2604 availability schedule. For instance, taking in or out of service a SIPS / SPS due to
 2605 communication issue, in combination with other availability functions with the same availability
 2606 schedule.

2607 Table 67 shows all attributes of AvailabilityRemedialActionScheme.

2608 **Table 67 – Attributes of ExtAvailabilitySchedule::AvailabilityRemedialActionScheme**

name	mult	type	description
kind	0..1	AvailabilityFunctionKind	(NC) inherited from: AvailabilityPowerSystemFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

2609

2610 Table 68 shows all association ends of AvailabilityRemedialActionScheme with other classes.

2611 **Table 68 – Association ends of**
 2612 **ExtAvailabilitySchedule::AvailabilityRemedialActionScheme with other classes**

mult from	name	mult to	type	description
0..*	RemedialActionScheme	0..1	RemedialActionScheme	(NC) Remedial action scheme that is affected by the availability given by this availability remedial action scheme.
0..*	AvailabilityGroup	0..1	AvailabilityGroup	(NC) inherited from: AvailabilityPowerSystemFunction
1..*	AvailabilitySchedule	1..1	AvailabilitySchedule	(NC) inherited from: AvailabilityPowerSystemFunction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2613

2614 **3.5.8 (NC) AvailabilitySchedule**

2615 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

2616 A given (un)availability schedule with a given status and cause that include multiple equipment
 2617 that need to follow the same scheduling periods.

2618 Table 69 shows all attributes of AvailabilitySchedule.

2619 **Table 69 – Attributes of ExtAvailabilitySchedule::AvailabilitySchedule**

name	mult	type	description
cancelledDateTime	0..1	DateTime	(NC) The date and time the (un)availability schedule were cancelled .
causeDescription	0..1	String	(NC) A cause description for a cause kind. In case of CauseKind equals other, description or a reference of the cause of the (un)availability schedule.
causeKind	0..1	AvailabilityScheduleCauseKind	(NC) Kind of cause for the availability schedule.
daytimeRestitutionDuration	0..1	Duration	(NC) The time required to take the out-of-service equipment back into service during daytime. This includes the start-up time for generating units.
eveningRestitutionDuration	0..1	Duration	(NC) The time required to take the out-of-service equipment back into service after office hours. This includes the start-up time for generating units.
maxRestitutionDuration	0..1	Duration	(NC) The maximum time required to take the out-of-service equipment back into service. This includes the start-up time for generating units.
priority	0..1	Integer	(NC) Value 0 means ignore priority. 1 means the highest priority, 2 is the second highest priority.
weekendRestitutionDuration	0..1	Duration	(NC) The time required to take the out-of-service equipment back into service in the weekend or during bank holidays. This includes the start-up time for generating units.
isCancelled	0..1	Boolean	(NC) Defines the cancelling of the availability schedule. True means that is cancelling, False means that it is not cancelling.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

2620

2621 Table 70 shows all association ends of AvailabilitySchedule with other classes.

2622 **Table 70 – Association ends of ExtAvailabilitySchedule::AvailabilitySchedule with other**
2623 **classes**

mult from	name	mult to	type	description
1..1	AvailabilityPowerSystemFunction	1..*	AvailabilityPowerSystemFunction	(NC) All the couplings that associate one concrete function (e.g., equipment or container, SIPS/SPSSs, grid state alteration, exceptional operational limits) with the same availability schedule.
0..*	RemedialAction	0..1	AvailabilityRemedialAction	(NC) Remedial action that is cancelling this availability schedule.
0..1	ActualSchedule	0..1	EventSchedule	(NC) Actual schedule that relates to this availability schedule; used for ex-post

mult from	name	mult to	type	description
				reporting and analysis (e.g., to compare planned vs. actual).
0..1	PlannedSchedule	0..1	EventSchedule	(NC) Planned schedule that relates to this availability schedule used for planning availability (e.g., to compare planned vs. actual).
0..*	DependentOnSchedule	0..1	AvailabilitySchedule	(NC) (Un)availability schedule requested by one operator may require another operator to request their (un)availability schedule. This association is linking the schedules so that the dependency is clear.
0..1	AlternativeSchedule	0..*	AvailabilitySchedule	(NC) Alternative schedule. The priority in regards to multiple alternatives is given by the priority attribute. This schedule is only relevant if all the alternatives with higher priority are cancelled.
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) The grid state alteration collection that has this availability schedule.
0..1	PowerSystemProject	0..1	PowerSystemProject	(NC) The power system project that has this availability schedule.
1..1	OutageAvailability	0..*	OutageAvailability	(NC) All outage requests that contribute to the formation of this availability schedule.
0..*	AvailabilityPlan	0..1	AvailabilityPlan	(NC) The AvailabilityPlan of which this AvailabilitySchedule is a component.
0..1	AvailabilitySchedule	0..*	AvailabilitySchedule	(NC) Availability schedule that has a dependent availability schedule.
0..*	PrioritySchedule	0..1	AvailabilitySchedule	(NC) Priority schedule. This is the schedule that has the highest priority and the only valid if not cancelled.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2624

2625

3.5.9 (NC) AvailabilityContainer

2626 Inheritance path = [AvailabilityPowerSystemFunction](#) : IdentifiedObject : ExtEuIdentifiedObject :
 2627 Identity

2628 Availability container serves for associating an equipment container with an availability
 2629 schedule. For instance, putting in or out of service all the equipment inside a Line or a Bay in
 2630 combination with other availability functions with the same availability schedule.

2631 Table 71 shows all attributes of AvailabilityContainer.

2632

Table 71 – Attributes of ExtAvailabilitySchedule::AvailabilityContainer

name	mult	type	description
kind	0..1	AvailabilityFunctionKind	(NC) inherited from: AvailabilityPowerSystemFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 72 shows all association ends of AvailabilityContainer with other classes.

Table 72 – Association ends of ExtAvailabilitySchedule::AvailabilityContainer with other classes

mult from	name	mult to	type	description
0..*	EquipmentContainer	0..1	EquipmentContainer	(NC) Equipment container that is affected by the availability given by this availability container.
0..*	AvailabilityGroup	0..1	AvailabilityGroup	(NC) inherited from: AvailabilityPowerSystemFunction
1..*	AvailabilitySchedule	1..1	AvailabilitySchedule	(NC) inherited from: AvailabilityPowerSystemFunction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.5.10 (NC) AvailabilityFunctionKind enumeration

Kind of availability that is affecting the function.

Table 73 shows all literals of AvailabilityFunctionKind.

Table 73 – Literals of ExtAvailabilitySchedule::AvailabilityFunctionKind

literal	value	description
inService		Function is in service.
outOfService		Function is out-of-service.
underTesting		Function is under testing and need to expect unscheduled availability.

3.5.11 (NC) AvailabilityScheduleCauseKind enumeration

The kinds of cause of the (un)availability schedule.

Table 74 shows all literals of AvailabilityScheduleCauseKind.

Table 74 – Literals of ExtAvailabilitySchedule::AvailabilityScheduleCauseKind

literal	value	description
commissioning		The cause is due to a commissioning.
decommissioning		The cause is due to a decommissioning.
functionalControl		The cause is due to a functional control (in & out).

literal	value	description
environmentalCondition		The cause is due to an environmental condition. This can lead to exceptional margin and limits.
maintenance		The cause is due to a maintenance.
refurbishment		The cause is due to a refurbishment, either upgrade or downgrade.
worksInProximity		The cause is due to a works in proximity.
other		The cause is of other kind.
mothball		The cause is mothball, i.e. the asset is not used but it is kept ready for use if needed. This is in cases where it is not economically viable at a given time but remains on the grid to be de-mothballed when it becomes viable again.
demothball		The cause is de-mothball. If the asset is already mothballed, then the asset is de-mothballed if it is viable economically.

2647

2648 **3.5.12 (NC) AvailabilityPlan**

2649 Inheritance path = IdentifiedObject : ExtEuIdentifiedObject : Identity

2650 A consolidated plan established by a System Operator that groups the AvailabilitySchedules applicable to a defined period and operational scope.

2652 Note: An AvailabilityPlan provides the system-level view of resource availability used for outage coordination and operational planning. It may be divided into subordinate AvailabilityPlans and may be subject to approval by an Outage Coordinator.

2655 Table 75 shows all attributes of AvailabilityPlan.

2656

Table 75 – Attributes of ExtAvailabilitySchedule::AvailabilityPlan

name	mult	type	description
validTo	0..1	DateTime	(NC) The date and time the end of the availability plan.
validFrom	0..1	DateTime	(NC) The date and time the start of the availability plan.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

2657

2658 Table 76 shows all association ends of AvailabilityPlan with other classes.

Table 76 – Association ends of ExtAvailabilitySchedule::AvailabilityPlan with other classes

mult from	name	mult to	type	description
0..1	AvailabilitySchedule	0..*	AvailabilitySchedule	(NC) The AvailabilitySchedules included in this AvailabilityPlan.
0..*	SystemOperator	0..1	SystemOperator	(NC) The System Operator responsible for establishing and maintaining the AvailabilityPlan.

2657

2658

2659

2660

mult from	name	mult to	type	description
0..1	HasPart	0..*	AvailabilityPlan	(NC) The subordinate AvailabilityPlans that form part of this AvailabilityPlan.
1..1	AvailabilityPlanVersion	0..*	AvailabilityPlanVersion	(NC) The versions created for this AvailabilityPlan.
0..*	AvailabilityPlanApprover	0..1	OutageCoordinator	(NC) The Outage Coordinator responsible for approving the AvailabilityPlan.
0..*	PowerSystemProject	0..1	PowerSystemProject	(NC)
0..*	PartOf	0..1	AvailabilityPlan	(NC) The parent AvailabilityPlan of which this AvailabilityPlan forms a part.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2661

2662 **3.5.13 (NC) AvailabilityPlanVersion**2663 Inheritance path = [RecordVersion](#)

2664 A specific version of an AvailabilityPlan used in the coordination and approval process.

2665 Note: An AvailabilityPlanVersion preserves the state of the plan at a given point in time and is

2666 the subject of responses issued by affected Outage Coordinators. Changes to the

2667 AvailabilityPlan are represented by successive AvailabilityPlanVersions, thereby preserving the

2668 history and traceability of the coordination process.

2669 Table 77 shows all attributes of AvailabilityPlanVersion.

2670 **Table 77 – Attributes of ExtAvailabilitySchedule::AvailabilityPlanVersion**

name	mult	type	description
created	0..1	DateTime	(NC) inherited from: RecordVersion
version	0..1	String	(NC) inherited from: RecordVersion
recordStatus	0..1	RecordStatusKind	(NC) inherited from: RecordVersion
mRID	0..1	String	(NC) inherited from: RecordVersion
changeDescription	0..1	String	(NC) inherited from: RecordVersion

2671

2672 Table 78 shows all association ends of AvailabilityPlanVersion with other classes.

2673 **Table 78 – Association ends of ExtAvailabilitySchedule::AvailabilityPlanVersion with**

2674 **other classes**

mult from	name	mult to	type	description
0..*	AvailabilityPlan	1..1	AvailabilityPlan	(NC) The AvailabilityPlan represented by this version.
1..1	AvailabilityPlanResponse	0..*	AvailabilityPlanResponse	(NC) The responses provided for this version of the AvailabilityPlan.
0..1	Revise	0..*	RecordVersion	(NC) inherited from: RecordVersion
0..1	RecordInvolvement	0..*	RecordInvolvement	inherited from: RecordVersion
0..*	RevisedBy	0..1	RecordVersion	(NC) inherited from: RecordVersion

2675

2676 **3.5.14 (NC) AvailabilityPlanResponse root class**2677 A formal response provided by an affected Outage Coordinator to a specific
2678 AvailabilityPlanVersion.2679 Note: The response records the coordinator's position on the proposed plan, such as
2680 acceptance, refusal, acceptance with conditions, an alternative proposal, acknowledgement, or
2681 absence of a response within the applicable time limit.

2682 Table 79 shows all attributes of AvailabilityPlanResponse.

2683 **Table 79 – Attributes of ExtAvailabilitySchedule::AvailabilityPlanResponse**

name	mult	type	description
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
status	0..1	RequestResponseKind	(NC) Outcome of the response to the outage request version, indicating the decision or position of the responding party.
comment	0..1	String	(NC) Free-text explanation, justification or additional information provided with the response to the outage request version.

2684

2685 Table 80 shows all association ends of AvailabilityPlanResponse with other classes.

2686 **Table 80 – Association ends of ExtAvailabilitySchedule::AvailabilityPlanResponse with**
2687 **other classes**

mult from	name	mult to	type	description
0..*	AvailabilityPlanVersion	1..1	AvailabilityPlanVersion	(NC) The version of the AvailabilityPlan to which this response applies.
0..*	AffectedCoordinator	0..1	OutageCoordinator	(NC) The affected Outage Coordinator that provides the response to the AvailabilityPlanVersion.

2688

2689 **3.5.15 (NC) OutageRequest**

2690 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

2691 Represents the initial business intent to take one or more resources out of service during a
2692 specified period, as submitted by an Outage Planning Agent.

2693 Table 81 shows all attributes of OutageRequest.

2694 **Table 81 – Attributes of ExtAvailabilitySchedule::OutageRequest**

name	mult	type	description
expectedWorkDuration	0..1	Duration	(NC) The expected planned work duration.
minWorkDuration	0..1	Duration	(NC) The minimum work duration that can be achieved when extra resources are allocated.
maxWorkDuration	0..1	Duration	(NC) The maximum work duration taken into account risk mitigation with less resources available. If like that assessment is done on this duration to avoid re-planning on a later stage.

name	mult	type	description
daytimeReinstatementDuration	0..1	Duration	(NC) The time required to take the out-of-service equipment back into service during daytime. This includes the start-up time for generating units.
eveningReinstatementDuration	0..1	Duration	(NC) The time required to take the out-of-service equipment back into service after office hours. This includes the start-up time for generating units.
maxReinstatementDuration	0..1	Duration	(NC) The maximum time required to take the out-of-service equipment back into service after office hours. This includes the start-up time for generating units.
weekendReinstatementDuration	0..1	Duration	(NC) The time required to take the out-of-service equipment back into service in the weekend or during bank holidays. This includes the start-up time for generating units.
priority	0..1	Integer	(NC) 0 means ignore priority. 1 means the highest priority, 2 is the second highest priority.
earlyStart	0..1	DateTime	(NC) Earliest possible start time/date of the work.
requestedStart	0..1	DateTime	(NC) Requested start time/date.
lateStart	0..1	DateTime	(NC) The latest time/date the work can start.
workDayStartTime	0..1	Time	(NC) The time in a normal work day that equipment would be taken out of service in case of reinstatement later in the working day.
workDayEndTime	0..1	Time	(NC) The time in a normal work day that equipment can be reinstated.
weekendReinstatement	0..1	Boolean	(NC) True, when no work is planned for the weekend or public holidays and the equipment can be reinstated.
eveningReinstatement	0..1	Boolean	(NC) True, when no work is planned for the weekend or public holidays and the equipment can be reinstated.
daytimeReinstatement	0..1	Boolean	(NC) True, when no work is planned for the weekend or public holidays and the equipment can be reinstated.
causeDescription	0..1	String	(NC) A cause description for a cause kind. In case of CauseKind equals other, description or a reference of the cause of the (un)availability schedule.
causeKind	0..1	AvailabilityScheduleCauseKind	(NC) Kind of cause for the availability schedule.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

2695

2696

Table 82 shows all association ends of OutageRequest with other classes.

Table 82 – Association ends of ExtAvailabilitySchedule::OutageRequest with other classes

mult from	name	mult to	type	description
1..1	DependencyAsDependee	0..*	OutageDependency	(NC) The outage dependency in which this outage request is the dependee.
1..1	DependencyAsDependent	0..*	OutageDependency	(NC) The outage dependency in which this outage request is the dependent.
1..1	OutageAvailability	0..*	OutageAvailability	(NC) All availability relationships in which this outage request is used as an input to determine system availability.
0..*	RequestedBy	0..1	OutagePlanningAgent	(NC) The agent responsible for creating and submitting the outage request.
0..*	OutageRequestApprover	0..1	OutageCoordinator	(NC) The coordinator responsible for approving the final version of the outage request.
1..1	OutageRequestVersion	0..*	OutageRequestVersion	(NC) All version instances associated with this OutageRequest.
1..1	OutageRequestResource	1..*	OutageRequestResource	(NC) Outage request resource entries referencing the resource.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.5.16 (NC) OutageRequestVersion

Inheritance path = [RecordVersion](#)

Specialisation of RecordVersion that represents a specific version of an OutageRequest used in the outage coordination process.

An OutageRequestVersion contains the current proposed timing, scope and conditions of the outage and is the object against which outage dependencies, outage responses and resulting availability are evaluated.

Table 83 shows all attributes of OutageRequestVersion.

Table 83 – Attributes of ExtAvailabilitySchedule::OutageRequestVersion

name	mult	type	description
created	0..1	DateTime	(NC) inherited from: RecordVersion
version	0..1	String	(NC) inherited from: RecordVersion
recordStatus	0..1	RecordStatusKind	(NC) inherited from: RecordVersion
mRID	0..1	String	(NC) inherited from: RecordVersion
changeDescription	0..1	String	(NC) inherited from: RecordVersion

Table 84 shows all association ends of OutageRequestVersion with other classes.

Table 84 – Association ends of ExtAvailabilitySchedule::OutageRequestVersion with other classes

mult from	name	mult to	type	description
0..*	OutageRequest	1..1	OutageRequest	(NC) The OutageRequest for which this object represents a specific version used during coordination.
1..1	OutageResponseRecord	0..*	OutageResponse	(NC) All formal responses received for this version of the outage request.
0..1	Revise	0..*	RecordVersion	(NC) inherited from: RecordVersion
0..1	RecordInvolvement	0..*	RecordInvolvement	inherited from: RecordVersion
0..*	RevisedBy	0..1	RecordVersion	(NC) inherited from: RecordVersion

3.5.17 (NC) RequestResponseKind enumeration

Classification of the response to a request.

Table 85 shows all literals of RequestResponseKind.

Table 85 – Literals of ExtAvailabilitySchedule::RequestResponseKind

literal	value	description
accepted		Indicates that the responding agent agrees and accept the request version as submitted.
refused		Indicates that the responding agent does not accept the request version due to operational, technical, or regulatory constraints.
acceptedWithConditions		Indicates that the responding agent can accept the request version only if specific conditions, modifications, or mitigations are met.
alternativeProposal		Indicates that the responding agent proposes alternative timing, duration, scope, or other adjustments to the request version.
noResponseTimeout		Indicates that the responding agent did not provide a response within the required timeframe, and the coordination process proceeded using a timeout rule.
acknowledged		Indicates that the responding agent has received and reviewed the request version, but has not yet provided an approval or objection.

3.5.18 (NC) OutageResponse root class

Represents the formal response provided by an affected agent or the outage coordinator to a specific OutageRequestVersion.

Table 86 shows all attributes of OutageResponse.

Table 86 – Attributes of ExtAvailabilitySchedule::OutageResponse

name	mult	type	description
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID

name	mult	type	description
			or rdf:about attributes that identify CIM object elements.
status	0..1	RequestResponseKind	(NC) Outcome of the response to the outage request version, indicating the decision or position of the responding party.
comment	0..1	String	(NC) Free-text explanation, justification or additional information provided with the response to the outage request version.

Table 87 shows all association ends of OutageResponse with other classes.

Table 87 – Association ends of ExtAvailabilitySchedule::OutageResponse with other classes

mult from	name	mult to	type	description
0..*	OutageRequestVersion	1..1	OutageRequestVersion	(NC) The version of the outage request to which this response applies.
0..*	AffectedCoordinator	0..1	OutageCoordinator	(NC) The system operator acting as outage coordinator who issued the response.
0..*	AffectedAgent	0..1	OutagePlanningAgent	(NC) The agent that issued the response.

3.5.19 (NC) OutageRequestResource root class

Associates an OutageRequest with a PowerSystemResource affected by the requested outage.

Table 88 shows all attributes of OutageRequestResource.

Table 88 – Attributes of ExtAvailabilitySchedule::OutageRequestResource

name	mult	type	description
kind	0..1	AvailabilityFunctionKind	(NC) The requested operational availability function of the associated PowerSystemResource. This value is used as input when determining the resulting AvailabilitySchedule.
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

Table 89 shows all association ends of OutageRequestResource with other classes.

Table 89 – Association ends of ExtAvailabilitySchedule::OutageRequestResource with other classes

mult from	name	mult to	type	description
0..*	PowerSystemResource	1..1	PowerSystemResource	(NC) The specific power system resource that is affected by the outage request.

mult from	name	mult to	type	description
1..*	OutageRequest	1..1	OutageRequest	(NC) The outage request that includes this specific affected resource.

3.5.20 (NC) OutageDependency

Inheritance path = [PeerTemporalDependency](#)

A peer temporal dependency that defines temporal or operational constraints between two outage requests.

Note: The dependency constrains the start or end of the dependent outage relative to the start or end of the dependee outage. Lag constraints are evaluated using the latest applicable transition of the dependee. This supports sequencing and coordination of related outages without implying a hierarchical relationship between the outage requests.

Example:

- startToStartLag = 1H, startToStartLagKind = minimum: the dependent outage may start no earlier than one hour after the dependee outage starts.

- finishToStartLag = 20M, finishToStartLagKind = exact: the dependent outage starts exactly 20 minutes after the dependee outage ends, for example to allow a defined switching or restoration sequence between the outages.

- finishToFinishLag = 30M, finishToFinishLagKind = maximum: the dependent outage shall end no later than 30 minutes after the dependee outage ends.

Table 90 shows all attributes of OutageDependency.

Table 90 – Attributes of ExtAvailabilitySchedule::OutageDependency

name	mult	type	description
mRID	0..1	String	(NC) inherited from: PeerTemporalDependency
finishToFinishLag	0..1	Duration	(NC) inherited from: PeerTemporalDependency
constraintKind	0..1	DependencyConstraintKind	(NC) inherited from: PeerTemporalDependency
finishToFinishLagKind	0..1	ReferenceValueKind	(NC) inherited from: PeerTemporalDependency
overlap	0..1	Duration	(NC) inherited from: PeerTemporalDependency
overlapKind	0..1	ReferenceValueKind	(NC) inherited from: PeerTemporalDependency
finishToStartLag	0..1	Duration	(NC) inherited from: PeerTemporalDependency
startToStartLag	0..1	Duration	(NC) inherited from: PeerTemporalDependency
finishToStartLagKind	0..1	ReferenceValueKind	(NC) inherited from: PeerTemporalDependency
startToStartLagKind	0..1	ReferenceValueKind	(NC) inherited from: PeerTemporalDependency

Table 91 shows all association ends of OutageDependency with other classes.

Table 91 – Association ends of ExtAvailabilitySchedule::OutageDependency with other classes

mult from	name	mult to	type	description
0..*	DependeeOutageRequest	1..1	OutageRequest	(NC) The outage request upon which the dependent outage request depends.
0..*	DependentOutageRequest	1..1	OutageRequest	(NC) The outage request whose timing or execution is constrained by the dependee outage request.

2761 **3.5.21 (NC) OutageAvailability root class**

2762 Relationship between an OutageRequest and an AvailabilitySchedule, indicating that the
 2763 outage request is one of the inputs or constraints used to establish that availability schedule.
 2764 Multiple outage requests may contribute to a single availability schedule, and a single outage
 2765 request may be reflected in multiple availability schedules issued by the system operator.
 2766 Table 92 shows all attributes of OutageAvailability.

2767 **Table 92 – Attributes of ExtAvailabilitySchedule::OutageAvailability**

name	mult	type	description
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

2768
 2769 Table 93 shows all association ends of OutageAvailability with other classes.

2770 **Table 93 – Association ends of ExtAvailabilitySchedule::OutageAvailability with other classes**
2771

mult from	name	mult to	type	description
0..*	AvailabilitySchedule	1..1	AvailabilitySchedule	(NC) The availability schedule derived in part from this outage request.
0..*	OutageRequest	1..1	OutageRequest	(NC) The outage request that contributes to or influences the resulting availability schedule.

2772
 2773 **3.6 Contingency extensions**

2774 **3.6.1 General**

2775 This package contains the extensions related to the contingency.

Figure 10: The diagram contains classes related to the contingency.

Combination of a contingency and a remedial action. ContingencyWithRemedialAction shall not be instantiated for preventive RemedialAction (RemedialAction.kind equals RemedialActionKind.preventive).

Table 94 – Attributes of ExtContingency::ContingencyWithRemedialAction

– Page 124 of 634 –

name	mult	type	description
			contingency. Else if excluded, this remedial action should not be used for this contingency. Else if considered, this remedial action can be considered for this contingency.
normalEnabled	0..1	Boolean	(NC) If true, the contingency with remedial action is enabled, otherwise it is disabled under normal operating conditions.

Table 95 shows all association ends of ContingencyWithRemedialAction with other classes.

Table 95 – Association ends of ExtContingency::ContingencyWithRemedialAction with other classes

mult from	name	mult to	type	description
0..*	Contingency	0..1	Contingency	(NC) The contingency that is associated with a remedial action, i.e. the contingency that is the cause for the creation of a remedial action and justifies it or would usually be resolved with a remedial action.
0..*	RemedialAction	0..1	RemedialAction	(NC) The remedial action defined for this contingency and remedial action combination.
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) Enabling schedule associated to a contingency with remedial action.

3.6.3 (NC) ExceptionalContingency

Inheritance path = Contingency : IdentifiedObject : ExtEuIdentifiedObject : Identity : [ExtContingency](#)

Exceptional contingency means the simultaneous occurrence of multiple contingencies with a common cause.

Table 96 shows all attributes of ExceptionalContingency.

Table 96 – Attributes of ExtContingency::ExceptionalContingency

name	mult	type	description
kind	0..1	ContingencyConditionKind	(NC) Defines the kind of relevance and criteria of application of the exceptional contingency.
mustStudy	0..1	Boolean	inherited from: Contingency
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
normalProbability	0..1	PerCent	(NC) inherited from: ExtContingency
normalMustStudy	0..1	Boolean	(NC) inherited from: ExtContingency
probability	0..1	PerCent	(NC) inherited from: ExtContingency

Table 97 shows all association ends of ExceptionalContingency with other classes.

Table 97 – Association ends of ExtContingency::ExceptionalContingency with other classes

mult from	name	mult to	type	description
1..1	ContingencyElement	0..*	ContingencyElement	inherited from: Contingency
0..1	SimulationEvents	0..1	SimulationEvents	(NC) inherited from: Contingency
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.6.4 (NC) ExtContingency root class

Specifies the forecasted probability of the occurrence of the contingency based on the given operational condition, status of the equipment and the forecasted environment condition. Table 98 shows all attributes of ExtContingency.

Table 98 – Attributes of ExtContingency::ExtContingency

name	mult	type	description
normalProbability	0..1	PerCent	(NC) Normal probability of the occurrence of the contingency based on normal operational condition. The value is used as the default if the probability is missing. The allowed value range is [0,100].
normalMustStudy	0..1	Boolean	(NC) Specifies the requirement of study the contingency under normal operating conditions. True means the contingency must be study in a normal scenario. False means that the contingency does not need to be included in the scenario. This is the default value if mustStudy is missing.
probability	0..1	PerCent	(NC) The forecasted probability of the occurrence of the contingency based on the given operational condition, status of the equipment and the forecasted environment condition. The allowed value range is [0,100].

3.6.5 (NC) OrdinaryContingency

Inheritance path = Contingency : IdentifiedObject : ExtEuIdentifiedObject : Identity : [ExtContingency](#)
Ordinary contingency means the occurrence of a contingency of a single branch or injection. Table 99 shows all attributes of OrdinaryContingency.

Table 99 – Attributes of ExtContingency::OrdinaryContingency

name	mult	type	description
mustStudy	0..1	Boolean	inherited from: Contingency
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
normalProbability	0..1	PerCent	(NC) inherited from: ExtContingency
normalMustStudy	0..1	Boolean	(NC) inherited from: ExtContingency
probability	0..1	PerCent	(NC) inherited from: ExtContingency

Table 100 shows all association ends of OrdinaryContingency with other classes.

Table 100 – Association ends of ExtContingency::OrdinaryContingency with other classes

mult from	name	mult to	type	description
1..1	ContingencyElement	0..*	ContingencyElement	inherited from: Contingency
0..1	SimulationEvents	0..1	SimulationEvents	(NC) inherited from: Contingency
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.6.6 (NC) OutOfRangeContingency

Inheritance path = Contingency : IdentifiedObject : ExtEuIdentifiedObject : Identity : [ExtContingency](#)

Out of range means the simultaneous occurrence of multiple contingencies without a common cause, or a loss of power generating modules with a total loss of generation capacity exceeding the reference incident.

Table 101 shows all attributes of OutOfRangeContingency.

Table 101 – Attributes of ExtContingency::OutOfRangeContingency

name	mult	type	description
mustStudy	0..1	Boolean	inherited from: Contingency
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
normalProbability	0..1	PerCent	(NC) inherited from: ExtContingency
normalMustStudy	0..1	Boolean	(NC) inherited from: ExtContingency
probability	0..1	PerCent	(NC) inherited from: ExtContingency

Table 102 shows all association ends of OutOfRangeContingency with other classes.

Table 102 – Association ends of ExtContingency::OutOfRangeContingency with other classes

mult from	name	mult to	type	description
1..1	ContingencyElement	0..*	ContingencyElement	inherited from: Contingency
0..1	SimulationEvents	0..1	SimulationEvents	(NC) inherited from: Contingency
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.6.7 (NC) ContingencyConditionKind enumeration

Kinds of occurrence criteria of application.

Table 103 shows all literals of ContingencyConditionKind.

Table 103 – Literals of ExtContingency::ContingencyConditionKind

literal	value	description
geographicalLocation		Permanent occurrence factor which is specific geographical location.
design		Permanent occurrence factor which is design condition.
environmental		Temporary occurrence factor which is weather or environmental condition (e.g. storm).
operational		Temporary occurrence factor which is operational condition.
malfunction		Temporary occurrence factor which is life time or generic malfunction affecting the risk of failure condition.

3.7 (CIM18) Package ExtDirectCurent

3.7.1 General

This package contains the extensions related to the direct current (DC).

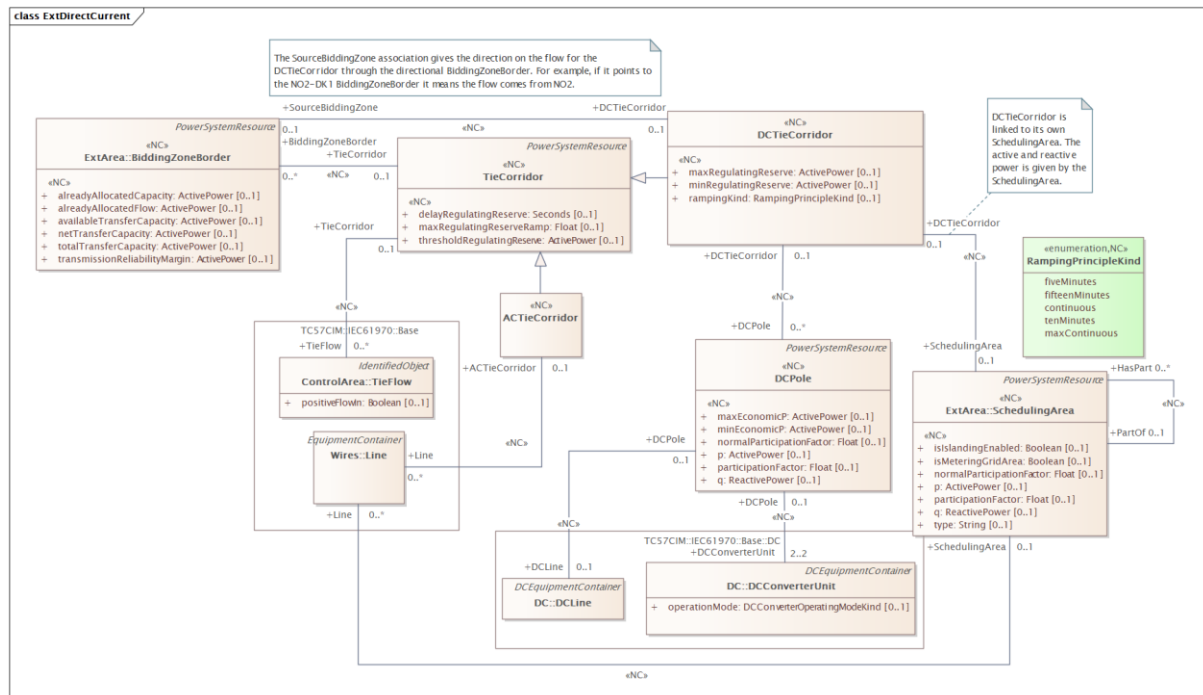


Figure 11 – Class diagram ExtDirectCurrent::ExtDirectCurrent

Figure 11: The diagram contains classes related to direct current.

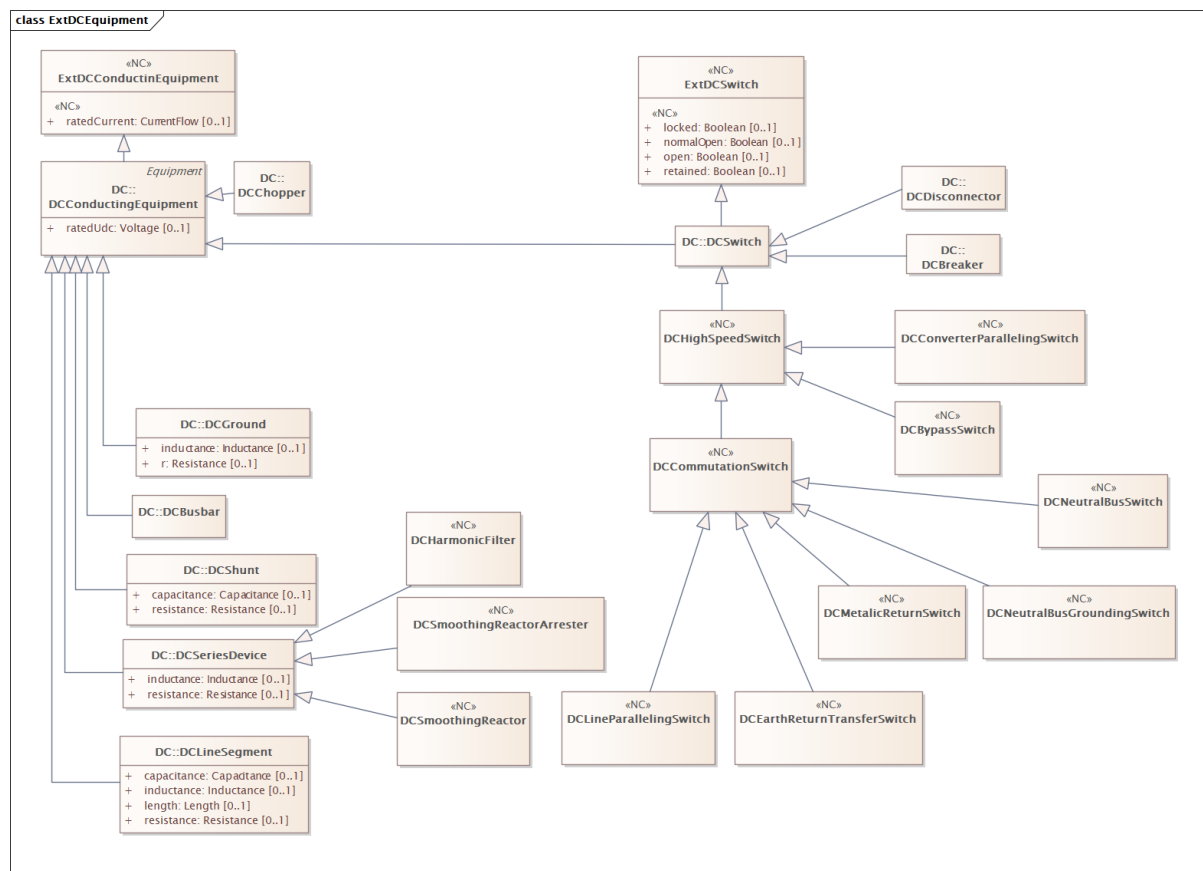
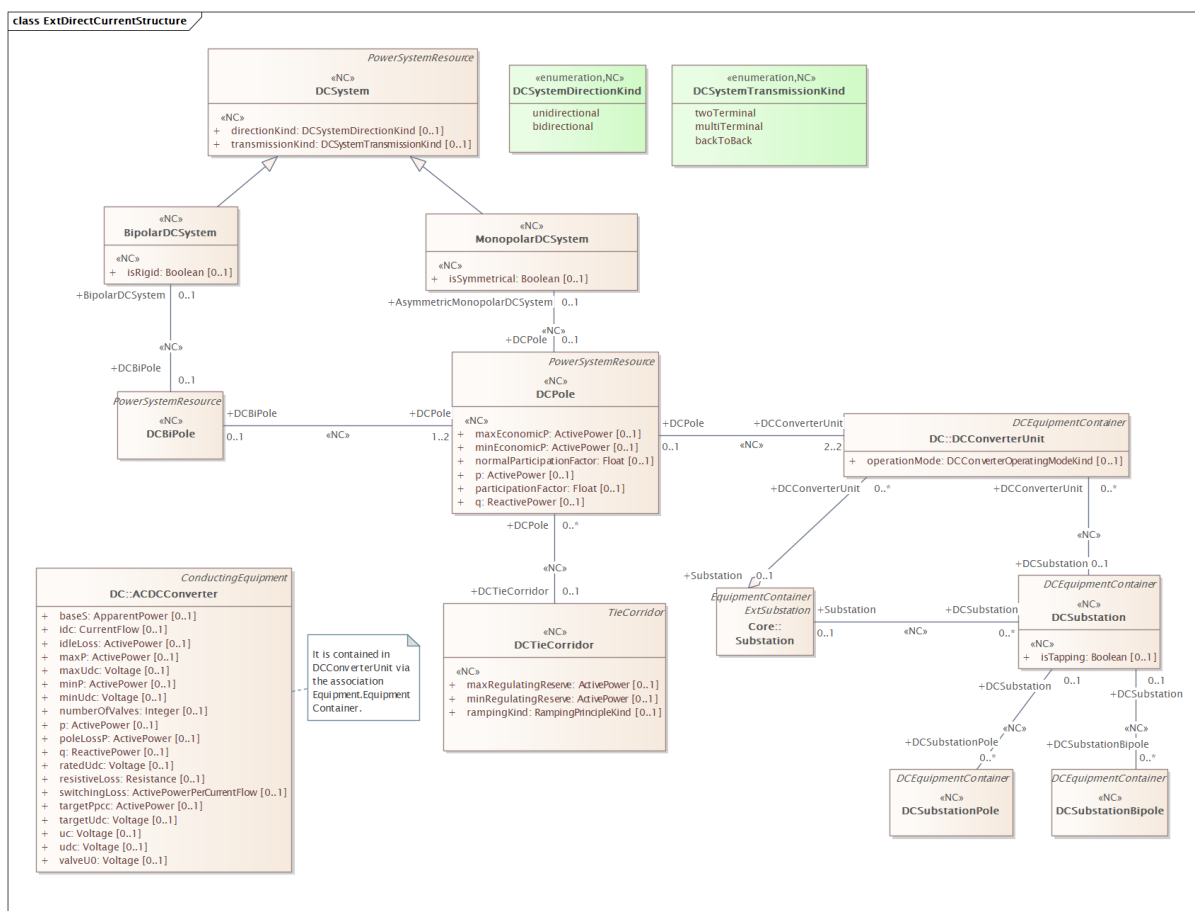


Figure 12 – Class diagram ExtDirectCurent::ExtDCEquipment

2845 Figure 12: The diagram shows the DC equipment model.



2846

2847 Figure 13 – Class diagram ExtDirectCurent::ExtDirectCurrentStructure

2848 Figure 13: The diagram contains classes related to direct current structure.

2849 **3.7.2 (NC) DCSystemDirectionKind enumeration**

2850 Direction kinds of the DC system.

2851 Table 104 shows all literals of DCSystemDirectionKind.

2852 **Table 104 – Literals of ExtDirectCurent::DCSystemDirectionKind**

literal	value	description
unidirectional		Unidirectional DC system used for the transfer of energy in only one direction. According to IEC 60633, most DC systems are inherently bidirectional. However, some systems may be optimized to transmit power in only one preferred direction. Such systems may still be considered as "bidirectional".
bidirectional		Bidirectional DC system used for the transfer of energy in either direction. According to IEC 60633 a multiterminal DC system is bidirectional if one or more substations are bidirectional.

2853

2854 **3.7.3 (NC) DCSystemTransmissionKind enumeration**

2855 DC system transmission kind.

2856 Table 105 shows all literals of DCSystemTransmissionKind.

2857 **Table 105 – Literals of ExtDirectCurent::DCSystemTransmissionKind**

literal	value	description
twoTerminal		Two-terminal DC transmission system (IEC 60633), consisting of two DC substations and the connecting DC transmission line(s).
multiTerminal		Multiterminal DC transmission system (IEC 60633) consisting of more than two separated DC substations and the interconnecting DC transmission lines.
backToBack		DC back-to-back system (IEC 60633) is a DC system which transfers energy between AC buses at the same location.

2858

2859 **3.7.4 (NC) RampingPrincipleKind enumeration**

2860 Kind of ramping principle.

2861 Table 106 shows all literals of RampingPrincipleKind.

2862 **Table 106 – Literals of ExtDirectCurent::RampingPrincipleKind**

literal	value	description
fiveMinutes		Five minutes ramping principle. Ramping starts five minutes before the schedule time point and ends five minutes after. For instance, if the schedule time point is 19:30h it starts at 19:25h and ends at 19:35h.
fifteenMinutes		Fifteen minutes ramping principle. Ramping starts 15 minutes before the schedule time point and ends 15 minutes after. For instance, if the schedule time point is 19:30h it starts at 19:15h and ends at 19:45h.
continuous		Continuous ramping principle is applied between two scheduled time point. For instance, from 10 MW to 70 MW over one hour the change is 1 MW/min.
tenMinutes		Ten minutes ramping principle. Ramping starts 10 minutes before the schedule time point and ends 10 minutes after. For instance, if the schedule time point is 19:30h it starts at 19:20h and ends at 19:40h.
maxContinuous		Maximum continuous ramping principle. The schedule is kept as long as possible and the maximum ramping rate is used to get from one point to another, symmetrically around the schedule time points. For example, there is 40 MW change in the schedule the maximum ramp rate is 20 MW/min the ramping starts 1 min before (e.g. 19:29h) and finishes 1 min after (e.g. 19:31h).

2863

2864 **3.7.5 (NC) ACTieCorridor**

2865 Inheritance path = [TieCorridor](#) : PowerSystemResource : IdentifiedObject :
 2866 ExtEulIdentifiedObject : Identity

2867 A collection of one or more AC tie lines that connect two different control areas.

2868 Table 107 shows all attributes of ACTieCorridor.

2869

Table 107 – Attributes of ExtDirectCurent::ACTieCorridor

name	mult	type	description
delayRegulatingReserve	0..1	Seconds	(NC) inherited from: TieCorridor
maxRegulatingReserveRamp	0..1	Float	(NC) inherited from: TieCorridor
thresholdRegulatingReserve	0..1	ActivePower	(NC) inherited from: TieCorridor
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

2870

2871

Table 108 shows all association ends of ACTieCorridor with other classes.

2872

Table 108 – Association ends of ExtDirectCurent::ACTieCorridor with other classes

mult from	name	mult to	type	description
0..1	Line	0..*	Line	(NC) Line that is part of the ACTieCorridor.
0..1	TieFlow	0..*	TieFlow	(NC) inherited from: TieCorridor
0..1	BiddingZoneBorder	0..*	BiddingZoneBorder	(NC) inherited from: TieCorridor
0..*	LoadFrequencyControlArea	0..1	LoadFrequencyControlArea	(NC) inherited from: TieCorridor
0..1	AreaReserveResource	0..*	AreaReserveResource	(NC) inherited from: TieCorridor
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2873

2874

3.7.6 (NC) BipolarDCSystem

2875

Inheritance path = [DCSystem](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

2876

2877

Bipolar DC system (IEC 60633) consists of two poles of opposite polarity with respect to earth.

2878

The overhead lines, if any, of the two poles may be carried on common or separate towers.

2879

Table 109 shows all attributes of BipolarDCSystem.

2880

Table 109 – Attributes of ExtDirectCurent::BipolarDCSystem

name	mult	type	description
isRigid	0..1	Boolean	(NC) If true, the bipolar DC system is a rigid DC current bipolar system (IEC 60633). It is a bipolar DC system without neutral connection between both converter stations. Since only two (pole) conductors exist, no unbalance current between both poles is possible. In case of interruption of power transfer of one converter pole, the current of the other pole has to be interrupted as well (at least for a limited time to allow reconfiguration of the DC circuit).
directionKind	0..1	DCSystemDirectionKind	(NC) inherited from: DCSystem
transmissionKind	0..1	DCSystemTransmissionKind	(NC) inherited from: DCSystem
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

2881

2882 Table 110 shows all association ends of BipolarDCSystem with other classes.

2883 **Table 110 – Association ends of ExtDirectCurent::BipolarDCSystem with other classes**

mult from	name	mult to	type	description
0..1	DCBiPole	0..1	DCBiPole	(NC) DC bipole that belongs to a bipolar DC system.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2884

2885 **3.7.7 (NC) DCBiPole**

2886 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

2887 DC system bipole (IEC 60633), which is part of an DC system consisting of two independently

2888 operable DC system poles, which during normal operation, exhibit opposite direct voltage

2889 polarities with respect to earth.

2890 Table 111 shows all attributes of DCBiPole.

2891

Table 111 – Attributes of ExtDirectCurent::DCBiPole

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

2892

2893

Table 112 shows all association ends of DCBiPole with other classes.

2894

Table 112 – Association ends of ExtDirectCurent::DCBiPole with other classes

mult from	name	mult to	type	description
0..1	DCPole	1..2	DCPole	(NC) DC pole part of the DC system bipole.
0..1	BipolarDCSystem	0..1	BipolarDCSystem	(NC) Bipolar DC system that has this DC bipole.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2895

2896

3.7.8 (NC) DCBypassSwitch

2897

Inheritance path = [DCHighSpeedSwitch](#) : DCSwitch : DCConductingEquipment : Equipment :

2898

PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity :

2899

[ExtDCConductinEquipment](#) : [ExtDCSwitch](#)

2900

By-pass switch (IEC 60633) is a high-speed DC switch connected across each converter valve group in DC schemes using more than one independent converter per pole, designed to close rapidly to bypass a converter group that is being taken out of service and commutate the current back into a valve group that is being taken back in service. A by-pass switch may also be used for prolonged shunting of the bridge(s).

2902

2903

2904

Table 113 shows all attributes of DCBypassSwitch.

2905

2906

Table 113 – Attributes of ExtDirectCurent::DCBypassSwitch

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment

name	mult	type	description
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment
normalOpen	0..1	Boolean	(NC) inherited from: ExtDCSwitch
retained	0..1	Boolean	(NC) inherited from: ExtDCSwitch
open	0..1	Boolean	(NC) inherited from: ExtDCSwitch
locked	0..1	Boolean	(NC) inherited from: ExtDCSwitch

Table 114 shows all association ends of DCBypassSwitch with other classes.

Table 114 – Association ends of ExtDirectCurent::DCBypassSwitch with other classes

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2911 **3.7.9 (NC) DCCommutationSwitch**

2912 Inheritance path = [DCHighSpeedSwitch](#) : DCSwitch : DCConductingEquipment : Equipment :
 2913 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity :
 2914 [ExtDCConductinEquipment](#) : [ExtDCSwitch](#)

2915 DC commutation switch (IEC 60633) is a type of high-speed DC switch specifically designed to
 2916 commute load current into an alternative parallel current path.

2917 Table 115 shows all attributes of DCCommutationSwitch.

2918 **Table 115 – Attributes of ExtDirectCurent::DCCommutationSwitch**

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment
normalOpen	0..1	Boolean	(NC) inherited from: ExtDCSwitch
retained	0..1	Boolean	(NC) inherited from: ExtDCSwitch
open	0..1	Boolean	(NC) inherited from: ExtDCSwitch
locked	0..1	Boolean	(NC) inherited from: ExtDCSwitch

2919

2920 Table 116 shows all association ends of DCCommutationSwitch with other classes.

2921 **Table 116 – Association ends of ExtDirectCurent::DCCommutationSwitch with other**
 2922 **classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2923

2924

3.7.10 (NC) DCConverterParallelingSwitch

2925 Inheritance path = [DCHighSpeedSwitch](#) : DCSwitch : DCConductingEquipment : Equipment :
 2926 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity :
 2927 [ExtDCConductinEquipment](#) : [ExtDCSwitch](#)

2928 Converter paralleling switch (IEC 60633) is a high-speed DC switch connected in series with
 2929 each converter at the DC terminal in DC schemes where two or more converters are connected
 2930 in parallel onto a common pole conductor, designed to allow additional converter(s) to be
 2931 connected in parallel or disconnected without affecting the load current in the other converter.
 2932 Table 117 shows all attributes of DCConverterParallelingSwitch.

2933

Table 117 – Attributes of ExtDirectCurent::DCConverterParallelingSwitch

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment
normalOpen	0..1	Boolean	(NC) inherited from: ExtDCSwitch
retained	0..1	Boolean	(NC) inherited from: ExtDCSwitch
open	0..1	Boolean	(NC) inherited from: ExtDCSwitch
locked	0..1	Boolean	(NC) inherited from: ExtDCSwitch

2934

2935 Table 118 shows all association ends of DCConverterParallelingSwitch with other classes.

2936 **Table 118 – Association ends of ExtDirectCurent::DCConverterParallelingSwitch with**
2937 **other classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2938

2939 3.7.11 (NC) DCEarthReturnTransferSwitch

2940 Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : DCSwitch :
2941 DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :
2942 ExtEulIdentifiedObject : Identity : [ExtDCConductinEquipment](#) : [ExtDCSwitch](#)
2943 Earth return transfer switch (IEC 60633) DC commutation switch used to transfer DC current
2944 from a metallic return path to an earth return path. In some applications, this function is
2945 performed by a by-pass switch. Although the term "earth return transfer breaker" has been
2946 widely used in the industry for many years, it is misleading since such switches have no ability
2947 to interrupt fault current.

2948 Table 119 shows all attributes of DCEarthReturnTransferSwitch.

2949 **Table 119 – Attributes of ExtDirectCurent::DCEarthReturnTransferSwitch**

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment
normalOpen	0..1	Boolean	(NC) inherited from: ExtDCSwitch
retained	0..1	Boolean	(NC) inherited from: ExtDCSwitch
open	0..1	Boolean	(NC) inherited from: ExtDCSwitch
locked	0..1	Boolean	(NC) inherited from: ExtDCSwitch

Table 120 shows all association ends of DCEarthReturnTransferSwitch with other classes.

Table 120 – Association ends of ExtDirectCurent::DCEarthReturnTransferSwitch with other classes

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.7.12 (NC) DCHarmonicFilter

Inheritance path = DCSeriesDevice : DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : Identity : [ExtDCConductinEquipment](#)

2959 DC harmonic filter (IEC 60633) is a filter which, in conjunction with the DC reactor(s) and with
 2960 the DC surge capacitor(s), if any, serves the primary function of reducing (current or voltage)
 2961 ripple on the DC transmission line and/or earth electrode line.
 2962 Table 121 shows all attributes of DCHarmonicFilter.

2963 **Table 121 – Attributes of ExtDirectCurent::DCHarmonicFilter**

name	mult	type	description
inductance	0..1	Inductance	inherited from: DCSeriesDevice
resistance	0..1	Resistance	inherited from: DCSeriesDevice
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment

2964
 2965 Table 122 shows all association ends of DCHarmonicFilter with other classes.

2966 **Table 122 – Association ends of ExtDirectCurent::DCHarmonicFilter with other classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2967

2968 **3.7.13 (NC) DCHighSpeedSwitch**

2969 Inheritance path = DCSwitch : DCConductingEquipment : Equipment : PowerSystemResource :
 2970 IdentifiedObject : ExtEulIdentifiedObject : Identity : [ExtDCConductinEquipment](#) : [ExtDCSwitch](#)
 2971 High-speed DC switch (IEC 60633) is a type of switchgear used on a DC scheme, required to
 2972 open or close rapidly (< 1 s), including in some cases the need to commute load current into
 2973 a parallel conducting path, but with no requirement to interrupt fault or load current. DC
 2974 switchgear is usually based on a single-phase unit of an AC circuit-breaker, appropriately
 2975 modified for their DC applications. Their capabilities to perform faster opening and closing than
 2976 disconnect switches are used but the function of breaking short-circuit currents is not required.
 2977 Table 123 shows all attributes of DCHighSpeedSwitch.

2978 **Table 123 – Attributes of ExtDirectCurent::DCHighSpeedSwitch**

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment
normalOpen	0..1	Boolean	(NC) inherited from: ExtDCSwitch
retained	0..1	Boolean	(NC) inherited from: ExtDCSwitch
open	0..1	Boolean	(NC) inherited from: ExtDCSwitch
locked	0..1	Boolean	(NC) inherited from: ExtDCSwitch

2979

2980 Table 124 shows all association ends of DCHighSpeedSwitch with other classes.

2981 **Table 124 – Association ends of ExtDirectCurent::DCHighSpeedSwitch with other**
2982 **classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment

mult from	name	mult to	type	description
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2983

2984

3.7.14 (NC) DCLineParallelingSwitch

2985 Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : DCSwitch :
 2986 DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :
 2987 ExtEulIdentifiedObject : Identity : [ExtDCConductinEquipment](#) : [ExtDCSwitch](#)
 2988 Line paralleling switch (IEC 60633) DC commutation switch placed in series with one or more
 2989 high-voltage pole conductors, allowing two or more lines to be connected in parallel or to revert
 2990 to single-line operation while conducting load current.
 2991 Table 125 shows all attributes of DCLineParallelingSwitch.

2992

Table 125 – Attributes of ExtDirectCurent::DCLineParallelingSwitch

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment
normalOpen	0..1	Boolean	(NC) inherited from: ExtDCSwitch

name	mult	type	description
retained	0..1	Boolean	(NC) inherited from: ExtDCSwitch
open	0..1	Boolean	(NC) inherited from: ExtDCSwitch
locked	0..1	Boolean	(NC) inherited from: ExtDCSwitch

Table 126 shows all association ends of DCLineParallelingSwitch with other classes.

Table 126 – Association ends of ExtDirectCurent::DCLineParallelingSwitch with other classes

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.7.15 (NC) DCMetallicReturnSwitch

Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : DCSwitch : DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity : [ExtDCConductingEquipment](#) : [ExtDCSwitch](#)

Metallic return transfer switch (IEC 60633) is a DC commutation switch used to transfer DC current from an earth return path to a metallic return path. Although the term "metallic return transfer breaker" has been widely used in the industry for many years, it is misleading since such switches have no ability to interrupt fault current.

Table 127 shows all attributes of DCMetallicReturnSwitch.

Table 127 – Attributes of ExtDirectCurent::DCMetallicReturnSwitch

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment

name	mult	type	description
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment
normalOpen	0..1	Boolean	(NC) inherited from: ExtDCSwitch
retained	0..1	Boolean	(NC) inherited from: ExtDCSwitch
open	0..1	Boolean	(NC) inherited from: ExtDCSwitch
locked	0..1	Boolean	(NC) inherited from: ExtDCSwitch

Table 128 shows all association ends of DCMetalicReturnSwitch with other classes.

Table 128 – Association ends of ExtDirectCurent::DCMetalicReturnSwitch with other classes

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3013 **3.7.16 (NC) DCNeutralBusGroundingSwitch**

3014 Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : DCSwitch :
 3015 DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :
 3016 ExtEulIdentifiedObject : Identity : [ExtDCConductinEquipment](#) : [ExtDCSwitch](#)
 3017 Neutral bus grounding switch (IEC 60633) or a neutral bus earthing switch is a DC commutation
 3018 switch connected from the neutral bus to the station earth mat on a bipolar DC scheme,
 3019 designed to provide a temporary earth connection in the event of an open circuit fault on the
 3020 electrode line until the imbalance of current between the two poles can be reduced to a safe
 3021 minimum level or the electrode line connection can be restored.
 3022 Table 129 shows all attributes of DCNeutralBusGroundingSwitch.

3023 **Table 129 – Attributes of ExtDirectCurent::DCNeutralBusGroundingSwitch**

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment
normalOpen	0..1	Boolean	(NC) inherited from: ExtDCSwitch
retained	0..1	Boolean	(NC) inherited from: ExtDCSwitch
open	0..1	Boolean	(NC) inherited from: ExtDCSwitch
locked	0..1	Boolean	(NC) inherited from: ExtDCSwitch

3024 Table 130 shows all association ends of DCNeutralBusGroundingSwitch with other classes.

3025 **Table 130 – Association ends of ExtDirectCurent::DCNeutralBusGroundingSwitch with**
 3026 **other classes**
 3027

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment

mult from	name	mult to	type	description
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3028

3029

3.7.17 (NC) DCNeutralBusSwitch3030 Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : DCSwitch :

3031 DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :

3032 ExtEulIdentifiedObject : Identity : [ExtDCConductinEquipment](#) : [ExtDCSwitch](#)

3033 Neutral bus switch (IEC 60633) is a DC commutation switch connected in series with the neutral
 3034 bus on a bipolar DC scheme, designed to commutate current out of the pole conductor or neutral
 3035 bus and into the electrode line or dedicated metallic return conductor or earth in response to a
 3036 fault in a converter or neutral bus.

3037 Table 131 shows all attributes of DCNeutralBusSwitch.

3038

Table 131 – Attributes of ExtDirectCurent::DCNeutralBusSwitch

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment
normalOpen	0..1	Boolean	(NC) inherited from: ExtDCSwitch
retained	0..1	Boolean	(NC) inherited from: ExtDCSwitch
open	0..1	Boolean	(NC) inherited from: ExtDCSwitch
locked	0..1	Boolean	(NC) inherited from: ExtDCSwitch

3039

3040

Table 132 shows all association ends of DCNeutralBusSwitch with other classes.

3041 **Table 132 – Association ends of ExtDirectCurent::DCNeutralBusSwitch with other**
 3042 **classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.7.18 (NC) DCPole

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity
 The direct current (DC) system pole (IEC 60633) is part of a DC system consisting of all the equipment in the DC substations and the interconnecting transmission lines, if any, which during normal operation exhibit a common direct voltage polarity with respect to earth.
 It includes active power, reactive power and participation factor to be able to schedule top down (using DCTieCorridor and participation factor to provide schedule on the DCPole) and bottom up (aggregation of DCPole to DCTieCorridor). Only one approach can be used at a time.
 Table 133 shows all attributes of DCPole.

Table 133 – Attributes of ExtDirectCurent::DCPole

name	mult	type	description
normalParticipationFactor	0..1	Float	(NC) Normal participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(\text{PF})$. In the case of priority strategy, the item with the lowest number gets allocated energy first.

name	mult	type	description
p	0..1	ActivePower	(NC) Active power flow for the pole. The attribute is a positive value. The direction is given by the DCTieCorridor association with BiddingZoneBorder.
q	0..1	ReactivePower	(NC) Reactive power flow for the pole. The attribute is a positive value. The direction is given by the DCTieCorridor association with BiddingZoneBorder.
participationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(\text{PF})$. In the case of priority strategy, the item with the lowest number gets allocated energy first.
maxEconomicP	0..1	ActivePower	(NC) Maximum high economic active power limit, that should not exceed the maximum operating active power limit.
minEconomicP	0..1	ActivePower	(NC) Low economic active power limit that shall be greater than or equal to the minimum operating active power limit.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 134 shows all association ends of DCPole with other classes.

Table 134 – Association ends of ExtDirectCurrent::DCPole with other classes

mult from	name	mult to	type	description
0..1	DCConverterUnit	2..2	DCConverterUnit	(NC) The DC converter unit that relates to this DC pole.
0..1	DCLine	0..1	DCLine	(NC) The DC line that is related to this DC pole.
0..*	DCTieCorridor	0..1	DCTieCorridor	(NC) The DCTieCorridor that has this DC pole.
0..1	PowerSchedule	0..*	PowerSchedule	(NC) Power schedule which has DC poles.
0..1	PowerShiftKeySchedule	0..*	PowerShiftKeySchedule	(NC) The Power Shift Key schedule for a DCPole.
1..1	DirectCurrentPoleController	0..1	DirectCurrentPoleController	(NC) DC pole controller that controls this DC pole.
1..2	DCBiPole	0..1	DCBiPole	(NC) DC system bipole that has two independently operatable DC system poles.

mult from	name	mult to	type	description
0..1	AsymmetricMonopolarDCSystem	0..1	MonopolarDCSystem	(NC) Asymmetric monopolar DC system that has this DC pole.
1..1	CrossZonalDCPole	0..*	CrossZonalDCPole	(NC) Cross-zonal direct current pole representations associated with the direct current pole.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3057

3058 **3.7.19 (NC) DCSmoothingReactor**

3059 Inheritance path = DCSeriesDevice : DCConductingEquipment : Equipment :
 3060 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity :
 3061 [ExtDCConductinEquipment](#)

3062 Reactor (IEC 60633) connected in series with a converter unit or converter units on the DC side
 3063 for the primary purpose of smoothing the direct current and reducing current transients.

3064 Table 135 shows all attributes of DCSmoothingReactor.

3065 **Table 135 – Attributes of ExtDirectCurrent::DCSmoothingReactor**

name	mult	type	description
inductance	0..1	Inductance	inherited from: DCSeriesDevice
resistance	0..1	Resistance	inherited from: DCSeriesDevice
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment

3066

3067 Table 136 shows all association ends of DCSmoothingReactor with other classes.

3068 **Table 136 – Association ends of ExtDirectCurent::DCSmoothingReactor with other**
3069 **classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.7.20 (NC) DCSmoothingReactorArrester

Inheritance path = DCSeriesDevice : DCConductingEquipment : Equipment :
PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity :
[ExtDCConductingEquipment](#)

Arrester (IEC 60633) connected between the terminals of a smoothing reactor.

Table 137 shows all attributes of DCSmoothingReactorArrester.

Table 137 – Attributes of ExtDirectCurent::DCSmoothingReactorArrester

name	mult	type	description
inductance	0..1	Inductance	inherited from: DCSeriesDevice
resistance	0..1	Resistance	inherited from: DCSeriesDevice
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment

Table 138 shows all association ends of DCSmoothingReactorArrester with other classes.

Table 138 – Association ends of ExtDirectCurent::DCSmoothingReactorArrester with other classes

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.7.21 (NC) DCSubstation

Inheritance path = DCEquipmentContainer : EquipmentContainer : ConnectivityNodeContainer : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

DC substation or DC converter station (IEC 60633) is part of an DC system which consists of one or more converter units installed in a single location together with buildings, reactors, filters, reactive power supply, control, monitoring, protective, measuring and auxiliary equipment. A DC substation forming part of an DC transmission system may be referred to as an DC transmission substation.

Table 139 shows all attributes of DCSubstation.

3092

Table 139 – Attributes of ExtDirectCurrent::DCSubstation

name	mult	type	description
isTapping	0..1	Boolean	(NC) DC tapping substation (IEC 60633) is a DC substation, mainly used for inversion, with a rating which is a small fraction of that of the rectifier(s) in the system.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3093

3094

Table 140 shows all association ends of DCSubstation with other classes.

3095

Table 140 – Association ends of ExtDirectCurrent::DCSubstation with other classes

mult from	name	mult to	type	description
0..*	Substation	0..1	Substation	(NC) Substation that contains this DC substation.
0..1	DCConverterUnit	0..*	DCConverterUnit	(NC) DC converter unit that belongs to this DC substation.
0..1	DCSubstationBipole	0..*	DCSubstationBipole	(NC) DC substation bipole which is part of the DC substation.
0..1	DCSubstationPole	0..*	DCSubstationPole	(NC) DC substation pole which is part of the DC substation.
0..1	DCTopologicalNode	0..*	DCTopologicalNode	inherited from: DCEquipmentContainer
1..1	DCNodes	0..*	DCNode	inherited from: DCEquipmentContainer
0..*	HVDCInterconnectionDynamics	0..1	HVDCInterconnectionDynamics	inherited from: DCEquipmentContainer
0..1	Equipments	0..*	Equipment	inherited from: EquipmentContainer
0..*	AdditionalGroupedEquipment	0..*	Equipment	inherited from: EquipmentContainer
1..1	ConnectivityNodes	0..*	ConnectivityNode	inherited from: ConnectivityNodeContainer
0..1	TopologicalNode	0..*	TopologicalNode	inherited from: ConnectivityNodeContainer
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3096

3097

3.7.22 (NC) DCSubstationBipole

3098 Inheritance path = DCEquipmentContainer : EquipmentContainer : ConnectivityNodeContainer :

3099 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

3100 Part of a bipolar DC system (IEC 60633) contained within a DC substation.

3101 Table 141 shows all attributes of DCSubstationBipole.

3102

Table 141 – Attributes of ExtDirectCurrent::DCSubstationBipole

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3103

3104

Table 142 shows all association ends of DCSubstationBipole with other classes.

3105

Table 142 – Association ends of ExtDirectCurrent::DCSubstationBipole with other classes

3106

mult from	name	mult to	type	description
0..*	DCSubstation	0..1	DCSubstation	(NC) DC substation that contains this DC substation bipole part.
1..1	DirectCurrentSubstation BipoleController	0..1	DirectCurrentSubstation BipoleController	(NC) DC substation bipole controller controlling this DC substation bipole.
0..1	DCTopologicalNode	0..*	DCTopologicalNode	inherited from: DCEquipmentContainer
1..1	DCNodes	0..*	DCNode	inherited from: DCEquipmentContainer
0..*	HVDCInterconnectionDynamics	0..1	HVDCInterconnectionDynamics	inherited from: DCEquipmentContainer
0..1	Equipments	0..*	Equipment	inherited from: EquipmentContainer
0..*	AdditionalGroupedEquipment	0..*	Equipment	inherited from: EquipmentContainer
1..1	ConnectivityNodes	0..*	ConnectivityNode	inherited from: ConnectivityNodeContainer
0..1	TopologicalNode	0..*	TopologicalNode	inherited from: ConnectivityNodeContainer
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3107

3108 **3.7.23 (NC) DCSubstationPole**

3109 Inheritance path = DCEquipmentContainer : EquipmentContainer : ConnectivityNodeContainer :

3110 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

3111 Part of an DC system pole (IEC 60633) which is contained within a DC substation.

3112 Table 143 shows all attributes of DCSubstationPole.

3113 **Table 143 – Attributes of ExtDirectCurrent::DCSubstationPole**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3114

3115 Table 144 shows all association ends of DCSubstationPole with other classes.

3116 **Table 144 – Association ends of ExtDirectCurrent::DCSubstationPole with other classes**

mult from	name	mult to	type	description
0..*	DCSubstation	0..1	DCSubstation	(NC) DC substation that contains this DC substation pole part.
1..1	DirectCurrentSubstation PoleController	0..1	DirectCurrentSubstation PoleController	(NC) DC substation pole controller controlling this DC substation pole.
0..1	DCTopologicalNode	0..*	DCTopologicalNode	inherited from: DCEquipmentContainer
1..1	DCNodes	0..*	DCNode	inherited from: DCEquipmentContainer
0..*	HVDCInterconnectionDynamics	0..1	HVDCInterconnectionDynamics	inherited from: DCEquipmentContainer
0..1	Equipments	0..*	Equipment	inherited from: EquipmentContainer
0..*	AdditionalGroupedEquipment	0..*	Equipment	inherited from: EquipmentContainer
1..1	ConnectivityNodes	0..*	ConnectivityNode	inherited from: ConnectivityNodeContainer
0..1	TopologicalNode	0..*	TopologicalNode	inherited from: ConnectivityNodeContainer
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3117

3118 **3.7.24 (NC) DCSystem**

3119 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity
 3120 Electrical power system which transfers energy in the form of direct current between two or
 3121 more AC buses (defined in IEC 60633).
 3122 Table 145 shows all attributes of DCSystem.

3123

Table 145 – Attributes of ExtDirectCurent::DCSystem

name	mult	type	description
directionKind	0..1	DCSystemDirectionKind	(NC) Direction kind of the DC system.
transmissionKind	0..1	DCSystemTransmissionKind	(NC) Transmission kind of the DC system.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3124

3125 Table 146 shows all association ends of DCSystem with other classes.

3126

Table 146 – Association ends of ExtDirectCurent::DCSystem with other classes

mult from	name	mult to	type	description
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3127

3128 **3.7.25 (NC) DCTieCorridor**

3129 Inheritance path = [TieCorridor](#) : PowerSystemResource : IdentifiedObject :
 3130 ExtEulIdentifiedObject : Identity

3131 A collection of one or more direct current poles that connect two different control areas.
 3132 DCTieCorridor is linked to its own SchedulingArea. The active and reactive power is given by
 3133 the SchedulingArea. The flow direction is provided by the link with the directional bidding zone.
 3134 Table 147 shows all attributes of DCTieCorridor.

3135 **Table 147 – Attributes of ExtDirectCurent::DCTieCorridor**

name	mult	type	description
maxRegulatingReserve	0..1	ActivePower	(NC) Maximum regulating reserve.
minRegulatingReserve	0..1	ActivePower	(NC) Minimum regulating reserve.
rampingKind	0..1	RampingPrincipleKind	(NC) Ramping principle is used to define a transition from one scheduled value to next one.
delayRegulatingReserve	0..1	Seconds	(NC) inherited from: TieCorridor
maxRegulatingReserveRamp	0..1	Float	(NC) inherited from: TieCorridor
thresholdRegulatingReserve	0..1	ActivePower	(NC) inherited from: TieCorridor
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3136
 3137 Table 148 shows all association ends of DCTieCorridor with other classes.

3138 **Table 148 – Association ends of ExtDirectCurent::DCTieCorridor with other classes**

mult from	name	mult to	type	description
0..1	SourceBiddingZone	0..1	BiddingZoneBorder	(NC) The source bidding zone border that is related to the DC tie corridor.
0..1	AssessedElement	0..*	AssessedElement	(NC) The assessed element indicating that the DC tie corridor is assessed, i.e. monitored.
0..1	MustRunSchedule	0..*	MustRunSchedule	(NC) Must run schedule which has DC tie corridors.
0..1	SchedulingArea	0..1	SchedulingArea	(NC) The scheduling area that has this DC tie corridor.
0..1	DCPole	0..*	DCPole	(NC) The DCPole which is part of the DC corridor.
0..1	DirectCurrentMasterController	0..1	DirectCurrentMasterController	(NC) Direct current master controller for this DCTieCorridor.
1..1	DCTieCorridorDirectionTimePoint	0..*	DCTieCorridorDirectionTimePoint	(NC) The bidding zone border that has this time point.
0..1	TieFlow	0..*	TieFlow	(NC) inherited from: TieCorridor
0..1	BiddingZoneBorder	0..*	BiddingZoneBorder	(NC) inherited from: TieCorridor
0..*	LoadFrequencyControlArea	0..1	LoadFrequencyControlArea	(NC) inherited from: TieCorridor
0..1	AreaReserveResource	0..*	AreaReserveResource	(NC) inherited from: TieCorridor

mult from	name	mult to	type	description
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3139

3140 **3.7.26 (NC) ExtDCConductinEquipment root class**

3141 European network codes extension to base CIM counterpart.

3142 Table 149 shows all attributes of ExtDCConductinEquipment.

3143 **Table 149 – Attributes of ExtDirectCurent::ExtDCConductinEquipment**

name	mult	type	description
ratedCurrent	0..1	CurrentFlow	(NC) The maximum continuous current carrying capacity in amps governed by the device material and construction. The attribute shall be a positive value.

3144

3145 **3.7.27 (NC) ExtDCSwitch root class**

3146 European network codes extension to base CIM counterpart.

3147 Table 150 shows all attributes of ExtDCSwitch.

3148 **Table 150 – Attributes of ExtDirectCurent::ExtDCSwitch**

name	mult	type	description
normalOpen	0..1	Boolean	(NC) The attribute is used in cases when no Measurement for the status value is present. If the DCSwitch has a status measurement the Discrete.normalValue is expected to match with the DCSwitch.normalOpen.
retained	0..1	Boolean	(NC) Branch is retained in the topological solution. The flow through retained switches will normally be calculated in power flow.
open	0..1	Boolean	(NC) The attribute tells if the switch is considered open when used as input to topology processing.
locked	0..1	Boolean	(NC) If true, the switch is locked. The resulting switch state is a combination of locked and DCSwitch.open attributes as follows: - locked=true and DCSwitch.open=true. The resulting state is open and locked; - locked=false and DCSwitch.open=true. The resulting state is open; - locked=false and DCSwitch.open=false. The resulting state is closed.

3149

3150 **3.7.28 (NC) MonopolarDCSystem**

3151 Inheritance path = [DCSystem](#) : PowerSystemResource : IdentifiedObject :
 3152 ExtEulIdentifiedObject : Identity

3153 Monopolar DC system (IEC 60633) is a DC system with only one pole.

3154 Table 151 shows all attributes of MonopolarDCSystem.

3155 **Table 151 – Attributes of ExtDirectCurent::MonopolarDCSystem**

name	mult	type	description
isSymmetrical	0..1	Boolean	(NC) if true, the monopolar DC system is symmetrical monopolar DC system (IEC 60633). It is a DC system with only one symmetrical monopole. A symmetrical monopole is part of an DC system consisting of all the equipment in the DC substations and the interconnecting transmission lines, if any, which during normal operation exhibits equal and opposite direct voltage polarities with respect to earth but without series connection of converters in each converter station. The term "symmetrical monopole" is used even though there are two polarities with DC voltages, because with only one converter it is not possible to provide the redundancy which is normally associated with the term "bipole".
directionKind	0..1	DCSystemDirectionKind	(NC) inherited from: DCSystem
transmissionKind	0..1	DCSystemTransmissionKind	(NC) inherited from: DCSystem
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3156
 3157 Table 152 shows all association ends of MonopolarDCSystem with other classes.

3158 **Table 152 – Association ends of ExtDirectCurent::MonopolarDCSystem with other**
 3159 **classes**

mult from	name	mult to	type	description
0..1	DCPole	0..1	DCPole	(NC) DC pole part of the asymmetric DC system.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.7.29 (NC) TieCorridor

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity
A collection of one or more tie-lines or direct current poles that connect two different control areas.

Table 153 shows all attributes of TieCorridor.

Table 153 – Attributes of ExtDirectCurent::TieCorridor

name	mult	type	description
delayRegulatingReserve	0..1	Seconds	(NC) A positive number that is a multiple of Automatic Generation Control (AGC) run cycles that describes the delay in adapting imbalance of the tie corridor.
maxRegulatingReserveRamp	0..1	Float	(NC) Maximum authorized ramp for regulating reserve.
thresholdRegulatingReserve	0..1	ActivePower	(NC) Regulating reserve threshold.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 154 shows all association ends of TieCorridor with other classes.

Table 154 – Association ends of ExtDirectCurent::TieCorridor with other classes

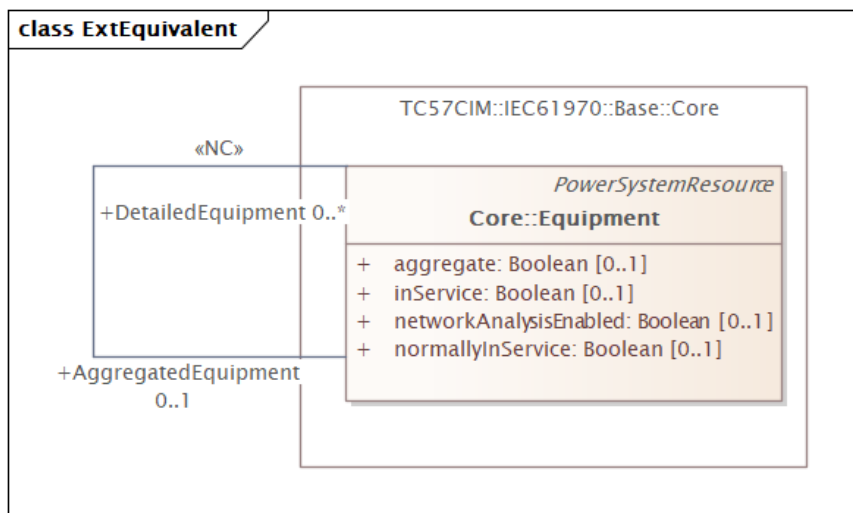
mult from	name	mult to	type	description
0..1	TieFlow	0..*	TieFlow	(NC) Tie flow which belongs to the tie corridor.
0..1	BiddingZoneBorder	0..*	BiddingZoneBorder	(NC) Bidding zone border in which the tie corridor is included..
0..*	LoadFrequencyControlArea	0..1	LoadFrequencyControlArea	(NC) LoadFrequencyControlArea controlling the TieCorridor.
0..1	AreaReserveResource	0..*	AreaReserveResource	(NC) Area reserve resources provided through the tie corridor for cross-area balancing support.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3170

3171 **3.8 Package ExtEquivalent**

3172 This package contains the extensions related to the equivalents.



3173

3174 **Figure 14 – Class diagram ExtEquivalent::ExtEquivalent**

3175 Figure 14: The diagram contains association related to equipment.

3176 **3.9 (CIM18) Package ExtFACTS**3177 **3.9.1 General**

3178 This package contains the extensions related to the FACTS.

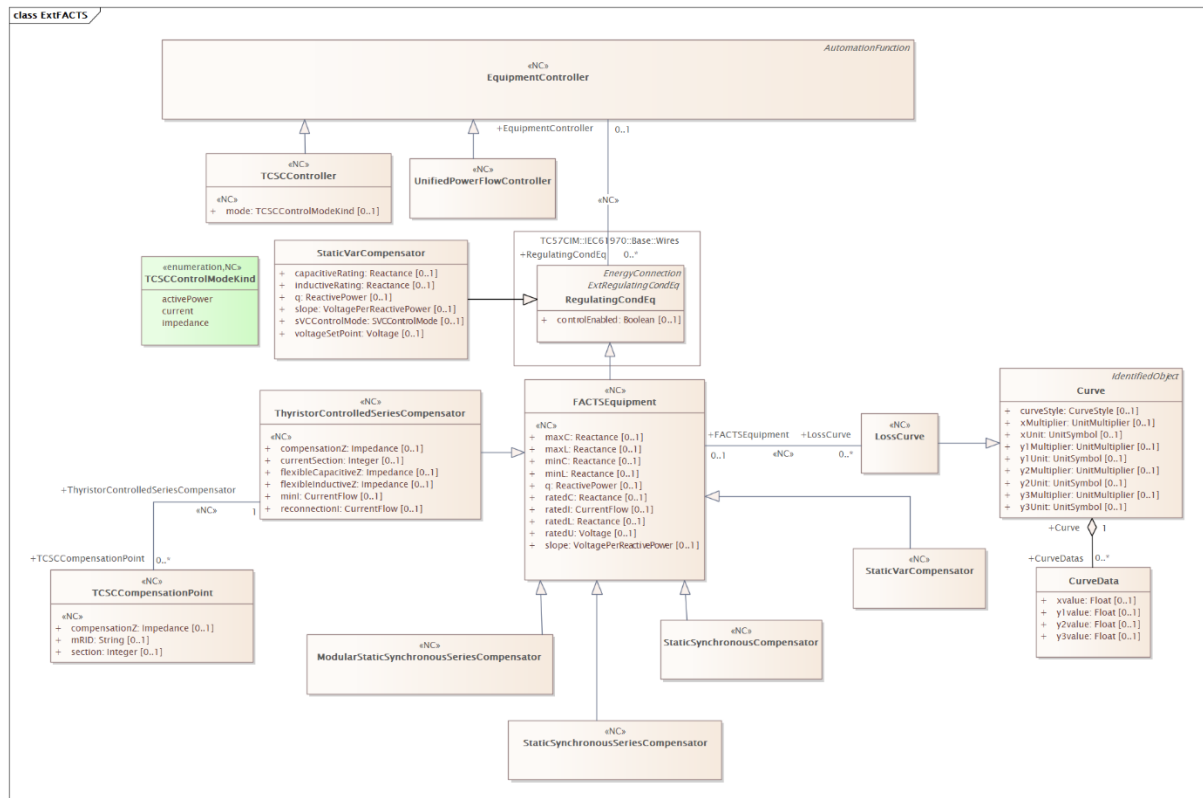


Figure 15 – Class diagram ExtFACTS::ExtFACTS

Figure 15: The diagram contains association related to FACTS.

3.9.2 (NC) FACTSEquipment

Inheritance path = RegulatingCondEq : EnergyConnection : ConductingEquipment :

Equipment : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

Flexible Alternating Current Transmission System regulating equipment.

Table 155 shows all attributes of FACTSEquipment.

Table 155 – Attributes of ExtFACTS::FACTSEquipment

name	mult	type	description
slope	0..1	VoltagePerReactivePower	(NC) The characteristics slope which defines how the reactive power output changes in proportion to the difference between the regulated bus voltage and the voltage setpoint. The attribute shall be a positive value or zero.
q	0..1	ReactivePower	(NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution.
ratedI	0..1	CurrentFlow	(NC) Rated current of the FACTS equipment.
ratedU	0..1	Voltage	(NC) Rated voltage of the FACTS equipment.
ratedC	0..1	Reactance	(NC) Capacitive reactance at maximum reactive power. Shall always be positive.
ratedL	0..1	Reactance	(NC) Inductive rating at maximum inductive reactive power. Shall always be negative.
minC	0..1	Reactance	(NC) Capacitive reactance at minimum reactive power. Shall always be positive.

name	mult	type	description
maxC	0..1	Reactance	(NC) Capacitive reactance at maximum reactive power. Shall always be positive.
minL	0..1	Reactance	(NC) Inductive rating at minimum inductive reactive power. Shall always be negative.
maxL	0..1	Reactance	(NC) Inductive rating at maximum inductive reactive power. Shall always be negative.
controlEnabled	0..1	Boolean	inherited from: RegulatingCondEq
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 156 shows all association ends of FACTSEquipment with other classes.

Table 156 – Association ends of ExtFACTS::FACTSEquipment with other classes

mult from	name	mult to	type	description
0..1	LossCurve	0..*	LossCurve	(NC) The loss curve for the FACTS equipment.
0..*	RegulatingControl	0..1	RegulatingControl	inherited from: RegulatingCondEq
0..*	BaseVoltage	0..1	BaseVoltage	inherited from: ConductingEquipment
1..1	SvStatus	0..*	SvStatus	inherited from: ConductingEquipment
0..*	ProtectionEquipments	0..*	ProtectionEquipment	inherited from: ConductingEquipment
1..1	Terminals	0..*	Terminal	inherited from: ConductingEquipment
0..1	RelayDynamics	0..*	RelayDynamics	inherited from: ConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource

mult from	name	mult to	type	description
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3191

3192 **3.9.3 (NC) LossCurve**

3193 Inheritance path = Curve : IdentifiedObject : ExtEulIdentifiedObject : Identity

3194 Represents the losses in the equipment due to operation position.

3195 Table 157 shows all attributes of LossCurve.

3196

Table 157 – Attributes of ExtFACTS::LossCurve

name	mult	type	description
curveStyle	0..1	CurveStyle	inherited from: Curve
xMultiplier	0..1	UnitMultiplier	inherited from: Curve
xUnit	0..1	UnitSymbol	inherited from: Curve
y1Multiplier	0..1	UnitMultiplier	inherited from: Curve
y1Unit	0..1	UnitSymbol	inherited from: Curve
y2Multiplier	0..1	UnitMultiplier	inherited from: Curve
y2Unit	0..1	UnitSymbol	inherited from: Curve
y3Multiplier	0..1	UnitMultiplier	inherited from: Curve
y3Unit	0..1	UnitSymbol	inherited from: Curve
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3197

3198 Table 158 shows all association ends of LossCurve with other classes.

3199 **Table 158 – Association ends of ExtFACTS::LossCurve with other classes**

mult from	name	mult to	type	description
0..*	FACTSEquipment	0..1	FACTSEquipment	(NC) The FACTS equipment which has a loss curve.
1..1	CurveDatas	0..*	CurveData	inherited from: Curve
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3200

3201 **3.9.4 (NC) ModularStaticSynchronousSeriesCompensator**

3202 Inheritance path = [FACTSEquipment](#) : RegulatingCondEq : EnergyConnection :
 3203 ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :
 3204 ExtEulIdentifiedObject : Identity

3205 Modular static synchronous series compensator (MSSSC) is a type of flexible AC transmission
 3206 system regulating equipment which consists of solid-state voltage source inverter connected in
 3207 series with a transmission line. This is similar to static synchronous series compensator
 3208 (SSSC), but without injection transformer. This enables the MSSSC to be truly modular with the
 3209 ability to simply install a number of equipment in series to provide a desired maximum level of
 3210 impedance. MSSSC can be dispersed into multiple location in a circuit working collectively
 3211 under the same controller scheme.

3212 Table 159 shows all attributes of ModularStaticSynchronousSeriesCompensator.

3213 **Table 159 – Attributes of ExtFACTS::ModularStaticSynchronousSeriesCompensator**

name	mult	type	description
slope	0..1	VoltagePerReactivePower	(NC) inherited from: FACTSEquipment
q	0..1	ReactivePower	(NC) inherited from: FACTSEquipment
ratedI	0..1	CurrentFlow	(NC) inherited from: FACTSEquipment
ratedU	0..1	Voltage	(NC) inherited from: FACTSEquipment
ratedC	0..1	Reactance	(NC) inherited from: FACTSEquipment
ratedL	0..1	Reactance	(NC) inherited from: FACTSEquipment
minC	0..1	Reactance	(NC) inherited from: FACTSEquipment
maxC	0..1	Reactance	(NC) inherited from: FACTSEquipment
minL	0..1	Reactance	(NC) inherited from: FACTSEquipment
maxL	0..1	Reactance	(NC) inherited from: FACTSEquipment
controlEnabled	0..1	Boolean	inherited from: RegulatingCondEq
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3214

3215 Table 160 shows all association ends of ModularStaticSynchronousSeriesCompensator with
 3216 other classes.

3217
3218**Table 160 – Association ends of
ExtFACTS::ModularStaticSynchronousSeriesCompensator with other classes**

mult from	name	mult to	type	description
0..1	LossCurve	0..*	LossCurve	(NC) inherited from: FACTSEquipment
0..*	RegulatingControl	0..1	RegulatingControl	inherited from: RegulatingCondEq
0..*	BaseVoltage	0..1	BaseVoltage	inherited from: ConductingEquipment
1..1	SvStatus	0..*	SvStatus	inherited from: ConductingEquipment
0..*	ProtectionEquipments	0..*	ProtectionEquipment	inherited from: ConductingEquipment
1..1	Terminals	0..*	Terminal	inherited from: ConductingEquipment
0..1	RelayDynamics	0..*	RelayDynamics	inherited from: ConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3219

3.9.5 (NC) StaticSynchronousCompensator

3221 Inheritance path = [FACTSEquipment](#) : RegulatingCondEq : EnergyConnection :
 3222 ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :
 3223 ExtEulIdentifiedObject : Identity

3224 Static synchronous compensator (STATCOM), also known as a static synchronous condenser
 3225 (STATCON), is a type of flexible AC transmission system regulating equipment used on
 3226 alternating current electricity transmission networks. It is based on a power electronics voltage-
 3227 source converter and can act as either a source or sink of reactive AC power to an electricity
 3228 network. If connected to a source of power it can also provide active AC power.

3229 Table 161 shows all attributes of StaticSynchronousCompensator.

3230

Table 161 – Attributes of ExtFACTS::StaticSynchronousCompensator

name	mult	type	description
slope	0..1	VoltagePerReactivePower	(NC) inherited from: FACTSEquipment

name	mult	type	description
q	0..1	ReactivePower	(NC) inherited from: FACTSEquipment
ratedI	0..1	CurrentFlow	(NC) inherited from: FACTSEquipment
ratedU	0..1	Voltage	(NC) inherited from: FACTSEquipment
ratedC	0..1	Reactance	(NC) inherited from: FACTSEquipment
ratedL	0..1	Reactance	(NC) inherited from: FACTSEquipment
minC	0..1	Reactance	(NC) inherited from: FACTSEquipment
maxC	0..1	Reactance	(NC) inherited from: FACTSEquipment
minL	0..1	Reactance	(NC) inherited from: FACTSEquipment
maxL	0..1	Reactance	(NC) inherited from: FACTSEquipment
controlEnabled	0..1	Boolean	inherited from: RegulatingCondEq
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 162 shows all association ends of StaticSynchronousCompensator with other classes.

Table 162 – Association ends of ExtFACTS::StaticSynchronousCompensator with other classes

mult from	name	mult to	type	description
0..1	LossCurve	0..*	LossCurve	(NC) inherited from: FACTSEquipment
0..*	RegulatingControl	0..1	RegulatingControl	inherited from: RegulatingCondEq
0..*	BaseVoltage	0..1	BaseVoltage	inherited from: ConductingEquipment
1..1	SvStatus	0..*	SvStatus	inherited from: ConductingEquipment
0..*	ProtectionEquipments	0..*	ProtectionEquipment	inherited from: ConductingEquipment
1..1	Terminals	0..*	Terminal	inherited from: ConductingEquipment
0..1	RelayDynamics	0..*	RelayDynamics	inherited from: ConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment

mult from	name	mult to	type	description
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3235

3236

3.9.6 (NC) StaticVarCompensator

3237 Inheritance path = [FACTSEquipment](#) : RegulatingCondEq : EnergyConnection :
 3238 ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :
 3239 ExtEulIdentifiedObject : Identity

3240 A facility for providing variable and controllable shunt reactive power. The SVC typically
 3241 consists of a stepdown transformer, filter, thyristor-controlled reactor, and thyristor-switched
 3242 capacitor arms.

3243 The SVC may operate in fixed MVar output mode or in voltage control mode. When in voltage
 3244 control mode, the output of the SVC will be proportional to the deviation of voltage at the
 3245 controlled bus from the voltage setpoint. The SVC characteristic slope defines the proportion.
 3246 If the voltage at the controlled bus is equal to the voltage setpoint, the SVC MVar output is zero.
 3247 Table 163 shows all attributes of StaticVarCompensator.

3248

Table 163 – Attributes of ExtFACTS::StaticVarCompensator

name	mult	type	description
slope	0..1	VoltagePerReactivePower	(NC) inherited from: FACTSEquipment
q	0..1	ReactivePower	(NC) inherited from: FACTSEquipment
ratedI	0..1	CurrentFlow	(NC) inherited from: FACTSEquipment
ratedU	0..1	Voltage	(NC) inherited from: FACTSEquipment
ratedC	0..1	Reactance	(NC) inherited from: FACTSEquipment
ratedL	0..1	Reactance	(NC) inherited from: FACTSEquipment
minC	0..1	Reactance	(NC) inherited from: FACTSEquipment
maxC	0..1	Reactance	(NC) inherited from: FACTSEquipment
minL	0..1	Reactance	(NC) inherited from: FACTSEquipment
maxL	0..1	Reactance	(NC) inherited from: FACTSEquipment
controlEnabled	0..1	Boolean	inherited from: RegulatingCondEq
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 164 shows all association ends of StaticVarCompensator with other classes.

Table 164 – Association ends of ExtFACTS::StaticVarCompensator with other classes

mult from	name	mult to	type	description
0..1	LossCurve	0..*	LossCurve	(NC) inherited from: FACTSEquipment
0..*	RegulatingControl	0..1	RegulatingControl	inherited from: RegulatingCondEq
0..*	BaseVoltage	0..1	BaseVoltage	inherited from: ConductingEquipment
1..1	SvStatus	0..*	SvStatus	inherited from: ConductingEquipment
0..*	ProtectionEquipments	0..*	ProtectionEquipment	inherited from: ConductingEquipment
1..1	Terminals	0..*	Terminal	inherited from: ConductingEquipment
0..1	RelayDynamics	0..*	RelayDynamics	inherited from: ConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.9.7 (NC) TCSCCompensationPoint root class

Compensation point of a TCSC compensator.

Table 165 shows all attributes of TCSCCompensationPoint.

3256

Table 165 – Attributes of ExtFACTS::TCSCCompensationPoint

name	mult	type	description
compensationZ	0..1	Impedance	(NC) The compensation impedance for this compensation point.
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
section	0..1	Integer	(NC) The number of the section.

3257

3258

Table 166 shows all association ends of TCSCCompensationPoint with other classes.

3259

Table 166 – Association ends of ExtFACTS::TCSCCompensationPoint with other classes

3260

mult from	name	mult to	type	description
0..*	ThyristorControlledSeriesCompensator	1..1	ThyristorControlledSeriesCompensator	(NC) TCSC that has different compensation points.

3261

3262

3.9.8 (NC) ThyristorControlledSeriesCompensator

3263

Inheritance path = [FACTSEquipment](#) : RegulatingCondEq : EnergyConnection : ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

3265

3266

3267

3268

3269

3270

3271

3272

Thyristor-controlled series capacitors (TCSC) is a type of flexible AC transmission system regulating equipment that is configured with controlled reactors in parallel with sections of a capacitor bank. This combination allows smooth control of the fundamental frequency capacitive reactance over a wide range. The thyristor valve contains a string of series connected high power thyristors. TCSC can control power flows in order to achieve eliminating of line overloads, reducing loop flows and minimising system losses.

Table 167 shows all attributes of ThyristorControlledSeriesCompensator.

3273

Table 167 – Attributes of ExtFACTS::ThyristorControlledSeriesCompensator

name	mult	type	description
compensationZ	0..1	Impedance	(NC) The actual compensation impedance provided by the compensator. The attribute value shall be positive if compensation is in the capacitive range. The attribute value shall be negative if compensation is in the inductive rating.
flexibleCapacitiveZ	0..1	Impedance	(NC) Flexible impedance that can be controlled by the compensator when operating in the capacitive range. Shall always be positive.
flexibleInductiveZ	0..1	Impedance	(NC) Flexible impedance that can be controlled by the compensator when operating in the inductive range. Shall always be negative.
minI	0..1	CurrentFlow	(NC) Minimum current below which the device bypassed.
reconnectionI	0..1	CurrentFlow	(NC) The current for which the TCSC returns back to operation after bypass.

name	mult	type	description
currentSection	0..1	Integer	(NC) The current section on which the TCSC is operating.
slope	0..1	VoltagePerReactivePower	(NC) inherited from: FACTSEquipment
q	0..1	ReactivePower	(NC) inherited from: FACTSEquipment
ratedI	0..1	CurrentFlow	(NC) inherited from: FACTSEquipment
ratedU	0..1	Voltage	(NC) inherited from: FACTSEquipment
ratedC	0..1	Reactance	(NC) inherited from: FACTSEquipment
ratedL	0..1	Reactance	(NC) inherited from: FACTSEquipment
minC	0..1	Reactance	(NC) inherited from: FACTSEquipment
maxC	0..1	Reactance	(NC) inherited from: FACTSEquipment
minL	0..1	Reactance	(NC) inherited from: FACTSEquipment
maxL	0..1	Reactance	(NC) inherited from: FACTSEquipment
controlEnabled	0..1	Boolean	inherited from: RegulatingCondEq
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 168 shows all association ends of ThyristorControlledSeriesCompensator with other classes.

Table 168 – Association ends of ExtFACTS::ThyristorControlledSeriesCompensator with other classes

mult from	name	mult to	type	description
1..1	TCSCCompensationPoint	0..*	TCSCCompensationPoint	(NC) Compensation point for this TCSC.
0..1	LossCurve	0..*	LossCurve	(NC) inherited from: FACTSEquipment
0..*	RegulatingControl	0..1	RegulatingControl	inherited from: RegulatingCondEq
0..*	BaseVoltage	0..1	BaseVoltage	inherited from: ConductingEquipment
1..1	SvStatus	0..*	SvStatus	inherited from: ConductingEquipment
0..*	ProtectionEquipments	0..*	ProtectionEquipment	inherited from: ConductingEquipment
1..1	Terminals	0..*	Terminal	inherited from: ConductingEquipment
0..1	RelayDynamics	0..*	RelayDynamics	inherited from: ConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment

3286 **3.9.9.2 (NC) CurrentDroopControlFunction**

3287 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :
3288 ExtEulIdentifiedObject : Identity

3289 Current droop control function is a function block that calculates the operating point of the
3290 controlled equipment to achieve the target current.

3291 Table 169 shows all attributes of CurrentDroopControlFunction.

3292 **Table 169 – Attributes of ExtSSSC::CurrentDroopControlFunction**

name	mult	type	description
targetValueInductive	0..1	CurrentFlow	(NC) Setpoint when control is active in inductive region.
offsetInductive	0..1	CurrentFlow	(NC) Offset in capacitive region.
droopInductive	0..1	Float	(NC) Droop in inductive region. The unit is V/A.
targetValueCapacitive	0..1	CurrentFlow	(NC) Setpoint when control is active in capacitive region.
offsetCapacitive	0..1	CurrentFlow	(NC) Offset in capacitive region.
droopCapacitive	0..1	Float	(NC) Droop in capacitive region. The unit is V/A.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetValueDeadband	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3293

3294 Table 170 shows all association ends of CurrentDroopControlFunction with other classes.

3295 **Table 170 – Association ends of ExtSSSC::CurrentDroopControlFunction with other**
3296 **classes**

mult from	name	mult to	type	description
1..1	CurrentDroopControlFunctionSchedule	0..*	CurrentDroopControlFunctionSchedule	(NC) The schedule of the control function.
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3297

3298 **3.9.9.3 (NC) CurrentDroopOverride root class**

3299 Current droop override uses the following logic:

3300 - When the current exceeds a threshold the device executes the following transitions: 1) When
 3301 injecting an inductive voltage or in monitoring mode the device tends to inject a voltage
 3302 proportional to the difference between the line current and the aforementioned threshold. 2)
 3303 When injecting a capacitive voltage the device transitions to monitoring mode.

3304 - If the aforementioned proportional voltage is lower than the initial one, the voltage injection
 3305 remains unchanged.

3306 Current droop override is not applied when the device operates in currentDroop mode.

3307 Table 171 shows all attributes of CurrentDroopOverride.

3308 **Table 171 – Attributes of ExtSSSC::CurrentDroopOverride**

name	mult	type	description
droopCapacitive	0..1	Float	(NC) Droop in capacitive region. The unit is V/A.
droopInductive	0..1	Float	(NC) Droop in inductive region. The unit is V/A.
enabled	0..1	Boolean	(NC) True, if the current droop override is enabled (active). Otherwise false.
offsetCapacitiveI	0..1	CurrentFlow	(NC) Offset in capacitive region.
offsetInductiveI	0..1	CurrentFlow	(NC) Offset in capacitive region.
targetValueCapacitiveI	0..1	CurrentFlow	(NC) Setpoint when control is active in capacitive region.
targetValueInductiveI	0..1	CurrentFlow	(NC) Setpoint when control is active in inductive region.
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

3309

3310 Table 172 shows all association ends of CurrentDroopOverride with other classes.

3311 **Table 172 – Association ends of ExtSSSC::CurrentDroopOverride with other classes**

mult from	name	mult to	type	description
0..1	SSSCController	1..1	SSSCController	(NC) The SSSC controller to which this CurrentDroopOverride applies to.

3312

3313 **3.9.9.4 (NC) SSSCController**3314 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :

3315 IdentifiedObject : ExtEulIdentifiedObject : Identity

3316 The controller of a Static synchronous series compensator (SSSC).

3317 Table 173 shows all attributes of SSSCController.

3318 **Table 173 – Attributes of ExtSSSC::SSSCController**

name	mult	type	description
mode	0..1	SSSCControlModeKind	(NC) Mode of the Static Synchronous Series compensator controller.
minInjectionU	0..1	Voltage	(NC) Minimum voltage that the device can inject.
maxInjectionU	0..1	Voltage	(NC) Maximum voltage that the device can inject.
maxLimitI	0..1	CurrentFlow	(NC) Maximum operating current limit applied for the controller and used by any of the available control functions.
minLimitI	0..1	CurrentFlow	(NC) Minimum operating current limit applied for the controller and used by any of the available control functions.
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3319

3320 Table 174 shows all association ends of SSSCController with other classes.

3321 **Table 174 – Association ends of ExtSSSC::SSSCController with other classes**

mult from	name	mult to	type	description
1..1	CurrentDroopOverride	0..1	CurrentDroopOverride	(NC) The current droop override for this SSSC controller. It is not used when the SSSC controller is in mode currentDroop.
0..*	SSSCSimulationSettings	0..1	SSSCSimulationSettings	(NC) The simulation settings that apply for this controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction

mult from	name	mult to	type	description
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3322

3323 **3.9.9.5 (NC) SSSCSimulationSettings root class**

3324 SSSC control simulation settings used by the algorithm for power flow calculations.

3325 Table 175 shows all attributes of SSSCSimulationSettings.

3326

Table 175 – Attributes of ExtSSSC::SSSCSimulationSettings

name	mult	type	description
maxCorrectionX	0..1	Reactance	(NC) Maximum value of the reactance correction applied between iterations of the power flow calculation algorithm for the purpose of achieving control target value.
maxMismatch	0..1	Voltage	(NC) Maximum mismatch tolerance of voltage target value. If mismatch is lower, convergence is claimed. It is only used for voltageInjection and currentDroop control modes.
deltaX	0..1	Reactance	(NC) Reactance delta for the solution algorithm. The solution “outer-loop” algorithm is based on a secant method which needs two initial points. The second point is calculated from the first one by either adding or subtracting this “delta”. The “seed” is assumed to be 0 ohms.
isEstimateDLdVSensitive	0..1	Boolean	(NC) Defines if the estimate is considering the dI/dV sensitivity (true) instead of the secant algorithm (false).
maxIterations	0..1	Integer	(NC) Maximum number of iterations before claiming an open line condition. The algorithm uses it to assess if a line is really open by making sure low-currents are observed on various consecutive iterations.
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

Table 176 shows all association ends of SSSCSimulationSettings with other classes.

Table 176 – Association ends of ExtSSSC::SSSCSimulationSettings with other classes

mult from	name	mult to	type	description
0..1	SSSCController	0..*	SSSCController	(NC) The controller that uses these simulation settings.

3.9.9.6 (NC) VoltageInjectionControlFunction

Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Voltage injection control function is a function block that calculates the operating point of the controlled equipment to achieve the target voltage injection.

Table 177 shows all attributes of VoltageInjectionControlFunction.

Table 177 – Attributes of ExtSSSC::VoltageInjectionControlFunction

name	mult	type	description
targetValue	0..1	Voltage	(NC) Target value for the voltage that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetValueDeadband	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 178 shows all association ends of VoltageInjectionControlFunction with other classes.

Table 178 – Association ends of ExtSSSC::VoltageInjectionControlFunction with other classes

mult from	name	mult to	type	description
1..1	VoltageInjectionControlFunctionSchedule	0..*	VoltageInjectionControlFunctionSchedule	(NC) The schedule of the control function.
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock

mult from	name	mult to	type	description
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3342

3343 **3.9.9.7 (NC) SSSCControlModeKind enumeration**

3344 Control modes of the Static Synchronous Series Compensator (SSSC).

3345 Table 179 shows all literals of SSSCControlModeKind.

3346 **Table 179 – Literals of ExtSSSC::SSSCControlModeKind**

literal	value	description
effectiveReactance		The device injects a voltage proportional to the line current to achieve the specified target value defined by the ImpedanceControlFunction. The voltage will vary according to the line current level.
voltageInjection		The device injects a fixed voltage that is either inductive or capacitive according to the specified target value of the VoltageInjectionControlFunction. The effective reactance varies according to the flow of the line current.
monitoring		The device bypasses and a voltage injection is close to zero. In monitoring mode current is monitored.
currentDroop		The device injects a voltage proportional to the difference between the line current and the target value of the CurrentDroopControlFunction. There are capacitive and inductive operational regions.

3347

3348 **3.10 Package ExtPowerShiftKey**3349 **3.10.1 General**

3350 This package contains the extensions related to the generation and load shift keys (GLSKs).

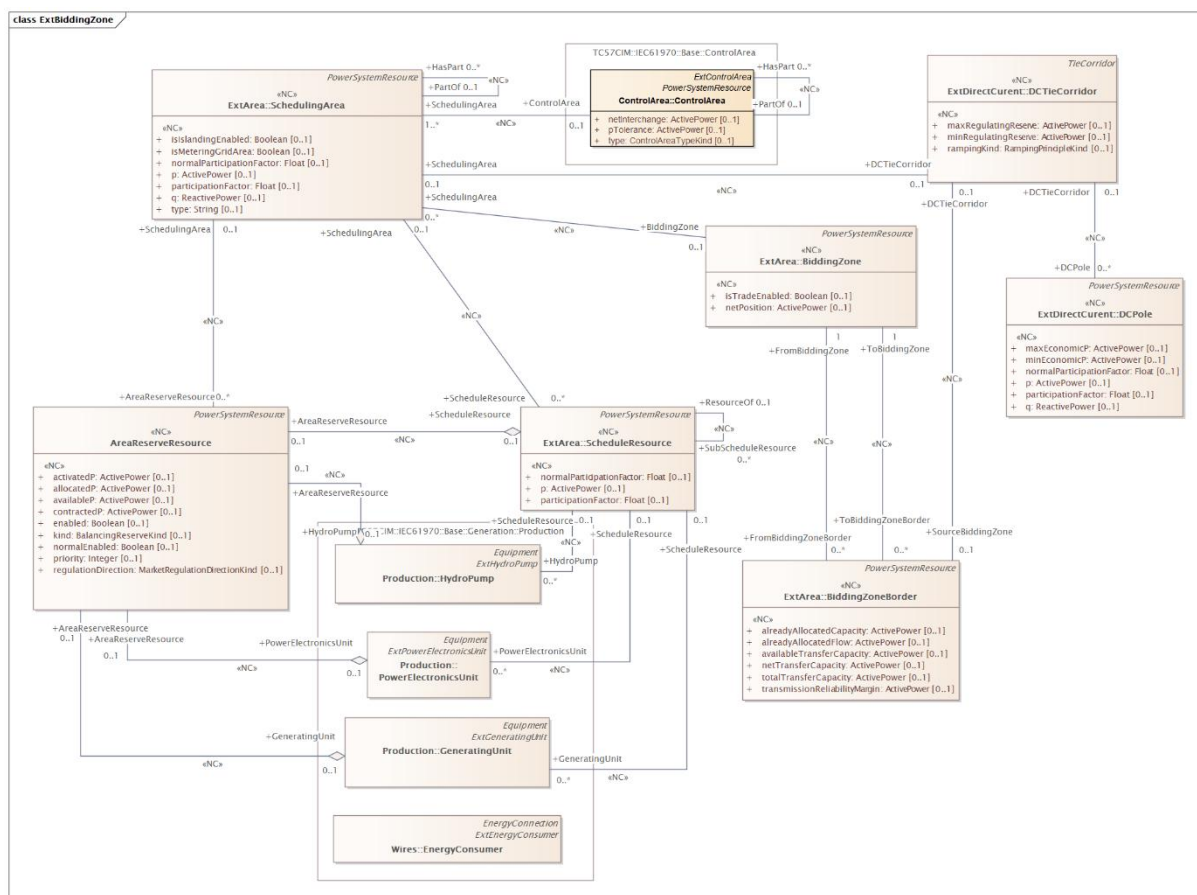


Figure 17 – Class diagram ExtPowerShiftKey::ExtBiddingZone

Figure 17: The diagram contains classes related to bidding zone.

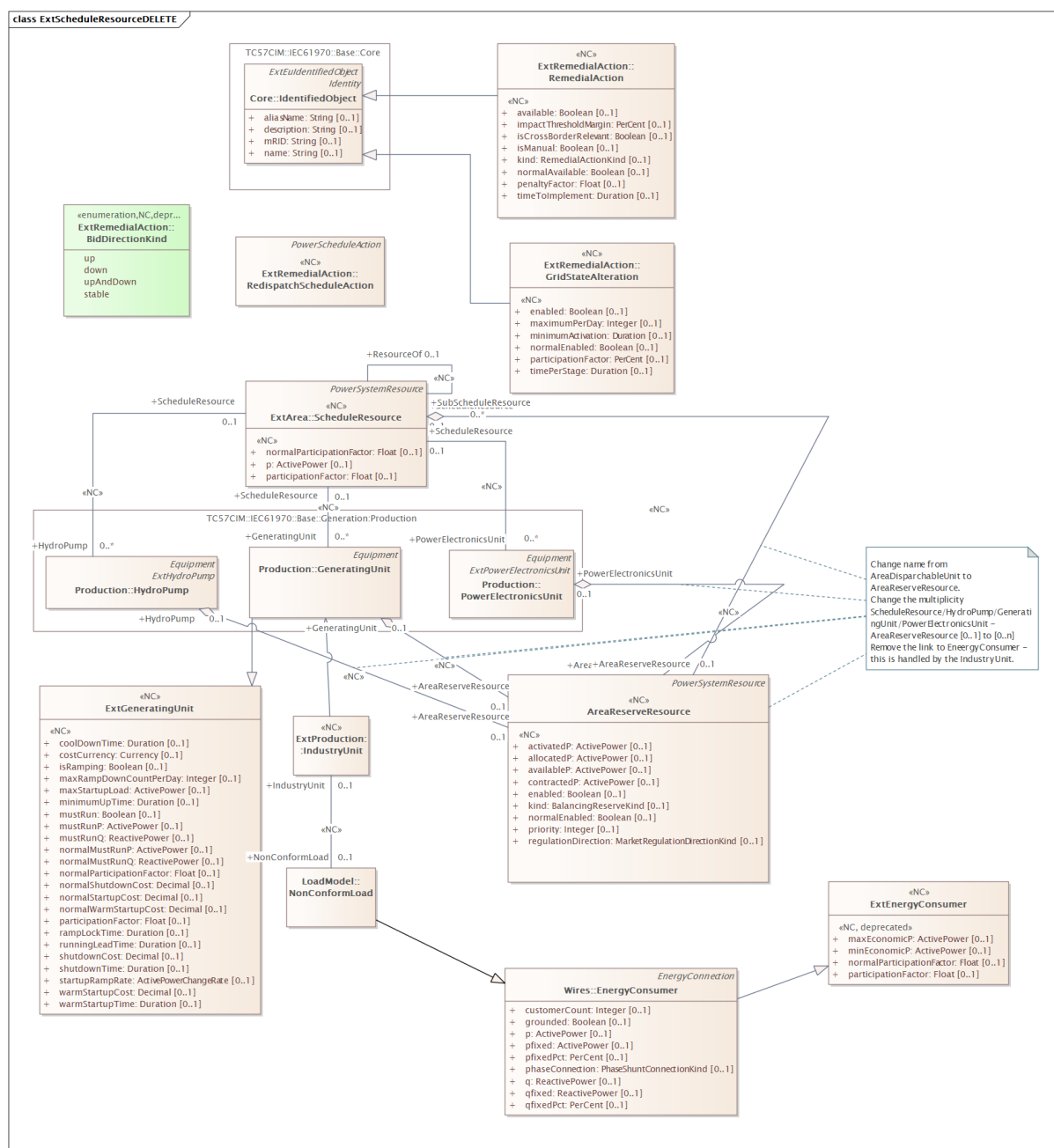


Figure 18 – Class diagram ExtPowerShiftKey::ExtScheduleResourceDELETE

Figure 18: The diagram contains classes related to schedule resource.

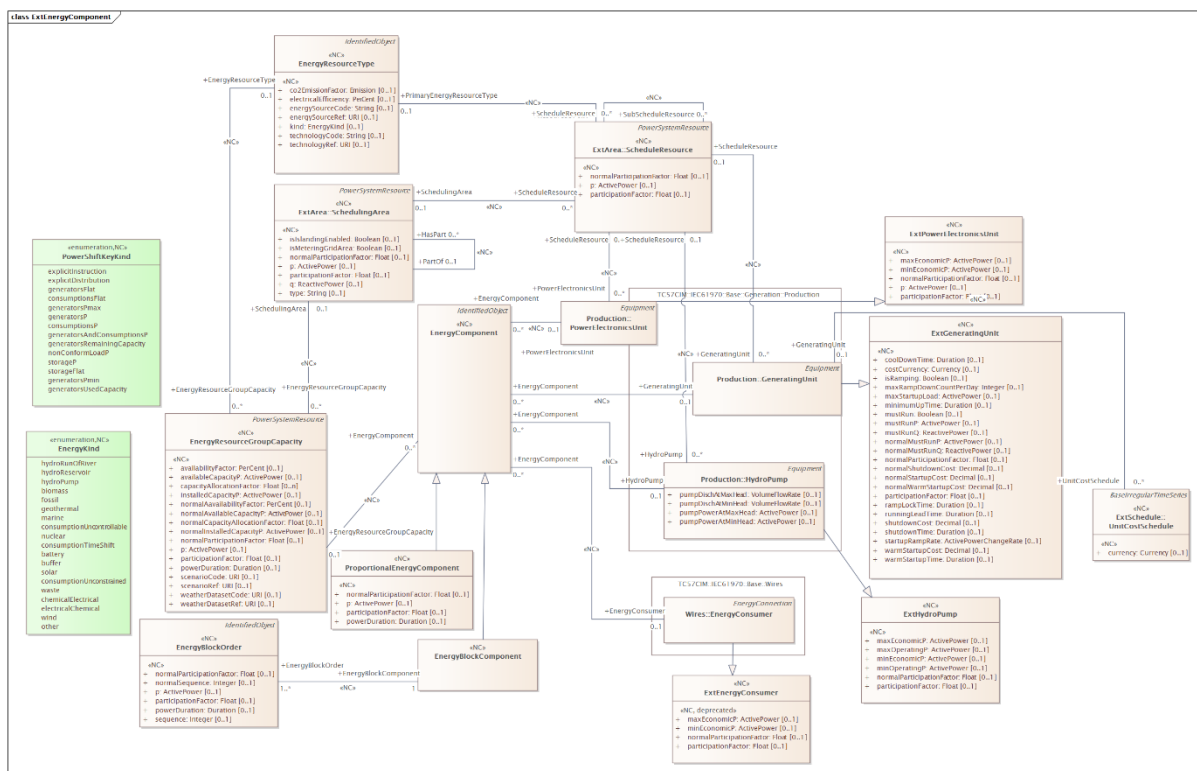


Figure 19 – Class diagram ExtPowerShiftKey::ExtEnergyComponent

Figure 19: The diagram contains classes related to GLSK.

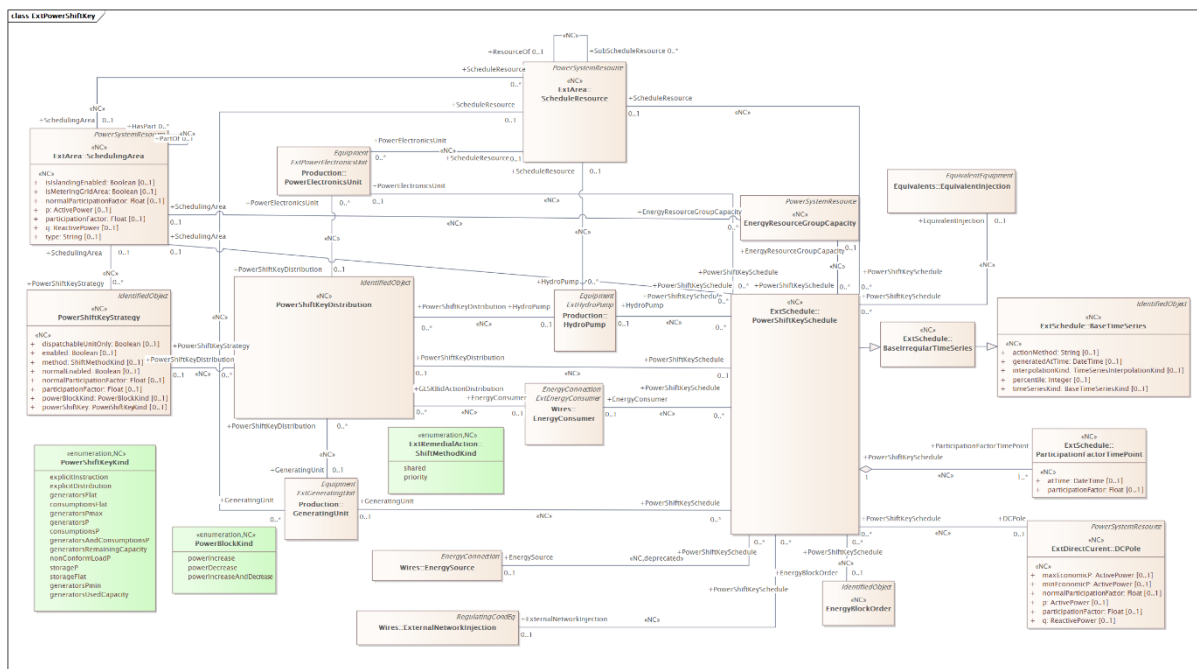


Figure 20 – Class diagram ExtPowerShiftKey::ExtPowerShiftKey

Figure 20: The diagram contains classes related to GLSK schedule.

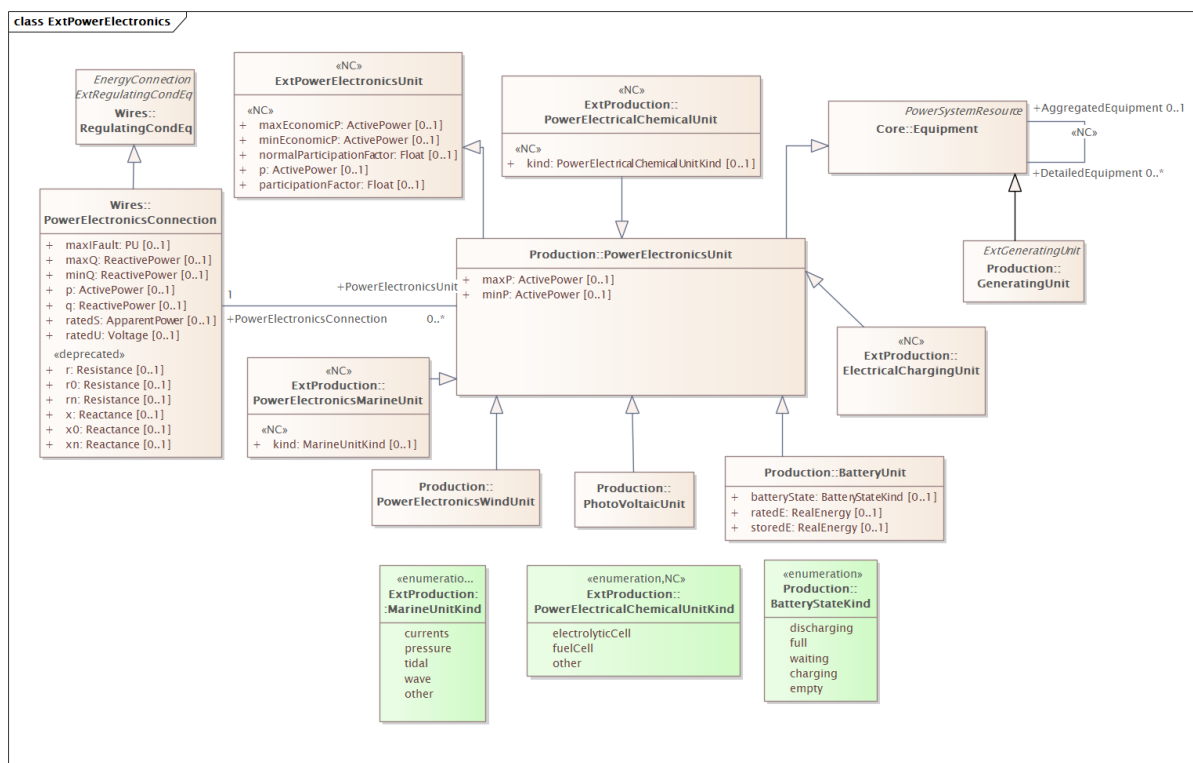


Figure 21 – Class diagram ExtPowerShiftKey::ExtPowerElectronics

Figure 21: The diagram contains classes related to power electronics.

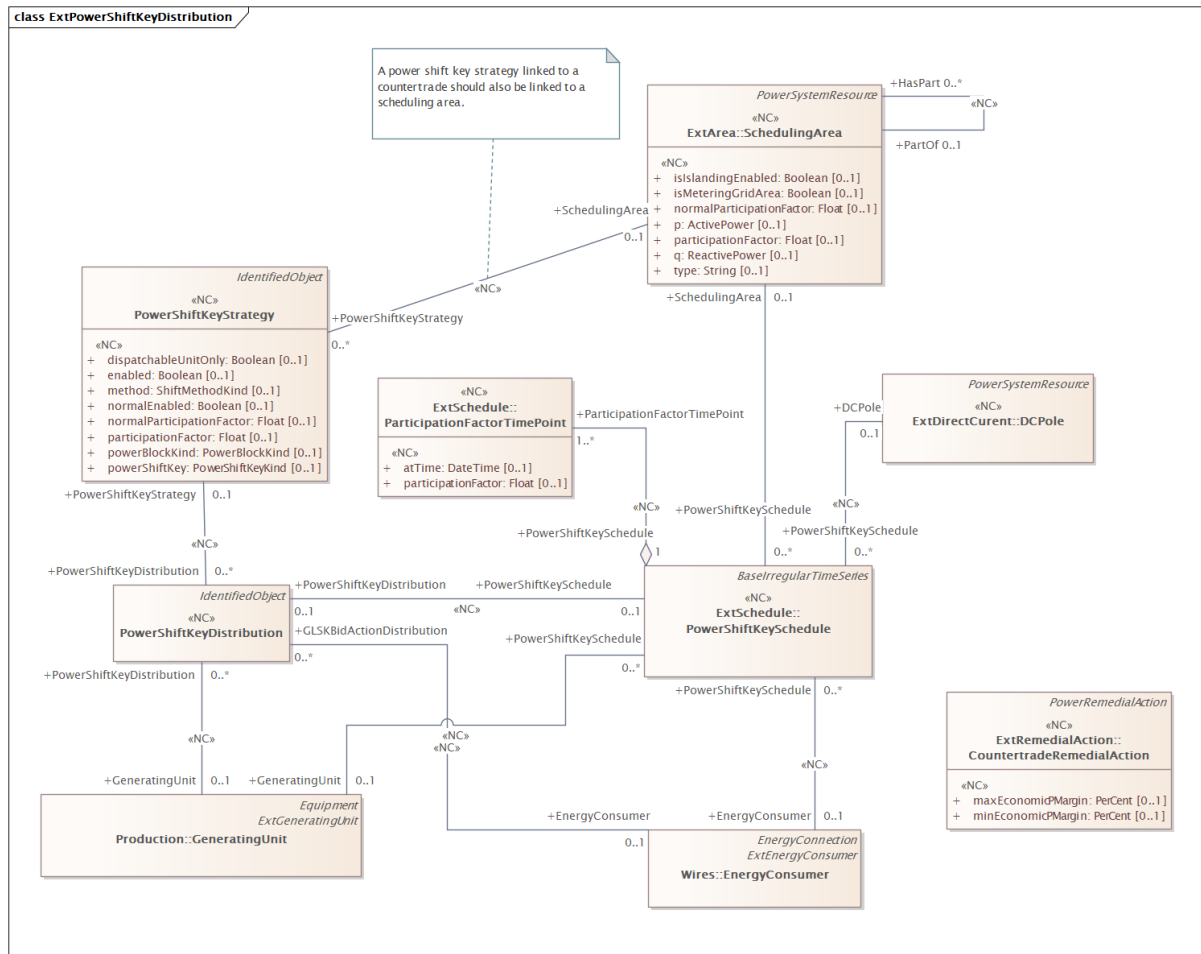


Figure 22 – Class diagram ExtPowerShiftKey::ExtPowerShiftKeyDistribution

Figure 22: The diagram includes classes relevant to modelling of power shift key distribution.

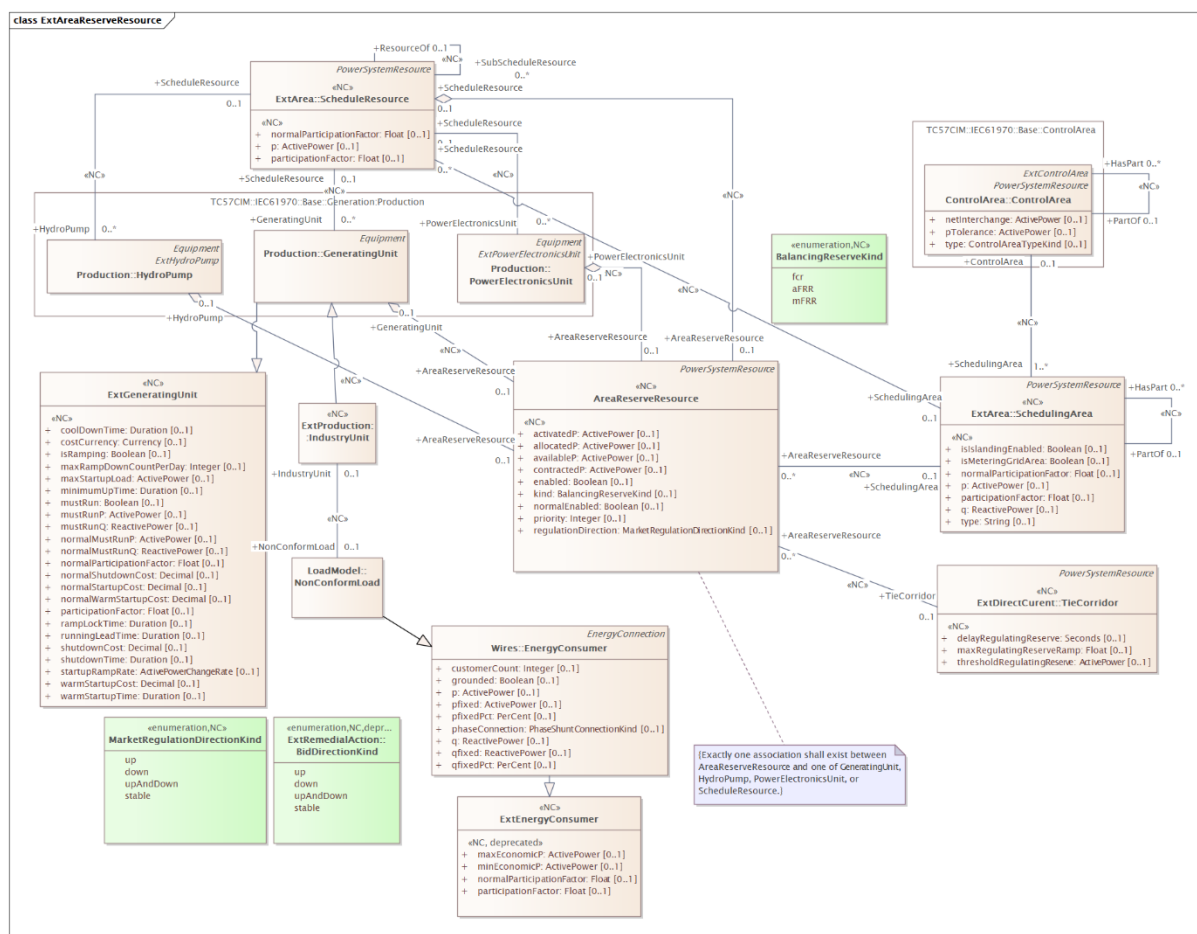


Figure 23 – Class diagram ExtPowerShiftKey::ExtAreaReserveResource

Figure 23: The diagram contains classes related to schedule resource.

3.10.2 (NC) AreaReserveResource

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity
A resource representation for a specific balancing reserve product, associated with either a scheduling area or a tie corridor, and used to represent reserve capability made available to a control area for market and operational purposes.

Note: An AreaReserveResource shall be associated with either a SchedulingArea or a TieCorridor, but not both.

When associated with a `SchedulingArea`, the resource represents reserve capability made available within that area context.

When associated with a TieCorridor, the resource represents reserve capability provided across an inter-area connection to support a control area other than the one in which the underlying resource is located.

A single physical or logical resource (for example a GeneratingUnit, HydroPump, PowerElectronicsUnit, or equivalent) may be represented by multiple AreaReserveResource instances, each corresponding to a different balancing reserve product (e.g. FCR, aFRR, mFRR).

Table 180 shows all attributes of AreaReserveResource.

Table 180 – Attributes of ExtPowerShiftKey::AreaReserveResource

name	mult	type	description
enabled	0..1	Boolean	(NC) Identifies if the unit is enabled to accept a dispatch instruction. If true, the unit is enabled to

name	mult	type	description
			accept a dispatch instruction. If false, the unit has the capability, but it is not enabled to receive a dispatch instruction.
normalEnabled	0..1	Boolean	(NC) Identifies if the unit is normally enabled to accept a dispatch instruction. If true, the unit is enabled to accept a dispatch instruction. If false, the unit has the capability, but it is not enabled to receive a dispatch instruction.
allocatedP	0..1	ActivePower	(NC) Amount of active power capability allocated from the associated resource to the area for the given reserve product.
activatedP	0..1	ActivePower	(NC) Amount of active power currently activated for the reserve product.
priority	0..1	Integer	(NC) Relative priority for activation or selection within an area or aggregated reserve structure.
regulationDirection	0..1	MarketRegulationDirectionKind	(NC) Direction of the product flow.
kind	0..1	BalancingReserveKind	(NC) Type of reserve product represented by the allocation.
availableP	0..1	ActivePower	(NC) Amount of active power currently available for provision of the reserve product.
contractedP	0..1	ActivePower	(NC) Amount of active power contracted for the reserve product.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 181 shows all association ends of AreaReserveResource with other classes.

Table 181 – Association ends of ExtPowerShiftKey::AreaReserveResource with other classes

mult from	name	mult to	type	description
0..1	GeneratingUnit	0..1	GeneratingUnit	(NC) Generating unit that provides the reserve capability represented by the area reserve resource.
0..1	HydroPump	0..1	HydroPump	(NC) Hydro pump that provides the reserve capability represented by the area reserve resource.
0..1	PowerElectronicsUnit	0..1	PowerElectronicsUnit	(NC) Power electronics unit that provides the reserve capability represented by the area reserve resource.
0..1	RegisteredResource	0..1	RegisteredResource	(NC)
0..*	SchedulingArea	0..1	SchedulingArea	(NC) Scheduling area within which the reserve resource is made available when the reserve support is provided in the area context of the underlying resource.

mult from	name	mult to	type	description
0..1	PowerSchedule	0..*	PowerSchedule	(NC) Power schedule which has area dispatchable units.
0..1	PowerBidSchedule	0..*	PowerBidSchedule	(NC)
1..1	AreaReserveResourceSchedule	0..*	AreaReserveResourceSchedule	(NC) The schedule for this resource.
1..1	AreaReserveResourceRegularSchedule	0..*	AreaReserveResourceRegularSchedule	(NC) The schedule for this resource.
0..1	ScheduleResource	0..1	ScheduleResource	(NC) Schedule resource representing an aggregation or grouping of resources that provides the reserve capability represented by the area reserve resource.
0..*	TieCorridor	0..1	TieCorridor	(NC) Tie corridor through which the reserve resource is made available to support a control area other than the one in which the underlying resource is located.
0..1	MarketResourceProductRelevance	0..*	MarketResourceProductEligibility	(NC,new)
0..1	ResourceVoltagePriceSensitivity	0..*	ResourceVoltagePriceSensitivity	(NC,new)
0..1	ResourceReactivePowerPriceSensitivity	0..*	ResourceReactivePowerPriceSensitivity	(NC,new)
0..1	EnergyResourceAvailability	0..*	EnergyResourceAvailability	
0..1	ResourcePowerPriceSensitivity	0..*	ResourcePowerPriceSensitivity	(NC,new)
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3394

3395 **3.10.3 (NC) EnergyBlockComponent**3396 Inheritance path = [EnergyComponent](#) : IdentifiedObject : ExtEuIdentifiedObject : Identity

3397 Energy block component where the energy group is distributed according to the energy block order of each energy component in an energy group.

3399 Table 182 shows all attributes of EnergyBlockComponent.

3400

Table 182 – Attributes of ExtPowerShiftKey::EnergyBlockComponent

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 183 shows all association ends of EnergyBlockComponent with other classes.

Table 183 – Association ends of ExtPowerShiftKey::EnergyBlockComponent with other classes

mult from	name	mult to	type	description
1..1	EnergyBlockOrder	1..*	EnergyBlockOrder	(NC) The energy block order for this energy block component.
0..*	EnergyConsumer	0..1	EnergyConsumer	(NC) inherited from: EnergyComponent
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) inherited from: EnergyComponent
0..*	HydroPump	0..1	HydroPump	(NC) inherited from: EnergyComponent
0..*	PowerElectronicsUnit	0..1	PowerElectronicsUnit	(NC) inherited from: EnergyComponent
0..*	EnergyResourceGroupCapacity	0..1	EnergyResourceGroupCapacity	(NC) inherited from: EnergyComponent
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.10.4 (NC) EnergyBlockOrder

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

The energy block order is a block (an amount) of energy that forms the sequence of orders that are going to be distributed to an energy block component.

Table 184 shows all attributes of EnergyBlockOrder.

Table 184 – Attributes of ExtPowerShiftKey::EnergyBlockOrder

name	mult	type	description
participationFactor	0..1	Float	(NC) Participation factor.
sequence	0..1	Integer	(NC) Sequence needs to be ordered by the scheduling area. It has to be unique by the scheduling area.
powerDuration	0..1	Duration	(NC) Duration for the active power.
normalParticipationFactor	0..1	Float	(NC) Normal participation factor.
p	0..1	ActivePower	(NC) The maximum active power that can be applied as part of this block order.
normalSequence	0..1	Integer	(NC) Normal sequence represents the local order of the power block order. The sequence order for a given block dispatch instruction. The sequence number need to be unique for a given block dispatch instruction,

name	mult	type	description
			e.g. two order in the same instruction cannot have the same sequence.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 185 shows all association ends of EnergyBlockOrder with other classes.

Table 185 – Association ends of ExtPowerShiftKey::EnergyBlockOrder with other classes

mult from	name	mult to	type	description
1..*	EnergyBlockComponent	1..1	EnergyBlockComponent	(NC) The energy block component that has this energy block order.
0..1	PowerShiftKeySchedule	0..*	PowerShiftKeySchedule	(NC) The Power Shift Key schedule for an energy block order.
0..1	GenericSequenceSchedule	0..*	GenericSequenceSchedule	(NC) Generic sequence schedule associated with an energy block order.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.10.5 (NC) EnergyComponent

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

The energy component for a producer or a consumer that has the same energy characteristic, e.g. fuel type and technology.

Table 186 shows all attributes of EnergyComponent.

Table 186 – Attributes of ExtPowerShiftKey::EnergyComponent

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 187 shows all association ends of EnergyComponent with other classes.

Table 187 – Association ends of ExtPowerShiftKey::EnergyComponent with other classes

mult from	name	mult to	type	description
0..*	EnergyConsumer	0..1	EnergyConsumer	(NC) The energy consumer that relates to this energy component.
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) The generating unit that is part of this energy component.
0..*	HydroPump	0..1	HydroPump	(NC) The hydro pump that relates to this energy component.
0..*	PowerElectronicsUnit	0..1	PowerElectronicsUnit	(NC) The power electronics unit that relates to this energy component.
0..*	EnergyResourceGroupCapacity	0..1	EnergyResourceGroupCapacity	(NC) The Energy Resource Group Capacity that has this energy component.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.10.6 (NC) EnergyResourceGroupCapacity

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity
An aggregation of energy resources having common energy characteristics for which installed, available, or effective capacity is represented.

Note: EnergyResourceGroupCapacity groups energy resources for capacity modelling, forecasting, scenario analysis and aggregation. The group may be characterised by an energy kind, energy source, technology, location, scenario, weather condition or other modelling context.

The aggregated capacity may be represented by static values or by time-series values describing forecast, scheduled, actual or hindcast conditions. An EnergyComponent represents the part of an aggregated value associated with a particular underlying unit or resource. The aggregated value of the EnergyResourceGroupCapacity may therefore be distributed among its associated EnergyComponents, for example in proportion to the capability of the corresponding units or according to an ordered block-based allocation.

Weather or other environmental information may be referenced where it is relevant to the capacity or availability of the grouped resources/

Table 188 shows all attributes of EnergyResourceGroupCapacity.

Table 188 – Attributes of ExtPowerShiftKey::EnergyResourceGroupCapacity

name	mult	type	description
participationFactor	0..1	Float	(NC) Participation factor for the power group in relation to scheduling area. Must be a positive value.
p	0..1	ActivePower	(NC) The effective active power capacity for the resource at the specified time, after considering all applied deratings, outages, operational limits, or weather influences. This value represents the usable capacity that can be delivered or consumed, effective capacity.
powerDuration	0..1	Duration	(NC) Duration for the active power.

name	mult	type	description
normalParticipationFactor	0..1	Float	(NC) Normal participation factor for the power group in relation to scheduling area. Must be a positive value.
installedCapacityP	0..1	ActivePower	(NC) The nominal installed active power capacity of the energy type, independent of weather or operating conditions. This is the maximum technical power rating under standard design assumptions and optimum operation condition.
weatherDatasetRef	0..1	URI	(NC) Reference to the external weather or climate dataset used to determine availability or effective capacity for weather-dependent resources. Examples include datasets from the Pan-European Climate Database (PECD) or similar climate data services.
availableCapacityP	0..1	ActivePower	(NC) The weather or condition-dependent active power capacity that is realistically available for operation at a given time. This value reflects reductions due to climatic, hydrological, or operational constraints.
availabilityFactor	0..1	PerCent	(NC) The ratio (in percent) between the effective available capacity and the installed capacity over a defined time interval. For weather-dependent resources, the value reflects climate-driven availability as derived from meteorological or hydrological conditions.
scenarioRef	0..1	URI	(NC) Reference to the study, scenario, or modelling configuration from which the capacity or availability values are derived. Examples include TYNDP scenario identifiers, national estimates, or dataset versions.
scenarioCode	0..1	URI	(NC) Code identifying the study, scenario, or modelling configuration from which the capacity or availability values are derived. Examples include TYNDP scenario identifiers, national estimates, or dataset versions.
weatherDatasetCode	0..1	URI	(NC) Code identifying the external weather or climate dataset used to determine availability or effective capacity for weather-dependent resources. Examples include datasets from the Pan-European Climate Database (PECD) or similar climate data services.
normalAvailabilityFactor	0..1	PerCent	(NC) The normal ratio (in percent) between the effective available capacity and the installed capacity over a defined time interval. For weather-dependent resources, the value reflects climate-driven availability as derived from meteorological or hydrological conditions.
normalAvailableCapacityP	0..1	ActivePower	(NC) The weather or condition-dependent active power capacity that is realistically available for operation at a given time. This value reflects normal reduction due to climatic, hydrological, or operational constraints.
normalInstalledCapacityP	0..1	ActivePower	(NC) The nominal installed active power capacity of the energy type, independent of weather or normal operating conditions. This is the maximum technical power rating under standard design assumptions and optimum operation condition.
capacityAllocationFactor	0..n	Float	(NC) The relative weighting used to allocate an aggregate capacity requirement to this energy resource group on a time-series basis.

name	mult	type	description
			Note: The values provide context-specific top-down capacity allocation weightings and may override normalCapacityAllocationFactor. Each value applies to the corresponding time interval represented by the time-series context. The factors are relative weights and are not required to represent percentages or to sum to 1. The allocation algorithm may normalize or otherwise adjust the applicable factors according to availability, existing capacity and other modelling constraints.
normalCapacityAllocationFactor	0..1	Float	(NC) The normal relative weighting used to allocate an aggregate capacity requirement to this energy resource group. Note: The value provides the default weighting for top-down capacity allocation when a more specific 'capacityAllocationFactor' is not provided. The factor is relative to the factors of other applicable energy resource groups and is not required to represent a percentage or to sum to 1 across the groups. The allocation algorithm may normalize the applicable factors and take account of availability, existing capacity and other modelling constraints.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 189 shows all association ends of EnergyResourceGroupCapacity with other classes.

Table 189 – Association ends of ExtPowerShiftKey::EnergyResourceGroupCapacity with other classes

mult from	name	mult to	type	description
0..*	SchedulingArea	0..1	SchedulingArea	(NC) The scheduling area that has this energy group.
0..*	EnergyResourceType	0..1	EnergyResourceType	(NC) The energy resource type represented by the aggregated capacity group.
0..1	PowerSchedule	0..*	PowerSchedule	(NC) Power schedule which is associated with an energy group.
1..1	EnergyResourceGroupCapacityRegularSchedule	0..*	EnergyResourceGroupCapacityRegularSchedule	(NC) The regular schedule for this energy resource group capacity.
0..*	ClimateZone	0..1	ClimateZone	(NC) The climate zone for the energy group.
0..1	EnergyComponent	0..*	EnergyComponent	(NC) The energy component that is part of this energy group.
0..1	PowerShiftKeySchedule	0..*	PowerShiftKeySchedule	(NC) The Power Shift Key schedule for an energy group capacity.
0..1	EnergyResourceGroupCapacitySchedule	0..*	EnergyResourceGroupCapacitySchedule	(NC)

mult from	name	mult to	type	description
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3450

3451 **3.10.7 (NC) EnergyResourceType**

3452 Inheritance path = IdentifiedObject : ExtEuIdentifiedObject : Identity

3453 A reference classification of an energy resource based on its energy kind, primary energy
3454 source and conversion technology.3455 Note: An energy resource type provides a common classification for forecasting, capacity
3456 aggregation, scheduling and reporting. Codes and references may identify entries in external
3457 controlled vocabularies, such as the European Energy Certificate System (EECS) energy
3458 source and technology classifications. Technical and environmental attributes represent
3459 reference or default characteristics used for modelling and reporting and do not represent
3460 measurements of an individual resource.3461 Example: (1) Name = "Solar-Photovoltaic-Thin Film", kind = solar, technologyCode = T010102
3462 (2) Name = "Renewable-Solid-Wood-Unspecified", kind = biomass, energySourceCode =
3463 F01010300.

3464 Table 190 shows all attributes of EnergyResourceType.

3465

Table 190 – Attributes of ExtPowerShiftKey::EnergyResourceType

name	mult	type	description
kind	0..1	EnergyKind	(NC) The general kind of energy resource. Note: The value provides a broad functional classification suitable for aggregation and forecasting. More detailed classifications of the energy input and technology are provided by fuelCode, fuelRef, technologyCode and technologyRef.
co2EmissionFactor	0..1	Emission	(NC) The reference carbon dioxide emission factor of the energy resource type. Note: The value represents a default factor used for modelling or reporting rather than measured emissions from an individual resource.
energySourceRef	0..1	URI	(NC) URI or URN identifying the same primary energy source classification as energySourceCode. Note: URI or URN identifying the same primary energy source as energySourceCode. The URI may be resolvable (HTTP) or non-resolvable (URN). CIM does not mandate any identification scheme. Example: https://www.aib-net.org/eees/F01010300 to point to Renewable-Solid-Wood-Unspecified.

name	mult	type	description
energySourceCode	0..1	String	(NC) Code identifying the primary energy source. Note: The code is assigned by a controlled vocabulary. The identified energy source need not be a combustible fuel; it may represent solar radiation, wind, hydro, ambient heat, biomass or another primary energy source. Example: F01010300 identifies Renewable–Solid–Wood–Unspecified in the European Energy Certificate System (EECS) energy source classification.
electricalEfficiency	0..1	PerCent	(NC) The reference ratio of electrical energy output to energy input for the energy resource type. Note: The value represents a default or reference efficiency used for modelling and reporting. It is not necessarily the measured efficiency of an individual resource. Example: An energy resource type representing a combined-cycle gas turbine may have a reference electrical efficiency of 60 %.
technologyRef	0..1	URI	(NC) URI or URN identifying the same technology classification as technologyCode. Note: URI or URN identifying the same technology as technologyCode. The URI may be resolvable (HTTP) or non-resolvable (URN). CIM does not mandate any identification scheme. Example: https://www.aib-net.org/eeecs/T010102 to point to Solar–Photovoltaic–Thin Film.
technologyCode	0..1	String	(NC) Code identifying the production, conversion, storage or consumption technology. Note: The code is assigned by an external controlled vocabulary. For electricity production, the code may identify a technology defined by the European Energy Certificate System (EECS) technology classification. Example: T010102 identifies Solar–Photovoltaic–Thin Film in the European Energy Certificate System (EECS) technology classification.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 191 shows all association ends of EnergyResourceType with other classes.

Table 191 – Association ends of ExtPowerShiftKey::EnergyResourceType with other classes

mult from	name	mult to	type	description
0..1	ScheduleResource	0..*	ScheduleResource	(NC) The schedule resources whose primary energy resource type is this energy resource type.

mult from	name	mult to	type	description
0..1	EnergyResourceGroupCapacity	0..*	EnergyResourceGroupCapacity	(NC) The capacity groups classified by this energy resource type.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3470

3471 **3.10.8 (NC) ExtEnergyConsumer root class**

3472 EU Network Code extension of EnergyConsumer.

3473 Table 192 shows all attributes of ExtEnergyConsumer.

3474 **Table 192 – Attributes of ExtPowerShiftKey::ExtEnergyConsumer**

name	mult	type	description
normalParticipationFactor	0..1	Float	(deprecated,NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(\text{PF})$. In the case of priority strategy, the item with the lowest number gets allocated energy first.
participationFactor	0..1	Float	(deprecated,NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(\text{PF})$. In the case of priority strategy, the item with the lowest number gets allocated energy first.
maxEconomicP	0..1	ActivePower	(deprecated,NC) Maximum high economic active power limit, that should not exceed the maximum operating active power limit.
minEconomicP	0..1	ActivePower	(deprecated,NC) Low economic active power limit that shall be greater than or equal to the minimum operating active power limit.

3475

3476 **3.10.9 (NC) ExtGeneratingUnit root class**

3477 EU Network Code extension of GeneratingUnit.

3478 Table 193 shows all attributes of ExtGeneratingUnit.

3479 **Table 193 – Attributes of ExtPowerShiftKey::ExtGeneratingUnit**

name	mult	type	description
maxStartupLoad	0..1	ActivePower	(NC) Maximum consumption by the generating unit as part of the startup process.

name	mult	type	description
participationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(\text{PF})$. In the case of priority strategy, the item with the lowest number gets allocated energy first.
normalShutdownCost	0..1	Decimal	(NC) The normal shutdown cost incurred for each shutdown of the GeneratingUnit.
shutdownTime	0..1	Duration	(NC) Time it takes to shutdown the unit.
warmStartupTime	0..1	Duration	(NC) Time it takes to startup the unit when it is warm.
coolDownTime	0..1	Duration	(NC) Time it takes from a unit shutdown until it is considered cold.
warmStartupCost	0..1	Decimal	(NC) The warm startup cost incurred for each start of the GeneratingUnit.
startupRampRate	0..1	ActivePowerChangeRate	(NC) The startup ramp rate of the generating unit which describes the speed of change of active power from zero to the minimum active power. When the ramp is not provided, the optimisation process shall consider the change as an instant change of active power from zero to minimum active power.
normalMustRunP	0..1	ActivePower	(NC) Normal minimum active power injection that is needed to meet must-run requirement. This value can be higher or equal to minimum operational limit. Load sign convention is used, i.e. positive sign means flow out from a node.
mustRunP	0..1	ActivePower	(NC) Minimum active power injection that is needed to meet must-run requirement. This value can be higher or equal to minimum operational limit. Load sign convention is used, i.e. positive sign means flow out from a node.
runningLeadTime	0..1	Duration	(NC) Time it takes to change the schedule when the unit is operating due to technical configuration of a supporting system, e.g. gas pipeline.
minimumUpTime	0..1	Duration	(NC) The time that a generating unit has to stay running after it has been switched on by the Remedial Action Optimizer.
normalStartupCost	0..1	Decimal	(NC) The normal initial startup cost incurred for each start of the GeneratingUnit.
normalWarmStartupCost	0..1	Decimal	(NC) The normal warm startup cost incurred for each start of the GeneratingUnit.
mustRunQ	0..1	ReactivePower	(NC) Minimum reactive power injection that is needed to meet must-run requirement. This value can be higher or equal to minimum operational limit. Load sign convention is used, i.e. positive sign means flow out from a node.
normalMustRunQ	0..1	ReactivePower	(NC) Normal minimum reactive power injection that is needed to meet must-run requirement. This value can be higher or equal to minimum operational limit. Load sign convention is used, i.e. positive sign means flow out from a node.

name	mult	type	description
isRamping	0..1	Boolean	(NC) Identifies if the generating unit is ramping up or down. If true, the generating unit is ramping and constraints should be ignored.
rampLockTime	0..1	Duration	(NC) Time between end or start of ramping. If a unit has just stopped the ramping, it will need to wait this time until a new ramping can start.
maxRampDownCountPerDay	0..1	Integer	(NC) Number of times the unit can do ramp down within a calendar day. One ramp down consists of a decrease of a power plant production level from a stable schedule to another regardless of how much time the power plant stays in such stable operating stage.
costCurrency	0..1	Currency	(NC) Currency the cost is given in.
shutdownCost	0..1	Decimal	(NC) The shutdown cost incurred for each shutdown of the GeneratingUnit.
mustRun	0..1	Boolean	(NC) Identifies if the generating unit is a must-run unit. This means that it cannot be instructed to shutdown due to other obligation. e.g. Providing heat. If true, the generating unit is must-run. If false, it is not.
normalParticipationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(\text{PF})$. In the case of priority strategy, the item with the lowest number gets allocated energy first.

3480

3481 **3.10.10 (NC) ExtHydroPump root class**

3482 EU Network Code extension of HydroPump.

3483 Table 194 shows all attributes of ExtHydroPump.

3484 **Table 194 – Attributes of ExtPowerShiftKey::ExtHydroPump**

name	mult	type	description
normalParticipationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(\text{PF})$. In the case of priority strategy, the item with the lowest number gets allocated energy first.
participationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated

name	mult	type	description
			value (T) divided by sum of participation factors (PF), i.e. $V=T/\sum(PF)$. In the case of priority strategy, the item with the lowest number gets allocated energy first.
maxEconomicP	0..1	ActivePower	(NC) Maximum high economic active power limit, that should not exceed the maximum operating active power limit.
maxOperatingP	0..1	ActivePower	(NC) This is the maximum operating active power limit the dispatcher can enter for this unit.
minEconomicP	0..1	ActivePower	(NC) Low economic active power limit that shall be greater than or equal to the minimum operating active power limit.
minOperatingP	0..1	ActivePower	(NC) This is the minimum operating active power limit the dispatcher can enter for this unit.

3485

3486 **3.10.11 (NC) ExtPowerElectronicsUnit root class**

3487 EU Network Code extension of PowerElectronicsUnit.

3488 Table 195 shows all attributes of ExtPowerElectronicsUnit.

3489 **Table 195 – Attributes of ExtPowerShiftKey::ExtPowerElectronicsUnit**

name	mult	type	description
p	0..1	ActivePower	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution.
normalParticipationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\sum(PF)$. In the case of priority strategy, the item with the lowest number gets allocated energy first.
participationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\sum(PF)$. In the case of priority strategy, the item with the lowest number gets allocated energy first.
maxEconomicP	0..1	ActivePower	(NC) Maximum high economic active power limit, that should not exceed the maximum operating active power limit.
minEconomicP	0..1	ActivePower	(NC) Low economic active power limit that shall be greater than or equal to the minimum operating active power limit.

3490

3491 **3.10.12 (NC) ProportionalEnergyComponent**3492 Inheritance path = [EnergyComponent](#) : IdentifiedObject : ExtEuIdentifiedObject : Identity3493 Serves for grouping components within an energy group, with proportional energy allocation to
3494 all components.

3495 Table 196 shows all attributes of ProportionalEnergyComponent.

3496 **Table 196 – Attributes of ExtPowerShiftKey::ProportionalEnergyComponent**

name	mult	type	description
normalParticipationFactor	0..1	Float	(NC) Normal participation factor.
powerDuration	0..1	Duration	(NC) Duration for the active power.
p	0..1	ActivePower	(NC) The maximum active power that can be applied as part of this block order.
participationFactor	0..1	Float	(NC) Participation factor.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3497
3498 Table 197 shows all association ends of ProportionalEnergyComponent with other classes.3499 **Table 197 – Association ends of ExtPowerShiftKey::ProportionalEnergyComponent with**
3500 **other classes**

mult from	name	mult to	type	description
0..*	EnergyConsumer	0..1	EnergyConsumer	(NC) inherited from: EnergyComponent
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) inherited from: EnergyComponent
0..*	HydroPump	0..1	HydroPump	(NC) inherited from: EnergyComponent
0..*	PowerElectronicsUnit	0..1	PowerElectronicsUnit	(NC) inherited from: EnergyComponent
0..*	EnergyResourceGroupCapacity	0..1	EnergyResourceGroupCapacity	(NC) inherited from: EnergyComponent
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3501

3502 **3.10.13 (NC) EnergyKind enumeration**

3503 A broad classification of an energy resource according to its energy source, storage function,
3504 or consumption behaviour.

3505 Note: EnergyKind provides a high-level grouping suitable for scenario modelling, forecasting,
3506 capacity aggregation and reporting. It is intended to classify generation, storage and
3507 consumption using a common set of categories without representing detailed fuel, energy-
3508 source or technology classifications. More detailed classifications may be provided separately,

for example by an `EnergyResourceType` using externally defined energy-source or technology codes.

The classification may represent the origin of energy, such as hydro, solar or wind; an energy storage behaviour, such as battery or buffer; or the flexibility characteristics of consumption, such as time-shiftable or unconstrained consumption.

Table 198 shows all literals of EnergyKind.

Table 198 – Literals of ExtPowerShiftKey::EnergyKind

literal	value	description
hydroRunOfRiver		Hydropower using natural river flow with little or no storage, where generation mainly follows river discharge.
hydroReservoir		Hydropower based on reservoirs with significant storage, enabling dispatchable generation.
hydroPump		Pumped-storage hydropower operation where electrical energy is used to pump water to an elevated reservoir.
biomass		Generation based mainly on biomass fuels of biogenic origin, including solid, liquid and gaseous forms.
fossil		Generation based mainly on fossil fuels such as coal, oil, gas or other non-renewable combustible fuels.
geothermal		Generation based on geothermal heat from underground reservoirs.
marine		Generation based on marine energy sources such as tidal or wave power.
nuclear		Generation based on nuclear fission reactors of any type.
consumptionUncontrollable		Demand that is not directly controlled and is primarily driven by weather, behaviour or unmanaged processes.
consumptionTimeShift		Demand that can be shifted in time without significantly changing total energy over a defined period.
battery		Energy storage based on batteries, capable of charging from and discharging to the electrical system.
buffer		Consumption associated with storage-like buffers where energy can be shifted in time while broadly preserving total energy use.
solar		Generation or heat production based on solar energy, including photovoltaic and solar thermal technologies.
consumptionUnconstrained		Modelled demand assuming no explicit network or market constraints, used as an unconstrained reference load.
waste		Generation based on energy recovery from renewable or non-renewable waste streams.
wind		Generation based on wind energy using wind turbines on land or offshore.
other		Other.
chemicalElectrical		Conversion from chemical energy carriers to electrical energy, such as fuel cells or combustion of hydrogen-rich fuels.

literal	value	description
electricalChemical		Conversion from electrical energy into chemical energy carriers, such as electrolysis or power-to-gas.

3516

3517 **3.10.14 (NC) PowerShiftKeyKind enumeration**

3518 Kind of generating and load shift keys strategy.

3519 Table 199 shows all literals of PowerShiftKeyKind.

3520

Table 199 – Literals of ExtPowerShiftKey::PowerShiftKeyKind

literal	value	description
explicitInstruction		The distribution is done according to the individual participation factor on the unit.
explicitDistribution		The distribution is explicitly done according to the power shift key distribution in the power bid Schedule.
generatorsFlat		Flat adjustment, equal amount of power, on all active generators. e.g. 100 MW increase adjustment on 4 generators, it means that each of them get increased 25 MW, as long as no other constraints are violated.
consumptionsFlat		Flat adjustment, equal amount of power, on all active consumption units (Energy Consumers and Power Electronics like FlexibleEnergyUnit). e.g. 100 MW decrease adjustment on 4 loads, it means that each of them get reduced 25 MW, as long as no other constraints are violated.
generatorsPmax		The distribution is relative to the maximum p of the generator.
generatorsP		The distribution is based on the generators active power in the given case.
consumptionsP		The distribution is based on the consumptions active power in the given case.
generatorsAndConsumptionsP		The distribution is based on the generator and consumption active power in the given case.
generatorsRemainingCapacity		The distribution is based on the remaining capacity for generators in the given case.
nonConformLoadP		The distribution is based on the non conform load active power in the given case.
storageP		The distribution is based on the batteries and any operating hydro pumps active power in the given case.
storageFlat		Flat adjustment, equal amount of power, on all the batteries and any operating hydro pumps. e.g. 100 MW increase or decrease adjustment on 4 batteries, it means that each of them get increased or reduced 25 MW, as long as no other constraints are violated.
generatorsPmin		The distribution is relative to the minimum p of the generator.
generatorsUsedCapacity		The distribution is based on the used capacity, the difference between the minimum operation and operating p (GeneratingUnit.minOperatingP)

3521

3522 **3.10.15 (NC) PowerShiftKeyDistribution**

3523 Inheritance path = IdentifiedObject : ExtEuIdentifiedObject : Identity

3524 Distribution of the bid action on the power shift keys.

3525 Table 200 shows all attributes of PowerShiftKeyDistribution.

3526 **Table 200 – Attributes of ExtPowerShiftKey::PowerShiftKeyDistribution**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3527
3528 Table 201 shows all association ends of PowerShiftKeyDistribution with other classes.3529 **Table 201 – Association ends of ExtPowerShiftKey::PowerShiftKeyDistribution with**
3530 **other classes**

mult from	name	mult to	type	description
0..*	EnergyConsumer	0..1	EnergyConsumer	(NC) Energy consumers distribution for a given bid.
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) Generating unit distribution for a given bid.
0..*	HydroPump	0..1	HydroPump	(NC) Hydro pump distribution for a given bid.
0..1	PowerElectronicsUnit	0..*	PowerElectronicsUnit	(NC) Power electronics unit distribution for a given bid.
0..*	PowerBidSchedule	0..1	PowerBidSchedule	(NC) Power bid schedule for the given distribution.
0..1	PowerShiftKeySchedule	0..1	PowerShiftKeySchedule	(NC) Power Shift Key schedule in power shift key distribution.
0..*	PowerShiftKeyStrategy	0..1	PowerShiftKeyStrategy	(NC) Power Shift Key Strategy which has a Power Shift Key Distribution.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3531
3532 **3.10.16 (NC) PowerShiftKeyStrategy**

3533 Inheritance path = IdentifiedObject : ExtEuIdentifiedObject : Identity

3534 Strategy of the power shift key.

3535 Table 202 shows all attributes of PowerShiftKeyStrategy.

3536

Table 202 – Attributes of ExtPowerShiftKey::PowerShiftKeyStrategy

name	mult	type	description
powerShiftKey	0..1	PowerShiftKeyKind	(NC) Power shift keys strategy gives instruction on how the value (Active power) is going to be distributed inside the relevant bidding zone.
method	0..1	ShiftMethodKind	(NC) Shift method used for the power shift strategy.
participationFactor	0..1	Float	(NC) Participation factor describing the entities part of the power shift strategy. Must be a positive value.
enabled	0..1	Boolean	(NC) If true, the assessed element is enabled, otherwise it is disabled.
normalEnabled	0..1	Boolean	(NC) If true, the assessed element shall be considered under normal operating conditions.
normalParticipationFactor	0..1	Float	(NC) Normal participation factor describing the entities part of the power shift strategy. Must be a positive value.
powerBlockKind	0..1	PowerBlockKind	(NC) Power block kind creates block (one or more) of power shift key strategy to address increase and/or decrease of power for a given scheduling area.
dispatchableUnitOnly	0..1	Boolean	(NC) If true, only dispatchable units are included in the power shift key strategy. A unit is considered dispatchable if it is associated with an area dispatchable unit that is linked to the same scheduling area as the power shift key strategy. Exceptions are done for units that are included in explicit or distributed strategies.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3537

3538

Table 203 shows all association ends of PowerShiftKeyStrategy with other classes.

3539

Table 203 – Association ends of ExtPowerShiftKey::PowerShiftKeyStrategy with other classes

3540

mult from	name	mult to	type	description
0..*	SchedulingArea	0..1	SchedulingArea	(NC) Scheduling area associated with power shift key strategy.
0..1	PowerShiftKeyDistribution	0..*	PowerShiftKeyDistribution	(NC) Power Shift Key Distribution associated to this power shift key strategy.
0..*	PowerRemedialAction	0..1	PowerRemedialAction	(NC) Power remedial action which has power shift key strategy.
0..1	PowerFrequencyController	0..*	PowerFrequencyController	(NC) Power frequency controller that has power shift key strategy.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject

mult from	name	mult to	type	description
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3541

3542 **3.10.17 (NC) PowerBlockKind enumeration**

3543 Power block kind describes the increase and/or decrease of power.

3544 Table 204 shows all literals of PowerBlockKind.

3545 **Table 204 – Literals of ExtPowerShiftKey::PowerBlockKind**

literal	value	description
powerIncrease		Increase in the power. The block represents action for increased power.
powerDecrease		Decrease in the power. The block represents action for decreased power.
powerIncreaseAndDecrease		Increase and decrease in the power. The block represents action for increased and decreased power.

3546

3547 **3.10.18 (NC) MarketRegulationDirectionKind enumeration**

3548 Identifies the direction of activation or reserve provision for a market regulation product or instrument (e.g., aFRR, mFRR, FCR). It expresses how the service affects the system balance — by increasing or decreasing net generation or consumption.

3551 Table 205 shows all literals of MarketRegulationDirectionKind.

3552 **Table 205 – Literals of ExtPowerShiftKey::MarketRegulationDirectionKind**

literal	value	description
up		Regulation activation that increases the system's net power injection — achieved either by increasing generation or decreasing consumption. Used for up-regulation bids or activations.
down		Regulation activation that decreases the system's net power injection — achieved either by decreasing generation or increasing consumption. Used for down-regulation bids or activations.
upAndDown		Product or capacity symmetrical for both up- and down-regulation; the same magnitude applies in both directions. Common for bidirectional balancing services (e.g., symmetrical aFRR capacity).
stable		No activation or neutral position; used for capacity or reserve states that maintain stability without a directional effect (e.g., system in balanced or standby mode).

3553

3554 **3.10.19 (NC) BalancingReserveKind enumeration**

3555 Classification of the balancing reserve product represented by an AreaReserveResource. The kind identifies the reserve service for which the associated resource has been qualified and made available.

3557

3558 Table 206 shows all literals of BalancingReserveKind.

3559 **Table 206 – Literals of ExtPowerShiftKey::BalancingReserveKind**

literal	value	description
fcr		Frequency Containment Reserve (FCR). Automatically activated reserve that provides immediate frequency containment following small frequency deviations or disturbances.
aFRR		Automatic Frequency Restoration Reserve (aFRR). Automatically activated balancing reserve used to restore system frequency and scheduled interchanges under automatic generation control (AGC).
mFRR		Manual Frequency Restoration Reserve (mFRR). Manually activated balancing reserve used to restore system balance following activation by the system operator.

3560

3561 3.11 Impact assessment matrix extensions

3562 3.11.1 General

3563 This package contains the extensions related to the impact assessment matrix.

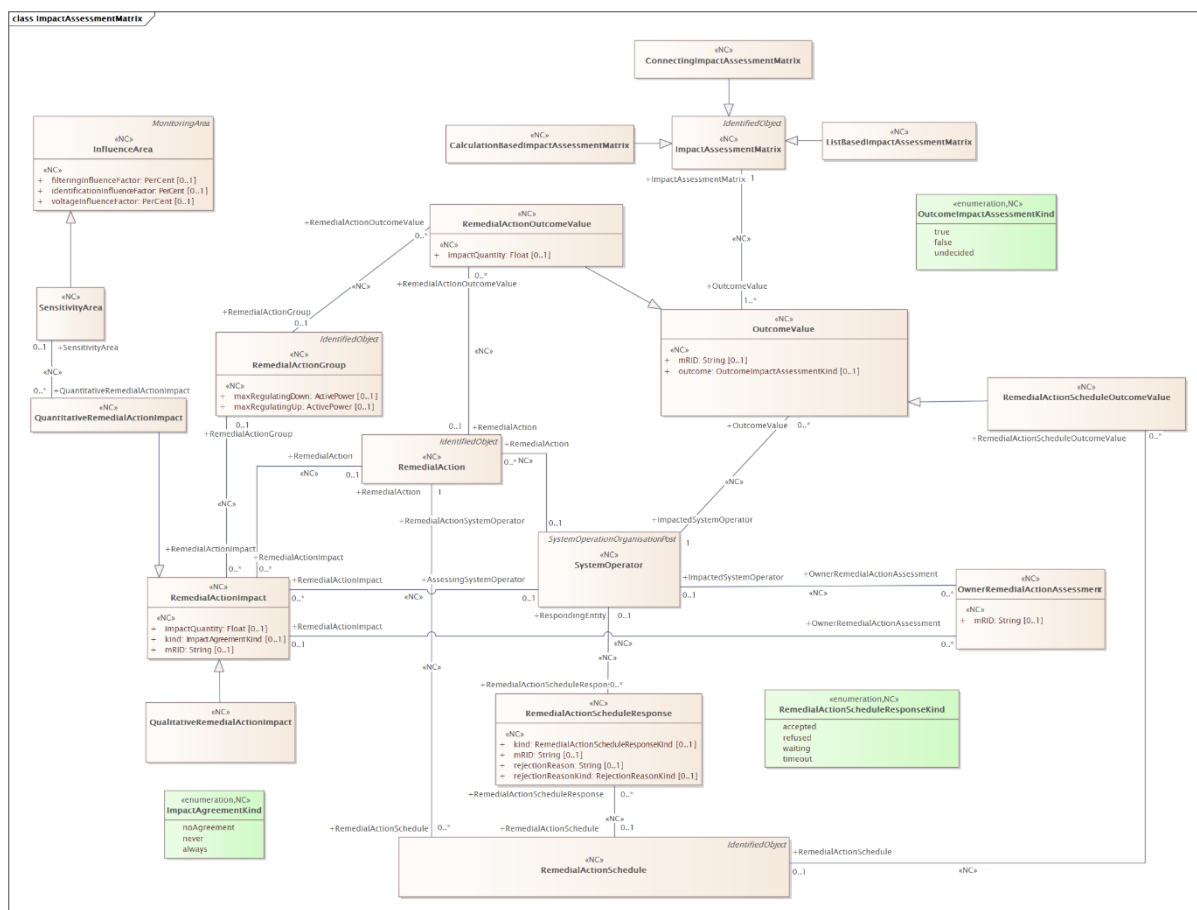


Figure 24 – Class diagram ExtlImpactAssessmentMatrix::ImpactAssessmentMatrix

3566 Figure 24: The diagram contains the classes related to the modelling of the impact assessment
3567 matrix.

3.11.2 (NC) CalculationBasedImpactAssessmentMatrix

Inheritance path = [ImpactAssessmentMatrix](#) : IdentifiedObject : ExtEuIdentifiedObject : Identity
Calculation based impact assessment matrix. It relates to the remedial action schedule.
Calculation-Based is the impact matrix determined by calculating the impact factors (eventually scaled by the intensity of the remedial action) and matching them against a threshold in a determined way described by the methodologies.

Table 207 shows all attributes of CalculationBasedImpactAssessmentMatrix.

**Table 207 – Attributes of
ExtImpactAssessmentMatrix::CalculationBasedImpactAssessmentMatrix**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 208 shows all association ends of CalculationBasedImpactAssessmentMatrix with other classes.

**Table 208 – Association ends of
ExtImpactAssessmentMatrix::CalculationBasedImpactAssessmentMatrix with other
classes**

mult from	name	mult to	type	description
1..1	OutcomeValue	1..*	OutcomeValue	(NC) inherited from: ImpactAssessmentMatrix
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.11.3 (NC) ConnectingImpactAssessmentMatrix

Inheritance path = [ImpactAssessmentMatrix](#) : IdentifiedObject : ExtEuIdentifiedObject : Identity
Connecting system operator matrix is the impact matrix indicating which system operators are connecting for that specific remedial action. The concept of connecting system operator for a remedial action is defined by CSAm Article 2.1(14).

Table 209 shows all attributes of ConnectingImpactAssessmentMatrix.

**Table 209 – Attributes of
ExtImpactAssessmentMatrix::ConnectingImpactAssessmentMatrix**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 210 shows all association ends of ConnectingImpactAssessmentMatrix with other classes.

Table 210 – Association ends of ExtImpactAssessmentMatrix::ConnectingImpactAssessmentMatrix with other classes

mult from	name	mult to	type	description
1..1	OutcomeValue	1..*	OutcomeValue	(NC) inherited from: ImpactAssessmentMatrix
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.11.4 (NC) ImpactAssessmentMatrix

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject : Identity

The result of an impact assessment analysis for each remedial action or remedial action schedule onto the grid and operation of each system operator.

Table 211 shows all attributes of ImpactAssessmentMatrix.

Table 211 – Attributes of ExtImpactAssessmentMatrix::ImpactAssessmentMatrix

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 212 shows all association ends of ImpactAssessmentMatrix with other classes.

Table 212 – Association ends of ExtImpactAssessmentMatrix::ImpactAssessmentMatrix with other classes

mult from	name	mult to	type	description
1..1	OutcomeValue	1..*	OutcomeValue	(NC) One of the values of the impact assessment matrix.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3608

3609 **3.11.5 (NC) ListBasedImpactAssessmentMatrix**3610 Inheritance path = [ImpactAssessmentMatrix](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

3611 List-Based is the impact matrix determined by agreement of the system operators involved.

3612 System operators jointly decide which Remedial Action (eventually scaled by the intensity of the remedial action) is impacting.

3614 Table 213 shows all attributes of ListBasedImpactAssessmentMatrix.

3615 **Table 213 – Attributes of**3616 **ExtImpactAssessmentMatrix::ListBasedImpactAssessmentMatrix**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3617

3618 Table 214 shows all association ends of ListBasedImpactAssessmentMatrix with other classes.

3619 **Table 214 – Association ends of**3620 **ExtImpactAssessmentMatrix::ListBasedImpactAssessmentMatrix with other classes**

mult from	name	mult to	type	description
1..1	OutcomeValue	1..*	OutcomeValue	(NC) inherited from: ImpactAssessmentMatrix
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3621

3622 **3.11.6 (NC) OutcomeValue root class**

3623 Outcome of an impact assessment matrix.

3624 Table 215 shows all attributes of OutcomeValue.

3625 **Table 215 – Attributes of ExtImpactAssessmentMatrix::OutcomeValue**

name	mult	type	description
outcome	0..1	OutcomeImpactAssessmentKind	(NC) Outcome value.
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an

name	mult	type	description
			exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

Table 216 shows all association ends of OutcomeValue with other classes.

Table 216 – Association ends of ExtImpactAssessmentMatrix::OutcomeValue with other classes

mult from	name	mult to	type	description
1..*	ImpactAssessmentMatrix	1..1	ImpactAssessmentMatrix	(NC) the impact assessment matrix which has this value.
0..*	ImpactedSystemOperator	1..1	SystemOperator	(NC) The impacted system operator that has an outcome value.

3.11.7 (NC) OwnerRemedialActionAssessment root class

Owner remedial action assessment of the impact of their remedial action on neighboring system operators.

Table 217 shows all attributes of OwnerRemedialActionAssessment.

Table 217 – Attributes of ExtImpactAssessmentMatrix::OwnerRemedialActionAssessment

name	mult	type	description
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

Table 218 shows all association ends of OwnerRemedialActionAssessment with other classes.

Table 218 – Association ends of ExtImpactAssessmentMatrix::OwnerRemedialActionAssessment with other classes

mult from	name	mult to	type	description
0..*	RemedialActionImpact	0..1	RemedialActionImpact	(NC) Remedial action impact which is evaluated by the owner of the remedial action.
0..*	ImpactedSystemOperator	0..1	SystemOperator	(NC) System operator that is evaluated to be impacted by the remedial action done by the remedial action owner.

3.11.8 (NC) RemedialActionOutcomeValue

Inheritance path = [OutcomeValue](#)

3644 Outcome of an impact assessment matrix for a remedial action.
3645 Table 219 shows all attributes of RemedialActionOutcomeValue.

3646 **Table 219 – Attributes of ExtImpactAssessmentMatrix::RemedialActionOutcomeValue**

name	mult	type	description
impactQuantity	0..1	Float	(NC) Delta, positive or negative, quantity that when it is applied to the remedial action, it will cause impact on a conducting equipment monitored by the assessed system operator. Example of relevant remedial action changes are redispatching, countertrading, change of set point on HVDC systems or change of taps on phase-shifting transformers.
outcome	0..1	OutcomeImpactAssessmentKind	(NC) inherited from: OutcomeValue
mRID	0..1	String	(NC) inherited from: OutcomeValue

3647
3648 Table 220 shows all association ends of RemedialActionOutcomeValue with other classes.

3649 **Table 220 – Association ends of**
3650 **ExtImpactAssessmentMatrix::RemedialActionOutcomeValue with other classes**

mult from	name	mult to	type	description
0..*	RemedialAction	0..1	RemedialAction	(NC) The remedial action that has a remedial action outcome value.
0..*	RemedialActionGroup	0..1	RemedialActionGroup	(NC) The remedial action group that has a remedial action group outcome value.
1..*	ImpactAssessmentMatrix	1..1	ImpactAssessmentMatrix	(NC) inherited from: OutcomeValue
0..*	ImpactedSystemOperator	1..1	SystemOperator	(NC) inherited from: OutcomeValue

3651
3652 **3.11.9 (NC) RemedialActionScheduleOutcomeValue**

3653 Inheritance path = [OutcomeValue](#)
3654 Outcome of an impact assessment matrix for a remedial action schedule.
3655 Table 221 shows all attributes of RemedialActionScheduleOutcomeValue.

3656 **Table 221 – Attributes of**
3657 **ExtImpactAssessmentMatrix::RemedialActionScheduleOutcomeValue**

name	mult	type	description
outcome	0..1	OutcomeImpactAssessmentKind	(NC) inherited from: OutcomeValue
mRID	0..1	String	(NC) inherited from: OutcomeValue

3658
3659 Table 222 shows all association ends of RemedialActionScheduleOutcomeValue with other
3660 classes.

**Table 222 – Association ends of
ExtImpactAssessmentMatrix::RemedialActionScheduleOutcomeValue with other
classes**

mult from	name	mult to	type	description
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) The remedial action schedule that has a remedial action schedule outcome value.
1..*	ImpactAssessmentMatrix	1..1	ImpactAssessmentMatrix	(NC) inherited from: OutcomeValue
0..*	ImpactedSystemOperator	1..1	SystemOperator	(NC) inherited from: OutcomeValue

3.11.10 (NC) OutcomeImpactAssessmentKind enumeration

Outcome impact assessments kinds.

Table 223 shows all literals of OutcomeImpactAssessmentKind.

Table 223 – Literals of ExtImpactAssessmentMatrix::OutcomeImpactAssessmentKind

literal	value	description
true		True.
false		False.
undecided		Undecided. Used only for list-based impact assessment matrix.

3.12 Package ExtPowerTransferCorridor

3.12.1 General

This package contains the extensions related to the power transfer corridor.

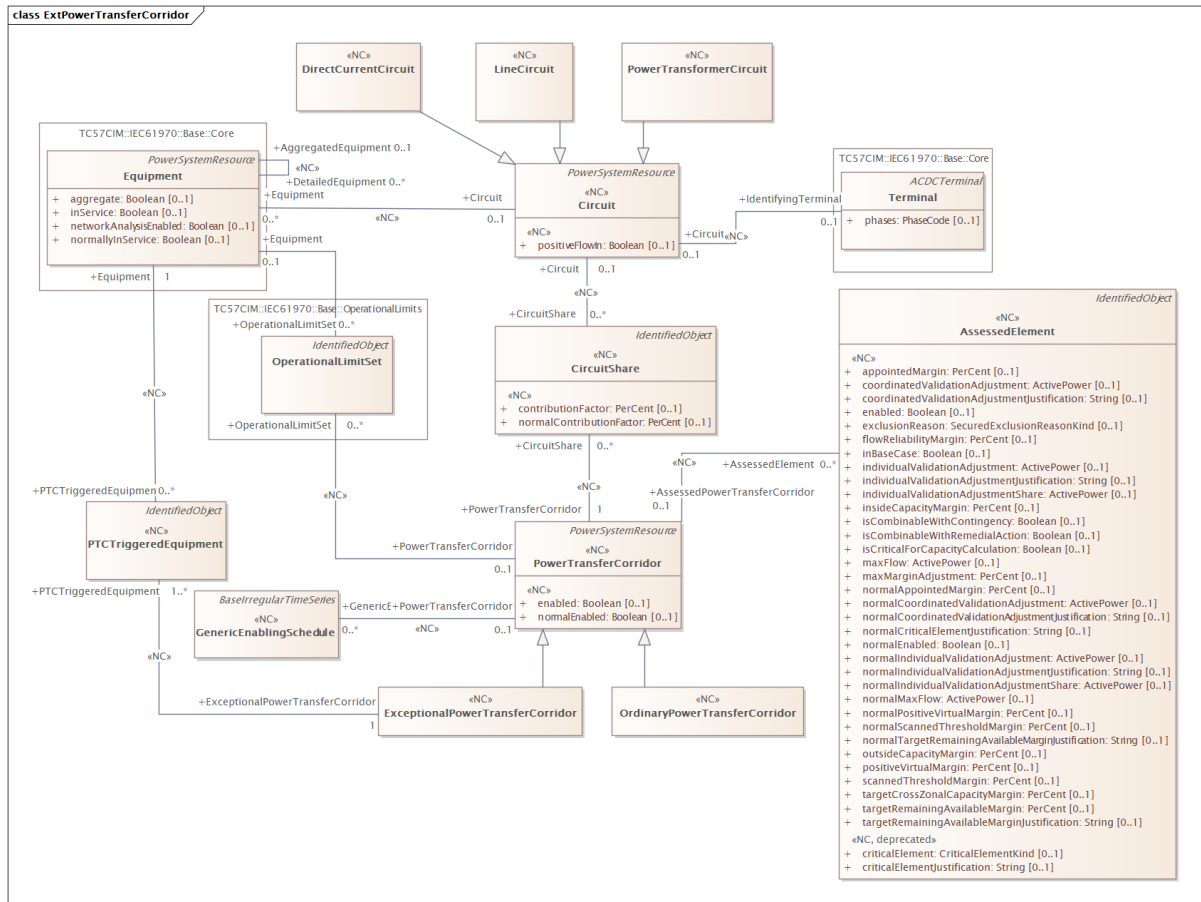


Figure 25 – Class diagram ExtPowerTransferCorridor::ExtPowerTransferCorridor

Figure 25: The diagram contains classes related to power transfer corridor.

3.12.2 (NC) Circuit

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity
A circuit is a collection of equipment in a network graph that provide common stability limits. The relevant equipment is in general given by the identifying terminal. A software application that can do topology processing shall calculate the equipment belonging to the circuit, if there are no stability limits associated to it. In case of stability limits, the containment reflects the equipments that were used in the calculation/analysis.
Table 224 shows all attributes of Circuit.

Table 224 – Attributes of ExtPowerTransferCorridor::Circuit

name	mult	type	description
positiveFlowIn	0..1	Boolean	(NC) True, if the positive value on the terminal shall be considered flow into the circuit. False, if the positive value on the terminal shall be considered flow out of the circuit.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 225 shows all association ends of Circuit with other classes.

Table 225 – Association ends of ExtPowerTransferCorridor::Circuit with other classes

mult from	name	mult to	type	description
0..1	Equipment	0..*	Equipment	(NC) The equipment which is part of the circuit. This includes all equipment related to the circuit (e.g. If the circuit is a transformer, the equipment could be all switching and auxiliary equipments related to the transformer). A BusbarSection shall not be part of the circuit.
0..1	IdentifyingTerminal	0..1	Terminal	(NC) Terminal that identifies the circuit.
0..1	CircuitShare	0..*	CircuitShare	(NC) The circuit share of the given power transfer corridor.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.12.3 (NC) CircuitShare

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

Defines the share of the circuit which is part of an associated power transfer corridor.

Table 226 shows all attributes of CircuitShare.

Table 226 – Attributes of ExtPowerTransferCorridor::CircuitShare

name	mult	type	description
contributionFactor	0..1	PerCent	(NC) Contribution factor for the circuit which is part of a power transfer corridor. The allowed value range is [0,100].
normalContributionFactor	0..1	PerCent	(NC) Normal contribution factor for the circuit which is part of a power transfer corridor. The allowed value range is [0,100].
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 227 shows all association ends of CircuitShare with other classes.

Table 227 – Association ends of ExtPowerTransferCorridor::CircuitShare with other classes

mult from	name	mult to	type	description
0..*	Circuit	0..1	Circuit	(NC) The circuit that has a share of the power system corridor.
0..*	PowerTransferCorridor	1..1	PowerTransferCorridor	(NC) The power transfer corridor that has this circuit share.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.12.4 (NC) ExceptionalPowerTransferCorridor

Inheritance path = [PowerTransferCorridor](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

Potential power transfer corridor that can be triggered by equipment which changes its in service status or it is operating in an island.

Table 228 shows all attributes of ExceptionalPowerTransferCorridor.

Table 228 – Attributes of ExtPowerTransferCorridor::ExceptionalPowerTransferCorridor

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: PowerTransferCorridor
normalEnabled	0..1	Boolean	(NC) inherited from: PowerTransferCorridor
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 229 shows all association ends of ExceptionalPowerTransferCorridor with other classes.

Table 229 – Association ends of ExtPowerTransferCorridor::ExceptionalPowerTransferCorridor with other classes

mult from	name	mult to	type	description
1..1	PTCTriggeredEquipment	1..*	PTCTriggeredEquipment	(NC) The equipment that triggers this exceptional power transfer corridor.

mult from	name	mult to	type	description
0..1	OperationalLimitSet	0..*	OperationalLimitSet	(NC) inherited from: PowerTransferCorridor
0..1	AssessedElement	0..*	AssessedElement	(NC) inherited from: PowerTransferCorridor
1..1	CircuitShare	0..*	CircuitShare	(NC) inherited from: PowerTransferCorridor
1..1	PTCActivePowerSupport	0..*	PTCActivePowerSupport	(NC) inherited from: PowerTransferCorridor
1..1	PinPowerTransferCorridor	0..*	PinPowerTransferCorridor	(NC) inherited from: PowerTransferCorridor
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: PowerTransferCorridor
0..1	PowerFlowResult	0..*	PowerFlowResult	inherited from: PowerTransferCorridor
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3710

3711 **3.12.5 (NC) LineCircuit**

3712 Inheritance path = [Circuit](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject :
 3713 Identity

3714 A line circuit is a circuit that has at least one ACLineSegment and may or may not include
 3715 related switching and/or auxiliary equipment.

3716 Table 230 shows all attributes of LineCircuit.

3717 **Table 230 – Attributes of ExtPowerTransferCorridor::LineCircuit**

name	mult	type	description
positiveFlowIn	0..1	Boolean	(NC) inherited from: Circuit
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3718

3719 Table 231 shows all association ends of LineCircuit with other classes.

Table 231 – Association ends of ExtPowerTransferCorridor::LineCircuit with other classes

mult from	name	mult to	type	description
0..1	Equipment	0..*	Equipment	(NC) inherited from: Circuit
0..1	IdentifyingTerminal	0..1	Terminal	(NC) inherited from: Circuit
0..1	CircuitShare	0..*	CircuitShare	(NC) inherited from: Circuit
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.12.6 (NC) OrdinaryPowerTransferCorridor

Inheritance path = [PowerTransferCorridor](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

Power transfer corridor defined for normal operating network.

Table 232 shows all attributes of OrdinaryPowerTransferCorridor.

Table 232 – Attributes of ExtPowerTransferCorridor::OrdinaryPowerTransferCorridor

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: PowerTransferCorridor
normalEnabled	0..1	Boolean	(NC) inherited from: PowerTransferCorridor
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 233 shows all association ends of OrdinaryPowerTransferCorridor with other classes.

Table 233 – Association ends of ExtPowerTransferCorridor::OrdinaryPowerTransferCorridor with other classes

mult from	name	mult to	type	description
0..1	OperationalLimitSet	0..*	OperationalLimitSet	(NC) inherited from: PowerTransferCorridor
0..1	AssessedElement	0..*	AssessedElement	(NC) inherited from: PowerTransferCorridor

mult from	name	mult to	type	description
1..1	CircuitShare	0..*	CircuitShare	(NC) inherited from: PowerTransferCorridor
1..1	PTCActivePowerSupport	0..*	PTCActivePowerSupport	(NC) inherited from: PowerTransferCorridor
1..1	PinPowerTransferCorridor	0..*	PinPowerTransferCorridor	(NC) inherited from: PowerTransferCorridor
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: PowerTransferCorridor
0..1	PowerFlowResult	0..*	PowerFlowResult	inherited from: PowerTransferCorridor
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3733

3734

3.12.7 (NC) PowerTransferCorridor

3735

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

3736

A power transfer corridor is defined as a set of circuits (transmission lines or transformers) separating two portions of the power system, or a subset of circuits exposed to a substantial portion of the transmission exchange between two parts of the system.

3737

3738

Table 234 shows all attributes of PowerTransferCorridor.

3739

3740

Table 234 – Attributes of ExtPowerTransferCorridor::PowerTransferCorridor

name	mult	type	description
enabled	0..1	Boolean	(NC) It enables/disables the monitoring/assessment of a power transfer corridor. True means that the monitoring of the power transfer corridor is assessed. False means the power transfer corridor is not assessed.
normalEnabled	0..1	Boolean	(NC) It is the normal enable/disable the monitoring/assessment of a power transfer corridor. True means that the monitoring of the power transfer corridor is assessed. False means the power transfer corridor is not assessed.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3741
3742 Table 235 shows all association ends of PowerTransferCorridor with other classes.
3743 **Table 235 – Association ends of ExtPowerTransferCorridor::PowerTransferCorridor with**
3744 **other classes**

mult from	name	mult to	type	description
0..1	OperationalLimitSet	0..*	OperationalLimitSet	(NC) The operational limit set relevant for this power transfer corridor.
0..1	AssessedElement	0..*	AssessedElement	(NC) The assessed element indicating that the power transfer corridor is assessed, i.e. monitored.
1..1	CircuitShare	0..*	CircuitShare	(NC) The circuit share for this power transfer corridor.
1..1	PTCActivePowerSupport	0..*	PTCActivePowerSupport	(NC) The active power capability associated with this PowerTransferCorridor.
1..1	PinPowerTransferCorridor	0..*	PinPowerTransferCorridor	(NC) The pin that uses this input.
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) Generic enabling schedule associated with a power transfer corridor.
0..1	PowerFlowResult	0..*	PowerFlowResult	Power result associated with the power transfer corridor.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3745
3746 **3.12.8 (NC) PowerTransformerCircuit**
3747 Inheritance path = [Circuit](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject :
3748 Identity
3749 A power transformer circuit is a circuit that has at least one PowerTransformer and may or may
3750 not include related switching and/or auxiliary equipment.
3751 Table 236 shows all attributes of PowerTransformerCircuit.

Table 236 – Attributes of ExtPowerTransferCorridor::PowerTransformerCircuit

name	mult	type	description
positiveFlowIn	0..1	Boolean	(NC) inherited from: Circuit
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
energyIdCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 237 shows all association ends of PowerTransformerCircuit with other classes.

Table 237 – Association ends of ExtPowerTransferCorridor::PowerTransformerCircuit with other classes

mult from	name	mult to	type	description
0..1	Equipment	0..*	Equipment	(NC) inherited from: Circuit
0..1	IdentifyingTerminal	0..1	Terminal	(NC) inherited from: Circuit
0..1	CircuitShare	0..*	CircuitShare	(NC) inherited from: Circuit
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.12.9 (NC) PTCTriggeredEquipment

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject : Identity

Power Transfer Corridor triggered equipment connects the equipment that will create the exceptional power transfer corridor when taking out of service. e.g. A system with three lines gets an exceptional power transfer corridor when one of the lines is taken out of service.

Table 238 shows all attributes of PTCTriggeredEquipment.

Table 238 – Attributes of ExtPowerTransferCorridor::PTCTriggeredEquipment

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 239 shows all association ends of PTCTriggeredEquipment with other classes.

Table 239 – Association ends of ExtPowerTransferCorridor::PTCTriggeredEquipment with other classes

mult from	name	mult to	type	description
0..*	Equipment	1..1	Equipment	(NC) The equipment which is part of power transfer corridor triggering.
1..*	ExceptionalPowerTransferCorridor	1..1	ExceptionalPowerTransferCorridor	(NC) The power transfer corridor which is triggered by this equipment.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.12.10 (NC) DirectCurrentCircuit

Inheritance path = [Circuit](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

A direct current circuit is a circuit consists of direct current equipment.

Table 240 shows all attributes of DirectCurrentCircuit.

Table 240 – Attributes of ExtPowerTransferCorridor::DirectCurrentCircuit

name	mult	type	description
positiveFlowIn	0..1	Boolean	(NC) inherited from: Circuit
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 241 shows all association ends of DirectCurrentCircuit with other classes.

Table 241 – Association ends of ExtPowerTransferCorridor::DirectCurrentCircuit with other classes

mult from	name	mult to	type	description
0..1	Equipment	0..*	Equipment	(NC) inherited from: Circuit
0..1	IdentifyingTerminal	0..1	Terminal	(NC) inherited from: Circuit
0..1	CircuitShare	0..*	CircuitShare	(NC) inherited from: Circuit
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject

3789 Table 242 shows all literals of GeothermalUnitKind.

3790 **Table 242 – Literals of ExtProduction::GeothermalUnitKind**

literal	value	description
binaryCycle		The moderately hot geothermal water is passed by a secondary fluid with a much lower boiling point than water.
drySteam		Uses geothermal steam of 150 degree Celsius or greater to turn turbines.
flashSteam		Pull deep, high-pressure hot water into lower-pressure tanks and use the resulting flashed steam to drive turbines.
other		Other type of geothermal generating unit.

3791

3792 3.13.3 (NC) MarineUnitKind enumeration

3793 Kind of marine energy capture.

3794 Table 243 shows all literals of MarineUnitKind.

3795 **Table 243 – Literals of ExtProduction::MarineUnitKind**

literal	value	description
currents		Capture energy from ocean current which are caused by forces like breaking waves, wind, coriolis effect etc.
pressure		Capture energy from pressure.
tidal		Capture energy from tidal power, which captures the energy of the current caused by the gravitational pull of the Sun and Moon.
wave		Capture energy from wind waves.
other		Other way of capture energy from marine elements.

3796

3797 3.13.4 (NC) NuclearReactorKind enumeration

3798 Kind of nuclear reactor.

3799 Table 244 shows all literals of NuclearReactorKind.

3800 **Table 244 – Literals of ExtProduction::NuclearReactorKind**

literal	value	description
breeder		Reactor whose heat source is a nuclear reactor that generates more fissile material than it consumes.
graphite		Reactor whose heat source is a graphite-moderated reactor that is a nuclear reactor that uses carbon as a neutron moderator, which allows natural uranium to be used as nuclear fuel.
heavyWater		Reactor whose heat source is a pressurized heavy-water reactor (PHWR) that uses heavy water (deuterium oxide D2O) as its coolant and neutron moderator.
lightWater		Reactor whose heat source is a light-water reactor (LWR) that is a type of thermal-neutron reactor that uses normal water, as both its

literal	value	description
		coolant and neutron moderator – furthermore a solid form of fissile elements is used as fuel.
liquidMetal		Reactor whose liquid metal cooled nuclear reactor, liquid metal fast reactor or LMFR is an advanced type of nuclear reactor where the primary coolant is a liquid metal.
other		Other type of nuclear reactors.

3801

3802 **3.13.5 (NC) PowerElectricalChemicalUnitKind enumeration**

3803 Kind of power electrical chemical unit.

3804 Table 245 shows all literals of PowerElectricalChemicalUnitKind.

3805 **Table 245 – Literals of ExtProduction::PowerElectricalChemicalUnitKind**

literal	value	description
electrolyticCell		An electrolytic cell is an electrochemical cell that drives a non-spontaneous redox reaction through the application of electrical energy. Example are the decomposition of water into hydrogen and oxygen.
fuelCell		A fuel cell is an electrochemical cell that converts the chemical energy from a fuel into electricity through an electrochemical reaction of hydrogen fuel with oxygen or another oxidizing agent.
other		Other type of cell used in chemical reactions.

3806

3807 **3.13.6 (NC) ElectricalChargingUnit**3808 Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource :
3809 IdentifiedObject : ExtEuIdentifiedObject : Identity : [ExtPowerElectronicsUnit](#)3810 A unit that supplies electrical power for charging electrical non-stationary entities, e.g. electrical
3811 vehicle, trucks, buses, ferries, boats and airplanes. The characteristic is that the energy
3812 consumption is highly schedule dependent.

3813 Table 246 shows all attributes of ElectricalChargingUnit.

3814 **Table 246 – Attributes of ExtProduction::ElectricalChargingUnit**

name	mult	type	description
maxP	0..1	ActivePower	inherited from: PowerElectronicsUnit
minP	0..1	ActivePower	inherited from: PowerElectronicsUnit
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

name	mult	type	description
p	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit
normalParticipationFactor	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
participationFactor	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
maxEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit
minEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit

Table 247 shows all association ends of ElectricalChargingUnit with other classes.

Table 247 – Association ends of ExtProduction::ElectricalChargingUnit with other classes

mult from	name	mult to	type	description
0..1	MobileElectricalUnit	0..*	MobileElectricalUnit	Mobile electrical unit that is part of the electrical charging unit.
0..*	PowerElectronicsConnection	1..1	PowerElectronicsConnection	inherited from: PowerElectronicsUnit
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.13.7 (NC) ExtNuclearGeneratingUnit root class

European Network Code extension of NuclearGeneratingUnit.

Table 248 shows all attributes of ExtNuclearGeneratingUnit.

Table 248 – Attributes of ExtProduction::ExtNuclearGeneratingUnit

name	mult	type	description
reactorKind	0..1	NuclearReactorKind	(NC) Kind of nuclear reactor.

3825 **3.13.8 (NC) ExtReservoir root class**

3826 EU Network Code extension of Reservoir.

3827 Table 249 shows all attributes of ExtReservoir.

3828 **Table 249 – Attributes of ExtProduction::ExtReservoir**

name	mult	type	description
energyStorage	0..1	RealEnergy	(NC) Amount of energy available in the storage.
normalEnergyStorage	0..1	RealEnergy	(NC) Normal amount of energy available in the storage.

3829

3830 **3.13.9 (NC) FlexibleEnergyUnit**3831 Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource :
3832 IdentifiedObject : ExtEuIdentifiedObject : Identity : [ExtPowerElectronicsUnit](#)

3833 Flexible consumer or embedded producer of energy. The unit cannot be a net producer.

3834 Table 250 shows all attributes of FlexibleEnergyUnit.

3835 **Table 250 – Attributes of ExtProduction::FlexibleEnergyUnit**

name	mult	type	description
uncontrollable	0..1	ActivePower	(NC) The active power, that forms the base consumption for the unit. This is measured and expected consumption. Load sign convention is used, i.e. positive sign means flow out from a node.
timeShift	0..1	ActivePower	(NC) The active power, that can be shifted from one pricing interval (market time unit) to another. It is expected to be a limited on the length of the shift. Example from household could be washing machine or dishwasher. Example from industry is the possible to shut down a machine for the relevant period. Load sign convention is used, i.e. positive sign means flow out from a node.
buffer	0..1	ActivePower	(NC) The active power, that has the flexibility to operate as production and/or consumption. The buffer is bound. Example are heat pump, cooling system, embedded batteries including electric vehicle. Load sign convention is used, i.e. positive sign means flow out from a node.
unconstrained	0..1	ActivePower	(NC) The active power, that has the flexibility to operate as production without any bound by a buffer. Example are alternative heating (wood, gas, diesel etc) or power generators. Load sign convention is used, i.e. positive sign means flow out from a node.
maxP	0..1	ActivePower	inherited from: PowerElectronicsUnit
minP	0..1	ActivePower	inherited from: PowerElectronicsUnit
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
p	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit
normalParticipationFactor	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
participationFactor	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
maxEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit
minEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit

Table 251 shows all association ends of FlexibleEnergyUnit with other classes.

Table 251 – Association ends of ExtProduction::FlexibleEnergyUnit with other classes

mult from	name	mult to	type	description
0..*	PowerElectronicsConnection	1..1	PowerElectronicsConnection	inherited from: PowerElectronicsUnit
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.13.10 (NC) FuelStorage

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity
 Fuel storage. e.g. pile of coal that can be shared between multiple thermal generating units.
 Table 252 shows all attributes of FuelStorage.

3844

Table 252 – Attributes of ExtProduction::FuelStorage

name	mult	type	description
energyStorage	0..1	RealEnergy	(NC) Amount of energy available in the storage.
normalEnergyStorage	0..1	RealEnergy	(NC) Normal amount of energy available in the storage.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3845

3846

Table 253 shows all association ends of FuelStorage with other classes.

3847

Table 253 – Association ends of ExtProduction::FuelStorage with other classes

mult from	name	mult to	type	description
0..1	FossilFuel	0..*	FossilFuel	(NC) Fossil fuel stored in a fuel storage.
0..1	FuelStorageSchedule	0..*	FuelStorageSchedule	(NC) The fuel storage schedule for this fuel storage.
0..1	FuelStorageRegularSchedule	0..*	FuelStorageRegularSchedule	(NC) The regular schedule for this fuel storage.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3848

3.13.11 (NC) GeothermalGeneratingUnit

Inheritance path = GeneratingUnit : Equipment : PowerSystemResource : IdentifiedObject :

ExtEulIdentifiedObject : Identity : [ExtGeneratingUnit](#)

Generating unit that is generating electrical power from geothermal energy.

Table 254 shows all attributes of GeothermalGeneratingUnit.

3854

Table 254 – Attributes of ExtProduction::GeothermalGeneratingUnit

name	mult	type	description
kind	0..1	GeothermalUnitKind	(NC) Kind of geothermal generating unit.
allocSpinResP	0..1	ActivePower	inherited from: GeneratingUnit
autoCntrlMarginP	0..1	ActivePower	inherited from: GeneratingUnit

name	mult	type	description
baseP	0..1	ActivePower	inherited from: GeneratingUnit
controlDeadband	0..1	ActivePower	inherited from: GeneratingUnit
controlPulseHigh	0..1	Seconds	inherited from: GeneratingUnit
controlPulseLow	0..1	Seconds	inherited from: GeneratingUnit
controlResponseRate	0..1	ActivePowerChangeRate	inherited from: GeneratingUnit
efficiency	0..1	PerCent	inherited from: GeneratingUnit
genControlMode	0..1	GeneratorControlMode	inherited from: GeneratingUnit
genControlSource	0..1	GeneratorControlSource	inherited from: GeneratingUnit
governorMPL	0..1	PU	inherited from: GeneratingUnit
governorSCD	0..1	PerCent	inherited from: GeneratingUnit
highControlLimit	0..1	ActivePower	inherited from: GeneratingUnit
initialP	0..1	ActivePower	inherited from: GeneratingUnit
longPF	0..1	Float	inherited from: GeneratingUnit
lowControlLimit	0..1	ActivePower	inherited from: GeneratingUnit
lowerRampRate	0..1	ActivePowerChangeRate	inherited from: GeneratingUnit
maxEconomicP	0..1	ActivePower	inherited from: GeneratingUnit
maximumAllowableSpinningReserve	0..1	ActivePower	inherited from: GeneratingUnit
maxOperatingP	0..1	ActivePower	inherited from: GeneratingUnit
minEconomicP	0..1	ActivePower	inherited from: GeneratingUnit
minimumOffTime	0..1	Seconds	inherited from: GeneratingUnit
minOperatingP	0..1	ActivePower	inherited from: GeneratingUnit
modelDetail	0..1	Classification	inherited from: GeneratingUnit
nominalP	0..1	ActivePower	inherited from: GeneratingUnit
normalPF	0..1	Float	inherited from: GeneratingUnit
penaltyFactor	0..1	Float	inherited from: GeneratingUnit
raiseRampRate	0..1	ActivePowerChangeRate	inherited from: GeneratingUnit
ratedGrossMaxP	0..1	ActivePower	inherited from: GeneratingUnit
ratedGrossMinP	0..1	ActivePower	inherited from: GeneratingUnit
ratedNetMaxP	0..1	ActivePower	inherited from: GeneratingUnit
shortPF	0..1	Float	inherited from: GeneratingUnit
startupCost	0..1	Money	inherited from: GeneratingUnit
startupTime	0..1	Seconds	inherited from: GeneratingUnit
tieLinePF	0..1	Float	inherited from: GeneratingUnit
totalEfficiency	0..1	PerCent	inherited from: GeneratingUnit
variableCost	0..1	Money	inherited from: GeneratingUnit
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
maxStartupLoad	0..1	ActivePower	(NC) inherited from: ExtGeneratingUnit
participationFactor	0..1	Float	(NC) inherited from: ExtGeneratingUnit
normalShutdownCost	0..1	Decimal	(NC) inherited from: ExtGeneratingUnit
shutdownTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
warmStartupTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
coolDownTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
warmStartupCost	0..1	Decimal	(NC) inherited from: ExtGeneratingUnit
startupRampRate	0..1	ActivePowerChangeRate	(NC) inherited from: ExtGeneratingUnit
normalMustRunP	0..1	ActivePower	(NC) inherited from: ExtGeneratingUnit
mustRunP	0..1	ActivePower	(NC) inherited from: ExtGeneratingUnit
runningLeadTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
minimumUpTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
normalStartupCost	0..1	Decimal	(NC) inherited from: ExtGeneratingUnit
normalWarmStartupCost	0..1	Decimal	(NC) inherited from: ExtGeneratingUnit
mustRunQ	0..1	ReactivePower	(NC) inherited from: ExtGeneratingUnit
normalMustRunQ	0..1	ReactivePower	(NC) inherited from: ExtGeneratingUnit
isRamping	0..1	Boolean	(NC) inherited from: ExtGeneratingUnit
rampLockTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
maxRampDownCountPerDay	0..1	Integer	(NC) inherited from: ExtGeneratingUnit
costCurrency	0..1	Currency	(NC) inherited from: ExtGeneratingUnit
shutdownCost	0..1	Decimal	(NC) inherited from: ExtGeneratingUnit
mustRun	0..1	Boolean	(NC) inherited from: ExtGeneratingUnit
normalParticipationFactor	0..1	Float	(NC) inherited from: ExtGeneratingUnit

Table 255 shows all association ends of GeothermalGeneratingUnit with other classes.

Table 255 – Association ends of ExtProduction::GeothermalGeneratingUnit with other classes

mult from	name	mult to	type	description
0..1	RotatingMachine	0..*	RotatingMachine	inherited from: GeneratingUnit
1..1	GenUnitOpCostCurves	0..*	GenUnitOpCostCurve	inherited from: GeneratingUnit
1..1	GenUnitOpSchedule	0..1	GenUnitOpSchedule	inherited from: GeneratingUnit
1..1	ControlAreaGeneratingUnit	0..*	ControlAreaGeneratingUnit	inherited from: GeneratingUnit

mult from	name	mult to	type	description
1..1	GrossToNetActivePower Curves	0..*	GrossToNetActivePower Curve	inherited from: GeneratingUnit
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3859

3860 **3.13.12 (NC) IndustryUnit**

3861 Inheritance path = GeneratingUnit : Equipment : PowerSystemResource : IdentifiedObject :
 3862 ExtEulIdentifiedObject : Identity : [ExtGeneratingUnit](#)

3863 An industrial energy conversion facility that primarily consumes electrical energy for mechanical
 3864 processes, typically involving large rotating machines (e.g., motors, compressors, pumps, or
 3865 mills).

3866 The IndustryUnit may represent one or more concrete machine installations or an equivalent
 3867 aggregated model of an industrial process.

3868 Table 256 shows all attributes of IndustryUnit.

3869

Table 256 – Attributes of ExtProduction::IndustryUnit

name	mult	type	description
allocSpinResP	0..1	ActivePower	inherited from: GeneratingUnit
autoCntrlMarginP	0..1	ActivePower	inherited from: GeneratingUnit
baseP	0..1	ActivePower	inherited from: GeneratingUnit
controlDeadband	0..1	ActivePower	inherited from: GeneratingUnit
controlPulseHigh	0..1	Seconds	inherited from: GeneratingUnit
controlPulseLow	0..1	Seconds	inherited from: GeneratingUnit
controlResponseRate	0..1	ActivePowerChangeRate	inherited from: GeneratingUnit
efficiency	0..1	PerCent	inherited from: GeneratingUnit
genControlMode	0..1	GeneratorControlMode	inherited from: GeneratingUnit

name	mult	type	description
genControlSource	0..1	GeneratorControlSource	inherited from: GeneratingUnit
governorMPL	0..1	PU	inherited from: GeneratingUnit
governorSCD	0..1	PerCent	inherited from: GeneratingUnit
highControlLimit	0..1	ActivePower	inherited from: GeneratingUnit
initialIP	0..1	ActivePower	inherited from: GeneratingUnit
longPF	0..1	Float	inherited from: GeneratingUnit
lowControlLimit	0..1	ActivePower	inherited from: GeneratingUnit
lowerRampRate	0..1	ActivePowerChangeRate	inherited from: GeneratingUnit
maxEconomicP	0..1	ActivePower	inherited from: GeneratingUnit
maximumAllowableSpinningReserve	0..1	ActivePower	inherited from: GeneratingUnit
maxOperatingP	0..1	ActivePower	inherited from: GeneratingUnit
minEconomicP	0..1	ActivePower	inherited from: GeneratingUnit
minimumOffTime	0..1	Seconds	inherited from: GeneratingUnit
minOperatingP	0..1	ActivePower	inherited from: GeneratingUnit
modelDetail	0..1	Classification	inherited from: GeneratingUnit
nominalP	0..1	ActivePower	inherited from: GeneratingUnit
normalPF	0..1	Float	inherited from: GeneratingUnit
penaltyFactor	0..1	Float	inherited from: GeneratingUnit
raiseRampRate	0..1	ActivePowerChangeRate	inherited from: GeneratingUnit
ratedGrossMaxP	0..1	ActivePower	inherited from: GeneratingUnit
ratedGrossMinP	0..1	ActivePower	inherited from: GeneratingUnit
ratedNetMaxP	0..1	ActivePower	inherited from: GeneratingUnit
shortPF	0..1	Float	inherited from: GeneratingUnit
startupCost	0..1	Money	inherited from: GeneratingUnit
startupTime	0..1	Seconds	inherited from: GeneratingUnit
tieLinePF	0..1	Float	inherited from: GeneratingUnit
totalEfficiency	0..1	PerCent	inherited from: GeneratingUnit
variableCost	0..1	Money	inherited from: GeneratingUnit
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
maxStartupLoad	0..1	ActivePower	(NC) inherited from: ExtGeneratingUnit

name	mult	type	description
participationFactor	0..1	Float	(NC) inherited from: ExtGeneratingUnit
normalShutdownCost	0..1	Decimal	(NC) inherited from: ExtGeneratingUnit
shutdownTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
warmStartupTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
coolDownTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
warmStartupCost	0..1	Decimal	(NC) inherited from: ExtGeneratingUnit
startupRampRate	0..1	ActivePowerChangeRate	(NC) inherited from: ExtGeneratingUnit
normalMustRunP	0..1	ActivePower	(NC) inherited from: ExtGeneratingUnit
mustRunP	0..1	ActivePower	(NC) inherited from: ExtGeneratingUnit
runningLeadTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
minimumUpTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
normalStartupCost	0..1	Decimal	(NC) inherited from: ExtGeneratingUnit
normalWarmStartupCost	0..1	Decimal	(NC) inherited from: ExtGeneratingUnit
mustRunQ	0..1	ReactivePower	(NC) inherited from: ExtGeneratingUnit
normalMustRunQ	0..1	ReactivePower	(NC) inherited from: ExtGeneratingUnit
isRamping	0..1	Boolean	(NC) inherited from: ExtGeneratingUnit
rampLockTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
maxRampDownCountPerDay	0..1	Integer	(NC) inherited from: ExtGeneratingUnit
costCurrency	0..1	Currency	(NC) inherited from: ExtGeneratingUnit
shutdownCost	0..1	Decimal	(NC) inherited from: ExtGeneratingUnit
mustRun	0..1	Boolean	(NC) inherited from: ExtGeneratingUnit
normalParticipationFactor	0..1	Float	(NC) inherited from: ExtGeneratingUnit

Table 257 shows all association ends of IndustryUnit with other classes.

Table 257 – Association ends of ExtProduction::IndustryUnit with other classes

mult from	name	mult to	type	description
0..1	NonConformLoad	0..1	NonConformLoad	(NC) The non conform load that for the industry unit.
0..1	RotatingMachine	0..*	RotatingMachine	inherited from: GeneratingUnit
1..1	GenUnitOpCostCurves	0..*	GenUnitOpCostCurve	inherited from: GeneratingUnit
1..1	GenUnitOpSchedule	0..1	GenUnitOpSchedule	inherited from: GeneratingUnit
1..1	ControlAreaGeneratingUnit	0..*	ControlAreaGeneratingUnit	inherited from: GeneratingUnit
1..1	GrossToNetActivePowerCurves	0..*	GrossToNetActivePowerCurve	inherited from: GeneratingUnit
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment

mult from	name	mult to	type	description
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3873

3874 **3.13.13 (NC) PowerElectricalChemicalUnit**

3875 Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource :

3876 IdentifiedObject : ExtEulIdentifiedObject : Identity : [ExtPowerElectronicsUnit](#)

3877 A unit capable of either generating electrical energy from chemical reactions or using electrical energy to cause chemical reactions.

3879 Table 258 shows all attributes of PowerElectricalChemicalUnit.

3880 **Table 258 – Attributes of ExtProduction::PowerElectricalChemicalUnit**

name	mult	type	description
kind	0..1	PowerElectricalChemicalUnitKind	(NC) Kind of power electrical chemical unit.
maxP	0..1	ActivePower	inherited from: PowerElectronicsUnit
minP	0..1	ActivePower	inherited from: PowerElectronicsUnit
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
p	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit
normalParticipationFactor	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
participationFactor	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit

name	mult	type	description
maxEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit
minEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit

Table 259 shows all association ends of PowerElectricalChemicalUnit with other classes.

Table 259 – Association ends of ExtProduction::PowerElectricalChemicalUnit with other classes

mult from	name	mult to	type	description
0..*	PowerElectronicsConnection	1..1	PowerElectronicsConnection	inherited from: PowerElectronicsUnit
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.13.14 (NC) PowerElectronicsMarineUnit

Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity : [ExtPowerElectronicsUnit](#)

A unit that capture energy from marine sources, e.g. waves, for generating electrical power.

Table 260 shows all attributes of PowerElectronicsMarineUnit.

Table 260 – Attributes of ExtProduction::PowerElectronicsMarineUnit

name	mult	type	description
kind	0..1	MarineUnitKind	(NC) Kind of marine unit.
maxP	0..1	ActivePower	inherited from: PowerElectronicsUnit
minP	0..1	ActivePower	inherited from: PowerElectronicsUnit
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment

name	mult	type	description
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
p	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit
normalParticipationFactor	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
participationFactor	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
maxEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit
minEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit

Table 261 shows all association ends of PowerElectronicsMarineUnit with other classes.

Table 261 – Association ends of ExtProduction::PowerElectronicsMarineUnit with other classes

mult from	name	mult to	type	description
0..*	PowerElectronicsConnection	1..1	PowerElectronicsConnection	inherited from: PowerElectronicsUnit
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3897 3.14 Remedial action extensions

3898 **3.14.1 General**

3899 This package contains the extensions related to the remedial action.

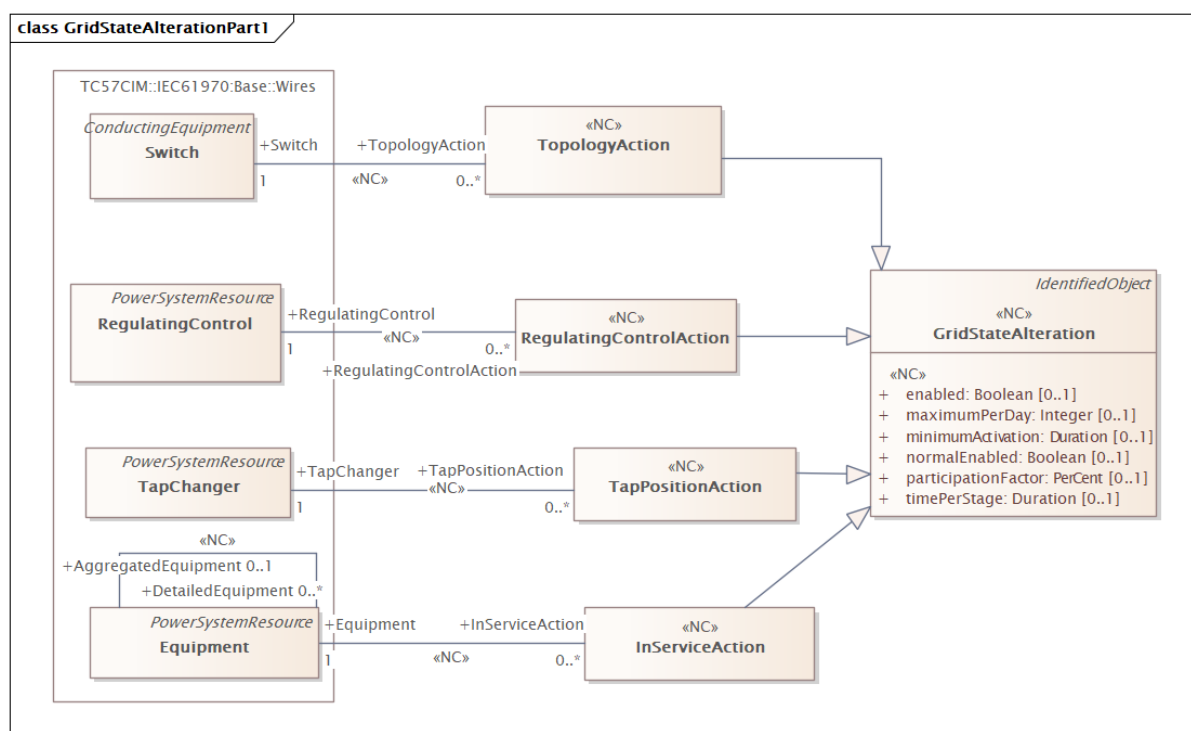


Figure 27 – Class diagram ExtRemedialAction::GridStateAlterationPart1

Figure 27: This diagram contains extended classes for the purpose of the remedial action data exchange.

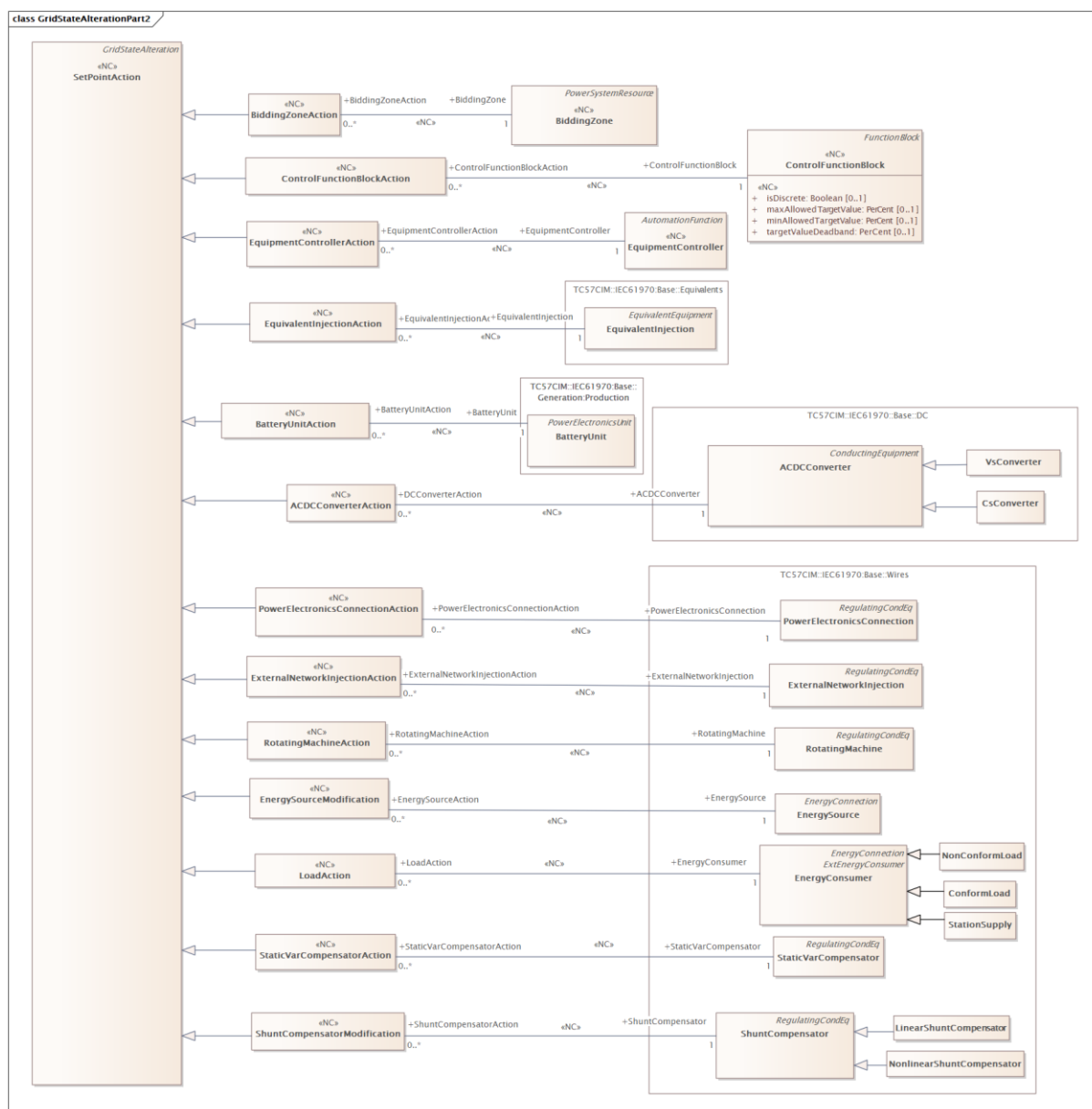


Figure 28 – Class diagram ExtRemedialAction::GridStateAlterationPart2

Figure 28: This diagram contains extended classes for the purpose of the remedial action data exchange.

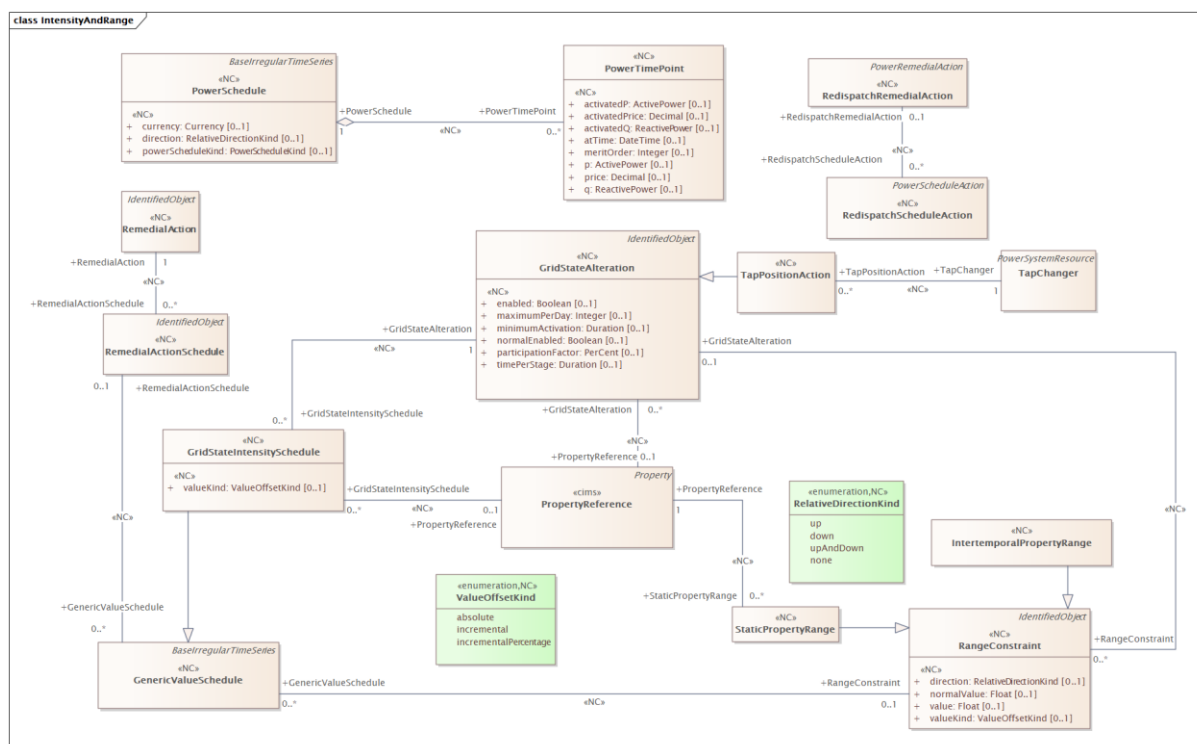


Figure 29 – Class diagram ExtRemedialAction::IntensityAndRange

Figure 29: This diagram contains extended classes related to the modelling of static, dynamic ranges and intensity.

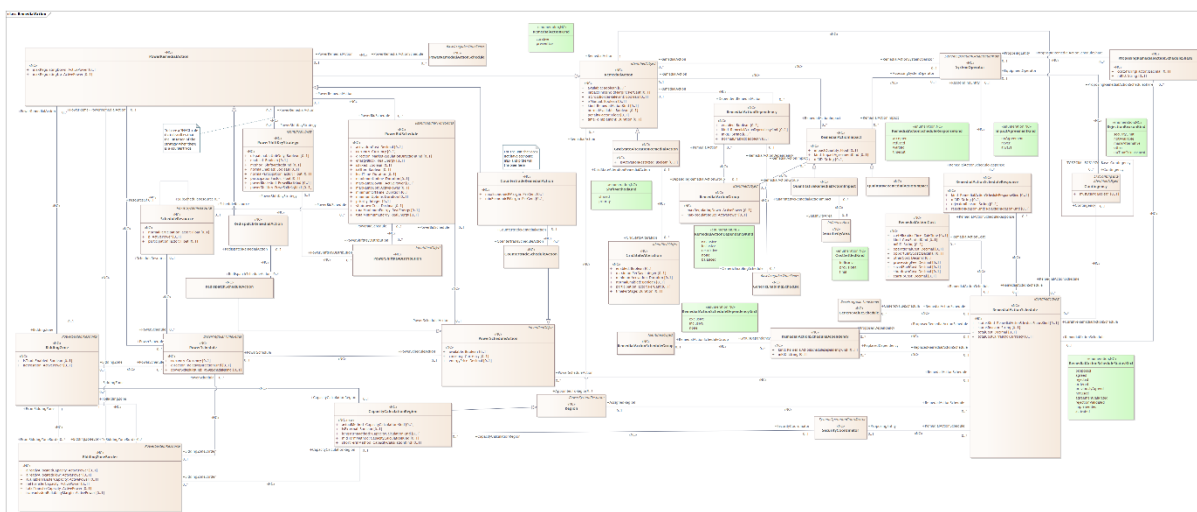


Figure 30 – Class diagram ExtRemedialAction::RemedialAction

Figure 30: The diagram contains main classes related to the remedial action.

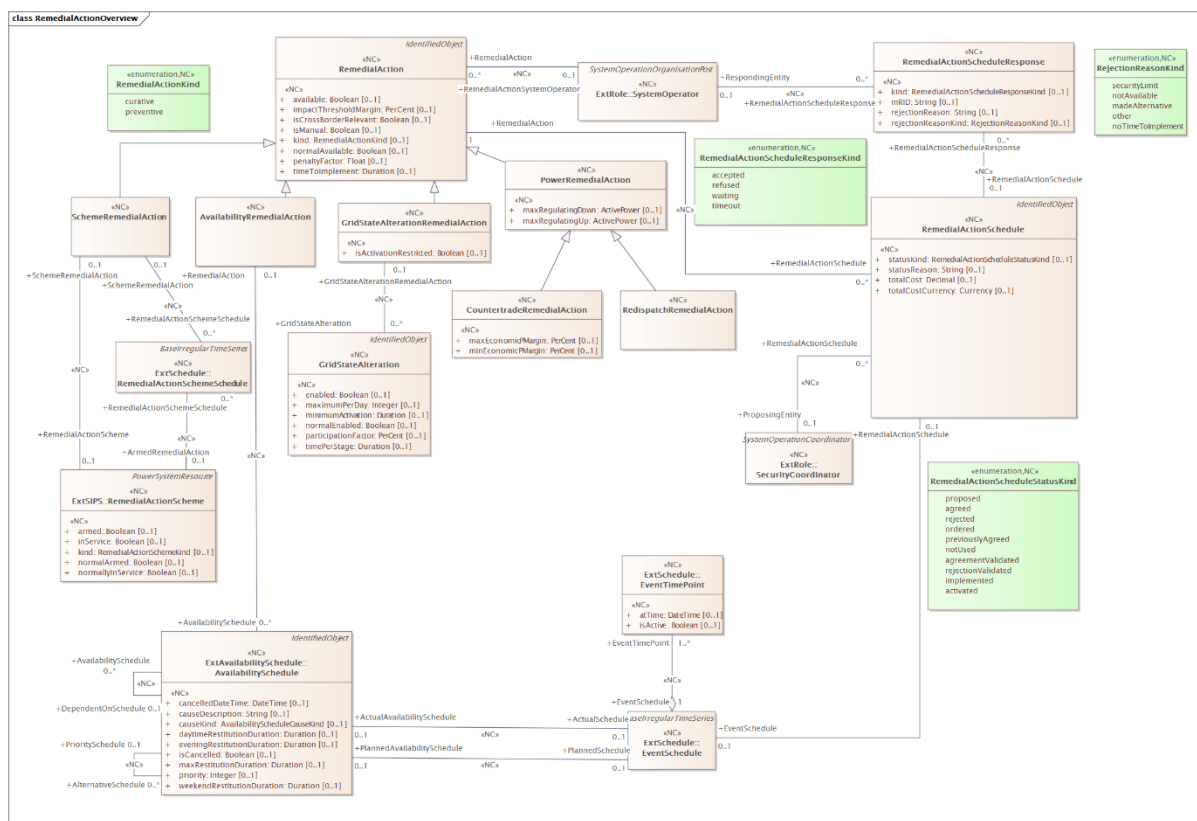


Figure 31 – Class diagram ExtRemedialAction::RemedialActionOverview

The diagram is an overview of the remedial action related extensions.

3.14.2 (NC) CostSettledKind enumeration

Kind describing how settled the cost is in regards to changes.

Table 262 shows all literals of CostSettledKind.

Table 262 – Literals of ExtRemedialAction::CostSettledKind

literal	value	description
indicative		Indicative cost.
provisional		Provisional cost.
final		Final cost. For instance, the cost is not expected to be changed on a later stage.

3.14.3 (NC) ImpactAgreementKind enumeration

The impact agreement for the remedial action.

Table 263 shows all literals of ImpactAgreementKind.

Table 263 – Literals of ExtRemedialAction::ImpactAgreementKind

literal	value	description
noAgreement		No agreement is reached on the qualitative impact of a remedial action.
never		An agreement is reached that a remedial action is never impacting.

literal	value	description
always		An agreement is reached that the remedial action is always impacting whichever the intensity.

3927

3928 **3.14.4 (deprecated,NC) BidDirectionKind enumeration**

3929 Kind of direction of the bid.

3930 Table 264 shows all literals of BidDirectionKind.

3931 **Table 264 – Literals of ExtRemedialAction::BidDirectionKind**

literal	value	description
up		Up signifies that the available power can be used by the purchasing area to increase energy.
down		Down signifies that the available power can be used by the purchasing area to decrease energy.
upAndDown		Up and down signifies that both up and down values are equal.
stable		The direction at a given instant in time is considered to be stable.

3932

3933 **3.14.5 (NC) RelativeDirectionKind enumeration**

3934 Kind of direction for the changes.

3935 Table 265 shows all literals of RelativeDirectionKind.

3936 **Table 265 – Literals of ExtRemedialAction::RelativeDirectionKind**

literal	value	description
up		Up signifies that the changes are increasing from the current status.
down		Down signifies that the changes are decreasing from the current status.
upAndDown		Up and down signifies that both up and down values are equal.
none		There is no direction on the changes.

3937

3938 **3.14.6 (NC) RemedialActionScheduleResponseKind enumeration**

3939 The kind of response for a remedial action schedule.

3940 Table 266 shows all literals of RemedialActionScheduleResponseKind.

3941 **Table 266 – Literals of ExtRemedialAction::RemedialActionScheduleResponseKind**

literal	value	description
accepted		The acceptance of remedial action schedule is concluded and accepted.
refused		The acceptance of the remedial action schedule is concluded and refused.
waiting		The acceptance of the remedial action schedule is waiting (in progress).
timeout		The acceptance of the remedial action schedule was not completed due to timeout.

3942

3943 **3.14.7 (NC) RemedialActionKind enumeration**

3944 The different kinds for a remedial action.

3945 Table 267 shows all literals of RemedialActionKind.

3946 **Table 267 – Literals of ExtRemedialAction::RemedialActionKind**

literal	value	description
curative		Curative remedial action means a remedial action that is the result of an operational planning process and is activated straight subsequent to the occurrence of the respective contingency for compliance with the (N-1) criterion, taking into account transitory admissible overloads and their accepted duration.
preventive		Preventive remedial action means a remedial action that is the result of an operational planning process and needs to be activated prior to the investigated timeframe for compliance with the (N-1) criterion.

3947

3948 **3.14.8 (NC) RemedialActionScheduleStatusKind enumeration**

3949 Remedial action schedule status kinds.

3950 Table 268 shows all literals of RemedialActionScheduleStatusKind.

3951 **Table 268 – Literals of ExtRemedialAction::RemedialActionScheduleStatusKind**

literal	value	description
proposed		Proposed remedial action schedule.
agreed		Agreed remedial action schedule.
rejected		Rejected remedial action schedule.
ordered		Ordered remedial action schedule.
previouslyAgreed		Previously agreed remedial action schedule.
notUsed		Not used remedial action schedule.
agreementValidated		The agreement is validated for the remedial action schedule.
rejectionValidated		The rejection is validated for the remedial action schedule.
implemented		An ordered remedial action is implemented.
activated		Activated remedial action schedule.

3952

3953 **3.14.9 (NC) ValueOffsetKind enumeration**

3954 The kind of the value offset.

3955 Table 269 shows all literals of ValueOffsetKind.

3956 **Table 269 – Literals of ExtRemedialAction::ValueOffsetKind**

literal	value	description
absolute		Value of the range constraint is replacing the attribute value referenced by the PropertyReference in a determined operational scenario.
incremental		Value of the range constraint is incrementing the attribute value referenced by the

literal	value	description
		PropertyReference in a determined operational scenario.
incrementalPercentage		Value of the range constraint is incrementing in percentage the attribute value referenced by the PropertyReference in a determined operational scenario.

3957

3958 **3.14.10 (NC) ACDCConverterAction**

3959 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :
 3960 ExtEulIdentifiedObject : Identity

3961 Alternate current Direct current (ACDC) converter action.

3962 Table 270 shows all attributes of ACDCConverterAction.

3963 **Table 270 – Attributes of ExtRemedialAction::ACDCConverterAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3964

3965 Table 271 shows all association ends of ACDCConverterAction with other classes.

3966 **Table 271 – Association ends of ExtRemedialAction::ACDCConverterAction with other**
 3967 **classes**

mult from	name	mult to	type	description
0..*	ACDCConverter	1..1	ACDCConverter	(NC) The ACDCConverter that is associated with an action.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration

mult from	name	mult to	type	description
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) inherited from: GridStateAlterationSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3968

3969 **3.14.11 (NC) AvailabilityRemedialAction**3970 Inheritance path = [RemedialAction](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

3971 Availability remedial action is a remedial action that cancels or reschedules an availability schedule.

3972 Table 272 shows all attributes of AvailabilityRemedialAction.

3974 **Table 272 – Attributes of ExtRemedialAction::AvailabilityRemedialAction**

name	mult	type	description
available	0..1	Boolean	(NC) inherited from: RemedialAction
kind	0..1	RemedialActionKind	(NC) inherited from: RemedialAction
penaltyFactor	0..1	Float	(NC) inherited from: RemedialAction
isCrossBorderRelevant	0..1	Boolean	(NC) inherited from: RemedialAction
isManual	0..1	Boolean	(NC) inherited from: RemedialAction
timeToImplement	0..1	Duration	(NC) inherited from: RemedialAction
normalAvailable	0..1	Boolean	(NC) inherited from: RemedialAction
impactThresholdMargin	0..1	PerCent	(NC) inherited from: RemedialAction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

3975

3976 Table 273 shows all association ends of AvailabilityRemedialAction with other classes.

3977 **Table 273 – Association ends of ExtRemedialAction::AvailabilityRemedialAction with other classes**

3978

mult from	name	mult to	type	description
0..1	AvailabilitySchedule	0..*	AvailabilitySchedule	(NC) Availability schedule that is part of the remedial action.
0..1	ContingencyWithRemedialAction	0..*	ContingencyWithRemedialAction	(NC) inherited from: RemedialAction
1..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) inherited from: RemedialAction

mult from	name	mult to	type	description
0..1	DependentRemedialAction	0..*	RemedialActionDependency	(NC) inherited from: RemedialAction
0..1	GenericAvailableSchedule	0..*	GenericAvailableSchedule	(NC) inherited from: RemedialAction
0..*	ImpactedOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToRegion	0..1	Region	(NC) inherited from: RemedialAction
0..1	AssessedElementWithRemedialAction	0..*	AssessedElementWithRemedialAction	(NC) inherited from: RemedialAction
0..1	RemedialActionOutcomeValue	0..*	RemedialActionOutcomeValue	(NC) inherited from: RemedialAction
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: RemedialAction
0..*	RemedialActionSystemOperator	0..1	SystemOperator	(NC) inherited from: RemedialAction
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) inherited from: RemedialAction
1..1	RemedialActionApplied	0..*	RemedialActionApplied	(NC) inherited from: RemedialAction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3979

3980 **3.14.12 (NC) BatteryUnitAction**3981 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :

3982 ExtEulIdentifiedObject : Identity

3983 Battery unit setpoint action.

3984 Table 274 shows all attributes of BatteryUnitAction.

3985 **Table 274 – Attributes of ExtRemedialAction::BatteryUnitAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
identifier	0..1	NullCIM	inherited from: Identity

Table 275 shows all association ends of BatteryUnitAction with other classes.

Table 275 – Association ends of ExtRemedialAction::BatteryUnitAction with other classes

mult from	name	mult to	type	description
0..*	BatteryUnit	1..1	BatteryUnit	(NC) The BatteryUnit that is associated with an action.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.14.13 (NC) CountertradeRemedialAction

Inheritance path = [PowerRemedialAction](#) : [RemedialAction](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Countertrade is a remedial action to relieve physical congestions where the location of activated resources within the bidding zone is not known.

Table 276 shows all attributes of CountertradeRemedialAction.

Table 276 – Attributes of ExtRemedialAction::CountertradeRemedialAction

name	mult	type	description
maxEconomicPMargin	0..1	PerCent	(NC) High economic active power limit given by the percentage of the relevant units operating p. e.g. If a generating unit (G1) with maximum operating active power of 100 MW and a conform load with active maximum load of 50 MW (L1). Max economic p margin of 90% will give the limit of the shift key to be 90 MW for the G1 and 45 MW for the L1. The allowed value range is [0,100].
minEconomicPMargin	0..1	PerCent	(NC) Low economic active power limit given by the percentage of the relevant units operating p. e.g. If a generating unit (G1) with minimum operating active power of 10 MW and a conform load with active maximum load of 5 MW (L1).

name	mult	type	description
			Min economic p margin of 90% will give the limit of the shift key to be 11 MW for the G1 and 5.5 MW for the L1. The allowed value range is [0,100].
maxRegulatingDown	0..1	ActivePower	(NC) inherited from: PowerRemedialAction
maxRegulatingUp	0..1	ActivePower	(NC) inherited from: PowerRemedialAction
available	0..1	Boolean	(NC) inherited from: RemedialAction
kind	0..1	RemedialActionKind	(NC) inherited from: RemedialAction
penaltyFactor	0..1	Float	(NC) inherited from: RemedialAction
isCrossBorderRelevant	0..1	Boolean	(NC) inherited from: RemedialAction
isManual	0..1	Boolean	(NC) inherited from: RemedialAction
timeToImplement	0..1	Duration	(NC) inherited from: RemedialAction
normalAvailable	0..1	Boolean	(NC) inherited from: RemedialAction
impactThresholdMargin	0..1	PerCent	(NC) inherited from: RemedialAction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 277 shows all association ends of CountertradeRemedialAction with other classes.

Table 277 – Association ends of ExtRemedialAction::CountertradeRemedialAction with other classes

mult from	name	mult to	type	description
0..1	CountertradeScheduleAction	0..*	CountertradeScheduleAction	(NC) Countertrade schedule action which belongs to a countertrade remedial action.
0..*	BiddingZone	0..1	BiddingZone	(NC) inherited from: PowerRemedialAction
0..*	BiddingZoneBorder	0..1	BiddingZoneBorder	(NC) inherited from: PowerRemedialAction
0..1	PowerShiftKeyStrategy	0..*	PowerShiftKeyStrategy	(NC) inherited from: PowerRemedialAction
0..1	PowerBidSchedule	0..*	PowerBidSchedule	(NC) inherited from: PowerRemedialAction
0..1	PowerRemedialActionSchedule	0..*	PowerRemedialActionSchedule	(NC) inherited from: PowerRemedialAction
0..1	PowerSchedule	0..*	PowerSchedule	(NC) inherited from: PowerRemedialAction
0..1	ContingencyWithRemedialAction	0..*	ContingencyWithRemedialAction	(NC) inherited from: RemedialAction
1..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) inherited from: RemedialAction

mult from	name	mult to	type	description
0..1	DependentRemedialAction	0..*	RemedialActionDependency	(NC) inherited from: RemedialAction
0..1	GenericAvailableSchedule	0..*	GenericAvailableSchedule	(NC) inherited from: RemedialAction
0..*	ImpactedOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToRegion	0..1	Region	(NC) inherited from: RemedialAction
0..1	AssessedElementWithRemedialAction	0..*	AssessedElementWithRemedialAction	(NC) inherited from: RemedialAction
0..1	RemedialActionOutcomeValue	0..*	RemedialActionOutcomeValue	(NC) inherited from: RemedialAction
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: RemedialAction
0..*	RemedialActionSystemOperator	0..1	SystemOperator	(NC) inherited from: RemedialAction
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) inherited from: RemedialAction
1..1	RemedialActionApplied	0..*	RemedialActionApplied	(NC) inherited from: RemedialAction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4002

4003 **3.14.14 (NC) ControlFunctionBlockAction**

4004 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :
 4005 ExtEulIdentifiedObject : Identity

4006 Action for setting the control function block target values.

4007 Table 278 shows all attributes of ControlFunctionBlockAction.

4008 **Table 278 – Attributes of ExtRemedialAction::ControlFunctionBlockAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
identifier	0..1	NullCIM	inherited from: Identity

Table 279 shows all association ends of ControlFunctionBlockAction with other classes.

Table 279 – Association ends of ExtRemedialAction::ControlFunctionBlockAction with other classes

mult from	name	mult to	type	description
0..*	ControlFunctionBlock	1..1	ControlFunctionBlock	(NC) The control function block that is associated with a ControlFunctionBlockAction.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.14.15 (NC) EnergySourceModification

Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity
Energy source action.

Table 280 shows all attributes of EnergySourceModification.

Table 280 – Attributes of ExtRemedialAction::EnergySourceModification

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 281 shows all association ends of EnergySourceModification with other classes.

Table 281 – Association ends of ExtRemedialAction::EnergySourceModification with other classes

mult from	name	mult to	type	description
0..*	EnergySource	1..1	EnergySource	(NC) The EnergySource which is associated with an EnergySourceAction.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.14.16 (NC) EquivalentInjectionAction

Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject : ExtEuIdentifiedObject : Identity

Equivalent injection action.

Table 282 shows all attributes of EquivalentInjectionAction.

Table 282 – Attributes of ExtRemedialAction::EquivalentInjectionAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
aliasName	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 283 shows all association ends of EquivalentInjectionAction with other classes.

Table 283 – Association ends of ExtRemedialAction::EquivalentInjectionAction with other classes

mult from	name	mult to	type	description
0..*	EquivalentInjection	1..1	EquivalentInjection	(NC) The EquivalentInjection that is associated with an action.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.14.17 (NC) ExternalNetworkInjectionAction

Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

External network injection action.

Table 284 shows all attributes of ExternalNetworkInjectionAction.

Table 284 – Attributes of ExtRemedialAction::ExternalNetworkInjectionAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration

name	mult	type	description
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 285 shows all association ends of ExternalNetworkInjectionAction with other classes.

Table 285 – Association ends of ExtRemedialAction::ExternalNetworkInjectionAction with other classes

mult from	name	mult to	type	description
0..*	ExternalNetworkInjection	1..1	ExternalNetworkInjection	(NC) The ExternalNetworkInjection that is associated with an action.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.14.18 (NC) GridStateAlteration

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

Grid state alteration is a change of values describing state (operating point) of one element in the grid model compared to the base case.

Table 286 shows all attributes of GridStateAlteration.

Table 286 – Attributes of ExtRemedialAction::GridStateAlteration

name	mult	type	description
enabled	0..1	Boolean	(NC) The status of the GridStateAlteration set by an operation or by a signal resulting from a control action.

name	mult	type	description
normalEnabled	0..1	Boolean	(NC) It identifies if the element is normally enabled. True means normally enabled, False means not normally enabled.
participationFactor	0..1	PerCent	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(PF)$. In the case of priority strategy, the item with the lowest number gets allocated energy first. e.g. If 0 this grid alteration does not participate. The sum of all participation factors for all grid state alterations associated with same remedial action shall be equal to 100%.
maximumPerDay	0..1	Integer	(NC) Maximum number of alterations per day.
minimumActivation	0..1	Duration	(NC) Minimum time duration between activating the same grid state alteration.
timePerStage	0..1	Duration	(NC) Time to implement a stage of a grid state alteration. If a grid state alteration consists of multiple stages (e.g. A step on a power transformer), this duration comes in addition to the timeToImplement and need to be multiplied by the number of stages. A stage can also be defined as MW in the case of regulating production.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 287 shows all association ends of GridStateAlteration with other classes.

Table 287 – Association ends of ExtRemedialAction::GridStateAlteration with other classes

mult from	name	mult to	type	description
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) Availability enabled describes the enabling or disabling of this grid state alteration.
0..*	PropertyReference	0..1	PropertyReference	(NC) The property reference for this grid state alteration.
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) The collection that has a GridStateAlteration.
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) The intensity associated with a given GridStateAlterationSchedule.

mult from	name	mult to	type	description
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) The grid state alteration remedial action associated with a given grid state alteration.
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) The controllable quantity associated with this grid state alteration.
0..1	RangeConstraint	0..*	RangeConstraint	(NC) The range constraint associated with a given GridStateAlteration.
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) Grid state alteration schedule associated with a grid state alteration.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4057

4058 **3.14.19 (NC) GridStateAlterationRemedialAction**4059 Inheritance path = [RemedialAction](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

4060 Grid state alteration remedial action describes one or many grid state alterations applied to a grid model state or a particular scenario in order to resolve one or more identified constraints.

4062 Table 288 shows all attributes of GridStateAlterationRemedialAction.

4063 **Table 288 – Attributes of ExtRemedialAction::GridStateAlterationRemedialAction**

name	mult	type	description
isActivationRestricted	0..1	Boolean	(NC) If true, all GridStateAlterations associated with the GridStateAlterationRemedialAction need to be available in order to activate the RA. If false, it means that even if one or more GridStateAlterations is/are not available then the rest of the GridStateAlterationRemedialAction can be activated. Being available means it is not in a contingency or out of service. A switch that has an action of opening is still available if it is open. GridStateAlteration.normalEnabled or GridStateAlteration.enabled equal to false does not make the GridStateAlterationRemedialAction not available even if GridStateAlteration as part of the remedial action cannot be used in a GridStateAlterationRemedialAction.
available	0..1	Boolean	(NC) inherited from: RemedialAction
kind	0..1	RemedialActionKind	(NC) inherited from: RemedialAction
penaltyFactor	0..1	Float	(NC) inherited from: RemedialAction
isCrossBorderRelevant	0..1	Boolean	(NC) inherited from: RemedialAction
isManual	0..1	Boolean	(NC) inherited from: RemedialAction
timeToImplement	0..1	Duration	(NC) inherited from: RemedialAction
normalAvailable	0..1	Boolean	(NC) inherited from: RemedialAction
impactThresholdMargin	0..1	PerCent	(NC) inherited from: RemedialAction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 289 shows all association ends of GridStateAlterationRemedialAction with other classes.

Table 289 – Association ends of ExtRemedialAction::GridStateAlterationRemedialAction with other classes

mult from	name	mult to	type	description
0..1	GridStateAlteration	0..*	GridStateAlteration	(NC) The grid state alteration which is part of the grid state alteration remedial action.
0..1	ContingencyWithRemedialAction	0..*	ContingencyWithRemedialAction	(NC) inherited from: RemedialAction
1..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) inherited from: RemedialAction
0..1	DependentRemedialAction	0..*	RemedialActionDependency	(NC) inherited from: RemedialAction
0..1	GenericAvailableSchedule	0..*	GenericAvailableSchedule	(NC) inherited from: RemedialAction
0..*	ImpactedOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToRegion	0..1	Region	(NC) inherited from: RemedialAction
0..1	AssessedElementWithRemedialAction	0..*	AssessedElementWithRemedialAction	(NC) inherited from: RemedialAction
0..1	RemedialActionOutcomeValue	0..*	RemedialActionOutcomeValue	(NC) inherited from: RemedialAction
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: RemedialAction
0..*	RemedialActionSystemOperator	0..1	SystemOperator	(NC) inherited from: RemedialAction
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) inherited from: RemedialAction
1..1	RemedialActionApplied	0..*	RemedialActionApplied	(NC) inherited from: RemedialAction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.14.20 (NC) GridStateIntensitySchedule

Inheritance path = [GenericValueSchedule](#) : [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Defines the intensity applied for a given grid state alteration. It is primarily used in exchanges related to the remedial action schedule. The value provided by the schedule replaces the value of the attribute to which the schedule refers to.

4075 Table 290 shows all attributes of GridStateIntensitySchedule.

4076 **Table 290 – Attributes of ExtRemedialAction::GridStateIntensitySchedule**

name	mult	type	description
valueKind	0..1	ValueOffsetKind	(NC) The kind of value1 and value2 of the associated IrregularIntervalSchedule.
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4077
4078 Table 291 shows all association ends of GridStateIntensitySchedule with other classes.

4079 **Table 291 – Association ends of ExtRemedialAction::GridStateIntensitySchedule with**
4080 **other classes**

mult from	name	mult to	type	description
0..*	GridStateAlteration	1..1	GridStateAlteration	(NC) The grid state alteration which has intensity.
0..*	PropertyReference	0..1	PropertyReference	(NC) The property reference for this grid schedule.
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) inherited from: GenericValueSchedule
0..*	RangeConstraint	0..1	RangeConstraint	(NC) inherited from: GenericValueSchedule
1..1	GenericValueTimePoint	1..*	GenericValueTimePoint	(NC) inherited from: GenericValueSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4081
4082 **3.14.21 (NC) IntertemporalPropertyRange**

4083 Inheritance path = [RangeConstraint](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity
4084 It represents the intertemporal range, which means that this is the maximum change of an
4085 attribute value between two time stamps or per time unit (e.g. hour). Both up and down
4086 directions are defined by the direction attribute, i.e. There are different schedules per direction.
4087 The class is not instantiated for PropertyReference which refers to Boolean type attributes.

4088 For instance the following example illustrates the approach:
 4089 - A tap changer related grid state alteration having two intertemporal range schedules.
 4090 - For a particular point in time, the value from up schedule is 6 and the value from down
 4091 schedule is 3.
 4092 - Then, the GridStateIntensity for the same point in time cannot be more than plus 6 taps from
 4093 the current, or more than minus 3 taps from the current.
 4094 Table 292 shows all attributes of IntertemporalPropertyRange.

4095 **Table 292 – Attributes of ExtRemedialAction::IntertemporalPropertyRange**

name	mult	type	description
valueKind	0..1	ValueOffsetKind	(NC) inherited from: RangeConstraint
direction	0..1	RelativeDirectionKind	(NC) inherited from: RangeConstraint
value	0..1	Float	(NC) inherited from: RangeConstraint
normalValue	0..1	Float	(NC) inherited from: RangeConstraint
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4096
 4097 Table 293 shows all association ends of IntertemporalPropertyRange with other classes.

4098 **Table 293 – Association ends of ExtRemedialAction::IntertemporalPropertyRange with**
 4099 **other classes**

mult from	name	mult to	type	description
0..*	GridStateAlteration	0..1	GridStateAlteration	(NC) inherited from: RangeConstraint
0..1	GenericValueSchedule	0..*	GenericValueSchedule	(NC) inherited from: RangeConstraint
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4100
 4101 **3.14.22 (NC) LoadAction**
 4102 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :
 4103 ExtEuIdentifiedObject : Identity
 4104 Load action.
 4105 Table 294 shows all attributes of LoadAction.

4106 **Table 294 – Attributes of ExtRemedialAction::LoadAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration

name	mult	type	description
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 295 shows all association ends of LoadAction with other classes.

Table 295 – Association ends of ExtRemedialAction::LoadAction with other classes

mult from	name	mult to	type	description
0..*	EnergyConsumer	1..1	EnergyConsumer	(NC) The EnergyConsumer that is associated with a load action.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.14.23 (NC) PowerElectronicsConnectionAction

Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Power electronics setpoint action.

Table 296 shows all attributes of PowerElectronicsConnectionAction.

Table 296 – Attributes of ExtRemedialAction::PowerElectronicsConnectionAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration

name	mult	type	description
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 297 shows all association ends of PowerElectronicsConnectionAction with other classes.

**Table 297 – Association ends of
ExtRemedialAction::PowerElectronicsConnectionAction with other classes**

mult from	name	mult to	type	description
0..*	PowerElectronicsConnection	1..1	PowerElectronicsConnection	(NC) The PowerElectronicsConnection that is applied to an action.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.14.24 (cims) PropertyReference

Inheritance path = Property

The reference to a class and one of its properties.

Table 298 shows all association ends of PropertyReference with other classes.

Table 298 – Association ends of ExtRemedialAction::PropertyReference with other classes

mult from	name	mult to	type	description
0..1	GridStateAlteration	0..*	GridStateAlteration	(NC) The grid state alteration for this property reference.
0..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) The grid schedule for this property reference.
1..1	PinEquipment	0..*	PinEquipment	(NC) The pin equipment that has this property reference.
1..1	StaticPropertyRange	0..*	StaticPropertyRange	(NC) Static property range that has this property reference.
0..1	FunctionOutputVariable	0..*	FunctionOutputVariable	(NC) Function output variable is the function output this property reference is used in.

3.14.25 (NC) QualitativeRemedialActionImpact

Inheritance path = [RemedialActionImpact](#)

Defines the qualitative impact for a remedial action. Relevant remedial action is assumed to have impact when the impact quantity is applied.

Table 299 shows all attributes of QualitativeRemedialActionImpact.

Table 299 – Attributes of ExtRemedialAction::QualitativeRemedialActionImpact

name	mult	type	description
impactQuantity	0..1	Float	(NC) inherited from: RemedialActionImpact
kind	0..1	ImpactAgreementKind	(NC) inherited from: RemedialActionImpact
mRID	0..1	String	(NC) inherited from: RemedialActionImpact

Table 300 shows all association ends of QualitativeRemedialActionImpact with other classes.

Table 300 – Association ends of ExtRemedialAction::QualitativeRemedialActionImpact with other classes

mult from	name	mult to	type	description
0..*	RemedialAction	0..1	RemedialAction	(NC) inherited from: RemedialActionImpact
0..*	AssessingSystemOperator	0..1	SystemOperator	(NC) inherited from: RemedialActionImpact
0..*	RemedialActionGroup	0..1	RemedialActionGroup	(NC) inherited from: RemedialActionImpact
0..1	OwnerRemedialActionAssessment	0..*	OwnerRemedialActionAssessment	(NC) inherited from: RemedialActionImpact

3.14.26 (NC) QuantitativeRemedialActionImpact

Inheritance path = [RemedialActionImpact](#)

Defines the quantitative impact for a remedial action. The value if the impact quantity is derived through offline calculation that has caused an impact of an element that is monitored by the assessed system operator higher than the relevant threshold for the conducting equipment.

Table 301 shows all attributes of QuantitativeRemedialActionImpact.

4146 **Table 301 – Attributes of ExtRemedialAction::QuantitativeRemedialActionImpact**

name	mult	type	description
impactQuantity	0..1	Float	(NC) inherited from: RemedialActionImpact
kind	0..1	ImpactAgreementKind	(NC) inherited from: RemedialActionImpact
mRID	0..1	String	(NC) inherited from: RemedialActionImpact

4147
4148 Table 302 shows all association ends of QuantitativeRemedialActionImpact with other classes.

4149 **Table 302 – Association ends of ExtRemedialAction::QuantitativeRemedialActionImpact**
4150 **with other classes**

mult from	name	mult to	type	description
0..*	SensitivityArea	0..1	SensitivityArea	(NC) Sensitivity area which should be monitored to evaluate the threshold given by the remedial action impact on relevant equipment.
0..*	RemedialAction	0..1	RemedialAction	(NC) inherited from: RemedialActionImpact
0..*	AssessingSystemOperator	0..1	SystemOperator	(NC) inherited from: RemedialActionImpact
0..*	RemedialActionGroup	0..1	RemedialActionGroup	(NC) inherited from: RemedialActionImpact
0..1	OwnerRemedialActionAssessment	0..*	OwnerRemedialActionAssessment	(NC) inherited from: RemedialActionImpact

4151
4152 **3.14.27 (NC) RedispatchScheduleAction**

4153 Inheritance path = [PowerScheduleAction](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity
4154 Redispatch schedule action is an action to rearrange power schedules for a scheduled resource
4155 to obtain a feasible and secure operational state of the power electricity system.
4156 Table 303 shows all attributes of RedispatchScheduleAction.

4157 **Table 303 – Attributes of ExtRemedialAction::RedispatchScheduleAction**

name	mult	type	description
currency	0..1	Currency	(NC) inherited from: PowerScheduleAction
energyPrice	0..1	Decimal	(NC) inherited from: PowerScheduleAction
available	0..1	Boolean	(NC) inherited from: PowerScheduleAction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4158
4159 Table 304 shows all association ends of RedispatchScheduleAction with other classes.

Table 304 – Association ends of ExtRemedialAction::RedispatchScheduleAction with other classes

mult from	name	mult to	type	description
0..*	RedispatchRemedialAction	0..1	RedispatchRemedialAction	(NC) Redispatch remedial action that is supported by the redispatch schedule action.
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) inherited from: PowerScheduleAction
0..1	PowerBidSchedule	0..1	PowerBidSchedule	(NC) inherited from: PowerScheduleAction
0..1	PowerSchedule	0..1	PowerSchedule	(NC) inherited from: PowerScheduleAction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.14.28 (NC) RedispatchRemedialAction

Inheritance path = [PowerRemedialAction](#) : [RemedialAction](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Redispatch remedial action is a remedial action that through rearranging power schedules is eliminating breaches of constraints.

Table 305 shows all attributes of RedispatchRemedialAction.

Table 305 – Attributes of ExtRemedialAction::RedispatchRemedialAction

name	mult	type	description
maxRegulatingDown	0..1	ActivePower	(NC) inherited from: PowerRemedialAction
maxRegulatingUp	0..1	ActivePower	(NC) inherited from: PowerRemedialAction
available	0..1	Boolean	(NC) inherited from: RemedialAction
kind	0..1	RemedialActionKind	(NC) inherited from: RemedialAction
penaltyFactor	0..1	Float	(NC) inherited from: RemedialAction
isCrossBorderRelevant	0..1	Boolean	(NC) inherited from: RemedialAction
isManual	0..1	Boolean	(NC) inherited from: RemedialAction
timeToImplement	0..1	Duration	(NC) inherited from: RemedialAction
normalAvailable	0..1	Boolean	(NC) inherited from: RemedialAction
impactThresholdMargin	0..1	PerCent	(NC) inherited from: RemedialAction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4171 Table 306 shows all association ends of RedispatchRemedialAction with other classes.

4172 **Table 306 – Association ends of ExtRemedialAction::RedispatchRemedialAction with**
4173 **other classes**

mult from	name	mult to	type	description
0..1	RedispatchScheduleAction	0..*	RedispatchScheduleAction	(NC) Redispatch schedule action which belongs to the redispatch remedial action.
0..*	BiddingZone	0..1	BiddingZone	(NC) inherited from: PowerRemedialAction
0..*	BiddingZoneBorder	0..1	BiddingZoneBorder	(NC) inherited from: PowerRemedialAction
0..1	PowerShiftKeyStrategy	0..*	PowerShiftKeyStrategy	(NC) inherited from: PowerRemedialAction
0..1	PowerBidSchedule	0..*	PowerBidSchedule	(NC) inherited from: PowerRemedialAction
0..1	PowerRemedialActionSchedule	0..*	PowerRemedialActionSchedule	(NC) inherited from: PowerRemedialAction
0..1	PowerSchedule	0..*	PowerSchedule	(NC) inherited from: PowerRemedialAction
0..1	ContingencyWithRemedialAction	0..*	ContingencyWithRemedialAction	(NC) inherited from: RemedialAction
1..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) inherited from: RemedialAction
0..1	DependentRemedialAction	0..*	RemedialActionDependency	(NC) inherited from: RemedialAction
0..1	GenericAvailableSchedule	0..*	GenericAvailableSchedule	(NC) inherited from: RemedialAction
0..*	ImpactedOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToRegion	0..1	Region	(NC) inherited from: RemedialAction
0..1	AssessedElementWithRemedialAction	0..*	AssessedElementWithRemedialAction	(NC) inherited from: RemedialAction
0..1	RemedialActionOutcomeValue	0..*	RemedialActionOutcomeValue	(NC) inherited from: RemedialAction
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: RemedialAction
0..*	RemedialActionSystemOperator	0..1	SystemOperator	(NC) inherited from: RemedialAction
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) inherited from: RemedialAction
1..1	RemedialActionApplied	0..*	RemedialActionApplied	(NC) inherited from: RemedialAction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4174

4175 **3.14.29 (NC) RegulatingControlAction**

4176 Inheritance path = [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity
 4177 Control action means the set point change of a regulating control power system resource in the
 4178 grid model compared to the base case.

4179 Table 307 shows all attributes of RegulatingControlAction.

4180 **Table 307 – Attributes of ExtRemedialAction::RegulatingControlAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4181

4182 Table 308 shows all association ends of RegulatingControlAction with other classes.

4183 **Table 308 – Association ends of ExtRemedialAction::RegulatingControlAction with**
 4184 **other classes**

mult from	name	mult to	type	description
0..*	RegulatingControl	1..1	RegulatingControl	(NC) The regulating control which has an action.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4185

4186 **3.14.30 (NC) RemedialAction**

4187 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

4188 Remedial action describes one or more actions that can be performed on a given power system
 4189 model situation to eliminate one or more identified breaches of constraints. The remedial action
 4190 can be costly, and have a cost characteristic, or non costly.

4191 Table 309 shows all attributes of RemedialAction.

4192

Table 309 – Attributes of ExtRemedialAction::RemedialAction

name	mult	type	description
available	0..1	Boolean	(NC) Identifies if the remedial action can be used in further processes. True means available, False means unavailable. For instance, remedial action optimisation and coordination.
kind	0..1	RemedialActionKind	(NC) The kind of the remedial action. If curative remedial action, it is required to have an association with ContingencyWithRemedialAction. If preventive remedial action, RemedialAction class shall not have association with ContingencyWithRemedialAction.
penaltyFactor	0..1	Float	(NC) Defines the relative penalty for a given remedial action. This is a positive number greater than zero and default is one, meaning the remedial action does not have negative nor positive effect on the quality of the solution. A remedial action that provide changes in the transmission loss can have negative (Between zero and one) or positive effect (Bigger than one) given by $1 / (1 - \text{Incremental Transmission Loss})$. In a similar way remedial action using generating units or compensation units can have negative or positive effect. Typical value would be between 0.8 and 1.1.
isCrossBorderRelevant	0..1	Boolean	(NC) Indicates if the remedial action is cross border relevant. True, means that the remedial action is cross border relevant.
isManual	0..1	Boolean	(NC) Indicates if the remedial action is manually executed which involves one or many actions performed by human. A SIPS remedial action cannot be manual. True, means that the remedial action is manual. False, means that the remedial action is automatically executed without human communication.
timeToImplement	0..1	Duration	(NC) Time to implement a remedial action.
normalAvailable	0..1	Boolean	(NC) Identifies if the remedial action can be used in further processes under normal condition. True means available, False means unavailable. For instance, remedial action optimisation and coordination.
impactThresholdMargin	0..1	PerCent	(NC) Impact threshold margin for the use of the remedial action. Meaning that the remedial action should not be used if it cannot resolve violation with more than the given impact threshold margin. The allowed value range is [0,100].
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 310 shows all association ends of RemedialAction with other classes.

Table 310 – Association ends of ExtRemedialAction::RemedialAction with other classes

mult from	name	mult to	type	description
0..1	ContingencyWithRemedialAction	0..*	ContingencyWithRemedialAction	(NC) The contingency and remedial action combination.
1..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) The remedial action schedule associated with a remedial action, i.e. the assigning a schedule to a remedial action.
0..1	DependentRemedialAction	0..*	RemedialActionDependency	(NC) Remedial action dependent on a remedial action.
0..1	GenericAvailableSchedule	0..*	GenericAvailableSchedule	(NC) Available schedule associated to a remedial action.
0..*	ImpactedOverlappingZone	0..1	OverlappingZone	(NC) The impacted overlapping zone for this impacting remedial action.
0..*	AppointedToOverlappingZone	0..1	OverlappingZone	(NC) The overlapping zone appointed to the remedial action.
0..*	AppointedToRegion	0..1	Region	(NC) The region in which the remedial action is appointed.
0..1	AssessedElementWithRemedialAction	0..*	AssessedElementWithRemedialAction	(NC) The assessed element and remedial action combination to be simulated for this remedial action.
0..1	RemedialActionOutcomeValue	0..*	RemedialActionOutcomeValue	(NC) The remedial action outcome value associated with a remedial action.
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) The controllable quantity for a remedial action.
0..*	RemedialActionSystemOperator	0..1	SystemOperator	(NC) System operator operating remedial actions.
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) This is the impact for a given remedial action.
1..1	RemedialActionApplied	0..*	RemedialActionApplied	(NC) The relationship of the applied remedial action and power flow result.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.14.31 (NC) RemedialActionCost root class

Remedial action cost is the total cost itemised cost by category and type for the remedial action.

Table 311 shows all attributes of RemedialActionCost.

4200

Table 311 – Attributes of ExtRemedialAction::RemedialActionCost

name	mult	type	description
operationalCost	0..1	Decimal	(NC) Operational cost is the total cost directly related to operate the unit according to the remedial action, e.g. fuel cost.
opportunityCost	0..1	Decimal	(NC) Opportunity cost is the total cost of potential earning that is missed due to performing the remedial action.
otherCost	0..1	Decimal	(NC) Other cost is the total cost that cannot be directly allocated to any of the other items.
processingFee	0..1	Decimal	(NC) Processing fee is the total cost for processing the remedial action.
savedFuelCost	0..1	Decimal	(NC) Saved fuel cost is the total saving due to not consuming the expected fuel as part of the remedial action.
shutdownCost	0..1	Decimal	(NC) Shutdown cost is the total cost for shutting down a unit as part of the remedial action.
startupCost	0..1	Decimal	(NC) Start-up cost is the total cost for activating the remedial action, e.g. if a generator needs to be started before it can perform the remedial action.
costAllocationTime	0..1	DateTime	(NC) Cost allocation time is the time the cost shall be allocated.
kind	0..1	CostSettledKind	(NC) Remedial action cost category related to the confirmation of the cost in regards to changes.
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

4201

4202 Table 312 shows all association ends of RemedialActionCost with other classes.

Table 312 – Association ends of ExtRemedialAction::RemedialActionCost with other classes

mult from	name	mult to	type	description
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) Remedial action schedule for which this remedial action cost relates to.

4205

3.14.32 (NC) RemedialActionImpact root class

4207 Remedial action impact assessment based on a given agreement with a specific system operator.

4209 Table 313 shows all attributes of RemedialActionImpact.

Table 313 – Attributes of ExtRemedialAction::RemedialActionImpact

name	mult	type	description
impactQuantity	0..1	Float	(NC) Delta, positive or negative, quantity that when it is applied to the remedial action, it will

4210

name	mult	type	description
			cause impact on a conducting equipment monitored by the assessed system operator. Example of relevant remedial action changes are redispatching, countertrading, change of set point on HVDC systems or change of taps on phase-shifting transformers.
kind	0..1	ImpactAgreementKind	(NC) The impact agreement kind.
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

Table 314 shows all association ends of RemedialActionImpact with other classes.

Table 314 – Association ends of ExtRemedialAction::RemedialActionImpact with other classes

mult from	name	mult to	type	description
0..*	RemedialAction	0..1	RemedialAction	(NC) The remedial action that has an impact.
0..*	AssessingSystemOperator	0..1	SystemOperator	(NC) The impacted System Operator that assigns a remedial action impact.
0..*	RemedialActionGroup	0..1	RemedialActionGroup	(NC) The remedial action group that has an impact.
0..1	OwnerRemedialActionAssessment	0..*	OwnerRemedialActionAssessment	(NC) The owner's assessment to the impacted system operator.

3.14.33 (NC) RemedialActionSchedule

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject : Identity

A schedule for a determined remedial action.

Table 315 shows all attributes of RemedialActionSchedule.

Table 315 – Attributes of ExtRemedialAction::RemedialActionSchedule

name	mult	type	description
statusKind	0..1	RemedialActionScheduleStatusKind	(NC) Indicates the status kind for the remedial action schedule.
statusReason	0..1	String	(NC) Description of reasoning for the status. For instance, in case of rejected remedial action, the reason for this rejection is described here.
totalCost	0..1	Decimal	(NC) Total cost of the remedial action.
totalCostCurrency	0..1	Currency	(NC) The currency of the total cost.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject

name	mult	type	description
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 316 shows all association ends of RemedialActionSchedule with other classes.

Table 316 – Association ends of ExtRemedialAction::RemedialActionSchedule with other classes

mult from	name	mult to	type	description
0..*	Contingency	0..1	Contingency	(NC) The contingency for a curative remedial action schedule.
0..1	EventSchedule	0..1	EventSchedule	Event schedule that describes the validity of the remedial action schedule.
0..*	ProposingEntity	0..1	SecurityCoordinator	(NC) The security coordinator that is proposing this remedial action schedule.
0..1	ProposingRemedialActionScheduleShare	0..*	ProposingRemedialActionScheduleShare	(NC) The entity with its associated share that are making the proposal of the remedial action schedule
0..*	OverlappingZone	0..1	OverlappingZone	(NC) The overlapping zone for this overlapping remedial action schedule.
0..*	AssignedRegion	0..1	Region	(NC) The assigned region for this remedial action schedule.
0..1	RemedialActionScheduleOutcomeValue	0..*	RemedialActionScheduleOutcomeValue	(NC) The remedial action schedule outcome value associated with a remedial action schedule.
0..*	RemedialAction	1..1	RemedialAction	(NC) The remedial action that has a remedial action schedule associated.
0..1	RemedialActionCost	0..*	RemedialActionCost	(NC) Remedial action cost related to this remedial schedule.
0..1	RemedialActionScheduleResponse	0..*	RemedialActionScheduleResponse	(NC) The remedial action schedule response related to a remedial action schedule.
0..1	PowerScheduleAction	0..*	PowerScheduleAction	(NC) Power schedule action which belongs to a remedial action schedule.
0..1	GenericValueSchedule	0..*	GenericValueSchedule	(NC) Generic value schedule which belongs to a remedial action schedule.
0..1	ProposedDependency	0..*	RemedialActionScheduleDependency	(NC) Dependency for the proposed remedial action schedule.
0..1	ReplacedDependency	0..*	RemedialActionScheduleDependency	(NC) Replaced dependency for this remedial action schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.14.34 (NC) RemedialActionScheduleResponse root class

The response on the remedial action schedule by a given system operator.

Table 317 shows all attributes of RemedialActionScheduleResponse.

4229 **Table 317 – Attributes of ExtRemedialAction::RemedialActionScheduleResponse**

name	mult	type	description
kind	0..1	RemedialActionScheduleResponseKind	(NC) The kind of the remedial action response.
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
rejectionReasonKind	0..1	RejectionReasonKind	(NC) The kind of the remedial action rejection reason.
rejectionReason	0..1	String	(NC) An additional type of rejection reason. It is used only when rejectionReasonKind equals RejectionReasonKind.other.

4230 Table 318 shows all association ends of RemedialActionScheduleResponse with other classes.

4231 **Table 318 – Association ends of ExtRemedialAction::RemedialActionScheduleResponse**
4232 **with other classes**
4233

mult from	name	mult to	type	description
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) A remedial action schedule for which a remedial action schedule response is reported.
0..*	RespondingEntity	0..1	SystemOperator	(NC) An entity for which a remedial action schedule response is reported.

4234 3.14.35 (NC) RotatingMachineAction

4235 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :
4236 ExtEulIdentifiedObject : Identity
4237 Rotating machine action.

4238 Table 319 shows all attributes of RotatingMachineAction.

4239 **Table 319 – Attributes of ExtRemedialAction::RotatingMachineAction**
4240

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 320 shows all association ends of RotatingMachineAction with other classes.

Table 320 – Association ends of ExtRemedialAction::RotatingMachineAction with other classes

mult from	name	mult to	type	description
0..*	RotatingMachine	1..1	RotatingMachine	(NC) The rotating machine that has an action.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.14.36 (NC) SetPointAction

Inheritance path = [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity
Setpoint action.

Table 321 shows all attributes of SetPointAction.

Table 321 – Attributes of ExtRemedialAction::SetPointAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 322 shows all association ends of SetPointAction with other classes.

Table 322 – Association ends of ExtRemedialAction::SetPointAction with other classes

mult from	name	mult to	type	description
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.14.37 (NC) SchemeRemedialAction

Inheritance path = [RemedialAction](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity
 Scheme remedial action is remedial action that involves a scheme that can include conditional logic and stages of grid alteration. The primary remedial action is the arming of these schemes, that will then perform curative remedial action when the condition is met. System Integrity Protection Scheme (SIPS) and Special Protection Scheme (SPS) are example of this.
 Table 323 shows all attributes of SchemeRemedialAction.

Table 323 – Attributes of ExtRemedialAction::SchemeRemedialAction

name	mult	type	description
available	0..1	Boolean	(NC) inherited from: RemedialAction
kind	0..1	RemedialActionKind	(NC) inherited from: RemedialAction
penaltyFactor	0..1	Float	(NC) inherited from: RemedialAction
isCrossBorderRelevant	0..1	Boolean	(NC) inherited from: RemedialAction
isManual	0..1	Boolean	(NC) inherited from: RemedialAction
timeToImplement	0..1	Duration	(NC) inherited from: RemedialAction
normalAvailable	0..1	Boolean	(NC) inherited from: RemedialAction
impactThresholdMargin	0..1	PerCent	(NC) inherited from: RemedialAction

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 324 shows all association ends of SchemeRemedialAction with other classes.

Table 324 – Association ends of ExtRemedialAction::SchemeRemedialAction with other classes

mult from	name	mult to	type	description
0..1	RemedialActionScheme Schedule	0..*	RemedialActionScheme Schedule	(NC) Remedial action scheme schedule associated with a remedial action scheme.
0..1	RemedialActionScheme	0..1	RemedialActionScheme	(NC) Remedial action scheme for this scheme remedial action.
0..1	ContingencyWithRemedialAction	0..*	ContingencyWithRemedialAction	(NC) inherited from: RemedialAction
1..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) inherited from: RemedialAction
0..1	DependentRemedialAction	0..*	RemedialActionDependency	(NC) inherited from: RemedialAction
0..1	GenericAvailableSchedule	0..*	GenericAvailableSchedule	(NC) inherited from: RemedialAction
0..*	ImpactedOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToRegion	0..1	Region	(NC) inherited from: RemedialAction
0..1	AssessedElementWithRemedialAction	0..*	AssessedElementWithRemedialAction	(NC) inherited from: RemedialAction
0..1	RemedialActionOutcomeValue	0..*	RemedialActionOutcomeValue	(NC) inherited from: RemedialAction
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: RemedialAction
0..*	RemedialActionSystemOperator	0..1	SystemOperator	(NC) inherited from: RemedialAction
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) inherited from: RemedialAction
1..1	RemedialActionApplied	0..*	RemedialActionApplied	(NC) inherited from: RemedialAction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4268 **3.14.38 (NC) ShuntCompensatorModification**4269 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :

4270 ExtEulIdentifiedObject : Identity

4271 Shunt compensator action.

4272 Table 325 shows all attributes of ShuntCompensatorModification.

4273 **Table 325 – Attributes of ExtRemedialAction::ShuntCompensatorModification**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4274

4275 Table 326 shows all association ends of ShuntCompensatorModification with other classes.

4276 **Table 326 – Association ends of ExtRemedialAction::ShuntCompensatorModification**
4277 **with other classes**

mult from	name	mult to	type	description
0..*	ShuntCompensator	1..1	ShuntCompensator	(NC) The ShuntCompensator that is associated with an action.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4278

4279 **3.14.39 (NC) StaticPropertyRange**4280 Inheritance path = [RangeConstraint](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity4281 Defines the static range, which means that this is the minimum and/or maximum of an attribute
4282 value. The value provided by the schedule replaces the value of the attribute to which the
4283 schedule refers to.4284 In case that the PropertyReference refers to Boolean type attributes, RangeConstraint.direction
4285 shall be none or upAndDown and the RangeConstraint.valueKind shall be absolute. If the
4286 direction is none then optimization of the attribute referenced by the PropertyReference is not
4287 possible if the current status is already as the value in the range. Otherwise if the direction is
4288 upAndDown, the optimization can change from true to false or vice versa independently of the
4289 initial value in the operational scenario.4290 For instance for a tap changer related grid state alteration for a particular point in time, if the
4291 range of TapChanger.step is to be restricted, the value of the schedule will represent that new
4292 TapChanger.step range.

4293 Table 327 shows all attributes of StaticPropertyRange.

4294 **Table 327 – Attributes of ExtRemedialAction::StaticPropertyRange**

name	mult	type	description
valueKind	0..1	ValueOffsetKind	(NC) inherited from: RangeConstraint
direction	0..1	RelativeDirectionKind	(NC) inherited from: RangeConstraint
value	0..1	Float	(NC) inherited from: RangeConstraint
normalValue	0..1	Float	(NC) inherited from: RangeConstraint
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4295

4296 Table 328 shows all association ends of StaticPropertyRange with other classes.

4297 **Table 328 – Association ends of ExtRemedialAction::StaticPropertyRange with other**
4298 **classes**

mult from	name	mult to	type	description
0..*	PropertyReference	1..1	PropertyReference	(NC) Property reference for this static property range.
0..*	GridStateAlteration	0..1	GridStateAlteration	(NC) inherited from: RangeConstraint
0..1	GenericValueSchedule	0..*	GenericValueSchedule	(NC) inherited from: RangeConstraint
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4299

4300 **3.14.40 (NC) StaticVarCompensatorAction**4301 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :

4302 ExtEulIdentifiedObject : Identity

4303 Static Var compensator action.

4304 Table 329 shows all attributes of StaticVarCompensatorAction.

4305 **Table 329 – Attributes of ExtRemedialAction::StaticVarCompensatorAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4306

4307 Table 330 shows all association ends of StaticVarCompensatorAction with other classes.

4308 **Table 330 – Association ends of ExtRemedialAction::StaticVarCompensatorAction with**
4309 **other classes**

mult from	name	mult to	type	description
0..*	StaticVarCompensator	1..1	StaticVarCompensator	(NC) The StaticVarCompensator which is associated with an action.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4310

4311 **3.14.41 (NC) TapPositionAction**4312 Inheritance path = [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

4313 Tap position action represents a change of a tap changer position in the grid model compared to the base case.

4315 Table 331 shows all attributes of TapPositionAction.

4316 **Table 331 – Attributes of ExtRemedialAction::TapPositionAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4317

4318 Table 332 shows all association ends of TapPositionAction with other classes.

4319 **Table 332 – Association ends of ExtRemedialAction::TapPositionAction with other**
4320 **classes**

mult from	name	mult to	type	description
0..*	TapChanger	1..1	TapChanger	(NC) The tap changer that has a tap position action associated.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.14.42 (NC) TopologyAction

Inheritance path = [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Topology action means the connection or disconnection of a switch in the grid model compared to the base case.

Table 333 shows all attributes of TopologyAction.

Table 333 – Attributes of ExtRemedialAction::TopologyAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 334 shows all association ends of TopologyAction with other classes.

Table 334 – Association ends of ExtRemedialAction::TopologyAction with other classes

mult from	name	mult to	type	description
0..*	Switch	1..1	Switch	(NC) The switch that has a topology action associated.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4331

4332 **3.14.43 (NC) RemedialActionDependency root class**

4333 Remedial action dependency is making two remedial actions depending on each other. Multiple
 4334 dependency is done by multiple instances of this class. The dependency can arrive by having
 4335 one of the following examples.

4336 - The dependent remedial action is controlled by different system operator (Modeling Authority)
 4337 (e.g. SIPS that goes across control area).

4338 - The dependent remedial action is representing two or more remedial action that represent
 4339 the same grid state alteration but with different modeling resolution (e.g. detail direct current
 4340 model versus a simplified model).

4341 - The remedial action can be combined with other remedial action without the need to create
 4342 multiple remedial action with the same grid alteration for enabling dependency.

4343 Table 335 shows all attributes of RemedialActionDependency.

4344 **Table 335 – Attributes of ExtRemedialAction::RemedialActionDependency**

name	mult	type	description
kind	0..1	RemedialActionDependencyKind	(NC) Type of dependency between two remedial actions.
enabled	0..1	Boolean	(NC) If true, the remedial action dependency is enabled, otherwise it is disabled.
normalEnabled	0..1	Boolean	(NC) If true, the remedial action dependency within a group shall be considered under normal operating conditions.
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

4345

4346 Table 336 shows all association ends of RemedialActionDependency with other classes.

4347 **Table 336 – Association ends of ExtRemedialAction::RemedialActionDependency with**
 4348 **other classes**

mult from	name	mult to	type	description
0..*	DependingRemedialActionGroup	0..1	RemedialActionGroup	(NC) Remedial action group which the remedial action is depending on.
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) Enabling schedule associated to a remedial action dependency.
0..*	RemedialAction	0..1	RemedialAction	(NC) Remedial action which has dependent remedial actions.

4349

4350 **3.14.44 (NC) BiddingZoneAction**4351 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :

4352 ExtEulIdentifiedObject : Identity

4353 Bidding zone set point action.

4354 Table 337 shows all attributes of BiddingZoneAction.

4355 **Table 337 – Attributes of ExtRemedialAction::BiddingZoneAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4356

4357 Table 338 shows all association ends of BiddingZoneAction with other classes.

4358 **Table 338 – Association ends of ExtRemedialAction::BiddingZoneAction with other**
4359 **classes**

mult from	name	mult to	type	description
0..*	BiddingZone	1..1	BiddingZone	(NC) The bidding zone that has this bidding zone action.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4360

4361 **3.14.45 (NC) RemedialActionScheduleGroup**

4362 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

4363 Remedial action schedule group collects two or more remedial action schedules together. The
4364 remedial action schedule group needs to be set up for the same remedial action or proposing
4365 alternative remedial action by including a reference to another remedial action.

4366 Table 339 shows all attributes of RemedialActionScheduleGroup.

4367 **Table 339 – Attributes of ExtRemedialAction::RemedialActionScheduleGroup**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4368

4369 Table 340 shows all association ends of RemedialActionScheduleGroup with other classes.

4370 **Table 340 – Association ends of ExtRemedialAction::RemedialActionScheduleGroup**
4371 **with other classes**

mult from	name	mult to	type	description
0..1	GroupDependency	0..*	RemedialActionScheduleDependency	(NC) Group dependency for this remedial action schedule group.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4372

4373 **3.14.46 (NC) RangeConstraint**

4374 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

4375 Defines the range constraint.

4376 Table 341 shows all attributes of RangeConstraint.

4377 **Table 341 – Attributes of ExtRemedialAction::RangeConstraint**

name	mult	type	description
valueKind	0..1	ValueOffsetKind	(NC) Kind of value offset for the range that applies to the attribute referenced by the PropertyReference.
direction	0..1	RelativeDirectionKind	(NC) Defines the direction of the attribute value referenced by the PropertyReference.
value	0..1	Float	(NC) The value at the time. The meaning of the value is defined by the attribute referenced by the PropertyReference. The attribute value can be integer, float or boolean. In case of boolean 1.0 equals true and 0.0 equals false. In case of

name	mult	type	description
			integer the 0 should be included as a decimal, e.g. 2.0. If the valueKind equals incremental or incrementalPercentage, then the attribute value shall be positive (greater than zero). If the valueKind equals absolute, it does not constraint attribute value to be positive. If the valueKind equals incrementalPercentage, then the attribute value "100.0" shall represent 100%. The attribute value shall be positive float (0.0 value is not allowed) and can exceed 100.0.
normalValue	0..1	Float	(NC) The normal (initial) value. The meaning of the value is defined by the attribute referenced by the PropertyReference. The attribute value can be integer, float or boolean. In case of boolean 1.0 equals true and 0.0 equals false. In case of integer the 0 should be included as a decimal, e.g. 2.0. If the valueKind equals incremental or incrementalPercentage, then the attribute value shall be positive (greater than zero). If the valueKind equals absolute, it does not constraint attribute value to be positive. If the valueKind equals incrementalPercentage, then the attribute value "100.0" shall represent 100%. The attribute value shall be positive float (0.0 value is not allowed) and can exceed 100.0.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 342 shows all association ends of RangeConstraint with other classes.

Table 342 – Association ends of ExtRemedialAction::RangeConstraint with other classes

mult from	name	mult to	type	description
0..*	GridStateAlteration	0..1	GridStateAlteration	(NC) The grid state alteration which has static range.
0..1	GenericValueSchedule	0..*	GenericValueSchedule	(NC) Generic value schedule which has a range constraint.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.14.47 (NC) RemedialActionDependencyKind enumeration

Kind of dependency between remedial actions.

4385 Table 343 shows all literals of RemedialActionDependencyKind.

4386 **Table 343 – Literals of ExtRemedialAction::RemedialActionDependencyKind**

literal	value	description
exclusive		Remedial actions are exclusive depending on each other. e.g. Only one of the remedial actions can be selected at the same time.
inclusive		Remedial actions are inclusive depending on each other. e.g. Both remedial actions need to be picked if one of them is needed.
restrictive		Remedial actions are restrictive depending on each other. The need to include or to exclude might depend on the model. e.g. In the case of simplified DC model and detailed DC model. In the case where the simplified remedial action is used but not the remedial action for the detail model and opposite for the DC model.
none		Remedial actions are not depending on each other. However, the two remedial actions should be evaluated together.
balanced		This applies only to a set of power remedial actions (including HVDC which play role to balance power) and means that the remedial action needs to be balanced between the area (directly or indirectly to the bidding zone) that it is applied to.

4387

4388 **3.14.48 (NC) ShiftMethodKind enumeration**

4389 Kind of shift method. Describes the way a power schedule should be distributed amongst
4390 production and consumption. e.g. Type of generating and load shift key.

4391 Table 344 shows all literals of ShiftMethodKind.

4392 **Table 344 – Literals of ExtRemedialAction::ShiftMethodKind**

literal	value	description
shared		Power schedule shift (distribution) is done by a shared fraction e.g. A two unit with the participation factor 60 and 40 will distribute a 10 MW schedule by 6 and 4 MW.
priority		Power schedule shift (distribution) is done by a shared fraction prioritizing the unit e.g. A two unit with the participation factor 60 and 40 will distribute a 10 MW increased schedule by first filling the highest participation factor (priority) until max economy power or maximum power allowed by the unit before it starts filling the next on the list. e.g. The unit with 60 will be getting its maximum shared first. The same logic applies with reducing the schedule. e.g. The 60 participation factor unit will be reduced to its min economy factor or minimum power.

4393

4394 **3.14.49 (NC) ProposingRemedialActionScheduleShare root class**

4395 Proposing entity (System Operator) with a proper cost share for a given remedial action
4396 schedule.

4397 Table 345 shows all attributes of ProposingRemedialActionScheduleShare.

4398 **Table 345 – Attributes of ExtRemedialAction::ProposingRemedialActionScheduleShare**

name	mult	type	description
costSharingFactor	0..1	Decimal	(NC) Sharing factor of the cost of the remedial action as a fraction of the total cost, i.e. system operator's cost = cost x (costSharingFactor / sum of all costSharingFactor).
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

4399
4400 Table 346 shows all association ends of ProposingRemedialActionScheduleShare with other
4401 classes.

4402 **Table 346 – Association ends of**
4403 **ExtRemedialAction::ProposingRemedialActionScheduleShare with other classes**

mult from	name	mult to	type	description
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) Remedial action schedule proposed by the proposing entity.
0..*	ProposingEntity	0..1	SystemOperator	(NC) Proposing entity making the proposing remedial action schedule share.

4404
4405 **3.14.50 (NC) CountertradeScheduleAction**

4406 Inheritance path = [PowerScheduleAction](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity
4407 Countertrade schedule action is an action to rearrange power schedules based on a Generation
4408 and Load Shift Key (GLSK) strategy.

4409 Table 347 shows all attributes of CountertradeScheduleAction.

4410 **Table 347 – Attributes of ExtRemedialAction::CountertradeScheduleAction**

name	mult	type	description
currency	0..1	Currency	(NC) inherited from: PowerScheduleAction
energyPrice	0..1	Decimal	(NC) inherited from: PowerScheduleAction
available	0..1	Boolean	(NC) inherited from: PowerScheduleAction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4411
4412 Table 348 shows all association ends of CountertradeScheduleAction with other classes.

4413 **Table 348 – Association ends of ExtRemedialAction::CountertradeScheduleAction with**
4414 **other classes**

mult from	name	mult to	type	description
0..*	CountertradeRemedialAction	0..1	CountertradeRemedialAction	(NC) Countertrade remedial action which has associated countertrade schedule actions.
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) inherited from: PowerScheduleAction
0..1	PowerBidSchedule	0..1	PowerBidSchedule	(NC) inherited from: PowerScheduleAction
0..1	PowerSchedule	0..1	PowerSchedule	(NC) inherited from: PowerScheduleAction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4415

4416 **3.14.51 (NC) PowerScheduleAction**

4417 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

4418 Power schedule action is an action to rearrange power schedules.

4419 Table 349 shows all attributes of PowerScheduleAction.

4420 **Table 349 – Attributes of ExtRemedialAction::PowerScheduleAction**

name	mult	type	description
currency	0..1	Currency	(NC) Currency the energy price is given in.
energyPrice	0..1	Decimal	(NC) Energy price for the power schedule action.
available	0..1	Boolean	(NC) Defines if the power schedule action is available and can be used. If true, the reserve action is available and can be used. If false, the reserve action is defined, but not available to be used.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4421

4422 Table 350 shows all association ends of PowerScheduleAction with other classes.

4423 **Table 350 – Association ends of ExtRemedialAction::PowerScheduleAction with other**
4424 **classes**

mult from	name	mult to	type	description
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) Remedial action schedule which power schedule actions.

mult from	name	mult to	type	description
0..1	PowerBidSchedule	0..1	PowerBidSchedule	(NC) The power bid schedule which contains the power schedule action.
0..1	PowerSchedule	0..1	PowerSchedule	(NC) Power schedule which contains the power schedule action.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4425

4426 **3.14.52 (NC) PowerRemedialAction**4427 Inheritance path = [RemedialAction](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

4428 Energy remedial action describes actions to rearrange power schedules.

4429 Table 351 shows all attributes of PowerRemedialAction.

4430 **Table 351 – Attributes of ExtRemedialAction::PowerRemedialAction**

name	mult	type	description
maxRegulatingDown	0..1	ActivePower	(NC) Maximum net amount of active power that the remedial action can regulate down.
maxRegulatingUp	0..1	ActivePower	(NC) Maximum net amount of active power that the remedial action can regulate up.
available	0..1	Boolean	(NC) inherited from: RemedialAction
kind	0..1	RemedialActionKind	(NC) inherited from: RemedialAction
penaltyFactor	0..1	Float	(NC) inherited from: RemedialAction
isCrossBorderRelevant	0..1	Boolean	(NC) inherited from: RemedialAction
isManual	0..1	Boolean	(NC) inherited from: RemedialAction
timeToImplement	0..1	Duration	(NC) inherited from: RemedialAction
normalAvailable	0..1	Boolean	(NC) inherited from: RemedialAction
impactThresholdMargin	0..1	PerCent	(NC) inherited from: RemedialAction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4431

4432 Table 352 shows all association ends of PowerRemedialAction with other classes.

4433 **Table 352 – Association ends of ExtRemedialAction::PowerRemedialAction with other classes**

4434

mult from	name	mult to	type	description
0..*	BiddingZone	0..1	BiddingZone	(NC) The Bidding Zone where the power remedial action is done.

mult from	name	mult to	type	description
0..*	BiddingZoneBorder	0..1	BiddingZoneBorder	(NC) Bidding zone border where the power remedial action is done.
0..1	PowerShiftKeyStrategy	0..*	PowerShiftKeyStrategy	(NC) Power Shift Key Strategy which applies to this power remedial action.
0..1	PowerBidSchedule	0..*	PowerBidSchedule	(NC) Power bid schedule addressing the power remedial action.
0..1	PowerRemedialActionSchedule	0..*	PowerRemedialActionSchedule	(NC) Power remedial action schedule which has a power remedial action.
0..1	PowerSchedule	0..*	PowerSchedule	(NC) Power schedule which contains the power remedial action.
0..1	ContingencyWithRemedialAction	0..*	ContingencyWithRemedialAction	(NC) inherited from: RemedialAction
1..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) inherited from: RemedialAction
0..1	DependentRemedialAction	0..*	RemedialActionDependency	(NC) inherited from: RemedialAction
0..1	GenericAvailableSchedule	0..*	GenericAvailableSchedule	(NC) inherited from: RemedialAction
0..*	ImpactedOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToRegion	0..1	Region	(NC) inherited from: RemedialAction
0..1	AssessedElementWithRemedialAction	0..*	AssessedElementWithRemedialAction	(NC) inherited from: RemedialAction
0..1	RemedialActionOutcomeValue	0..*	RemedialActionOutcomeValue	(NC) inherited from: RemedialAction
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: RemedialAction
0..*	RemedialActionSystemOperator	0..1	SystemOperator	(NC) inherited from: RemedialAction
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) inherited from: RemedialAction
1..1	RemedialActionApplied	0..*	RemedialActionApplied	(NC) inherited from: RemedialAction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4435

4436 **3.14.53 (NC) EquipmentControllerAction**4437 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :

4438 ExtEulIdentifiedObject : Identity

4439 Action for setting the equipment controller action.

4440 Table 353 shows all attributes of EquipmentControllerAction.

4441 **Table 353 – Attributes of ExtRemedialAction::EquipmentControllerAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration

name	mult	type	description
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 354 shows all association ends of EquipmentControllerAction with other classes.

Table 354 – Association ends of ExtRemedialAction::EquipmentControllerAction with other classes

mult from	name	mult to	type	description
0..*	EquipmentController	1..1	EquipmentController	(NC) Equipment controller that has associated equipment controller actions.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.14.54 (NC) RemedialActionGroup

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject : Identity

Grouping of remedial actions that can be operated together.

Table 355 shows all attributes of RemedialActionGroup.

4451

Table 355 – Attributes of ExtRemedialAction::RemedialActionGroup

name	mult	type	description
maxRegulatingDown	0..1	ActivePower	(NC) Maximum net amount of active power that the group of remedial actions can regulate down.
maxRegulatingUp	0..1	ActivePower	(NC) Maximum net amount of active power that the group of remedial actions can regulate up.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4452

4453 Table 356 shows all association ends of RemedialActionGroup with other classes.

4454 **Table 356 – Association ends of ExtRemedialAction::RemedialActionGroup with other**
4455 **classes**

mult from	name	mult to	type	description
0..1	RemedialActionOutcome Value	0..*	RemedialActionOutcome Value	(NC) The remedial action outcome value associated with a remedial action group.
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) This is the impact for a given remedial action group.
0..1	RemedialAction	0..*	RemedialActionDependency	(NC) Remedial action dependency on a remedial action group.
0..1	RemedialActionGroupSchedule	0..*	RemedialActionGroupSchedule	(NC) Remedial action group schedule associated with a remedial action group.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4456

4457 **3.14.55 (NC) InServiceAction**4458 Inheritance path = [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity4459 In service action represents a change of the status of the equipment in the grid model compared
4460 to the base case.

4461 Table 357 shows all attributes of InServiceAction.

4462 **Table 357 – Attributes of ExtRemedialAction::InServiceAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration

name	mult	type	description
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4463

4464

Table 358 shows all association ends of InServiceAction with other classes.

4465

Table 358 – Association ends of ExtRemedialAction::InServiceAction with other classes

mult from	name	mult to	type	description
0..*	Equipment	1..1	Equipment	(NC) Equipment that has a in service action associated.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	GridStateAlterationSchedule	0..*	GridStateAlterationSchedule	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4466

4467

3.14.56 (NC) RemedialActionScheduleDependency root class

4468

Remedial action schedule dependency is making two remedial action schedules depending on each other.

4469

4470

Table 359 shows all attributes of RemedialActionScheduleDependency.

4471

Table 359 – Attributes of ExtRemedialAction::RemedialActionScheduleDependency

name	mult	type	description
kind	0..1	RemedialActionScheduleDependencyKind	(NC) Type of dependency between two remedial action schedules.
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC

name	mult	type	description
			4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

Table 360 shows all association ends of RemedialActionScheduleDependency with other classes.

Table 360 – Association ends of ExtRemedialAction::RemedialActionScheduleDependency with other classes

mult from	name	mult to	type	description
0..*	ProposedRemedialActionSchedule	0..1	RemedialActionSchedule	(NC) Proposed remedial action schedule that has dependency.
0..*	ReplacedRemedialActionSchedule	0..1	RemedialActionSchedule	(NC) Remedial action schedule that is replaced by dependent remedial action schedule.
0..*	RemedialActionScheduleGroup	0..1	RemedialActionScheduleGroup	(NC) Remedial action schedule group which has remedial action schedule dependency.

3.14.57 (NC) RemedialActionScheduleDependencyKind enumeration

Kind of dependency between remedial action schedules.

Table 361 shows all literals of RemedialActionScheduleDependencyKind.

Table 361 – Literals of ExtRemedialAction::RemedialActionScheduleDependencyKind

literal	value	description
exclusive		Remedial action schedules are exclusive depending on each other. e.g. Only one of the remedial action schedules can be selected at the same time.
inclusive		Remedial action schedules are inclusive depending on each other. e.g. Both remedial action schedules need to be picked if one of them is needed.
none		Remedial action schedules are not depending on each other. However, the two remedial action schedules should be evaluated together.

3.14.58 (NC) RejectionReasonKind enumeration

The kind of rejection reason.

Table 362 shows all literals of RejectionReasonKind.

Table 362 – Literals of ExtRemedialAction::RejectionReasonKind

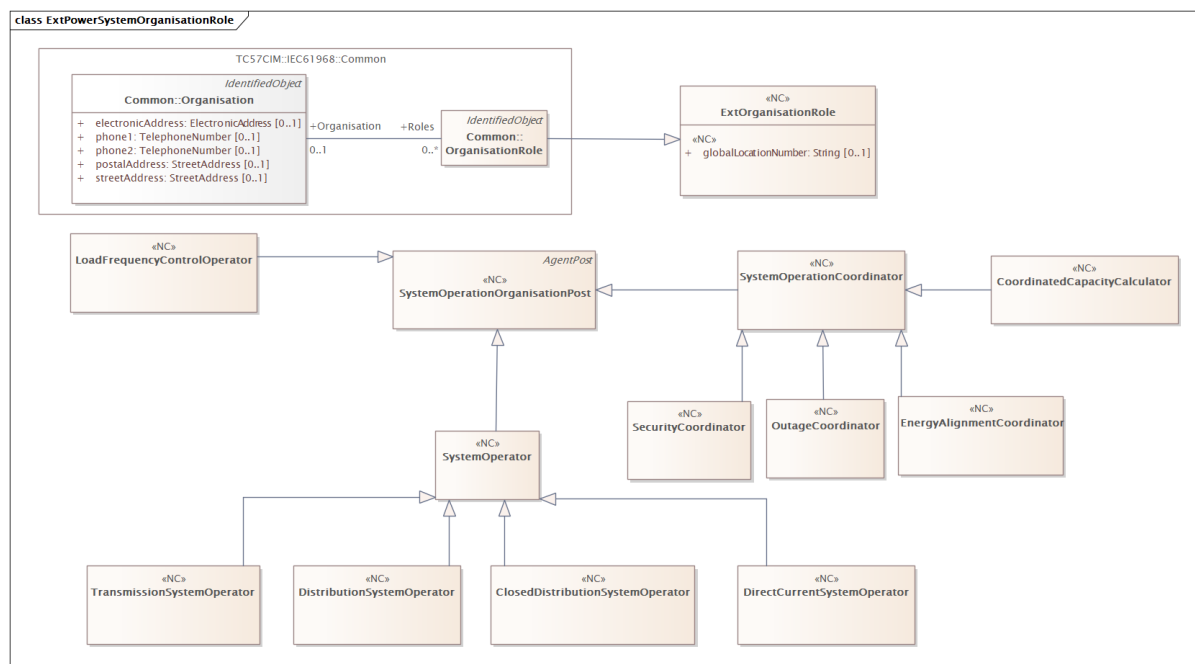
literal	value	description
securityLimit		The rejection is due to security limit violation.
notAvailable		The rejection is due to unavailability of the object.
other		The rejection is due to other more complex reason or the details are unknown.

literal	value	description
madeAlternative		The rejection is due to a proposal of an alternative remedial action.
noTimeToImplement		The rejection is due to lack of time to realise the proposed remedial action.

4487

4488 **3.15 Package ExtRole**4489 **3.15.1 General**

4490 This package contains the extensions related to the roles.



4491

4492 **Figure 32 – Class diagram ExtRole::ExtPowerSystemOrganisationRole**

4493 Figure 32: The diagram contains classes related to power system organization role.

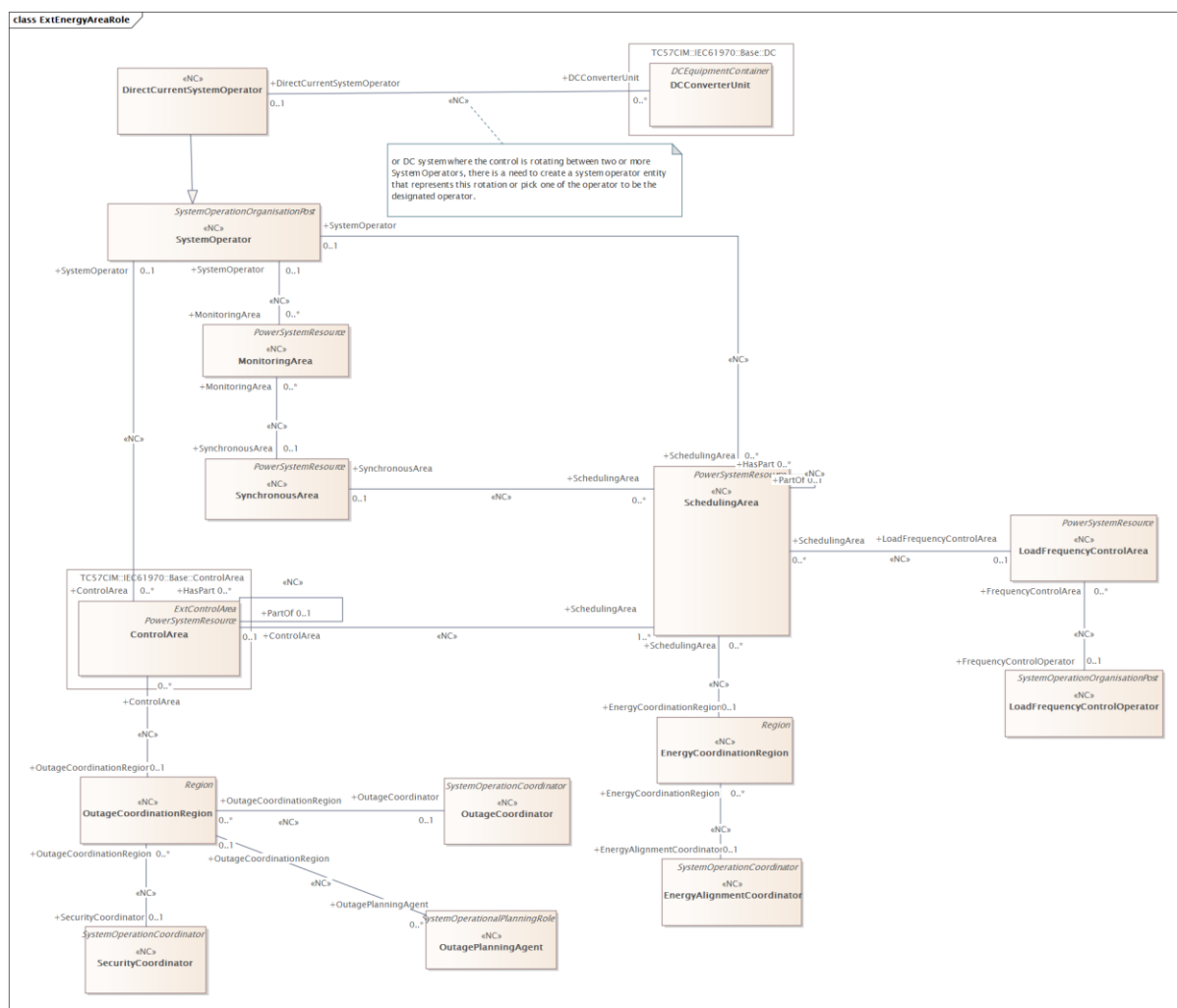


Figure 33 – Class diagram ExtRole::ExtEnergyAreaRole

Figure 33: The diagram contains classes related to energy area role.

3.15.2 (NC) CoordinatedCapacityCalculator

Inheritance path = [SystemOperationCoordinator](#) : [SystemOperationOrganisationPost](#) : AgentPost : IdentifiedObject : ExtEulIdentifiedObject : Identity

A post that coordinates and executes the task of calculating transmission capacity.

Table 363 shows all attributes of CoordinatedCapacityCalculator.

Table 363 – Attributes of ExtRole::CoordinatedCapacityCalculator

name	mult	type	description
validFrom	0..1	DateTime	inherited from: AgentPost
validTo	0..1	DateTime	inherited from: AgentPost
econClassCode	0..1	String	inherited from: AgentPost
econClassRef	0..1	NullCIM	inherited from: AgentPost
glnCode	0..1	String	inherited from: AgentPost
glnRef	0..1	NullCIM	inherited from: AgentPost
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 364 shows all association ends of CoordinatedCapacityCalculator with other classes.

Table 364 – Association ends of ExtRole::CoordinatedCapacityCalculator with other classes

mult from	name	mult to	type	description
0..1	CapacityCalculationRegion	0..*	CapacityCalculationRegion	(NC) Capacity calculation region in which the capacity is calculated by the coordinated capacity calculator.
1..1	PostAssignment	0..*	PostAssignment	inherited from: AgentPost
0..*	NormalAgent	0..1	Agent	inherited from: AgentPost
1..1	AgentPostRole	0..*	AgentPostRole	inherited from: AgentPost
0..1	ContactPoint	0..*	ContactPoint	inherited from: AgentPost
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.15.3 (NC) ClosedDistributionSystemOperator

Inheritance path = [SystemOperator](#) : [SystemOperationOrganisationPost](#) : AgentPost : IdentifiedObject : ExtEulIdentifiedObject : Identity

A system operator which distributes electricity (or gas) within a geographically confined industrial, commercial or shared services and does not supply household customers.

Table 365 shows all attributes of ClosedDistributionSystemOperator.

Table 365 – Attributes of ExtRole::ClosedDistributionSystemOperator

name	mult	type	description
validFrom	0..1	DateTime	inherited from: AgentPost
validTo	0..1	DateTime	inherited from: AgentPost
econClassCode	0..1	String	inherited from: AgentPost
econClassRef	0..1	NullCIM	inherited from: AgentPost
glnCode	0..1	String	inherited from: AgentPost
glnRef	0..1	NullCIM	inherited from: AgentPost
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 366 shows all association ends of ClosedDistributionSystemOperator with other classes.

Table 366 – Association ends of ExtRole::ClosedDistributionSystemOperator with other classes

mult from	name	mult to	type	description
0..1	ControlArea	0..*	ControlArea	(NC) inherited from: SystemOperator
0..1	Contingency	0..*	Contingency	(NC) inherited from: SystemOperator
0..1	Fault	0..*	Fault	(NC) inherited from: SystemOperator
0..1	SchedulingArea	0..*	SchedulingArea	(NC) inherited from: SystemOperator
0..1	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: SystemOperator
1..1	OutcomeValue	0..*	OutcomeValue	(NC) inherited from: SystemOperator
0..1	RemedialAction	0..*	RemedialAction	(NC) inherited from: SystemOperator
0..1	ProposingRemedialActionScheduleShare	0..*	ProposingRemedialActionScheduleShare	(NC) inherited from: SystemOperator
0..1	PowerSystemProject	0..*	PowerSystemProject	(NC) inherited from: SystemOperator
0..1	AssessedElement	0..*	AssessedElement	(NC) inherited from: SystemOperator
0..1	AvailabilityPlan	0..*	AvailabilityPlan	(NC) inherited from: SystemOperator
0..1	OwnerRemedialActionAssessment	0..*	OwnerRemedialActionAssessment	(NC) inherited from: SystemOperator
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) inherited from: SystemOperator
0..1	RemedialActionScheduleResponse	0..*	RemedialActionScheduleResponse	(NC) inherited from: SystemOperator
1..1	PostAssignment	0..*	PostAssignment	inherited from: AgentPost
0..*	NormalAgent	0..1	Agent	inherited from: AgentPost
1..1	AgentPostRole	0..*	AgentPostRole	inherited from: AgentPost
0..1	ContactPoint	0..*	ContactPoint	inherited from: AgentPost
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.15.4 (NC) DirectCurrentSystemOperator

Inheritance path = [SystemOperator](#) : [SystemOperationOrganisationPost](#) : AgentPost : IdentifiedObject : ExtEulIdentifiedObject : Identity

System operator of the direct current pole. There are typically one or two system operators that are operating either the control area at one side or the control areas at both sides of the direct current pole. In some cases it is operated by an operator from the connected control areas.

Table 367 shows all attributes of DirectCurrentSystemOperator.

4527

Table 367 – Attributes of ExtRole::DirectCurrentSystemOperator

name	mult	type	description
validFrom	0..1	DateTime	inherited from: AgentPost
validTo	0..1	DateTime	inherited from: AgentPost
econClassCode	0..1	String	inherited from: AgentPost
econClassRef	0..1	NullCIM	inherited from: AgentPost
glnCode	0..1	String	inherited from: AgentPost
glnRef	0..1	NullCIM	inherited from: AgentPost
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4528

4529 Table 368 shows all association ends of DirectCurrentSystemOperator with other classes.

Table 368 – Association ends of ExtRole::DirectCurrentSystemOperator with other classes4530
4531

mult from	name	mult to	type	description
0..1	DCConverterUnit	0..*	DCConverterUnit	(NC) The DC converter unit operated by this direct current system operator.
0..1	ControlArea	0..*	ControlArea	(NC) inherited from: SystemOperator
0..1	Contingency	0..*	Contingency	(NC) inherited from: SystemOperator
0..1	Fault	0..*	Fault	(NC) inherited from: SystemOperator
0..1	SchedulingArea	0..*	SchedulingArea	(NC) inherited from: SystemOperator
0..1	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: SystemOperator
1..1	OutcomeValue	0..*	OutcomeValue	(NC) inherited from: SystemOperator
0..1	RemedialAction	0..*	RemedialAction	(NC) inherited from: SystemOperator
0..1	ProposingRemedialActionScheduleShare	0..*	ProposingRemedialActionScheduleShare	(NC) inherited from: SystemOperator
0..1	PowerSystemProject	0..*	PowerSystemProject	(NC) inherited from: SystemOperator
0..1	AssessedElement	0..*	AssessedElement	(NC) inherited from: SystemOperator
0..1	AvailabilityPlan	0..*	AvailabilityPlan	(NC) inherited from: SystemOperator
0..1	OwnerRemedialActionAssessment	0..*	OwnerRemedialActionAssessment	(NC) inherited from: SystemOperator
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) inherited from: SystemOperator
0..1	RemedialActionScheduleResponse	0..*	RemedialActionScheduleResponse	(NC) inherited from: SystemOperator
1..1	PostAssignment	0..*	PostAssignment	inherited from: AgentPost
0..*	NormalAgent	0..1	Agent	inherited from: AgentPost
1..1	AgentPostRole	0..*	AgentPostRole	inherited from: AgentPost
0..1	ContactPoint	0..*	ContactPoint	inherited from: AgentPost

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4532

4533 **3.15.5 (NC) DistributionSystemOperator**

4534 Inheritance path = [SystemOperator](#) : [SystemOperationOrganisationPost](#) : AgentPost :
 4535 IdentifiedObject : ExtEulIdentifiedObject : Identity

4536 A system operator that is responsible for operating of energy distribution network from
 4537 transmission level down to low voltage levels including the connection to household.

4538 Table 369 shows all attributes of DistributionSystemOperator.

4539 **Table 369 – Attributes of ExtRole::DistributionSystemOperator**

name	mult	type	description
validFrom	0..1	DateTime	inherited from: AgentPost
validTo	0..1	DateTime	inherited from: AgentPost
econClassCode	0..1	String	inherited from: AgentPost
econClassRef	0..1	NullCIM	inherited from: AgentPost
glnCode	0..1	String	inherited from: AgentPost
glnRef	0..1	NullCIM	inherited from: AgentPost
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4540

4541 Table 370 shows all association ends of DistributionSystemOperator with other classes.

4542 **Table 370 – Association ends of ExtRole::DistributionSystemOperator with other**
 4543 **classes**

mult from	name	mult to	type	description
0..1	ControlArea	0..*	ControlArea	(NC) inherited from: SystemOperator
0..1	Contingency	0..*	Contingency	(NC) inherited from: SystemOperator
0..1	Fault	0..*	Fault	(NC) inherited from: SystemOperator
0..1	SchedulingArea	0..*	SchedulingArea	(NC) inherited from: SystemOperator
0..1	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: SystemOperator
1..1	OutcomeValue	0..*	OutcomeValue	(NC) inherited from: SystemOperator
0..1	RemedialAction	0..*	RemedialAction	(NC) inherited from: SystemOperator
0..1	ProposingRemedialActionScheduleShare	0..*	ProposingRemedialActionScheduleShare	(NC) inherited from: SystemOperator

mult from	name	mult to	type	description
0..1	PowerSystemProject	0..*	PowerSystemProject	(NC) inherited from: SystemOperator
0..1	AssessedElement	0..*	AssessedElement	(NC) inherited from: SystemOperator
0..1	AvailabilityPlan	0..*	AvailabilityPlan	(NC) inherited from: SystemOperator
0..1	OwnerRemedialActionAssessment	0..*	OwnerRemedialActionAssessment	(NC) inherited from: SystemOperator
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) inherited from: SystemOperator
0..1	RemedialActionScheduleResponse	0..*	RemedialActionScheduleResponse	(NC) inherited from: SystemOperator
1..1	PostAssignment	0..*	PostAssignment	inherited from: AgentPost
0..*	NormalAgent	0..1	Agent	inherited from: AgentPost
1..1	AgentPostRole	0..*	AgentPostRole	inherited from: AgentPost
0..1	ContactPoint	0..*	ContactPoint	inherited from: AgentPost
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4544

4545 **3.15.6 (NC) EnergyAlignmentCoordinator**

4546 Inheritance path = [SystemOperationCoordinator](#) : [SystemOperationOrganisationPost](#) :
 4547 AgentPost : IdentifiedObject : ExtEulIdentifiedObject : Identity

4548 A post that is responsible for alignment of forecast and schedule energy to a given energy
 4549 coordination region.

4550 Table 371 shows all attributes of EnergyAlignmentCoordinator.

4551 **Table 371 – Attributes of ExtRole::EnergyAlignmentCoordinator**

name	mult	type	description
validFrom	0..1	DateTime	inherited from: AgentPost
validTo	0..1	DateTime	inherited from: AgentPost
econClassCode	0..1	String	inherited from: AgentPost
econClassRef	0..1	NullCIM	inherited from: AgentPost
glnCode	0..1	String	inherited from: AgentPost
glnRef	0..1	NullCIM	inherited from: AgentPost
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4552

4553 Table 372 shows all association ends of EnergyAlignmentCoordinator with other classes.

Table 372 – Association ends of ExtRole::EnergyAlignmentCoordinator with other classes

mult from	name	mult to	type	description
0..1	EnergyCoordinationRegion	0..*	EnergyCoordinationRegion	(NC) The energy coordination region that has this energy alignment coordinator.
1..1	PostAssignment	0..*	PostAssignment	inherited from: AgentPost
0..*	NormalAgent	0..1	Agent	inherited from: AgentPost
1..1	AgentPostRole	0..*	AgentPostRole	inherited from: AgentPost
0..1	ContactPoint	0..*	ContactPoint	inherited from: AgentPost
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.15.7 (NC) ExtOrganisationRole root class

Organisation role NC extension class.

Table 373 shows all attributes of ExtOrganisationRole.

Table 373 – Attributes of ExtRole::ExtOrganisationRole

name	mult	type	description
globalLocationNumber	0..1	String	(NC) The Global Location Number (GLN) is part of the GS1 systems of standards. GLN is a 13-digit number structured that include GS1 Company Prefix, Location Reference (N1-N12) and Check Digit (N13). GS1 is a neutral, not-for-profit, international organisation that develops and maintains standards for supply and demand chains across multiple sectors.

3.15.8 (NC) LoadFrequencyControlOperator

Inheritance path = [SystemOperationOrganisationPost](#) : AgentPost : IdentifiedObject : ExtEuIdentifiedObject : Identity

A post that is responsible for operational security by operating the load frequency control (LFC) mechanism.

Table 374 shows all attributes of LoadFrequencyControlOperator.

Table 374 – Attributes of ExtRole::LoadFrequencyControlOperator

name	mult	type	description
validFrom	0..1	DateTime	inherited from: AgentPost
validTo	0..1	DateTime	inherited from: AgentPost
econClassCode	0..1	String	inherited from: AgentPost
econClassRef	0..1	NullCIM	inherited from: AgentPost
glnCode	0..1	String	inherited from: AgentPost
glnRef	0..1	NullCIM	inherited from: AgentPost

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 375 shows all association ends of LoadFrequencyControlOperator with other classes.

Table 375 – Association ends of ExtRole::LoadFrequencyControlOperator with other classes

mult from	name	mult to	type	description
0..1	FrequencyControlArea	0..*	LoadFrequencyControlArea	(NC) The frequency control area that has this frequency control operator.
1..1	PostAssignment	0..*	PostAssignment	inherited from: AgentPost
0..*	NormalAgent	0..1	Agent	inherited from: AgentPost
1..1	AgentPostRole	0..*	AgentPostRole	inherited from: AgentPost
0..1	ContactPoint	0..*	ContactPoint	inherited from: AgentPost
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.15.9 (NC) OutageCoordinator

Inheritance path = [SystemOperationCoordinator](#) : [SystemOperationOrganisationPost](#) : AgentPost : IdentifiedObject : ExtEulIdentifiedObject : Identity

A post that coordinates the planned availability status of relevant power system equipment to meet the need by the asset owner or operator and the security of the power system.

Table 376 shows all attributes of OutageCoordinator.

Table 376 – Attributes of ExtRole::OutageCoordinator

name	mult	type	description
validFrom	0..1	DateTime	inherited from: AgentPost
validTo	0..1	DateTime	inherited from: AgentPost
econClassCode	0..1	String	inherited from: AgentPost
econClassRef	0..1	NullCIM	inherited from: AgentPost
glnCode	0..1	String	inherited from: AgentPost
glnRef	0..1	NullCIM	inherited from: AgentPost
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 377 shows all association ends of OutageCoordinator with other classes.

Table 377 – Association ends of ExtRole::OutageCoordinator with other classes

mult from	name	mult to	type	description
0..1	OutageCoordinationRegion	0..*	OutageCoordinationRegion	(NC) The outage coordination region that has this outage coordinator.
0..1	AvailabilityPlan	0..*	AvailabilityPlan	(NC) The AvailabilityPlans for which this Outage Coordinator is responsible for approval.
0..1	AvailabilityPlanResponse	0..*	AvailabilityPlanResponse	(NC) The AvailabilityPlan responses provided by this Outage Coordinator.
0..1	OutageRequest	0..*	OutageRequest	(NC) Responses issued by the coordinator as part of the outage coordination process.
0..1	OutageResponse	0..*	OutageResponse	(NC) Responses issued by the coordinator as part of the outage coordination process.
1..1	PostAssignment	0..*	PostAssignment	inherited from: AgentPost
0..*	NormalAgent	0..1	Agent	inherited from: AgentPost
1..1	AgentPostRole	0..*	AgentPostRole	inherited from: AgentPost
0..1	ContactPoint	0..*	ContactPoint	inherited from: AgentPost
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.15.10 (NC) OutagePlanningAgent

Inheritance path = SystemOperationalPlanningRole : AgentPostRole

An entity with the task of planning the availability status of a relevant power generating module, a relevant demand facility or a relevant grid element.

Table 378 shows all attributes of OutagePlanningAgent.

Table 378 – Attributes of ExtRole::OutagePlanningAgent

name	mult	type	description
mRID	0..1	String	inherited from: AgentPostRole

Table 379 shows all association ends of OutagePlanningAgent with other classes.

4593 **Table 379 – Association ends of ExtRole::OutagePlanningAgent with other classes**

mult from	name	mult to	type	description
0..*	OutageCoordinationRegion	0..1	OutageCoordinationRegion	(NC) Outage coordination region that this agent has outage planning responsible.
0..1	OutageRequest	0..*	OutageRequest	(NC) Outage requests initiated by this planning agent.
0..1	OutageResponse	0..*	OutageResponse	(NC) Responses issued by this planning agent to outage requests submitted by other actors.
0..*	AgentPost	1..1	AgentPost	inherited from: AgentPostRole

4594

4595 **3.15.11 (NC) SystemOperationOrganisationPost**

4596 Inheritance path = AgentPost : IdentifiedObject : ExtEulIdentifiedObject : Identity

4597 A responsibility-bearing ecosystem post for system operation, held by an agent acting on behalf
 4598 of an organisation, with accountability for coordinating and executing operational functions
 4599 necessary to maintain the secure and reliable operation of the power system within a defined
 4600 scope (e.g., network area, control area, voltage level, or set of resources).

4601 Note: This post is defined from the power system ecosystem viewpoint and may be reassigned
 4602 over time. It covers operational accountability (planning, monitoring, switching/dispatch
 4603 coordination, and operational communication) for the applicable scope, rather than ownership
 4604 of the resources themselves.

4605 Table 380 shows all attributes of SystemOperationOrganisationPost.

4606 **Table 380 – Attributes of ExtRole::SystemOperationOrganisationPost**

name	mult	type	description
validFrom	0..1	DateTime	inherited from: AgentPost
validTo	0..1	DateTime	inherited from: AgentPost
econClassCode	0..1	String	inherited from: AgentPost
econClassRef	0..1	NullCIM	inherited from: AgentPost
glnCode	0..1	String	inherited from: AgentPost
glnRef	0..1	NullCIM	inherited from: AgentPost
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4607

4608 Table 381 shows all association ends of SystemOperationOrganisationPost with other classes.

4609 **Table 381 – Association ends of ExtRole::SystemOperationOrganisationPost with other classes**
4610

mult from	name	mult to	type	description
1..1	PostAssignment	0..*	PostAssignment	inherited from: AgentPost

mult from	name	mult to	type	description
0..*	NormalAgent	0..1	Agent	inherited from: AgentPost
1..1	AgentPostRole	0..*	AgentPostRole	inherited from: AgentPost
0..1	ContactPoint	0..*	ContactPoint	inherited from: AgentPost
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4611

4612 **3.15.12 (NC) SecurityCoordinator**

4613 Inheritance path = [SystemOperationCoordinator](#) : [SystemOperationOrganisationPost](#) :

4614 AgentPost : IdentifiedObject : ExtEulIdentifiedObject : Identity

4615 A post that coordinates the relevant remedial actions and their optimisation to ensure efficient

4616 use to achieve required operational security of the power system.

4617 Table 382 shows all attributes of SecurityCoordinator.

Table 382 – Attributes of ExtRole::SecurityCoordinator

name	mult	type	description
validFrom	0..1	DateTime	inherited from: AgentPost
validTo	0..1	DateTime	inherited from: AgentPost
econClassCode	0..1	String	inherited from: AgentPost
econClassRef	0..1	NullCIM	inherited from: AgentPost
glnCode	0..1	String	inherited from: AgentPost
glnRef	0..1	NullCIM	inherited from: AgentPost
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4619

4620 Table 383 shows all association ends of SecurityCoordinator with other classes.

Table 383 – Association ends of ExtRole::SecurityCoordinator with other classes

mult from	name	mult to	type	description
0..1	OutageCoordinationRegion	0..*	OutageCoordinationRegion	(NC) The outage coordination region that has this security coordinator.
0..1	CapacityCalculationRegion	0..*	CapacityCalculationRegion	(NC) The capacity calculation region operated by this security coordinator.
0..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) Remedial action schedule for this security coordinator.
1..1	PostAssignment	0..*	PostAssignment	inherited from: AgentPost

mult from	name	mult to	type	description
0..*	NormalAgent	0..1	Agent	inherited from: AgentPost
1..1	AgentPostRole	0..*	AgentPostRole	inherited from: AgentPost
0..1	ContactPoint	0..*	ContactPoint	inherited from: AgentPost
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.15.13 (NC) SystemOperator

Inheritance path = [SystemOperationOrganisationPost](#) : AgentPost : IdentifiedObject : ExtEulIdentifiedObject : Identity

A power system operation post responsible for performing and coordinating the real-time and planning functions required to maintain the secure, reliable, and efficient operation of the power system within a defined operational scope.

Note: SystemOperator represents the execution of power system operational responsibilities in practice. While the operational post exists independently at the ecosystem level, SystemOperator identifies the specific agent fulfilling that responsibility at a given time. The operational scope may correspond to a control area, network, voltage domain, or other defined boundary.

Table 384 shows all attributes of SystemOperator.

Table 384 – Attributes of ExtRole::SystemOperator

name	mult	type	description
validFrom	0..1	DateTime	inherited from: AgentPost
validTo	0..1	DateTime	inherited from: AgentPost
econClassCode	0..1	String	inherited from: AgentPost
econClassRef	0..1	NullCIM	inherited from: AgentPost
glnCode	0..1	String	inherited from: AgentPost
glnRef	0..1	NullCIM	inherited from: AgentPost
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 385 shows all association ends of SystemOperator with other classes.

Table 385 – Association ends of ExtRole::SystemOperator with other classes

mult from	name	mult to	type	description
0..1	ControlArea	0..*	ControlArea	(NC) The control area that is related to this system operator.

mult from	name	mult to	type	description
0..1	Contingency	0..*	Contingency	(NC) Contingency for the equipment that is operated by the system operator.
0..1	Fault	0..*	Fault	(NC) The faults that have occurred in this System Operator's control area.
0..1	SchedulingArea	0..*	SchedulingArea	(NC) The scheduling area that is operated by this system operator.
0..1	MonitoringArea	0..*	MonitoringArea	(NC) The monitoring area that is operated by this system operator.
1..1	OutcomeValue	0..*	OutcomeValue	(NC) Impact assessment outcome value for this impacted system operator.
0..1	RemedialAction	0..*	RemedialAction	(NC) Remedial action defined by this system operator.
0..1	ProposingRemedialActionScheduleShare	0..*	ProposingRemedialActionScheduleShare	(NC) Proposing remedial action schedule share which is made by the proposing entity.
0..1	PowerSystemProject	0..*	PowerSystemProject	(NC)
0..1	AssessedElement	0..*	AssessedElement	(NC) All relevant network elements on which operational security violations need to be managed in a coordinated way.
0..1	AvailabilityPlan	0..*	AvailabilityPlan	(NC) The AvailabilityPlans established or maintained by this System Operator.
0..1	OwnerRemedialActionAssessment	0..*	OwnerRemedialActionAssessment	(NC) Owner's assessment of the remedial action.
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) The remedial action impact for a given assessing System Operator.
0..1	RemedialActionScheduleResponse	0..*	RemedialActionScheduleResponse	(NC) Remedial action schedule response related to a system operator.
1..1	PostAssignment	0..*	PostAssignment	inherited from: AgentPost
0..*	NormalAgent	0..1	Agent	inherited from: AgentPost
1..1	AgentPostRole	0..*	AgentPostRole	inherited from: AgentPost
0..1	ContactPoint	0..*	ContactPoint	inherited from: AgentPost
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4639

4640 **3.15.14 (NC) SystemOperationCoordinator**

4641 Inheritance path = [SystemOperationOrganisationPost](#) : AgentPost : IdentifiedObject :
 4642 ExtEulIdentifiedObject : Identity

4643 A post that coordinates relevant information and impact in regards to operating the power
 4644 system.

4645 Table 386 shows all attributes of SystemOperationCoordinator.

4646 **Table 386 – Attributes of ExtRole::SystemOperationCoordinator**

name	mult	type	description
validFrom	0..1	DateTime	inherited from: AgentPost

name	mult	type	description
validTo	0..1	DateTime	inherited from: AgentPost
econClassCode	0..1	String	inherited from: AgentPost
econClassRef	0..1	NullCIM	inherited from: AgentPost
glnCode	0..1	String	inherited from: AgentPost
glnRef	0..1	NullCIM	inherited from: AgentPost
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 387 shows all association ends of SystemOperationCoordinator with other classes.

Table 387 – Association ends of ExtRole::SystemOperationCoordinator with other classes

mult from	name	mult to	type	description
1..1	PostAssignment	0..*	PostAssignment	inherited from: AgentPost
0..*	NormalAgent	0..1	Agent	inherited from: AgentPost
1..1	AgentPostRole	0..*	AgentPostRole	inherited from: AgentPost
0..1	ContactPoint	0..*	ContactPoint	inherited from: AgentPost
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.15.15 (NC) TransmissionSystemOperator

Inheritance path = [SystemOperator](#) : [SystemOperationOrganisationPost](#) : AgentPost : IdentifiedObject : ExtEulIdentifiedObject : Identity

A system operator role that is responsible for operating of an energy transmission network.

Table 388 shows all attributes of TransmissionSystemOperator.

Table 388 – Attributes of ExtRole::TransmissionSystemOperator

name	mult	type	description
validFrom	0..1	DateTime	inherited from: AgentPost
validTo	0..1	DateTime	inherited from: AgentPost
econClassCode	0..1	String	inherited from: AgentPost
econClassRef	0..1	NullCIM	inherited from: AgentPost
glnCode	0..1	String	inherited from: AgentPost
glnRef	0..1	NullCIM	inherited from: AgentPost
aliasName	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 389 shows all association ends of TransmissionSystemOperator with other classes.

Table 389 – Association ends of ExtRole::TransmissionSystemOperator with other classes

mult from	name	mult to	type	description
0..1	ControlArea	0..*	ControlArea	(NC) inherited from: SystemOperator
0..1	Contingency	0..*	Contingency	(NC) inherited from: SystemOperator
0..1	Fault	0..*	Fault	(NC) inherited from: SystemOperator
0..1	SchedulingArea	0..*	SchedulingArea	(NC) inherited from: SystemOperator
0..1	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: SystemOperator
1..1	OutcomeValue	0..*	OutcomeValue	(NC) inherited from: SystemOperator
0..1	RemedialAction	0..*	RemedialAction	(NC) inherited from: SystemOperator
0..1	ProposingRemedialActionScheduleShare	0..*	ProposingRemedialActionScheduleShare	(NC) inherited from: SystemOperator
0..1	PowerSystemProject	0..*	PowerSystemProject	(NC) inherited from: SystemOperator
0..1	AssessedElement	0..*	AssessedElement	(NC) inherited from: SystemOperator
0..1	AvailabilityPlan	0..*	AvailabilityPlan	(NC) inherited from: SystemOperator
0..1	OwnerRemedialActionAssessment	0..*	OwnerRemedialActionAssessment	(NC) inherited from: SystemOperator
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) inherited from: SystemOperator
0..1	RemedialActionScheduleResponse	0..*	RemedialActionScheduleResponse	(NC) inherited from: SystemOperator
1..1	PostAssignment	0..*	PostAssignment	inherited from: AgentPost
0..*	NormalAgent	0..1	Agent	inherited from: AgentPost
1..1	AgentPostRole	0..*	AgentPostRole	inherited from: AgentPost
0..1	ContactPoint	0..*	ContactPoint	inherited from: AgentPost
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.16 Security analysis result extensions

3.16.1 General

This package contains the extensions related to the security analysis result.

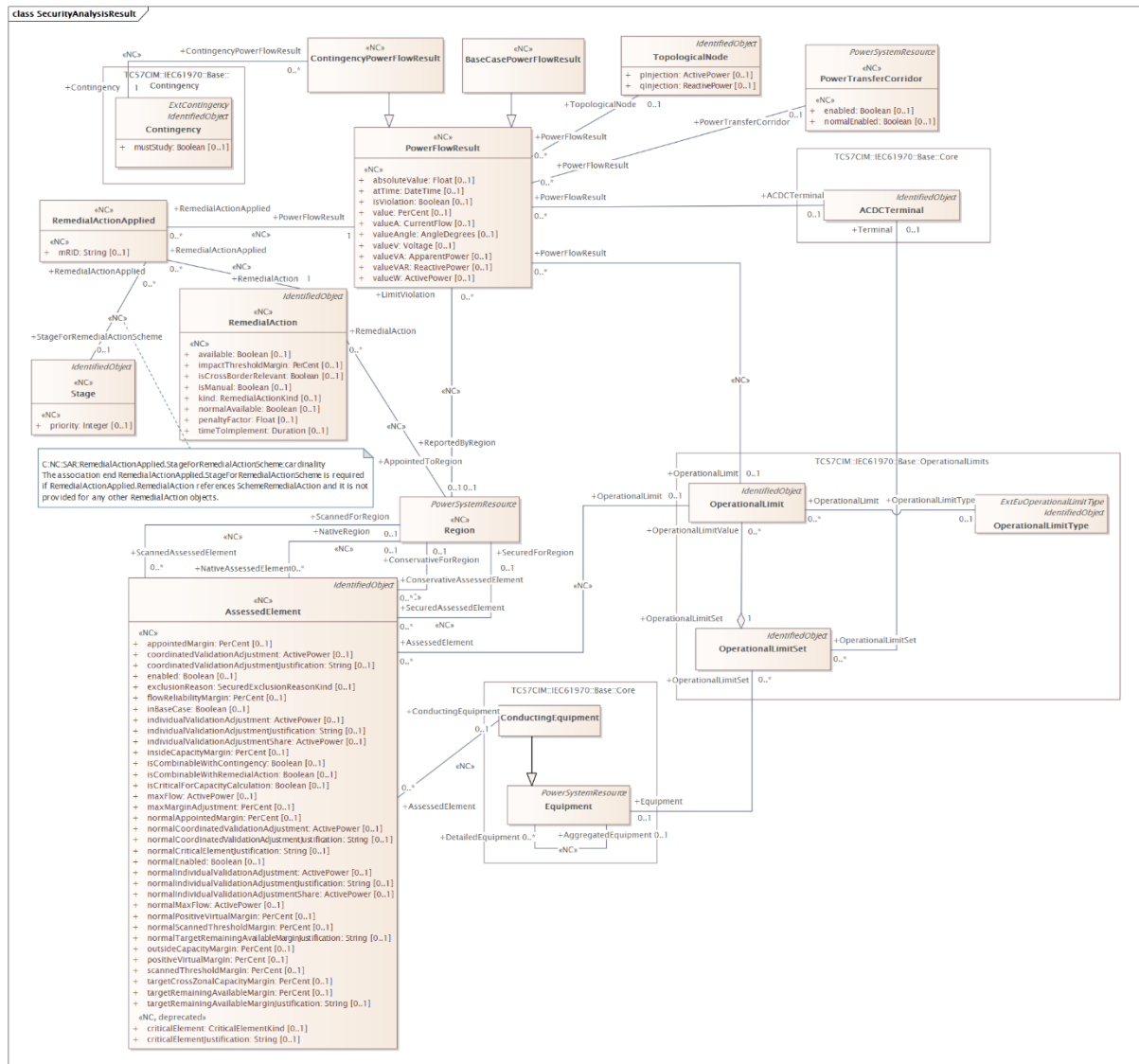


Figure 34 – Class diagram ExtSecurityAnalysisResult::SecurityAnalysisResult

Figure 34: The diagram contains classes related to the security analysis result.

3.16.2 (NC) BaseCasePowerFlowResult

Inheritance path = [PowerFlowResult](#)

Base case power flow result for a given terminal.

Table 390 shows all attributes of BaseCasePowerFlowResult.

Table 390 – Attributes of ExtSecurityAnalysisResult::BaseCasePowerFlowResult

name	mult	type	description
value	0..1	PerCent	(NC) inherited from: PowerFlowResult
absoluteValue	0..1	Float	(NC) inherited from: PowerFlowResult
atTime	0..1	DateTime	(NC) inherited from: PowerFlowResult
isViolation	0..1	Boolean	(NC) inherited from: PowerFlowResult
valueW	0..1	ActivePower	(NC) inherited from: PowerFlowResult
valueVA	0..1	ApparentPower	(NC) inherited from: PowerFlowResult

name	mult	type	description
valueV	0..1	Voltage	(NC) inherited from: PowerFlowResult
valueAngle	0..1	AngleDegrees	(NC) inherited from: PowerFlowResult
valueA	0..1	CurrentFlow	(NC) inherited from: PowerFlowResult
valueVAR	0..1	ReactivePower	(NC) inherited from: PowerFlowResult

Table 391 shows all association ends of BaseCasePowerFlowResult with other classes.

Table 391 – Association ends of ExtSecurityAnalysisResult::BaseCasePowerFlowResult with other classes

mult from	name	mult to	type	description
0..*	ACDCTerminal	0..1	ACDCTerminal	inherited from: PowerFlowResult
0..*	TopologicalNode	0..1	TopologicalNode	inherited from: PowerFlowResult
0..*	OperationalLimit	0..1	OperationalLimit	(NC) inherited from: PowerFlowResult
0..*	PowerTransferCorridor	0..1	PowerTransferCorridor	inherited from: PowerFlowResult
0..*	ReportedByRegion	0..1	Region	(NC) inherited from: PowerFlowResult
1..1	RemedialActionApplied	0..*	RemedialActionApplied	(NC) inherited from: PowerFlowResult

3.16.3 (NC) ContingencyPowerFlowResult

Inheritance path = [PowerFlowResult](#)

Contingency power flow result on a given terminal for a given contingency.

Table 392 shows all attributes of ContingencyPowerFlowResult.

Table 392 – Attributes of ExtSecurityAnalysisResult::ContingencyPowerFlowResult

name	mult	type	description
value	0..1	PerCent	(NC) inherited from: PowerFlowResult
absoluteValue	0..1	Float	(NC) inherited from: PowerFlowResult
atTime	0..1	DateTime	(NC) inherited from: PowerFlowResult
isViolation	0..1	Boolean	(NC) inherited from: PowerFlowResult
valueW	0..1	ActivePower	(NC) inherited from: PowerFlowResult
valueVA	0..1	ApparentPower	(NC) inherited from: PowerFlowResult
valueV	0..1	Voltage	(NC) inherited from: PowerFlowResult
valueAngle	0..1	AngleDegrees	(NC) inherited from: PowerFlowResult
valueA	0..1	CurrentFlow	(NC) inherited from: PowerFlowResult
valueVAR	0..1	ReactivePower	(NC) inherited from: PowerFlowResult

Table 393 shows all association ends of ContingencyPowerFlowResult with other classes.

Table 393 – Association ends of ExtSecurityAnalysisResult::ContingencyPowerFlowResult with other classes

mult from	name	mult to	type	description
0..*	Contingency	1..1	Contingency	(NC) The contingency that has this power flow result.
0..*	ACDCTerminal	0..1	ACDCTerminal	inherited from: PowerFlowResult

mult from	name	mult to	type	description
0..*	TopologicalNode	0..1	TopologicalNode	inherited from: PowerFlowResult
0..*	OperationalLimit	0..1	OperationalLimit	(NC) inherited from: PowerFlowResult
0..*	PowerTransferCorridor	0..1	PowerTransferCorridor	inherited from: PowerFlowResult
0..*	ReportedByRegion	0..1	Region	(NC) inherited from: PowerFlowResult
1..1	RemedialActionApplied	0..*	RemedialActionApplied	(NC) inherited from: PowerFlowResult

4688

4689 **3.16.4 (NC) PowerFlowResult root class**

4690 Power flow result including any operational limit violation.

4691 Table 394 shows all attributes of PowerFlowResult.

4692 **Table 394 – Attributes of ExtSecurityAnalysisResult::PowerFlowResult**

name	mult	type	description
value	0..1	PerCent	(NC) The value of the limit violation in percent related to the value of the operational limit that is violated. For instance, if the operational limit is 1000 A and the current flow is 1100 A the value is reported as 110 %.
absoluteValue	0..1	Float	(NC) Absolute value from a power flow calculation on a given terminal related to a given operational limit. For instance, if the operational limit is 1000 A and the current flow is 1100 A the absoluteValue is reported as 1100 A.
atTime	0..1	DateTime	(NC) The date and time of the scenario time that was studied and at which the limit violation occurred.
isViolation	0..1	Boolean	(NC) True if the power flow result is violating the associated operational limit. False if it is not violating the associated operational limits.
valueW	0..1	ActivePower	(NC) Active power value from a power flow calculation on a given terminal. Load sign convention is used, i.e. positive sign means flow out from a TopologicalNode (bus) into the conducting equipment.
valueVA	0..1	ApparentPower	(NC) Apparent power value from a power flow calculation on a given terminal.
valueV	0..1	Voltage	(NC) Voltage value from a power flow calculation on a given terminal. The attribute shall be a positive value.
valueAngle	0..1	AngleDegrees	(NC) Voltage angle value from a power flow calculation on a given terminal.
valueA	0..1	CurrentFlow	(NC) Current from a power flow calculation on a given terminal. The value shall be a positive value or zero.
valueVAR	0..1	ReactivePower	(NC) Reactive power value from a power flow calculation on a given terminal. Load sign convention is used, i.e. positive sign means flow out from a TopologicalNode (bus) into the conducting equipment.

4693

4694 Table 395 shows all association ends of PowerFlowResult with other classes.

Table 395 – Association ends of ExtSecurityAnalysisResult::PowerFlowResult with other classes

mult from	name	mult to	type	description
0..*	ACDCTerminal	0..1	ACDCTerminal	ACDC terminal where the powerflow result is located.
0..*	TopologicalNode	0..1	TopologicalNode	TopologicalNode that has this power flow result.
0..*	OperationalLimit	0..1	OperationalLimit	(NC) The operational limit that has this limit violation.
0..*	PowerTransferCorridor	0..1	PowerTransferCorridor	Power transfer corridor that has this power flow result.
0..*	ReportedByRegion	0..1	Region	(NC) The region which reports this limit violation.
1..1	RemedialActionApplied	0..*	RemedialActionApplied	(NC) Remedial action that is applied when the power flow result is calculated.

3.16.5 (NC) RemedialActionApplied root class

Remedial Action or Remedial Action Stage that has been applied to the power flow case which has the associated power flow result.

Table 396 shows all attributes of RemedialActionApplied.

Table 396 – Attributes of ExtSecurityAnalysisResult::RemedialActionApplied

name	mult	type	description
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

Table 397 shows all association ends of RemedialActionApplied with other classes.

Table 397 – Association ends of ExtSecurityAnalysisResult::RemedialActionApplied with other classes

mult from	name	mult to	type	description
0..*	RemedialAction	1..1	RemedialAction	(NC) Remedial action that is applied.
0..*	PowerFlowResult	1..1	PowerFlowResult	(NC) Power flow result that is obtained when the remedial action is applied.
0..*	StageForRemedialAction Scheme	0..1	Stage	(NC) The stage of the remedial action scheme that is applied.

3.17 (CIM18) Package ExtSecurityLimit**3.17.1 General**

This package contains the extensions related to the security limits.

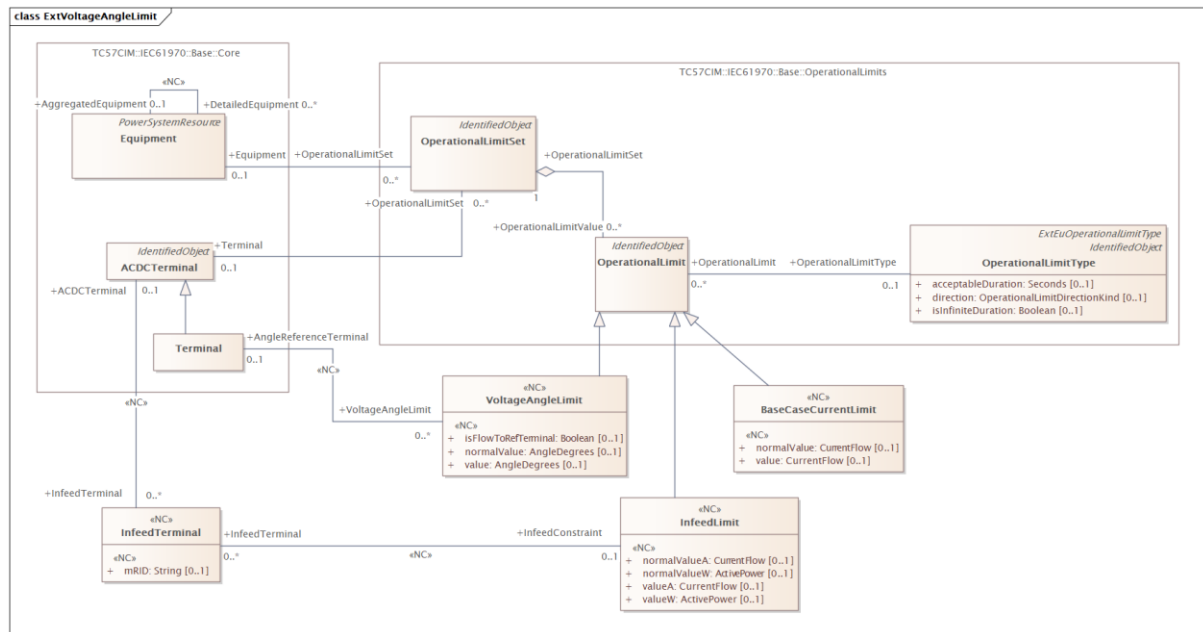


Figure 35 – Class diagram ExtSecurityLimit::ExtVoltageAngleLimit

Figure 35: The diagram contains classes related to voltage angle limit.

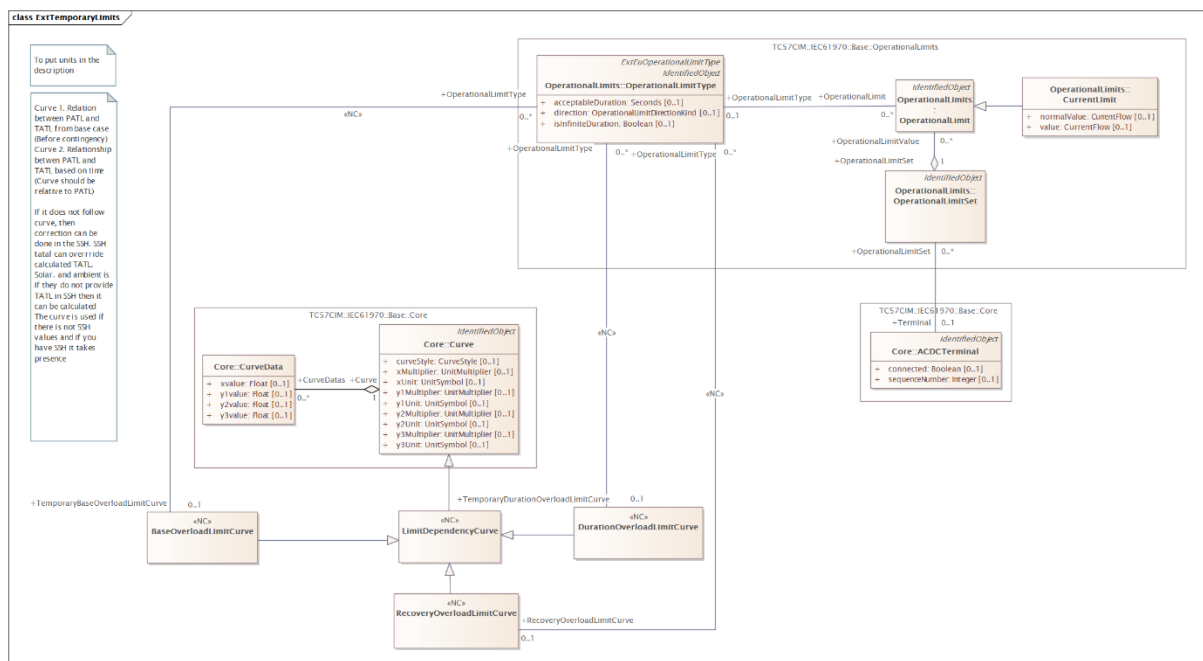


Figure 36 – Class diagram ExtSecurityLimit::ExtTemporaryLimits

Figure 36: The diagram contains classes related to temporary limits.

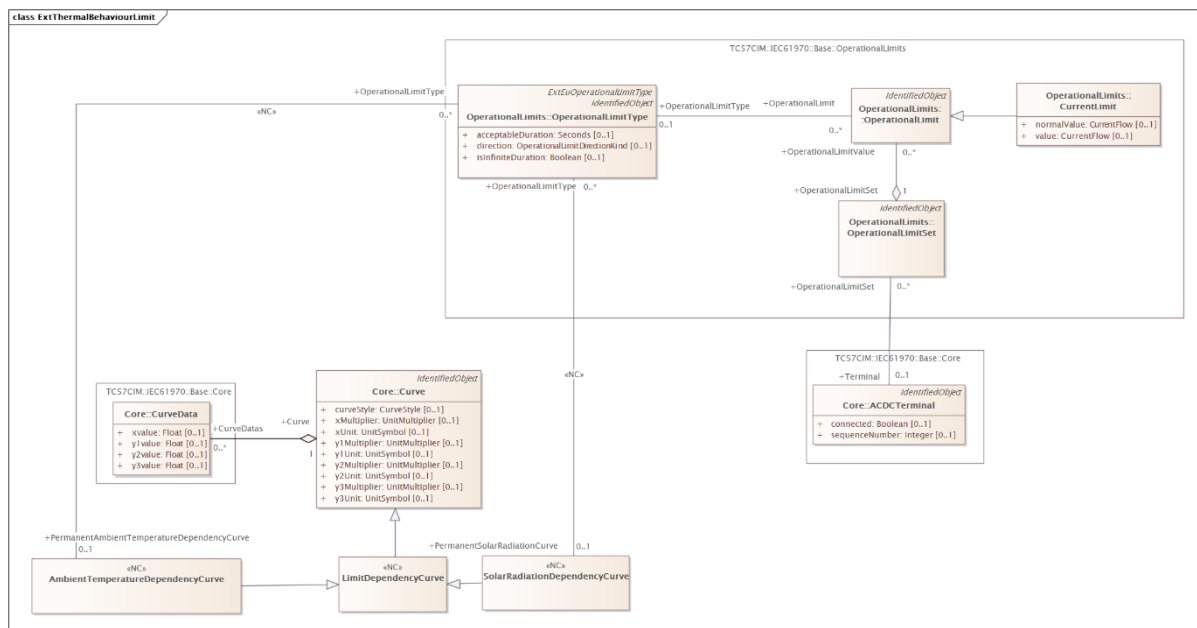


Figure 37 – Class diagram ExtSecurityLimit::ExtThermalBehaviourLimit

Figure 37: The diagram contains classes related to thermal behaviour limit.

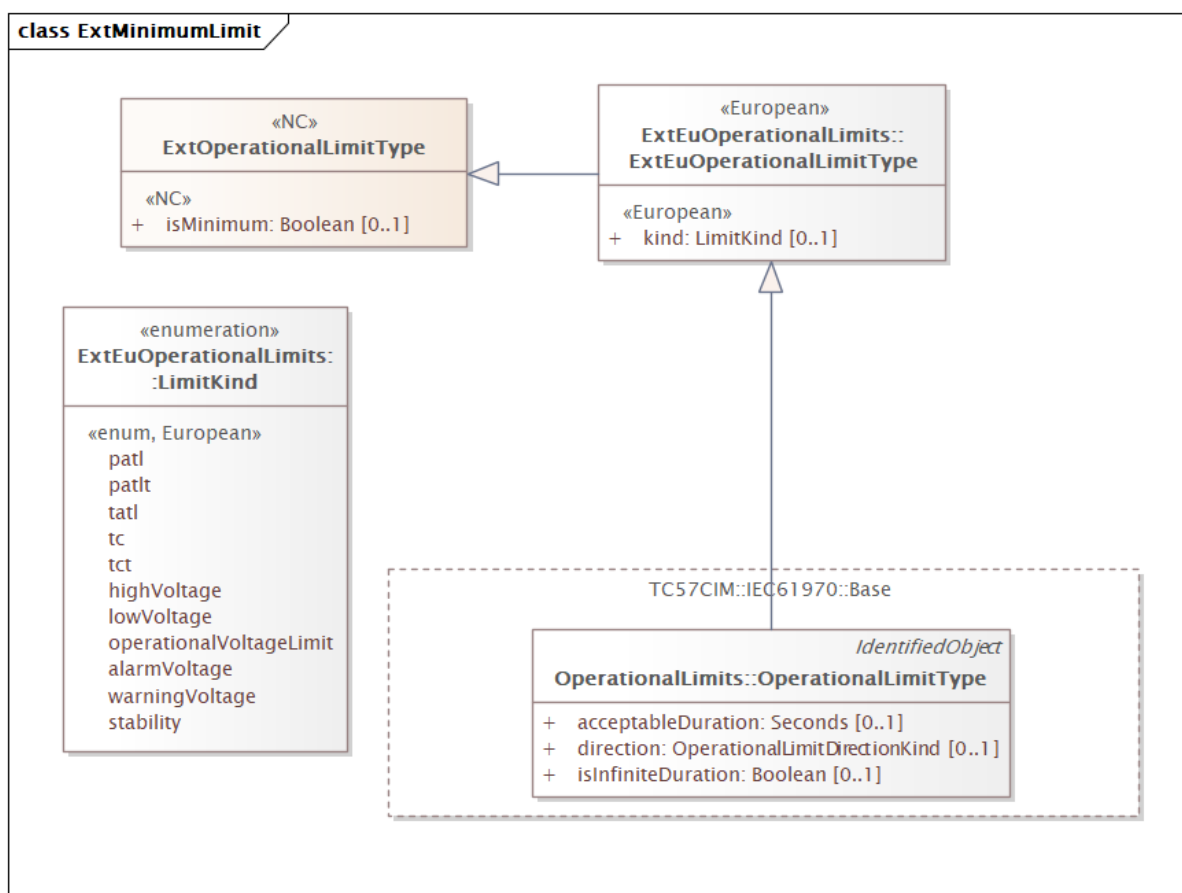


Figure 38 – Class diagram ExtSecurityLimit::ExtMinimumLimit

4722 Figure 38: The diagram contains classes related to minimum limit.

4723 3.17.2 (NC) AmbientTemperatureDependencyCurve

4724 Inheritance path = [LimitDependencyCurve](#) : Curve : IdentifiedObject : ExtEulIdentifiedObject :
4725 Identity

4726 A curve or functional relationship between the ambient temperature independent variable (X-
4727 axis) and relative temperature dependent (Y-axis) variables.

4728 Table 398 shows all attributes of AmbientTemperatureDependencyCurve.

4729 **Table 398 – Attributes of ExtSecurityLimit::AmbientTemperatureDependencyCurve**

name	mult	type	description
curveStyle	0..1	CurveStyle	inherited from: Curve
xMultiplier	0..1	UnitMultiplier	inherited from: Curve
xUnit	0..1	UnitSymbol	inherited from: Curve
y1Multiplier	0..1	UnitMultiplier	inherited from: Curve
y1Unit	0..1	UnitSymbol	inherited from: Curve
y2Multiplier	0..1	UnitMultiplier	inherited from: Curve
y2Unit	0..1	UnitSymbol	inherited from: Curve
y3Multiplier	0..1	UnitMultiplier	inherited from: Curve
y3Unit	0..1	UnitSymbol	inherited from: Curve
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4730
4731 Table 399 shows all association ends of AmbientTemperatureDependencyCurve with other
4732 classes.

4733 **Table 399 – Association ends of**
4734 **ExtSecurityLimit::AmbientTemperatureDependencyCurve with other classes**

mult from	name	mult to	type	description
0..1	OperationalLimitType	0..*	OperationalLimitType	(NC) The operational limit type that has this permanent ambient temperature dependency curve.
1..1	CurveDatas	0..*	CurveData	inherited from: Curve
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4735

4736 **3.17.3 (NC) BaseOverloadLimitCurve**4737 Inheritance path = [LimitDependencyCurve](#) : Curve : IdentifiedObject : ExtEulIdentifiedObject :
4738 Identity

4739 A curve or functional relationship between

4740 - the relative loading - current loading over permanent loading (PATL) independent variable (X-
4741 axis), and

4742 - temporary overloading (TATL) limiting dependent (Y-axis) variables.

4743 Table 400 shows all attributes of BaseOverloadLimitCurve.

4744 **Table 400 – Attributes of ExtSecurityLimit::BaseOverloadLimitCurve**

name	mult	type	description
curveStyle	0..1	CurveStyle	inherited from: Curve
xMultiplier	0..1	UnitMultiplier	inherited from: Curve
xUnit	0..1	UnitSymbol	inherited from: Curve
y1Multiplier	0..1	UnitMultiplier	inherited from: Curve
y1Unit	0..1	UnitSymbol	inherited from: Curve
y2Multiplier	0..1	UnitMultiplier	inherited from: Curve
y2Unit	0..1	UnitSymbol	inherited from: Curve
y3Multiplier	0..1	UnitMultiplier	inherited from: Curve
y3Unit	0..1	UnitSymbol	inherited from: Curve
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4745
4746 Table 401 shows all association ends of BaseOverloadLimitCurve with other classes.4747 **Table 401 – Association ends of ExtSecurityLimit::BaseOverloadLimitCurve with other**
4748 **classes**

mult from	name	mult to	type	description
0..1	OperationalLimitType	0..*	OperationalLimitType	(NC) The operational limit type that has this temporary base overload limit curve.
1..1	CurveDatas	0..*	CurveData	inherited from: Curve
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4749
4750 **3.17.4 (NC) DurationOverloadLimitCurve**4751 Inheritance path = [LimitDependencyCurve](#) : Curve : IdentifiedObject : ExtEulIdentifiedObject :
4752 Identity

4753 A curve or functional relationship between

- 4754 - the overload duration independent variable (X-axis), and
 4755 - temporary overloading (TATL) limiting dependent (Y-axis) variables.
 4756 Table 402 shows all attributes of DurationOverloadLimitCurve.

4757 **Table 402 – Attributes of ExtSecurityLimit::DurationOverloadLimitCurve**

name	mult	type	description
curveStyle	0..1	CurveStyle	inherited from: Curve
xMultiplier	0..1	UnitMultiplier	inherited from: Curve
xUnit	0..1	UnitSymbol	inherited from: Curve
y1Multiplier	0..1	UnitMultiplier	inherited from: Curve
y1Unit	0..1	UnitSymbol	inherited from: Curve
y2Multiplier	0..1	UnitMultiplier	inherited from: Curve
y2Unit	0..1	UnitSymbol	inherited from: Curve
y3Multiplier	0..1	UnitMultiplier	inherited from: Curve
y3Unit	0..1	UnitSymbol	inherited from: Curve
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

- 4758
 4759 Table 403 shows all association ends of DurationOverloadLimitCurve with other classes.

4760 **Table 403 – Association ends of ExtSecurityLimit::DurationOverloadLimitCurve with**
 4761 **other classes**

mult from	name	mult to	type	description
0..1	OperationalLimitType	0..*	OperationalLimitType	(NC) The operational limit type that has this temporary duration overload limit curve.
1..1	CurveDatas	0..*	CurveData	inherited from: Curve
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

- 4762
 4763 **3.17.5 (NC) LimitDependencyCurve**

- 4764 Inheritance path = Curve : IdentifiedObject : ExtEulIdentifiedObject : Identity
 4765 A curve or functional relationship between an independent variable (X-axis) and limiting
 4766 dependent (Y-axis) variables.
 4767 Table 404 shows all attributes of LimitDependencyCurve.

4768

Table 404 – Attributes of ExtSecurityLimit::LimitDependencyCurve

name	mult	type	description
curveStyle	0..1	CurveStyle	inherited from: Curve
xMultiplier	0..1	UnitMultiplier	inherited from: Curve
xUnit	0..1	UnitSymbol	inherited from: Curve
y1Multiplier	0..1	UnitMultiplier	inherited from: Curve
y1Unit	0..1	UnitSymbol	inherited from: Curve
y2Multiplier	0..1	UnitMultiplier	inherited from: Curve
y2Unit	0..1	UnitSymbol	inherited from: Curve
y3Multiplier	0..1	UnitMultiplier	inherited from: Curve
y3Unit	0..1	UnitSymbol	inherited from: Curve
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4769

4770

Table 405 shows all association ends of LimitDependencyCurve with other classes.

4771

Table 405 – Association ends of ExtSecurityLimit::LimitDependencyCurve with other classes

4772

mult from	name	mult to	type	description
1..1	CurveDatas	0..*	CurveData	inherited from: Curve
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4773

4774

3.17.6 (NC) RecoveryOverloadLimitCurve

4775

Inheritance path = [LimitDependencyCurve](#) : Curve : IdentifiedObject : ExtEulIdentifiedObject : Identity

4776

4777

The relation between the recovery time and an overload limit.

4778

Table 406 shows all attributes of RecoveryOverloadLimitCurve.

4779

Table 406 – Attributes of ExtSecurityLimit::RecoveryOverloadLimitCurve

name	mult	type	description
curveStyle	0..1	CurveStyle	inherited from: Curve
xMultiplier	0..1	UnitMultiplier	inherited from: Curve
xUnit	0..1	UnitSymbol	inherited from: Curve
y1Multiplier	0..1	UnitMultiplier	inherited from: Curve

name	mult	type	description
y1Unit	0..1	UnitSymbol	inherited from: Curve
y2Multiplier	0..1	UnitMultiplier	inherited from: Curve
y2Unit	0..1	UnitSymbol	inherited from: Curve
y3Multiplier	0..1	UnitMultiplier	inherited from: Curve
y3Unit	0..1	UnitSymbol	inherited from: Curve
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 407 shows all association ends of RecoveryOverloadLimitCurve with other classes.

Table 407 – Association ends of ExtSecurityLimit::RecoveryOverloadLimitCurve with other classes

mult from	name	mult to	type	description
0..1	OperationalLimitType	0..*	OperationalLimitType	(NC) The operational limit type which has recovery time characteristic.
1..1	CurveDatas	0..*	CurveData	inherited from: Curve
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.17.7 (NC) SolarRadiationDependencyCurve

Inheritance path = [LimitDependencyCurve](#) : Curve : IdentifiedObject : ExtEulIdentifiedObject : Identity

A curve or functional relationship between

- the solar radiation independent variable (X-axis), and

- relative dependent (Y-axis) variables.

Table 408 shows all attributes of SolarRadiationDependencyCurve.

Table 408 – Attributes of ExtSecurityLimit::SolarRadiationDependencyCurve

name	mult	type	description
curveStyle	0..1	CurveStyle	inherited from: Curve
xMultiplier	0..1	UnitMultiplier	inherited from: Curve
xUnit	0..1	UnitSymbol	inherited from: Curve
y1Multiplier	0..1	UnitMultiplier	inherited from: Curve
y1Unit	0..1	UnitSymbol	inherited from: Curve
y2Multiplier	0..1	UnitMultiplier	inherited from: Curve
y2Unit	0..1	UnitSymbol	inherited from: Curve

name	mult	type	description
y3Multiplier	0..1	UnitMultiplier	inherited from: Curve
y3Unit	0..1	UnitSymbol	inherited from: Curve
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 409 shows all association ends of SolarRadiationDependencyCurve with other classes.

Table 409 – Association ends of ExtSecurityLimit::SolarRadiationDependencyCurve with other classes

mult from	name	mult to	type	description
0..1	OperationalLimitType	0..*	OperationalLimitType	(NC) The operational limit type that has this permanent solar radiation curve.
1..1	CurveDatas	0..*	CurveData	inherited from: Curve
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.17.8 (NC) VoltageAngleLimit

Inheritance path = OperationalLimit : IdentifiedObject : ExtEulIdentifiedObject : Identity

Voltage angle limit between two terminals. The association end OperationalLimitSet.Terminal defines one end and the host of the limit. The association end VoltageAngleLimit.AngleReferenceTerminal defines the reference terminal.

Table 410 shows all attributes of VoltageAngleLimit.

Table 410 – Attributes of ExtSecurityLimit::VoltageAngleLimit

name	mult	type	description
value	0..1	AngleDegrees	(NC) The difference in angle degrees between referenced by the association end OperationalLimitSet.Terminal and the Terminal referenced by the association end VoltageAngleLimit.AngleReferenceTerminal. The value shall be positive (greater than zero).
normalValue	0..1	AngleDegrees	(NC) The difference in angle degrees between referenced by the association end OperationalLimitSet.Terminal and the Terminal referenced by the association end VoltageAngleLimit.AngleReferenceTerminal. The value shall be positive (greater than zero).
isFlowToRefTerminal	0..1	Boolean	(NC) True if the flow is from the operating limit terminal to the angle reference terminal. False means that the flow is the other direction. When

name	mult	type	description
			it is not given, the limit is the same for both directions.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 411 shows all association ends of VoltageAngleLimit with other classes.

Table 411 – Association ends of ExtSecurityLimit::VoltageAngleLimit with other classes

mult from	name	mult to	type	description
0..*	AngleReferenceTerminal	0..1	Terminal	(NC) The angle reference terminal for the voltage angle limit.
0..1	VoltageAngleSchedule	0..*	VoltageAngleSchedule	(NC) Voltage angle schedule associated with a voltage angle limit.
0..*	OperationalLimitSet	1..1	OperationalLimitSet	inherited from: OperationalLimit
0..*	OperationalLimitType	0..1	OperationalLimitType	inherited from: OperationalLimit
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.17.9 (NC) ExtOperationalLimitType root class

European network codes extension to base CIM counterpart.

Table 412 shows all attributes of ExtOperationalLimitType.

Table 412 – Attributes of ExtSecurityLimit::ExtOperationalLimitType

name	mult	type	description
isMinimum	0..1	Boolean	(NC) Defines if the operational limit type is minimum. If true, the value is a minimum value of the same kind. This applies to stability and PATL. If false, the limit has the normal behaviour. OperationalLimitType.direction attribute shall be absoluteValue.

3.17.10 (NC) InfeedLimit

Inheritance path = OperationalLimit : IdentifiedObject : ExtEulIdentifiedObject : Identity

Infeed limit set constraints fed in to the network by two or more terminals.

Table 413 shows all attributes of InfeedLimit.

4818

Table 413 – Attributes of ExtSecurityLimit::InfeedLimit

name	mult	type	description
normalValueW	0..1	ActivePower	(NC) The normal value of active power limit. The attribute shall be a positive value or zero.
valueW	0..1	ActivePower	(NC) Value of active power limit. The attribute shall be a positive value or zero.
normalValueA	0..1	CurrentFlow	(NC) The normal current limit. The attribute shall be a positive value or zero.
valueA	0..1	CurrentFlow	(NC) Value of current limit. The attribute shall be a positive value or zero.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4819

4820

Table 414 shows all association ends of InfeedLimit with other classes.

4821

Table 414 – Association ends of ExtSecurityLimit::InfeedLimit with other classes

mult from	name	mult to	type	description
0..1	InfeedTerminal	0..*	InfeedTerminal	(NC) Infeed terminal that has infeed constraints.
0..1	InfeedLimitSchedule	0..*	InfeedLimitSchedule	(NC) Infeed limit schedule associated with an infeed limit.
0..*	OperationalLimitSet	1..1	OperationalLimitSet	inherited from: OperationalLimit
0..*	OperationalLimitType	0..1	OperationalLimitType	inherited from: OperationalLimit
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4822

3.17.11 (NC) InfeedTerminal root class

4824

Infeed terminal defines the terminals that are linked to an infeed limit.

4825

Table 415 shows all attributes of InfeedTerminal.

4826

Table 415 – Attributes of ExtSecurityLimit::InfeedTerminal

name	mult	type	description
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID

name	mult	type	description
			or rdf:about attributes that identify CIM object elements.

4827

4828

Table 416 shows all association ends of InfeedTerminal with other classes.

4829

Table 416 – Association ends of ExtSecurityLimit::InfeedTerminal with other classes

mult from	name	mult to	type	description
0..*	ACDCTerminal	0..1	ACDCTerminal	(NC) ACDCTerminal which is connected to an infeed terminal.
0..*	InfeedConstraint	0..1	InfeedLimit	(NC) Infeed constraint which belongs to an infeed terminal.

4830

4831

3.17.12 (NC) BaseCaseCurrentLimit

4832

Inheritance path = OperationalLimit : IdentifiedObject : ExtEulIdentifiedObject : Identity

4833

Operational limit on current applicable for base case.

4834

Table 417 shows all attributes of BaseCaseCurrentLimit.

4835

Table 417 – Attributes of ExtSecurityLimit::BaseCaseCurrentLimit

name	mult	type	description
normalValue	0..1	CurrentFlow	(NC) The normal value for limit on current flow. The attribute shall be a positive value or zero.
value	0..1	CurrentFlow	(NC) Limit on current flow. The attribute shall be a positive value or zero.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4836

4837

Table 418 shows all association ends of BaseCaseCurrentLimit with other classes.

4838

Table 418 – Association ends of ExtSecurityLimit::BaseCaseCurrentLimit with other classes

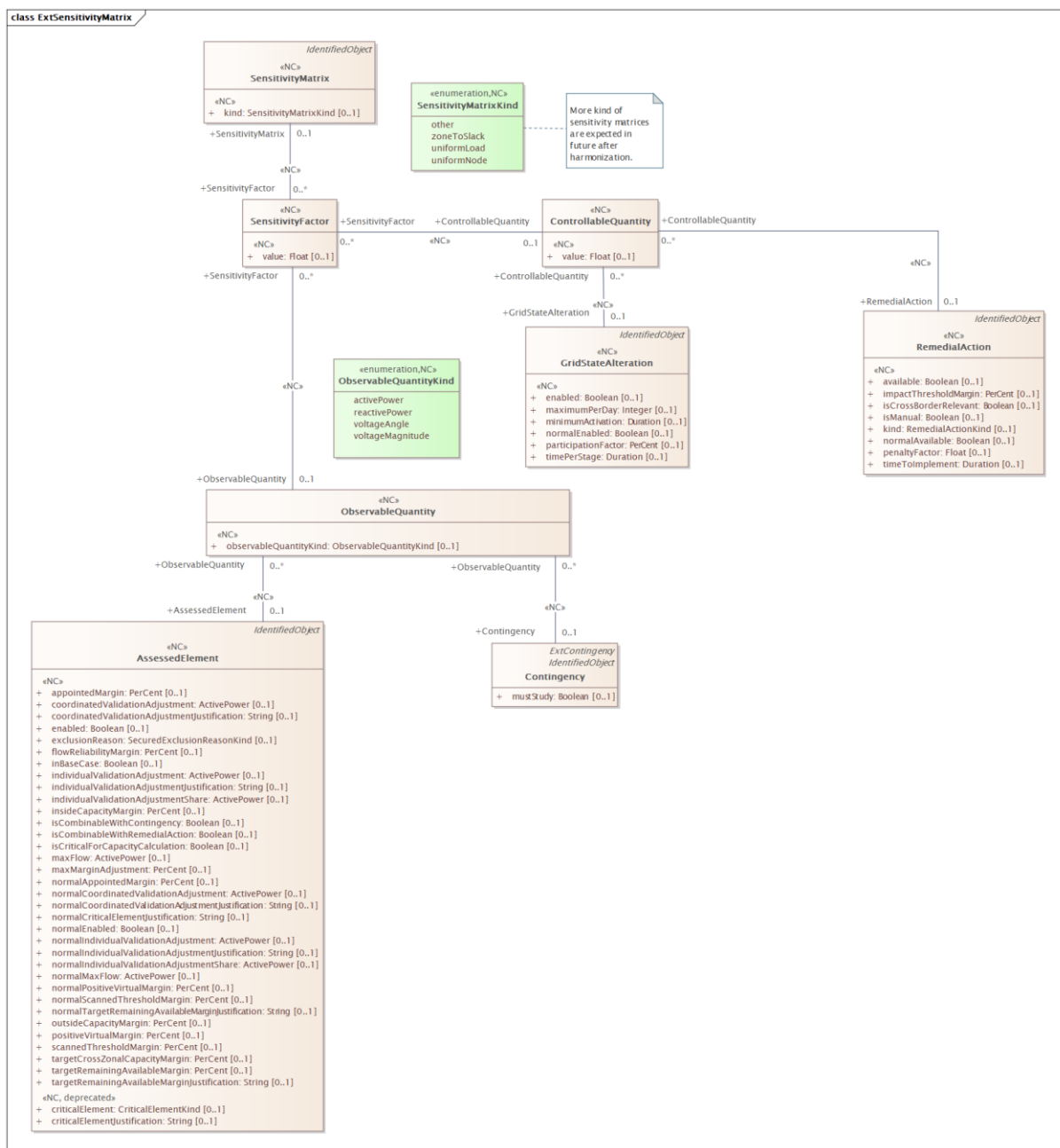
4839

mult from	name	mult to	type	description
0..1	BaseCaseCurrentLimitSchedule	0..*	BaseCaseCurrentLimitSchedule	(NC) Base case current limit schedule associated with a base case current limit.
0..*	OperationalLimitSet	1..1	OperationalLimitSet	inherited from: OperationalLimit
0..*	OperationalLimitType	0..1	OperationalLimitType	inherited from: OperationalLimit
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4840

4841 **3.18 Package ExtSensitivityMatrix**4842 **3.18.1 General**

4843 This package contains extensions related to sensitivity matrix.



4844

4845 **Figure 39 – Class diagram ExtSensitivityMatrix::ExtSensitivityMatrix**

4846 Figure 39: The diagram contains classes related to sensitivity matrix.

4847 **3.18.2 (NC) ControllableQuantity root class**

4848 Controllable quantity is a set point quantity on a grid state alteration or on a remedial action.
 4849 Table 419 shows all attributes of ControllableQuantity.

4850 **Table 419 – Attributes of ExtSensitivityMatrix::ControllableQuantity**

name	mult	type	description
value	0..1	Float	(NC) The value of the change applied to the grid state alteration or remedial action. In the case of multiple changes or non-quantifiable changes (e.g. Topology changes) the value needs to represent the suitable value that makes the derivable value given in the observable quantity for the purpose of the calculation of the sensitivity factor. The value can be integer, float or boolean. In case of boolean 1 equals true and 0 equals false.

4851
4852 Table 420 shows all association ends of ControllableQuantity with other classes.

4853 **Table 420 – Association ends of ExtSensitivityMatrix::ControllableQuantity with other**
4854 **classes**

mult from	name	mult to	type	description
0..*	GridStateAlteration	0..1	GridStateAlteration	(NC) The grid state alteration for this controllable quantity.
0..*	RemedialAction	0..1	RemedialAction	(NC) Remedial action which is associated with the controllable quantity.
0..1	SensitivityFactor	0..*	SensitivityFactor	(NC) The sensitivity factor associated with a controllable quantity.

4855
4856 **3.18.3 (NC) ObservableQuantity root class**

4857 Observable quantity is an electrical quantity on an assessed element or an assessed element
4858 with contingency.
4859 Table 421 shows all attributes of ObservableQuantity.

4860 **Table 421 – Attributes of ExtSensitivityMatrix::ObservableQuantity**

name	mult	type	description
observableQuantityKind	0..1	ObservableQuantityKind	(NC) Kind of observable quantity.

4861
4862 Table 422 shows all association ends of ObservableQuantity with other classes.

4863 **Table 422 – Association ends of ExtSensitivityMatrix::ObservableQuantity with other**
4864 **classes**

mult from	name	mult to	type	description
0..*	Contingency	0..1	Contingency	(NC) The contingency associated with this observable quantity.
0..*	AssessedElement	0..1	AssessedElement	(NC) The assessed element with contingency associated with this observable quantity.
0..1	SensitivityFactor	0..*	SensitivityFactor	(NC) The sensitivity factor associated with an observable quantity.

4865
4866 **3.18.4 (NC) SensitivityFactor root class**

4867 The sensitivity factor which represents the sensitivity between observable and controllable
4868 elements.
4869 Table 423 shows all attributes of SensitivityFactor.

4870

Table 423 – Attributes of ExtSensitivityMatrix::SensitivityFactor

name	mult	type	description
value	0..1	Float	(NC) The value of the sensitivity factor.

4871

4872 Table 424 shows all association ends of SensitivityFactor with other classes.

4873

Table 424 – Association ends of ExtSensitivityMatrix::SensitivityFactor with other classes

4874

mult from	name	mult to	type	description
0..*	ControllableQuantity	0..1	ControllableQuantity	(NC) The controllable quantity for this sensitivity factor.
0..*	ObservableQuantity	0..1	ObservableQuantity	(NC) The observable quantity for this sensitivity factor.
0..*	SensitivityMatrix	0..1	SensitivityMatrix	(NC) The sensitivity matrix which contains this sensitivity factor.

4875

3.18.5 (NC) SensitivityMatrix

4877 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

4878 The sensitivity matrix which represents the sensitivity factors between observable and
4879 controllable elements.

4880 Table 425 shows all attributes of SensitivityMatrix.

4881

Table 425 – Attributes of ExtSensitivityMatrix::SensitivityMatrix

name	mult	type	description
kind	0..1	SensitivityMatrixKind	(NC) The kind of sensitivity matrix.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4882

4883 Table 426 shows all association ends of SensitivityMatrix with other classes.

4884

Table 426 – Association ends of ExtSensitivityMatrix::SensitivityMatrix with other classes

4885

mult from	name	mult to	type	description
0..1	SensitivityFactor	0..*	SensitivityFactor	(NC) The sensitivity factor which belongs to this sensitivity matrix.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4886

4887 **3.18.6 (NC) ObservableQuantityKind enumeration**

4888 Kind of observable quantity.

4889 Table 427 shows all literals of ObservableQuantityKind.

4890 **Table 427 – Literals of ExtSensitivityMatrix::ObservableQuantityKind**

literal	value	description
activePower		The observable quantity is the active power.
reactivePower		The observable quantity is the reactive power.
voltageAngle		The observable quantity is the angle of terminal voltage.
voltageMagnitude		The observable quantity is the magnitude of terminal voltage.

4891

4892 **3.18.7 (NC) SensitivityMatrixKind enumeration**

4893 Kinds of sensitivity matrix.

4894 Table 428 shows all literals of SensitivityMatrixKind.

4895 **Table 428 – Literals of ExtSensitivityMatrix::SensitivityMatrixKind**

literal	value	description
zoneToSlack		Zone to slack kind of sensitivity matrix.
other		Other kind of sensitivity matrix.
uniformLoad		Uniform load matrix.
uniformNode		Uniform node matrix.

4896

4897 **3.19 Package ExtSchedule**4898 **3.19.1 General**

4899 This package contains the extensions related to the schedule.

Figure 40: The diagram contains classes related to schedule.

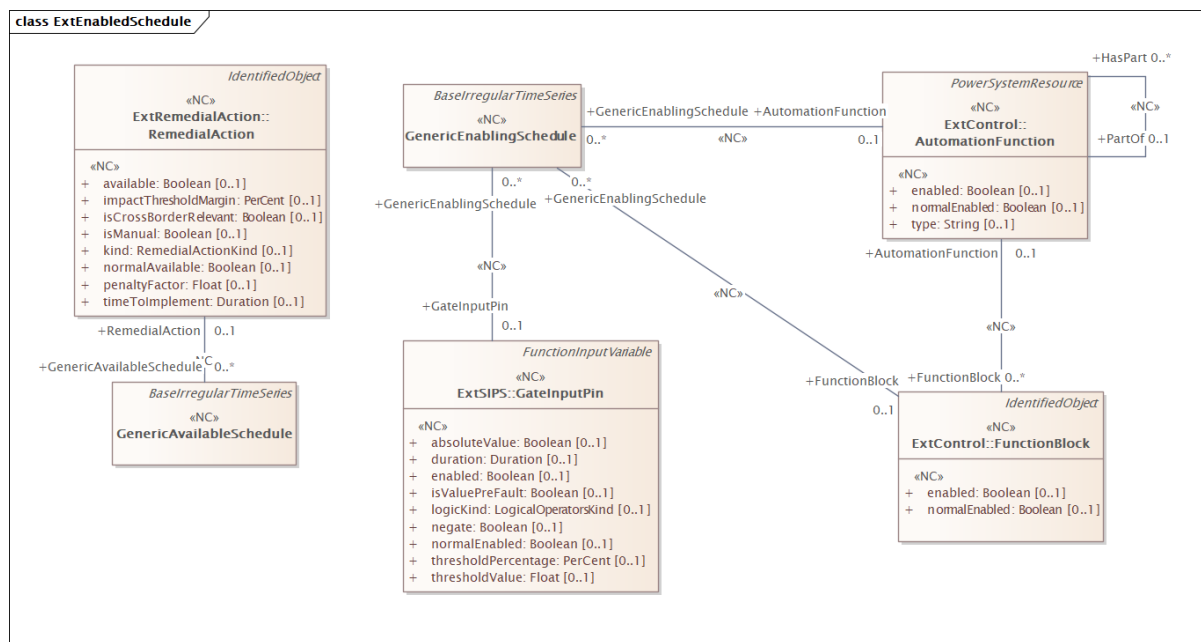


Figure 41: The diagram contains classes related to enabled schedule.

Figure 42: The diagram contains classes related to power bid schedule.

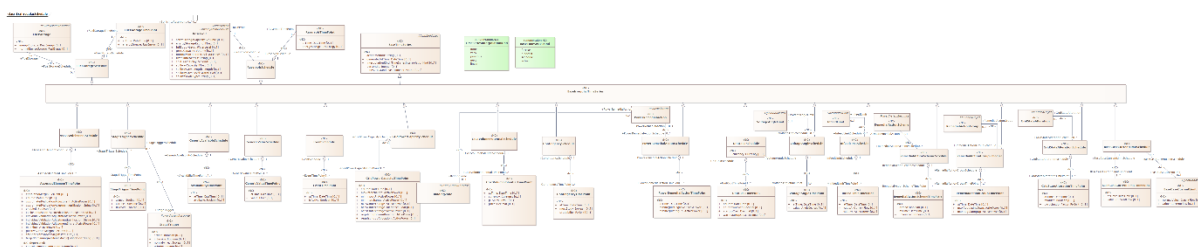


Figure 43: The diagram contains classes related to schedule.

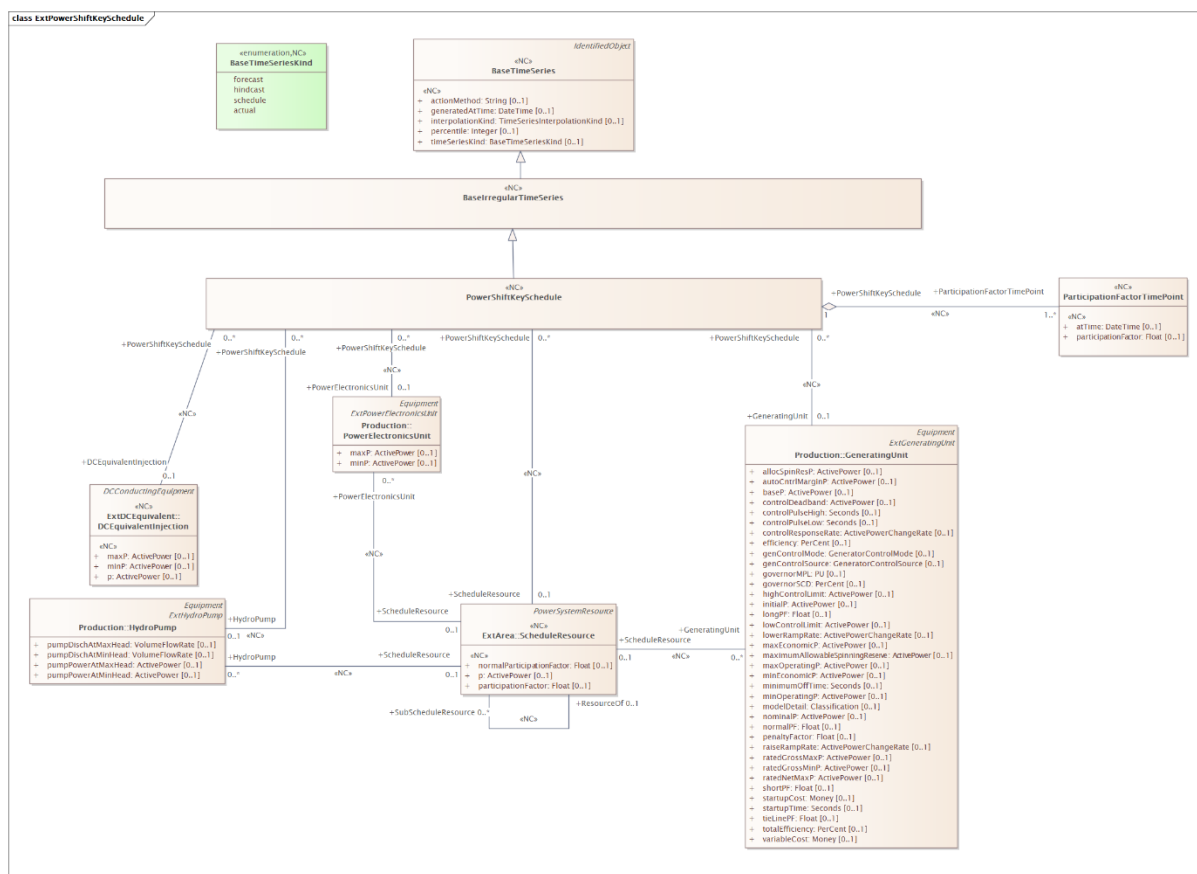


Figure 44 – Class diagram ExtSchedule::ExtPowerShiftKeySchedule

Figure 44: The diagram contains classes related to GLSK schedule.

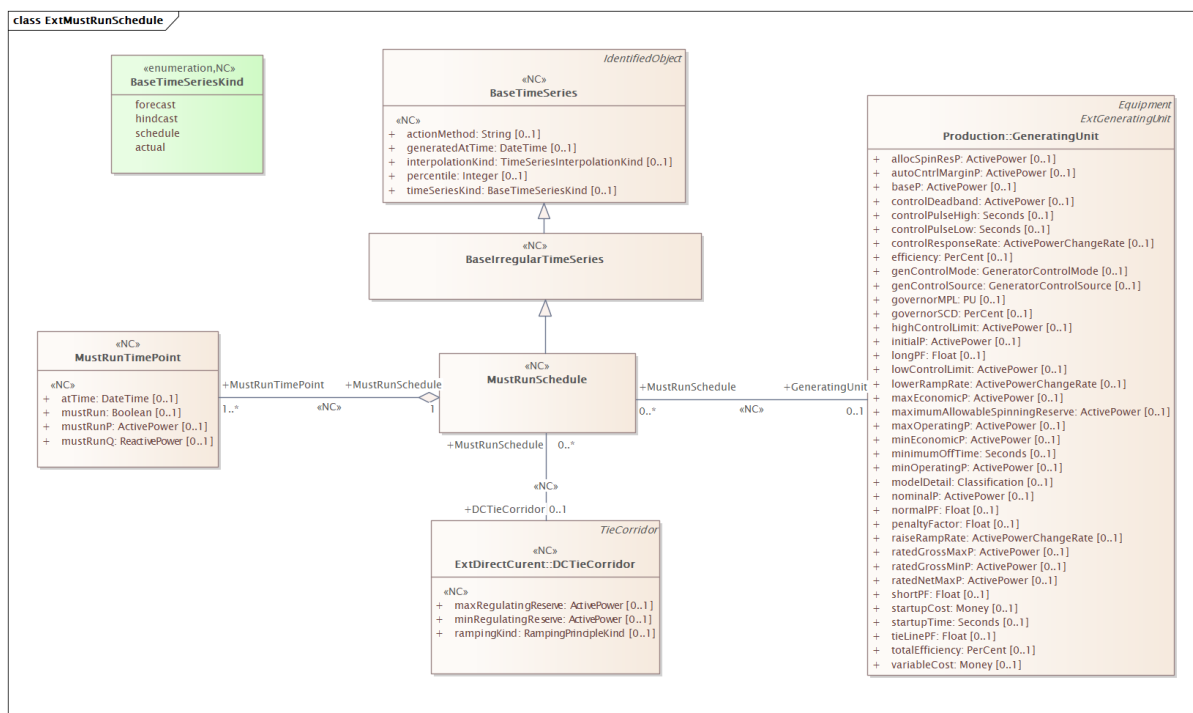


Figure 45 – Class diagram ExtSchedule::ExtMustRunSchedule

Figure 45: The diagram contains classes related to must run schedule.

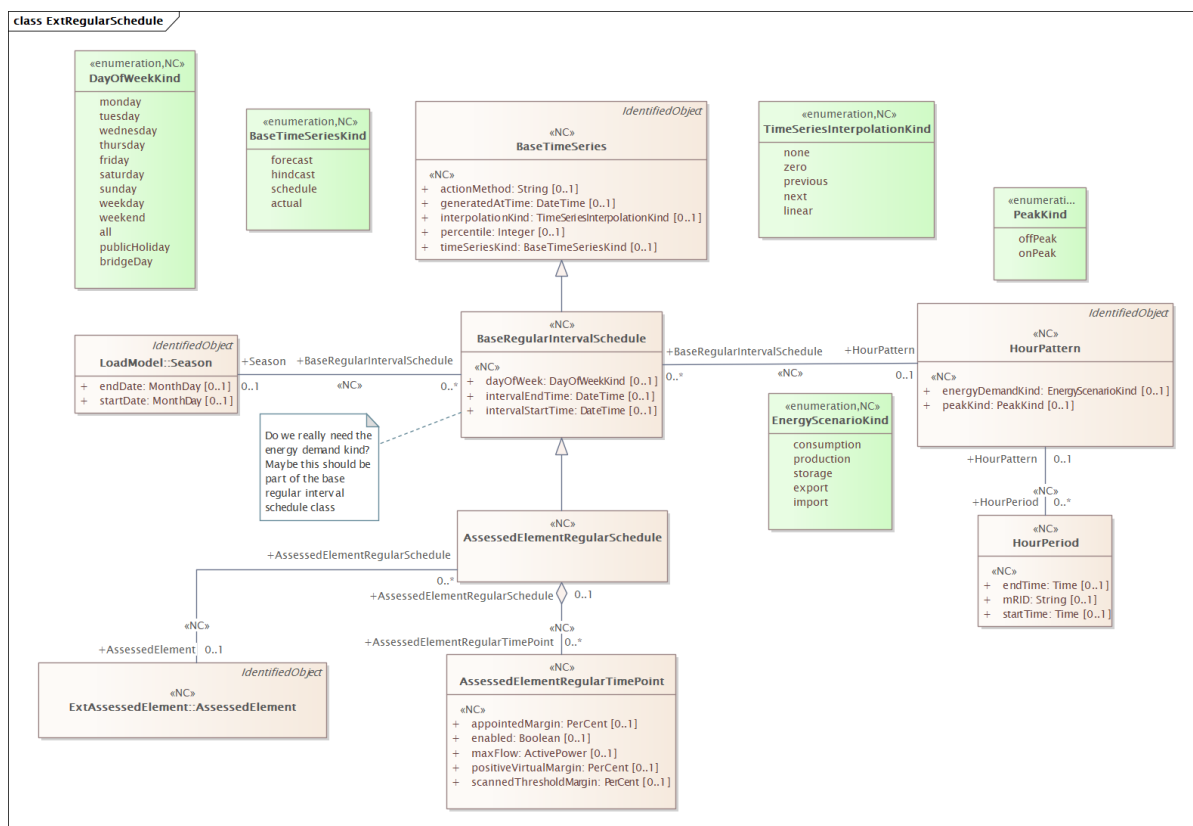


Figure 46 – Class diagram ExtSchedule::ExtRegularSchedule

```
class FxtSSHRegularSchedule /
```

Una Eccezione alla Solita

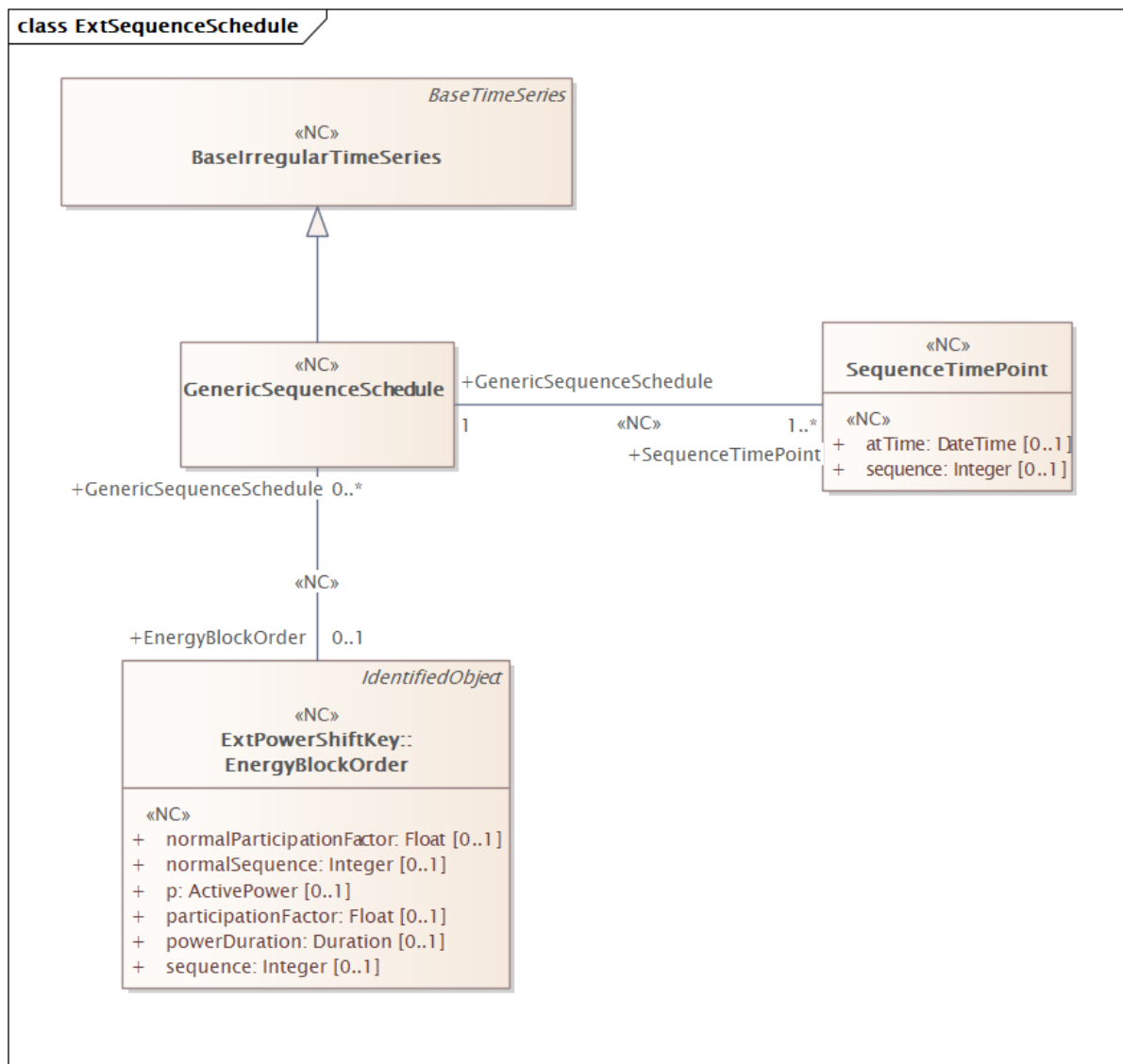


Figure 49 – Class diagram ExtSchedule::ExtSequenceSchedule

Figure 49: The diagram contains classes related to sequence schedule.

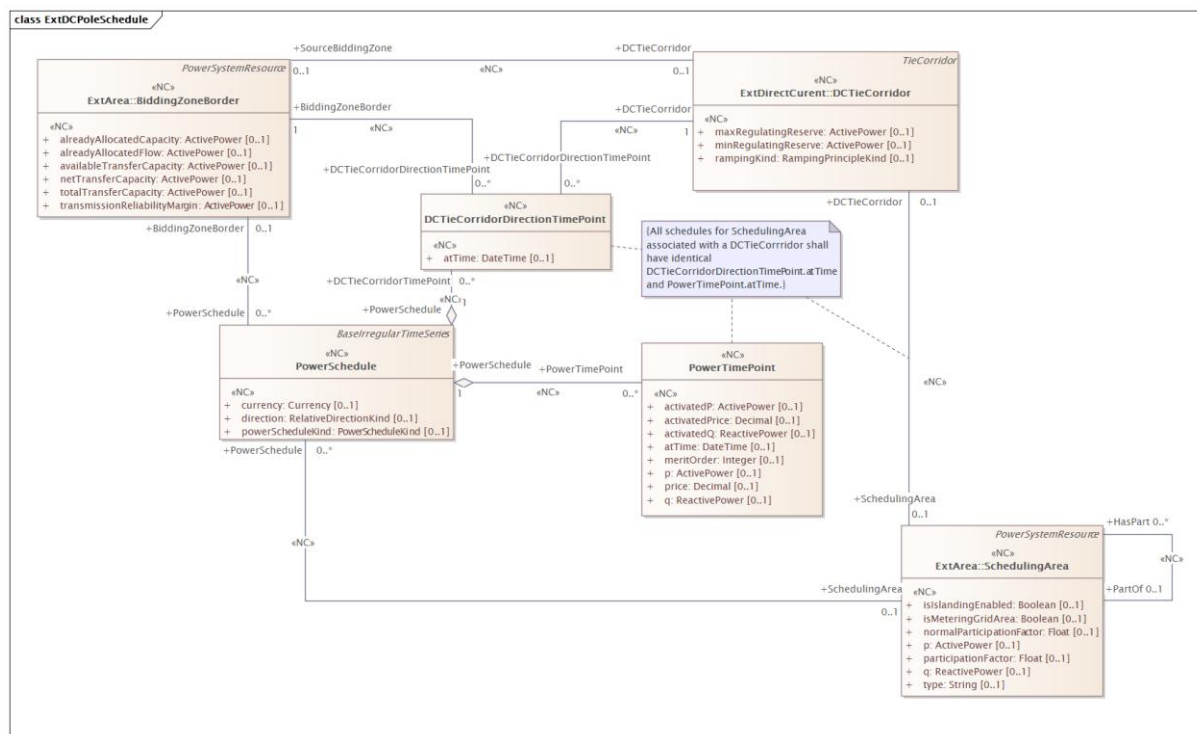


Figure 50 – Class diagram ExtSchedule::ExtDCPoleSchedule

Figure 50: The diagram includes classes relevant to modelling of DC pole schedule.

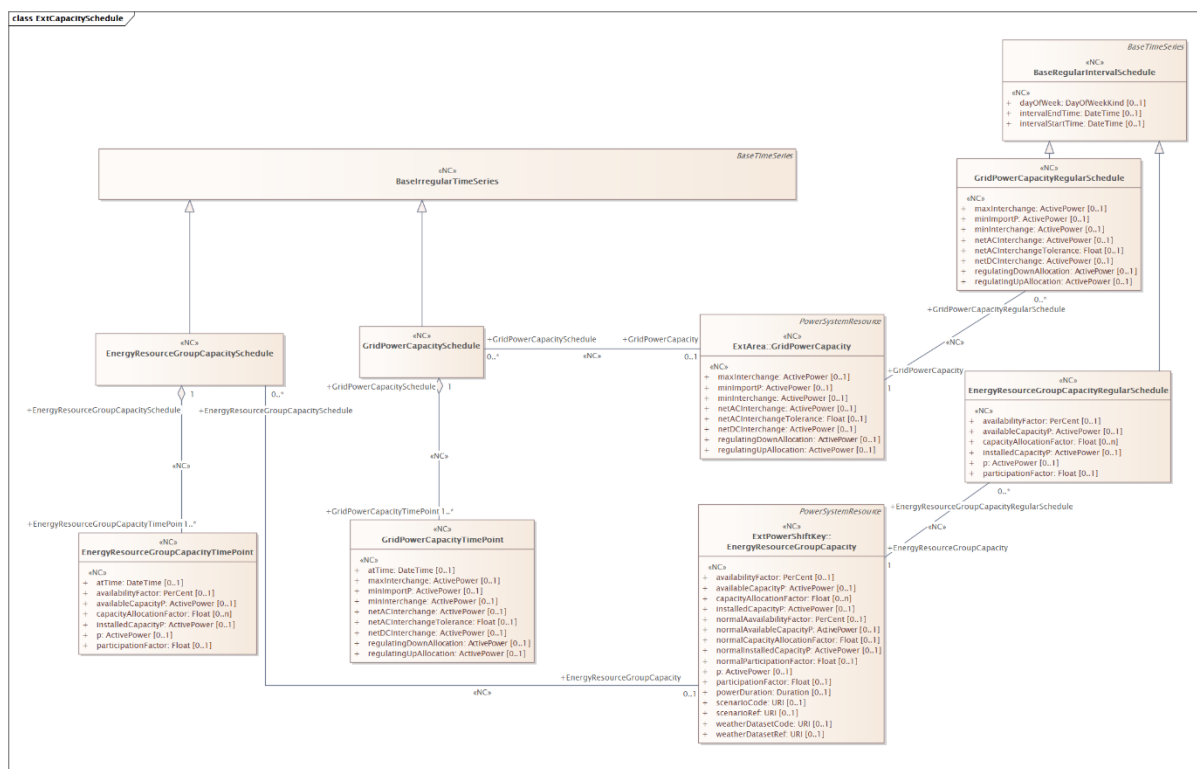


Figure 51 – Class diagram ExtSchedule::ExtCapacitySchedule

Figure 51:

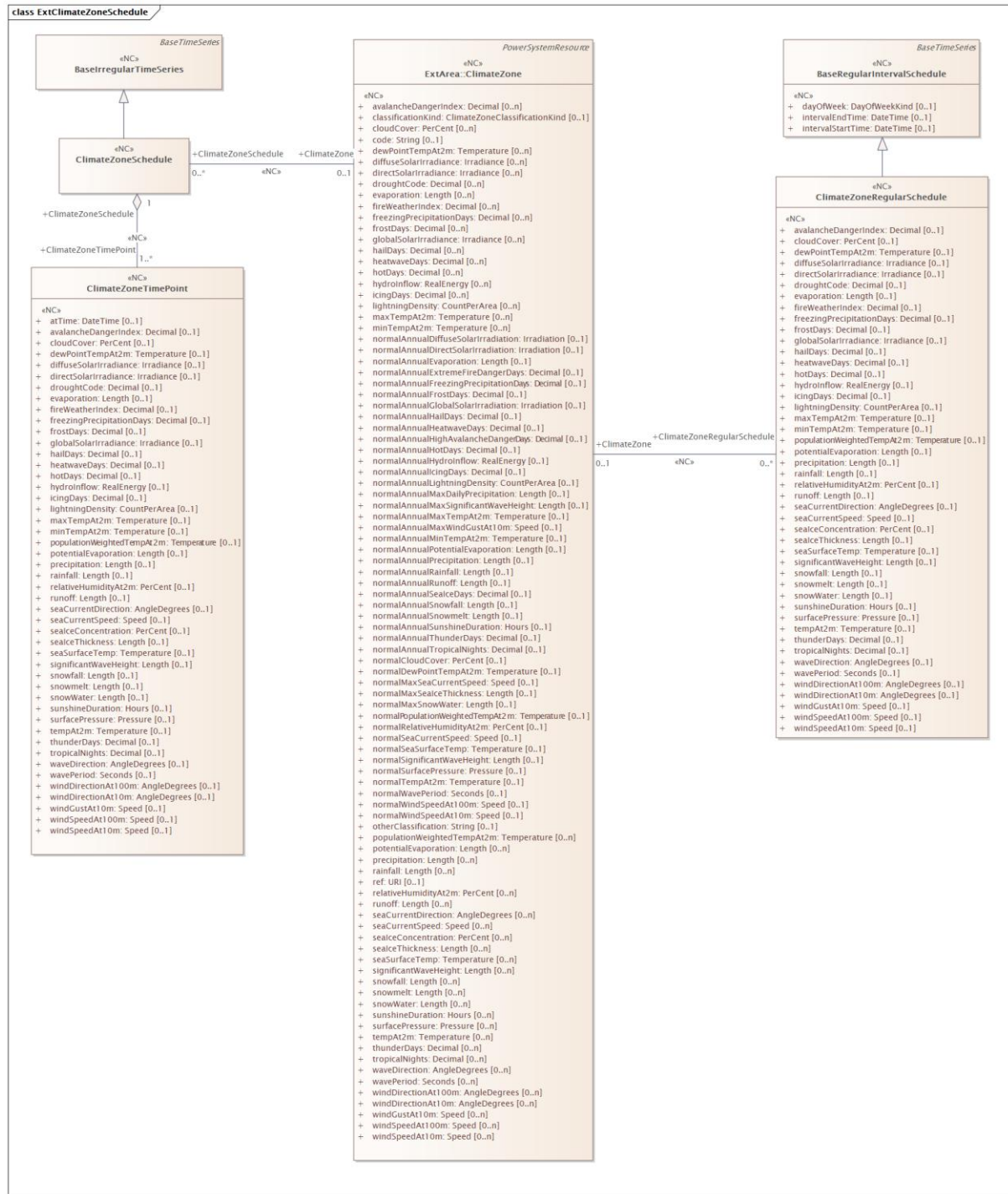


Figure 52 – Class diagram ExtSchedule::ExtClimateZoneSchedule

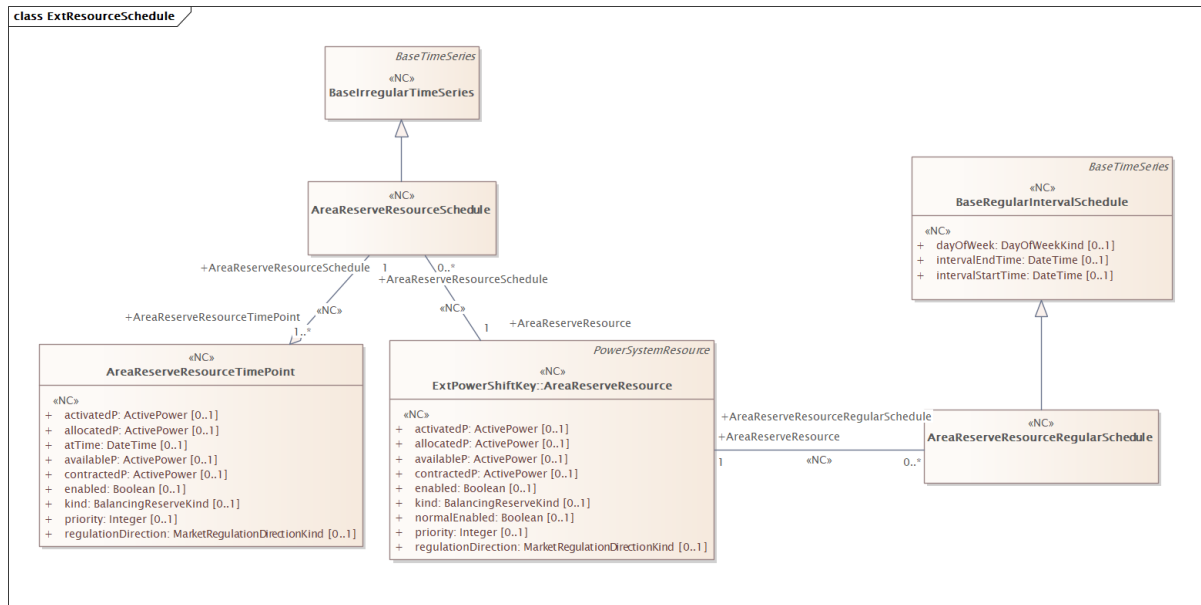


Figure 53 – Class diagram ExtSchedule::ExtResourceSchedule

Figure 53:

3.19.2 (NC) PowerShiftKeySchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

ExtEulIdentifiedObject : Identity

The schedule for Power Shift Keys.

Table 429 shows all attributes of PowerShiftKeySchedule.

Table 429 – Attributes of ExtSchedule::PowerShiftKeySchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 430 shows all association ends of PowerShiftKeySchedule with other classes.

4950 **Table 430 – Association ends of ExtSchedule::PowerShiftKeySchedule with other**
4951 **classes**

mult from	name	mult to	type	description
0..*	EnergyConsumer	0..1	EnergyConsumer	(NC) The EnergyConsumer that has a Power Shift Key schedule.
0..*	EnergySource	0..1	EnergySource	(deprecated,NC) The energy source which has a power shift key schedule. The renewable resources should be modelled as PowerElectronicsUnit.
0..*	ExternalNetworkInjection	0..1	ExternalNetworkInjection	(NC) The energy source which has a power shift key schedule.
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) The Generating Unit which has a Power Shift Key Schedule.
0..*	HydroPump	0..1	HydroPump	(NC) The Hydro Pump which has a Power Shift Key schedule.
0..*	PowerElectronicsUnit	0..1	PowerElectronicsUnit	(NC) The Power Electronics Unit which has a Power Shift Key schedule.
0..*	EquivalentInjection	0..1	EquivalentInjection	(NC) Equivalent injection which is part of a power shift key schedule.
0..*	ScheduleResource	0..1	ScheduleResource	(NC) The Schedule Resource which has a Power Shift Key schedule.
0..*	EnergyBlockOrder	0..1	EnergyBlockOrder	(NC) An energy block order which has a Power Shift Key Schedule.
0..*	EnergyResourceGroupCapacity	0..1	EnergyResourceGroupCapacity	(NC) The energy group capacity which has a Power Shift Key Schedule.
0..*	SchedulingArea	0..1	SchedulingArea	
0..*	DCPole	0..1	DCPole	(NC) A DC Pole which has a Power Shift Key Schedule.
0..1	PowerShiftKeyDistribution	0..1	PowerShiftKeyDistribution	(NC) Power Shift Key distribution for the Power Shift Key schedule.
1..1	ParticipationFactorTimePoint	1..*	ParticipationFactorTimePoint	(NC) The participation factor timepoint for a Power Shift Key schedule.
0..*	DCEquivalentInjection	0..1	DCEquivalentInjection	(NC) DC equivalent injection that has this power shift key schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4952
4953 **3.19.3 (NC) BaselrregularTimeSeries**
4954 Inheritance path = [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity
4955 Time series that has irregular points in time.
4956 Table 431 shows all attributes of BaselrregularTimeSeries.

4957 **Table 431 – Attributes of ExtSchedule::BaselrregularTimeSeries**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries

name	mult	type	description
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 432 shows all association ends of `BaseIrregularTimeSeries` with other classes.

Table 432 – Association ends of `ExtSchedule::BaseIrregularTimeSeries` with other classes

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.4 (NC) `BaseTimeSeries`

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

Time series of values at points in time.

Table 433 shows all attributes of `BaseTimeSeries`.

Table 433 – Attributes of `ExtSchedule::BaseTimeSeries`

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) The time this time series (entity) come to existents and available for use.
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) Kind of interpolation done between time point.
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) Kind of base time series.
actionMethod	0..1	String	(NC) Action method used to create the value. This is used for identification in the case where there is multiple time series for the same validity period and kind.
percentile	0..1	Integer	(NC) The percentile is a number where a certain percentage of scores/ranking/values of a sample fall below that number. This is a way for expressing uncertainty in the number provided.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 434 shows all association ends of BaseTimeSeries with other classes.

Table 434 – Association ends of ExtSchedule::BaseTimeSeries with other classes

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.5 (NC) EventSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Time series represent irregular event described by event points in time.

Table 435 shows all attributes of EventSchedule.

Table 435 – Attributes of ExtSchedule::EventSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 436 shows all association ends of EventSchedule with other classes.

4980 **Table 436 – Association ends of ExtSchedule::EventSchedule with other classes**

mult from	name	mult to	type	description
0..1	ActualAvailabilitySchedule	0..1	AvailabilitySchedule	(NC) Actual availability schedule that has this irregular interval schedule.
0..1	PlannedAvailabilitySchedule	0..1	AvailabilitySchedule	(NC) Planned availability schedule that has this irregular interval schedule.
0..1	RemedialActionSchedule	0..1	RemedialActionSchedule	Remedial action schedule is the event that is validity for the given time series.
1..1	EventTimePoint	1..*	EventTimePoint	(NC) Value for the point in time.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4981

4982 **3.19.6 (NC) EventTimePoint root class**

4983 Event valid for a given point in time.

4984 Table 437 shows all attributes of EventTimePoint.

4985 **Table 437 – Attributes of ExtSchedule::EventTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
isActive	0..1	Boolean	(NC) True, if the event is occurring (Active) at this time point. Otherwise false.

4986

4987 Table 438 shows all association ends of EventTimePoint with other classes.

4988 **Table 438 – Association ends of ExtSchedule::EventTimePoint with other classes**

mult from	name	mult to	type	description
1..*	EventSchedule	1..1	EventSchedule	(NC) Time series the time point values belongs to.

4989

4990 **3.19.7 (NC) GenericValueSchedule**4991 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

4993 Time series represent irregular generic value at given points in time. The type of value is given by the reference association.

4995 Table 439 shows all attributes of GenericValueSchedule.

4996 **Table 439 – Attributes of ExtSchedule::GenericValueSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries

name	mult	type	description
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

4997

4998

Table 440 shows all association ends of GenericValueSchedule with other classes.

4999

Table 440 – Association ends of ExtSchedule::GenericValueSchedule with other classes

mult from	name	mult to	type	description
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) Remedial action schedule which has generic value schedules.
0..*	RangeConstraint	0..1	RangeConstraint	(NC) Range constraint for the generic value schedule.
1..1	GenericValueTimePoint	1..*	GenericValueTimePoint	(NC) Value for the point in time.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5000

3.19.8 (NC) GenericValueTimePoint root class

5001

Generic value for a given point in time.

5002

Table 441 shows all attributes of GenericValueTimePoint.

5003

Table 441 – Attributes of ExtSchedule::GenericValueTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
value	0..1	Float	(NC) The value at the time. The meaning of the value is defined by the derived type of the associated schedule. The value can be integer, float or boolean. In case of boolean 1.0 equals true and 0.0 equals false. In case of integer the 0 should be included as a decimal, e.g. 2.0.

5005

5006

Table 442 shows all association ends of GenericValueTimePoint with other classes.

5007

Table 442 – Association ends of ExtSchedule::GenericValueTimePoint with other classes

5008

mult from	name	mult to	type	description
1..*	GenericValueSchedule	1..1	GenericValueSchedule	(NC) Time series the time point values belongs to.

5009

5010 **3.19.9 (NC) MustRunSchedule**

5011 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
5012 ExtEulIdentifiedObject : Identity

5013 Time series represent irregular must-run instruction values at given points in time. This could
5014 be instruction to a reliability must-run (RMR) generation facility that is necessary to run to meet
5015 certain operating conditions in order to maintain the security of power systems in a competitive
5016 environment.

5017 Table 443 shows all attributes of MustRunSchedule.

5018 **Table 443 – Attributes of ExtSchedule::MustRunSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5019
5020 Table 444 shows all association ends of MustRunSchedule with other classes.

5021 **Table 444 – Association ends of ExtSchedule::MustRunSchedule with other classes**

mult from	name	mult to	type	description
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) Generating unit which belongs to the must run schedule.
0..*	DCTieCorridor	0..1	DCTieCorridor	(NC) Hydro pump which belongs to the power schedule.
1..1	MustRunTimePoint	1..*	MustRunTimePoint	(NC) Value for the point in time.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5022

5023 **3.19.10 (NC) MustRunTimePoint root class**

5024 Must-run instruction value at a given point in time.

5025 Table 445 shows all attributes of MustRunTimePoint.

5026

Table 445 – Attributes of ExtSchedule::MustRunTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
mustRunP	0..1	ActivePower	(NC) Minimum active power injection that is needed to meet must-run requirement. This value can be higher or equal to minimum operational limit. Load sign convention is used, i.e. positive sign means flow out from a node.
mustRunQ	0..1	ReactivePower	(NC) Minimum reactive power injection that is needed to meet must-run requirement. This value can be higher or equal to minimum operational limit. Load sign convention is used, i.e. positive sign means flow out from a node.
mustRun	0..1	Boolean	(NC) True, if the must-run instruction is active this time point. Otherwise false.

5027

5028

Table 446 shows all association ends of MustRunTimePoint with other classes.

5029

Table 446 – Association ends of ExtSchedule::MustRunTimePoint with other classes

mult from	name	mult to	type	description
1..*	MustRunSchedule	1..1	MustRunSchedule	(NC) Time series the time point values belongs to.

5030

5031

3.19.11 (NC) PowerSchedule

5032

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

5033

Time series represent irregular power, active and reactive, values at given points in time.

5034

Constraints:

5035

:

5036

Mandatory if PowerSchedule.powerScheduleKind equal PowerScheduleKind.meritOrder.

5037

Table 447 shows all attributes of PowerSchedule.

5038

Table 447 – Attributes of ExtSchedule::PowerSchedule

name	mult	type	description
currency	0..1	Currency	(NC) Currency the energy price is given in.
direction	0..1	RelativeDirectionKind	(NC) Kind of direction.
powerScheduleKind	0..1	PowerScheduleKind	(NC) Kind of power schedule.
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 448 shows all association ends of PowerSchedule with other classes.

Table 448 – Association ends of ExtSchedule::PowerSchedule with other classes

mult from	name	mult to	type	description
0..*	EnergyConnection	0..1	EnergyConnection	(NC) The energy connection that has a power schedule.
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) Generating unit which belongs to the power schedule.
0..*	HydroPump	0..1	HydroPump	(NC) Hydro pump which belongs to the power schedule.
0..*	PowerElectronicsUnit	0..1	PowerElectronicsUnit	(NC) Power electronics unit which belongs to the power schedule.
0..*	BiddingZone	0..1	BiddingZone	(NC) Bidding zone which has power schedules.
0..*	PowerRemedialAction	0..1	PowerRemedialAction	(NC) Power remedial action which belongs to the Remedial Action Schedule.
0..*	EquivalentInjection	0..1	EquivalentInjection	(NC) Equivalent injection which belongs to the power schedule.
0..*	ScheduleResource	0..1	ScheduleResource	(NC) Schedule resource which has power schedules.
0..*	SchedulingArea	0..1	SchedulingArea	(NC) Scheduling area which has power schedules.
0..*	BiddingZoneBorder	0..1	BiddingZoneBorder	(NC) Bidding zone border which belongs to the power schedule.
0..*	DCPole	0..1	DCPole	(NC) DC pole which belongs to the power schedule.
0..*	AreaDispatchableUnit	0..1	AreaReserveResource	(NC) Area dispatchable unit which belongs to the power schedule.
0..*	EnergyGroup	0..1	EnergyResourceGroupCapacity	(NC) Energy group which belongs to a power schedule.
0..1	PowerScheduleAction	0..1	PowerScheduleAction	(NC) Power schedule action which belongs to the power schedule.
1..1	PowerTimePoint	0..*	PowerTimePoint	(NC) Value for the point in time.
1..1	DCTieCorridorTimePoint	0..*	DCTieCorridorDirectionTimePoint	(NC) The DC tie corridor time point for the power schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.12 (NC) PowerTimePoint root class

Time series represent irregular values at given points in time.

Constraints:

5047 :
5048 Mandatory field in the case of PowerSchedule.kind equals meritOrder.
5049 Table 449 shows all attributes of PowerTimePoint.

5050 **Table 449 – Attributes of ExtSchedule::PowerTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
p	0..1	ActivePower	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node or area.
q	0..1	ReactivePower	(NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node or area.
price	0..1	Decimal	(NC) Price for the scheduled active power per unit of active power. e.g. per MW.
activatedP	0..1	ActivePower	(NC) Active power activated as part of redispatch. Negative number means that the value is scheduling down. Positive number means that the value is scheduling up.
activatedPrice	0..1	Decimal	(NC) Price for the activated active power per unit e.g. per MW.
activatedQ	0..1	ReactivePower	(NC) Reactive power activated as part of redispatch. Negative number means that the value is scheduling down. Positive number means that the value is scheduling up.
meritOrder	0..1	Integer	(NC) Ranking the energy blocks. Ranking can be based on historical values or other sources. It is required if power schedule is kind merit order.

5051
5052 Table 450 shows all association ends of PowerTimePoint with other classes.

5053 **Table 450 – Association ends of ExtSchedule::PowerTimePoint with other classes**

mult from	name	mult to	type	description
0..*	PowerSchedule	1..1	PowerSchedule	(NC) Time series the time point values belongs to.

5054
5055 **3.19.13 (NC) BaseTimeSeriesKind enumeration**

5056 Kind of time series.
5057 Table 451 shows all literals of BaseTimeSeriesKind.

5058 **Table 451 – Literals of ExtSchedule::BaseTimeSeriesKind**

literal	value	description
forecast		Time series is forecast data. The values represent the result of scientific predictions based on historical time stamped data.
hindcast		Time series is hindcast data. The value represent probable past (historic) condition given by calculation done using actual values. For instance, determine the among of wind based on the energy produced by wind. However, hindcast is typical the result of a simulated forecasts for historical periods.
schedule		Time series is schedule data. The values represent the result of a committed and plan

literal	value	description
		forecast data that has been through a quality control and could incur penalty when not followed.
actual		Time series is actual data. The values represent measured or calculated values that represent the actual behaviour.

5059

5060 **3.19.14 (NC) TimeSeriesInterpolationKind enumeration**

5061 Kinds of interpolation of values between two time point.

5062 Table 452 shows all literals of TimeSeriesInterpolationKind.

5063 **Table 452 – Literals of ExtSchedule::TimeSeriesInterpolationKind**

literal	value	description
none		No interpolation is applied.
zero		The value between two time points is set to zero.
previous		The value between two time points is set to previous value.
next		The value between two time points is set to next value.
linear		Linear interpolation is applied for values between two time points.

5064

5065 **3.19.15 (NC) GenericEnablingSchedule**5066 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
5067 ExtEulIdentifiedObject : Identity

5068 The schedule for the enabling of elements.

5069 Table 453 shows all attributes of GenericEnablingSchedule.

5070 **Table 453 – Attributes of ExtSchedule::GenericEnablingSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5071

5072 Table 454 shows all association ends of GenericEnablingSchedule with other classes.

5073
5074**Table 454 – Association ends of ExtSchedule::GenericEnablingSchedule with other classes**

mult from	name	mult to	type	description
0..*	ContingencyWithRemedialAction	0..1	ContingencyWithRemedialAction	(NC) Contingency with remedial action which has enabling schedules.
0..*	PowerTransferCorridor	0..1	PowerTransferCorridor	(NC) Power transfer corridor which has generic enabling schedules.
0..*	GateInputPin	0..1	GateInputPin	(NC) Gate input pin that has a schedule.
0..*	AssessedElementWithContingency	0..1	AssessedElementWithContingency	(NC) Assessed element with contingency that has enabling schedules.
0..*	AssessedElementWithRemedialAction	0..1	AssessedElementWithRemedialAction	(NC) Assessed element with remedial action that has enabling schedules.
0..*	CrossBorderRelevance	0..1	CrossBorderRelevance	(NC) Cross border relevant that has enabling schedules.
0..*	RemedialActionDependency	0..1	RemedialActionDependency	(NC) Remedial action dependency which has enabling schedules.
1..1	EnablingTimePoint	1..*	EnablingTimePoint	(NC) The enabling timepoint for a assessed element with enabling schedule.
0..*	AutomationFunction	0..1	AutomationFunction	(NC) Automation function which has enabling schedules.
0..*	FunctionBlock	0..1	FunctionBlock	(NC) Function block which has enabling schedules.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5075

3.19.16 (NC) GenericAvailableSchedule5077 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5078 ExtEulIdentifiedObject : Identity

5079 The schedule for the availability of elements.

5080 Table 455 shows all attributes of GenericAvailableSchedule.

5081

Table 455 – Attributes of ExtSchedule::GenericAvailableSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 456 shows all association ends of GenericAvailableSchedule with other classes.

Table 456 – Association ends of ExtSchedule::GenericAvailableSchedule with other classes

mult from	name	mult to	type	description
0..*	RemedialAction	0..1	RemedialAction	(NC) Remedial action which has available schedules.
1..1	AvailabilityTimePoint	1..*	AvailabilityTimePoint	(NC) The availability timepoint for an available schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.17 (NC) EnablingTimePoint root class

Enabling instruction value at a given point in time.

Table 457 shows all attributes of EnablingTimePoint.

Table 457 – Attributes of ExtSchedule::EnablingTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
enabled	0..1	Boolean	(NC) It identifies if the element is enabled. True means enabled, False means not enabled.

Table 458 shows all association ends of EnablingTimePoint with other classes.

Table 458 – Association ends of ExtSchedule::EnablingTimePoint with other classes

mult from	name	mult to	type	description
1..*	GenericEnablingSchedule	1..1	GenericEnablingSchedule	(NC) The enabling schedule which belongs to the enabling timepoint.

3.19.18 (NC) AvailabilityTimePoint root class

Availability instruction value at a given point in time.

Table 459 shows all attributes of AvailabilityTimePoint.

Table 459 – Attributes of ExtSchedule::AvailabilityTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
available	0..1	Boolean	(NC) It identifies if the element is available. True means available, False means unavailable.

5099

5100 Table 460 shows all association ends of AvailabilityTimePoint with other classes.

5101 **Table 460 – Association ends of ExtSchedule::AvailabilityTimePoint with other classes**

mult from	name	mult to	type	description
1..*	GenericAvailabilitySchedule	1..1	GenericAvailableSchedule	(NC) The availability schedule which belongs to the availability timepoint.

5102

5103 **3.19.19 (NC) ParticipationFactorTimePoint root class**

5104 Participation factor for a given point in time.

5105 Table 461 shows all attributes of ParticipationFactorTimePoint.

5106 **Table 461 – Attributes of ExtSchedule::ParticipationFactorTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
participationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(PF)$. In the case of priority strategy, the item with the lowest number gets allocated energy first.

5107

5108 Table 462 shows all association ends of ParticipationFactorTimePoint with other classes.

5109 **Table 462 – Association ends of ExtSchedule::ParticipationFactorTimePoint with other classes**

5110

mult from	name	mult to	type	description
1..*	PowerShiftKeySchedule	1..1	PowerShiftKeySchedule	(NC) The Power Shift Key schedule which belongs to the participation factor timepoint.

5111

5112 **3.19.20 (NC) GridPowerCapacitySchedule**5113 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
5114 ExtEulIdentifiedObject : Identity

5115 The irregular schedule for the capacity.

5116 Table 463 shows all attributes of GridPowerCapacitySchedule.

5117 **Table 463 – Attributes of ExtSchedule::GridPowerCapacitySchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries

name	mult	type	description
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 464 shows all association ends of GridPowerCapacitySchedule with other classes.

Table 464 – Association ends of ExtSchedule::GridPowerCapacitySchedule with other classes

mult from	name	mult to	type	description
0..*	GridPowerCapacity	0..1	GridPowerCapacity	(NC) Grid Power Capacity which is referred by the capacity schedule.
1..1	GridPowerCapacityTime Point	1..*	GridPowerCapacityTime Point	(NC) The capacity timepoint for a capacity schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.21 (NC) GridPowerCapacityTimePoint root class

Capacity instruction value at a given point in time.

Table 465 shows all attributes of GridPowerCapacityTimePoint.

Table 465 – Attributes of ExtSchedule::GridPowerCapacityTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
netACInterchange	0..1	ActivePower	(NC) The netted aggregation of all AC external schedules of an area. Positive sign means flow into the area (Import).
netACInterchangeTolerance	0..1	Float	(NC) The area AC Net Position tolerance.
netDCInterchange	0..1	ActivePower	(NC) The netted aggregation of all DC external schedules of an area. Positive sign means flow into the area.
regulatingUpAllocation	0..1	ActivePower	(NC) The balancing capacity allocated for regulating up, by increasing the production, decreasing the direct current export, increasing direct current import or reducing the consumption of energy in the bidding zone. This must be a positive number.
maxInterchange	0..1	ActivePower	(NC) Maximum total active power (AC and DC) that the net position for the bidding zone can

name	mult	type	description
			have to maintain operational security. Positive sign means flow into the bidding zone.
minImportP	0..1	ActivePower	(NC) Minimum imported active power requirement.
minInterchange	0..1	ActivePower	(NC) Minimum total active power (AC and DC) that the net position for the bidding zone can have to maintain operational security. Negative sign means flow out of the bidding zone.
regulatingDownAllocation	0..1	ActivePower	(NC) The balancing capacity allocated for regulating down, by decreasing the production, increasing the direct current export, decreasing direct current import or increasing the consumption of energy in the bidding zone. This must be a positive number.

Table 466 shows all association ends of GridPowerCapacityTimePoint with other classes.

Table 466 – Association ends of ExtSchedule::GridPowerCapacityTimePoint with other classes

mult from	name	mult to	type	description
1..*	GridPowerCapacitySchedule	1..1	GridPowerCapacitySchedule	(NC) The capacity schedule which belongs to the capacity timepoint.

3.19.22 (NC) CostVolumePotentialSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

The schedule for the cost volume potential.

Table 467 shows all attributes of CostVolumePotentialSchedule.

Table 467 – Attributes of ExtSchedule::CostVolumePotentialSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 468 shows all association ends of CostVolumePotentialSchedule with other classes.

Table 468 – Association ends of ExtSchedule::CostVolumePotentialSchedule with other classes

mult from	name	mult to	type	description
1..1	CostVolumePotentialTimePoint	1..*	CostVolumePotentialTimePoint	(NC) The time point that relates to this cost volume potential schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.23 (NC) CostVolumePotentialTimePoint root class

Cost volume potential value at a given point in time.

Table 469 shows all attributes of CostVolumePotentialTimePoint.

Table 469 – Attributes of ExtSchedule::CostVolumePotentialTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
p	0..1	ActivePower	(NC) The maximum active power that can be imported to the bidding zone. Load sign convention is used, i.e. negative number means an import, positive number means an export.
currency	0..1	Currency	(NC) The maximum reactive power that can be imported to the bidding zone. Load sign convention is used, i.e. negative number means an import, positive number means an export.
price	0..1	Decimal	(NC) Maximum active power.

Table 470 shows all association ends of CostVolumePotentialTimePoint with other classes.

Table 470 – Association ends of ExtSchedule::CostVolumePotentialTimePoint with other classes

mult from	name	mult to	type	description
1..*	CostVolumePotentialSchedule	1..1	CostVolumePotentialSchedule	(NC) The cost volume potential schedule that has this time point.

3.19.24 (NC) ContingencySchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

The schedule for Contingency.

Table 471 shows all attributes of ContingencySchedule.

Table 471 – Attributes of ExtSchedule::ContingencySchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries

name	mult	type	description
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 472 shows all association ends of ContingencySchedule with other classes.

Table 472 – Association ends of ExtSchedule::ContingencySchedule with other classes

mult from	name	mult to	type	description
0..*	Contingency	0..1	Contingency	(NC) Contingency which has a contingency schedule.
1..1	ContingencyTimePoint	1..*	ContingencyTimePoint	(NC) The time point that relates to this contingency schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.25 (NC) ContingencyTimePoint root class

Contingency instruction value at a given point in time.

Table 473 shows all attributes of ContingencyTimePoint.

Table 473 – Attributes of ExtSchedule::ContingencyTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
probability	0..1	PerCent	(NC) Probability of occurrence. The allowed value range is [0,100].
mustStudy	0..1	Boolean	(NC) Set true if must study this contingency.

Table 474 shows all association ends of ContingencyTimePoint with other classes.

Table 474 – Association ends of ExtSchedule::ContingencyTimePoint with other classes

mult from	name	mult to	type	description
1..*	ContingencySchedule	1..1	ContingencySchedule	(NC) The contingency schedule that has this time point.

5170 **3.19.26 (NC) AssessedElementSchedule**5171 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5172 ExtEulIdentifiedObject : Identity

5173 Schedule for assessed element.

5174 Table 475 shows all attributes of AssessedElementSchedule.

5175 **Table 475 – Attributes of ExtSchedule::AssessedElementSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5176

5177 Table 476 shows all association ends of AssessedElementSchedule with other classes.

5178 **Table 476 – Association ends of ExtSchedule::AssessedElementSchedule with other**
5179 **classes**

mult from	name	mult to	type	description
0..*	AssessedElement	0..1	AssessedElement	(NC) Assessed element which has an assessed element schedule.
1..1	AssessedElementTimePoint	1..*	AssessedElementTimePoint	(NC) The time point that relates to this assessed element schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5180

5181 **3.19.27 (NC) AssessedElementTimePoint root class**

5182 Assessed element instruction value at a given point in time.

5183 Table 477 shows all attributes of AssessedElementTimePoint.

5184 **Table 477 – Attributes of ExtSchedule::AssessedElementTimePoint**

name	mult	type	description
enabled	0..1	Boolean	(NC) It identifies if the assessed element is enabled. True means enabled, False means disabled.

name	mult	type	description
maxFlow	0..1	ActivePower	(NC) Maximum flow on an a conducting equipment or a collection of conducting equipment forming a power transfer corridor. For assessed elements that is becomes critical due to contingency, this value represents the maximum flow with remedial action taken into consideration.
appointedMargin	0..1	PerCent	(NC) The percentage (appointed to a region) of the remaining margin obtained in the grid model to reach its current limit. The maximum percentage shall by default be 10% of the remaining margin. It is only used when an assessed element is considered conservative for a region. The allowed value range is [0,100].
atTime	0..1	DateTime	(NC) The time the data is valid for.
positiveVirtualMargin	0..1	PerCent	(NC) A margin defined only for scanned AssessedElement (If AssessedElement.ScannedForRegion is present) in order to represent the influence of available remedial action which is not cross-border relevant remedial action. The margin is modifying the limits used for the assessment whatever the limit it is (e.g. PATL, TATL). This symbolizes a remedial action that can be applied internally by the System Operator. It will be resolved by the System Operator and not by the optimization of remedial actions. The attribute shall be a positive value. The allowed value range is [0,100].
scannedThresholdMargin	0..1	PerCent	(NC) Threshold percentage that a scanned element can be overloaded, on a given element, on top of any overload prior to optimisation (default= 5%). e.g. Initial loading of the element is 110%, with a 5% scanned threshold margin, the new maximum is 115% of the limit (e.g. PATL, TATL, etc). The allowed value range is [0,100].
exclusionReason	0..1	SecuredExclusionReasonKind	(NC) Reason for not associating this assessed element with a secured region.
individualValidationAdjustment	0..1	ActivePower	(NC) A positive value expressed in MW, calculated and provided by System Operators from their individual validation process for the reduction of Remaining Available Margin in order to ensure grid security.
coordinatedValidationAdjustment	0..1	ActivePower	(NC) A positive value expressed in MW, calculated and provided by the coordinated capacity calculator (CCC) for the reduction of Remaining Available Margin (RAM) in order to ensure grid security.
individualValidationAdjustmentShare	0..1	ActivePower	(NC) A positive value expressed in MW, calculated by the coordinated capacity calculator (CCC) based on the provided Individual Validation Adjustment (IVA) by System Operators in order to show the actual reduction of Remaining Available Margin (RAM). Individual Validation Adjustment Share is a positive non-zero value. It is equal or less than the Individual Validation Adjustment value.
individualValidationAdjustmentJustification	0..1	String	(NC) A text description provided by System Operators for justifying the reduction of Remaining Available Margin (RAM) by means of

name	mult	type	description
			Individual Validation Adjustment (IVA). This justification is not intended for any application processing purpose, it should only be used for reporting.
coordinatedValidationAdjustmentJustification	0..1	String	(NC) A text description provided by the coordinated capacity calculator (CCC) for justifying the reduction of Remaining Available Margin (RAM) by means of Coordinated Validation Adjustment (CVA). This justification is not intended for any application processing purpose, it should only be used for reporting.
criticalElementJustification	0..1	String	(deprecated,NC) Justification indicating the kind of critical element contingency. This justification is not intended for any application processing purpose, it should only be used for reporting.
targetRemainingAvailableMarginJustification	0..1	String	(NC) Justification indicating the target remaining available margin. This justification is not intended for any application processing purpose, it should only be used for reporting.

Table 478 shows all association ends of `AssessedElementTimePoint` with other classes.

Table 478 – Association ends of `ExtSchedule::AssessedElementTimePoint` with other classes

mult from	name	mult to	type	description
1..*	AssessedElementSchedule	1..1	AssessedElementSchedule	(NC) The assessed element schedule that has this time point.

3.19.28 (NC) `PowerBidScheduleTimePoint` root class

Time series represent irregular values at given points in time.

Table 479 shows all attributes of `PowerBidScheduleTimePoint`.

Table 479 – Attributes of `ExtSchedule::PowerBidScheduleTimePoint`

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
price	0..1	Decimal	(NC) Price given in the time point.
p	0..1	ActivePower	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node.
minimumActivationP	0..1	ActivePower	(NC) Minimum active power given in the time point.
reservePrice	0..1	Decimal	(NC) Price for reserving the step increment active power.
stepIncrementP	0..1	ActivePower	(NC) The minimum increment that can be applied for an increase in an activation request.
activationCost	0..1	Decimal	(NC) Cost to activate the bid in the given time point.
shutdownCost	0..1	Decimal	(NC) Total shutdown cost incurred for all the units involved in the bid given in the time point. This overrides any cost on the specific unit.

Table 480 shows all association ends of `PowerBidScheduleTimePoint` with other classes.

Table 480 – Association ends of ExtSchedule::PowerBidScheduleTimePoint with other classes

mult from	name	mult to	type	description
1..*	PowerBidSchedule	1..1	PowerBidSchedule	(NC) Power bid schedule that has many power bid schedule time points.

3.19.29 (NC) PowerBidSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Power bid or offer related to a redispatch or countertrading measures. In the case of market place for economic efficiency of the bids and offers, this is equivalent to BidTimeSeries class in 62325 package.

Table 481 shows all attributes of PowerBidSchedule.

Table 481 – Attributes of ExtSchedule::PowerBidSchedule

name	mult	type	description
currency	0..1	Currency	(NC) Currency of the bid.
isOffer	0..1	Boolean	(NC) Indicates if the power bid is an offer or not. True, means that the bid is an offer. False, means that the bid is not an offer.
direction	0..1	MarketRegulationDirectionKind	(NC) Define the direction of the energy adjustment.
totalMinimumEnergy	0..1	RealEnergy	(NC) Minimum total energy that has to be activated by the bid.
priority	0..1	Integer	(NC) The numeric local priority given to a bid. Lower numeric values will have higher priority.
maximumUptime	0..1	Duration	(NC) Maximum duration the action needs to be remain active after startup.
minimumUptime	0..1	Duration	(NC) Minimum duration the action needs to be remain active after startup.
activationCost	0..1	Decimal	(NC) Cost to activate the bid.
shutdownCost	0..1	Decimal	(NC) Total shutdown cost incurred for all the units involved in the bid. This overrides any cost on the specific unit.
leadTime	0..1	Duration	(NC) Time it takes for the bid to be called upon until it is active.
energyBlock	0..1	RealEnergy	(NC) Maximum total energy that can be activated by the bid.
minimumOffTime	0..1	Duration	(NC) Minimum time interval between activation of the bid involving startup and shutdown. This value overrides any value on the unit.
isFixed	0..1	Boolean	(NC) Indicates if the power bid schedule is fixed, meaning that all the different power bid schedule values need to be taken without changes. e.g. It is a take-it-or-leave-it bid offer.
maxRampUpP	0..1	ActivePower	(NC) Maximum increase of the active power change from one time point to the next.
maxRampDownP	0..1	ActivePower	(NC) Maximum decrease of the active power change from one time point to the next.
totalMaximumEnergy	0..1	RealEnergy	(NC) Maximum total energy that can be activated by the bid.

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 482 shows all association ends of PowerBidSchedule with other classes.

Table 482 – Association ends of ExtSchedule::PowerBidSchedule with other classes

mult from	name	mult to	type	description
0..*	ScheduleResource	0..1	ScheduleResource	(NC) Schedule resource which has several power bid schedules.
0..*	PowerRemedialAction	0..1	PowerRemedialAction	(NC) Power remedial action for which the bid is given.
0..*	AreaDispatchableUnit	0..1	AreaReserveResource	(NC)
0..1	PowerShiftKeyDistribution	0..*	PowerShiftKeyDistribution	(NC) Distribution of the power bid amongst the power shift keys.
0..1	PowerScheduleAction	0..1	PowerScheduleAction	(NC) The power schedule action pointed by the power bid schedule.
1..1	PowerBidScheduleTimePoint	1..*	PowerBidScheduleTimePoint	(NC) Power bid schedule time points which belong to a power bid schedule.
1..1	DependencyAsDependee	0..*	PowerBidDependency	(NC) The power bid dependency in which this power bid schedule is the dependee.
1..1	DependencyAsDependent	0..*	PowerBidDependency	(NC) The power bid dependency in which this power bid schedule is the dependent.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.30 (NC) PowerRemedialActionSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

The schedule for a power remedial action.

Table 483 shows all attributes of PowerRemedialActionSchedule.

5216

Table 483 – Attributes of ExtSchedule::PowerRemedialActionSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5217

5218

Table 484 shows all association ends of PowerRemedialActionSchedule with other classes.

5219

Table 484 – Association ends of ExtSchedule::PowerRemedialActionSchedule with other classes

5220

mult from	name	mult to	type	description
0..*	PowerRemedialAction	0..1	PowerRemedialAction	(NC) Power remedial action for the power remedial action schedule.
1..1	PowerRemedialActionTimePoint	1..*	PowerRemedialActionTimePoint	(NC) The time point that relates to this power remedial action schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5221

5222

3.19.31 (NC) PowerRemedialActionTimePoint root class

5223

Regulating values at a given point in time.

5224

Table 485 shows all attributes of PowerRemedialActionTimePoint.

5225

Table 485 – Attributes of ExtSchedule::PowerRemedialActionTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
maxRegulatingDown	0..1	ActivePower	(NC) Maximum net amount of active power that the remedial action can regulate down.
maxRegulatingUp	0..1	ActivePower	(NC) Maximum net amount of active power that the remedial action can regulate up.

5226

5227

Table 486 shows all association ends of PowerRemedialActionTimePoint with other classes.

5228 **Table 486 – Association ends of ExtSchedule::PowerRemedialActionTimePoint with**
5229 **other classes**

mult from	name	mult to	type	description
1..*	PowerRemedialActionSchedule	1..1	PowerRemedialActionSchedule	(NC) The power remedial action schedule that has this time point.

5230

5231 **3.19.32 (NC) UnitCostSchedule**

5232 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5233 ExtEulIdentifiedObject : Identity

5234 The schedule for a unit cost.

5235 Table 487 shows all attributes of UnitCostSchedule.

5236 **Table 487 – Attributes of ExtSchedule::UnitCostSchedule**

name	mult	type	description
currency	0..1	Currency	(NC) Currency the energy price is given in.
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5237

5238 Table 488 shows all association ends of UnitCostSchedule with other classes.

5239 **Table 488 – Association ends of ExtSchedule::UnitCostSchedule with other classes**

mult from	name	mult to	type	description
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) GeneratingUnit which has unit cost schedules.
1..1	UnitCostTimePoint	1..*	UnitCostTimePoint	(NC) The unit cost time point that relates to this unit cost schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5240

5241 **3.19.33 (NC) UnitCostTimePoint root class**

5242 Unit cost at a given point in time.

5243 Table 489 shows all attributes of UnitCostTimePoint.

5244 **Table 489 – Attributes of ExtSchedule::UnitCostTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
startupCost	0..1	Decimal	(NC) The initial startup cost incurred for each start of the GeneratingUnit.
warmStartupCost	0..1	Decimal	(NC) The warm startup cost incurred for each start of the GeneratingUnit.
shutdownCost	0..1	Decimal	(NC) The shutdown cost incurred for each shutdown of the GeneratingUnit.

5245

5246 Table 490 shows all association ends of UnitCostTimePoint with other classes.

5247 **Table 490 – Association ends of ExtSchedule::UnitCostTimePoint with other classes**

mult from	name	mult to	type	description
1..*	UnitCostSchedule	1..1	UnitCostSchedule	(NC) The unit cost schedule that has time point.

5248

5249 **3.19.34 (NC) BaseRegularIntervalSchedule**5250 Inheritance path = [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

5251 Time series that has regular points in time.

5252 Table 491 shows all attributes of BaseRegularIntervalSchedule.

5253 **Table 491 – Attributes of ExtSchedule::BaseRegularIntervalSchedule**

name	mult	type	description
dayOfWeek	0..1	DayOfWeekKind	(NC) Day of the week for which the schedule is valid for.
intervalStartTime	0..1	DateTime	(NC) Interval start time for which the schedule is valid for.
intervalEndTime	0..1	DateTime	(NC) Interval end time for which the schedule is valid for.
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5254

5255 Table 492 shows all association ends of BaseRegularIntervalSchedule with other classes.

5256 **Table 492 – Association ends of ExtSchedule::BaseRegularIntervalSchedule with other**
5257 **classes**

mult from	name	mult to	type	description
0..*	Season	0..1	Season	(NC) Season associated with a base regular interval schedule.
0..*	HourPattern	0..1	HourPattern	(NC) HourPattern that has base regular interval schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5258

5259 **3.19.35 (NC) DayOfWeekKind enumeration**

5260 The kind of day to be included in a regular schedule.

5261 Table 493 shows all literals of DayOfWeekKind.

5262 **Table 493 – Literals of ExtSchedule::DayOfWeekKind**

literal	value	description
monday		Monday as the day of the week.
tuesday		Tuesday as the day of the week.
wednesday		Wednesday as the day of the week.
thursday		Thursday as the day of the week.
friday		Friday as the day of the week.
saturday		Saturday as the day of the week.
sunday		Sunday as the day of the week.
weekday		Day of the week other than Sunday or Saturday.
weekend		Day of the week which is Sunday or Saturday.
all		All days of the week.
publicHoliday		Public holiday is an officially designated day when most workplaces and schools are closed.
bridgeDay		A day that is a gap between two distinguished days e.g holiday and weekend that leads to an abnormal scheduling behavior. e.g. if Ascension day falls on a Thursday, then Friday would be a bridge day due to the schedule will not have a normal Friday consumption and production.

5263

5264 **3.19.36 (NC) HourPattern**

5265 Inheritance path = IdentifiedObject : ExtEuIdentifiedObject : Identity

5266 Pattern of hourly period in a day with the same kind of intensity.

5267 Table 494 shows all attributes of HourPattern.

5268

Table 494 – Attributes of ExtSchedule::HourPattern

name	mult	type	description
peakKind	0..1	PeakKind	(NC) Type of peak or intensity that the pattern is valid for.
energyDemandKind	0..1	EnergyScenarioKind	(NC) Type of energy demand that the pattern is valid for.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5269

5270

Table 495 shows all association ends of HourPattern with other classes.

5271

Table 495 – Association ends of ExtSchedule::HourPattern with other classes

mult from	name	mult to	type	description
0..1	BaseRegularIntervalSchedule	0..*	BaseRegularIntervalSchedule	(NC) Base regular interval schedule which belongs to an hour pattern.
0..1	HourPeriod	0..*	HourPeriod	(NC) Hour period which belongs to an hour pattern.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5272

3.19.37 (NC) PeakKind enumeration

Kind of time period with similar intensity.

Table 496 shows all literals of PeakKind.

5276

Table 496 – Literals of ExtSchedule::PeakKind

literal	value	description
offPeak		Off-peak refer to periods of lower demand for a particular service or commodity.
onPeak		Off-peak refer to periods of higher demand for a particular service or commodity.

5277

3.19.38 (NC) EnergyScenarioKind enumeration

Kind of energy scenario.

Table 497 shows all literals of EnergyScenarioKind.

5281

Table 497 – Literals of ExtSchedule::EnergyScenarioKind

literal	value	description
consumption		Scenario focus on consumption of energy.

literal	value	description
production		Scenario focus on production of energy.
storage		Scenario focus on storage of energy.
export		Scenario focus on export of energy.
import		Scenario focus on import of energy.

5282

5283 **3.19.39 (NC) HourPeriod root class**

5284 Period of hours in a day.

5285 Table 498 shows all attributes of HourPeriod.

5286

Table 498 – Attributes of ExtSchedule::HourPeriod

name	mult	type	description
startTime	0..1	Time	(NC) Time the period start and including, e.g. 12:00 which means it include the time of 12:00.
endTime	0..1	Time	(NC) Time the period end and not including, e.g. 13:00 which means it does not include the time of 13:00 but 12:59.
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

5287

5288 Table 499 shows all association ends of HourPeriod with other classes.

5289

Table 499 – Association ends of ExtSchedule::HourPeriod with other classes

mult from	name	mult to	type	description
0..*	HourPattern	0..1	HourPattern	(NC) HourPattern which has some hour periods.

5290

5291 **3.19.40 (NC) AssessedElementRegularSchedule**5292 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :
5293 ExtEulIdentifiedObject : Identity

5294 Regular schedule for assessed element.

5295 Table 500 shows all attributes of AssessedElementRegularSchedule.

5296

Table 500 – Attributes of ExtSchedule::AssessedElementRegularSchedule

name	mult	type	description
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries

name	mult	type	description
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 501 shows all association ends of AssessedElementRegularSchedule with other classes.

Table 501 – Association ends of ExtSchedule::AssessedElementRegularSchedule with other classes

mult from	name	mult to	type	description
0..*	AssessedElement	0..1	AssessedElement	(NC) Assessed Element that has regular schedules.
0..1	AssessedElementRegularTimePoint	0..*	AssessedElementRegularTimePoint	(NC) Assessed element regular time point which belong to an assessed element regular schedule.
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.41 (NC) AssessedElementRegularTimePoint root class

Assessed element instruction value at a given point in time.

Table 502 shows all attributes of AssessedElementRegularTimePoint.

Table 502 – Attributes of ExtSchedule::AssessedElementRegularTimePoint

name	mult	type	description
appointedMargin	0..1	PerCent	(NC) The percentage (appointed to a region) of the remaining margin obtained in the grid model to reach its current limit. The maximum percentage shall by default be 10% of the remaining margin. It is only used when an assessed element is considered conservative for a region. The allowed value range is [0,100].

name	mult	type	description
maxFlow	0..1	ActivePower	(NC) Maximum flow on an a conducting equipment or a collection of conducting equipment forming a power transfer corridor. For assessed elements that is becomes critical due to contingency, this value represents the maximum flow with remedial action taken into consideration.
enabled	0..1	Boolean	(NC) It identifies if the assessed element is enabled. True means enabled, False means disabled.
positiveVirtualMargin	0..1	PerCent	(NC) A margin defined only for scanned AssessedElement (If AssessedElement.ScannedForRegion is present) in order to represent the influence of available remedial action which is not cross-border relevant remedial action. The margin is modifying the limits used for the assessment whatever the limit it is (e.g. PATL, TATL). This symbolizes a remedial action that can be applied internally by the System Operator. It will be resolved by the System Operator and not by the optimization of remedial actions. The attribute shall be a positive value. The allowed value range is [0,100].
scannedThresholdMargin	0..1	PerCent	(NC) Threshold percentage that a scanned element can be overloaded, on a given element, on top of any overload prior to optimisation (default= 5%). e.g. Initial loading of the element is 110%, with a 5% scanned threshold margin, the new maximum is 115% of the limit (e.g. PATL, TATL, etc). The allowed value range is [0,100].

Table 503 shows all association ends of AssessedElementRegularTimePoint with other classes.

Table 503 – Association ends of ExtSchedule::AssessedElementRegularTimePoint with other classes

mult from	name	mult to	type	description
0..*	AssessedElementRegularSchedule	0..1	AssessedElementRegularSchedule	(NC) Assessed element regular schedule which has assessed element regular time points.

3.19.42 (NC) VoltageAngleSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

ExtEulIdentifiedObject : Identity

The schedule for a voltage angle.

Table 504 shows all attributes of VoltageAngleSchedule.

Table 504 – Attributes of ExtSchedule::VoltageAngleSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries

name	mult	type	description
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5317
5318 Table 505 shows all association ends of VoltageAngleSchedule with other classes.
5319 **Table 505 – Association ends of ExtSchedule::VoltageAngleSchedule with other classes**

mult from	name	mult to	type	description
0..*	VoltageAngleLimit	0..1	VoltageAngleLimit	(NC) Voltage angle limit which has voltage angle schedule.
1..1	VoltageAngleTimePoint	1..*	VoltageAngleTimePoint	(NC) The voltage angle time point that relates to this voltage angle schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5320
5321 **3.19.43 (NC) VoltageAngleTimePoint root class**

5322 Voltage angle at a given point in time.
5323 Table 506 shows all attributes of VoltageAngleTimePoint.

5324 **Table 506 – Attributes of ExtSchedule::VoltageAngleTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
value	0..1	AngleDegrees	(NC) The difference in angle degrees between referenced by the association end OperationalLimitSet.Terminal and the Terminal referenced by the association end VoltageAngleLimit.AngleReferenceTerminal. The value shall be positive (greater than zero).

5325
5326 Table 507 shows all association ends of VoltageAngleTimePoint with other classes.

5327 **Table 507 – Association ends of ExtSchedule::VoltageAngleTimePoint with other classes**
5328

mult from	name	mult to	type	description
1..*	VoltageAngleSchedule	1..1	VoltageAngleSchedule	(NC) The voltage angle schedule that has time point.

5329

5330 **3.19.44 (NC) PowerScheduleKind enumeration**

5331 Kind of power schedule.

5332 Table 508 shows all literals of PowerScheduleKind.

5333 **Table 508 – Literals of ExtSchedule::PowerScheduleKind**

literal	value	description
meritOrder		Power schedule is a merit order that includes ranking of the power block. Power block provides the maximum power allocation possible.
mustRun		Power schedule is a must run schedule that identifies the unit that must run for a given time point.
power		Power schedule that has no additional meaning than allocating power to unit for a given time point.
price		Power schedule includes prices for a given a power per time point.

5334

5335 **3.19.45 (NC) InfeedLimitSchedule**5336 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5337 ExtEulIdentifiedObject : Identity

5338 The schedule for an infeed limit.

5339 Table 509 shows all attributes of InfeedLimitSchedule.

5340 **Table 509 – Attributes of ExtSchedule::InfeedLimitSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5341

5342 Table 510 shows all association ends of InfeedLimitSchedule with other classes.

5343 **Table 510 – Association ends of ExtSchedule::InfeedLimitSchedule with other classes**

mult from	name	mult to	type	description
0..*	InfeedLimit	0..1	InfeedLimit	(NC) Infeed limit which has infeed limit schedule.
1..1	InfeedLimitTimePoint	1..*	InfeedLimitTimePoint	(NC) Infeed limit time point that relates to this infeed limit schedule.

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5344

5345 **3.19.46 (NC) InfeedLimitTimePoint root class**

5346 Infeed limit at a given point in time.

5347 Table 511 shows all attributes of InfeedLimitTimePoint.

5348 **Table 511 – Attributes of ExtSchedule::InfeedLimitTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
valueW	0..1	ActivePower	(NC) Value of active power limit. The attribute shall be a positive value or zero.
valueA	0..1	CurrentFlow	(NC) Value of current limit. The attribute shall be a positive value or zero.

5349

5350 Table 512 shows all association ends of InfeedLimitTimePoint with other classes.

5351 **Table 512 – Association ends of ExtSchedule::InfeedLimitTimePoint with other classes**

mult from	name	mult to	type	description
1..*	InfeedLimitSchedule	1..1	InfeedLimitSchedule	(NC) Infeed limit schedule that has time point.

5352

5353 **3.19.47 (NC) RemedialActionSchemeSchedule**5354 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5355 ExtEulIdentifiedObject : Identity

5356 The schedule for a remedial action scheme.

5357 Table 513 shows all attributes of RemedialActionSchemeSchedule.

5358 **Table 513 – Attributes of ExtSchedule::RemedialActionSchemeSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 514 shows all association ends of RemedialActionSchemeSchedule with other classes.

Table 514 – Association ends of ExtSchedule::RemedialActionSchemeSchedule with other classes

mult from	name	mult to	type	description
0..*	SchemeRemedialAction	0..1	SchemeRemedialAction	(NC) Remedial action scheme which has remedial action scheme schedules.
0..*	ArmedRemedialAction	0..1	RemedialActionScheme	(NC) Armed remedial action for a remedial action scheme.
1..1	RemedialActionScheme TimePoint	1..*	RemedialActionScheme TimePoint	(NC) Remedial action scheme time point that relates to this remedial action scheme schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.48 (NC) RemedialActionSchemeTimePoint root class

Remedial action scheme at a given point in time.

Table 515 shows all attributes of RemedialActionSchemeTimePoint.

Table 515 – Attributes of ExtSchedule::RemedialActionSchemeTimePoint

name	mult	type	description
armed	0..1	Boolean	(NC) Defines the arming status of the remedial action scheme. It is set by operation or by signal.
inService	0..1	Boolean	(NC) Specifies the availability of the Remedial Action Scheme (RAS). If true, the RAS is available for contingency processing. If false, the RAS is treated by contingency processing as if it is not in the model.
atTime	0..1	DateTime	(NC) The time the data is valid for.

Table 516 shows all association ends of RemedialActionSchemeTimePoint with other classes.

Table 516 – Association ends of ExtSchedule::RemedialActionSchemeTimePoint with other classes

mult from	name	mult to	type	description
1..*	RemedialActionScheme Schedule	1..1	RemedialActionScheme Schedule	(NC) Remedial action scheme schedule that has time point.

3.19.49 (NC) RemedialActionGroupSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

5376 The schedule for a remedial action group.

5377 Table 517 shows all attributes of RemedialActionGroupSchedule.

5378 **Table 517 – Attributes of ExtSchedule::RemedialActionGroupSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5379
5380 Table 518 shows all association ends of RemedialActionGroupSchedule with other classes.

5381 **Table 518 – Association ends of ExtSchedule::RemedialActionGroupSchedule with**
5382 **other classes**

mult from	name	mult to	type	description
0..*	RemedialActionGroup	0..1	RemedialActionGroup	(NC) Remedial action group which has remedial action group schedules.
1..1	RemedialActionGroupTimePoint	1..*	RemedialActionGroupTimePoint	(NC) Remedial action group time point that relates to this remedial action group schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5383
5384 **3.19.50 (NC) RemedialActionGroupTimePoint root class**

5385 Remedial action group at a given point in time.

5386 Table 519 shows all attributes of RemedialActionGroupTimePoint.

5387 **Table 519 – Attributes of ExtSchedule::RemedialActionGroupTimePoint**

name	mult	type	description
maxRegulatingDown	0..1	ActivePower	(NC) Maximum net amount of active power that the group of remedial actions can regulate down.
maxRegulatingUp	0..1	ActivePower	(NC) Maximum net amount of active power that the group of remedial actions can regulate up.
atTime	0..1	DateTime	(NC) The time the data is valid for.

5388

5389 Table 520 shows all association ends of RemedialActionGroupTimePoint with other classes.

5390 **Table 520 – Association ends of ExtSchedule::RemedialActionGroupTimePoint with**
5391 **other classes**

mult from	name	mult to	type	description
1..*	RemedialActionGroupSchedule	1..1	RemedialActionGroupSchedule	(NC) Remedial action group schedule that has time point.

5392

5393 3.19.51 (NC) GridStateAlterationSchedule

5394 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5395 ExtEulIdentifiedObject : Identity

5396 Schedule for a grid state alteration.

5397 Table 521 shows all attributes of GridStateAlterationSchedule.

5398 **Table 521 – Attributes of ExtSchedule::GridStateAlterationSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5399

5400 Table 522 shows all association ends of GridStateAlterationSchedule with other classes.

5401 **Table 522 – Association ends of ExtSchedule::GridStateAlterationSchedule with other**
5402 **classes**

mult from	name	mult to	type	description
0..*	GridStateAlteration	0..1	GridStateAlteration	(NC) Grid state alteration which has grid state alteration schedules.
1..1	GridStateAlterationTimePoint	1..*	GridStateAlterationTimePoint	(NC) Grid state alteration time point that relates to this grid state alteration schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5403

5404 **3.19.52 (NC) GridStateAlterationTimePoint root class**

5405 Grid state alteration at a given point in time.

5406 Table 523 shows all attributes of GridStateAlterationTimePoint.

5407 **Table 523 – Attributes of ExtSchedule::GridStateAlterationTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
enabled	0..1	Boolean	(NC) The status of the GridStateAlteration set by an operation or by a signal resulting from a control action.
participationFactor	0..1	PerCent	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(\text{PF})$. In the case of priority strategy, the item with the lowest number gets allocated energy first. e.g. If 0 this grid alteration does not participate. The sum of all participation factors for all grid state alterations associated with same remedial action shall be equal to 100%.

5408
5409 Table 524 shows all association ends of GridStateAlterationTimePoint with other classes.5410 **Table 524 – Association ends of ExtSchedule::GridStateAlterationTimePoint with other**
5411 **classes**

mult from	name	mult to	type	description
1..*	GridStateAlterationSchedule	1..1	GridStateAlterationSchedule	(NC) Grid state alteration schedule that has time point.

5412

5413 **3.19.53 (NC) RegulatingControlRegularSchedule**5414 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :
5415 ExtEulIdentifiedObject : Identity

5416 Regular schedule for regulating control.

5417 Table 525 shows all attributes of RegulatingControlRegularSchedule.

5418 **Table 525 – Attributes of ExtSchedule::RegulatingControlRegularSchedule**

name	mult	type	description
discrete	0..1	Boolean	(NC) The regulation is performed in a discrete mode. This applies to equipment with discrete controls, e.g. tap changers and shunt compensators.
enabled	0..1	Boolean	(NC) The flag tells if regulation is enabled.
targetDeadband	0..1	NullCIM	(NC) This is a deadband used with discrete control to avoid excessive update of controls like tap changers and shunt compensator banks while regulating. The units of those appropriate for the mode. The attribute shall be a positive value or zero. If RegulatingControl.discrete is set

name	mult	type	description
			to "false", the RegulatingControl.targetDeadband is to be ignored. Note that for instance, if the targetValue is 100 kV and the targetDeadband is 2 kV the range is from 99 to 101 kV.
targetValue	0..1	NullCIM	(NC) The target value specified for case input. This value can be used for the target value without the use of schedules. The value has the units appropriate to the mode attribute.
targetValueUnitMultiplier	0..1	NullCIM	(NC) Specify the multiplier for used for the targetValue.
maxAllowedTargetValue	0..1	NullCIM	(NC) Maximum allowed target value (RegulatingControl.targetValue).
minAllowedTargetValue	0..1	NullCIM	(NC) Minimum allowed target value (RegulatingControl.targetValue).
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 526 shows all association ends of RegulatingControlRegularSchedule with other classes.

Table 526 – Association ends of ExtSchedule::RegulatingControlRegularSchedule with other classes

mult from	name	mult to	type	description
0..*	RegulatingControl	0..1	RegulatingControl	(NC) Regulating control which has RegulatingControlRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5423

5424 **3.19.54 (NC) TapChangerControlRegularSchedule**

5425 Inheritance path = [RegulatingControlRegularSchedule](#) : [BaseRegularIntervalSchedule](#) :
 5426 [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

5427 Regular schedule for tap changer control.

5428 Table 527 shows all attributes of TapChangerControlRegularSchedule.

5429 **Table 527 – Attributes of ExtSchedule::TapChangerControlRegularSchedule**

name	mult	type	description
discrete	0..1	Boolean	(NC) inherited from: RegulatingControlRegularSchedule
enabled	0..1	Boolean	(NC) inherited from: RegulatingControlRegularSchedule
targetDeadband	0..1	NullCIM	(NC) inherited from: RegulatingControlRegularSchedule
targetValue	0..1	NullCIM	(NC) inherited from: RegulatingControlRegularSchedule
targetValueUnitMultiplier	0..1	NullCIM	(NC) inherited from: RegulatingControlRegularSchedule
maxAllowedTargetValue	0..1	NullCIM	(NC) inherited from: RegulatingControlRegularSchedule
minAllowedTargetValue	0..1	NullCIM	(NC) inherited from: RegulatingControlRegularSchedule
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5430

5431 Table 528 shows all association ends of TapChangerControlRegularSchedule with other
5432 classes.

5433 **Table 528 – Association ends of ExtSchedule::TapChangerControlRegularSchedule with**
5434 **other classes**

mult from	name	mult to	type	description
0..*	TapChangerControl	0..1	TapChangerControl	(NC) Tap changer control which has TapChangerControlRegularSchedule.
0..*	RegulatingControl	0..1	RegulatingControl	(NC) inherited from: RegulatingControlRegularSchedule
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5435

5436 **3.19.55 (NC) TapRegularSchedule**

5437 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :

5438 ExtEulIdentifiedObject : Identity

5439 Regular schedule for tap.

5440 Table 529 shows all attributes of TapRegularSchedule.

5441 **Table 529 – Attributes of ExtSchedule::TapRegularSchedule**

name	mult	type	description
controlEnabled	0..1	NullCIM	(NC) Specifies the regulation status of the equipment. True is regulating, false is not regulating.
step	0..1	NullCIM	(NC) Tap changer position. Starting step for a steady state solution. Non integer values are allowed to support continuous tap variables. The reasons for continuous value are to support study cases where no discrete tap changer has yet been designed, a solution where a narrow voltage band forces the tap step to oscillate or to accommodate for a continuous solution as input. The attribute shall be equal to or greater than lowStep and equal to or less than highStep.
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries

name	mult	type	description
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 530 shows all association ends of TapRegularSchedule with other classes.

Table 530 – Association ends of ExtSchedule::TapRegularSchedule with other classes

mult from	name	mult to	type	description
0..*	TapChanger	0..1	TapChanger	(NC) Tap changer which has TapRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.56 (NC) SwitchRegularSchedule

Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Regular schedule for switch.

Table 531 shows all attributes of SwitchRegularSchedule.

Table 531 – Attributes of ExtSchedule::SwitchRegularSchedule

name	mult	type	description
open	0..1	NullCIM	(NC) The attribute tells if the switch is considered open when used as input to topology processing.
locked	0..1	NullCIM	(NC) If true, the switch is locked. The resulting switch state is a combination of locked and Switch.open attributes as follows: - locked=true and Switch.open=true. The resulting state is open and locked; - locked=false and Switch.open=true. The resulting state is open; - locked=false and Switch.open=false. The resulting state is closed.
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule

name	mult	type	description
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 532 shows all association ends of SwitchRegularSchedule with other classes.

Table 532 – Association ends of ExtSchedule::SwitchRegularSchedule with other classes

mult from	name	mult to	type	description
0..*	Switch	0..1	Switch	(NC) Switch which has SwitchRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.57 (NC) EnergyConnectionRegularSchedule

Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Regular schedule for energy connection.

Table 533 shows all attributes of EnergyConnectionRegularSchedule.

Table 533 – Attributes of ExtSchedule::EnergyConnectionRegularSchedule

name	mult	type	description
p	0..1	NullCIM	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node.

name	mult	type	description
			Starting value for a steady state solution.
q	0..1	NullCIM	(NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution.
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 534 shows all association ends of EnergyConnectionRegularSchedule with other classes.

Table 534 – Association ends of ExtSchedule::EnergyConnectionRegularSchedule with other classes

mult from	name	mult to	type	description
0..*	EnergyConnection	0..1	EnergyConnection	(NC) EnergyConnection which has EnergyConnectionRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.58 (NC) InServiceRegularSchedule

Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity
Regular schedule for elements having in service.

5472 Table 535 shows all attributes of InServiceRegularSchedule.

5473 **Table 535 – Attributes of ExtSchedule::InServiceRegularSchedule**

name	mult	type	description
inService	0..1	NullCIM	(NC) Specifies the availability of the equipment. True means the equipment is available for topology processing, which determines if the equipment is energized or not. False means that the equipment is treated by network applications as if it is not in the model.
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5474
5475 Table 536 shows all association ends of InServiceRegularSchedule with other classes.

5476 **Table 536 – Association ends of ExtSchedule::InServiceRegularSchedule with other**
5477 **classes**

mult from	name	mult to	type	description
0..*	Equipment	0..1	Equipment	(NC) Equipment which has InServiceRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5478

5479 **3.19.59 (NC) ControlAreaRegularSchedule**5480 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :

5481 ExtEulIdentifiedObject : Identity

5482 Regular schedule for control area.

5483 Table 537 shows all attributes of ControlAreaRegularSchedule.

5484 **Table 537 – Attributes of ExtSchedule::ControlAreaRegularSchedule**

name	mult	type	description
netInterchange	0..1	NullCIM	(NC) The specified positive net interchange into the control area, i.e. positive sign means flow into the area.
pTolerance	0..1	NullCIM	(NC) Active power net interchange tolerance. The attribute shall be a positive value or zero.
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5485

5486 Table 538 shows all association ends of ControlAreaRegularSchedule with other classes.

5487 **Table 538 – Association ends of ExtSchedule::ControlAreaRegularSchedule with other**
5488 **classes**

mult from	name	mult to	type	description
0..*	ControlArea	0..1	ControlArea	(NC) ControlArea which has ControlAreaRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5489

5490

3.19.60 (NC) SynchronousMachineRegularSchedule5491 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :

5492 ExtEulIdentifiedObject : Identity

5493 Regular schedule for synchronous machine.

5494 Table 539 shows all attributes of SynchronousMachineRegularSchedule.

5495

Table 539 – Attributes of ExtSchedule::SynchronousMachineRegularSchedule

name	mult	type	description
operatingMode	0..1	NullCIM	(NC) Current mode of operation.
referencePriority	0..1	NullCIM	(NC) Priority of unit for use as powerflow voltage phase angle reference bus selection. 0 = don't care (default) 1 = highest priority. 2 is less than 1 and so on.
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5496

5497 Table 540 shows all association ends of SynchronousMachineRegularSchedule with other
5498 classes.**Table 540 – Association ends of ExtSchedule::SynchronousMachineRegularSchedule with other classes**

mult from	name	mult to	type	description
0..*	SynchronousMachine	0..1	SynchronousMachine	(NC) SynchronousMachine which has SynchronousMachineRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule

mult from	name	mult to	type	description
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5501

5502 **3.19.61 (NC) AsynchronousMachineRegularSchedule**5503 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :

5504 ExtEuIdentifiedObject : Identity

5505 Regular schedule for asynchronous machine.

5506 Table 541 shows all attributes of AsynchronousMachineRegularSchedule.

5507 **Table 541 – Attributes of ExtSchedule::AsynchronousMachineRegularSchedule**

name	mult	type	description
asynchronousMachineType	0..1	NullCIM	(NC) Indicates the type of Asynchronous Machine (motor or generator).
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5508

5509 Table 542 shows all association ends of AsynchronousMachineRegularSchedule with other
5510 classes.

5511 **Table 542 – Association ends of ExtSchedule::AsynchronousMachineRegularSchedule**
5512 **with other classes**

mult from	name	mult to	type	description
0..*	AsynchronousMachine	0..1	AsynchronousMachine	(NC) AsynchronousMachine which has AsynchronousMachineRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5513

5514 **3.19.62 (NC) ExternalNetworkInjectionRegularSchedule**

5515 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :
5516 ExtEulIdentifiedObject : Identity

5517 Regular schedule for external network injection.

5518 Table 543 shows all attributes of ExternalNetworkInjectionRegularSchedule.

5519 **Table 543 – Attributes of ExtSchedule::ExternalNetworkInjectionRegularSchedule**

name	mult	type	description
referencePriority	0..1	NullCIM	(NC) Priority of unit for use as powerflow voltage phase angle reference bus selection. 0 = don't care (default) 1 = highest priority. 2 is less than 1 and so on.
p	0..1	NullCIM	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for steady state solutions.
q	0..1	NullCIM	(NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for steady state solutions.
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 544 shows all association ends of ExternalNetworkInjectionRegularSchedule with other classes.

**Table 544 – Association ends of
ExtSchedule::ExternalNetworkInjectionRegularSchedule with other classes**

mult from	name	mult to	type	description
0..*	ExternalNetworkInjection	0..1	ExternalNetworkInjection	(NC) External network injection which has ExternalNetworkInjectionRegularSchedule
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.63 (NC) EquivalentInjectionRegularSchedule

Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Regular schedule for equivalent injection.

Table 545 shows all attributes of EquivalentInjectionRegularSchedule.

Table 545 – Attributes of ExtSchedule::EquivalentInjectionRegularSchedule

name	mult	type	description
regulationStatus	0..1	NullCIM	(NC) Specifies the regulation status of the EquivalentInjection. True is regulating. False is not regulating.
regulationTarget	0..1	NullCIM	(NC) The target voltage for voltage regulation. The attribute shall be a positive value.
p	0..1	NullCIM	(NC) Equivalent active power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for steady state solutions.
q	0..1	NullCIM	(NC) Equivalent reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for steady state solutions.
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule

name	mult	type	description
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 546 shows all association ends of EquivalentInjectionRegularSchedule with other classes.

Table 546 – Association ends of ExtSchedule::EquivalentInjectionRegularSchedule with other classes

mult from	name	mult to	type	description
0..*	EquivalentInjection	0..1	EquivalentInjection	(NC) EquivalentInjection which has EquivalentInjectionRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.64 (NC) ACDCConverterRegularSchedule

Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Regular schedule for ACDC converter.

Table 547 shows all attributes of ACDCConverterRegularSchedule.

5543

Table 547 – Attributes of ExtSchedule::ACDCCConverterRegularSchedule

name	mult	type	description
p	0..1	ActivePower	(NC) Active power at the point of common coupling. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution in the case a simplified power flow model is used.
q	0..1	ReactivePower	(NC) Reactive power at the point of common coupling. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution in the case a simplified power flow model is used.
targetPpcc	0..1	ActivePower	(NC) Real power injection target in AC grid, at point of common coupling. Load sign convention is used, i.e. positive sign means flow out from a node.
targetUdc	0..1	Voltage	(NC) Target value for DC voltage magnitude. The attribute shall be a positive value.
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5544

5545

Table 548 shows all association ends of ACDCCConverterRegularSchedule with other classes.

5546

Table 548 – Association ends of ExtSchedule::ACDCCConverterRegularSchedule with other classes

5547

mult from	name	mult to	type	description
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5548

5549 **3.19.65 (NC) CsConverterRegularSchedule**5550 Inheritance path = [ACDCConverterRegularSchedule](#) : [BaseRegularIntervalSchedule](#) :5551 [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

5552 Regular schedule for CS converter.

5553 Table 549 shows all attributes of CsConverterRegularSchedule.

5554 **Table 549 – Attributes of ExtSchedule::CsConverterRegularSchedule**

name	mult	type	description
operatingMode	0..1	NullCIM	(NC) Indicates whether the DC pole is operating as an inverter or as a rectifier. It is converter's control variable used in power flow.
pPccControl	0..1	NullCIM	(NC) Kind of active power control.
targetAlpha	0..1	NullCIM	(NC) Target firing angle. It is converter's control variable used in power flow. It is only applicable for rectifier if continuous tap changer control is used. Allowed values are within the range $\text{minAlpha} \leq \text{targetAlpha} \leq \text{maxAlpha}$. The attribute shall be a positive value.
targetGamma	0..1	NullCIM	(NC) Target extinction angle. It is converter's control variable used in power flow. It is only applicable for inverter if continuous tap changer control is used. Allowed values are within the range $\text{minGamma} \leq \text{targetGamma} \leq \text{maxGamma}$. The attribute shall be a positive value.
targetIdc	0..1	NullCIM	(NC) DC current target value. It is converter's control variable used in power flow. The attribute shall be a positive value.
p	0..1	ActivePower	(NC) inherited from: ACDCConverterRegularSchedule
q	0..1	ReactivePower	(NC) inherited from: ACDCConverterRegularSchedule
targetPpcc	0..1	ActivePower	(NC) inherited from: ACDCConverterRegularSchedule
targetUdc	0..1	Voltage	(NC) inherited from: ACDCConverterRegularSchedule
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 550 shows all association ends of CsConverterRegularSchedule with other classes.

Table 550 – Association ends of ExtSchedule::CsConverterRegularSchedule with other classes

mult from	name	mult to	type	description
0..*	CsConverter	0..1	CsConverter	(NC) CsConverter which has CsConverterRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.66 (NC) VsConverterRegularSchedule

Inheritance path = [ACDCConverterRegularSchedule](#) : [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity
Regular schedule for VS converter.

Table 551 shows all attributes of VsConverterRegularSchedule.

Table 551 – Attributes of ExtSchedule::VsConverterRegularSchedule

name	mult	type	description
droop	0..1	NullCIM	(NC) Droop constant. The pu value is obtained as $D \text{ [kV/MW]} \times S_b / U_{bdc}$. The attribute shall be a positive value.
droopCompensation	0..1	NullCIM	(NC) Compensation constant. Used to compensate for voltage drop when controlling voltage at a distant bus. The attribute shall be a positive value.
pPccControl	0..1	NullCIM	(NC) Kind of control of real power and/or DC voltage.
qPccControl	0..1	NullCIM	(NC) Kind of reactive power control.
qShare	0..1	NullCIM	(NC) Reactive power sharing factor among parallel converters on Uac control. The attribute shall be a positive value or zero.
targetQpcc	0..1	NullCIM	(NC) Reactive power injection target in AC grid, at point of common coupling. Load sign

name	mult	type	description
			convention is used, i.e. positive sign means flow out from a node.
targetUpcc	0..1	NullCIM	(NC) Voltage target in AC grid, at point of common coupling. The attribute shall be a positive value.
targetPowerFactorPcc	0..1	NullCIM	(NC) Power factor target at the AC side, at point of common coupling. The attribute shall be a positive value.
targetPhasePcc	0..1	NullCIM	(NC) Phase target at AC side, at point of common coupling. The attribute shall be a positive value.
targetPWMfactor	0..1	NullCIM	(NC) Magnitude of pulse-modulation factor. The attribute shall be a positive value.
p	0..1	ActivePower	(NC) inherited from: ACDCCConverterRegularSchedule
q	0..1	ReactivePower	(NC) inherited from: ACDCCConverterRegularSchedule
targetPpcc	0..1	ActivePower	(NC) inherited from: ACDCCConverterRegularSchedule
targetUdc	0..1	Voltage	(NC) inherited from: ACDCCConverterRegularSchedule
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 552 shows all association ends of VsConverterRegularSchedule with other classes.

Table 552 – Association ends of ExtSchedule::VsConverterRegularSchedule with other classes

mult from	name	mult to	type	description
0..*	VsConverter	0..1	VsConverter	(NC) VsConverter which has VsConverterRegularSchedule.

mult from	name	mult to	type	description
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5570

5571 **3.19.67 (NC) EquivalentInjectionSchedule**5572 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5573 ExtEulIdentifiedObject : Identity

5574 Regular schedule for equivalent injection.

5575 Table 553 shows all attributes of EquivalentInjectionSchedule.

5576 **Table 553 – Attributes of ExtSchedule::EquivalentInjectionSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5577

5578 Table 554 shows all association ends of EquivalentInjectionSchedule with other classes.

5579 **Table 554 – Association ends of ExtSchedule::EquivalentInjectionSchedule with other**
5580 **classes**

mult from	name	mult to	type	description
0..*	EquivalentInjection	0..1	EquivalentInjection	(NC) Equivalent injection which has equivalent injection schedules.
1..1	EquivalentInjectionTime Point	1..*	EquivalentInjectionTime Point	(NC) The time point that relates to this equivalent injection schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5581

5582 **3.19.68 (NC) EnergyConnectionSchedule**5583 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5584 ExtEulIdentifiedObject : Identity

5585 Schedule for energy connection.

5586 Table 555 shows all attributes of EnergyConnectionSchedule.

5587 **Table 555 – Attributes of ExtSchedule::EnergyConnectionSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5588

5589 Table 556 shows all association ends of EnergyConnectionSchedule with other classes.

5590 **Table 556 – Association ends of ExtSchedule::EnergyConnectionSchedule with other classes**

5591

mult from	name	mult to	type	description
0..*	EnergyConnection	0..1	EnergyConnection	(NC) Energy connection which has energy connection schedules.
1..1	EnergyConnectionTimePoint	1..*	EnergyConnectionTimePoint	(NC) The time point that relates to this energy connection schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5592

5593 **3.19.69 (NC) TapSchedule**5594 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5595 ExtEulIdentifiedObject : Identity

5596 Schedule for tap.

5597 Table 557 shows all attributes of TapSchedule.

5598 **Table 557 – Attributes of ExtSchedule::TapSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5599

5600 Table 558 shows all association ends of TapSchedule with other classes.

5601 **Table 558 – Association ends of ExtSchedule::TapSchedule with other classes**

mult from	name	mult to	type	description
0..*	TapChanger	0..1	TapChanger	(NC) Tap changer which has tap schedules.
1..1	TapScheduleTimePoint	1..*	TapScheduleTimePoint	(NC) The time point that relates to this tap schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5602

5603 3.19.70 (NC) EquivalentInjectionTimePoint root class

5604 Equivalent injection values for a given point in time.

5605 Table 559 shows all attributes of EquivalentInjectionTimePoint.

5606 **Table 559 – Attributes of ExtSchedule::EquivalentInjectionTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
regulationStatus	0..1	NullCIM	(NC) Specifies the regulation status of the EquivalentInjection. True is regulating. False is not regulating.
regulationTarget	0..1	NullCIM	(NC) The target voltage for voltage regulation. The attribute shall be a positive value.
p	0..1	NullCIM	(NC) Equivalent active power injection. Load sign convention is used, i.e. positive sign means flow out from a node.

name	mult	type	description
			Starting value for steady state solutions.
q	0..1	NullCIM	(NC) Equivalent reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for steady state solutions.

Table 560 shows all association ends of EquivalentInjectionTimePoint with other classes.

Table 560 – Association ends of ExtSchedule::EquivalentInjectionTimePoint with other classes

mult from	name	mult to	type	description
1..*	EquivalentInjectionSchedule	1..1	EquivalentInjectionSchedule	(NC) The EquivalentInjection schedule that has this time point.

3.19.71 (NC) RegulatingControlSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

ExtEulIdentifiedObject : Identity

Schedule for regulating control.

Table 561 shows all attributes of RegulatingControlSchedule.

Table 561 – Attributes of ExtSchedule::RegulatingControlSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 562 shows all association ends of RegulatingControlSchedule with other classes.

Table 562 – Association ends of ExtSchedule::RegulatingControlSchedule with other classes

mult from	name	mult to	type	description
0..*	RegulatingControl	0..1	RegulatingControl	(NC) Regulating control which has regulating control schedules.
1..1	RegulatingControlTimePoint	1..*	RegulatingControlTimePoint	(NC) The time point that relates to this regulating control schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject

mult from	name	mult to	type	description
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5622

5623 **3.19.72 (NC) TapChangerControlSchedule**

5624 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
 5625 ExtEulIdentifiedObject : Identity

5626 Schedule for tap changer control.

5627 Table 563 shows all attributes of TapChangerControlSchedule.

5628 **Table 563 – Attributes of ExtSchedule::TapChangerControlSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5629

5630 Table 564 shows all association ends of TapChangerControlSchedule with other classes.

5631 **Table 564 – Association ends of ExtSchedule::TapChangerControlSchedule with other**
5632 **classes**

mult from	name	mult to	type	description
0..*	TapChangerControl	0..1	TapChangerControl	(NC) Tap changer control which has TapChangerControlSchedule.
1..1	RegulatingControlTimePoint	1..*	RegulatingControlTimePoint	(NC) The time point that relates to this tap changer control schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5633

5634 **3.19.73 (NC) RegulatingControlTimePoint root class**

5635 Regulating control values for a given point in time.

5636 Table 565 shows all attributes of RegulatingControlTimePoint.

5637 **Table 565 – Attributes of ExtSchedule::RegulatingControlTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
targetValue	0..1	NullCIM	(NC) The target value specified for case input. This value can be used for the target value without the use of schedules. The value has the units appropriate to the mode attribute.
targetValueUnitMultiplier	0..1	NullCIM	(NC) Specify the multiplier for used for the targetValue.
maxAllowedTargetValue	0..1	NullCIM	(NC) Maximum allowed target value (RegulatingControl.targetValue).
minAllowedTargetValue	0..1	NullCIM	(NC) Minimum allowed target value (RegulatingControl.targetValue).

5638

5639 Table 566 shows all association ends of RegulatingControlTimePoint with other classes.

5640 **Table 566 – Association ends of ExtSchedule::RegulatingControlTimePoint with other**
5641 **classes**

mult from	name	mult to	type	description
1..*	RegulatingControlSchedule	1..1	RegulatingControlSchedule	(NC) The regulating control schedule that has this time point.
1..*	TapChangerControlSchedule	1..1	TapChangerControlSchedule	(NC) The tap changer control schedule that has this time point.

5642

5643 **3.19.74 (NC) SwitchSchedule**5644 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5645 ExtEulIdentifiedObject : Identity

5646 Schedule for switch.

5647 Table 567 shows all attributes of SwitchSchedule.

5648 **Table 567 – Attributes of ExtSchedule::SwitchSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
identifier	0..1	NullCIM	inherited from: Identity

Table 568 shows all association ends of SwitchSchedule with other classes.

Table 568 – Association ends of ExtSchedule::SwitchSchedule with other classes

mult from	name	mult to	type	description
0..*	Switch	0..1	Switch	(NC) Switch which has switch schedules.
1..1	SwitchTimePoint	1..*	SwitchTimePoint	The time point that relates to this switch schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.75 (NC) InServiceSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Schedule for elements having in service.

Table 569 shows all attributes of InServiceSchedule.

Table 569 – Attributes of ExtSchedule::InServiceSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 570 shows all association ends of InServiceSchedule with other classes.

Table 570 – Association ends of ExtSchedule::InServiceSchedule with other classes

mult from	name	mult to	type	description
0..*	Equipment	0..1	Equipment	(NC) Equipment which has equipment schedules.

mult from	name	mult to	type	description
1..1	InServiceTimePoint	1..*	InServiceTimePoint	(NC) The time point that relates to this in service schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5662

5663 **3.19.76 (NC) ControlAreaSchedule**5664 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5665 ExtEulIdentifiedObject : Identity

5666 Schedule for control area.

5667 Table 571 shows all attributes of ControlAreaSchedule.

5668 **Table 571 – Attributes of ExtSchedule::ControlAreaSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5669

5670 Table 572 shows all association ends of ControlAreaSchedule with other classes.

5671 **Table 572 – Association ends of ExtSchedule::ControlAreaSchedule with other classes**

mult from	name	mult to	type	description
0..*	ControlArea	0..1	ControlArea	(NC) Control area which has control area schedules.
1..1	ControlAreaTimePoint	1..*	ControlAreaTimePoint	(NC) The time point that relates to this control area schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5672

5673 **3.19.77 (NC) SynchronousMachineSchedule**5674 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5675 ExtEulIdentifiedObject : Identity

5676 Schedule for synchronous machine.

5677 Table 573 shows all attributes of SynchronousMachineSchedule.

5678 **Table 573 – Attributes of ExtSchedule::SynchronousMachineSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5679

5680 Table 574 shows all association ends of SynchronousMachineSchedule with other classes.

5681 **Table 574 – Association ends of ExtSchedule::SynchronousMachineSchedule with other**
5682 **classes**

mult from	name	mult to	type	description
0..*	SynchronousMachine	0..1	SynchronousMachine	(NC) Synchronous machine which has synchronous machine schedules.
1..1	SynchronousMachineTimePoint	1..*	SynchronousMachineTimePoint	(NC) The time point that relates to this synchronous machine schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5683

5684 **3.19.78 (NC) AsynchronousMachineSchedule**5685 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5686 ExtEulIdentifiedObject : Identity

5687 Schedule for asynchronous machine.

5688 Table 575 shows all attributes of AsynchronousMachineSchedule.

5689 **Table 575 – Attributes of ExtSchedule::AsynchronousMachineSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries

name	mult	type	description
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 576 shows all association ends of AsynchronousMachineSchedule with other classes.

Table 576 – Association ends of ExtSchedule::AsynchronousMachineSchedule with other classes

mult from	name	mult to	type	description
0..*	AsynchronousMachine	0..1	AsynchronousMachine	(NC) Asynchronous machine which has asynchronous machine schedules.
1..1	AsynchronousMachineTimePoint	1..*	AsynchronousMachineTimePoint	(NC) The time point that relates to this asynchronous machine schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.79 (NC) ExternalNetworkInjectionSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Schedule for external network injection.

Table 577 shows all attributes of ExternalNetworkInjectionSchedule.

Table 577 – Attributes of ExtSchedule::ExternalNetworkInjectionSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 578 shows all association ends of ExternalNetworkInjectionSchedule with other classes.

Table 578 – Association ends of ExtSchedule::ExternalNetworkInjectionSchedule with other classes

mult from	name	mult to	type	description
0..*	ExternalNetworkInjection	0..1	ExternalNetworkInjection	(NC) External Network Injection which has External Network Injection schedules.
1..1	ExternalNetworkInjectionTimePoint	1..*	ExternalNetworkInjectionTimePoint	(NC) The time point that relates to this external network injection schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.80 (NC) VsConverterSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Schedule for VS converter.

Table 579 shows all attributes of VsConverterSchedule.

Table 579 – Attributes of ExtSchedule::VsConverterSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 580 shows all association ends of VsConverterSchedule with other classes.

5714 **Table 580 – Association ends of ExtSchedule::VsConverterSchedule with other classes**

mult from	name	mult to	type	description
0..*	VsConverter	0..1	VsConverter	(NC) Vs converter which has Vs converter schedules.
1..1	VsConverterTimePoint	1..*	VsConverterTimePoint	(NC) The time point that relates to this VS converter schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5715

5716 **3.19.81 (NC) CsConverterSchedule**5717 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5718 ExtEulIdentifiedObject : Identity

5719 Schedule for CS converter.

5720 Table 581 shows all attributes of CsConverterSchedule.

5721 **Table 581 – Attributes of ExtSchedule::CsConverterSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5722

5723 Table 582 shows all association ends of CsConverterSchedule with other classes.

5724 **Table 582 – Association ends of ExtSchedule::CsConverterSchedule with other classes**

mult from	name	mult to	type	description
0..*	CsConverter	0..1	CsConverter	(NC) Cs converter which has Cs converter schedules.
0..1	CsConverterTimePoint	0..*	CsConverterTimePoint	(NC) The time point that relates to this CS converter schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5725

5726 **3.19.82 (NC) ACDCTimePoint root class**

5727 ACDC values for a given point in time.

5728 Table 583 shows all attributes of ACDCTimePoint.

5729 **Table 583 – Attributes of ExtSchedule::ACDCTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
p	0..1	ActivePower	(NC) Active power at the point of common coupling. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution in the case a simplified power flow model is used.
q	0..1	NullCIM	(NC) Reactive power at the point of common coupling. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution in the case a simplified power flow model is used.
targetPpcc	0..1	NullCIM	(NC) Real power injection target in AC grid, at point of common coupling. Load sign convention is used, i.e. positive sign means flow out from a node.
targetUdc	0..1	NullCIM	(NC) Target value for DC voltage magnitude. The attribute shall be a positive value.

5730

5731 **3.19.83 (NC) VsConverterTimePoint**5732 Inheritance path = [ACDCTimePoint](#)

5733 VS converter values for a given point in time.

5734 Table 584 shows all attributes of VsConverterTimePoint.

5735 **Table 584 – Attributes of ExtSchedule::VsConverterTimePoint**

name	mult	type	description
droop	0..1	NullCIM	(NC) Droop constant. The pu value is obtained as $D \text{ [kV/MW]} \times S_b / U_{bdc}$. The attribute shall be a positive value.
droopCompensation	0..1	NullCIM	(NC) Compensation constant. Used to compensate for voltage drop when controlling voltage at a distant bus. The attribute shall be a positive value.
pPccControl	0..1	NullCIM	(NC) Kind of control of real power and/or DC voltage.
qPccControl	0..1	NullCIM	(NC) Kind of reactive power control.
qShare	0..1	NullCIM	(NC) Reactive power sharing factor among parallel converters on Uac control. The attribute shall be a positive value or zero.
targetQpcc	0..1	NullCIM	(NC) Reactive power injection target in AC grid, at point of common coupling. Load sign

name	mult	type	description
			convention is used, i.e. positive sign means flow out from a node.
targetUpcc	0..1	NullCIM	(NC) Voltage target in AC grid, at point of common coupling. The attribute shall be a positive value.
targetPowerFactorPcc	0..1	NullCIM	(NC) Power factor target at the AC side, at point of common coupling. The attribute shall be a positive value.
targetPhasePcc	0..1	NullCIM	(NC) Phase target at AC side, at point of common coupling. The attribute shall be a positive value.
targetPWMfactor	0..1	NullCIM	(NC) Magnitude of pulse-modulation factor. The attribute shall be a positive value.
atTime	0..1	DateTime	(NC) inherited from: ACDCTimePoint
p	0..1	ActivePower	(NC) inherited from: ACDCTimePoint
q	0..1	NullCIM	(NC) inherited from: ACDCTimePoint
targetPpcc	0..1	NullCIM	(NC) inherited from: ACDCTimePoint
targetUdc	0..1	NullCIM	(NC) inherited from: ACDCTimePoint

5736

5737

Table 585 shows all association ends of VsConverterTimePoint with other classes.

5738

Table 585 – Association ends of ExtSchedule::VsConverterTimePoint with other classes

mult from	name	mult to	type	description
1..*	VsConverterSchedule	1..1	VsConverterSchedule	(NC) The VS converter schedule that has this time point.

5739

5740

3.19.84 (NC) CsConverterTimePoint

5741

Inheritance path = [ACDCTimePoint](#)

5742

CsConverter values for a given point in time.

5743

Table 586 shows all attributes of CsConverterTimePoint.

5744

Table 586 – Attributes of ExtSchedule::CsConverterTimePoint

name	mult	type	description
operatingMode	0..1	NullCIM	(NC) Indicates whether the DC pole is operating as an inverter or as a rectifier. It is converter's control variable used in power flow.
pPccControl	0..1	NullCIM	(NC) Kind of active power control.
targetAlpha	0..1	NullCIM	(NC) Target firing angle. It is converter's control variable used in power flow. It is only applicable for rectifier if continuous tap changer control is used. Allowed values are within the range $\text{minAlpha} \leq \text{targetAlpha} \leq \text{maxAlpha}$. The attribute shall be a positive value.
targetGamma	0..1	NullCIM	(NC) Target extinction angle. It is converter's control variable used in power flow. It is only applicable for inverter if continuous tap changer control is used. Allowed values are within the range $\text{minGamma} \leq \text{targetGamma} \leq \text{maxGamma}$. The attribute shall be a positive value.
targetIdc	0..1	NullCIM	(NC) DC current target value. It is converter's control variable used in power flow. The attribute shall be a positive value.

name	mult	type	description
atTime	0..1	DateTime	(NC) inherited from: ACDCTimePoint
p	0..1	ActivePower	(NC) inherited from: ACDCTimePoint
q	0..1	NullCIM	(NC) inherited from: ACDCTimePoint
targetPpcc	0..1	NullCIM	(NC) inherited from: ACDCTimePoint
targetUdc	0..1	NullCIM	(NC) inherited from: ACDCTimePoint

5745

5746

Table 587 shows all association ends of CsConverterTimePoint with other classes.

5747

Table 587 – Association ends of ExtSchedule::CsConverterTimePoint with other classes

mult from	name	mult to	type	description
0..*	CsConverterSchedule	0..1	CsConverterSchedule	(NC) The CS converter schedule that has this time point.

5748

5749

3.19.85 (NC) TapScheduleTimePoint root class

5750

Tap schedule values for a given point in time.

5751

Table 588 shows all attributes of TapScheduleTimePoint.

5752

Table 588 – Attributes of ExtSchedule::TapScheduleTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
controlEnabled	0..1	NullCIM	(NC) Specifies the regulation status of the equipment. True is regulating, false is not regulating.
step	0..1	NullCIM	(NC) Tap changer position. Starting step for a steady state solution. Non integer values are allowed to support continuous tap variables. The reasons for continuous value are to support study cases where no discrete tap changer has yet been designed, a solution where a narrow voltage band forces the tap step to oscillate or to accommodate for a continuous solution as input. The attribute shall be equal to or greater than lowStep and equal to or less than highStep.

5753

5754

Table 589 shows all association ends of TapScheduleTimePoint with other classes.

5755

Table 589 – Association ends of ExtSchedule::TapScheduleTimePoint with other classes

5756

mult from	name	mult to	type	description
1..*	TapSchedule	1..1	TapSchedule	(NC) The tap schedule that has this time point.

5757

5758

3.19.86 (NC) EnergyConnectionTimePoint root class

5759

Energy connection values for a given point in time.

5760

Table 590 shows all attributes of EnergyConnectionTimePoint.

5761 **Table 590 – Attributes of ExtSchedule::EnergyConnectionTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
p	0..1	NullCIM	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution.
q	0..1	NullCIM	(NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution.

5762
5763 Table 591 shows all association ends of EnergyConnectionTimePoint with other classes.

5764 **Table 591 – Association ends of ExtSchedule::EnergyConnectionTimePoint with other**
5765 **classes**

mult from	name	mult to	type	description
1..*	EnergyConnectionSchedule	1..1	EnergyConnectionSchedule	(NC) The energy connection schedule that has this time point.

5766
5767 **3.19.87 (NC) SwitchTimePoint root class**

5768 Switch values for a given point in time.

5769 Table 592 shows all attributes of SwitchTimePoint.

5770 **Table 592 – Attributes of ExtSchedule::SwitchTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
open	0..1	NullCIM	(NC) The attribute tells if the switch is considered open when used as input to topology processing.
locked	0..1	NullCIM	(NC) If true, the switch is locked. The resulting switch state is a combination of locked and Switch.open attributes as follows: - locked=true and Switch.open=true. The resulting state is open and locked; - locked=false and Switch.open=true. The resulting state is open; - locked=false and Switch.open=false. The resulting state is closed.

5771
5772 Table 593 shows all association ends of SwitchTimePoint with other classes.

5773 **Table 593 – Association ends of ExtSchedule::SwitchTimePoint with other classes**

mult from	name	mult to	type	description
1..*	SwitchSchedule	1..1	SwitchSchedule	The switch schedule that has this time point.

5774
5775 **3.19.88 (NC) InServiceTimePoint root class**

5776 In service values for a given point in time.

5777 Table 594 shows all attributes of InServiceTimePoint.

5778 **Table 594 – Attributes of ExtSchedule::InServiceTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
inService	0..1	NullCIM	(NC) Specifies the availability of the equipment. True means the equipment is available for topology processing, which determines if the equipment is energized or not. False means that the equipment is treated by network applications as if it is not in the model.

5779

5780 Table 595 shows all association ends of InServiceTimePoint with other classes.

5781 **Table 595 – Association ends of ExtSchedule::InServiceTimePoint with other classes**

mult from	name	mult to	type	description
1..*	InServiceSchedule	1..1	InServiceSchedule	(NC) The in service schedule that has this time point.

5782

5783 **3.19.89 (NC) ControlAreaTimePoint root class**

5784 Participation factor for a given point in time.

5785 Table 596 shows all attributes of ControlAreaTimePoint.

5786 **Table 596 – Attributes of ExtSchedule::ControlAreaTimePoint**

name	mult	type	description
pTolerance	0..1	NullCIM	(NC) Active power net interchange tolerance. The attribute shall be a positive value or zero.
netInterchange	0..1	NullCIM	(NC) The specified positive net interchange into the control area, i.e. positive sign means flow into the area.
atTime	0..1	DateTime	(NC) The time the data is valid for.

5787

5788 Table 597 shows all association ends of ControlAreaTimePoint with other classes.

5789 **Table 597 – Association ends of ExtSchedule::ControlAreaTimePoint with other classes**

mult from	name	mult to	type	description
1..*	ControlAreaSchedule	1..1	ControlAreaSchedule	(NC) The control area schedule that has this time point.

5790

5791 **3.19.90 (NC) SynchronousMachineTimePoint root class**

5792 Synchronous machine values for a given point in time.

5793 Table 598 shows all attributes of SynchronousMachineTimePoint.

5794 **Table 598 – Attributes of ExtSchedule::SynchronousMachineTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
operatingMode	0..1	NullCIM	(NC) Current mode of operation.
referencePriority	0..1	NullCIM	(NC) Priority of unit for use as powerflow voltage phase angle reference bus selection. 0 = don't care (default) 1 = highest priority. 2 is less than 1 and so on.

Table 599 shows all association ends of SynchronousMachineTimePoint with other classes.

Table 599 – Association ends of ExtSchedule::SynchronousMachineTimePoint with other classes

mult from	name	mult to	type	description
1..*	SynchronousMachineSchedule	1..1	SynchronousMachineSchedule	(NC) The synchronous machine schedule that has this time point.

3.19.91 (NC) AsynchronousMachineTimePoint root class

Asynchronous machine values for a given point in time.

Table 600 shows all attributes of AsynchronousMachineTimePoint.

Table 600 – Attributes of ExtSchedule::AsynchronousMachineTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
asynchronousMachineType	0..1	NullCIM	(NC) Indicates the type of Asynchronous Machine (motor or generator).

Table 601 shows all association ends of AsynchronousMachineTimePoint with other classes.

Table 601 – Association ends of ExtSchedule::AsynchronousMachineTimePoint with other classes

mult from	name	mult to	type	description
1..*	AsynchronousMachineSchedule	1..1	AsynchronousMachineSchedule	(NC) The asynchronous machine schedule that has this time point.

3.19.92 (NC) ExternalNetworkInjectionTimePoint root class

External network injection values for a given point in time.

Table 602 shows all attributes of ExternalNetworkInjectionTimePoint.

Table 602 – Attributes of ExtSchedule::ExternalNetworkInjectionTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
referencePriority	0..1	NullCIM	(NC) Priority of unit for use as powerflow voltage phase angle reference bus selection. 0 = don't care (default) 1 = highest priority. 2 is less than 1 and so on.
p	0..1	NullCIM	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for steady state solutions.
q	0..1	NullCIM	(NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for steady state solutions.

Table 603 shows all association ends of ExternalNetworkInjectionTimePoint with other classes.

Table 603 – Association ends of ExtSchedule::ExternalNetworkInjectionTimePoint with other classes

mult from	name	mult to	type	description
1..*	ExternalNetworkInjectionSchedule	1..1	ExternalNetworkInjectionSchedule	(NC) The external network injection schedule that has this time point.

3.19.93 (NC) BatteryUnitSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

ExtEulIdentifiedObject : Identity

Schedule for battery unit.

Table 604 shows all attributes of BatteryUnitSchedule.

Table 604 – Attributes of ExtSchedule::BatteryUnitSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 605 shows all association ends of BatteryUnitSchedule with other classes.

Table 605 – Association ends of ExtSchedule::BatteryUnitSchedule with other classes

mult from	name	mult to	type	description
0..*	BatteryUnit	0..1	BatteryUnit	(NC) Battery unit which has battery unit schedules.
1..1	BatteryUnitTimePoint	1..*	BatteryUnitTimePoint	(NC) The time point that relates to this battery unit schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.94 (NC) BatteryUnitTimePoint root class

Battery unit values for a given point in time.

Table 606 shows all attributes of BatteryUnitTimePoint.

5831 **Table 606 – Attributes of ExtSchedule::BatteryUnitTimePoint**

name	mult	type	description
batteryState	0..1	NullCIM	(NC) The current state of the battery (charging, full, etc.).
storedE	0..1	NullCIM	(NC) Amount of energy currently stored. The attribute shall be a positive value or zero and lower than BatteryUnit.ratedE.
atTime	0..1	DateTime	(NC) The time the data is valid for.

5832

5833 Table 607 shows all association ends of BatteryUnitTimePoint with other classes.

5834 **Table 607 – Association ends of ExtSchedule::BatteryUnitTimePoint with other classes**

mult from	name	mult to	type	description
1..*	BatteryUnitSchedule	1..1	BatteryUnitSchedule	(NC) The battery unit schedule that has this time point.

5835

5836 **3.19.95 (NC) VoltageLimitSchedule**5837 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5838 ExtEulIdentifiedObject : Identity

5839 Schedule for voltage limit.

5840 Table 608 shows all attributes of VoltageLimitSchedule.

5841 **Table 608 – Attributes of ExtSchedule::VoltageLimitSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5842

5843 Table 609 shows all association ends of VoltageLimitSchedule with other classes.

5844 **Table 609 – Association ends of ExtSchedule::VoltageLimitSchedule with other classes**

mult from	name	mult to	type	description
0..*	VoltageLimit	0..1	VoltageLimit	(NC) Voltage limit which has voltage limit schedules.
1..1	VoltageLimitTimePoint	1..*	VoltageLimitTimePoint	(NC) The time point that relates to this voltage limit schedule.

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5845

5846 **3.19.96 (NC) ActivePowerLimitSchedule**5847 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5848 ExtEulIdentifiedObject : Identity

5849 Schedule for active power limit.

5850 Table 610 shows all attributes of ActivePowerLimitSchedule.

5851 **Table 610 – Attributes of ExtSchedule::ActivePowerLimitSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5852

5853 Table 611 shows all association ends of ActivePowerLimitSchedule with other classes.

5854 **Table 611 – Association ends of ExtSchedule::ActivePowerLimitSchedule with other**
5855 **classes**

mult from	name	mult to	type	description
0..*	ActivePowerLimit	0..1	ActivePowerLimit	(NC) Active power limit which has active power limit schedules.
1..1	ActivePowerLimitTimePoint	1..*	ActivePowerLimitTimePoint	(NC) The time point that relates to this active power limit schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5856

5857 **3.19.97 (NC) ApparentPowerLimitSchedule**5858 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
5859 ExtEulIdentifiedObject : Identity

5860 Schedule for apparent power limit.

5861 Table 612 shows all attributes of ApparentPowerLimitSchedule.

5862 **Table 612 – Attributes of ExtSchedule::ApparentPowerLimitSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5863
5864 Table 613 shows all association ends of ApparentPowerLimitSchedule with other classes.5865 **Table 613 – Association ends of ExtSchedule::ApparentPowerLimitSchedule with other**
5866 **classes**

mult from	name	mult to	type	description
0..*	ApparentPowerLimit	0..1	ApparentPowerLimit	(NC) Apparent power limit which has apparent power limit schedules.
1..1	ApparentPowerLimitTimePoint	1..*	ApparentPowerLimitTimePoint	(NC) The time point that relates to this apparent power limit schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5867
5868 **3.19.98 (NC) CurrentLimitSchedule**5869 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
5870 ExtEulIdentifiedObject : Identity

5871 Schedule for current limit.

5872 Table 614 shows all attributes of CurrentLimitSchedule.

5873 **Table 614 – Attributes of ExtSchedule::CurrentLimitSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries

name	mult	type	description
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 615 shows all association ends of CurrentLimitSchedule with other classes.

Table 615 – Association ends of ExtSchedule::CurrentLimitSchedule with other classes

mult from	name	mult to	type	description
0..*	CurrentLimit	0..1	CurrentLimit	(NC) Current limit which has current limit schedules.
1..1	CurrentLimitTimePoint	1..*	CurrentLimitTimePoint	(NC) The time point that relates to this current limit schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.99 (NC) CurrentLimitTimePoint root class

Current limit values for a given point in time.

Table 616 shows all attributes of CurrentLimitTimePoint.

Table 616 – Attributes of ExtSchedule::CurrentLimitTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
value	0..1	NullCIM	(NC) Limit on current flow. The attribute shall be a positive value or zero.

Table 617 shows all association ends of CurrentLimitTimePoint with other classes.

Table 617 – Association ends of ExtSchedule::CurrentLimitTimePoint with other classes

mult from	name	mult to	type	description
1..*	CurrentLimitSchedule	1..1	CurrentLimitSchedule	(NC) The current limit schedule that has this time point.

3.19.100 (NC) ApparentPowerLimitTimePoint root class

Apparent power limit for a given point in time.

Table 618 shows all attributes of ApparentPowerLimitTimePoint.

Table 618 – Attributes of ExtSchedule::ApparentPowerLimitTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
value	0..1	NullCIM	(NC) The apparent power limit. The attribute shall be a positive value or zero.

Table 619 shows all association ends of ApparentPowerLimitTimePoint with other classes.

Table 619 – Association ends of ExtSchedule::ApparentPowerLimitTimePoint with other classes

mult from	name	mult to	type	description
1..*	ApparentPowerLimitSchedule	1..1	ApparentPowerLimitSchedule	(NC) The apparent power limit schedule that has this time point.

3.19.101 (NC) ActivePowerLimitTimePoint root class

Active power limit for a given point in time.

Table 620 shows all attributes of ActivePowerLimitTimePoint.

Table 620 – Attributes of ExtSchedule::ActivePowerLimitTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
value	0..1	NullCIM	(NC) Value of active power limit. The attribute shall be a positive value or zero.

Table 621 shows all association ends of ActivePowerLimitTimePoint with other classes.

Table 621 – Association ends of ExtSchedule::ActivePowerLimitTimePoint with other classes

mult from	name	mult to	type	description
1..*	ActivePowerLimitSchedule	1..1	ActivePowerLimitSchedule	(NC) The active power limit schedule that has this time point.

3.19.102 (NC) VoltageLimitTimePoint root class

Voltage limit values for a given point in time.

Table 622 shows all attributes of VoltageLimitTimePoint.

Table 622 – Attributes of ExtSchedule::VoltageLimitTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
value	0..1	NullCIM	(NC) Limit on voltage. High or low limit nature of the limit depends upon the properties of the operational limit type. The attribute shall be a positive value or zero.

Table 623 shows all association ends of VoltageLimitTimePoint with other classes.

5910 **Table 623 – Association ends of ExtSchedule::VoltageLimitTimePoint with other classes**

mult from	name	mult to	type	description
1..*	VoltageLimitSchedule	1..1	VoltageLimitSchedule	(NC) The voltage limit schedule that has this time point.

5911

5912 **3.19.103 (NC) ShuntCompensatorSchedule**

5913 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5914 ExtEulIdentifiedObject : Identity

5915 Schedule for shunt compensator.

5916 Table 624 shows all attributes of ShuntCompensatorSchedule.

5917 **Table 624 – Attributes of ExtSchedule::ShuntCompensatorSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5918

5919 Table 625 shows all association ends of ShuntCompensatorSchedule with other classes.

5920 **Table 625 – Association ends of ExtSchedule::ShuntCompensatorSchedule with other classes**

mult from	name	mult to	type	description
0..*	ShuntCompensator	0..1	ShuntCompensator	(NC) Shunt compensator which has shunt compensator schedules.
1..1	ShuntCompensatorTime Point	1..*	ShuntCompensatorTime Point	(NC) The time point that relates to this shunt compensator schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5922

5923 **3.19.104 (NC) ShuntCompensatorTimePoint root class**

5924 Shunt compensator values for a given point in time.

5925 Table 626 shows all attributes of ShuntCompensatorTimePoint.

5926

Table 626 – Attributes of ExtSchedule::ShuntCompensatorTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
sections	0..1	NullCIM	(NC) Shunt compensator sections in use. Starting value for steady state solution. The attribute shall be a positive value or zero. Non integer values are allowed to support continuous variables. The reasons for continuous value are to support study cases where no discrete shunt compensators has yet been designed, a solutions where a narrow voltage band force the sections to oscillate or accommodate for a continuous solution as input. For LinearShuntCompensator the value shall be between zero and ShuntCompensator.maximumSections. At value zero the shunt compensator conductance and admittance is zero. Linear interpolation of conductance and admittance between the previous and next integer section is applied in case of non-integer values. For NonlinearShuntCompensator-s shall only be set to one of the NonlinearShuntCompensatorPoint.sectionNumber. There is no interpolation between NonlinearShuntCompensatorPoint-s.

5927

5928

Table 627 shows all association ends of ShuntCompensatorTimePoint with other classes.

5929

Table 627 – Association ends of ExtSchedule::ShuntCompensatorTimePoint with other classes

5930

mult from	name	mult to	type	description
1..*	ShuntCompensatorSchedule	1..1	ShuntCompensatorSchedule	(NC) The shunt compensator schedule that has this time point.

5931

3.19.105 (NC) GeneratingUnitSchedule5933 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5934 ExtEulIdentifiedObject : Identity

5935 Schedule for generating unit.

5936 Table 628 shows all attributes of GeneratingUnitSchedule.

5937

Table 628 – Attributes of ExtSchedule::GeneratingUnitSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 629 shows all association ends of GeneratingUnitSchedule with other classes.

Table 629 – Association ends of ExtSchedule::GeneratingUnitSchedule with other classes

mult from	name	mult to	type	description
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) Generating unit which has generating unit schedules.
1..1	GeneratingUnitTimePoint	1..*	GeneratingUnitTimePoint	The time point that relates to this generating unit schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.106 (NC) GeneratingUnitTimePoint root class

Generating unit values for a given point in time.

Table 630 shows all attributes of GeneratingUnitTimePoint.

Table 630 – Attributes of ExtSchedule::GeneratingUnitTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
normalPF	0..1	NullCIM	(NC) Generating unit economic participation factor. The sum of the participation factors across generating units does not have to sum to one. It is used for representing distributed slack participation factor. The attribute shall be a positive value or zero.

Table 631 shows all association ends of GeneratingUnitTimePoint with other classes.

Table 631 – Association ends of ExtSchedule::GeneratingUnitTimePoint with other classes

mult from	name	mult to	type	description
1..*	GeneratingUnitSchedule	1..1	GeneratingUnitSchedule	The generating unit schedule that has this time point.

3.19.107 (NC) StaticVarCompensatorSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Schedule for static var compensator.

Table 632 shows all attributes of StaticVarCompensatorSchedule.

5957 **Table 632 – Attributes of ExtSchedule::StaticVarCompensatorSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5958 Table 633 shows all association ends of StaticVarCompensatorSchedule with other classes.

5959 **Table 633 – Association ends of ExtSchedule::StaticVarCompensatorSchedule with other classes**

mult from	name	mult to	type	description
0..*	StaticVarCompensator	0..1	StaticVarCompensator	(NC) Static var compensator which has static var compensator schedules.
1..1	StaticVarCompensatorTimePoint	1..*	StaticVarCompensatorTimePoint	(NC) The time point that relates to this static var compensator schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5962 3.19.108 (NC) StaticVarCompensatorTimePoint root class

5963 Static var compensator values for a given point in time.

5964 Table 634 shows all attributes of StaticVarCompensatorTimePoint.

5965 **Table 634 – Attributes of ExtSchedule::StaticVarCompensatorTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
q	0..1	NullCIM	(NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution.

5967 Table 635 shows all association ends of StaticVarCompensatorTimePoint with other classes.

Table 635 – Association ends of ExtSchedule::StaticVarCompensatorTimePoint with other classes

mult from	name	mult to	type	description
1..*	StaticVarCompensatorSchedule	1..1	StaticVarCompensatorSchedule	(NC) The StaticVarCompensator schedule that has this time point.

3.19.109 (NC) StageTriggerSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

ExtEulIdentifiedObject : Identity

Schedule for a stage trigger.

Table 636 shows all attributes of StageTriggerSchedule.

Table 636 – Attributes of ExtSchedule::StageTriggerSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 637 shows all association ends of StageTriggerSchedule with other classes.

Table 637 – Association ends of ExtSchedule::StageTriggerSchedule with other classes

mult from	name	mult to	type	description
0..*	StageTrigger	1..1	StageTrigger	(NC) Stage trigger which has stage trigger schedules.
1..1	StageTriggerTimePoint	1..*	StageTriggerTimePoint	(NC) Stage trigger time point that relates to this remedial action scheme schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.110 (NC) StageTriggerTimePoint root class

Stage trigger values at a given point in time.

Table 638 shows all attributes of StageTriggerTimePoint.

5985

Table 638 – Attributes of ExtSchedule::StageTriggerTimePoint

name	mult	type	description
armed	0..1	Boolean	(NC) Defines the arming status of the remedial action scheme. It is set by operation or by signal.
atTime	0..1	DateTime	(NC) The time the data is valid for.
inService	0..1	Boolean	(NC) Specifies the availability of the Remedial Action Scheme (RAS). If true, the RAS is available for contingency processing. If false, the RAS is treated by contingency processing as if it is not in the model.

5986

5987

Table 639 shows all association ends of StageTriggerTimePoint with other classes.

5988

Table 639 – Association ends of ExtSchedule::StageTriggerTimePoint with other classes

5989

mult from	name	mult to	type	description
1..*	StageTriggerSchedule	1..1	StageTriggerSchedule	(NC) Stage trigger schedule that has time point.

5990

3.19.111 (NC) GenericSequenceSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

ExtEulIdentifiedObject : Identity

Schedule for sequence.

Table 640 shows all attributes of GenericSequenceSchedule.

5996

Table 640 – Attributes of ExtSchedule::GenericSequenceSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

5997

5998

Table 641 shows all association ends of GenericSequenceSchedule with other classes.

5999 **Table 641 – Association ends of ExtSchedule::GenericSequenceSchedule with other**
6000 **classes**

mult from	name	mult to	type	description
0..*	EnergyBlockOrder	0..1	EnergyBlockOrder	(NC) Energy block order which has generic sequence schedules.
1..1	SequenceTimePoint	1..*	SequenceTimePoint	(NC) The sequence timepoint for a sequence schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6001

6002 3.19.112 (NC) SequenceTimePoint root class

6003 Sequence at a given point in time.

6004 Table 642 shows all attributes of SequenceTimePoint.

6005 **Table 642 – Attributes of ExtSchedule::SequenceTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
sequence	0..1	Integer	(NC) Sequence needs to be ordered by the scheduling area. It has to be unique by the scheduling area.

6006

6007 Table 643 shows all association ends of SequenceTimePoint with other classes.

6008 **Table 643 – Association ends of ExtSchedule::SequenceTimePoint with other classes**

mult from	name	mult to	type	description
1..*	GenericSequenceSchedule	1..1	GenericSequenceSchedule	(NC) The sequence schedule which belongs to the sequence timepoint.

6009

6010 3.19.113 (NC) BaseCaseCurrentLimitSchedule

6011 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
6012 ExtEulIdentifiedObject : Identity

6013 The schedule for a base case current limit.

6014 Table 644 shows all attributes of BaseCaseCurrentLimitSchedule.

6015 **Table 644 – Attributes of ExtSchedule::BaseCaseCurrentLimitSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 645 shows all association ends of BaseCaseCurrentLimitSchedule with other classes.

Table 645 – Association ends of ExtSchedule::BaseCaseCurrentLimitSchedule with other classes

mult from	name	mult to	type	description
0..*	BaseCaseCurrentLimit	0..1	BaseCaseCurrentLimit	(NC) Base case current limit which has base case current limit schedule.
1..1	BaseCaseCurrentLimitTimePoint	1..*	BaseCaseCurrentLimitTimePoint	(NC) Base case current limit time point that relates to this base case current limit schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.114 (NC) BaseCaseCurrentLimitTimePoint root class

Base case current limit at a given point in time.

Table 646 shows all attributes of BaseCaseCurrentLimitTimePoint.

Table 646 – Attributes of ExtSchedule::BaseCaseCurrentLimitTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
value	0..1	CurrentFlow	(NC) Value of current limit. The attribute shall be a positive value or zero.

Table 647 shows all association ends of BaseCaseCurrentLimitTimePoint with other classes.

Table 647 – Association ends of ExtSchedule::BaseCaseCurrentLimitTimePoint with other classes

mult from	name	mult to	type	description
1..*	BaseCaseCurrentLimitSchedule	1..1	BaseCaseCurrentLimitSchedule	(NC) Base case current limit schedule that has time point.

3.19.115 (NC) FuelStorageSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Fuel storage schedule for elements.

Table 648 shows all attributes of FuelStorageSchedule.

6035

Table 648 – Attributes of ExtSchedule::FuelStorageSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6036

6037

Table 649 shows all association ends of FuelStorageSchedule with other classes.

6038

Table 649 – Association ends of ExtSchedule::FuelStorageSchedule with other classes

mult from	name	mult to	type	description
0..*	FuelStorage	0..1	FuelStorage	(NC) Fuel storage of this fuel storage schedule.
1..1	FuelStorageTimePoint	1..*	FuelStorageTimePoint	(NC) The time point that relates to this fuel storage schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6039

6040 3.19.116 (NC) FuelStorageTimePoint root class

6041 Fuel storage values for a given point in time.

6042 Table 650 shows all attributes of FuelStorageTimePoint.

6043

Table 650 – Attributes of ExtSchedule::FuelStorageTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
energyStorage	0..1	RealEnergy	(NC) Amount of energy available in the storage.

6044

6045

Table 651 shows all association ends of FuelStorageTimePoint with other classes.

6046 **Table 651 – Association ends of ExtSchedule::FuelStorageTimePoint with other classes**

mult from	name	mult to	type	description
1..*	FuelStorageSchedule	1..1	FuelStorageSchedule	(NC) The fuel storage schedule that has this time point.

6047

6048 **3.19.117 (NC) ReservoirSchedule**6049 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

6050 ExtEulIdentifiedObject : Identity

6051 Reservoir schedule for elements.

6052 Table 652 shows all attributes of ReservoirSchedule.

6053 **Table 652 – Attributes of ExtSchedule::ReservoirSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6054

6055 Table 653 shows all association ends of ReservoirSchedule with other classes.

6056 **Table 653 – Association ends of ExtSchedule::ReservoirSchedule with other classes**

mult from	name	mult to	type	description
0..*	Reservoir	0..1	Reservoir	(NC) The reservoir that has a schedule.
1..1	ReservoirTimePoint	1..*	ReservoirTimePoint	(NC) The time point that relates to this reservoir schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6057

6058 **3.19.118 (NC) ReservoirTimePoint root class**

6059 Reservoir values for a given point in time.

6060 Table 654 shows all attributes of ReservoirTimePoint.

6061 **Table 654 – Attributes of ExtSchedule::ReservoirTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
energyStorage	0..1	RealEnergy	(NC) Amount of energy available in the storage.

6062
6063 Table 655 shows all association ends of ReservoirTimePoint with other classes.

6064 **Table 655 – Association ends of ExtSchedule::ReservoirTimePoint with other classes**

mult from	name	mult to	type	description
1..*	ReservoirSchedule	1..1	ReservoirSchedule	(NC) The reservoir schedule that has this time point.

6065
6066 **3.19.119 (NC) FuelStorageRegularSchedule**
6067 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :
6068 ExtEulIdentifiedObject : Identity
6069 Regular schedule for fuel storage.
6070 Table 656 shows all attributes of FuelStorageRegularSchedule.

6071 **Table 656 – Attributes of ExtSchedule::FuelStorageRegularSchedule**

name	mult	type	description
energyStorage	0..1	RealEnergy	(NC) Amount of energy available in the storage.
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6072
6073 Table 657 shows all association ends of FuelStorageRegularSchedule with other classes.

6074 **Table 657 – Association ends of ExtSchedule::FuelStorageRegularSchedule with other**
6075 **classes**

mult from	name	mult to	type	description
0..*	FuelStorage	0..1	FuelStorage	(NC) the fule storage that has a regular schedule.
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6076

6077 **3.19.120 (NC) ReservoirRegularSchedule**6078 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :

6079 ExtEulIdentifiedObject : Identity

6080 Regular schedule for reservoir.

6081 Table 658 shows all attributes of ReservoirRegularSchedule.

6082 **Table 658 – Attributes of ExtSchedule::ReservoirRegularSchedule**

name	mult	type	description
energyStorage	0..1	RealEnergy	(NC) Amount of energy available in the storage.
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6083

6084 Table 659 shows all association ends of ReservoirRegularSchedule with other classes.

Table 659 – Association ends of ExtSchedule::ReservoirRegularSchedule with other classes

mult from	name	mult to	type	description
0..*	Reservoir	0..1	Reservoir	(NC) The reservoir that has this regular schedule.
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.121 (NC) EnergyResourceGroupCapacitySchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

The irregular schedule for the energy resource capacity group.

Table 660 shows all attributes of EnergyResourceGroupCapacitySchedule.

Table 660 – Attributes of ExtSchedule::EnergyResourceGroupCapacitySchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 661 shows all association ends of EnergyResourceGroupCapacitySchedule with other classes.

Table 661 – Association ends of ExtSchedule::EnergyResourceGroupCapacitySchedule with other classes

mult from	name	mult to	type	description
0..*	EnergyResourceGroupCapacity	0..1	EnergyResourceGroupCapacity	(NC)

mult from	name	mult to	type	description
1..1	EnergyResourceGroupCapacityTimePoint	1..*	EnergyResourceGroupCapacityTimePoint	(NC) The time point for this energy resource capacity Schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6099

6100 **3.19.122 (NC) DCTieCorridorDirectionTimePoint root class**

6101 Time series represent irregular values at given points in time.

6102 Table 662 shows all attributes of DCTieCorridorDirectionTimePoint.

6103 **Table 662 – Attributes of ExtSchedule::DCTieCorridorDirectionTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.

6104

6105 Table 663 shows all association ends of DCTieCorridorDirectionTimePoint with other classes.

6106 **Table 663 – Association ends of ExtSchedule::DCTieCorridorDirectionTimePoint with other classes**

6107

mult from	name	mult to	type	description
0..*	BiddingZoneBorder	1..1	BiddingZoneBorder	(NC) The bidding zone border that has this time point.
0..*	DCTieCorridor	1..1	DCTieCorridor	(NC) The DC tie corridor that has DC tie corridor direction time point.
0..*	PowerSchedule	1..1	PowerSchedule	(NC) The power schedule that has this DC tie corridor time point.

6108

6109 **3.19.123 (NC) PowerBidDependency**6110 Inheritance path = [PeerTemporalDependency](#)

6111 A peer temporal dependency that defines temporal or operational constraints between two power bid schedules.

6112 Note: The dependency constrains activation or deactivation of the dependent power bid schedule relative to activation or deactivation of the dependee power bid schedule. Lag constraints are evaluated from the latest applicable activation or deactivation of the dependee.

6113 A subsequent state change of the dependee supersedes the previous reference transition if the corresponding transition of the dependent has not yet occurred.

6114 Example:

6115 - startToStartLag = 15M, startToStartLagKind = exact: the dependent bid is activated exactly 15 minutes after activation of the dependee bid, provided the dependee has not subsequently changed state.

6116 - finishToStartLag = 30M, finishToStartLagKind = minimum: the dependent bid may be activated no earlier than 30 minutes after deactivation of the dependee bid.

6117 - finishToFinishLag = 15M, finishToFinishLagKind = maximum: the dependent bid shall be deactivated no later than 15 minutes after deactivation of the dependee bid.

6118 Table 664 shows all attributes of PowerBidDependency.

6127

Table 664 – Attributes of ExtSchedule::PowerBidDependency

name	mult	type	description
mRID	0..1	String	(NC) inherited from: PeerTemporalDependency
finishToFinishLag	0..1	Duration	(NC) inherited from: PeerTemporalDependency
constraintKind	0..1	DependencyConstraintKind	(NC) inherited from: PeerTemporalDependency
finishToFinishLagKind	0..1	ReferenceValueKind	(NC) inherited from: PeerTemporalDependency
overlap	0..1	Duration	(NC) inherited from: PeerTemporalDependency
overlapKind	0..1	ReferenceValueKind	(NC) inherited from: PeerTemporalDependency
finishToStartLag	0..1	Duration	(NC) inherited from: PeerTemporalDependency
startToStartLag	0..1	Duration	(NC) inherited from: PeerTemporalDependency
finishToStartLagKind	0..1	ReferenceValueKind	(NC) inherited from: PeerTemporalDependency
startToStartLagKind	0..1	ReferenceValueKind	(NC) inherited from: PeerTemporalDependency

6128

6129

Table 665 shows all association ends of PowerBidDependency with other classes.

6130

Table 665 – Association ends of ExtSchedule::PowerBidDependency with other classes

mult from	name	mult to	type	description
0..*	DependeePowerBidSchedule	1..1	PowerBidSchedule	(NC) The power bid schedule upon which the dependent power bid schedule depends.
0..*	DependentPowerBidSchedule	1..1	PowerBidSchedule	(NC) The power bid schedule whose activation, deactivation, or execution is constrained by the dependee power bid schedule.

6131

6132

3.19.124 (NC) EnergyResourceGroupCapacityTimePoint root class

6133

Energy resource group capacity value at a given point in time.

6134

Table 666 shows all attributes of EnergyResourceGroupCapacityTimePoint.

6135

Table 666 – Attributes of ExtSchedule::EnergyResourceGroupCapacityTimePoint

name	mult	type	description
availabilityFactor	0..1	PerCent	(NC) The ratio (in percent) between the effective available capacity and the installed capacity over a defined time interval. For weather-dependent resources, the value reflects climate-driven availability as derived from meteorological or hydrological conditions.
atTime	0..1	DateTime	(NC) The time the data is valid for.
availableCapacityP	0..1	ActivePower	(NC) The weather or condition-dependent active power capacity that is realistically available for operation at a given time. This value reflects reductions due to climatic, hydrological, or operational constraints.
installedCapacityP	0..1	ActivePower	(NC) The nominal installed active power capacity of the energy type, independent of weather or operating conditions. This is the maximum technical power rating under standard design assumptions and optimum operation condition.
p	0..1	ActivePower	(NC) The effective active power capacity for the resource at the specified time, after considering

name	mult	type	description
			all applied deratings, outages, operational limits, or weather influences. This value represents the usable capacity that can be delivered or consumed, effective capacity.
participationFactor	0..1	Float	(NC) Participation factor for the power group in relation to scheduling area. Must be a positive value.
capacityAllocationFactor	0..n	Float	(NC) The relative weighting used to allocate an aggregate capacity requirement to this energy resource group on a time-series basis. Note: The values provide context-specific top-down capacity allocation weightings and may override normalCapacityAllocationFactor. Each value applies to the corresponding time interval represented by the time-series context. The factors are relative weights and are not required to represent percentages or to sum to 1. The allocation algorithm may normalize or otherwise adjust the applicable factors according to availability, existing capacity and other modelling constraints.

Table 667 shows all association ends of EnergyResourceGroupCapacityTimePoint with other classes.

Table 667 – Association ends of ExtSchedule::EnergyResourceGroupCapacityTimePoint with other classes

mult from	name	mult to	type	description
1..*	EnergyResourceGroupCapacitySchedule	1..1	EnergyResourceGroupCapacitySchedule	(NC) The energy resource capacity schedule that has this time point.

3.19.125 (NC) ClimateZoneSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

The irregular schedule for the ClimateZone.

Table 668 shows all attributes of ClimateZoneSchedule.

Table 668 – Attributes of ExtSchedule::ClimateZoneSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
identifier	0..1	NullCIM	inherited from: Identity

Table 669 shows all association ends of ClimateZoneSchedule with other classes.

Table 669 – Association ends of ExtSchedule::ClimateZoneSchedule with other classes

mult from	name	mult to	type	description
0..*	ClimateZone	0..1	ClimateZone	(NC) The climate zone that has this schedule.
1..1	ClimateZoneTimePoint	1..*	ClimateZoneTimePoint	(NC) The climate zone time point of the climate zone schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.126 (NC) ClimateZoneTimePoint root class

Climate zone value at a given point in time.

Table 670 shows all attributes of ClimateZoneTimePoint.

Table 670 – Attributes of ExtSchedule::ClimateZoneTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
cloudCover	0..1	PerCent	(NC) The proportion of the sky covered by cloud for the corresponding time interval.
dewPointTempAt2m	0..1	Temperature	(NC) The dew-point temperature at 2 metres above ground level for the corresponding time interval.
diffuseSolarIrradiance	0..1	Irradiance	(NC) The diffuse solar irradiance for the corresponding time interval.
directSolarIrradiance	0..1	Irradiance	(NC) The direct solar irradiance for the corresponding time interval.
evaporation	0..1	Length	(NC) The evaporation and evapotranspiration during the corresponding time interval, expressed as an equivalent depth of water. Note: The sign convention, where relevant, is defined by the applicable data specification.
freezingPrecipitationDays	0..1	Decimal	(NC) The number of days with freezing precipitation within the corresponding time interval.
frostDays	0..1	Decimal	(NC) The number of frost days within the corresponding time interval.
globalSolarIrradiance	0..1	Irradiance	(NC) The global solar irradiance for the corresponding time interval. Note: Global solar irradiance represents the total direct and diffuse solar power incident per unit area on the applicable reference surface. It may be used as an environmental input for applications such as photovoltaic production and thermal rating of overhead conductors. The orientation of the reference surface is defined by

name	mult	type	description
			the applicable dataset or provenance information.
hailDays	0..1	Decimal	(NC) The number of days on which hail occurs within the corresponding time interval.
heatwaveDays	0..1	Decimal	(NC) The number of days occurring as part of a heatwave within the corresponding time interval.
hotDays	0..1	Decimal	(NC) The number of days meeting the applicable hot-day criterion within the corresponding time interval.
hydroInflow	0..1	RealEnergy	(NC) The energy equivalent of natural hydro inflow associated with hydro resources in the ClimateZone during the corresponding time interval. Note: The value represents inflow energy for the interval. For example, a weekly TimePoint may contain the natural hydro inflow energy for that week.
icingDays	0..1	Decimal	(NC) The number of days meeting the applicable icing criterion within the corresponding time interval.
lightningDensity	0..1	CountPerArea	(NC) The number of lightning events per unit area occurring during the corresponding time interval.
maxTempAt2m	0..1	Temperature	(NC) The maximum air temperature at 2 metres above ground level during the corresponding time interval. Note: This time series is intended for datasets providing maximum temperature directly.
minTempAt2m	0..1	Temperature	(NC) The minimum air temperature at 2 metres above ground level during the corresponding time interval. Note: This time series is intended for datasets providing minimum temperature directly, for example daily minimum temperature. It is not required when the minimum can appropriately be derived from tempAt2m.
populationWeightedTempAt2m	0..1	Temperature	(NC) The population-weighted air temperature at 2 metres above ground level for the corresponding time interval. Note: The value is derived by spatially weighting the air temperature within the represented area by the population distribution. It may be used for modelling temperature-dependent energy consumption, including heating and cooling demand. The population dataset and weighting method are identified through the applicable provenance information.
potentialEvaporation	0..1	Length	(NC) The potential evaporation during the corresponding time interval, expressed as an equivalent depth of water.
precipitation	0..1	Length	(NC) The total precipitation received during the corresponding time interval. Note: The value represents accumulated precipitation expressed as an equivalent depth of water.
rainfall	0..1	Length	(NC) The amount of liquid precipitation received during the corresponding time interval. Note: The value represents accumulated rainfall expressed as an equivalent depth of water.

name	mult	type	description
relativeHumidityAt2m	0..1	PerCent	(NC) The relative humidity at 2 metres above ground level for the corresponding time interval.
runoff	0..1	Length	(NC) The runoff during the corresponding time interval, expressed as an equivalent depth of water over the area.
seaCurrentDirection	0..1	AngleDegrees	(NC) The direction of the sea-water current for the corresponding time interval. Note: Current direction normally identifies the direction towards which the water is moving, unlike meteorological wind direction, which identifies the direction from which the wind originates.
seaCurrentSpeed	0..1	Speed	(NC) The speed of the sea-water current for the corresponding time interval. Note: The applicable depth or vertical reference is defined by the source dataset or provenance information.
seaIceConcentration	0..1	PerCent	(NC) The proportion of the sea surface covered by sea ice for the corresponding time interval. Note: Sea-ice concentration provides the time-dependent information needed to determine sea-ice presence and extent. It replaces a simple integer sea-ice value, which cannot distinguish between partial and complete ice coverage.
seaIceThickness	0..1	Length	(NC) The sea-ice thickness for the corresponding time interval.
seaSurfaceTemp	0..1	Temperature	(NC) The sea-surface temperature for the corresponding time interval.
significantWaveHeight	0..1	Length	(NC) The significant wave height for the corresponding time interval.
snowfall	0..1	Length	(NC) The solid precipitation received during the corresponding time interval, expressed as its equivalent amount of liquid water.
snowmelt	0..1	Length	(NC) The amount of water released by melting snow during the corresponding time interval, expressed as an equivalent depth of liquid water.
snowWater	0..1	Length	(NC) The amount of water stored in the snowpack at the corresponding time, expressed as an equivalent depth of liquid water. Example: January = 180 mm, March = 430 mm, May = 160 mm, June = 0 mm.
sunshineDuration	0..1	Hours	(NC) The duration of sunshine during the corresponding time interval.
surfacePressure	0..1	Pressure	(NC) The atmospheric pressure at the surface for the corresponding time interval. Note: Surface pressure may be relevant when determining air density for wind-energy calculations.
tempAt2m	0..1	Temperature	(NC) The air temperature at 2 metres above ground level for the corresponding time interval.
thunderDays	0..1	Decimal	(NC) The number of days on which thunder is observed within the corresponding time interval.
tropicalNights	0..1	Decimal	(NC) The number of nights meeting the applicable tropical-night criterion within the corresponding time interval.

name	mult	type	description
waveDirection	0..1	AngleDegrees	(NC) The direction from which waves propagate for the corresponding time interval. Note: No corresponding normal value is defined because a single average direction may not meaningfully represent a multi-directional sea state.
wavePeriod	0..1	Seconds	(NC) The representative wave period for the corresponding time interval.
windDirectionAt100m	0..1	AngleDegrees	(NC) The wind direction at 100 metres above ground level for the corresponding time interval. Note: Meteorological wind direction normally identifies the direction from which the wind originates.
windDirectionAt10m	0..1	AngleDegrees	(NC) The wind direction at 10 metres above ground level for the corresponding time interval. Note: Meteorological wind direction normally identifies the direction from which the wind originates. No corresponding normal attribute is defined because a single average direction may be misleading for multimodal wind regimes.
windGustAt10m	0..1	Speed	(NC) The maximum wind gust at 10 metres above ground level during the corresponding time interval. Note: The time interval over which the gust maximum applies is defined by the associated Schedule and TimePoint.
windSpeedAt100m	0..1	Speed	(NC) The wind speed at 100 metres above ground level for the corresponding time interval.
windSpeedAt10m	0..1	Speed	(NC) The wind speed at 10 metres above ground level for the corresponding time interval.
droughtCode	0..1	Decimal	(NC) The Drought Code for the corresponding time interval. Note: The Drought Code is a component of the Canadian Fire Weather Index System representing the moisture condition of deep, compact organic fuel layers. It is particularly useful for representing the cumulative effect of prolonged dry conditions and seasonal drought on wildfire potential. Higher values indicate drier conditions. The attribute is used when the applicable wildfire methodology provides a Drought Code. Example: Values such as "15", "300" and "600" represent progressively drier conditions in the Drought Code scale. No universal low, moderate or high classification is implied by these example values; interpretation is provided by the applicable methodology and provenance.
fireWeatherIndex	0..1	Decimal	(NC) A fire-weather index indicating the meteorological conditions relevant to wildfire danger for the corresponding time interval. Note: The applicable fire-weather index methodology and classification are identified through the associated data provenance. The CIM model does not prescribe a specific wildfire classification. The Canadian Fire Weather Index (FWI) System, as used by European Forest Fire Information System (EFFIS), is one example. In this system, the index combines fuel-moisture and fire-behaviour components derived from temperature, relative humidity, wind speed and

name	mult	type	description
			precipitation. Higher values indicate conditions increasingly favourable to intense wildfire. Example: Using the EFFIS classification: "5.0" (Very low), "10.0" (Low), "15.0" (Moderate), "37.77" (High), "40.01" (Very high), "55.55" (Extreme).
avalancheDangerIndex	0..1	Decimal	(NC) An index representing the avalanche danger for the corresponding time interval. Note: The applicable avalanche danger methodology and classification are identified through the associated data provenance. The CIM model does not prescribe a particular avalanche danger scale. Where the index represents categorical danger levels, the numerical values shall not be assumed to form a linear scale. Example: Using the European Avalanche Danger Scale: "1" (Low), "2" (Moderate), "3" (Considerable), "4" (High), "5" (Very high).

Table 671 shows all association ends of ClimateZoneTimePoint with other classes.

Table 671 – Association ends of ExtSchedule::ClimateZoneTimePoint with other classes

mult from	name	mult to	type	description
1..*	ClimateZoneSchedule	1..1	ClimateZoneSchedule	(NC) The climate zone schedule that has climate zone time point.

3.19.127 (NC) EnergyResourceGroupCapacityRegularSchedule

Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Regular schedule for EnergyResourceGroupCapacity.

Table 672 shows all attributes of EnergyResourceGroupCapacityRegularSchedule.

Table 672 – Attributes of ExtSchedule::EnergyResourceGroupCapacityRegularSchedule

name	mult	type	description
availabilityFactor	0..1	PerCent	(NC) The ratio (in percent) between the effective available capacity and the installed capacity over a defined time interval. For weather-dependent resources, the value reflects climate-driven availability as derived from meteorological or hydrological conditions.
availableCapacityP	0..1	ActivePower	(NC) The weather or condition-dependent active power capacity that is realistically available for operation at a given time. This value reflects reductions due to climatic, hydrological, or operational constraints.
installedCapacityP	0..1	ActivePower	(NC) The nominal installed active power capacity of the energy type, independent of weather or operating conditions. This is the maximum technical power rating under standard design assumptions and optimum operation condition.
p	0..1	ActivePower	(NC) The effective active power capacity for the resource at the specified time, after considering all applied deratings, outages, operational limits, or weather influences. This value represents the usable capacity that can be delivered or consumed, effective capacity.

name	mult	type	description
participationFactor	0..1	Float	(NC) Participation factor for the power group in relation to scheduling area. Must be a positive value.
capacityAllocationFactor	0..n	Float	(NC) The relative weighting used to allocate an aggregate capacity requirement to this energy resource group on a time-series basis. Note: The values provide context-specific top-down capacity allocation weightings and may override normalCapacityAllocationFactor. Each value applies to the corresponding time interval represented by the time-series context. The factors are relative weights and are not required to represent percentages or to sum to 1. The allocation algorithm may normalize or otherwise adjust the applicable factors according to availability, existing capacity and other modelling constraints.
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 673 shows all association ends of EnergyResourceGroupCapacityRegularSchedule with other classes.

**Table 673 – Association ends of
ExtSchedule::EnergyResourceGroupCapacityRegularSchedule with other classes**

mult from	name	mult to	type	description
0..*	EnergyResourceGroupCapacity	1..1	EnergyResourceGroupCapacity	(NC) The energy resource group capacity that has a regular schedule.
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6171

6172 **3.19.128 (NC) GridPowerCapacityRegularSchedule**

6173 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :

6174 ExtEulIdentifiedObject : Identity

6175 Regular schedule for GridPowerCapacity.

6176 Table 674 shows all attributes of GridPowerCapacityRegularSchedule.

Table 674 – Attributes of ExtSchedule::GridPowerCapacityRegularSchedule

name	mult	type	description
maxInterchange	0..1	ActivePower	(NC) Maximum total active power (AC and DC) that the net position for the bidding zone can have to maintain operational security. Positive sign means flow into the bidding zone.
minImportP	0..1	ActivePower	(NC) Minimum imported active power requirement.
minInterchange	0..1	ActivePower	(NC) Minimum total active power (AC and DC) that the net position for the bidding zone can have to maintain operational security. Negative sign means flow out of the bidding zone.
netACInterchange	0..1	ActivePower	(NC) The netted aggregation of all AC external schedules of an area. Positive sign means flow into the area (Import).
netACInterchangeTolerance	0..1	Float	(NC) The area AC Net Position tolerance.
netDCInterchange	0..1	ActivePower	(NC) The netted aggregation of all DC external schedules of an area. Positive sign means flow into the area.
regulatingDownAllocation	0..1	ActivePower	(NC) The balancing capacity allocated for regulating down, by decreasing the production, increasing the direct current export, decreasing direct current import or increasing the consumption of energy in the bidding zone. This must be a positive number.
regulatingUpAllocation	0..1	ActivePower	(NC) The balancing capacity allocated for regulating up, by increasing the production, decreasing the direct current export, increasing direct current import or reducing the consumption of energy in the bidding zone. This must be a positive number.
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries

name	mult	type	description
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 675 shows all association ends of GridPowerCapacityRegularSchedule with other classes.

Table 675 – Association ends of ExtSchedule::GridPowerCapacityRegularSchedule with other classes

mult from	name	mult to	type	description
0..*	GridPowerCapacity	1..1	GridPowerCapacity	(NC) The grid power capacity that has a regular schedule.
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.129 (NC) AreaReserveResourceSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Schedule for area reserve resource .

Table 676 shows all attributes of AreaReserveResourceSchedule.

Table 676 – Attributes of ExtSchedule::AreaReserveResourceSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 677 shows all association ends of AreaReserveResourceSchedule with other classes.

Table 677 – Association ends of ExtSchedule::AreaReserveResourceSchedule with other classes

mult from	name	mult to	type	description
0..*	AreaReserveResource	1..1	AreaReserveResource	(NC) The resource that has a schedule.
1..1	AreaReserveResourceTimePoint	1..*	AreaReserveResourceTimePoint	(NC) The time point for this schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.19.130 (NC) AreaReserveResourceTimePoint root class

Area reserve resource for a given point in time.

Table 678 shows all attributes of AreaReserveResourceTimePoint.

Table 678 – Attributes of ExtSchedule::AreaReserveResourceTimePoint

name	mult	type	description
activatedP	0..1	ActivePower	(NC) Amount of active power currently activated for the reserve product.
allocatedP	0..1	ActivePower	(NC) Amount of active power capability allocated from the associated resource to the area for the given reserve product.
availableP	0..1	ActivePower	(NC) Amount of active power currently available for provision of the reserve product.
contractedP	0..1	ActivePower	(NC) Amount of active power contracted for the reserve product.
enabled	0..1	Boolean	(NC) Identifies if the unit is enabled to accept a dispatch instruction. If true, the unit is enabled to accept a dispatch instruction. If false, the unit has the capability, but it is not enabled to receive a dispatch instruction.
kind	0..1	BalancingReserveKind	(NC) Type of reserve product represented by the allocation.
priority	0..1	Integer	(NC) Relative priority for activation or selection within an area or aggregated reserve structure.
regulationDirection	0..1	MarketRegulationDirectionKind	(NC) Direction of the product flow.
atTime	0..1	DateTime	(NC) The time the data is valid for.

Table 679 shows all association ends of AreaReserveResourceTimePoint with other classes.

6201 **Table 679 – Association ends of ExtSchedule::AreaReserveResourceTimePoint with**
6202 **other classes**

mult from	name	mult to	type	description
1..*	AreaReserveResourceSchedule	1..1	AreaReserveResourceSchedule	(NC) The schedule that has a time point.

6203

6204 **3.19.131 (NC) AreaReserveResourceRegularSchedule**

6205 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :

6206 ExtEulIdentifiedObject : Identity

6207 Regular schedule for area reserve resource .

6208 Table 680 shows all attributes of AreaReserveResourceRegularSchedule.

6209 **Table 680 – Attributes of ExtSchedule::AreaReserveResourceRegularSchedule**

name	mult	type	description
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6210

6211 Table 681 shows all association ends of AreaReserveResourceRegularSchedule with other
6212 classes.

6213 **Table 681 – Association ends of ExtSchedule::AreaReserveResourceRegularSchedule**
6214 **with other classes**

mult from	name	mult to	type	description
0..*	AreaReserveResource	1..1	AreaReserveResource	(NC) The resource that has a schedule.
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject

mult from	name	mult to	type	description
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6215

6216 **3.19.132 (NC) ClimateZoneRegularSchedule**

6217 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :
 6218 ExtEulIdentifiedObject : Identity

6219 Regular schedule for ClimateZone.

6220 Table 682 shows all attributes of ClimateZoneRegularSchedule.

6221 **Table 682 – Attributes of ExtSchedule::ClimateZoneRegularSchedule**

name	mult	type	description
windSpeedAt100m	0..1	Speed	(NC) The wind speed at 100 metres above ground level for the corresponding time interval.
windGustAt10m	0..1	Speed	(NC) The maximum wind gust at 10 metres above ground level during the corresponding time interval. Note: The time interval over which the gust maximum applies is defined by the associated Schedule and TimePoint.
windSpeedAt10m	0..1	Speed	(NC) The wind speed at 10 metres above ground level for the corresponding time interval.
dewPointTempAt2m	0..1	Temperature	(NC) The dew-point temperature at 2 metres above ground level for the corresponding time interval.
maxTempAt2m	0..1	Temperature	(NC) The maximum air temperature at 2 metres above ground level during the corresponding time interval. Note: This time series is intended for datasets providing maximum temperature directly.
minTempAt2m	0..1	Temperature	(NC) The minimum air temperature at 2 metres above ground level during the corresponding time interval. Note: This time series is intended for datasets providing minimum temperature directly, for example daily minimum temperature. It is not required when the minimum can appropriately be derived from tempAt2m.
relativeHumidityAt2m	0..1	PerCent	(NC) The relative humidity at 2 metres above ground level for the corresponding time interval.
sunshineDuration	0..1	Hours	(NC) The duration of sunshine during the corresponding time interval.
tempAt2m	0..1	Temperature	(NC) The air temperature at 2 metres above ground level for the corresponding time interval.
windDirectionAt100m	0..1	AngleDegrees	(NC) The wind direction at 100 metres above ground level for the corresponding time interval. Note: Meteorological wind direction normally identifies the direction from which the wind originates.
windDirectionAt10m	0..1	AngleDegrees	(NC) The wind direction at 10 metres above ground level for the corresponding time interval.

name	mult	type	description
			Note: Meteorological wind direction normally identifies the direction from which the wind originates. No corresponding normal attribute is defined because a single average direction may be misleading for multimodal wind regimes.
cloudCover	0..1	PerCent	(NC) The proportion of the sky covered by cloud for the corresponding time interval.
surfacePressure	0..1	Pressure	(NC) The atmospheric pressure at the surface for the corresponding time interval. Note: Surface pressure may be relevant when determining air density for wind-energy calculations.
diffuseSolarIrradiance	0..1	Irradiance	(NC) The diffuse solar irradiance for the corresponding time interval.
directSolarIrradiance	0..1	Irradiance	(NC) The direct solar irradiance for the corresponding time interval.
globalSolarIrradiance	0..1	Irradiance	(NC) The global solar irradiance for the corresponding time interval. Note: Global solar irradiance represents the total direct and diffuse solar power incident per unit area on the applicable reference surface. It may be used as an environmental input for applications such as photovoltaic production and thermal rating of overhead conductors. The orientation of the reference surface is defined by the applicable dataset or provenance information.
precipitation	0..1	Length	(NC) The total precipitation received during the corresponding time interval. Note: The value represents accumulated precipitation expressed as an equivalent depth of water.
rainfall	0..1	Length	(NC) The amount of liquid precipitation received during the corresponding time interval. Note: The value represents accumulated rainfall expressed as an equivalent depth of water.
snowfall	0..1	Length	(NC) The solid precipitation received during the corresponding time interval, expressed as its equivalent amount of liquid water.
snowmelt	0..1	Length	(NC) The amount of water released by melting snow during the corresponding time interval, expressed as an equivalent depth of liquid water.
snowWater	0..1	Length	(NC) The amount of water stored in the snowpack at the corresponding time, expressed as an equivalent depth of liquid water. Example: January = 180 mm, March = 430 mm, May = 160 mm, June = 0 mm.
hydroInflow	0..1	RealEnergy	(NC) The energy equivalent of natural hydro inflow associated with hydro resources in the ClimateZone during the corresponding time interval. Note: The value represents inflow energy for the interval. For example, a weekly TimePoint may contain the natural hydro inflow energy for that week.
runoff	0..1	Length	(NC) The runoff during the corresponding time interval, expressed as an equivalent depth of water over the area.

name	mult	type	description
evaporation	0..1	Length	(NC) The evaporation and evapotranspiration during the corresponding time interval, expressed as an equivalent depth of water. Note: The sign convention, where relevant, is defined by the applicable data specification.
potentialEvaporation	0..1	Length	(NC) The potential evaporation during the corresponding time interval, expressed as an equivalent depth of water.
frostDays	0..1	Decimal	(NC) The number of frost days within the corresponding time interval.
icingDays	0..1	Decimal	(NC) The number of days meeting the applicable icing criterion within the corresponding time interval.
freezingPrecipitationDays	0..1	Decimal	(NC) The number of days with freezing precipitation within the corresponding time interval.
hailDays	0..1	Decimal	(NC) The number of days on which hail occurs within the corresponding time interval.
thunderDays	0..1	Decimal	(NC) The number of days on which thunder is observed within the corresponding time interval.
lightningDensity	0..1	CountPerArea	(NC) The number of lightning events per unit area occurring during the corresponding time interval.
hotDays	0..1	Decimal	(NC) The number of days meeting the applicable hot-day criterion within the corresponding time interval.
heatwaveDays	0..1	Decimal	(NC) The number of days occurring as part of a heatwave within the corresponding time interval.
tropicalNights	0..1	Decimal	(NC) The number of nights meeting the applicable tropical-night criterion within the corresponding time interval.
seaSurfaceTemp	0..1	Temperature	(NC) The sea-surface temperature for the corresponding time interval.
significantWaveHeight	0..1	Length	(NC) The significant wave height for the corresponding time interval.
wavePeriod	0..1	Seconds	(NC) The representative wave period for the corresponding time interval.
waveDirection	0..1	AngleDegrees	(NC) The direction from which waves propagate for the corresponding time interval. Note: No corresponding normal value is defined because a single average direction may not meaningfully represent a multi-directional sea state.
seaIceThickness	0..1	Length	(NC) The sea-ice thickness for the corresponding time interval.
seaIceConcentration	0..1	PerCent	(NC) The proportion of the sea surface covered by sea ice for the corresponding time interval. Note: Sea-ice concentration provides the time-dependent information needed to determine sea-ice presence and extent. It replaces a simple integer seaice value, which cannot distinguish between partial and complete ice coverage.
seaCurrentSpeed	0..1	Speed	(NC) The speed of the sea-water current for the corresponding time interval.

name	mult	type	description
			Note: The applicable depth or vertical reference is defined by the source dataset or provenance information.
seaCurrentDirection	0..1	AngleDegrees	(NC) The direction of the sea-water current for the corresponding time interval. Note: Current direction normally identifies the direction towards which the water is moving, unlike meteorological wind direction, which identifies the direction from which the wind originates.
fireWeatherIndex	0..1	Decimal	(NC) A fire-weather index indicating the meteorological conditions relevant to wildfire danger for the corresponding time interval. Note: The applicable fire-weather index methodology and classification are identified through the associated data provenance. The CIM model does not prescribe a specific wildfire classification. The Canadian Fire Weather Index (FWI) System, as used by European Forest Fire Information System (EFFIS), is one example. In this system, the index combines fuel-moisture and fire-behaviour components derived from temperature, relative humidity, wind speed and precipitation. Higher values indicate conditions increasingly favourable to intense wildfire. Example: Using the EFFIS classification: "5.0" (Very low), "10.0" (Low), "15.0" (Moderate), "37.77" (High), "40.01" (Very high), "55.55" (Extreme).
droughtCode	0..1	Decimal	(NC) The Drought Code for the corresponding time interval. Note: The Drought Code is a component of the Canadian Fire Weather Index System representing the moisture condition of deep, compact organic fuel layers. It is particularly useful for representing the cumulative effect of prolonged dry conditions and seasonal drought on wildfire potential. Higher values indicate drier conditions. The attribute is used when the applicable wildfire methodology provides a Drought Code. Example: Values such as "15", "300" and "600" represent progressively drier conditions in the Drought Code scale. No universal low, moderate or high classification is implied by these example values; interpretation is provided by the applicable methodology and provenance.
populationWeightedTemperatureAt2m	0..1	Temperature	(NC) The population-weighted air temperature at 2 metres above ground level for the corresponding time interval. Note: The value is derived by spatially weighting the air temperature within the represented area by the population distribution. It may be used for modelling temperature-dependent energy consumption, including heating and cooling demand. The population dataset and weighting method are identified through the applicable provenance information.
avalancheDangerIndex	0..1	Decimal	(NC) An index representing the avalanche danger for the corresponding time interval. Note: The applicable avalanche danger methodology and classification are identified through the associated data provenance. The CIM model does not prescribe a particular

name	mult	type	description
			avalanche danger scale. Where the index represents categorical danger levels, the numerical values shall not be assumed to form a linear scale. Example: Using the European Avalanche Danger Scale: "1" (Low), "2" (Moderate), "3" (Considerable), "4" (High), "5" (Very high).
dayOfWeek	0..1	DayOfWeekKind	(NC) inherited from: BaseRegularIntervalSchedule
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
intervalEndTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6222

6223

Table 683 shows all association ends of ClimateZoneRegularSchedule with other classes.

6224

Table 683 – Association ends of ExtSchedule::ClimateZoneRegularSchedule with other classes

6225

mult from	name	mult to	type	description
0..*	ClimateZone	0..1	ClimateZone	(NC) The climate zone that has regular schedule.
0..*	Season	0..1	Season	(NC) inherited from: BaseRegularIntervalSchedule
0..*	HourPattern	0..1	HourPattern	(NC) inherited from: BaseRegularIntervalSchedule
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6226

3.20 (CIM18) SIPS extensions

3.20.1 General

This package contains the extensions related to the SIPS which is a kind of remedial action scheme. A remedial action scheme can have different stages. Each stage represents the change of values of one element in the grid model compared to the base case is described by the grid state alteration. Each stage can have multiple triggers that have a priority and one or many conditions. When the condition (gate) is reached, the grid state alteration is activated. A remedial action scheme is a kind of a remedial action. In this way, the remedial action scheme participates in the optimization of the remedial actions.

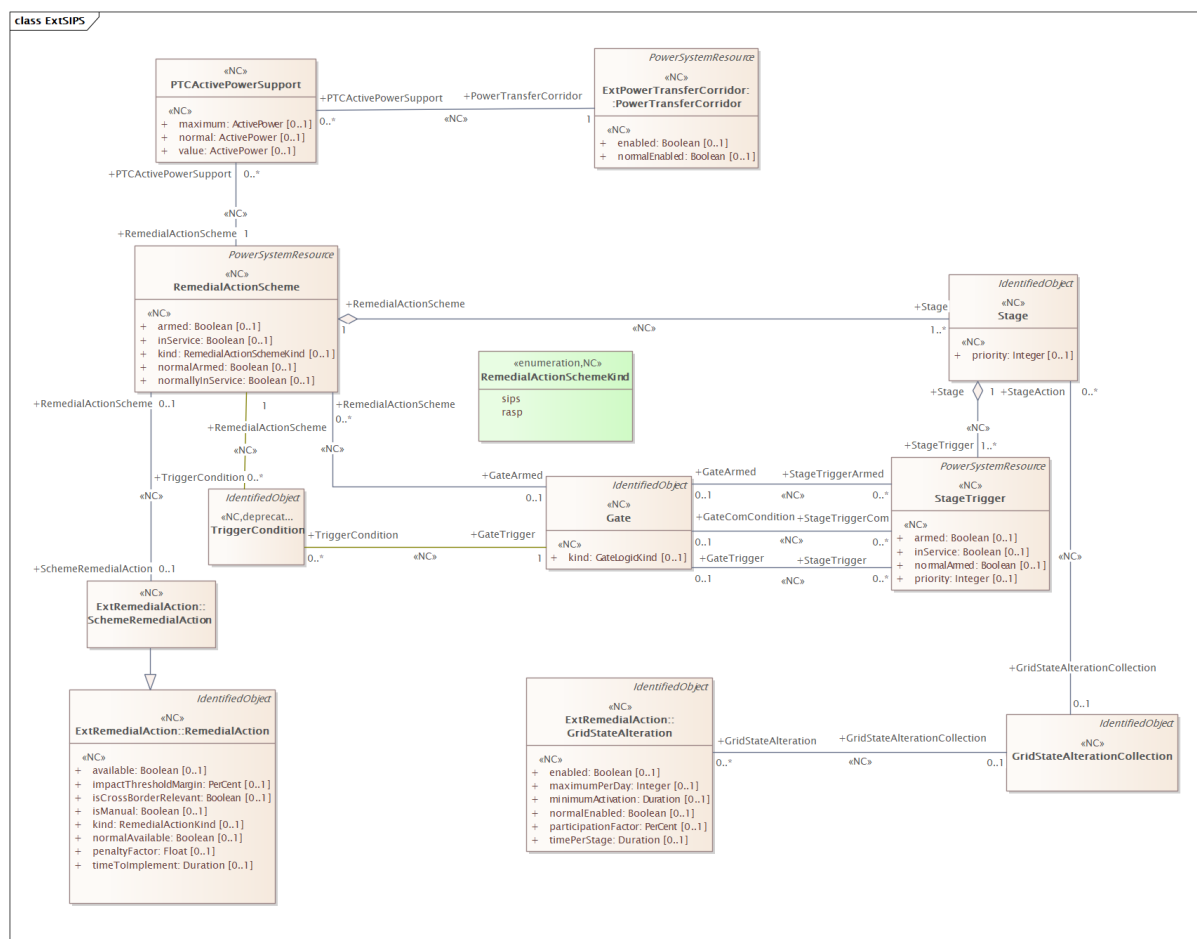


Figure 54 – Class diagram ExtSIPS::ExtSIPS

Figure 54: The diagram contains classes related to SIPS.

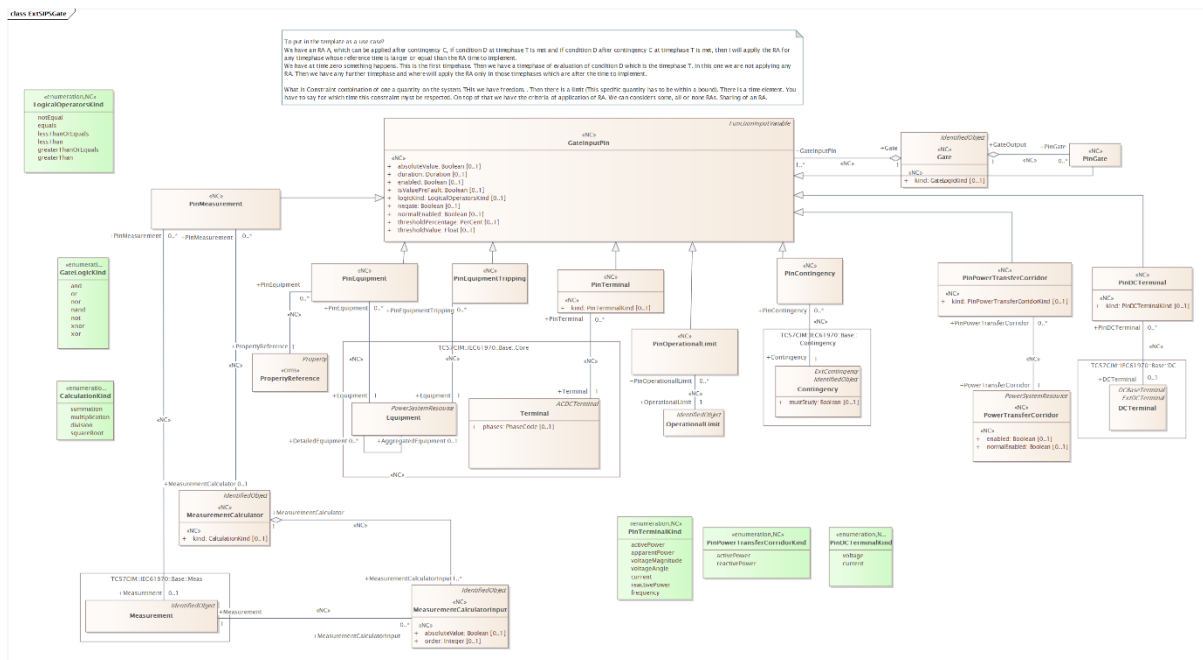


Figure 55 – Class diagram ExtSIPS::ExtSIPSGate

Figure 55: The diagram contains classes related to SIPS gate.

3.20.2 (NC) Gate

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject : Identity

Logical gate that supports a logical operation based on the input.

Table 684 shows all attributes of Gate.

Table 684 – Attributes of ExtSIPS::Gate

name	mult	type	description
kind	0..1	GateLogicKind	(NC) The logical operation of the gate.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 685 shows all association ends of Gate with other classes.

Table 685 – Association ends of ExtSIPS::Gate with other classes

mult from	name	mult to	type	description
0..1	RemedialActionScheme	0..*	RemedialActionScheme	(NC) The remedial action scheme which has an armed gate.
1..1	PinGate	0..*	PinGate	(NC) The pin for this gate output.
1..1	GateInputPin	1..*	GateInputPin	(NC) This is the input to the gate.

mult from	name	mult to	type	description
0..1	StageTriggerArmed	0..*	StageTrigger	(NC) The stage trigger associated with the armed gate.
0..1	StageTrigger	0..*	StageTrigger	(NC) The stage trigger associated with the gate trigger.
0..1	StageTriggerCom	0..*	StageTrigger	(NC) The stage trigger associated with the communication gate.
1..1	TriggerCondition	0..*	TriggerCondition	(deprecated,NC) The trigger condition that has a gate trigger.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6250

6251 **3.20.3 (NC) GateInputPin**

6252 Inheritance path = [FunctionInputVariable](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity
 6253 Input pin for a logical gate. The condition described in the input pin gives a logical true or false.
 6254 The result from measurement and calculation are converted to a true or false.
 6255 Table 686 shows all attributes of GateInputPin.

6256

Table 686 – Attributes of ExtSIPS::GateInputPin

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) Indicates if the absolute value is used for comparison. If true, use the absolute value. If false, use the complex value (vector).
duration	0..1	Duration	(NC) The time duration for which the condition is satisfied before acting. Default is 0 seconds.
logicKind	0..1	LogicalOperatorsKind	(NC) The logical operator kind used for comparison.
negate	0..1	Boolean	(NC) Invert/negate the result of the comparison.
thresholdPercentage	0..1	PerCent	(NC) The threshold percentage that should be used for compare with the percentage change between input value and threshold value. The allowed value range is [0,100].
thresholdValue	0..1	Float	(NC) The threshold value that should be used for compare with the input value.
isValuePreFault	0..1	Boolean	(NC) Indicates if the gate input pin value is referring to the value prior to a fault (e.g. simulated by a contingency or due to a SIPS activation in a N-x-y case). If it is true, it means that the value is referring to pre-fault. If it is false or not populated, then it is post-fault.
enabled	0..1	Boolean	(NC) True, if the gate input pin is enabled (active). Otherwise false.
normalEnabled	0..1	Boolean	(NC) True, if the gate input pin is normally enabled (active). Otherwise false.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 687 shows all association ends of GateInputPin with other classes.

Table 687 – Association ends of ExtSIPS::GateInputPin with other classes

mult from	name	mult to	type	description
1..*	Gate	1..1	Gate	(NC) The Gate that has this input.
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) Enabling schedule associated to a gate input pin.
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.20.4 (NC) GridStateAlterationCollection

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

A collection of grid state alterations.

Table 688 shows all attributes of GridStateAlterationCollection.

Table 688 – Attributes of ExtSIPS::GridStateAlterationCollection

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 689 shows all association ends of GridStateAlterationCollection with other classes.

Table 689 – Association ends of ExtSIPS::GridStateAlterationCollection with other classes

mult from	name	mult to	type	description
0..1	AvailabilitySchedule	0..*	AvailabilitySchedule	(NC) Availability schedule that require the a collection of grid state alteration to provide a valid power flow solution. For instance, a set of switching plans.

mult from	name	mult to	type	description
0..1	GridStateAlteration	0..*	GridStateAlteration	(NC) The GridStateAlteration that belongs to the collection.
0..1	StageAction	0..*	Stage	(NC) The stage action related to this GridStateAlterationCollection.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6270

6271 **3.20.5 (NC) MeasurementCalculator**

6272 Inheritance path = IdentifiedObject : ExtEuIdentifiedObject : Identity

6273 Result of a calculation of one or more measurement.

6274 Table 690 shows all attributes of MeasurementCalculator.

6275

Table 690 – Attributes of ExtSIPS::MeasurementCalculator

name	mult	type	description
kind	0..1	CalculationKind	(NC) Calculation operation executed on the operands.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6276

6277 Table 691 shows all association ends of MeasurementCalculator with other classes.

6278 **Table 691 – Association ends of ExtSIPS::MeasurementCalculator with other classes**

mult from	name	mult to	type	description
0..1	PinMeasurement	0..*	PinMeasurement	(NC) The pin that uses this input.
1..1	MeasurementCalculatorInput	1..*	MeasurementCalculatorInput	(NC) The input used for the calculator.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6279

6280 **3.20.6 (NC) MeasurementCalculatorInput**

6281 Inheritance path = IdentifiedObject : ExtEuIdentifiedObject : Identity

6282 Input to measurement calculation. It supports Analog, Discrete and Accumulator
6283 measurements.

6284 Table 692 shows all attributes of MeasurementCalculatorInput.

6285 **Table 692 – Attributes of ExtSIPS::MeasurementCalculatorInput**

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) Indicates if the absolute value is used for comparison. If true, use the absolute value. If false, use the complex value (vector).
order	0..1	Integer	(NC) Positive number that defines the order of the operand in the calculation. 0 means default in which case the order is not relevant.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6286 Table 693 shows all association ends of MeasurementCalculatorInput with other classes.

6287 **Table 693 – Association ends of ExtSIPS::MeasurementCalculatorInput with other classes**

mult from	name	mult to	type	description
0..*	Measurement	1..1	Measurement	(NC) Measurement used as input to a calculation.
1..*	MeasurementCalculator	1..1	MeasurementCalculator	(NC) The measurement calculator using this calculator input.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6290

6291 **3.20.7 (NC) PinContingency**

6292 Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject :

6293 ExtEulIdentifiedObject : Identity

6294 Input pin associated with a Contingency. It is used for comparison.

6295 Table 694 shows all attributes of PinContingency.

6296 **Table 694 – Attributes of ExtSIPS::PinContingency**

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin
duration	0..1	Duration	(NC) inherited from: GateInputPin
logicKind	0..1	LogicalOperatorsKind	(NC) inherited from: GateInputPin
negate	0..1	Boolean	(NC) inherited from: GateInputPin
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin

name	mult	type	description
isValuePreFault	0..1	Boolean	(NC) inherited from: GateInputPin
enabled	0..1	Boolean	(NC) inherited from: GateInputPin
normalEnabled	0..1	Boolean	(NC) inherited from: GateInputPin
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 695 shows all association ends of PinContingency with other classes.

Table 695 – Association ends of ExtSIPS::PinContingency with other classes

mult from	name	mult to	type	description
0..*	Contingency	1..1	Contingency	(NC) The Contingency that is used in the input pin.
1..*	Gate	1..1	Gate	(NC) inherited from: GateInputPin
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GateInputPin
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.20.8 (NC) PinDCTerminal

Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Input pin associated with a DCTerminal. It is used for comparison.

Table 696 shows all attributes of PinDCTerminal.

Table 696 – Attributes of ExtSIPS::PinDCTerminal

name	mult	type	description
kind	0..1	PinDCTerminalKind	(NC) The kind of quantity which is used as an input value.
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin
duration	0..1	Duration	(NC) inherited from: GateInputPin
logicKind	0..1	LogicalOperatorsKind	(NC) inherited from: GateInputPin
negate	0..1	Boolean	(NC) inherited from: GateInputPin
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin

name	mult	type	description
isValuePreFault	0..1	Boolean	(NC) inherited from: GateInputPin
enabled	0..1	Boolean	(NC) inherited from: GateInputPin
normalEnabled	0..1	Boolean	(NC) inherited from: GateInputPin
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 697 shows all association ends of PinDCTerminal with other classes.

Table 697 – Association ends of ExtSIPS::PinDCTerminal with other classes

mult from	name	mult to	type	description
0..*	DCTerminal	0..1	DCTerminal	(NC) The DC terminal that has this pin DC terminal.
1..*	Gate	1..1	Gate	(NC) inherited from: GateInputPin
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GateInputPin
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.20.9 (NC) PinEquipment

Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Input pin associated with an Equipment. It is used for the comparison.

Table 698 shows all attributes of PinEquipment.

Table 698 – Attributes of ExtSIPS::PinEquipment

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin
duration	0..1	Duration	(NC) inherited from: GateInputPin
logicKind	0..1	LogicalOperatorsKind	(NC) inherited from: GateInputPin
negate	0..1	Boolean	(NC) inherited from: GateInputPin
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin
isValuePreFault	0..1	Boolean	(NC) inherited from: GateInputPin
enabled	0..1	Boolean	(NC) inherited from: GateInputPin

name	mult	type	description
normalEnabled	0..1	Boolean	(NC) inherited from: GateInputPin
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 699 shows all association ends of PinEquipment with other classes.

Table 699 – Association ends of ExtSIPS::PinEquipment with other classes

mult from	name	mult to	type	description
0..*	Equipment	1..1	Equipment	(NC) The Equipment that is used in the input pin.
0..*	PropertyReference	1..1	PropertyReference	(NC) The property reference for this pin equipment.
1..*	Gate	1..1	Gate	(NC) inherited from: GateInputPin
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GateInputPin
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.20.10 (NC) PinEquipmentTripping

Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Input pin associated with an Equipment. It is used to determine if the equipment is tripped between two consecutive stages, i.e. the equipment is in service at pre-fault stage and it is out of service at post-fault stage.

Table 700 shows all attributes of PinEquipmentTripping.

Table 700 – Attributes of ExtSIPS::PinEquipmentTripping

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin
duration	0..1	Duration	(NC) inherited from: GateInputPin
logicKind	0..1	LogicalOperatorsKind	(NC) inherited from: GateInputPin
negate	0..1	Boolean	(NC) inherited from: GateInputPin
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin
isValuePreFault	0..1	Boolean	(NC) inherited from: GateInputPin

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GateInputPin
normalEnabled	0..1	Boolean	(NC) inherited from: GateInputPin
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 701 shows all association ends of PinEquipmentTripping with other classes.

Table 701 – Association ends of ExtSIPS::PinEquipmentTripping with other classes

mult from	name	mult to	type	description
0..*	Equipment	1..1	Equipment	(NC) Equipment that is tripped.
1..*	Gate	1..1	Gate	(NC) inherited from: GateInputPin
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GateInputPin
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.20.11 (NC) PinGate

Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

An output from one gate represents an input to another gate.

Table 702 shows all attributes of PinGate.

Table 702 – Attributes of ExtSIPS::PinGate

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin
duration	0..1	Duration	(NC) inherited from: GateInputPin
logicKind	0..1	LogicalOperatorsKind	(NC) inherited from: GateInputPin
negate	0..1	Boolean	(NC) inherited from: GateInputPin
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin
isValuePreFault	0..1	Boolean	(NC) inherited from: GateInputPin
enabled	0..1	Boolean	(NC) inherited from: GateInputPin
normalEnabled	0..1	Boolean	(NC) inherited from: GateInputPin

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 703 shows all association ends of PinGate with other classes.

Table 703 – Association ends of ExtSIPS::PinGate with other classes

mult from	name	mult to	type	description
0..*	GateOutput	1..1	Gate	(NC) The output of the gate.
1..*	Gate	1..1	Gate	(NC) inherited from: GateInputPin
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GateInputPin
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.20.12 (NC) PinMeasurement

Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Input pin associated with a Measurement. It is used for comparison.

Table 704 shows all attributes of PinMeasurement.

Table 704 – Attributes of ExtSIPS::PinMeasurement

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin
duration	0..1	Duration	(NC) inherited from: GateInputPin
logicKind	0..1	LogicalOperatorsKind	(NC) inherited from: GateInputPin
negate	0..1	Boolean	(NC) inherited from: GateInputPin
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin
isValuePreFault	0..1	Boolean	(NC) inherited from: GateInputPin
enabled	0..1	Boolean	(NC) inherited from: GateInputPin
normalEnabled	0..1	Boolean	(NC) inherited from: GateInputPin
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 705 shows all association ends of PinMeasurement with other classes.

Table 705 – Association ends of ExtSIPS::PinMeasurement with other classes

mult from	name	mult to	type	description
0..*	Measurement	0..1	Measurement	(NC) The Measurement that is used in the input pin.
0..*	MeasurementCalculator	0..1	MeasurementCalculator	(NC) The result of the calculation used as input to a gate.
1..*	Gate	1..1	Gate	(NC) inherited from: GateInputPin
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GateInputPin
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.20.13 (NC) PinPowerTransferCorridor

Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Input pin associated with a PowerTransferCorridor. It is used for comparison.

Table 706 shows all attributes of PinPowerTransferCorridor.

Table 706 – Attributes of ExtSIPS::PinPowerTransferCorridor

name	mult	type	description
kind	0..1	PinPowerTransferCorridorKind	(NC) The kind of quantity which is used as an input value.
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin
duration	0..1	Duration	(NC) inherited from: GateInputPin
logicKind	0..1	LogicalOperatorsKind	(NC) inherited from: GateInputPin
negate	0..1	Boolean	(NC) inherited from: GateInputPin
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin
isValuePreFault	0..1	Boolean	(NC) inherited from: GateInputPin
enabled	0..1	Boolean	(NC) inherited from: GateInputPin
normalEnabled	0..1	Boolean	(NC) inherited from: GateInputPin

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 707 shows all association ends of PinPowerTransferCorridor with other classes.

Table 707 – Association ends of ExtSIPS::PinPowerTransferCorridor with other classes

mult from	name	mult to	type	description
0..*	PowerTransferCorridor	1..1	PowerTransferCorridor	(NC) The PowerTransferCorridor that is used in the input pin.
1..*	Gate	1..1	Gate	(NC) inherited from: GateInputPin
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GateInputPin
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.20.14 (NC) PinTerminal

Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Input pin associated with a Terminal. It is used for comparison.

Table 708 shows all attributes of PinTerminal.

Table 708 – Attributes of ExtSIPS::PinTerminal

name	mult	type	description
kind	0..1	PinTerminalKind	(NC) The kind of quantity which is used as an input value.
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin
duration	0..1	Duration	(NC) inherited from: GateInputPin
logicKind	0..1	LogicalOperatorsKind	(NC) inherited from: GateInputPin
negate	0..1	Boolean	(NC) inherited from: GateInputPin
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin
isValuePreFault	0..1	Boolean	(NC) inherited from: GateInputPin
enabled	0..1	Boolean	(NC) inherited from: GateInputPin
normalEnabled	0..1	Boolean	(NC) inherited from: GateInputPin

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 709 shows all association ends of PinTerminal with other classes.

Table 709 – Association ends of ExtSIPS::PinTerminal with other classes

mult from	name	mult to	type	description
0..*	Terminal	1..1	Terminal	(NC) The Terminal that is used in the input pin.
1..*	Gate	1..1	Gate	(NC) inherited from: GateInputPin
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GateInputPin
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.20.15 (NC) PinOperationalLimit

Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Input pin associated with the limits of a Terminal. It is used for comparison.

Table 710 shows all attributes of PinOperationalLimit.

Table 710 – Attributes of ExtSIPS::PinOperationalLimit

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin
duration	0..1	Duration	(NC) inherited from: GateInputPin
logicKind	0..1	LogicalOperatorsKind	(NC) inherited from: GateInputPin
negate	0..1	Boolean	(NC) inherited from: GateInputPin
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin
isValuePreFault	0..1	Boolean	(NC) inherited from: GateInputPin
enabled	0..1	Boolean	(NC) inherited from: GateInputPin
normalEnabled	0..1	Boolean	(NC) inherited from: GateInputPin
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 711 shows all association ends of PinOperationalLimit with other classes.

Table 711 – Association ends of ExtSIPS::PinOperationalLimit with other classes

mult from	name	mult to	type	description
0..*	OperationalLimit	1..1	OperationalLimit	(NC) The operational limit that is used in the input pin.
1..*	Gate	1..1	Gate	(NC) inherited from: GateInputPin
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GateInputPin
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.20.16 (NC) PTCActivePowerSupport root class

Defines the active power capability (support) of the scheme in relation to a PowerTransferCorridor.

Table 712 shows all attributes of PTCActivePowerSupport.

Table 712 – Attributes of ExtSIPS::PTCActivePowerSupport

name	mult	type	description
maximum	0..1	ActivePower	(NC) Maximum support that a System Integrity Protection Scheme (SIPS) can provide to a Power Transfer Corridor (PTC). This is normally limited by the maximum power system disconnect allowed.
normal	0..1	ActivePower	(NC) Normal support that a System Integrity Protection Scheme (SIPS) is expected to provide when enabled to a Power Transfer Corridor (PTC).
value	0..1	ActivePower	(NC) The support that a System Integrity Protection Scheme (SIPS) gives to a Power Transfer Corridor (PTC).

Table 713 shows all association ends of PTCActivePowerSupport with other classes.

6390 **Table 713 – Association ends of ExtSIPS::PTCActivePowerSupport with other classes**

mult from	name	mult to	type	description
0..*	PowerTransferCorridor	1..1	PowerTransferCorridor	(NC) The PowerTransferCorridor that has a specific active power support.
0..*	RemedialActionScheme	1..1	RemedialActionScheme	(NC) The RemedialActionScheme which has active power support from the PowerTransferCorridor.

6391

6392 **3.20.17 (NC) RemedialActionScheme**

6393 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity
 6394 Remedial Action Scheme (RAS), Special Protection Schemes (SPS), System Protection
 6395 Schemes (SPS) or System Integrity Protection Schemes (SIPS).

6396 A Remedial Action Scheme consists of one or more stages that can trigger and execute a
 6397 protection action.

6398 Table 714 shows all attributes of RemedialActionScheme.

6399 **Table 714 – Attributes of ExtSIPS::RemedialActionScheme**

name	mult	type	description
armed	0..1	Boolean	(NC) Defines the arming status of the remedial action scheme. It is set by operation or by signal.
inService	0..1	Boolean	(NC) Indicates if the remedial action scheme and related assets are active and can participate in system operation. If true, the scheme is active. If false, the scheme is treated as if it is not in the model.
kind	0..1	RemedialActionScheme Kind	(NC) Kind of Remedial Action Scheme.
normalArmed	0..1	Boolean	(NC) Defines the normal arming status of the remedial action scheme.
normallyInService	0..1	Boolean	(NC) Indicates if the remedial action scheme and related assets are normally active and can participate in system operation under normal operating conditions. If true, the scheme is normally active. If false, the scheme is treated as if it is not in the model.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6400

6401 Table 715 shows all association ends of RemedialActionScheme with other classes.

6402 **Table 715 – Association ends of ExtSIPS::RemedialActionScheme with other classes**

mult from	name	mult to	type	description
0..1	SchemeRemedialAction	0..1	SchemeRemedialAction	(NC) Scheme remedial action that belongs to the remedial action scheme.

mult from	name	mult to	type	description
0..1	AvailabilityRemedialActionScheme	0..*	AvailabilityRemedialActionScheme	(NC) Availability remedial action scheme describe the availability that affect this remedial action scheme.
0..1	RemedialActionSchemeSchedule	0..*	RemedialActionSchemeSchedule	(NC) Remedial action scheme schedule that has this armed remedial action.
0..*	GateArmed	0..1	Gate	(NC) Gate that through a gate logic and input pin defines arming of a Remedial Action Scheme.
1..1	PTCActivePowerSupport	0..*	PTCActivePowerSupport	(NC) The active power support of the PowerTransferCorridor related to this RemedialActionScheme.
1..1	TriggerCondition	0..*	TriggerCondition	(deprecated,NC) The triggering condition of this Remedial Action Scheme.
1..1	Stage	1..*	Stage	(NC) The stage for this remedial action scheme.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6403

6404 **3.20.18 (NC) Stage**

6405 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

6406 Stage of a remedial action scheme.

6407 Table 716 shows all attributes of Stage.

6408

Table 716 – Attributes of ExtSIPS::Stage

name	mult	type	description
priority	0..1	Integer	(NC) The priority of the stage. 0 = do not care (default) 1 = highest priority. 2 is less than 1 and so on. A stage with higher priority needs be activated before a lower stage can be activated.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6409

6410 Table 717 shows all association ends of Stage with other classes.

6411

Table 717 – Association ends of ExtSIPS::Stage with other classes

mult from	name	mult to	type	description
1..*	RemedialActionScheme	1..1	RemedialActionScheme	(NC) The remedial action scheme that has a stage.
0..1	RemedialActionApplied	0..*	RemedialActionApplied	(NC) The applied relationship between remedial action and a power flow result.
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) The GridStateAlterationCollection which belongs to the Stage.
1..1	StageTrigger	1..*	StageTrigger	(NC) The state trigger that is part of this stage.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6412

6413 3.20.19 (NC) StageTrigger

6414 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

6415 Stage that is triggered either by TriggerCondition or by gate condition within a stage.

6416 Table 718 shows all attributes of StageTrigger.

6417

Table 718 – Attributes of ExtSIPS::StageTrigger

name	mult	type	description
armed	0..1	Boolean	(NC) The status of the class set by operation or by signal. Optional field that will override other status fields.
normalArmed	0..1	Boolean	(NC) The default/normal value used when other active signal/values are missing.
priority	0..1	Integer	(NC) Priority of trigger. 0 = don't care (default) 1 = highest priority. 2 is less than 1 and so on. A trigger with the highest priority will trigger first.
inService	0..1	Boolean	(NC) Indicates if the stage trigger is in service.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6418

6419 Table 719 shows all association ends of StageTrigger with other classes.

6420 Table 719 – Association ends of ExtSIPS::StageTrigger with other classes

mult from	name	mult to	type	description
0..*	GateArmed	0..1	Gate	(NC) The gate that is the input pin which defines arming of the StageTrigger.

mult from	name	mult to	type	description
0..*	GateTrigger	0..1	Gate	(NC) The gate that is the input pin which triggers the protective reactions.
0..*	GateComCondition	0..1	Gate	(NC) The gate that is the input pin which defines a communication condition.
1..*	Stage	1..1	Stage	(NC) The stage that has this stage trigger.
1..1	StageTriggerSchedule	0..*	StageTriggerSchedule	(NC) Stage trigger schedule associated with a stage trigger.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6421

6422 **3.20.20 (deprecated,NC) TriggerCondition**

6423 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

6424 The condition that triggers a remedial action scheme.

6425 Table 720 shows all attributes of TriggerCondition.

6426

Table 720 – Attributes of ExtSIPS::TriggerCondition

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6427

6428 Table 721 shows all association ends of TriggerCondition with other classes.

6429 **Table 721 – Association ends of ExtSIPS::TriggerCondition with other classes**

mult from	name	mult to	type	description
0..*	GateTrigger	1..1	Gate	(deprecated,NC) The gate that is the condition for the trigger.
0..*	RemedialActionScheme	1..1	RemedialActionScheme	(deprecated,NC) The remedial action scheme that has the trigger condition.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6430

6431 **3.20.21 (NC) CalculationKind enumeration**

6432 Kind of calculation operation that can be done to Measurement.

6433 Table 722 shows all literals of CalculationKind.

6434 **Table 722 – Literals of ExtSIPS::CalculationKind**

literal	value	description
summation		Summation operation on the input values (operands).
multiplication		Multiplication operation on the input values (operands).
division		Division operation on the input values (operands).
squareRoot		Square root operator - only one input value (operands).

6435

6436 **3.20.22 (NC) GateLogicKind enumeration**

6437 Define the different logical operations.

6438 Table 723 shows all literals of GateLogicKind.

6439 **Table 723 – Literals of ExtSIPS::GateLogicKind**

literal	value	description
and		A logical AND operation. True when all inputs are true.
or		A logical OR operation. True when one or more inputs are true.
nor		A logical NOR operation. False when one or more inputs are true.
nand		A logical NAND operation. False when all inputs are true.
not		A logical NOT operation. Only one input and true input will give false out and false in will give true out. An inverter.
xnor		A logical XNOR operation. The function is the inverse of the exclusive OR (XOR) gate. All input false or true will give true. Otherwise false.
xor		A logical XOR operation. All input false or true will give false. Otherwise true.

6440

6441 **3.20.23 (NC) LogicalOperatorsKind enumeration**

6442 Kinds of logical operators for comparison.

6443 Table 724 shows all literals of LogicalOperatorsKind.

6444 **Table 724 – Literals of ExtSIPS::LogicalOperatorsKind**

literal	value	description
notEqual		Not equal (unlike) comparison operation.
equals		Equals (like) comparison operation.
lessThanOrEquals		Less than or equals comparison operation.
lessThan		Less than comparison operation.
greaterThanOrEquals		Greater than or equals comparison operation.
greaterThan		Greater than comparison operation.

6445

6446 **3.20.24 (NC) PinDCTerminalKind enumeration**

6447 The kind of quantities that can serve as an input value for the DCTerminal pin.

6448 Table 725 shows all literals of PinDCTerminalKind.

6449 **Table 725 – Literals of ExtSIPS::PinDCTerminalKind**

literal	value	description
voltage		Direct current voltage in the DCTerminal.
current		Direct current in the DCTerminal.

6450

6451 **3.20.25 (NC) PinPowerTransferCorridorKind enumeration**

6452 The kind of quantities that can serve as an input value for the PowerTransferCorridor pin.

6453 Table 726 shows all literals of PinPowerTransferCorridorKind.

6454 **Table 726 – Literals of ExtSIPS::PinPowerTransferCorridorKind**

literal	value	description
activePower		Active power in the branch group.
reactivePower		Reactive power in the branch group.

6455

6456 **3.20.26 (NC) PinTerminalKind enumeration**

6457 The kind of quantities that can serve as an input value for the pin.

6458 Table 727 shows all literals of PinTerminalKind.

6459 **Table 727 – Literals of ExtSIPS::PinTerminalKind**

literal	value	description
activePower		Active power on the Terminal.
apparentPower		Apparent power on the Terminal.
voltageMagnitude		Voltage magnitude on the Terminal.
voltageAngle		Voltage angle on the Terminal.
current		Current on the Terminal.
reactivePower		Reactive power on the Terminal.
frequency		Frequency on the Terminal.

6460

6461 **3.20.27 (NC) RemedialActionSchemeKind enumeration**

6462 Classification of Remedial Action Scheme.

6463 Table 728 shows all literals of RemedialActionSchemeKind.

6464

Table 728 – Literals of ExtSIPS::RemedialActionSchemeKind

literal	value	description
sips		System Integrity Protection Scheme (SIPS). The triggering conditions are met through field measurements.
rasp		Remedial Action Schema Plan (RASP). The triggering conditions are met through calculation or manual intervention.

6465

6466 3.21 Package ExtFaultsPRA

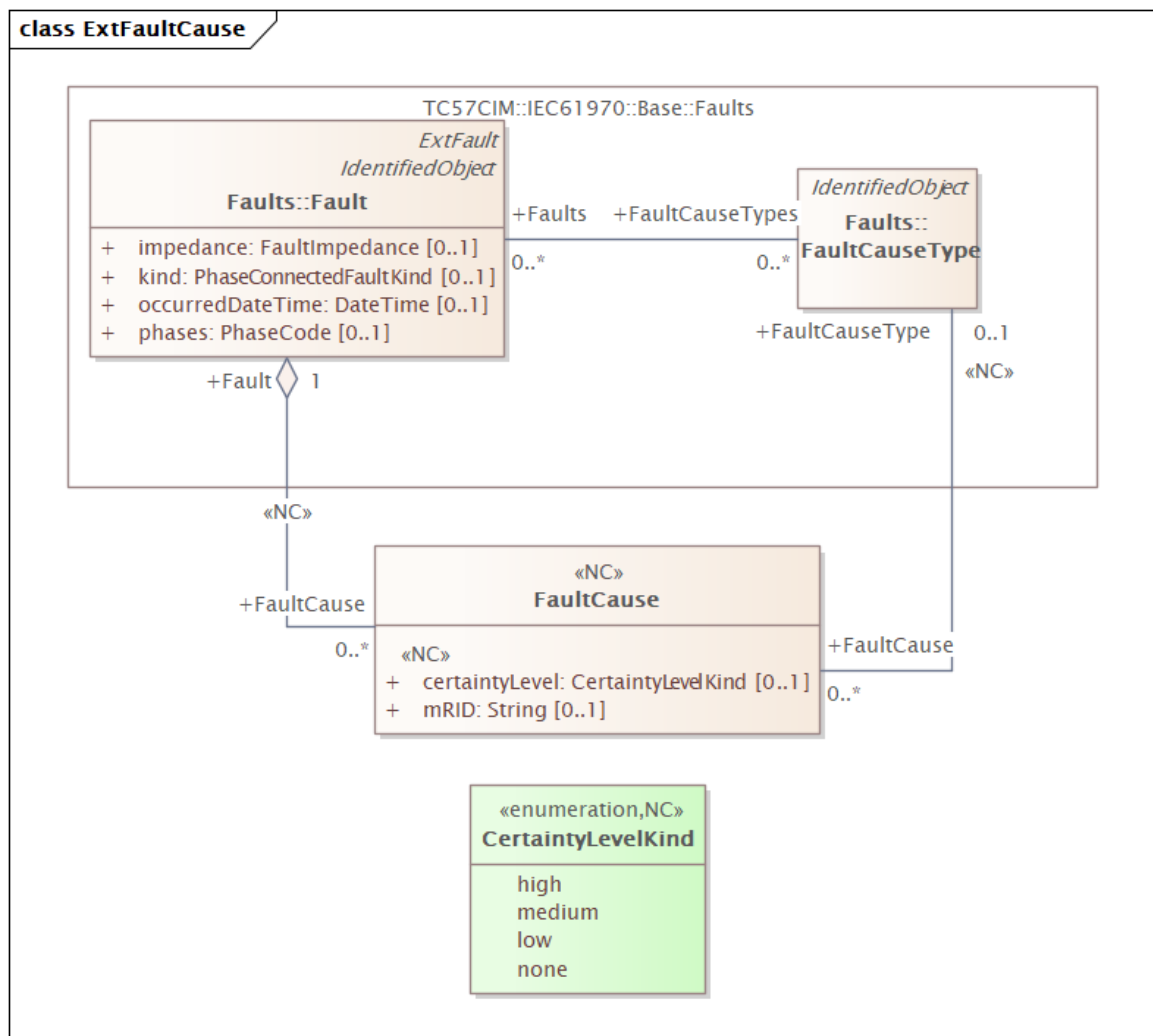
6467 **3.21.1 General**

6468 The package includes extensions related to reporting fault situations in the power system.

6469 3.21.2 Package ExtFaultCause

6470 **3.21.2.1 General**

6471 Extensions related to fault cause.



6472

Figure 56 – Class diagram ExtFaultCause::ExtFaultCause

6473

6474 Figure 56: The diagram contains classes and attributes related to the extensions.

6475 **3.21.2.2 (NC) FaultCause root class**

6476 Fault cause.

6477 Table 729 shows all attributes of FaultCause.

6478 **Table 729 – Attributes of ExtFaultCause::FaultCause**

name	mult	type	description
certaintyLevel	0..1	CertaintyLevelKind	(NC) The degree of certainty of which the cause of a fault is determined by a user. Note 1: the used certainty levels are low, medium and high. High certainty level is used when the cause of a fault is 100 % certain or when the cause is the most probable cause and potentially determined by an expert. Medium certainty level is used when the cause of the fault is very probable but there is not enough evidence to fully support the claim. Low certainty level is used when there is some idea of what the cause could be with the help of, for example, the fault details or expert knowledge. Note 2: the fault cause 'unknown' is used if no other fault cause can be chosen by any degree of certainty.
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

6479

6480 Table 730 shows all association ends of FaultCause with other classes.

6481 **Table 730 – Association ends of ExtFaultCause::FaultCause with other classes**

mult from	name	mult to	type	description
0..*	Fault	1..1	Fault	(NC) The fault defined for this fault and cause combination.
0..*	FaultCauseType	0..1	FaultCauseType	(NC) The fault and cause combination to be simulated for this cause.

6482

6483 **3.21.2.3 (NC) CertaintyLevelKind enumeration**

6484 High certainty level is used when the cause of a fault is 100 % certain or when the cause is the most probable cause and potentially determined by an expert.

6485 Table 731 shows all literals of CertaintyLevelKind.

6487 **Table 731 – Literals of ExtFaultCause::CertaintyLevelKind**

literal	value	description
high		The certainty level is high.
medium		The certainty level is medium.
low		The certainty level is low.
none		The certainty level is none.

6488

6489 3.21.3 Package ExtGridDisturbance

6490 **3.21.3.1 General**

6491 Extensions relate to grid disturbance.

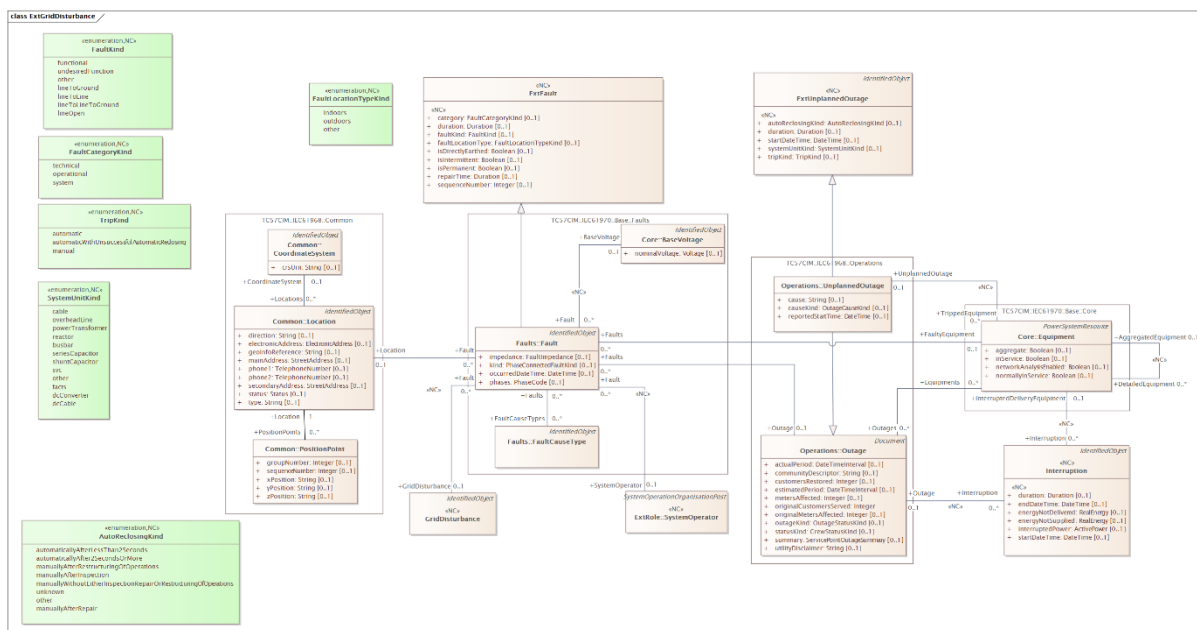


Figure 57 – Class diagram ExtGridDisturbance::ExtGridDisturbance

Figure 57: The diagram contains classes and attributes related to the extensions.

3.21.3.2 (NC) FaultLocationTypeKind enumeration

Categories of fault location types.

Table 732 shows all literals of FaultLocationTypeKind.

Table 732 – Literals of ExtGridDisturbance::FaultLocationTypeKind

literal	value	description
indoors		Fault occurs indoors.
outdoors		Fault occurs outdoors.
other		Fault occurs in other location.

3.21.3.3 (NC) ExtFault root class

A fault of a component is defined as the inability to perform as required, due to an internal state. Table 733 shows all attributes of ExtFault.

Table 733 – Attributes of ExtGridDisturbance::ExtFault

name	mult	type	description
category	0..1	FaultCategoryKind	(NC) The fault category.
duration	0..1	Duration	(NC) The duration of the fault.
faultKind	0..1	FaultKind	(NC) One fault can consist of several fault types. If a fault consists of several fault types, the most significant fault type is used. In case of developing faults, that is in faults changing from one type to another, the final type is given.

name	mult	type	description
isIntermittent	0..1	Boolean	(NC) The kind of occurrence of the fault. It is either intermittent (true) or non-intermittent (false). An intermittent fault is a recurring fault in the same unit and in the same place and for the same reason which repeats itself before it becomes necessary to carry out any repairs or eliminate the cause [8]. A non-intermittent fault occurs only once. Note 1: a fault which repeats itself after an inspection, which did not result in the fault being pinpointed or repaired, is not considered an intermittent fault. A fault like this is considered as the beginning of a grid disturbance every time the fault occurs. Note 2: one example of an intermittent fault is galloping lines. Note 3: when deciding whether a fault is intermittent or not, one should consider more of the cause, location and consequence of the fault and not on the time between the faults. An intermittent fault is counted as one fault. However, all individual caused outages are connected to this fault. Note 4: there is no standard for the required timespan between intermittent faults. Some system operators use 2 hours.
repairTime	0..1	Duration	(NC) Time from when repair commences, including necessary troubleshooting, until the unit's function(s) has (have) been resumed and the unit is ready for operation. Note 1: repair time is registered only for permanent faults and does not include administrative delays (voluntary waiting time). However, any preparations necessary to carry out repairs, for example the collection or ordering of spare parts, waiting for spare parts or transport, are included in the repair time. Note 2: the repair time is zero if a fault is left unrepaired deliberately. Note 3: this definition differs from the IEC 192-07-19 definition by also including the preparation time necessary to carry out the repairs mentioned in note 1.
sequenceNumber	0..1	Integer	(NC) A chronological serial number indicating the order of the faults related to the grid disturbance. Primary faults have fault ID "1", and secondary/latent faults have fault ID "2" or more.
isDirectlyEarthed	0..1	Boolean	(NC) Whether the power system is directly earthed (true) or compensated (false). Usually optional for faults on units with reactive compensation with voltages lower than 100 kV.
isPermanent	0..1	Boolean	(NC) Whether the fault is a permanent (true) or a temporary (false) fault. A permanent fault is a fault that will remain unless it is removed by some intervention. Note 1 to entry: The "intervention" may be modification or maintenance. Note 2: a permanent fault requires repair or adjustment before the unit is ready for operation. For example, the resetting of computers is

name	mult	type	description
			considered as repair work and a switch in the wrong position is considered as a permanent fault. Signal acknowledgement is not considered as repair work. Note 3: the duration of the disconnection is irrelevant when determining if a fault is permanent or not. A temporary fault is a fault where the unit or component is undamaged and is restored to service by switching operations without repair but possibly with on-site inspection. Note 1: a temporary fault does not require measures other than the reconnection of circuit breakers, replacement of fuses or signal acknowledgement. Note 2: the duration of the disconnection is irrelevant when determining if a fault is temporary or not. If, for example, a fault results in long-term disconnection and (on-site) inspection cannot pinpoint its source, the fault is considered to be temporary as no repairs are carried out.
faultLocationType	0..1	FaultLocationTypeKind	(NC) Fault location type.

6504

6505 **3.21.3.4 (NC) ExtUnplannedOutage**

6506 Inheritance path = IdentifiedObject : ExtEuIdentifiedObject : Identity

6507 An event where a component or unit gets partially or fully isolated from the system.

6508 Table 734 shows all attributes of ExtUnplannedOutage.

6509 **Table 734 – Attributes of ExtGridDisturbance::ExtUnplannedOutage**

name	mult	type	description
startDateTime	0..1	DateTime	(NC) The date and time at which the unplanned outage occurred.
duration	0..1	Duration	(NC) The duration of the unplanned outage.
tripKind	0..1	TripKind	(NC) Whether the type of the trip due to the outage was automatic, automatic with successful automatic reclosing or manual. In case of a fault in the reclosing automatics resulting in lack of reclosing, automatic should be chosen as an alternative.
autoReclosingKind	0..1	AutoReclosingKind	(NC) The type of autoreclosing that occurred with the trip. If high-speed automatic reclosing is successful at one end of a line, but the line needs to be reclosed manually at the other end, choose manual reclosing. In this document, high-speed automatic reclosing refers to automatic reclosing after less than 2 seconds.
systemUnitKind	0..1	SystemUnitKind	(NC) The type of system unit of the component affected by the outage. A system unit is defined as: A group of components which are delimited by one or more circuit breakers. Note 1: the system unit concept has been defined to simplify the calculation of availability. While a system unit is always delimited by circuit breakers, an individual component may not

name	mult	type	description
			always be. A system unit may therefore contain more than one component. Note 2: the circuit breakers are not included in the system unit. Note 3: a tripped element is synonymous to a tripped system unit. Note 4: the type of a system unit is determined by its dominant component. The available system unit types are power transformer, overhead line, cable, reactor, busbar, series capacitor, shunt capacitor and SVC. Note 5: when a system unit is no longer transporting or supplying electrical energy, the system unit is affected by an outage. The system unit is unavailable after the outage has occurred.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 735 shows all association ends of ExtUnplannedOutage with other classes.

Table 735 – Association ends of ExtGridDisturbance::ExtUnplannedOutage with other classes

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.21.3.5 (NC) GridDisturbance

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

Automatic, unintended, or manual undeferrable switching of breakers as a result of faults in the power grid.

Table 736 shows all attributes of GridDisturbance.

Table 736 – Attributes of ExtGridDisturbance::GridDisturbance

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
identifier	0..1	NullCIM	inherited from: Identity

Table 737 shows all association ends of GridDisturbance with other classes.

Table 737 – Association ends of ExtGridDisturbance::GridDisturbance with other classes

mult from	name	mult to	type	description
0..1	Fault	0..*	Fault	(NC) Faults that are related to one grid disturbance.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.21.3.6 (NC) Interruption

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

Disappearance of the supply voltage at a delivery point.

Table 738 shows all attributes of Interruption.

Table 738 – Attributes of ExtGridDisturbance::Interruption

name	mult	type	description
duration	0..1	Duration	(NC) The duration of the interruption.
endDateTime	0..1	DateTime	(NC) The end date time of the interruption.
energyNotDelivered	0..1	RealEnergy	(NC) The estimated energy which would have been delivered through the delivery point if no interruption and no transmission restrictions had occurred.
energyNotSupplied	0..1	RealEnergy	(NC) The estimated energy which would have been supplied to end-users if no interruption and no transmission restrictions had occurred.
interruptedPower	0..1	ActivePower	(NC) The estimated power that was delivered through the delivery point when the interruption occurred.
startDateTime	0..1	DateTime	(NC) The date and time at which the interruption occurred.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 739 shows all association ends of Interruption with other classes.

6533 **Table 739 – Association ends of ExtGridDisturbance::Interruption with other classes**

mult from	name	mult to	type	description
0..*	InterruptedDeliveryEquipment	0..1	Equipment	(NC) The delivery point (equipment) that is affected by the interruption. It is an equipment, power transformer or busbar in the grid where electricity is exchanged.
0..*	Outage	0..1	Outage	(NC) One outage may have multiple interruptions.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6534

6535 **3.21.3.7 (NC) AutoReclosingKind enumeration**

6536 The type of autoreclosing that occurred with the trip.

6537 If high-speed automatic reclosing is successful at one end of a line, but the line needs to be reclosed manually at the other end, choose manual reclosing.

6539 In this document, high-speed automatic reclosing refers to automatic reclosing after less than 2 seconds.

6540 Table 740 shows all literals of AutoReclosingKind.

6542 **Table 740 – Literals of ExtGridDisturbance::AutoReclosingKind**

literal	value	description
automaticallyAfterLessThan2Seconds		If the automatic reclosing was successful in 2 seconds or less. Also known as "successful high-speed reclosing".
automaticallyAfter2SecondsOrMore		If the automatic reclosing was successful in 2 seconds or more. Also known as "successful high-speed reclosing".
manuallyAfterRestructuringOfOperations		If the reclosing was done manually after restructuring of operations.
manuallyAfterInspection		If the reclosing was done manually after inspection of the component.
manuallyWithoutEitherInspectionRepairOrRestructuringOfOperations		If the reclosing was done manually without any inspections, repairs or restructurings of operations.
unknown		If the type of auto-reclosing is unknown.
other		If the type of auto-reclosing is not unknown but does not fit the other categories, report it as other.
manuallyAfterRepair		If the reclosing was done manually after repair.

6543

6544 **3.21.3.8 (NC) FaultCategoryKind enumeration**

6545 Available kinds of fault categories.

6546 Table 741 shows all literals of FaultCategoryKind.

6547

Table 741 – Literals of ExtGridDisturbance::FaultCategoryKind

literal	value	description
technical		A fault due to a technical error.
operational		A fault due to a temporary human error. Note 1: incorrect operation is considered a fault in a component, or in other words, the incorrect operation is attributed to the unit which has been operated incorrectly.
system		A fault due to off-nominal parameters, exceeding of regulated norms and standards, or exceeding protection limits. Note 1: Typical examples of system fault causes are high/low frequency, power oscillations, overload, overvoltage, undervoltage or high harmonic content in voltage or current. Common causes for system faults are significant changes in load or generation and switching of lines or transformers with following change of load flow.

6548

3.21.3.9 (NC) FaultKind enumeration

6550 One fault can consist of several fault types. If a fault consists of several fault types, the most
6551 significant fault type is used.

6552 In case of developing faults, that is in faults changing from one type to another, the final type
6553 is given.

6554 Table 742 shows all literals of FaultKind.

6555

Table 742 – Literals of ExtGridDisturbance::FaultKind

literal	value	description
functional		The components main function failed to occur.
undesiredFunction		If the component's main function occurred correctly but had an undesired result, that is, the fault. Is only stated if the component is a circuit breaker, disconnector or control system.
other		For example, geomagnetic currents, SSR, capacitor bank imbalances, bad contact, overheating.
lineToGround		The fault connects the indicated phases to ground. The line to line fault impedance is not used and assumed infinite. The full ground impedance is connected between each phase specified in the fault and ground, but not between the phases.
lineToLine		The fault connects the specified phases together without a connection to ground. The ground impedance of this fault is ignored. The line to line impedance is connected between each of the phases specified in the fault. For example three times for a three phase fault, one time for a two phase fault. A single phase fault should not be specified.
lineToLineToGround		The fault connects the indicated phases to ground and to each other. The line to line impedance is connected between each of the phases specified in the fault in a full mesh. For example three times for a three phase fault, one time for a two phase fault. A single phase fault should not be specified. The full ground

literal	value	description
		impedance is connected between each phase specified in the fault and ground.
lineOpen		The fault is when the conductor path is broken between two terminals. Additional coexisting faults may be required if the broken conductor also causes connections to grounds or other lines or phases.

6556

6557 **3.21.3.10 (NC) SystemUnitKind enumeration**

6558 A system unit is defined as:

6559 A group of components which are delimited by one or more circuit breakers.

6560 Note 1: the system unit concept has been defined to simplify the calculation of availability. While
6561 a system unit is always delimited by circuit breakers, an individual component may not always
6562 be. A system unit may therefore contain more than one component.

6563 Note 2: the circuit breakers are not included in the system unit.

6564 Note 3: a tripped element is synonymous to a tripped system unit.

6565 Note 4: the type of a system unit is determined by its dominant component. The available system
6566 unit types are power transformer, overhead line, cable, reactor, busbar, series capacitor, shunt
6567 capacitor and SVC.6568 Note 5: when a system unit is no longer transporting or supplying electrical energy, the system
6569 unit is affected by an outage. The system unit is unavailable after the outage has occurred.

6570 Table 743 shows all literals of SystemUnitKind.

6571

Table 743 – Literals of ExtGridDisturbance::SystemUnitKind

literal	value	description
cable		If the main function of the system unit is cable.
overheadLine		If the main function of the system unit is overhead line.
powerTransformer		If the main function of the system unit is power transformer.
reactor		If the main function of the system unit is reactor.
busbar		If the main function of the system unit is busbar.
seriesCapacitor		If the main function of the system unit is series capacitor.
shuntCapacitor		If the main function of the system unit is shunt capacitor.
svc		If the main function of the system unit is static var compensator (SVC).
other		If it is of other kind.
facts		If the main function of the system unit is FACTS.
dcConverter		If the main function of the system unit is DCCConverter.
dcCable		If the main function of the system unit is DCCable.

6572

6573 **3.21.3.11 (NC) TripKind enumeration**6574 Whether the type of the trip due to the outage was automatic, automatic with successful
6575 automatic reclosing or manual.6576 In case of a fault in the reclosing automatics resulting in lack of reclosing, automatic should be
6577 chosen as an alternative.

6578 Table 744 shows all literals of TripKind.

6579

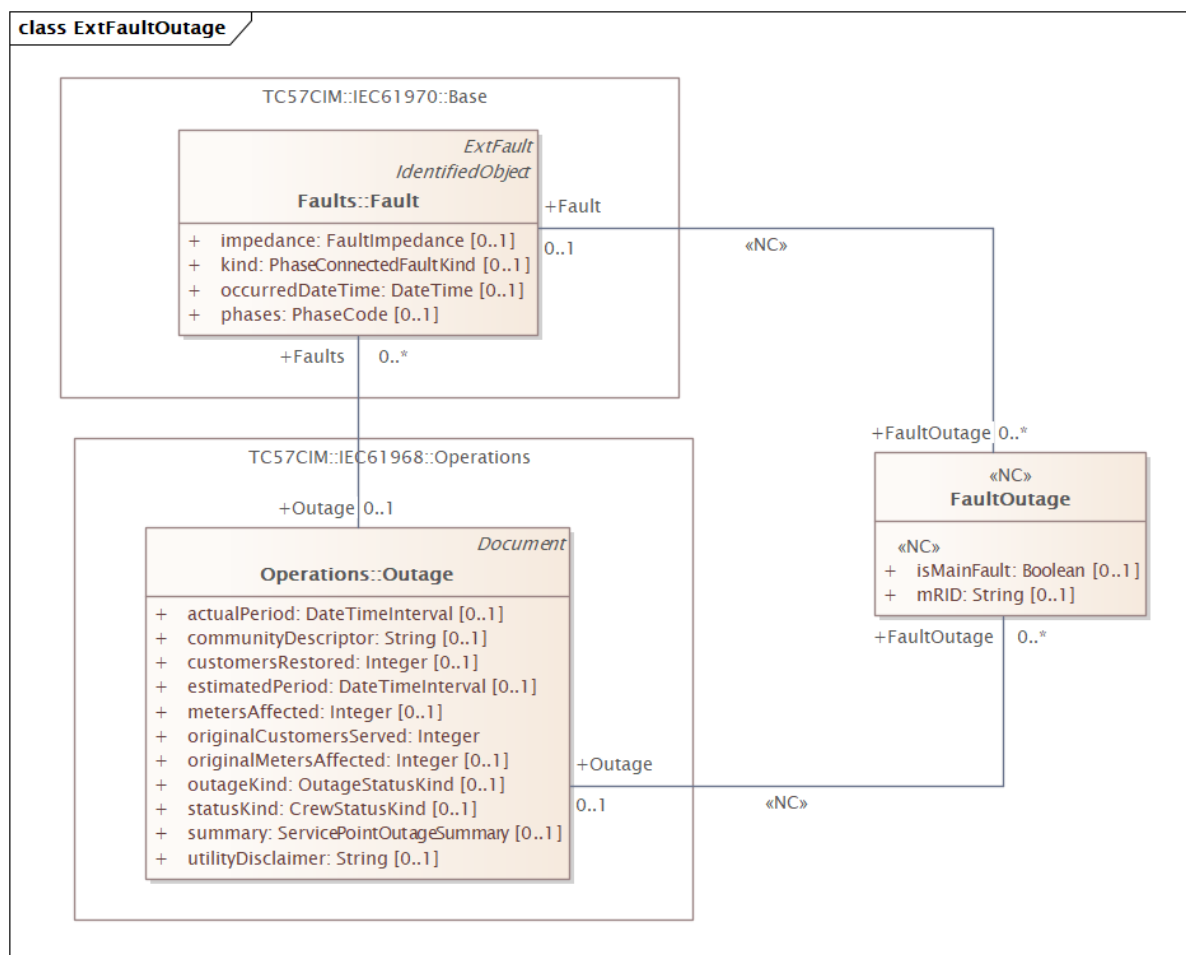
Table 744 – Literals of ExtGridDisturbance::TripKind

literal	value	description
automatic		The trip that resulted in the outage was automatic. In case of a fault in the reclosing automatics resulting in lack of reclosing, automatic should be chosen as an alternative.
automaticWithUnsuccessfulAutomaticReclosing		The trip that resulted in an outage was correctly initiated but the automatic reclosing was unsuccessful. In case of a fault in the reclosing automatics resulting in lack of reclosing, automatic should be chosen as an alternative.
manual		The trip that resulted in the outage was manually cleared.

6580

6581 **3.21.4 Package ExtFaultOutage**6582 **3.21.4.1 General**

6583 Extensions related to fault outage.



6584

Figure 58 – Class diagram ExtFaultOutage::ExtFaultOutage

6586 Figure 58: The diagram contains classes and attributes related to the extensions.

6587 **3.21.4.2 (NC) FaultOutage root class**

6588 Association class for relating one fault and one outage.

6589 Table 745 shows all attributes of FaultOutage.

6590 **Table 745 – Attributes of ExtFaultOutage::FaultOutage**

name	mult	type	description
isMainFault	0..1	Boolean	(NC) If true the fault outage is the main fault.
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

6591

6592 Table 746 shows all association ends of FaultOutage with other classes.

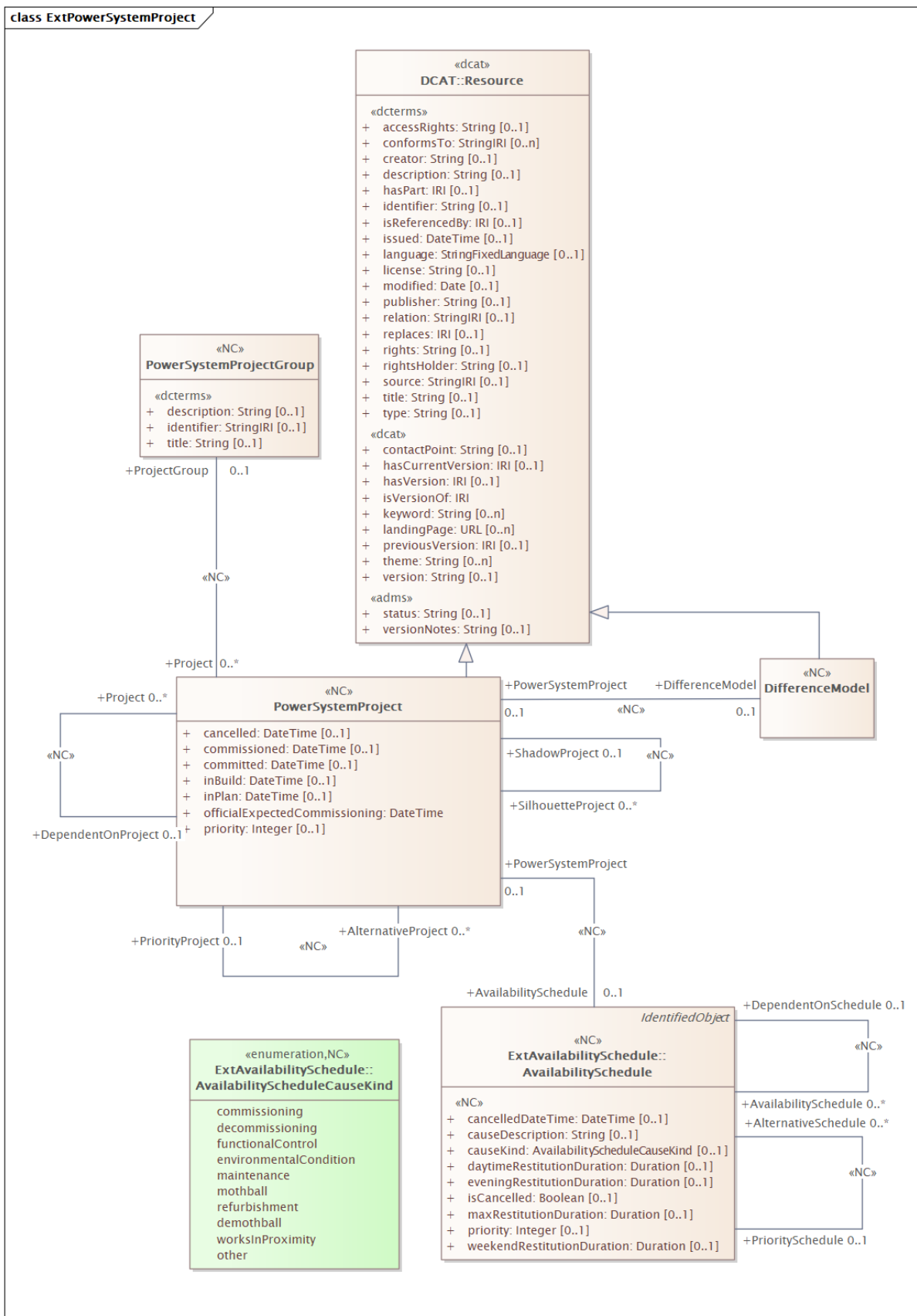
6593 **Table 746 – Association ends of ExtFaultOutage::FaultOutage with other classes**

mult from	name	mult to	type	description
0..*	Fault	0..1	Fault	(NC) The fault defined for this combination of a fault and an outage.
0..*	Outage	0..1	Outage	(NC) The outage defined for this combination of a fault and an outage.

6594

6595 **3.22 Package ExtPowerSystemProject**6596 **3.22.1 General**

6597 The package includes extensions related to power system project.



6598

6599 **Figure 59 – Class diagram ExtPowerSystemProject::ExtPowerSystemProject**

6600 Figure 59: The diagram shows the extensions related to power system project.

6601 **3.22.2 (NC) DifferenceModel**

6602 Inheritance path = Resource

6603 A set of statements describing the changes in the network model. The statement is defined in
6604 the difference model.

6605 Table 747 shows all attributes of DifferenceModel.

6606 **Table 747 – Attributes of ExtPowerSystemProject::DifferenceModel**

name	mult	type	description
accessRights	0..1	String	(dcterms) inherited from: Resource
conformsTo	0..n	StringIRI	(dcterms) inherited from: Resource
contactPoint	0..1	String	(dcat) inherited from: Resource
creator	0..1	String	(dcterms) inherited from: Resource
description	0..1	String	(dcterms) inherited from: Resource
hasCurrentVersion	0..1	IRI	(dcat) inherited from: Resource
hasPart	0..1	IRI	(dcterms) inherited from: Resource
hasVersion	0..1	IRI	(dcat) inherited from: Resource
identifier	0..1	String	(dcterms) inherited from: Resource
isReferencedBy	0..1	IRI	(dcterms) inherited from: Resource
issued	0..1	DateTime	(dcterms) inherited from: Resource
isVersionOf	1..1	IRI	(dcat) inherited from: Resource
keyword	0..n	String	(dcat) inherited from: Resource
landingPage	0..n	URL	(dcat) inherited from: Resource
language	0..1	StringFixedLanguage	(dcterms) inherited from: Resource
license	0..1	String	(dcterms) inherited from: Resource
modified	0..1	Date	(dcterms) inherited from: Resource
previousVersion	0..1	IRI	(dcat) inherited from: Resource
publisher	0..1	String	(dcterms) inherited from: Resource
relation	0..1	StringIRI	(dcterms) inherited from: Resource
replaces	0..1	IRI	(dcterms) inherited from: Resource
rights	0..1	String	(dcterms) inherited from: Resource
rightsHolder	0..1	String	(dcterms) inherited from: Resource
status	0..1	String	(adms) inherited from: Resource
theme	0..n	String	(dcat) inherited from: Resource
title	0..1	String	(dcterms) inherited from: Resource
type	0..1	String	(dcterms) inherited from: Resource
version	0..1	String	(dcat) inherited from: Resource
versionNotes	0..1	String	(adms) inherited from: Resource
source	0..1	StringIRI	(dcterms) inherited from: Resource

6607

6608 Table 748 shows all association ends of DifferenceModel with other classes.

6609 **Table 748 – Association ends of ExtPowerSystemProject::DifferenceModel with other**
6610 **classes**

mult from	name	mult to	type	description
0..1	PowerSystemProject	0..1	PowerSystemProject	(NC) The power system project that is described by this difference model.
0..*	QualifiedRelation	0..1	Relationship	(dcat) inherited from: Resource
0..1	isForwardDifferenceSet Of	0..1	DifferenceSet	inherited from: Resource
0..1	isReverseDifferenceOf	0..1	DifferenceSet	inherited from: Resource
0..1	Relationship	0..*	Relationship	(dct) inherited from: Resource

6611
6612 **3.22.3 (NC) PowerSystemProject**
6613 Inheritance path = Resource
6614 Knowledge data for the power system project that describe the status and the planned
6615 implementation of the changes into the as-built model.
6616 Table 749 shows all attributes of PowerSystemProject.

6617 **Table 749 – Attributes of ExtPowerSystemProject::PowerSystemProject**

name	mult	type	description
cancelled	0..1	DateTime	From this date the project is in cancelled state. No further development will be done to the project or associated change set in this state.
commissioned	0..1	DateTime	From this date the project is in commissioned state. Any conducting equipment in the change set can be energized from this day. No further changes will be done to the change set.
committed	0..1	DateTime	From this date the project is in committed state. The change set will from this day be part of the as-build model.
inBuild	0..1	DateTime	From this day the project is in build state. Alternative project have been evaluated. Any procurement has started and the change set is being updated to an as-build model.
inPlan	0..1	DateTime	From this date the project is in planning state. Study or procurement strategy has triggered the start of a project involving changes to one or more models. Alternative projects and change sets are evaluated.
priority	0..1	Integer	Priority between competing project. Use 0 for do not care. Use 1 for highest priority. Use 2 as priority is less than 1 and so on.
officialExpectedCommissioning	1..1	DateTime	Published official commissioning date.
accessRights	0..1	String	(dcterms) inherited from: Resource
conformsTo	0..n	StringIRI	(dcterms) inherited from: Resource
contactPoint	0..1	String	(dcat) inherited from: Resource
creator	0..1	String	(dcterms) inherited from: Resource
description	0..1	String	(dcterms) inherited from: Resource
hasCurrentVersion	0..1	IRI	(dcat) inherited from: Resource
hasPart	0..1	IRI	(dcterms) inherited from: Resource

name	mult	type	description
hasVersion	0..1	IRI	(dcat) inherited from: Resource
identifier	0..1	String	(dcterms) inherited from: Resource
isReferencedBy	0..1	IRI	(dcterms) inherited from: Resource
issued	0..1	DateTime	(dcterms) inherited from: Resource
isVersionOf	1..1	IRI	(dcat) inherited from: Resource
keyword	0..n	String	(dcat) inherited from: Resource
landingPage	0..n	URL	(dcat) inherited from: Resource
language	0..1	StringFixedLanguage	(dcterms) inherited from: Resource
license	0..1	String	(dcterms) inherited from: Resource
modified	0..1	Date	(dcterms) inherited from: Resource
previousVersion	0..1	IRI	(dcat) inherited from: Resource
publisher	0..1	String	(dcterms) inherited from: Resource
relation	0..1	StringIRI	(dcterms) inherited from: Resource
replaces	0..1	IRI	(dcterms) inherited from: Resource
rights	0..1	String	(dcterms) inherited from: Resource
rightsHolder	0..1	String	(dcterms) inherited from: Resource
status	0..1	String	(adms) inherited from: Resource
theme	0..n	String	(dcat) inherited from: Resource
title	0..1	String	(dcterms) inherited from: Resource
type	0..1	String	(dcterms) inherited from: Resource
version	0..1	String	(dcat) inherited from: Resource
versionNotes	0..1	String	(adms) inherited from: Resource
source	0..1	StringIRI	(dcterms) inherited from: Resource

Table 750 shows all association ends of PowerSystemProject with other classes.

Table 750 – Association ends of ExtPowerSystemProject::PowerSystemProject with other classes

mult from	name	mult to	type	description
0..1	AvailabilitySchedule	0..1	AvailabilitySchedule	(NC) The availability schedule associated with this power system project.
0..1	DifferenceModel	0..1	DifferenceModel	(NC) The difference model describing this power system project.
0..*	ProjectGroup	0..1	PowerSystemProjectGroup	(NC) Power system project group to which this project belongs.
0..*	DependentOnProject	0..1	PowerSystemProject	(NC) Grouping of projects that are depending on each other. A project can only be linked to one dependent project.
0..*	ShadowProject	0..1	PowerSystemProject	(NC) A shadowing project that includes the same change set, but different timeline.
0..1	AlternativeProject	0..*	PowerSystemProject	(NC) Alternative project. Only one of the projects will be commissioned.

mult from	name	mult to	type	description
0..1	Project	0..*	PowerSystemProject	(NC) The project that has a dependent on project.
0..1	SilhouetteProject	0..*	PowerSystemProject	(NC) The project that has a shadow project.
0..*	PriorityProject	0..1	PowerSystemProject	(NC) The project that has an alternative project.
0..*	QualifiedRelation	0..1	Relationship	(dcat) inherited from: Resource
0..1	isForwardDifferenceSet Of	0..1	DifferenceSet	inherited from: Resource
0..1	isReverseDifferenceOf	0..1	DifferenceSet	inherited from: Resource
0..1	Relationship	0..*	Relationship	(dct) inherited from: Resource

3.22.4 (NC) PowerSystemProjectGroup root class

A container with project that are grouped together. Primarily used for navigation and to highlight the phases that an overall project can go through.

Table 751 shows all attributes of PowerSystemProjectGroup.

Table 751 – Attributes of ExtPowerSystemProject::PowerSystemProjectGroup

name	mult	type	description
description	0..1	String	(dcterms) A free-text account of the resource. Description may include but is not limited to: an abstract, a table of contents, a graphical representation, or a free-text account of the resource.
identifier	0..1	StringIRI	(dcterms) A unique identifier of the resource being described or cataloged. The identifier might be used as part of the IRI of the resource, but still having it represented explicitly is useful. The identifier is a text string which is assigned to the resource to provide an unambiguous reference within a particular context.
title	0..1	String	(dcterms) A name given to the resource.

Table 752 shows all association ends of PowerSystemProjectGroup with other classes.

Table 752 – Association ends of ExtPowerSystemProject::PowerSystemProjectGroup with other classes

mult from	name	mult to	type	description
0..1	Project	0..*	PowerSystemProject	(NC) The project included in the power system project group.

3.23 (CIM18) Package ExtReactiveCapabilityCurve

3.23.1 General

This package contains the extensions related to reactive capability curve.

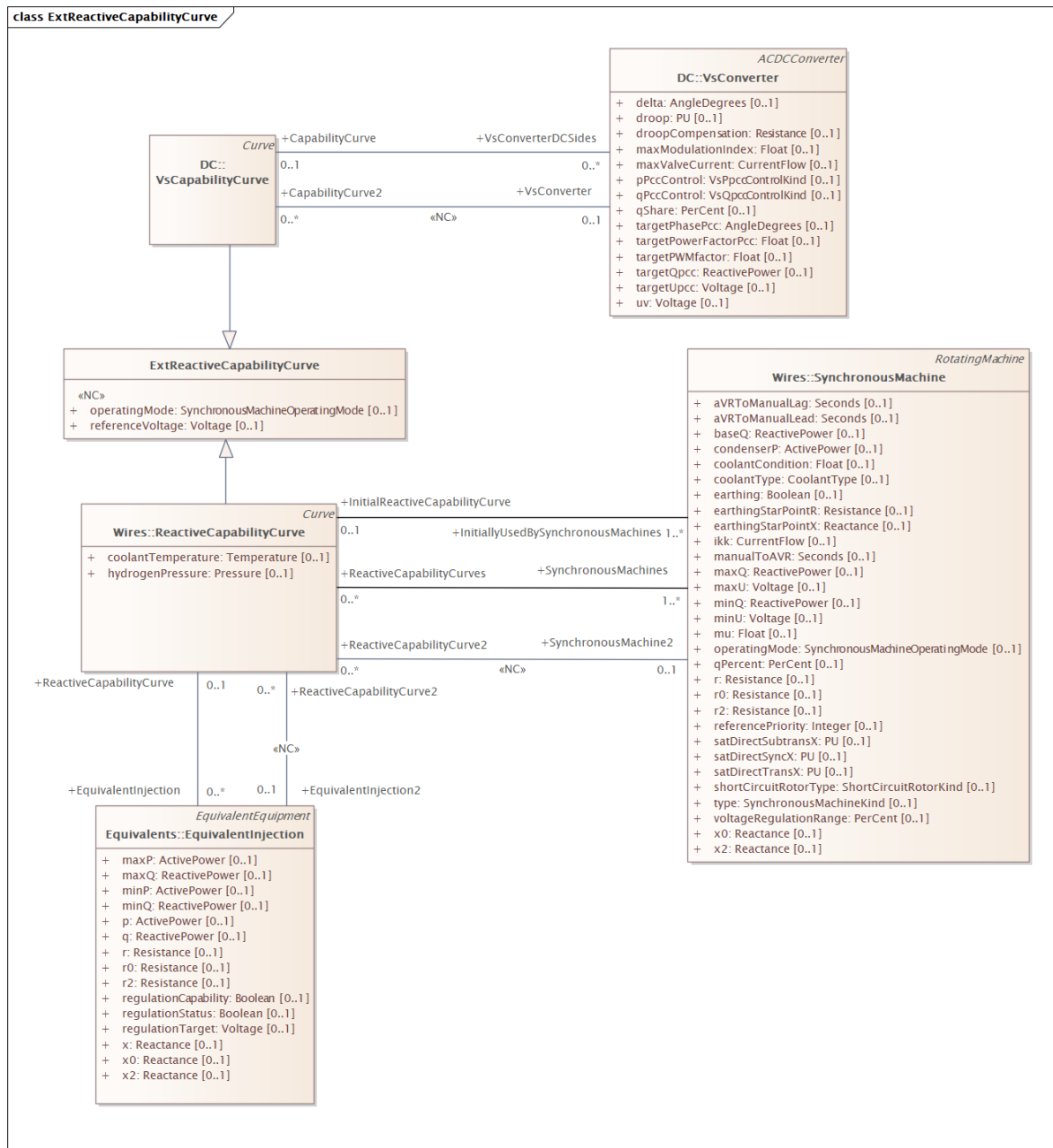


Figure 60 – Class diagram ExtReactiveCapabilityCurve::ExtReactiveCapabilityCurve

Figure 60: The diagram contains classes related to reactive capability curve.

3.23.2 ExtReactiveCapabilityCurve root class

European network codes extension to base CIM counterpart.

Table 753 shows all attributes of ExtReactiveCapabilityCurve.

Table 753 – Attributes of ExtReactiveCapabilityCurve::ExtReactiveCapabilityCurve

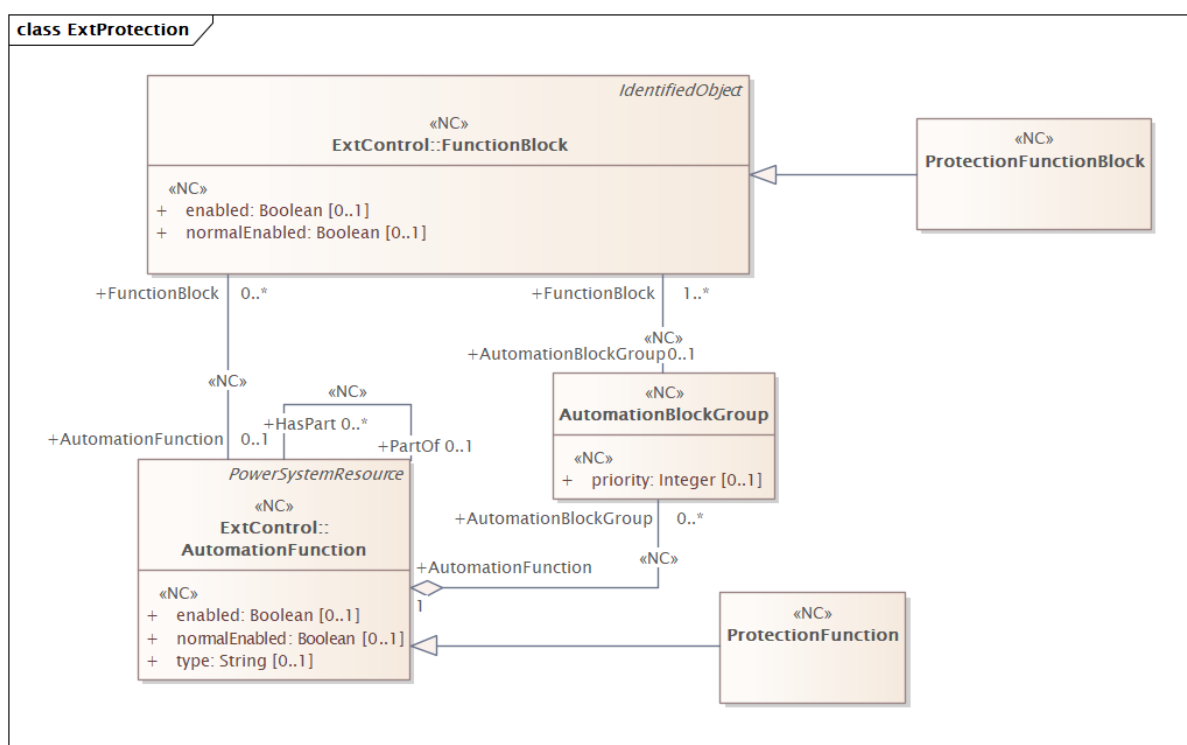
name	mult	type	description
referenceVoltage	0..1	Voltage	(NC) The reference voltage for which the capability curve is valid.

name	mult	type	description
operatingMode	0..1	SynchronousMachineOperatingMode	(NC) The operating mode of synchronous machine for which the reactive capability curve is valid for. In case the attribute is not provided it is assumed that the reactive capability curve covers all possible operating modes of the synchronous machine.

6643

6644 **3.24 (CIM18) Package ExtProtection**6645 **3.24.1 General**

6646 This package contains the extensions related to the protections.



6647

6648 **Figure 61 – Class diagram ExtProtection::ExtProtection**

6649 Figure 61: The diagram includes classes relevant to modelling of protection.

6650 **3.24.2 (NC) AutomationBlockGroup root class**

6651 Grouping of function block that are operated with the same priority as settings.

6652 Table 754 shows all attributes of AutomationBlockGroup.

6653 **Table 754 – Attributes of ExtProtection::AutomationBlockGroup**

name	mult	type	description
priority	0..1	Integer	(NC) Value 0 means ignore priority. 1 means the highest priority, 2 is the second highest priority.

6654

6655 Table 755 shows all association ends of AutomationBlockGroup with other classes.

Table 755 – Association ends of ExtProtection::AutomationBlockGroup with other classes

mult from	name	mult to	type	description
0..1	FunctionBlock	1..*	FunctionBlock	(NC) Function block which belongs to an automation block group.
0..*	AutomationFunction	1..1	AutomationFunction	(NC) Automation function which has automation block group.

3.24.3 (NC) ProtectionFunction

Inheritance path = [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

Protection function is an automation function that can protect one or multiple equipment.

Table 756 shows all attributes of ProtectionFunction.

Table 756 – Attributes of ExtProtection::ProtectionFunction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 757 shows all association ends of ProtectionFunction with other classes.

Table 757 – Association ends of ExtProtection::ProtectionFunction with other classes

mult from	name	mult to	type	description
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6668

6669 **3.24.4 (NC) ProtectionFunctionBlock**6670 Inheritance path = [FunctionBlock](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

6671 Protection function block is a function block that contains an algorithm for protecting the equipment.

6673 Table 758 shows all attributes of ProtectionFunctionBlock.

6674 **Table 758 – Attributes of ExtProtection::ProtectionFunctionBlock**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6675

6676 Table 759 shows all association ends of ProtectionFunctionBlock with other classes.

6677 **Table 759 – Association ends of ExtProtection::ProtectionFunctionBlock with other classes**

mult from	name	mult to	type	description
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6679

6680 **3.25 (CIM18) Package ExtControl**6681 **3.25.1 General**

6682 The package contains extensions related to control.

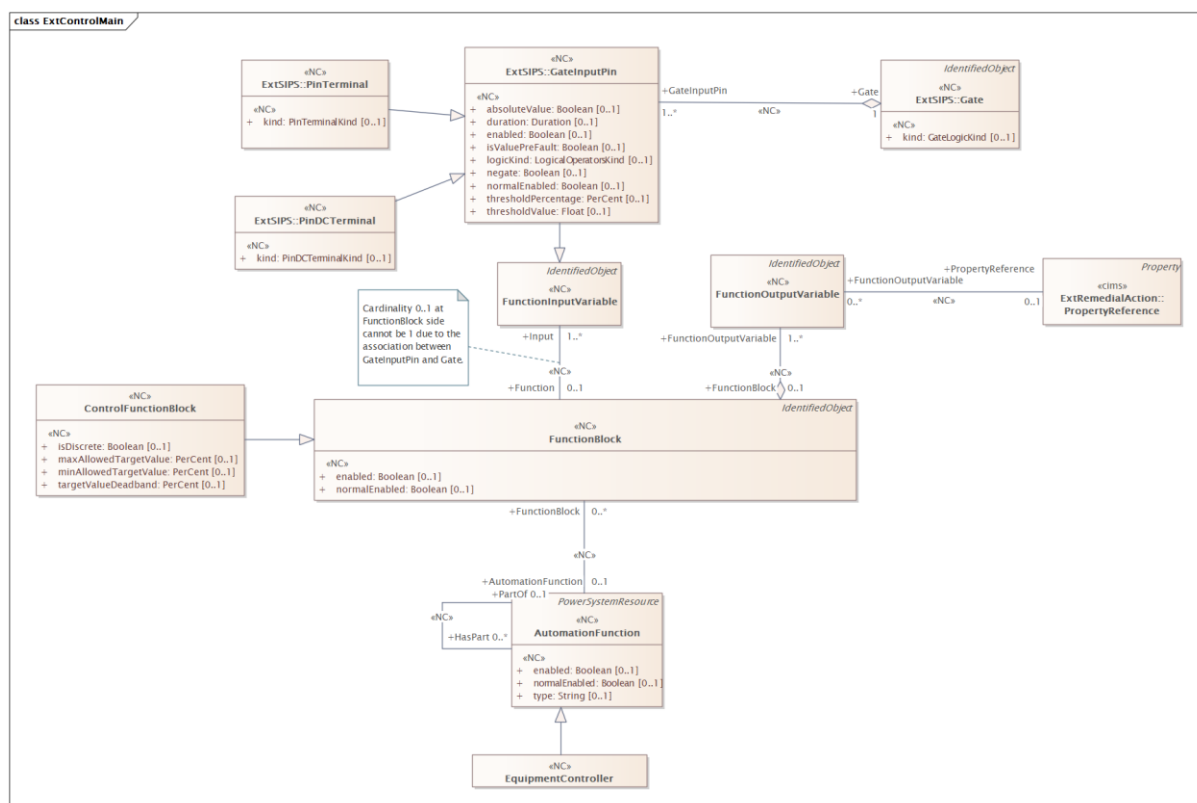


Figure 62 – Class diagram ExtControl::ExtControlMain

Figure 62: The diagram contains main classes and associations related to control.

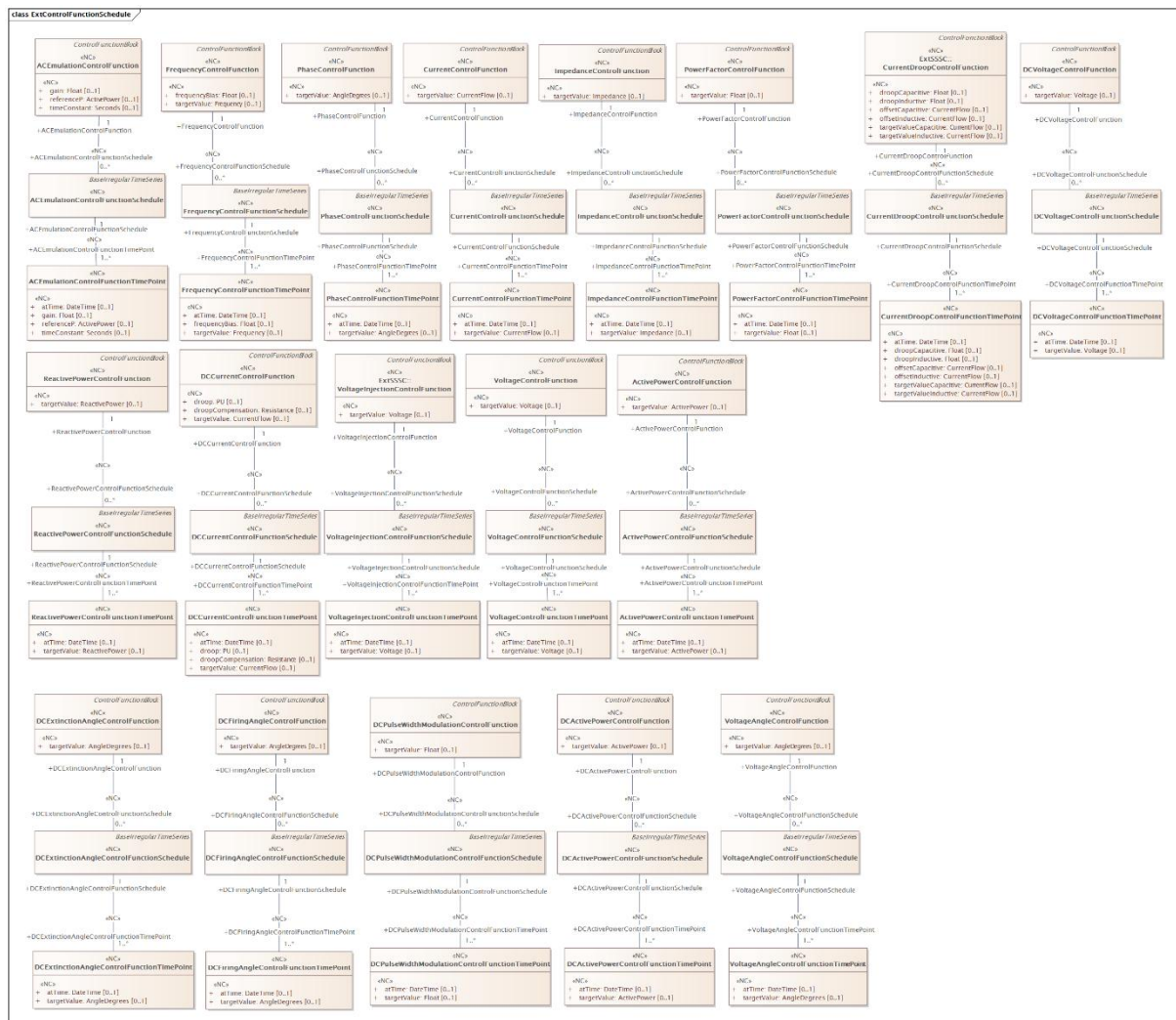


Figure 63 – Class diagram ExtControl::ExtControlFunctionSchedule

Figure 63: The diagram contains main classes and associations related to control function schedules.

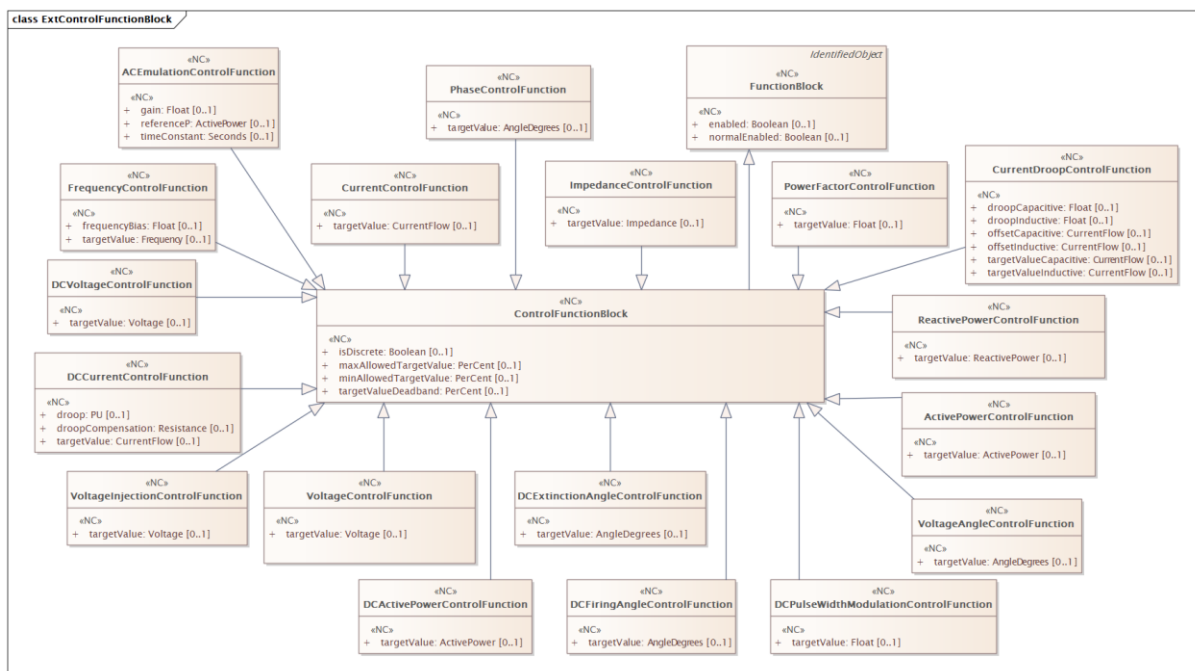


Figure 64 – Class diagram ExtControl::ExtControlFunctionBlock

Figure 64: The diagram contains classes and association related to control function block.

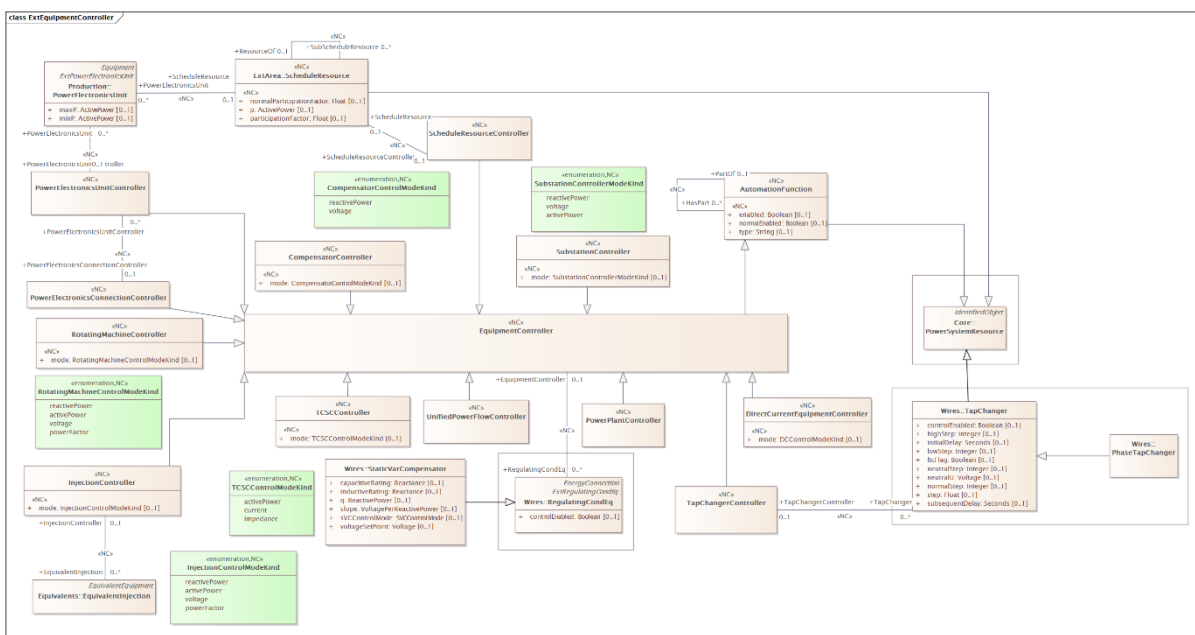


Figure 65 – Class diagram ExtControl::ExtEquipmentController

Figure 65: The diagram includes classes relevant to modelling of equipment controller.

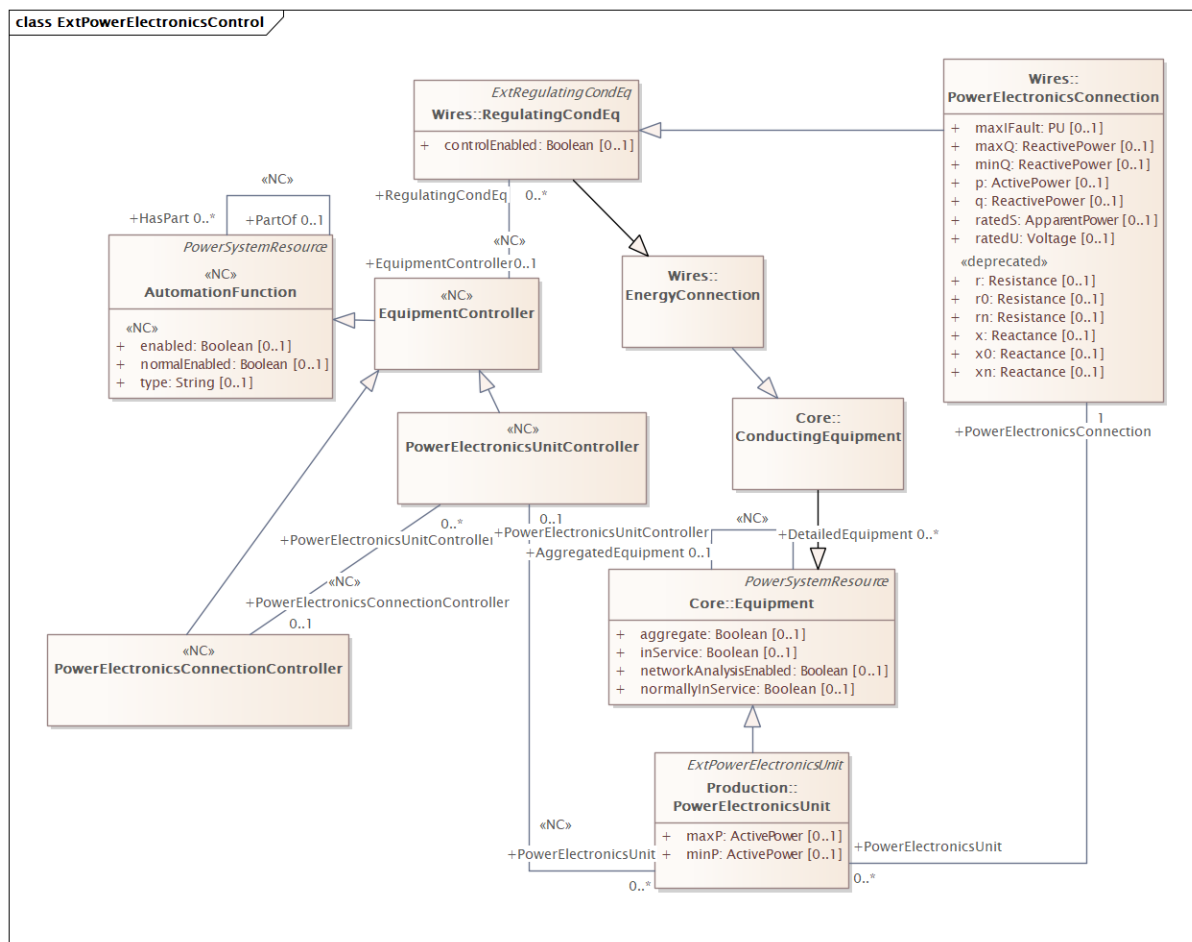


Figure 66 – Class diagram ExtControl::ExtPowerElectronicsControl

Figure 66:

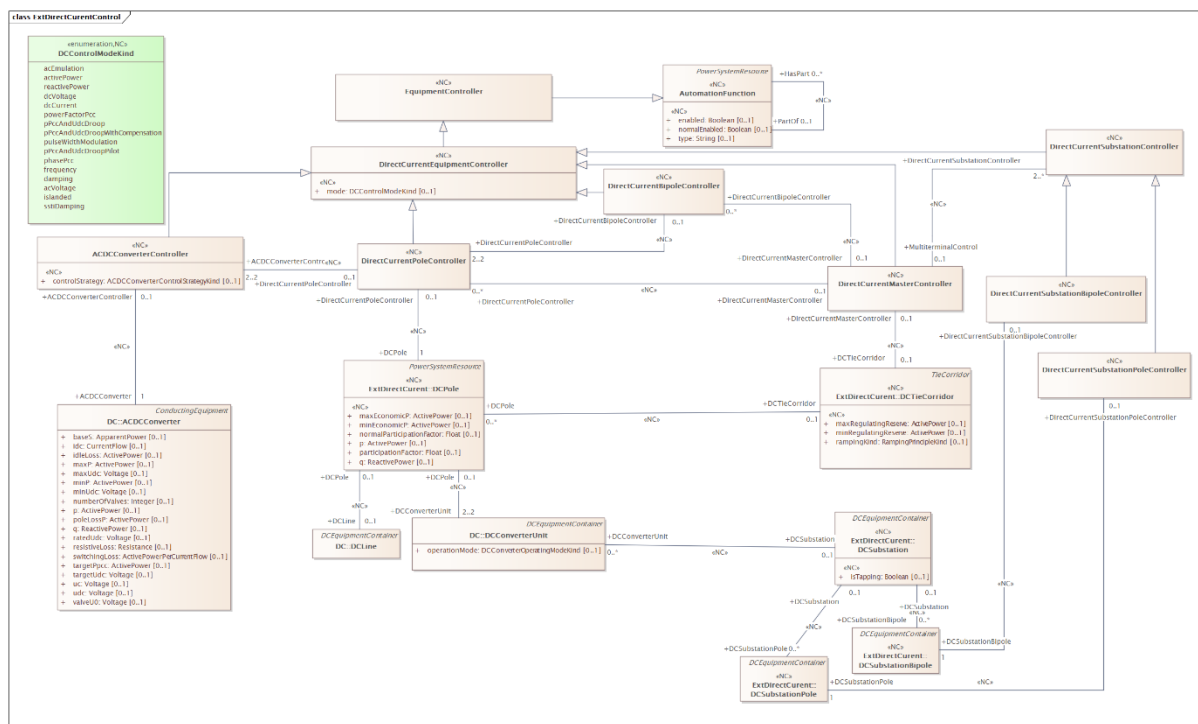


Figure 67 – Class diagram ExtControl::ExtDirectCurentControl

Figure 67: The diagram contains classes related to direct current control.

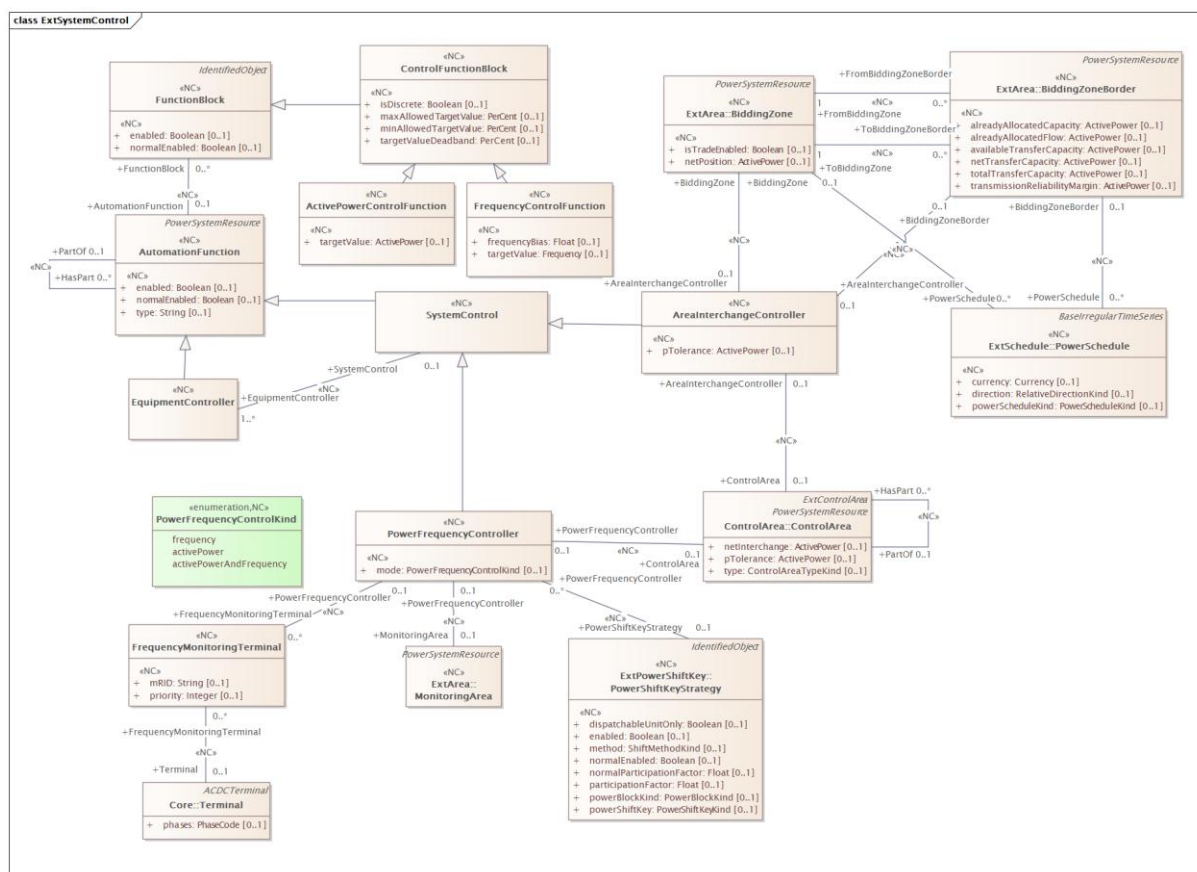


Figure 68 – Class diagram ExtControl::ExtSystemControl

Figure 68: The diagram contains classes related to integrated AC and DC system control.

3.25.2 (NC) CompensatorControlModeKind enumeration

Kind of compensator controller mode.

Table 760 shows all literals of `CompensatorControlModeKind`.

Table 760 – Literals of ExtControl::CompensatorControlModeKind

literal	value	description
reactivePower		Reactive power control.
voltage		Voltage control.

3.25.3 (NC) DCControlModeKind enumeration

Kind of DC control mode.

Table 761 shows all literals of `DCControlModeKind`.

Table 761 – Literals of ExtControl::DCControlModeKind

literal	value	description
reactivePower		Control is reactive power control at AC side, at point of common coupling. According to IEC 60633 reactive power control mode is a control of the reactive power exchanged between a converter unit, or DC substation and the connected AC network.

literal	value	description
powerFactorPcc		Control is power factor at point of common coupling.
pulseWidthModulation		No explicit control. Pulse-modulation factor is directly set in magnitude and phase.
pPccAndUdcDroop		Control is active power at point of common coupling and local DC voltage, with the droop.
pPccAndUdcDroopWithCompensation		Control is active power at point of common coupling and compensated DC voltage, with the droop. Compensation factor is the resistance, as an approximation of the DC voltage of a common (real or virtual) node in the DC network.
pPccAndUdcDroopPilot		Control is active power at point of common coupling and the pilot DC voltage, with the droop. The mode is used for Multi Terminal High Voltage DC (MTDC) systems where multiple DC Substations are connected to the DC transmission lines. The pilot voltage is then used to coordinate the control the DC voltage across the DC substations.
phasePcc		Control is phase at point of common coupling.
acEmulation		An AC emulation control aims to reproduce the behaviour of an AC line by means of a function of the difference between angles in both converter stations in DC links embedded within a single synchronous AC grid. For changes in the phase angle on either station, the response of this control is to 'emulate the behaviour of an AC line' in both steady and transient states. The AC emulation control needs measurement signals for the angles at both ends of the DC system (at the AC points of common coupling of the DC system). In practice, the angle difference is measured by built-in devices in the converters and the synchronization of angle measurements on both stations is done by means of GPS. ACEmulationControlFunction is used by this control. The control can only be applied by a controller that have access to the two AC points of common coupling of the DC system. Therefore it cannot be applied for a ACDCCConverterController.
activePower		Control is active power control at AC side, at point of common coupling. According to IEC 60633 the active power control mode is control of the active power flow exchanged between a DC substation and the connected AC network.
dcVoltage		Control is DC voltage in a DC substation (IEC 60633).
dcCurrent		Control is DC current in a DC system (IEC 60633).
frequency		Frequency control mode (IEC 60633) is a control of the frequency of the connected AC network by varying the active power exchanged between a DC substation and the connected AC network.
damping		Damping control mode (IEC 60633) is supplementary control mode providing the damping of power oscillations in one or more connected AC networks.

literal	value	description
acVoltage		AC voltage control mode (IEC 60633) is a control of the AC voltage of the AC network connected to a DC substation.
islanded		Islanded network operation mode (IEC 60633) is a control mode in which the DC substation is connected to an islanded AC network.
sstiDamping		Sub-synchronous torsional interaction (SSTI) damping control mode (IEC 60633) is a supplementary control mode providing the damping of critical frequencies of an (electrical) nearby generator.

6714

6715 **3.25.4 (NC) InjectionControlModeKind enumeration**

6716 Kind of injection controller mode.

6717 Table 762 shows all literals of InjectionControlModeKind.

6718 **Table 762 – Literals of ExtControl::InjectionControlModeKind**

literal	value	description
reactivePower		Reactive power control.
activePower		Active power is specified.
voltage		Voltage control.
powerFactor		Power factor is specified.

6719

6720 **3.25.5 (NC) PowerFrequencyControlKind enumeration**

6721 Kinds of power frequency control modes.

6722 Table 763 shows all literals of PowerFrequencyControlKind.

6723 **Table 763 – Literals of ExtControl::PowerFrequencyControlKind**

literal	value	description
frequency		Frequency control mode.
activePower		Active power control mode.
activePowerAndFrequency		Active power and frequency control mode.

6724

6725 **3.25.6 (NC) RotatingMachineControlModeKind enumeration**

6726 Kind of rotating machine controller mode.

6727 Table 764 shows all literals of RotatingMachineControlModeKind.

6728 **Table 764 – Literals of ExtControl::RotatingMachineControlModeKind**

literal	value	description
reactivePower		Reactive power control.
voltage		Voltage control.
powerFactor		Power factor is specified.
activePower		Active power is specified.

6729

6730 **3.25.7 (NC) SubstationControllerModeKind enumeration**

6731 Kind of substation controller mode.

6732 Table 765 shows all literals of SubstationControllerModeKind.

6733 **Table 765 – Literals of ExtControl::SubstationControllerModeKind**

literal	value	description
reactivePower		Reactive power control is the primary control of the substation.
voltage		Voltage control is the primary control of the substation.
activePower		Active power control is the primary control of the substation..

6734

6735 **3.25.8 (NC) TCSCControlModeKind enumeration**

6736 Kind of TCSC control mode.

6737 Table 766 shows all literals of TCSCControlModeKind.

6738 **Table 766 – Literals of ExtControl::TCSCControlModeKind**

literal	value	description
activePower		Control is active power.
current		Control is current.
impedance		Control is impedance.

6739

6740 **3.25.9 (NC) ACDCCConverterController**

6741 Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) :
 6742 [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject :
 6743 Identity

6744 ACDCC converter unit control. According to IEC 60633, it is the control system used for the
 6745 controlling, monitoring and protection of a single converter unit.

6746 Table 767 shows all attributes of ACDCCConverterController.

6747 **Table 767 – Attributes of ExtControl::ACDCCConverterController**

name	mult	type	description
controlStrategy	0..1	ACDCCConverterControlsStrategyKind	(NC) High-level control strategy defining how the converter interacts with and regulates the connected AC system.
mode	0..1	DCCControlModeKind	(NC) inherited from: DirectCurrentEquipmentController
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6748

6749 Table 768 shows all association ends of ACDCCConverterController with other classes.

6750 **Table 768 – Association ends of ExtControl::ACDCConverterController with other**
6751 **classes**

mult from	name	mult to	type	description
0..1	ACDCConverter	1..1	ACDCConverter	(NC) ACDC converter controlled by the direct current controller.
2..2	DirectCurrentPoleController	0..1	DirectCurrentPoleController	(NC) DC pole controller that controls this ACDC controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6752

6753 3.25.10 (NC) ACEmulationControlFunction

6754 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :
6755 ExtEulIdentifiedObject : Identity

6756 The AC emulation control function is used when AC emulation model is activated for a DC
6757 system. It consists in computing the active power set point of the DC system as a function of
6758 the voltage angle difference between both points of common coupling with the AC network in
6759 order to mimic the behavior of an AC transmission line. This control mode enables the automatic
6760 adjustment of the active power reference following variations of the AC system operational
6761 point.

6762 The setpoint of the DC system is calculated by $P_{setpoint} = P_{ref} + K_{dc} * (angle1 - angle2)$, where

6763 - P_{ref} is the existing active power setpoint;

6764 - K_{dc} is the control system gain and

6765 - $angle1$ and $angle2$ are the phase angle measurement (measured at points of common coupling
6766 with the AC network) respectively at the side 1 and 2 of the DC system.

6767 Table 769 shows all attributes of ACEmulationControlFunction.

6768

Table 769 – Attributes of ExtControl::ACEmulationControlFunction

name	mult	type	description
referenceP	0..1	ActivePower	(NC) Existing active power setpoint used to calculate the active power setpoint of the AC emulation control.
gain	0..1	Float	(NC) Control system gain in AC transmission emulation control measured in MW/deg. It plays the role of an admittance of the equivalent AC transmission line that the control is emulating the higher is the gain the higher is the active power transfer at steady state.
timeConstant	0..1	Seconds	(NC) Control system time constant in AC transmission emulation control. It affects the time needed to reach a new steady state equilibrium point after a network perturbation extremely important to guarantee N-1 relief related to an interconnection. The higher is time constant the slower is the DC system dynamic.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetValueDeadband	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6769

6770

Table 770 shows all association ends of ACEmulationControlFunction with other classes.

6771

6772

Table 770 – Association ends of ExtControl::ACEmulationControlFunction with other classes

mult from	name	mult to	type	description
1..1	ACEmulationControlFunctionSchedule	0..*	ACEmulationControlFunctionSchedule	(NC) The schedule of the control function.
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject

mult from	name	mult to	type	description
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6773

6774 **3.25.11 (NC) ACEmulationControlFunctionSchedule**

6775 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
 6776 ExtEulIdentifiedObject : Identity

6777 The schedule for ACEmulationControlFunction.

6778 Table 771 shows all attributes of ACEmulationControlFunctionSchedule.

6779 **Table 771 – Attributes of ExtControl::ACEmulationControlFunctionSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6780

6781 Table 772 shows all association ends of ACEmulationControlFunctionSchedule with other
 6782 classes.

6783 **Table 772 – Association ends of ExtControl::ACEmulationControlFunctionSchedule with**
 6784 **other classes**

mult from	name	mult to	type	description
0..*	ACEmulationControlFunction	1..1	ACEmulationControlFunction	(NC) The control function that has this schedule.
1..1	ACEmulationControlFunctionTimePoint	1..*	ACEmulationControlFunctionTimePoint	(NC) The time point of the schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6785

6786 **3.25.12 (NC) ACEmulationControlFunctionTimePoint root class**

6787 AC emulation control function value for a given point in time.

6788 Table 773 shows all attributes of ACEmulationControlFunctionTimePoint.

6789 **Table 773 – Attributes of ExtControl::ACEmulationControlFunctionTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
gain	0..1	Float	(NC) Control system gain in AC transmission emulation control measured in MW/deg. It plays the role of an admittance of the equivalent AC transmission line that the control is emulating the higher is the gain the higher is the active power transfer at steady state.
referenceP	0..1	ActivePower	(NC) Existing active power setpoint used to calculate the active power setpoint of the AC emulation control.
timeConstant	0..1	Seconds	(NC) Control system time constant in AC transmission emulation control. It affects the time needed to reach a new steady state equilibrium point after a network perturbation extremely important to guarantee N-1 relief related to an interconnection. The higher is time constant the slower is the DC system dynamic.

6790

6791 Table 774 shows all association ends of ACEmulationControlFunctionTimePoint with other
6792 classes.6793 **Table 774 – Association ends of ExtControl::ACEmulationControlFunctionTimePoint**
6794 **with other classes**

mult from	name	mult to	type	description
1..*	ACEmulationControlFunctionSchedule	1..1	ACEmulationControlFunctionSchedule	(NC) The schedule that has this time point.

6795

6796 **3.25.13 (NC) ActivePowerControlFunction**6797 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :
6798 ExtEulIdentifiedObject : Identity6799 Active power control function is a function block that calculates operating point of the controlled
6800 equipment to achieve the target active power.

6801 Table 775 shows all attributes of ActivePowerControlFunction.

6802 **Table 775 – Attributes of ExtControl::ActivePowerControlFunction**

name	mult	type	description
targetValue	0..1	ActivePower	(NC) Target value for the active power that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetValueDeadband	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock

name	mult	type	description
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 776 shows all association ends of ActivePowerControlFunction with other classes.

Table 776 – Association ends of ExtControl::ActivePowerControlFunction with other classes

mult from	name	mult to	type	description
1..1	ActivePowerControlFunctionSchedule	0..*	ActivePowerControlFunctionSchedule	(NC) The schedule of the control function.
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.14 (NC) ActivePowerControlFunctionSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

The schedule for ActivePowerControlFunction.

Table 777 shows all attributes of ActivePowerControlFunctionSchedule.

Table 777 – Attributes of ExtControl::ActivePowerControlFunctionSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 778 shows all association ends of ActivePowerControlFunctionSchedule with other classes.

Table 778 – Association ends of ExtControl::ActivePowerControlFunctionSchedule with other classes

mult from	name	mult to	type	description
0..*	ActivePowerControlFunction	1..1	ActivePowerControlFunction	(NC) The control function that has this schedule.
1..1	ActivePowerControlFunctionTimePoint	1..*	ActivePowerControlFunctionTimePoint	(NC) The time point of the schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.15 (NC) ActivePowerControlFunctionTimePoint root class

Active power control function value for a given point in time.

Table 779 shows all attributes of ActivePowerControlFunctionTimePoint.

Table 779 – Attributes of ExtControl::ActivePowerControlFunctionTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
targetValue	0..1	ActivePower	(NC) Target value for the active power that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.

Table 780 shows all association ends of ActivePowerControlFunctionTimePoint with other classes.

Table 780 – Association ends of ExtControl::ActivePowerControlFunctionTimePoint with other classes

mult from	name	mult to	type	description
1..*	ActivePowerControlFunctionSchedule	1..1	ActivePowerControlFunctionSchedule	(NC) The schedule that has this time point.

6830 **3.25.16 (NC) AreaInterchangeController**

6831 Inheritance path = [SystemControl](#) : [AutomationFunction](#) : PowerSystemResource :
 6832 IdentifiedObject : ExtEulIdentifiedObject : Identity

6833 Area interchange control is set to control active power of an area.

6834 Table 781 shows all attributes of AreaInterchangeController.

6835 **Table 781 – Attributes of ExtControl::AreaInterchangeController**

name	mult	type	description
pTolerance	0..1	ActivePower	(NC) Active power net interchange tolerance. The attribute shall be a positive value or zero.
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6836

6837 Table 782 shows all association ends of AreaInterchangeController with other classes.

6838 **Table 782 – Association ends of ExtControl::AreaInterchangeController with other**
 6839 **classes**

mult from	name	mult to	type	description
0..1	ControlArea	0..1	ControlArea	(NC) Control area that has a area interchange controller.
0..1	BiddingZone	0..1	BiddingZone	(NC) Bidding zone which has an area interchange controller.
0..1	BiddingZoneBorder	0..1	BiddingZoneBorder	(NC) Bidding zone border that has an area interchange controller.
0..1	EquipmentController	1..*	EquipmentController	(NC) inherited from: SystemControl
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6840

6841 **3.25.17 (NC) AutomationFunction**

6842 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

6843 Automation function is a collection of functional block or other automation function that can be
6844 executed as a work cycle program as part of an automated system.

6845 Table 783 shows all attributes of AutomationFunction.

6846 **Table 783 – Attributes of ExtControl::AutomationFunction**

name	mult	type	description
enabled	0..1	Boolean	(NC) True, if the automation function is enabled (active). Otherwise false.
type	0..1	String	(NC) Type of automation function.
normalEnabled	0..1	Boolean	(NC) True, if the automation function is enabled (active). Otherwise false.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6847

6848 Table 784 shows all association ends of AutomationFunction with other classes.

6849 **Table 784 – Association ends of ExtControl::AutomationFunction with other classes**

mult from	name	mult to	type	description
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) Enabling schedule associated to an automation function.
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) Automation block group which belongs to an automation function.
0..1	HasPart	0..*	AutomationFunction	(NC) Automation function has this automation function as a part.
0..1	FunctionBlock	0..*	FunctionBlock	(NC) Function block is part of this automation function.
0..*	PartOf	0..1	AutomationFunction	(NC) Automation function is part of this automation function.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject

mult from	name	mult to	type	description
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6850

6851 **3.25.18 (NC) CompensatorController**

6852 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :
 6853 IdentifiedObject : ExtEulIdentifiedObject : Identity

6854 Compensator controller is controlling the equipment to optimize the use of the compensators.

6855 Table 785 shows all attributes of CompensatorController.

6856 **Table 785 – Attributes of ExtControl::CompensatorController**

name	mult	type	description
mode	0..1	CompensatorControlModeKind	(NC) Mode of the compensator controller.
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6857

6858 Table 786 shows all association ends of CompensatorController with other classes.

6859 **Table 786 – Association ends of ExtControl::CompensatorController with other classes**

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6860

6861 **3.25.19 (NC) ControlFunctionBlock**6862 Inheritance path = [FunctionBlock](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

6863 Control function block is a function block that contains an algorithm for controlling the equipment.

6864 Table 787 shows all attributes of ControlFunctionBlock.

6866 **Table 787 – Attributes of ExtControl::ControlFunctionBlock**

name	mult	type	description
isDiscrete	0..1	Boolean	(NC) True, if the control function is discrete. This applies to equipment with discrete controls, e.g. tap changers and shunt compensators.
targetValueDeadband	0..1	PerCent	(NC) The deadband related to the targetValue of the control function. It is used with discrete control to avoid excessive update of controls like tap changers and shunt compensator banks while regulating. The attribute shall be a positive value or zero. If isDiscrete is set to "false", the targetDeadband is to be ignored. Note that for instance, if the targetValue is 100 kV and the targetValueDeadband is 2 percent the range is from 99 to 101 kV.
maxAllowedTargetValue	0..1	PerCent	(NC) Maximum allowed target value given by the percent of target value. The allowed value range is [0,100].
minAllowedTargetValue	0..1	PerCent	(NC) Minimum allowed target value given by the percent of target value. The allowed value range is [0,100].
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6867

6868 Table 788 shows all association ends of ControlFunctionBlock with other classes.

6869 **Table 788 – Association ends of ExtControl::ControlFunctionBlock with other classes**

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) The action that is applied to this control function block.
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6870

6871 **3.25.20 (NC) CurrentControlFunction**6872 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :

6873 ExtEulIdentifiedObject : Identity

6874 Current control function is a function block that calculates the operating point of the controlled equipment to achieve the target current.

6875 Table 789 shows all attributes of CurrentControlFunction.

6877 **Table 789 – Attributes of ExtControl::CurrentControlFunction**

name	mult	type	description
targetValue	0..1	CurrentFlow	(NC) Target value for the current that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetValueDeadband	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6878

6879 Table 790 shows all association ends of CurrentControlFunction with other classes.

6880 **Table 790 – Association ends of ExtControl::CurrentControlFunction with other classes**

mult from	name	mult to	type	description
1..1	CurrentControlFunctionSchedule	0..*	CurrentControlFunctionSchedule	(NC) The schedule of the control function.
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6881

6882 **3.25.21 (NC) CurrentControlFunctionSchedule**

6883 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

6884 ExtEulIdentifiedObject : Identity

6885 The schedule for CurrentControlFunction.

6886 Table 791 shows all attributes of CurrentControlFunctionSchedule.

6887 **Table 791 – Attributes of ExtControl::CurrentControlFunctionSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6888

6889 Table 792 shows all association ends of CurrentControlFunctionSchedule with other classes.

Table 792 – Association ends of ExtControl::CurrentControlFunctionSchedule with other classes

mult from	name	mult to	type	description
0..*	CurrentControlFunction	1..1	CurrentControlFunction	(NC) The control function that has this schedule.
1..1	CurrentControlFunctionTimePoint	1..*	CurrentControlFunctionTimePoint	(NC) The time point of the schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.22 (NC) CurrentControlFunctionTimePoint root class

Current control function value for a given point in time.

Table 793 shows all attributes of CurrentControlFunctionTimePoint.

Table 793 – Attributes of ExtControl::CurrentControlFunctionTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
targetValue	0..1	CurrentFlow	(NC) Target value for the current that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.

Table 794 shows all association ends of CurrentControlFunctionTimePoint with other classes.

Table 794 – Association ends of ExtControl::CurrentControlFunctionTimePoint with other classes

mult from	name	mult to	type	description
1..*	CurrentControlFunctionSchedule	1..1	CurrentControlFunctionSchedule	(NC) The schedule that has this time point.

3.25.23 (NC) CurrentDroopControlFunctionSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

The schedule for CurrentDroopControlFunction.

Table 795 shows all attributes of CurrentDroopControlFunctionSchedule.

Table 795 – Attributes of ExtControl::CurrentDroopControlFunctionSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 796 shows all association ends of CurrentDroopControlFunctionSchedule with other classes.

Table 796 – Association ends of ExtControl::CurrentDroopControlFunctionSchedule with other classes

mult from	name	mult to	type	description
0..*	CurrentDroopControlFunction	1..1	CurrentDroopControlFunction	(NC) The control function that has this schedule.
1..1	CurrentDroopControlFunctionTimePoint	1..*	CurrentDroopControlFunctionTimePoint	(NC) The time point of the schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.24 (NC) CurrentDroopControlFunctionTimePoint root class

Current droop control function value for a given point in time.

Table 797 shows all attributes of CurrentDroopControlFunctionTimePoint.

Table 797 – Attributes of ExtControl::CurrentDroopControlFunctionTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
droopCapacitive	0..1	Float	(NC) Droop in capacitive region. The unit is V/A.
droopInductive	0..1	Float	(NC) Droop in inductive region. The unit is V/A.
offsetCapacitive	0..1	CurrentFlow	(NC) Offset in capacitive region.
offsetInductive	0..1	CurrentFlow	(NC) Offset in capacitive region.
targetValueCapacitive	0..1	CurrentFlow	(NC) Setpoint when control is active in capacitive region.
targetValueInductive	0..1	CurrentFlow	(NC) Setpoint when control is active in inductive region.

Table 798 shows all association ends of CurrentDroopControlFunctionTimePoint with other classes.

Table 798 – Association ends of ExtControl::CurrentDroopControlFunctionTimePoint with other classes

mult from	name	mult to	type	description
1..*	CurrentDroopControlFunctionSchedule	1..1	CurrentDroopControlFunctionSchedule	(NC) The schedule that has this time point.

3.25.25 (NC) DCActivePowerControlFunction

Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Direct current active power control function is a function block that calculates operating point of the controlled equipment to achieve the target active power.

Table 799 shows all attributes of DCActivePowerControlFunction.

Table 799 – Attributes of ExtControl::DCActivePowerControlFunction

name	mult	type	description
targetValue	0..1	ActivePower	(NC) Target value for the active power that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetValueDeadband	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 800 shows all association ends of DCActivePowerControlFunction with other classes.

Table 800 – Association ends of ExtControl::DCActivePowerControlFunction with other classes

mult from	name	mult to	type	description
1..1	DCActivePowerControlFunctionSchedule	0..*	DCActivePowerControlFunctionSchedule	(NC) The schedule of the control function.
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock

mult from	name	mult to	type	description
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6935

6936

3.25.26 (NC) DCActivePowerControlFunctionSchedule6937 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

6938 ExtEulIdentifiedObject : Identity

6939 The schedule for DCActivePowerControlFunction.

6940 Table 801 shows all attributes of DCActivePowerControlFunctionSchedule.

6941 **Table 801 – Attributes of ExtControl::DCActivePowerControlFunctionSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6942

6943 Table 802 shows all association ends of DCActivePowerControlFunctionSchedule with other
6944 classes.6945 **Table 802 – Association ends of ExtControl::DCActivePowerControlFunctionSchedule**
6946 **with other classes**

mult from	name	mult to	type	description
0..*	DCActivePowerControlFunction	1..1	DCActivePowerControlFunction	(NC) The control function that has this schedule.
1..1	DCActivePowerControlFunctionTimePoint	1..*	DCActivePowerControlFunctionTimePoint	(NC) The time point of the schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6947

6948 **3.25.27 (NC) DCActivePowerControlFunctionTimePoint root class**

6949 Direct current active power control function value for a given point in time.

6950 Table 803 shows all attributes of DCActivePowerControlFunctionTimePoint.

6951 **Table 803 – Attributes of ExtControl::DCActivePowerControlFunctionTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
targetValue	0..1	ActivePower	(NC) Target value for the active power that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.

6952

6953 Table 804 shows all association ends of DCActivePowerControlFunctionTimePoint with other
6954 classes.6955 **Table 804 – Association ends of ExtControl::DCActivePowerControlFunctionTimePoint**
6956 **with other classes**

mult from	name	mult to	type	description
1..*	DCActivePowerControlFunctionSchedule	1..1	DCActivePowerControlFunctionSchedule	(NC) The schedule that has this time point.

6957

6958 **3.25.28 (NC) DCCurrentControlFunction**6959 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :
6960 ExtEulIdentifiedObject : Identity6961 DC current control function is a function block that calculates the operating point of the
6962 controlled equipment to achieve the target current.

6963 Table 805 shows all attributes of DCCurrentControlFunction.

6964 **Table 805 – Attributes of ExtControl::DCCurrentControlFunction**

name	mult	type	description
droop	0..1	PU	(NC) Droop constant. The pu value is obtained as $D [kV/MW] \times S_b / U_{bdc}$. The attribute shall be a positive value.
droopCompensation	0..1	Resistance	(NC) Compensation constant. Used to compensate for voltage drop when controlling voltage at a distant bus. The attribute shall be a positive value.
targetValue	0..1	CurrentFlow	(NC) Target value for the current that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetValueDeadband	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock

name	mult	type	description
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 806 shows all association ends of DCCurrentControlFunction with other classes.

Table 806 – Association ends of ExtControl::DCCurrentControlFunction with other classes

mult from	name	mult to	type	description
1..1	DCCurrentControlFunctionSchedule	0..*	DCCurrentControlFunctionSchedule	(NC) The schedule of the control function.
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.29 (NC) DCCurrentControlFunctionSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

The schedule for DCCurrentControlFunction.

Table 807 shows all attributes of DCCurrentControlFunctionSchedule.

Table 807 – Attributes of ExtControl::DCCurrentControlFunctionSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 808 shows all association ends of DCCurrentControlFunctionSchedule with other classes.

Table 808 – Association ends of ExtControl::DCCurrentControlFunctionSchedule with other classes

mult from	name	mult to	type	description
0..*	DCCurrentControlFunction	1..1	DCCurrentControlFunction	(NC) The control function that has this schedule.
1..1	DCCurrentControlFunctionTimePoint	1..*	DCCurrentControlFunctionTimePoint	(NC) The time point of the schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.30 (NC) DCCurrentControlFunctionTimePoint root class

DC current control function value for a given point in time.

Table 809 shows all attributes of DCCurrentControlFunctionTimePoint.

Table 809 – Attributes of ExtControl::DCCurrentControlFunctionTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
droop	0..1	PU	(NC) Droop constant. The pu value is obtained as $D [kV/MW] \times S_b / U_{bdc}$. The attribute shall be a positive value.
droopCompensation	0..1	Resistance	(NC) Compensation constant. Used to compensate for voltage drop when controlling voltage at a distant bus. The attribute shall be a positive value.
targetValue	0..1	CurrentFlow	(NC) Target value for the current that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.

Table 810 shows all association ends of DCCurrentControlFunctionTimePoint with other classes.

6989 **Table 810 – Association ends of ExtControl::DCCurrentControlFunctionTimePoint with**
6990 **other classes**

mult from	name	mult to	type	description
1..*	DCCurrentControlFunctionSchedule	1..1	DCCurrentControlFunctionSchedule	(NC) The schedule that has this time point.

6991
6992 **3.25.31 (NC) DCExinctionAngleControlFunction**
6993 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :
6994 ExtEulIdentifiedObject : Identity
6995 Direct current extinction angle control function is a function block that calculates operating point
6996 of the controlled equipment to achieve the target extinction angle.
6997 Table 811 shows all attributes of DCExinctionAngleControlFunction.

6998 **Table 811 – Attributes of ExtControl::DCExinctionAngleControlFunction**

name	mult	type	description
targetValue	0..1	AngleDegrees	(NC) Target value for the extinction angle that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetValueDeadband	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

6999
7000 Table 812 shows all association ends of DCExinctionAngleControlFunction with other classes.

7001 **Table 812 – Association ends of ExtControl::DCExinctionAngleControlFunction with**
7002 **other classes**

mult from	name	mult to	type	description
1..1	DCExinctionAngleControlFunctionSchedule	0..*	DCExinctionAngleControlFunctionSchedule	(NC) The schedule of the control function.
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock

mult from	name	mult to	type	description
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7003

7004 **3.25.32 (NC) DCExtinctionAngleControlFunctionSchedule**

7005 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
 7006 ExtEulIdentifiedObject : Identity

7007 The schedule for DCExtinctionAngleControlFunction.

7008 Table 813 shows all attributes of DCExtinctionAngleControlFunctionSchedule.

7009 **Table 813 – Attributes of ExtControl::DCExtinctionAngleControlFunctionSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7010

7011 Table 814 shows all association ends of DCExtinctionAngleControlFunctionSchedule with other
 7012 classes.

7013 **Table 814 – Association ends of**7014 **ExtControl::DCExtinctionAngleControlFunctionSchedule with other classes**

mult from	name	mult to	type	description
0..*	DCExtinctionAngleControlFunction	1..1	DCExtinctionAngleControlFunction	(NC) The control function that has this schedule.
1..1	DCExtinctionAngleControlFunctionTimePoint	1..*	DCExtinctionAngleControlFunctionTimePoint	(NC) The time point of the schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7015

7016 **3.25.33 (NC) DCExtinctionAngleControlFunctionTimePoint root class**

7017 Direct current extinction angle control function value for a given point in time.

7018 Table 815 shows all attributes of DCExtinctionAngleControlFunctionTimePoint.

7019 **Table 815 – Attributes of ExtControl::DCExtinctionAngleControlFunctionTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
targetValue	0..1	AngleDegrees	(NC) Target value for the extinction angle that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.

7020

7021 Table 816 shows all association ends of DCExtinctionAngleControlFunctionTimePoint with
7022 other classes.7023 **Table 816 – Association ends of**7024 **ExtControl::DCExtinctionAngleControlFunctionTimePoint with other classes**

mult from	name	mult to	type	description
1..*	DCExtinctionAngleControlFunctionSchedule	1..1	DCExtinctionAngleControlFunctionSchedule	(NC) The schedule that has this time point.

7025

7026 **3.25.34 (NC) DCFiringAngleControlFunction**7027 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :
7028 ExtEulIdentifiedObject : Identity7029 Direct current firing angle control function is a function block that calculates operating point of
7030 the controlled equipment to achieve the target firing angle.

7031 Table 817 shows all attributes of DCFiringAngleControlFunction.

7032 **Table 817 – Attributes of ExtControl::DCFiringAngleControlFunction**

name	mult	type	description
targetValue	0..1	AngleDegrees	(NC) Target value for the firing angle that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetValueDeadband	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 818 shows all association ends of DCFiringAngleControlFunction with other classes.

Table 818 – Association ends of ExtControl::DCFiringAngleControlFunction with other classes

mult from	name	mult to	type	description
1..1	DCFiringAngleControlFunctionSchedule	0..*	DCFiringAngleControlFunctionSchedule	(NC) The schedule of the control function.
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.35 (NC) DCFiringAngleControlFunctionSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

The schedule for DCFiringAngleControlFunction.

Table 819 shows all attributes of DCFiringAngleControlFunctionSchedule.

Table 819 – Attributes of ExtControl::DCFiringAngleControlFunctionSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 820 shows all association ends of DCFiringAngleControlFunctionSchedule with other classes.

Table 820 – Association ends of ExtControl::DCFiringAngleControlFunctionSchedule with other classes

mult from	name	mult to	type	description
0..*	DCFiringAngleControlFunction	1..1	DCFiringAngleControlFunction	(NC) The control function that has this schedule.
1..1	DCFiringAngleControlFunctionTimePoint	1..*	DCFiringAngleControlFunctionTimePoint	(NC) The time point of the schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.36 (NC) DCFiringAngleControlFunctionTimePoint root class

Direct current firing angle control function value for a given point in time.

Table 821 shows all attributes of DCFiringAngleControlFunctionTimePoint.

Table 821 – Attributes of ExtControl::DCFiringAngleControlFunctionTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
targetValue	0..1	AngleDegrees	(NC) Target value for the firing angle that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.

Table 822 shows all association ends of DCFiringAngleControlFunctionTimePoint with other classes.

Table 822 – Association ends of ExtControl::DCFiringAngleControlFunctionTimePoint with other classes

mult from	name	mult to	type	description
1..*	DCFiringAngleControlFunctionSchedule	1..1	DCFiringAngleControlFunctionSchedule	(NC) The schedule that has this time point.

3.25.37 (NC) DCPulseWidthModulationControlFunction

Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Direct current pulse width modulation control function is a function block that calculates operating point of the controlled equipment to achieve the target pulse width modulation.

Table 823 shows all attributes of DCPulseWidthModulationControlFunction.

7066 **Table 823 – Attributes of ExtControl::DCPulseWidthModulationControlFunction**

name	mult	type	description
targetValue	0..1	Float	(NC) Target value for the pulse width factor that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetValueDeadband	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7067
7068
7069 Table 824 shows all association ends of DCPulseWidthModulationControlFunction with other classes.

7070 **Table 824 – Association ends of ExtControl::DCPulseWidthModulationControlFunction**
7071 **with other classes**

mult from	name	mult to	type	description
1..1	DCPulseWidthModulationControlFunctionSchedule	0..*	DCPulseWidthModulationControlFunctionSchedule	(NC) The schedule of the control function.
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7072
7073 **3.25.38 (NC) DCPulseWidthModulationControlFunctionSchedule**

7074 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
7075 ExtEulIdentifiedObject : Identity

7076 The schedule for DCPulseWidthModulationControlFunction.
 7077 Table 825 shows all attributes of DCPulseWidthModulationControlFunctionSchedule.

7078 **Table 825 – Attributes of**
 7079 **ExtControl::DCPulseWidthModulationControlFunctionSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7080
 7081 Table 826 shows all association ends of DCPulseWidthModulationControlFunctionSchedule
 7082 with other classes.

7083 **Table 826 – Association ends of**
 7084 **ExtControl::DCPulseWidthModulationControlFunctionSchedule with other classes**

mult from	name	mult to	type	description
0..*	DCPulseWidthModulationControlFunction	1..1	DCPulseWidthModulationControlFunction	(NC) The control function that has this schedule.
1..1	DCPulseWidthModulationControlFunctionTimePoint	1..*	DCPulseWidthModulationControlFunctionTimePoint	(NC) The time point of the schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7085
 7086 **3.25.39 (NC) DCPulseWidthModulationControlFunctionTimePoint root class**

7087 Direct current pulse width modulation control function value for a given point in time.
 7088 Table 827 shows all attributes of DCPulseWidthModulationControlFunctionTimePoint.

7089 **Table 827 – Attributes of**
 7090 **ExtControl::DCPulseWidthModulationControlFunctionTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
targetValue	0..1	Float	(NC) Target value for the pulse width factor that the control function is calculating to achieve by

name	mult	type	description
			adjusting the operational setting to the controlled equipment.

7091
7092 Table 828 shows all association ends of DCPulseWidthModulationControlFunctionTimePoint
7093 with other classes.

7094 **Table 828 – Association ends of**
7095 **ExtControl::DCPulseWidthModulationControlFunctionTimePoint with other classes**

mult from	name	mult to	type	description
1..*	DCPulseWidthModulationControlFunctionSchedule	1..1	DCPulseWidthModulationControlFunctionSchedule	(NC) The schedule that has this time point.

7096
7097 **3.25.40 (NC) DCVoltageControlFunction**

7098 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :
7099 ExtEulIdentifiedObject : Identity

7100 DC voltage control function is a function block that calculate the operating point of the controlled
7101 equipment to achieve the target voltage.

7102 Table 829 shows all attributes of DCVoltageControlFunction.

7103 **Table 829 – Attributes of ExtControl::DCVoltageControlFunction**

name	mult	type	description
targetValue	0..1	Voltage	(NC) Target value for the voltage that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetValueDeadband	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7104
7105 Table 830 shows all association ends of DCVoltageControlFunction with other classes.

7106 **Table 830 – Association ends of ExtControl::DCVoltageControlFunction with other**
7107 **classes**

mult from	name	mult to	type	description
1..1	DCVoltageControlFunctionSchedule	0..*	DCVoltageControlFunctionSchedule	(NC) The schedule of the control function.

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7108

7109 **3.25.41 (NC) DCVoltageControlFunctionSchedule**7110 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

7111 ExtEulIdentifiedObject : Identity

7112 The schedule for DCVoltageControlFunction.

7113 Table 831 shows all attributes of DCVoltageControlFunctionSchedule.

7114 **Table 831 – Attributes of ExtControl::DCVoltageControlFunctionSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7115

7116 Table 832 shows all association ends of DCVoltageControlFunctionSchedule with other
7117 classes.7118 **Table 832 – Association ends of ExtControl::DCVoltageControlFunctionSchedule with
7119 other classes**

mult from	name	mult to	type	description
0..*	DCVoltageControlFunction	1..1	DCVoltageControlFunction	(NC) The control function that has this schedule.

mult from	name	mult to	type	description
1..1	DCVoltageControlFunctionTimePoint	1..*	DCVoltageControlFunctionTimePoint	(NC) The time point of the schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7120

7121 **3.25.42 (NC) DCVoltageControlFunctionTimePoint root class**

7122 DC voltage control function value for a given point in time.

7123 Table 833 shows all attributes of DCVoltageControlFunctionTimePoint.

7124 **Table 833 – Attributes of ExtControl::DCVoltageControlFunctionTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
targetValue	0..1	Voltage	(NC) Target value for the voltage that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.

7125

7126 Table 834 shows all association ends of DCVoltageControlFunctionTimePoint with other
7127 classes.7128 **Table 834 – Association ends of ExtControl::DCVoltageControlFunctionTimePoint with**
7129 **other classes**

mult from	name	mult to	type	description
1..*	DCVoltageControlFunctionSchedule	1..1	DCVoltageControlFunctionSchedule	(NC) The schedule that has this time point.

7130

7131 **3.25.43 (NC) DirectCurrentBipoleController**7132 Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) :
7133 [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject :
7134 Identity

7135 DC system bipole control that is the control system of a bipole in accordance with IEC 60633.

7136 Table 835 shows all attributes of DirectCurrentBipoleController.

7137 **Table 835 – Attributes of ExtControl::DirectCurrentBipoleController**

name	mult	type	description
mode	0..1	DCControlModeKind	(NC) inherited from: DirectCurrentEquipmentController
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 836 shows all association ends of DirectCurrentBipoleController with other classes.

Table 836 – Association ends of ExtControl::DirectCurrentBipoleController with other classes

mult from	name	mult to	type	description
0..*	DirectCurrentMasterController	0..1	DirectCurrentMasterController	(NC) Direct current master controller which has direct current bipole controllers.
0..1	DirectCurrentPoleController	2..2	DirectCurrentPoleController	(NC) DC pole controller that is controlled by a DC bipole controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.44 (NC) DirectCurrentEquipmentController

Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : Identity

Direct current equipment controller used to control different parts of the hierarchical structure of the DC control system defined by IEC 60633.

Table 837 shows all attributes of DirectCurrentEquipmentController.

7149

Table 837 – Attributes of ExtControl::DirectCurrentEquipmentController

name	mult	type	description
mode	0..1	DCControlModeKind	(NC) Mode of the dc controller.
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7150

7151

Table 838 shows all association ends of DirectCurrentEquipmentController with other classes.

7152

7153

Table 838 – Association ends of ExtControl::DirectCurrentEquipmentController with other classes

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7154

7155 **3.25.45 (NC) DirectCurrentMasterController**

7156 Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) :
 7157 [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject :
 7158 Identity

7159 Direct current system control is a control system which governs the operation of an entire DC
 7160 system consisting of more than one DC substation and performs those functions of controlling,
 7161 monitoring and protection which require information from more than one substation. This can
 7162 also be a multiterminal control which is a DC system control for more than two DC substations
 7163 or a DC master control, which is a general concept for control coordination of a DC system. The
 7164 DC master control may be implemented at the bipole and/or pole level as defined in IEC 60633.
 7165 The DC system control/multiterminal control/master control is part of the hierarchical structure
 7166 of an HVDC control system that has an integrated AC/DC system control as the highest level
 7167 of control which governs the integrated operation of AC and DC systems of a power system.
 7168 This control system is under the responsibility of the system operator.
 7169 Table 839 shows all attributes of DirectCurrentMasterController.

7170 **Table 839 – Attributes of ExtControl::DirectCurrentMasterController**

name	mult	type	description
mode	0..1	DCControlModeKind	(NC) inherited from: DirectCurrentEquipmentController
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7171
 7172 Table 840 shows all association ends of DirectCurrentMasterController with other classes.

7173 **Table 840 – Association ends of ExtControl::DirectCurrentMasterController with other**
 7174 **classes**

mult from	name	mult to	type	description
0..1	DCTieCorridor	0..1	DCTieCorridor	(NC) DCTieCorridor controlled by this direct current master controller.
0..1	DirectCurrentPoleController	0..*	DirectCurrentPoleController	(NC) DC pole controller that is controlled by this DC master controller.
0..1	DirectCurrentSubstationController	2..*	DirectCurrentSubstationController	(NC) DC substation controller controlled by a multiterminal control.
0..1	DirectCurrentBipoleController	0..*	DirectCurrentBipoleController	(NC) Direct current bipole controller which belongs to a direct current master controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController

mult from	name	mult to	type	description
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7175

7176 **3.25.46 (NC) DirectCurrentPoleController**

7177 Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) :
 7178 [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject :
 7179 Identity

7180 DC system pole control, which is the control system of a pole in accordance with IEC 60633.

7181 Table 841 shows all attributes of DirectCurrentPoleController.

7182 **Table 841 – Attributes of ExtControl::DirectCurrentPoleController**

name	mult	type	description
mode	0..1	DCControlModeKind	(NC) inherited from: DirectCurrentEquipmentController
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7183

7184 Table 842 shows all association ends of DirectCurrentPoleController with other classes.

Table 842 – Association ends of ExtControl::DirectCurrentPoleController with other classes

mult from	name	mult to	type	description
2..2	DirectCurrentBipoleController	0..1	DirectCurrentBipoleController	(NC) DC bipole controller that controls this DC pole controller.
0..1	DCPole	1..1	DCPole	(NC) DC pole that is controlled by a DC pole controller.
0..1	ACDCConverterController	2..2	ACDCConverterController	(NC) ACDC converter controller that is controlled by a DC pole controller.
0..*	DirectCurrentMasterController	0..1	DirectCurrentMasterController	(NC) DC master controller that has a DC pole controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.47 (NC) DirectCurrentSubstationBipoleController

Inheritance path = [DirectCurrentSubstationController](#) : [DirectCurrentEquipmentController](#) : [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

Control system of a substation bipole (IEC 60633).

Table 843 shows all attributes of DirectCurrentSubstationBipoleController.

Table 843 – Attributes of ExtControl::DirectCurrentSubstationBipoleController

name	mult	type	description
mode	0..1	DCControlModeKind	(NC) inherited from: DirectCurrentEquipmentController
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction

name	mult	type	description
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 844 shows all association ends of DirectCurrentSubstationBipoleController with other classes.

Table 844 – Association ends of ExtControl::DirectCurrentSubstationBipoleController with other classes

mult from	name	mult to	type	description
0..1	DCSubstationBipole	1..1	DCSubstationBipole	(NC) DC substation bipole that is controlled by a DC substation bipole controller.
2..*	MultiterminalControl	0..1	DirectCurrentMasterController	(NC) inherited from: DirectCurrentSubstationController
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7201 **3.25.48 (NC) DirectCurrentSubstationController**

7202 Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) :
 7203 [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject :
 7204 Identity

7205 Control system used for the controlling, monitoring and protection within a DC substation (IEC
 7206 60633). A DC substation control may be implemented at the bipole and/or pole level and may
 7207 be referred to as local control.

7208 Table 845 shows all attributes of DirectCurrentSubstationController.

7209 **Table 845 – Attributes of ExtControl::DirectCurrentSubstationController**

name	mult	type	description
mode	0..1	DCControlModeKind	(NC) inherited from: DirectCurrentEquipmentController
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7210 Table 846 shows all association ends of DirectCurrentSubstationController with other classes.
 7211

7212 **Table 846 – Association ends of ExtControl::DirectCurrentSubstationController with**
 7213 **other classes**

mult from	name	mult to	type	description
2..*	MultiterminalControl	0..1	DirectCurrentMasterController	(NC) Multiterminal control that controls more than two DC substation controllers.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7214

7215 **3.25.49 (NC) DirectCurrentSubstationPoleController**

7216 Inheritance path = [DirectCurrentSubstationController](#) : [DirectCurrentEquipmentController](#) :
7217 [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject :
7218 ExtEulIdentifiedObject : Identity

7219 Control system of a substation pole (IEC 60633).

7220 Table 847 shows all attributes of DirectCurrentSubstationPoleController.

7221 **Table 847 – Attributes of ExtControl::DirectCurrentSubstationPoleController**

name	mult	type	description
mode	0..1	DCControlModeKind	(NC) inherited from: DirectCurrentEquipmentController
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7222

7223 Table 848 shows all association ends of DirectCurrentSubstationPoleController with other
7224 classes.

7225 **Table 848 – Association ends of ExtControl::DirectCurrentSubstationPoleController**
7226 **with other classes**

mult from	name	mult to	type	description
0..1	DCSubstationPole	1..1	DCSubstationPole	(NC) DC substation pole that is controlled by a DC substation pole controller.
2..*	MultiterminalControl	0..1	DirectCurrentMasterController	(NC) inherited from: DirectCurrentSubstationController
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController

mult from	name	mult to	type	description
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7227

7228 **3.25.50 (NC) EquipmentController**7229 Inheritance path = [AutomationFunction](#) : PowerSystemResource : IdentifiedObject :
7230 ExtEulIdentifiedObject : Identity7231 Equipment controller is an automation function that can control one or multiple equipment
7232 function to achieve all the targets inside the given tolerance.

7233 Table 849 shows all attributes of EquipmentController.

7234 **Table 849 – Attributes of ExtControl::EquipmentController**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7235

7236 Table 850 shows all association ends of EquipmentController with other classes.

7237 **Table 850 – Association ends of ExtControl::EquipmentController with other classes**

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) All regulating conducting equipment that belongs to this equipment controller.
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) Equipment controller action for this equipment controller.
1..*	SystemControl	0..1	SystemControl	(NC) System control which controls this equipment controller.
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7238

7239 **3.25.51 (NC) FrequencyControlFunction**

7240 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :
 7241 ExtEulIdentifiedObject : Identity

7242 Frequency control function is a function block that calculate the operating point of the controlled
 7243 equipment to achieve the target frequency.

7244 Table 851 shows all attributes of FrequencyControlFunction.

7245 **Table 851 – Attributes of ExtControl::FrequencyControlFunction**

name	mult	type	description
targetValue	0..1	Frequency	(NC) Target value for the frequency that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
frequencyBias	0..1	Float	(NC) Frequency bias that the control function is using to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetValueDeadband	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock

name	mult	type	description
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 852 shows all association ends of FrequencyControlFunction with other classes.

Table 852 – Association ends of ExtControl::FrequencyControlFunction with other classes

mult from	name	mult to	type	description
1..1	FrequencyControlFunctionSchedule	0..*	FrequencyControlFunctionSchedule	(NC) The schedule of the control function.
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.52 (NC) FrequencyControlFunctionSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

The schedule for FrequencyControlFunction.

Table 853 shows all attributes of FrequencyControlFunctionSchedule.

Table 853 – Attributes of ExtControl::FrequencyControlFunctionSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 854 shows all association ends of FrequencyControlFunctionSchedule with other classes.

Table 854 – Association ends of ExtControl::FrequencyControlFunctionSchedule with other classes

mult from	name	mult to	type	description
0..*	FrequencyControlFunction	1..1	FrequencyControlFunction	(NC) The control function that has this schedule.
1..1	FrequencyControlFunctionTimePoint	1..*	FrequencyControlFunctionTimePoint	(NC) The time point of the schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.53 (NC) FrequencyControlFunctionTimePoint root class

Frequency control function value for a given point in time.

Table 855 shows all attributes of FrequencyControlFunctionTimePoint.

Table 855 – Attributes of ExtControl::FrequencyControlFunctionTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
frequencyBias	0..1	Float	(NC) Frequency bias that the control function is using to achieve by adjusting the operational setting to the controlled equipment.
targetValue	0..1	Frequency	(NC) Target value for the frequency that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.

Table 856 shows all association ends of FrequencyControlFunctionTimePoint with other classes.

Table 856 – Association ends of ExtControl::FrequencyControlFunctionTimePoint with other classes

mult from	name	mult to	type	description
1..*	FrequencyControlFunctionSchedule	1..1	FrequencyControlFunctionSchedule	(NC) The schedule that has this time point.

7271

7272 **3.25.54 (NC) FrequencyMonitoringTerminal root class**7273 Frequency monitoring terminal provides location in the model where the frequency is monitored
7274 for the purpose of power frequency control.

7275 Table 857 shows all attributes of FrequencyMonitoringTerminal.

7276

Table 857 – Attributes of ExtControl::FrequencyMonitoringTerminal

name	mult	type	description
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
priority	0..1	Integer	(NC) Value 0 means ignore priority. 1 means the highest priority, 2 is the second highest priority.

7277

7278 Table 858 shows all association ends of FrequencyMonitoringTerminal with other classes.

7279 **Table 858 – Association ends of ExtControl::FrequencyMonitoringTerminal with other**
7280 **classes**

mult from	name	mult to	type	description
0..*	Terminal	0..1	Terminal	(NC) The terminal for this frequency monitoring terminal.
0..*	PowerFrequencyController	0..1	PowerFrequencyController	(NC) Power frequency controller that has this frequency monitoring terminal.

7281

7282 **3.25.55 (NC) FunctionBlock**

7283 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

7284 Function block is a function described as a set of elementary blocks. The blocks describe the
7285 function between input variables and output variables.

7286 Table 859 shows all attributes of FunctionBlock.

7287

Table 859 – Attributes of ExtControl::FunctionBlock

name	mult	type	description
enabled	0..1	Boolean	(NC) True, if the function block is enabled (active). Otherwise false.
normalEnabled	0..1	Boolean	(NC) True, if the function block is normally enabled (active). Otherwise false.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7288

7289 Table 860 shows all association ends of FunctionBlock with other classes.

7290 **Table 860 – Association ends of ExtControl::FunctionBlock with other classes**

mult from	name	mult to	type	description
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) Enabling schedule associated to a function block.
0..*	AutomationFunction	0..1	AutomationFunction	(NC) Automation function describe automation that this function block is part of.
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) Automation block group which has function blocks.
0..1	Input	1..*	FunctionInputVariable	(NC) Function input variable describe the input or domain to the function block.
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) Function output variable describe the output or codomain to the function block.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7291

7292 **3.25.56 (NC) FunctionInputVariable**

7293 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

7294 Functional input variable defines the domain of the function.

7295 Table 861 shows all attributes of FunctionInputVariable.

7296 **Table 861 – Attributes of ExtControl::FunctionInputVariable**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7297

7298 Table 862 shows all association ends of FunctionInputVariable with other classes.

7299 **Table 862 – Association ends of ExtControl::FunctionInputVariable with other classes**

mult from	name	mult to	type	description
1..*	Function	0..1	FunctionBlock	(NC) Function block describe the function that function input variable provides the domain for.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7300

7301 **3.25.57 (NC) FunctionOutputVariable**

7302 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

7303 Functional output variable defines the codomain of the function.

7304 Table 863 shows all attributes of FunctionOutputVariable.

7305 **Table 863 – Attributes of ExtControl::FunctionOutputVariable**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7306

7307 Table 864 shows all association ends of FunctionOutputVariable with other classes.

7308 **Table 864 – Association ends of ExtControl::FunctionOutputVariable with other classes**

mult from	name	mult to	type	description
0..*	PropertyReference	0..1	PropertyReference	(NC) Property reference refers to a given class and property that is populated by the function output variable.
1..*	FunctionBlock	0..1	FunctionBlock	(NC) Function block describe the function that function output variable provides the codomain for.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7309

7310 **3.25.58 (NC) ImpedanceControlFunction**7311 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :
7312 ExtEulIdentifiedObject : Identity7313 Impedance control function is a function block that calculates the operating point of the
7314 controlled equipment to achieve the target impedance.

7315 Table 865 shows all attributes of ImpedanceControlFunction.

7316

Table 865 – Attributes of ExtControl::ImpedanceControlFunction

name	mult	type	description
targetValue	0..1	Impedance	(NC) Target value for the impedance that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetValueDeadband	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7317

7318

Table 866 shows all association ends of ImpedanceControlFunction with other classes.

7319

Table 866 – Association ends of ExtControl::ImpedanceControlFunction with other classes

7320

mult from	name	mult to	type	description
1..1	ImpedanceControlFunctionSchedule	0..*	ImpedanceControlFunctionSchedule	(NC) The schedule of the control function.
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7321

3.25.59 (NC) ImpedanceControlFunctionScheduleInheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

ExtEulIdentifiedObject : Identity

The schedule for ImpedanceControlFunction.

7326 Table 867 shows all attributes of ImpedanceControlFunctionSchedule.

7327 **Table 867 – Attributes of ExtControl::ImpedanceControlFunctionSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7328 Table 868 shows all association ends of ImpedanceControlFunctionSchedule with other
7329 classes.
7330

7331 **Table 868 – Association ends of ExtControl::ImpedanceControlFunctionSchedule with**
7332 **other classes**

mult from	name	mult to	type	description
0..*	ImpedanceControlFunction	1..1	ImpedanceControlFunction	(NC) The control function that has this schedule.
1..1	ImpedanceControlFunctionTimePoint	1..*	ImpedanceControlFunctionTimePoint	(NC) The time point of the schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7333
7334 **3.25.60 (NC) ImpedanceControlFunctionTimePoint root class**

7335 Impedance control function value for a given point in time.

7336 Table 869 shows all attributes of ImpedanceControlFunctionTimePoint.

7337 **Table 869 – Attributes of ExtControl::ImpedanceControlFunctionTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
targetValue	0..1	Impedance	(NC) Target value for the impedance that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.

7338

7339 Table 870 shows all association ends of ImpedanceControlFunctionTimePoint with other
7340 classes.

7341 **Table 870 – Association ends of ExtControl::ImpedanceControlFunctionTimePoint with**
7342 **other classes**

mult from	name	mult to	type	description
1..*	ImpedanceControlFunctionSchedule	1..1	ImpedanceControlFunctionSchedule	(NC) The schedule that has this time point.

7343

7344 **3.25.61 (NC) InjectionController**

7345 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :
7346 IdentifiedObject : ExtEulIdentifiedObject : Identity

7347 Injection controller is controlling the equipment which represents an injection or an external
7348 network.

7349 Table 871 shows all attributes of InjectionController.

7350 **Table 871 – Attributes of ExtControl::InjectionController**

name	mult	type	description
mode	0..1	InjectionControlModeKind	(NC) Mode of the injection controller.
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7351

7352 Table 872 shows all association ends of InjectionController with other classes.

7353 **Table 872 – Association ends of ExtControl::InjectionController with other classes**

mult from	name	mult to	type	description
0..1	EquivalentInjection	0..*	EquivalentInjection	(NC) Equivalent injection controlled by the injection controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction

mult from	name	mult to	type	description
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7354

7355 **3.25.62 (NC) PhaseControlFunction**

7356 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :
 7357 ExtEulIdentifiedObject : Identity

7358 Phase control function is a function block that calculate the operating point of the controlled
 7359 equipment to achieve the target voltage.

7360 Table 873 shows all attributes of PhaseControlFunction.

7361

Table 873 – Attributes of ExtControl::PhaseControlFunction

name	mult	type	description
targetValue	0..1	AngleDegrees	(NC) Target value for the phase that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetValueDeadband	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7362

7363 Table 874 shows all association ends of PhaseControlFunction with other classes.

7364 **Table 874 – Association ends of ExtControl::PhaseControlFunction with other classes**

mult from	name	mult to	type	description
1..1	PhaseControlFunctionSchedule	0..*	PhaseControlFunctionSchedule	(NC) The schedule of the control function.
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7365

7366 **3.25.63 (NC) PhaseControlFunctionSchedule**7367 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

7368 ExtEulIdentifiedObject : Identity

7369 The schedule for PhaseControlFunction.

7370 Table 875 shows all attributes of PhaseControlFunctionSchedule.

7371 **Table 875 – Attributes of ExtControl::PhaseControlFunctionSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7372

7373 Table 876 shows all association ends of PhaseControlFunctionSchedule with other classes.

7374 **Table 876 – Association ends of ExtControl::PhaseControlFunctionSchedule with other**
7375 **classes**

mult from	name	mult to	type	description
0..*	PhaseControlFunction	1..1	PhaseControlFunction	(NC) The control function that has this schedule.
1..1	PhaseControlFunctionTimePoint	1..*	PhaseControlFunctionTimePoint	(NC) The time point of the schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7376

7377 **3.25.64 (NC) PhaseControlFunctionTimePoint root class**

7378 Phase control function value for a given point in time.

7379 Table 877 shows all attributes of PhaseControlFunctionTimePoint.

7380 **Table 877 – Attributes of ExtControl::PhaseControlFunctionTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
targetValue	0..1	AngleDegrees	(NC) Target value for the phase that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.

7381

7382 Table 878 shows all association ends of PhaseControlFunctionTimePoint with other classes.

7383 **Table 878 – Association ends of ExtControl::PhaseControlFunctionTimePoint with other**
7384 **classes**

mult from	name	mult to	type	description
1..*	PhaseControlFunctionSchedule	1..1	PhaseControlFunctionSchedule	(NC) The schedule that has this time point.

7385

7386 **3.25.65 (NC) PowerElectronicsConnectionController**

7387 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :
7388 IdentifiedObject : ExtEulIdentifiedObject : Identity

7389 Power electronics connection controller is controlling the equipment to optimize the power
7390 electronics connection.

7391 Table 879 shows all attributes of PowerElectronicsConnectionController.

7392 **Table 879 – Attributes of ExtControl::PowerElectronicsConnectionController**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 880 shows all association ends of PowerElectronicsConnectionController with other classes.

Table 880 – Association ends of ExtControl::PowerElectronicsConnectionController with other classes

mult from	name	mult to	type	description
0..1	PowerElectronicsUnitController	0..*	PowerElectronicsUnitController	(NC) Power electronics unit controller that has this power electronics connection controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.66 (NC) PowerElectronicsUnitController

Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

Power electronics unit controller is controlling the equipment to optimize the power electronics unit.

Table 881 shows all attributes of PowerElectronicsUnitController.

7405

Table 881 – Attributes of ExtControl::PowerElectronicsUnitController

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7406

7407

Table 882 shows all association ends of PowerElectronicsUnitController with other classes.

7408

Table 882 – Association ends of ExtControl::PowerElectronicsUnitController with other classes

7409

mult from	name	mult to	type	description
0..1	PowerElectronicsUnit	0..*	PowerElectronicsUnit	(NC) Power electronics unit that has this power electronics unit controller.
0..*	PowerElectronicsConnectionController	0..1	PowerElectronicsConnectionController	(NC) Power electronics connection controller for the power electronics unit controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7410

7411 **3.25.67 (NC) PowerFactorControlFunction**

7412 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :
 7413 ExtEulIdentifiedObject : Identity

7414 Power factor control function is a function block that calculates the operating point of the
 7415 controlled equipment to achieve the target power factor.

7416 Table 883 shows all attributes of PowerFactorControlFunction.

7417 **Table 883 – Attributes of ExtControl::PowerFactorControlFunction**

name	mult	type	description
targetValue	0..1	Float	(NC) Target power-factor value that the control function aims to achieve by adjusting the operating setpoint of the controlled equipment. A positive value represents capacitive operation, while a negative value represents inductive operation.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetValueDeadband	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7418

7419 Table 884 shows all association ends of PowerFactorControlFunction with other classes.

7420 **Table 884 – Association ends of ExtControl::PowerFactorControlFunction with other**
 7421 **classes**

mult from	name	mult to	type	description
1..1	PowerFactorControlFunctionSchedule	0..*	PowerFactorControlFunctionSchedule	(NC) The schedule of the control function.
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7422

7423 **3.25.68 (NC) PowerFactorControlFunctionSchedule**7424 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

7425 ExtEulIdentifiedObject : Identity

7426 the schedule for PowerFactorControlFunction.

7427 Table 885 shows all attributes of PowerFactorControlFunctionSchedule.

7428 **Table 885 – Attributes of ExtControl::PowerFactorControlFunctionSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7429

7430 Table 886 shows all association ends of PowerFactorControlFunctionSchedule with other
7431 classes.7432 **Table 886 – Association ends of ExtControl::PowerFactorControlFunctionSchedule with**
7433 **other classes**

mult from	name	mult to	type	description
0..*	PowerFactorControlFunction	1..1	PowerFactorControlFunction	(NC) The control function that has this schedule.
1..1	PowerFactorControlFunctionTimePoint	1..*	PowerFactorControlFunctionTimePoint	(NC) The time point of the schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7434

7435 **3.25.69 (NC) PowerFactorControlFunctionTimePoint root class**

7436 Power factor control function value for a given point in time.

7437 Table 887 shows all attributes of PowerFactorControlFunctionTimePoint.

7438 **Table 887 – Attributes of ExtControl::PowerFactorControlFunctionTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
targetValue	0..1	Float	(NC) Target value for the power factor that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.

7439
7440 Table 888 shows all association ends of PowerFactorControlFunctionTimePoint with other
7441 classes.

7442 **Table 888 – Association ends of ExtControl::PowerFactorControlFunctionTimePoint**
7443 **with other classes**

mult from	name	mult to	type	description
1..*	PowerFactorControlFunctionSchedule	1..1	PowerFactorControlFunctionSchedule	(NC) The schedule that has this time point.

7444
7445 **3.25.70 (NC) PowerFrequencyController**
7446 Inheritance path = [SystemControl](#) : [AutomationFunction](#) : PowerSystemResource :
7447 IdentifiedObject : ExtEulIdentifiedObject : Identity
7448 Power frequency controller is controlling the active power balance as typically done by the
7449 secondary control. If an unbalance between the scheduled active power values of each
7450 generation unit and the loads plus losses occurs, primary control will adapt (increase/decrease)
7451 the active power production of each unit (depending on the power shift key strategy), leading
7452 to an over- or under-frequency situation. The secondary frequency controller will then control
7453 the frequency back to its nominal value, re- establishing a cost-efficient generation delivered
7454 by each unit.

7455 Table 889 shows all attributes of PowerFrequencyController.

7456 **Table 889 – Attributes of ExtControl::PowerFrequencyController**

name	mult	type	description
mode	0..1	PowerFrequencyControlKind	(NC) Mode of the power frequency controller.
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7457
7458 Table 890 shows all association ends of PowerFrequencyController with other classes.

7459
7460**Table 890 – Association ends of ExtControl::PowerFrequencyController with other classes**

mult from	name	mult to	type	description
0..1	ControlArea	0..1	ControlArea	(NC) Control area which has a power frequency controller.
0..1	MonitoringArea	0..1	MonitoringArea	(NC) Monitoring area that has this power frequency controller.
0..*	PowerShiftKeyStrategy	0..1	PowerShiftKeyStrategy	(NC) Power shift key strategy for this power frequency controller.
0..1	FrequencyMonitoringTerminal	0..*	FrequencyMonitoringTerminal	(NC) Frequency monitoring terminal for this power frequency controller.
0..1	EquipmentController	1..*	EquipmentController	(NC) inherited from: SystemControl
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7461

7462 3.25.71 (NC) PowerPlantController7463 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :

7464 IdentifiedObject : ExtEulIdentifiedObject : Identity

7465 Power plant controller is controlling the equipment of a power plant.

7466 Table 891 shows all attributes of PowerPlantController.

7467 Table 891 – Attributes of ExtControl::PowerPlantController

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 892 shows all association ends of PowerPlantController with other classes.

Table 892 – Association ends of ExtControl::PowerPlantController with other classes

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.72 (NC) ReactivePowerControlFunction

Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Reactive power control function is a function block that calculate the operating point of the controlled equipment to achieve the target reactive power.

Table 893 shows all attributes of ReactivePowerControlFunction.

Table 893 – Attributes of ExtControl::ReactivePowerControlFunction

name	mult	type	description
targetValue	0..1	ReactivePower	(NC) Target value for the reactive power that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetValueDeadband	0..1	PerCent	(NC) inherited from: ControlFunctionBlock

name	mult	type	description
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 894 shows all association ends of ReactivePowerControlFunction with other classes.

Table 894 – Association ends of ExtControl::ReactivePowerControlFunction with other classes

mult from	name	mult to	type	description
1..1	ReactivePowerControlFunctionSchedule	0..*	ReactivePowerControlFunctionSchedule	(NC) The schedule of the control function.
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.73 (NC) ReactivePowerControlFunctionSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

The schedule for ReactivePowerControlFunction.

Table 895 shows all attributes of ReactivePowerControlFunctionSchedule.

Table 895 – Attributes of ExtControl::ReactivePowerControlFunctionSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries

name	mult	type	description
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 896 shows all association ends of ReactivePowerControlFunctionSchedule with other classes.

Table 896 – Association ends of ExtControl::ReactivePowerControlFunctionSchedule with other classes

mult from	name	mult to	type	description
0..*	ReactivePowerControlFunction	1..1	ReactivePowerControlFunction	(NC) The control function that has this schedule.
1..1	ReactivePowerControlFunctionTimePoint	1..*	ReactivePowerControlFunctionTimePoint	(NC) The time point of the schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.74 (NC) ReactivePowerControlFunctionTimePoint root class

Reactive power control function value for a given point in time.

Table 897 shows all attributes of ReactivePowerControlFunctionTimePoint.

Table 897 – Attributes of ExtControl::ReactivePowerControlFunctionTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
targetValue	0..1	ReactivePower	(NC) Target value for the reactive power that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.

Table 898 shows all association ends of ReactivePowerControlFunctionTimePoint with other classes.

Table 898 – Association ends of ExtControl::ReactivePowerControlFunctionTimePoint with other classes

mult from	name	mult to	type	description
1..*	ReactivePowerControlFunctionSchedule	1..1	ReactivePowerControlFunctionSchedule	(NC) The schedule that has this time point.

3.25.75 (NC) RotatingMachineController

Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

Rotating machine controller is controlling the equipment which may be used as a generator or motor.

Table 899 shows all attributes of RotatingMachineController.

Table 899 – Attributes of ExtControl::RotatingMachineController

name	mult	type	description
mode	0..1	RotatingMachineControlModeKind	(NC) Mode of the rotating machine controller.
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 900 shows all association ends of RotatingMachineController with other classes.

Table 900 – Association ends of ExtControl::RotatingMachineController with other classes

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7517

7518 **3.25.76 (NC) ScheduleResourceController**

7519 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :
 7520 IdentifiedObject : ExtEulIdentifiedObject : Identity

7521 Schedule resource controller is controlling the equipment to optimize the schedule resource.

7522 Table 901 shows all attributes of ScheduleResourceController.

7523

Table 901 – Attributes of ExtControl::ScheduleResourceController

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7524

7525 Table 902 shows all association ends of ScheduleResourceController with other classes.

7526 **Table 902 – Association ends of ExtControl::ScheduleResourceController with other**
 7527 **classes**

mult from	name	mult to	type	description
0..1	ScheduleResource	0..1	ScheduleResource	(NC) Schedule resource that has a schedule resource controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction

mult from	name	mult to	type	description
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7528

7529 **3.25.77 (NC) StaticSynchronousSeriesCompensator**

7530 Inheritance path = [FACTSEquipment](#) : RegulatingCondEq : EnergyConnection :
 7531 ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :
 7532 ExtEulIdentifiedObject : Identity

7533 Static synchronous series compensator (SSSC) is a type of flexible AC transmission system
 7534 which consists of a solid-state voltage source inverter coupled with a transformer that is
 7535 connected in series with a transmission line. This device can inject an almost sinusoidal voltage
 7536 in series with the line. This injected voltage could be considered as an inductive or capacitive
 7537 reactance, which is connected in series with the transmission line. This feature can provide
 7538 controllable voltage compensation. In addition, SSSC is able to reverse the power flow by
 7539 injecting a sufficiently large series reactive compensating voltage. Moreover it can inject a
 7540 voltage proportional to the difference between the line current and the pre-configured current
 7541 threshold. It shall have two Terminal-s associated with it.

7542 Table 903 shows all attributes of StaticSynchronousSeriesCompensator.

7543 **Table 903 – Attributes of ExtControl::StaticSynchronousSeriesCompensator**

name	mult	type	description
slope	0..1	VoltagePerReactivePower	(NC) inherited from: FACTSEquipment
q	0..1	ReactivePower	(NC) inherited from: FACTSEquipment
ratedI	0..1	CurrentFlow	(NC) inherited from: FACTSEquipment
ratedU	0..1	Voltage	(NC) inherited from: FACTSEquipment
ratedC	0..1	Reactance	(NC) inherited from: FACTSEquipment
ratedL	0..1	Reactance	(NC) inherited from: FACTSEquipment
minC	0..1	Reactance	(NC) inherited from: FACTSEquipment
maxC	0..1	Reactance	(NC) inherited from: FACTSEquipment
minL	0..1	Reactance	(NC) inherited from: FACTSEquipment
maxL	0..1	Reactance	(NC) inherited from: FACTSEquipment
controlEnabled	0..1	Boolean	inherited from: RegulatingCondEq

name	mult	type	description
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 904 shows all association ends of StaticSynchronousSeriesCompensator with other classes.

Table 904 – Association ends of ExtControl::StaticSynchronousSeriesCompensator with other classes

mult from	name	mult to	type	description
0..1	LossCurve	0..*	LossCurve	(NC) inherited from: FACTSEquipment
0..*	RegulatingControl	0..1	RegulatingControl	inherited from: RegulatingCondEq
0..*	BaseVoltage	0..1	BaseVoltage	inherited from: ConductingEquipment
1..1	SvStatus	0..*	SvStatus	inherited from: ConductingEquipment
0..*	ProtectionEquipments	0..*	ProtectionEquipment	inherited from: ConductingEquipment
1..1	Terminals	0..*	Terminal	inherited from: ConductingEquipment
0..1	RelayDynamics	0..*	RelayDynamics	inherited from: ConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7549

7550 **3.25.78 (NC) SubstationController**

7551 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :
 7552 IdentifiedObject : ExtEulIdentifiedObject : Identity

7553 Substation controller is controlling the equipment to optimize the use of the controlling
 7554 equipment within a substation.

7555 Table 905 shows all attributes of SubstationController.

7556 **Table 905 – Attributes of ExtControl::SubstationController**

name	mult	type	description
mode	0..1	SubstationControllerModeKind	(NC) Mode of the substation controller.
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7557

7558 Table 906 shows all association ends of SubstationController with other classes.

7559 **Table 906 – Association ends of ExtControl::SubstationController with other classes**

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource

mult from	name	mult to	type	description
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7560

7561 **3.25.79 (NC) SystemControl**

7562 Inheritance path = [AutomationFunction](#) : PowerSystemResource : IdentifiedObject :
 7563 ExtEulIdentifiedObject : Identity

7564 System control is the management and regulation of various parameters within the electrical
 7565 grid to ensure its stable and reliable operation. The primary goal of system control is to maintain
 7566 the balance between electricity generation and consumption, while also managing factors such
 7567 as voltage, frequency, and power quality. This involves the use of control devices, automation,
 7568 and monitoring systems to respond to changes in the grid and maintain its overall stability.
 7569 This serves as Integrated AC and DC control system (IEC 60633) which governs the integrated
 7570 operation of AC and DC systems of a power system.

7571 Table 907 shows all attributes of SystemControl.

7572 **Table 907 – Attributes of ExtControl::SystemControl**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7573

7574 Table 908 shows all association ends of SystemControl with other classes.

7575 **Table 908 – Association ends of ExtControl::SystemControl with other classes**

mult from	name	mult to	type	description
0..1	EquipmentController	1..*	EquipmentController	(NC) Equipment controller controls by this system control
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction

mult from	name	mult to	type	description
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7576

7577 **3.25.80 (NC) TapChangerController**7578 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :

7579 IdentifiedObject : ExtEulIdentifiedObject : Identity

7580 Tap changer controller is an equipment controller that controls a tap changer, e.g. how the
7581 voltage at the end of a line varies with the load level and compensation of the voltage drop by
7582 tap adjustment.

7583 Table 909 shows all attributes of TapChangerController.

7584

Table 909 – Attributes of ExtControl::TapChangerController

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7585

7586 Table 910 shows all association ends of TapChangerController with other classes.

7587 **Table 910 – Association ends of ExtControl::TapChangerController with other classes**

mult from	name	mult to	type	description
0..1	TapChanger	0..*	TapChanger	(NC) All tap changers controlled by this controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController

mult from	name	mult to	type	description
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7588

7589 **3.25.81 (NC) TCSCController**7590 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :

7591 IdentifiedObject : ExtEulIdentifiedObject : Identity

7592 TCSC controller is controlling the equipment to optimize the performance of the TCSC.

7593 Table 911 shows all attributes of TCSCController.

7594 **Table 911 – Attributes of ExtControl::TCSCController**

name	mult	type	description
mode	0..1	TCSCControlModeKind	(NC) Mode of the TCSC controller.
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7595

7596 Table 912 shows all association ends of TCSCController with other classes.

7597

Table 912 – Association ends of ExtControl::TCSCController with other classes

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7598

3.25.82 (NC) UnifiedPowerFlowController7600 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :

7601 IdentifiedObject : ExtEulIdentifiedObject : Identity

7602 Unified power flow controller (UPFC) is providing fast-acting reactive power compensation on
7603 high-voltage electricity transmission networks.

7604 Table 913 shows all attributes of UnifiedPowerFlowController.

7605

Table 913 – Attributes of ExtControl::UnifiedPowerFlowController

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
normalEnabled	0..1	Boolean	(NC) inherited from: AutomationFunction
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 914 shows all association ends of UnifiedPowerFlowController with other classes.

Table 914 – Association ends of ExtControl::UnifiedPowerFlowController with other classes

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
1..*	SystemControl	0..1	SystemControl	(NC) inherited from: EquipmentController
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: AutomationFunction
1..1	AutomationBlockGroup	0..*	AutomationBlockGroup	(NC) inherited from: AutomationFunction
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.83 (NC) VoltageAngleControlFunction

Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

Voltage angle control function is a function block that calculates operating point of the controlled equipment to achieve the target voltage angle.

Table 915 shows all attributes of VoltageAngleControlFunction.

Table 915 – Attributes of ExtControl::VoltageAngleControlFunction

name	mult	type	description
targetValue	0..1	AngleDegrees	(NC) Target value for the voltage angle that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetValueDeadband	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock

name	mult	type	description
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 916 shows all association ends of VoltageAngleControlFunction with other classes.

Table 916 – Association ends of ExtControl::VoltageAngleControlFunction with other classes

mult from	name	mult to	type	description
1..1	VoltageAngleControlFunctionSchedule	0..*	VoltageAngleControlFunctionSchedule	(NC) The schedule of the control function.
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.84 (NC) VoltageAngleControlFunctionSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

The schedule for VoltageAngleControlFunction.

Table 917 shows all attributes of VoltageAngleControlFunctionSchedule.

Table 917 – Attributes of ExtControl::VoltageAngleControlFunctionSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 918 shows all association ends of VoltageAngleControlFunctionSchedule with other classes.

Table 918 – Association ends of ExtControl::VoltageAngleControlFunctionSchedule with other classes

mult from	name	mult to	type	description
0..*	VoltageAngleControlFunction	1..1	VoltageAngleControlFunction	(NC) The control function that has this schedule.
1..1	VoltageAngleControlFunctionTimePoint	1..*	VoltageAngleControlFunctionTimePoint	(NC) The time point of the schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.25.85 (NC) VoltageAngleControlFunctionTimePoint root class

Voltage angle control function value for a given point in time.

Table 919 shows all attributes of VoltageAngleControlFunctionTimePoint.

Table 919 – Attributes of ExtControl::VoltageAngleControlFunctionTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
targetValue	0..1	AngleDegrees	(NC) Target value for the voltage angle that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.

Table 920 shows all association ends of VoltageAngleControlFunctionTimePoint with other classes.

Table 920 – Association ends of ExtControl::VoltageAngleControlFunctionTimePoint with other classes

mult from	name	mult to	type	description
1..*	VoltageAngleControlFunctionSchedule	1..1	VoltageAngleControlFunctionSchedule	(NC) The schedule that has this time point.

7645 **3.25.86 (NC) VoltageControlFunction**7646 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :
7647 ExtEulIdentifiedObject : Identity7648 Voltage control function is a function block that calculate the operating point of the controlled
7649 equipment to achieve the target voltage.

7650 Table 921 shows all attributes of VoltageControlFunction.

7651 **Table 921 – Attributes of ExtControl::VoltageControlFunction**

name	mult	type	description
targetValue	0..1	Voltage	(NC) Target value for the voltage that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetValueDeadband	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
normalEnabled	0..1	Boolean	(NC) inherited from: FunctionBlock
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7652
7653 Table 922 shows all association ends of VoltageControlFunction with other classes.7654 **Table 922 – Association ends of ExtControl::VoltageControlFunction with other classes**

mult from	name	mult to	type	description
1..1	VoltageControlFunction Schedule	0..*	VoltageControlFunction Schedule	(NC) The schedule of the control function.
1..1	ControlFunctionBlockAct ion	0..*	ControlFunctionBlockAct ion	(NC) inherited from: ControlFunctionBlock
0..1	GenericEnablingSchedul e	0..*	GenericEnablingSchedul e	(NC) inherited from: FunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7655

7656 **3.25.87 (NC) VoltageControlFunctionSchedule**

7657 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
 7658 ExtEulIdentifiedObject : Identity

7659 The schedule for VoltageControlFunction.

7660 Table 923 shows all attributes of VoltageControlFunctionSchedule.

7661 **Table 923 – Attributes of ExtControl::VoltageControlFunctionSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7662

7663 Table 924 shows all association ends of VoltageControlFunctionSchedule with other classes.

7664 **Table 924 – Association ends of ExtControl::VoltageControlFunctionSchedule with other classes**

7665

mult from	name	mult to	type	description
0..*	VoltageControlFunction	1..1	VoltageControlFunction	(NC) The control function that has this schedule.
1..1	VoltageControlFunctionTimePoint	1..*	VoltageControlFunctionTimePoint	(NC) The time point of the schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7666

7667 **3.25.88 (NC) VoltageControlFunctionTimePoint root class**

7668 Voltage control function value for a given point in time.

7669 Table 925 shows all attributes of VoltageControlFunctionTimePoint.

7670 **Table 925 – Attributes of ExtControl::VoltageControlFunctionTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.

name	mult	type	description
targetValue	0..1	Voltage	(NC) Target value for the voltage that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.

Table 926 shows all association ends of VoltageControlFunctionTimePoint with other classes.

Table 926 – Association ends of ExtControl::VoltageControlFunctionTimePoint with other classes

mult from	name	mult to	type	description
1..*	VoltageControlFunctionSchedule	1..1	VoltageControlFunctionSchedule	(NC) The schedule that has this time point.

3.25.89 (NC) VoltageInjectionControlFunctionSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

The schedule for VoltageInjectionControlFunction.

Table 927 shows all attributes of VoltageInjectionControlFunctionSchedule.

Table 927 – Attributes of ExtControl::VoltageInjectionControlFunctionSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	(NC) inherited from: BaseTimeSeries
timeSeriesKind	0..1	BaseTimeSeriesKind	(NC) inherited from: BaseTimeSeries
actionMethod	0..1	String	(NC) inherited from: BaseTimeSeries
percentile	0..1	Integer	(NC) inherited from: BaseTimeSeries
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 928 shows all association ends of VoltageInjectionControlFunctionSchedule with other classes.

Table 928 – Association ends of ExtControl::VoltageInjectionControlFunctionSchedule with other classes

mult from	name	mult to	type	description
0..*	VoltageInjectionControlFunction	1..1	VoltageInjectionControlFunction	(NC) The control function that has this schedule.
1..1	VoltageInjectionControlFunctionTimePoint	1..*	VoltageInjectionControlFunctionTimePoint	(NC) The time point of the schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject

mult from	name	mult to	type	description
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7687

7688 **3.25.90 (NC) VoltageInjectionControlFunctionTimePoint root class**

7689 Voltage injection control function value for a given point in time.

7690 Table 929 shows all attributes of VoltageInjectionControlFunctionTimePoint.

7691 **Table 929 – Attributes of ExtControl::VoltageInjectionControlFunctionTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
targetValue	0..1	Voltage	(NC) Target value for the voltage that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.

7692

7693 Table 930 shows all association ends of VoltageInjectionControlFunctionTimePoint with other
7694 classes.7695 **Table 930 – Association ends of ExtControl::VoltageInjectionControlFunctionTimePoint**
7696 **with other classes**

mult from	name	mult to	type	description
1..*	VoltageInjectionControlFunctionSchedule	1..1	VoltageInjectionControlFunctionSchedule	(NC) The schedule that has this time point.

7697

7698 **3.26 Package ExtGeneratingUnit**7699 **3.26.1 General**

7700 This package contains the extensions related to the generating unit.

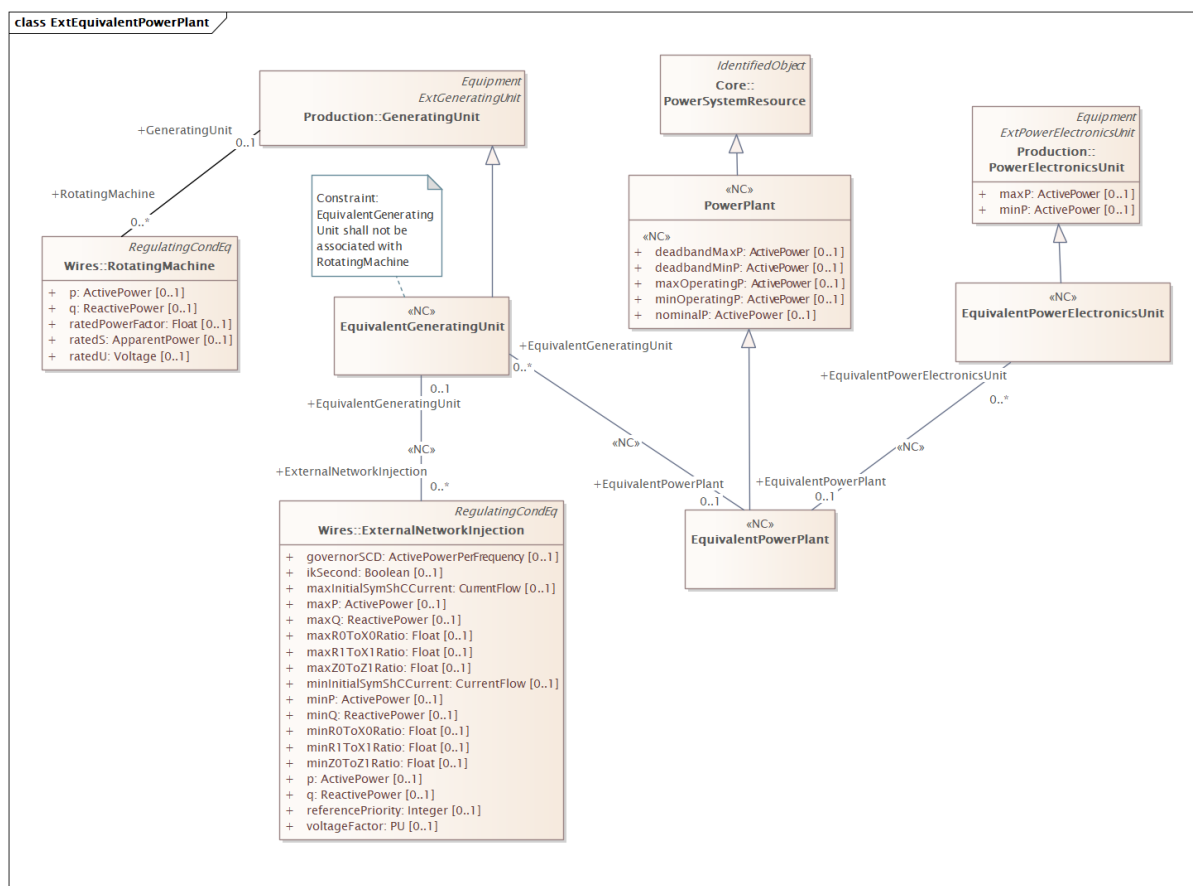


Figure 69 – Class diagram ExtGeneratingUnit::ExtEquivalentPowerPlant

Figure 69: The diagram contains classes related to generating unit.

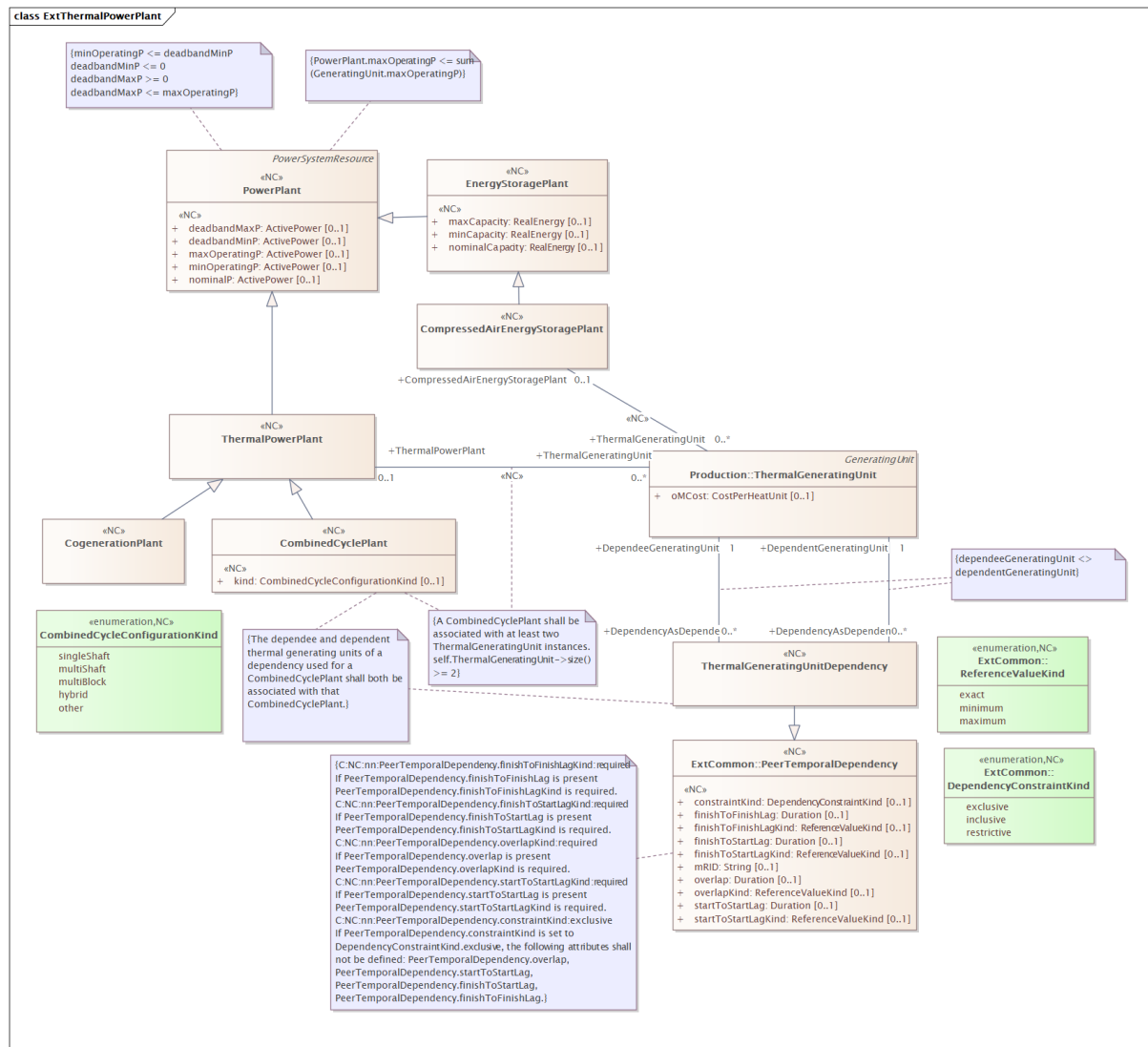


Figure 70 – Class diagram ExtGeneratingUnit::ExtThermalPowerPlant

Figure 70:

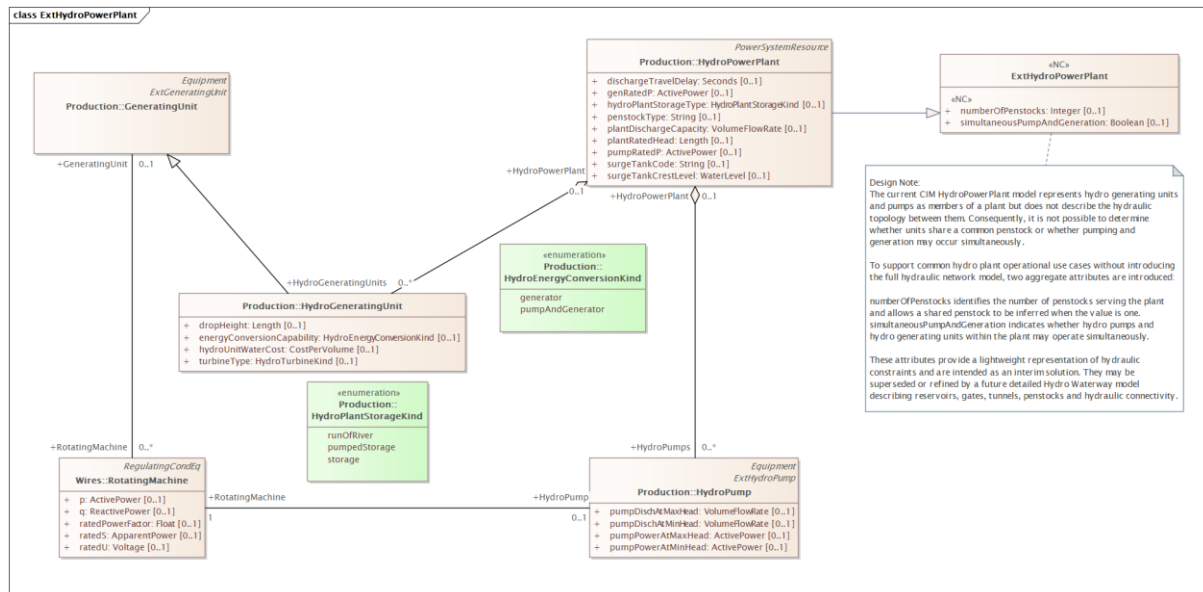


Figure 71 – Class diagram ExtGeneratingUnit::ExtHydroPowerPlant

Figure 71:

3.26.2 (NC) EquivalentGeneratingUnit

Inheritance path = GeneratingUnit : Equipment : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity : [ExtGeneratingUnit](#)

An indivisible set of installations which can generate electrical energy such that the frequency of the generated voltage, the generator speed and the frequency of network voltage are in a constant ratio and thus in synchronism. This is often referred as synchronous power-generating module.

Table 931 shows all attributes of EquivalentGeneratingUnit.

Table 931 – Attributes of ExtGeneratingUnit::EquivalentGeneratingUnit

name	mult	type	description
allocSpinResP	0..1	ActivePower	inherited from: GeneratingUnit
autoCntrlMarginP	0..1	ActivePower	inherited from: GeneratingUnit
baseP	0..1	ActivePower	inherited from: GeneratingUnit
controlDeadband	0..1	ActivePower	inherited from: GeneratingUnit
controlPulseHigh	0..1	Seconds	inherited from: GeneratingUnit
controlPulseLow	0..1	Seconds	inherited from: GeneratingUnit
controlResponseRate	0..1	ActivePowerChangeRate	inherited from: GeneratingUnit
efficiency	0..1	PerCent	inherited from: GeneratingUnit
genControlMode	0..1	GeneratorControlMode	inherited from: GeneratingUnit
genControlSource	0..1	GeneratorControlSource	inherited from: GeneratingUnit
governorMPL	0..1	PU	inherited from: GeneratingUnit
governorSCD	0..1	PerCent	inherited from: GeneratingUnit
highControlLimit	0..1	ActivePower	inherited from: GeneratingUnit
initialIP	0..1	ActivePower	inherited from: GeneratingUnit
longPF	0..1	Float	inherited from: GeneratingUnit
lowControlLimit	0..1	ActivePower	inherited from: GeneratingUnit

name	mult	type	description
lowerRampRate	0..1	ActivePowerChangeRate	inherited from: GeneratingUnit
maxEconomicP	0..1	ActivePower	inherited from: GeneratingUnit
maximumAllowableSpinningReserve	0..1	ActivePower	inherited from: GeneratingUnit
maxOperatingP	0..1	ActivePower	inherited from: GeneratingUnit
minEconomicP	0..1	ActivePower	inherited from: GeneratingUnit
minimumOffTime	0..1	Seconds	inherited from: GeneratingUnit
minOperatingP	0..1	ActivePower	inherited from: GeneratingUnit
modelDetail	0..1	Classification	inherited from: GeneratingUnit
nominalP	0..1	ActivePower	inherited from: GeneratingUnit
normalPF	0..1	Float	inherited from: GeneratingUnit
penaltyFactor	0..1	Float	inherited from: GeneratingUnit
raiseRampRate	0..1	ActivePowerChangeRate	inherited from: GeneratingUnit
ratedGrossMaxP	0..1	ActivePower	inherited from: GeneratingUnit
ratedGrossMinP	0..1	ActivePower	inherited from: GeneratingUnit
ratedNetMaxP	0..1	ActivePower	inherited from: GeneratingUnit
shortPF	0..1	Float	inherited from: GeneratingUnit
startupCost	0..1	Money	inherited from: GeneratingUnit
startupTime	0..1	Seconds	inherited from: GeneratingUnit
tieLinePF	0..1	Float	inherited from: GeneratingUnit
totalEfficiency	0..1	PerCent	inherited from: GeneratingUnit
variableCost	0..1	Money	inherited from: GeneratingUnit
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
maxStartupLoad	0..1	ActivePower	(NC) inherited from: ExtGeneratingUnit
participationFactor	0..1	Float	(NC) inherited from: ExtGeneratingUnit
normalShutdownCost	0..1	Decimal	(NC) inherited from: ExtGeneratingUnit
shutdownTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
warmStartupTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
coolDownTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
warmStartupCost	0..1	Decimal	(NC) inherited from: ExtGeneratingUnit
startupRampRate	0..1	ActivePowerChangeRate	(NC) inherited from: ExtGeneratingUnit

name	mult	type	description
normalMustRunP	0..1	ActivePower	(NC) inherited from: ExtGeneratingUnit
mustRunP	0..1	ActivePower	(NC) inherited from: ExtGeneratingUnit
runningLeadTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
minimumUpTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
normalStartupCost	0..1	Decimal	(NC) inherited from: ExtGeneratingUnit
normalWarmStartupCost	0..1	Decimal	(NC) inherited from: ExtGeneratingUnit
mustRunQ	0..1	ReactivePower	(NC) inherited from: ExtGeneratingUnit
normalMustRunQ	0..1	ReactivePower	(NC) inherited from: ExtGeneratingUnit
isRamping	0..1	Boolean	(NC) inherited from: ExtGeneratingUnit
rampLockTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
maxRampDownCountPerDay	0..1	Integer	(NC) inherited from: ExtGeneratingUnit
costCurrency	0..1	Currency	(NC) inherited from: ExtGeneratingUnit
shutdownCost	0..1	Decimal	(NC) inherited from: ExtGeneratingUnit
mustRun	0..1	Boolean	(NC) inherited from: ExtGeneratingUnit
normalParticipationFactor	0..1	Float	(NC) inherited from: ExtGeneratingUnit

Table 932 shows all association ends of EquivalentGeneratingUnit with other classes.

Table 932 – Association ends of ExtGeneratingUnit::EquivalentGeneratingUnit with other classes

mult from	name	mult to	type	description
0..1	ExternalNetworkInjection	0..*	ExternalNetworkInjection	(NC) External network injection part of the equivalent generating unit.
0..*	EquivalentPowerPlant	0..1	EquivalentPowerPlant	(NC) Equivalent power plant that has this equivalent generating unit.
0..1	RotatingMachine	0..*	RotatingMachine	inherited from: GeneratingUnit
1..1	GenUnitOpCostCurves	0..*	GenUnitOpCostCurve	inherited from: GeneratingUnit
1..1	GenUnitOpSchedule	0..1	GenUnitOpSchedule	inherited from: GeneratingUnit
1..1	ControlAreaGeneratingUnit	0..*	ControlAreaGeneratingUnit	inherited from: GeneratingUnit
1..1	GrossToNetActivePowerCurves	0..*	GrossToNetActivePowerCurve	inherited from: GeneratingUnit
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7723

7724 **3.26.3 (NC) EquivalentPowerPlant**

7725 Inheritance path = [PowerPlant](#) : PowerSystemResource : IdentifiedObject :
 7726 ExtEulIdentifiedObject : Identity

7727 Collection of equivalent equipment for purposes of generation.

7728 Table 933 shows all attributes of EquivalentPowerPlant.

7729

Table 933 – Attributes of ExtGeneratingUnit::EquivalentPowerPlant

name	mult	type	description
nominalP	0..1	ActivePower	(NC) inherited from: PowerPlant
maxOperatingP	0..1	ActivePower	(NC) inherited from: PowerPlant
minOperatingP	0..1	ActivePower	(NC) inherited from: PowerPlant
deadbandMinP	0..1	ActivePower	(NC) inherited from: PowerPlant
deadbandMaxP	0..1	ActivePower	(NC) inherited from: PowerPlant
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7730

7731 Table 934 shows all association ends of EquivalentPowerPlant with other classes.

7732 **Table 934 – Association ends of ExtGeneratingUnit::EquivalentPowerPlant with other**
 7733 **classes**

mult from	name	mult to	type	description
0..1	EquivalentPowerElectronicsUnit	0..*	EquivalentPowerElectronicsUnit	(NC) Equivalent power electronics that is part of the equivalent power plant.
0..1	EquivalentGeneratingUnit	0..*	EquivalentGeneratingUnit	(NC) Equivalent generating unit that is part of the equivalent power plant.
0..*	ResourceContainer	0..1	Facility	inherited from: PowerPlant
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7734

7735 **3.26.4 (NC) PowerPlant**

7736 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

7737 A functional aggregation of one or more generating units and associated equipment that is
7738 coordinated to produce, consume or exchange active power with the power system.

7739 Table 935 shows all attributes of PowerPlant.

7740

Table 935 – Attributes of ExtGeneratingUnit::PowerPlant

name	mult	type	description
nominalP	0..1	ActivePower	(NC) The reference active power capacity of the power plant.
maxOperatingP	0..1	ActivePower	(NC) The maximum net active power at which the power plant is designed to operate.
minOperatingP	0..1	ActivePower	(NC) The minimum signed net active power at which the power plant is designed to operate.
deadbandMinP	0..1	ActivePower	(NC) The lower active-power boundaries of the range around zero in which continuous power-plant operation is not supported.
deadbandMaxP	0..1	ActivePower	(NC) The upper active-power boundaries of the range around zero in which continuous power-plant operation is not supported.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7741

7742 Table 936 shows all association ends of PowerPlant with other classes.

7743 **Table 936 – Association ends of ExtGeneratingUnit::PowerPlant with other classes**

mult from	name	mult to	type	description
0..*	ResourceContainer	0..1	Facility	
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource

mult from	name	mult to	type	description
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7744

7745

3.26.5 (NC) EquivalentPowerElectronicsUnit

7746 Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource :

7747 IdentifiedObject : ExtEuIdentifiedObject : Identity : [ExtPowerElectronicsUnit](#)

7748 An equivalent unit or ensemble of units generating electricity, which is either non-synchronously
7749 connected to the network or connected through power electronics, and that also has a single
7750 connection point to a transmission system, distribution system including closed distribution
7751 system or an equivalent representation of a HVDC system. This is often referred as power park
7752 module.

7753 Table 937 shows all attributes of EquivalentPowerElectronicsUnit.

7754

Table 937 – Attributes of ExtGeneratingUnit::EquivalentPowerElectronicsUnit

name	mult	type	description
maxP	0..1	ActivePower	inherited from: PowerElectronicsUnit
minP	0..1	ActivePower	inherited from: PowerElectronicsUnit
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
p	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit
normalParticipationFactor	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
participationFactor	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
maxEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit
minEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit

7755

7756 Table 938 shows all association ends of EquivalentPowerElectronicsUnit with other classes.

7757 **Table 938 – Association ends of ExtGeneratingUnit::EquivalentPowerElectronicsUnit**
7758 **with other classes**

mult from	name	mult to	type	description
0..*	EquivalentPowerPlant	0..1	EquivalentPowerPlant	(NC) Equivalent power plan that has this equivalent power electronics unit.
0..*	PowerElectronicsConnection	1..1	PowerElectronicsConnection	inherited from: PowerElectronicsUnit
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7759

7760 3.26.6 (NC) MobileElectricalUnit

7761 Inheritance path = BatteryUnit : PowerElectronicsUnit : Equipment : PowerSystemResource :
7762 IdentifiedObject : ExtEulIdentifiedObject : Identity : [ExtPowerElectronicsUnit](#)

7763 A MobileElectricalUnit represents a persistent power system resource that can act as a source
7764 or sink of electrical energy within the grid. It is designed to interface with the grid through
7765 defined connection points for charging or discharging, while the physical energy storage asset
7766 associated with it (e.g., an electric vehicle or battery trailer) may be mobile.

7767 The MobileElectricalUnit abstracts the system-side functionality of mobile energy storage,
7768 independent of specific assets or charging events. It typically stores electrical energy in
7769 batteries or equivalent storage media and supports flexible, temporary, or location-variable
7770 integration into the power system.

7771 Examples include, but are not limited to:

- 7772 - Electric vehicles (EVs)
- 7773 - Electrically powered ferries
- 7774 - Trailer-based battery storage units
- 7775 - Mobile battery systems for backup or temporary grid support
- 7776 - This concept supports consistent modeling of mobile energy systems in grid studies by treating
7777 the grid-facing connection as a stable power system element, while the associated physical unit
7778 is managed as an asset.

7779 Table 939 shows all attributes of MobileElectricalUnit.

7780

Table 939 – Attributes of ExtGeneratingUnit::MobileElectricalUnit

name	mult	type	description
batteryState	0..1	BatteryStateKind	inherited from: BatteryUnit
ratedE	0..1	RealEnergy	inherited from: BatteryUnit
storedE	0..1	RealEnergy	inherited from: BatteryUnit
maxP	0..1	ActivePower	inherited from: PowerElectronicsUnit
minP	0..1	ActivePower	inherited from: PowerElectronicsUnit
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
p	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit
normalParticipationFactor	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
participationFactor	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
maxEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit
minEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit

7781

7782

Table 940 shows all association ends of MobileElectricalUnit with other classes.

7783

7784

Table 940 – Association ends of ExtGeneratingUnit::MobileElectricalUnit with other classes

mult from	name	mult to	type	description
0..*	ElectricalChargingUnit	0..1	ElectricalChargingUnit	Electrical charging unit that has a mobile electrical unit.
0..*	PowerElectronicsConnection	1..1	PowerElectronicsConnection	inherited from: PowerElectronicsUnit
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7785

7786 **3.26.7 (NC) CombinedCyclePlant**

7787 Inheritance path = [ThermalPowerPlant](#) : [PowerPlant](#) : PowerSystemResource :
 7788 IdentifiedObject : ExtEulIdentifiedObject : Identity

7789 A thermal power plant in which two or more thermal generating units are operated in
 7790 combination so that heat from one thermodynamic cycle is used as an energy input to another
 7791 thermodynamic cycle.

7792 Note: A combined cycle plant normally includes at least one combustion-turbine generating unit
 7793 and one steam-turbine generating unit. Dependencies between the thermal generating units
 7794 may define their relative activation, deactivation and operation.

7795 Table 941 shows all attributes of CombinedCyclePlant.

7796

Table 941 – Attributes of ExtGeneratingUnit::CombinedCyclePlant

name	mult	type	description
kind	0..1	CombinedCycleConfigurationKind	(NC) The configuration used to arrange and coordinate the thermal generating units of the combined cycle plant.
nominalP	0..1	ActivePower	(NC) inherited from: PowerPlant
maxOperatingP	0..1	ActivePower	(NC) inherited from: PowerPlant
minOperatingP	0..1	ActivePower	(NC) inherited from: PowerPlant
deadbandMinP	0..1	ActivePower	(NC) inherited from: PowerPlant
deadbandMaxP	0..1	ActivePower	(NC) inherited from: PowerPlant
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

7797

7798 Table 942 shows all association ends of CombinedCyclePlant with other classes.

Table 942 – Association ends of ExtGeneratingUnit::CombinedCyclePlant with other classes

mult from	name	mult to	type	description
0..1	ThermalGeneratingUnit	0..*	ThermalGeneratingUnit	(NC) inherited from: ThermalPowerPlant
0..*	ResourceContainer	0..1	Facility	inherited from: PowerPlant
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.26.8 (NC) CogenerationPlant

Inheritance path = [ThermalPowerPlant](#) : [PowerPlant](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

A set of thermal generating units for the production of electrical energy and process steam (usually from the output of the steam turbines). The steam sendout is typically used for industrial purposes or for municipal heating and cooling.

Update:

Table 943 shows all attributes of CogenerationPlant.

Table 943 – Attributes of ExtGeneratingUnit::CogenerationPlant

name	mult	type	description
nominalP	0..1	ActivePower	(NC) inherited from: PowerPlant
maxOperatingP	0..1	ActivePower	(NC) inherited from: PowerPlant
minOperatingP	0..1	ActivePower	(NC) inherited from: PowerPlant
deadbandMinP	0..1	ActivePower	(NC) inherited from: PowerPlant
deadbandMaxP	0..1	ActivePower	(NC) inherited from: PowerPlant
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 944 shows all association ends of CogenerationPlant with other classes.

Table 944 – Association ends of ExtGeneratingUnit::CogenerationPlant with other classes

mult from	name	mult to	type	description
1..1	CogenerationCharacteristic	0..*	CogenerationCharacteristic	(NC) The aggregate active-power and steam-sendout characteristics applicable to the cogeneration plant.
0..1	ThermalGeneratingUnit	0..*	ThermalGeneratingUnit	(NC) inherited from: ThermalPowerPlant
0..*	ResourceContainer	0..1	Facility	inherited from: PowerPlant
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.26.9 (NC) CompressedAirEnergyStoragePlant

Inheritance path = [EnergyStoragePlant](#) : [PowerPlant](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

An energy storage plant in which energy is stored by compressing air and is subsequently recovered by expanding the compressed air to support electrical generation. The plant may use stored thermal energy, external heat or fuel combustion during the energy recovery process. Table 945 shows all attributes of CompressedAirEnergyStoragePlant.

Table 945 – Attributes of ExtGeneratingUnit::CompressedAirEnergyStoragePlant

name	mult	type	description
nominalCapacity	0..1	RealEnergy	(NC) inherited from: EnergyStoragePlant
minCapacity	0..1	RealEnergy	(NC) inherited from: EnergyStoragePlant
maxCapacity	0..1	RealEnergy	(NC) inherited from: EnergyStoragePlant
nominalP	0..1	ActivePower	(NC) inherited from: PowerPlant
maxOperatingP	0..1	ActivePower	(NC) inherited from: PowerPlant
minOperatingP	0..1	ActivePower	(NC) inherited from: PowerPlant
deadbandMinP	0..1	ActivePower	(NC) inherited from: PowerPlant
deadbandMaxP	0..1	ActivePower	(NC) inherited from: PowerPlant
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 946 shows all association ends of CompressedAirEnergyStoragePlant with other classes.

Table 946 – Association ends of ExtGeneratingUnit::CompressedAirEnergyStoragePlant with other classes

mult from	name	mult to	type	description
0..1	ThermalGeneratingUnit	0..*	ThermalGeneratingUnit	(NC) The thermal generating unit that is a member of this compressed air energy storage plant.
0..1	CompressedAirStorage	0..*	CompressedAirStorage	
0..*	ResourceContainer	0..1	Facility	inherited from: PowerPlant
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.26.10 (NC) ThermalPowerPlant

Inheritance path = [PowerPlant](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

A power plant that coordinates one or more thermal generating units for producing electrical energy through a thermal energy conversion process.

Table 947 shows all attributes of ThermalPowerPlant.

Table 947 – Attributes of ExtGeneratingUnit::ThermalPowerPlant

name	mult	type	description
nominalP	0..1	ActivePower	(NC) inherited from: PowerPlant
maxOperatingP	0..1	ActivePower	(NC) inherited from: PowerPlant
minOperatingP	0..1	ActivePower	(NC) inherited from: PowerPlant
deadbandMinP	0..1	ActivePower	(NC) inherited from: PowerPlant
deadbandMaxP	0..1	ActivePower	(NC) inherited from: PowerPlant
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 948 shows all association ends of ThermalPowerPlant with other classes.

Table 948 – Association ends of ExtGeneratingUnit::ThermalPowerPlant with other classes

mult from	name	mult to	type	description
0..1	ThermalGeneratingUnit	0..*	ThermalGeneratingUnit	(NC) The thermal generating unit that is coordinated as part of this thermal power plant.
0..*	ResourceContainer	0..1	Facility	inherited from: PowerPlant
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.26.11 (NC) ThermalGeneratingUnitDependency

Inheritance path = [PeerTemporalDependency](#)

A peer temporal dependency that defines temporal or operational constraints between two thermal generating units participating in combined operation.

Note: The dependency may define required operating relationships, start-up or shutdown sequencing, loading conditions, temporal constraints, or overlap between the generating units. A lag is evaluated relative to the latest applicable state transition of the dependee generating unit. If the dependee changes state again before the corresponding transition of the dependent generating unit occurs, the previous reference transition is superseded. Consequently, a previous start of the dependee cannot satisfy a start-to-start constraint after the dependee has subsequently stopped and started again. Once the dependent has performed the corresponding transition, that lag constraint is satisfied for that operating cycle.

Example:

- startToStartLag = 30M, startToStartLagKind = minimum: a dependent steam generating unit may start no earlier than 30 minutes after the dependee gas generating unit starts. If the gas generating unit stops during this period and subsequently starts again, the 30M duration is evaluated from the new start.

- finishToStartLag = 2H, finishToStartLagKind = exact: the dependent generating unit starts exactly two hours after the dependee generating unit stops, provided that the dependee has not subsequently changed state.

- finishToFinishLag = 20M, finishToFinishLagKind = maximum: the dependent generating unit shall stop no later than 20 minutes after the dependee generating unit stops.

Table 949 shows all attributes of ThermalGeneratingUnitDependency.

Table 949 – Attributes of ExtGeneratingUnit::ThermalGeneratingUnitDependency

name	mult	type	description
mRID	0..1	String	(NC) inherited from: PeerTemporalDependency
finishToFinishLag	0..1	Duration	(NC) inherited from: PeerTemporalDependency
constraintKind	0..1	DependencyConstraintKind	(NC) inherited from: PeerTemporalDependency

name	mult	type	description
finishToFinishLagKind	0..1	ReferenceValueKind	(NC) inherited from: PeerTemporalDependency
overlap	0..1	Duration	(NC) inherited from: PeerTemporalDependency
overlapKind	0..1	ReferenceValueKind	(NC) inherited from: PeerTemporalDependency
finishToStartLag	0..1	Duration	(NC) inherited from: PeerTemporalDependency
startToStartLag	0..1	Duration	(NC) inherited from: PeerTemporalDependency
finishToStartLagKind	0..1	ReferenceValueKind	(NC) inherited from: PeerTemporalDependency
startToStartLagKind	0..1	ReferenceValueKind	(NC) inherited from: PeerTemporalDependency

Table 950 shows all association ends of ThermalGeneratingUnitDependency with other classes.

Table 950 – Association ends of ExtGeneratingUnit::ThermalGeneratingUnitDependency with other classes

mult from	name	mult to	type	description
0..*	DependeeGeneratingUnit	1..1	ThermalGeneratingUnit	The thermal generating unit upon which operation of the dependent generating unit depends.
0..*	DependentGeneratingUnit	1..1	ThermalGeneratingUnit	The thermal generating unit whose timing or operation is constrained by the dependee generating unit.

3.26.12 (NC) CombinedCycleConfigurationKind enumeration

The configuration of thermal generating units and shaft arrangements used by a combined cycle plant.

Table 951 shows all literals of CombinedCycleConfigurationKind.

Table 951 – Literals of ExtGeneratingUnit::CombinedCycleConfigurationKind

literal	value	description
singleShaft		
multiShaft		
multiBlock		
hybrid		
other		

3.26.13 (NC) EnergyStoragePlant

Inheritance path = [PowerPlant](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

A power plant that coordinates one or more energy storage facilities and associated equipment for receiving, storing and subsequently delivering energy to the power system.

Table 952 shows all attributes of EnergyStoragePlant.

Table 952 – Attributes of ExtGeneratingUnit::EnergyStoragePlant

name	mult	type	description
nominalCapacity	0..1	RealEnergy	(NC) The reference amount of stored energy that the energy storage plant is intended to operate with under normal conditions.

name	mult	type	description
minCapacity	0..1	RealEnergy	(NC) The minimum amount of stored energy within the normal operating range of the energy storage plant.
maxCapacity	0..1	RealEnergy	(NC) The maximum amount of energy that may be stored by the energy storage plant within its defined operating limits.
nominalP	0..1	ActivePower	(NC) inherited from: PowerPlant
maxOperatingP	0..1	ActivePower	(NC) inherited from: PowerPlant
minOperatingP	0..1	ActivePower	(NC) inherited from: PowerPlant
deadbandMinP	0..1	ActivePower	(NC) inherited from: PowerPlant
deadbandMaxP	0..1	ActivePower	(NC) inherited from: PowerPlant
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 953 shows all association ends of EnergyStoragePlant with other classes.

Table 953 – Association ends of ExtGeneratingUnit::EnergyStoragePlant with other classes

mult from	name	mult to	type	description
0..*	ResourceContainer	0..1	Facility	inherited from: PowerPlant
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.26.14 (NC) ExtHydroPowerPlant root class

EU Network Code extension of HydroPowerPlant.

Table 954 shows all attributes of ExtHydroPowerPlant.

Table 954 – Attributes of ExtGeneratingUnit::ExtHydroPowerPlant

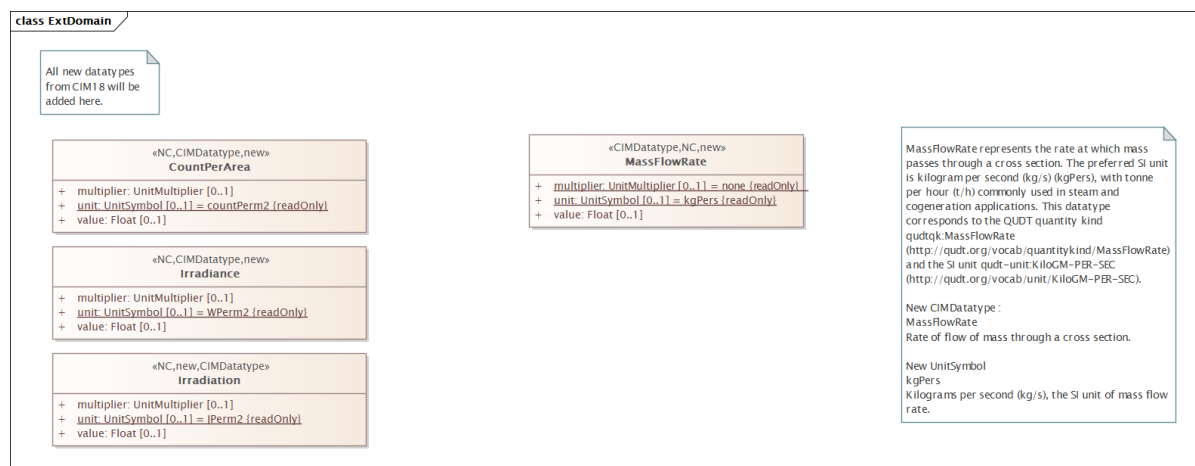
name	mult	type	description
numberOfPenstocks	0..1	Integer	(NC) Number of penstocks hydraulically serving the hydro generating units and hydro pumps of the hydro power plant. When the value is one,

name	mult	type	description
			the hydro generating units and hydro pumps are assumed to share a common penstock unless a detailed hydraulic network model specifies otherwise.
simultaneousPumpAndGeneration	0..1	Boolean	(NC) Indicates whether at least one hydro pump and at least one hydro generating unit of the hydro power plant may operate simultaneously.

7892

7893 **3.27 (CIM18) Package ExtDomain**7894 **3.27.1 General**

7895 This package contains extensions to domain package.



7896

7897 **Figure 72 – Class diagram ExtDomain::ExtDomain**

7898 Figure 72:

7899 **3.27.2 (NC,new) MassFlowRate datatype**

7900 Rate of flow of mass through a cross section.

7901 Table 955 shows all attributes of MassFlowRate.

7902 **Table 955 – Attributes of ExtDomain::MassFlowRate**

name	mult	type	description
multiplier	0..1	UnitMultiplier	
unit	0..1	UnitSymbol	
value	0..1	Float	

7903

7904 **3.27.3 (European) URI primitive**7905 URI is a string following the rules defined by the W3C/IETF URI Planning Interest Group in a
7906 set of RFCs of which one is RFC 3305.7907 **3.27.4 (NC,new) CountPerArea datatype**

7908 Number of discrete occurrences or events per unit area.

7909 Note: Intended for spatial event densities such as lightning density. A new UnitSymbol
7910 countPerM2 is required if this quantity is represented as a CIMDatatype with an explicit unit.

7911 Table 956 shows all attributes of CountPerArea.

7912

Table 956 – Attributes of ExtDomain::CountPerArea

name	mult	type	description
multiplier	0..1	UnitMultiplier	
unit	0..1	UnitSymbol	
value	0..1	Float	

7913

7914 3.27.5 (NC,new) Irradiance datatype

7915 Power carried by electromagnetic radiation incident on a surface per unit area.

7916 Note: Intended for solar irradiance values such as global, direct and diffuse solar irradiance.

7917 Table 957 shows all attributes of Irradiance.

7918

Table 957 – Attributes of ExtDomain::Irradiance

name	mult	type	description
multiplier	0..1	UnitMultiplier	
unit	0..1	UnitSymbol	
value	0..1	Float	

7919

7920 3.27.6 (NC,new) Irradiation datatype

7921 Energy carried by electromagnetic radiation incident on a surface per unit area over a time interval.

7922 Note: Intended for accumulated solar energy such as annual global, direct or diffuse solar irradiation.

7925 Table 958 shows all attributes of Irradiation.

7926

Table 958 – Attributes of ExtDomain::Irradiation

name	mult	type	description
multiplier	0..1	UnitMultiplier	
unit	0..1	UnitSymbol	
value	0..1	Float	

7927

7928 3.28 Package ExtDCEquivalent**7929 3.28.1 General**

7930 This package contains the CIM extensions required to describe the DC equipment.

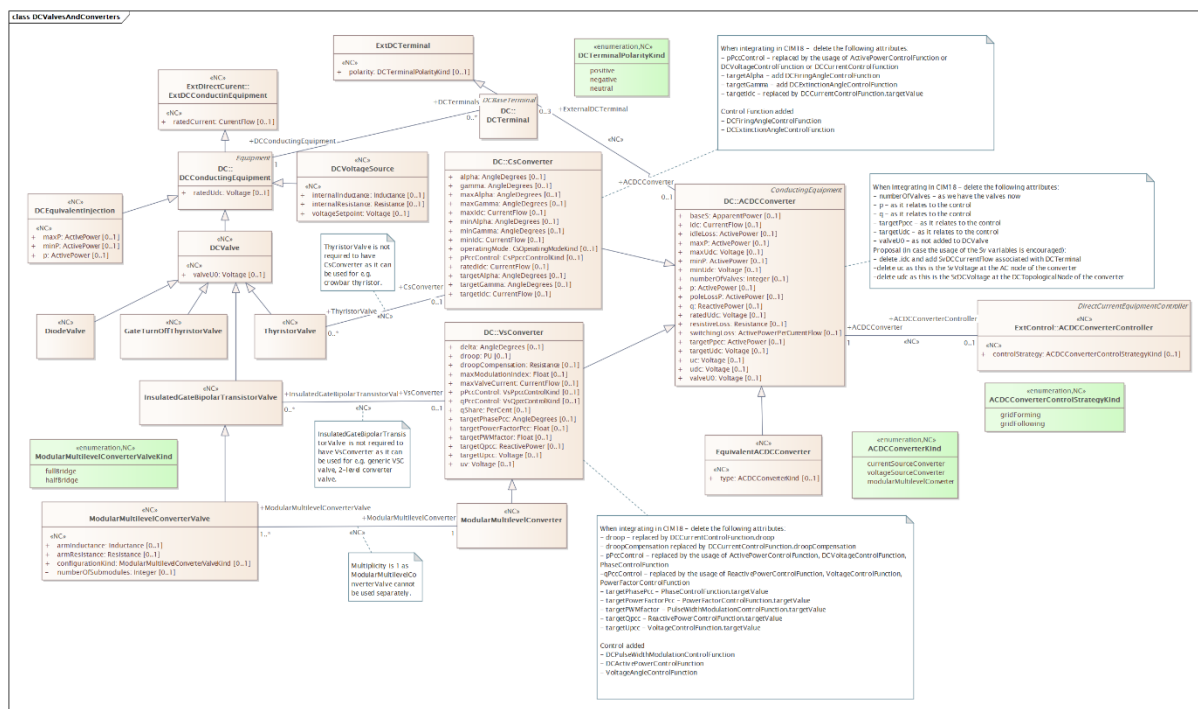
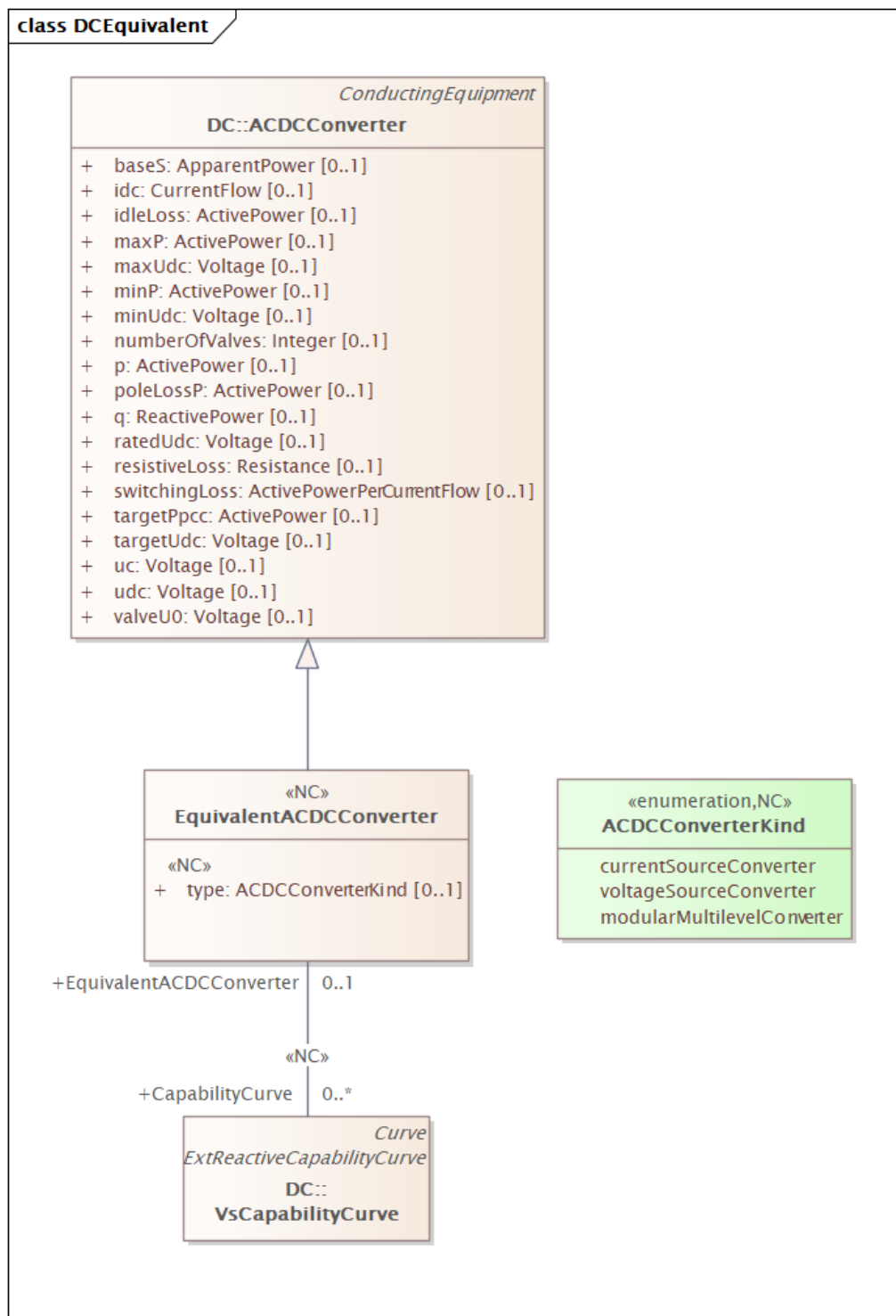


Figure 73 – Class diagram ExtDCEquivalent::DCValvesAndConverters

Figure 73: The diagram includes classes relevant to modelling of DC valves and converters.



7934

7935

Figure 74 – Class diagram ExtDCEquivalent::DCEquivalent

7936 Figure 74: The diagram includes classes relevant to modelling of DC equivalent.

7937 **3.28.2 (NC) DCValve**

```

7938 Inheritance path = DCConductingEquipment : Equipment : PowerSystemResource :
7939 IdentifiedObject : ExtEuIdentifiedObject : Identity : ExtDCConductinEquipment

```

7939

7940 A DC Valve is a solid-state switching module designed to control the flow of electrical power
7941 between two main terminals. The internal semiconductor device determines the valve's behavior
7942 and level of control.
7943 Table 959 shows all attributes of DCValve.

7944 **Table 959 – Attributes of ExtDCEquivalent::DCValve**

name	mult	type	description
valveU0	0..1	Voltage	(NC) Represents the threshold or on-state voltage across the valve during conduction. The value is used in conduction loss calculations for converter valves. Approximate valve conduction losses may be calculated using: $P_{loss} \sim U0 \times I$ where: U0 = valve forward voltage (valveU0) I = valve current Converter-level losses may be approximated from the combined contribution of associated valves, for example: $P_{converter_loss} \sim N \times U0 \times I$ where: N = number of conducting valves U0 = valve forward voltage I = valve current.
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment

7945
7946 Table 960 shows all association ends of DCValve with other classes.

7947 **Table 960 – Association ends of ExtDCEquivalent::DCValve with other classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment

mult from	name	mult to	type	description
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7948

7949 **3.28.3 (NC) EquivalentACDCConverter**

7950 Inheritance path = ACDCConverter : ConductingEquipment : Equipment :
 7951 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity

7952 An equivalent representation of an AC/DC converter used to model the electrical interaction
 7953 between an AC network and a DC system, without explicitly modelling internal converter station
 7954 equipment or DC connectivity. The EquivalentACDCConverter abstracts the behaviour of a DC
 7955 converter by representing its active and reactive power exchange, control characteristics, and
 7956 connectivity at the AC and/or DC interface. It is used where a detailed converter model is not
 7957 exchanged or required. The converter has one AC Terminal and two DC Terminal objects.
 7958 Table 961 shows all attributes of EquivalentACDCConverter.

7959

Table 961 – Attributes of ExtDCEquivalent::EquivalentACDCConverter

name	mult	type	description
type	0..1	ACDCConverterKind	(NC) The type of the converter.
baseS	0..1	ApparentPower	inherited from: ACDCConverter
idc	0..1	CurrentFlow	inherited from: ACDCConverter
idleLoss	0..1	ActivePower	inherited from: ACDCConverter
maxUdc	0..1	Voltage	inherited from: ACDCConverter
minUdc	0..1	Voltage	inherited from: ACDCConverter
numberOfValves	0..1	Integer	inherited from: ACDCConverter
p	0..1	ActivePower	inherited from: ACDCConverter
poleLossP	0..1	ActivePower	inherited from: ACDCConverter
q	0..1	ReactivePower	inherited from: ACDCConverter
ratedUdc	0..1	Voltage	inherited from: ACDCConverter
resistiveLoss	0..1	Resistance	inherited from: ACDCConverter
switchingLoss	0..1	ActivePowerPerCurrentFlow	inherited from: ACDCConverter
targetPpcc	0..1	ActivePower	inherited from: ACDCConverter
targetUdc	0..1	Voltage	inherited from: ACDCConverter

name	mult	type	description
uc	0..1	Voltage	inherited from: ACDCCConverter
udc	0..1	Voltage	inherited from: ACDCCConverter
valveU0	0..1	Voltage	inherited from: ACDCCConverter
maxP	0..1	ActivePower	inherited from: ACDCCConverter
minP	0..1	ActivePower	inherited from: ACDCCConverter
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 962 shows all association ends of EquivalentACDCCConverter with other classes.

Table 962 – Association ends of ExtDCEquivalent::EquivalentACDCCConverter with other classes

mult from	name	mult to	type	description
0..1	CapabilityCurve	0..*	VsCapabilityCurve	(NC) The capability curve for the equivalent AC and DC converter.
0..*	PccTerminal	0..1	Terminal	inherited from: ACDCCConverter
1..1	DCTerminals	0..*	ACDCCConverterDCTerminal	inherited from: ACDCCConverter
0..1	ExternalDCTerminal	0..3	DCTerminal	(NC) inherited from: ACDCCConverter
0..*	BaseVoltage	0..1	BaseVoltage	inherited from: ConductingEquipment
1..1	SvStatus	0..*	SvStatus	inherited from: ConductingEquipment
0..*	ProtectionEquipments	0..*	ProtectionEquipment	inherited from: ConductingEquipment
1..1	Terminals	0..*	Terminal	inherited from: ConductingEquipment
0..1	RelayDynamics	0..*	RelayDynamics	inherited from: ConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7964

7965 **3.28.4 (NC) ACDCCConverterKind enumeration**

7966 Kinds of AC and DC converter.

7967 Table 963 shows all literals of ACDCCConverterKind.

7968 **Table 963 – Literals of ExtDCEquivalent::ACDCCConverterKind**

literal	value	description
currentSourceConverter		Current source converter (CSC).
voltageSourceConverter		Voltage source converter (VSC).
modularMultilevelConverter		Modular Multilevel Converter (MMC).

7969

7970 **3.28.5 (NC) ModularMultilevelConverterValve**

7971 Inheritance path = [InsulatedGateBipolarTransistorValve](#) : [DCValve](#) : DCConductingEquipment :
 7972 Equipment : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity :
 7973 [ExtDCConductinEquipment](#)

7974 Represents a specialized DC valve used in a Modular Multilevel Converter (MMC) topology in
 7975 DC systems. Unlike a conventional DCValve, which only identifies the semiconductor
 7976 technology (thyristor, IGBT, etc.), DCValveMMC models the MMC submodule valve
 7977 configuration used inside a Voltage Source Converter (VSC). An MMC valve is composed of
 7978 many cascaded submodules arranged in converter arms. The valve configuration determines:
 7979 switching topology, fault blocking capability, losses, control behavior, and voltage generation
 7980 capability.

7981 Table 964 shows all attributes of ModularMultilevelConverterValve.

7982 **Table 964 – Attributes of ExtDCEquivalent::ModularMultilevelConverterValve**

name	mult	type	description
configurationKind	0..1	ModularMultilevelConverterValveKind	(NC) Defines the MMC submodule valve topology/configuration used by the valve. It identifies how the semiconductor switches are arranged within the MMC submodule.
armInductance	0..1	Inductance	(NC) Represents the inductive component connected in series with the MMC valve arm, typically used to: limit circulating currents, reduce fault currents, smooth arm current transitions, support converter stability. Often physically implemented as an arm reactor.
armResistance	0..1	Resistance	(NC) Represents the effective series resistance of the MMC valve arm, including contributions from: arm reactor winding resistance, conductor resistance, semiconductor conduction losses,

name	mult	type	description
			internal connection losses. The resistance affects: converter losses, damping characteristics, circulating current behavior, transient performance.
valveU0	0..1	Voltage	(NC) inherited from: DCValve
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment

Table 965 shows all association ends of ModularMultilevelConverterValve with other classes.

Table 965 – Association ends of ExtDCEquivalent::ModularMultilevelConverterValve with other classes

mult from	name	mult to	type	description
1..*	ModularMultilevelConverter	1..1	ModularMultilevelConverter	(NC) The ModularMultilevelConverter the has ModularMultilevelConverterValve.
0..*	VsConverter	0..1	VsConverter	(NC) inherited from: InsulatedGateBipolarTransistorValve
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

7987

7988 **3.28.6 (NC) ModularMultilevelConverterValveKind enumeration**

7989 Defines the possible MMC valve submodule configurations.

7990 Table 966 shows all literals of ModularMultilevelConverterValveKind.

7991 **Table 966 – Literals of ExtDCEquivalent::ModularMultilevelConverterValveKind**

literal	value	description
fullBridge		MMC valve based on a full-bridge submodule topology capable of bipolar voltage generation and DC fault blocking.
halfBridge		MMC valve based on a half-bridge submodule topology typically used for efficient voltage source converter operation.

7992

7993 **3.28.7 (NC) ModularMultilevelConverter**7994 Inheritance path = VsConverter : ACDCCConverter : ConductingEquipment : Equipment :
7995 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity7996 Specialized voltage source converter based on modular multilevel converter (MMC) topology
7997 using cascaded converter submodules for voltage synthesis and power conversion.

7998 Table 967 shows all attributes of ModularMultilevelConverter.

7999 **Table 967 – Attributes of ExtDCEquivalent::ModularMultilevelConverter**

name	mult	type	description
delta	0..1	AngleDegrees	inherited from: VsConverter
droop	0..1	PU	inherited from: VsConverter
droopCompensation	0..1	Resistance	inherited from: VsConverter
maxModulationIndex	0..1	Float	inherited from: VsConverter
maxValveCurrent	0..1	CurrentFlow	inherited from: VsConverter
pPccControl	0..1	VsPpccControlKind	inherited from: VsConverter
qPccControl	0..1	VsQpccControlKind	inherited from: VsConverter
qShare	0..1	PerCent	inherited from: VsConverter
targetQpcc	0..1	ReactivePower	inherited from: VsConverter
targetUpcc	0..1	Voltage	inherited from: VsConverter
uv	0..1	Voltage	inherited from: VsConverter
targetPowerFactorPcc	0..1	Float	inherited from: VsConverter
targetPhasePcc	0..1	AngleDegrees	inherited from: VsConverter
targetPWMfactor	0..1	Float	inherited from: VsConverter
baseS	0..1	ApparentPower	inherited from: ACDCCConverter
idc	0..1	CurrentFlow	inherited from: ACDCCConverter

name	mult	type	description
idleLoss	0..1	ActivePower	inherited from: ACDCCConverter
maxUdc	0..1	Voltage	inherited from: ACDCCConverter
minUdc	0..1	Voltage	inherited from: ACDCCConverter
numberOfValves	0..1	Integer	inherited from: ACDCCConverter
p	0..1	ActivePower	inherited from: ACDCCConverter
poleLossP	0..1	ActivePower	inherited from: ACDCCConverter
q	0..1	ReactivePower	inherited from: ACDCCConverter
ratedUdc	0..1	Voltage	inherited from: ACDCCConverter
resistiveLoss	0..1	Resistance	inherited from: ACDCCConverter
switchingLoss	0..1	ActivePowerPerCurrentFlow	inherited from: ACDCCConverter
targetPpcc	0..1	ActivePower	inherited from: ACDCCConverter
targetUdc	0..1	Voltage	inherited from: ACDCCConverter
uc	0..1	Voltage	inherited from: ACDCCConverter
udc	0..1	Voltage	inherited from: ACDCCConverter
valveU0	0..1	Voltage	inherited from: ACDCCConverter
maxP	0..1	ActivePower	inherited from: ACDCCConverter
minP	0..1	ActivePower	inherited from: ACDCCConverter
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 968 shows all association ends of ModularMultilevelConverter with other classes.

Table 968 – Association ends of ExtDCEquivalent::ModularMultilevelConverter with other classes

mult from	name	mult to	type	description
1..1	ModularMultilevelConverterValve	1..*	ModularMultilevelConverterValve	(NC) The ModularMultilevelConverterValve of this ModularMultilevelConverter.
0..*	CapabilityCurve	0..1	VsCapabilityCurve	inherited from: VsConverter
0..1	CapabilityCurve2	0..*	VsCapabilityCurve	(NC) inherited from: VsConverter
1..1	VSCDynamics	0..1	VSCDynamics	inherited from: VsConverter
0..*	PccTerminal	0..1	Terminal	inherited from: ACDCCConverter

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	ACDCCConverterDCTerminal	inherited from: ACDCCConverter
0..1	ExternalDCTerminal	0..3	DCTerminal	(NC) inherited from: ACDCCConverter
0..*	BaseVoltage	0..1	BaseVoltage	inherited from: ConductingEquipment
1..1	SvStatus	0..*	SvStatus	inherited from: ConductingEquipment
0..*	ProtectionEquipments	0..*	ProtectionEquipment	inherited from: ConductingEquipment
1..1	Terminals	0..*	Terminal	inherited from: ConductingEquipment
0..1	RelayDynamics	0..*	RelayDynamics	inherited from: ConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

8004

8005 **3.28.8 (NC) DiodeValve**

8006 Inheritance path = [DCValve](#) : DCConductingEquipment : Equipment : PowerSystemResource :
8007 IdentifiedObject : ExtEulIdentifiedObject : Identity : [ExtDCConductinEquipment](#)

8008 The diode is uncontrolled valve. It is always in a "ready" state and conducts automatically when
8009 the voltage at the anode is higher than the cathode. It cannot be turned off or on by an external
8010 signal.

8011 Table 969 shows all attributes of DiodeValve.

8012

Table 969 – Attributes of ExtDCEquivalent::DiodeValve

name	mult	type	description
valveU0	0..1	Voltage	(NC) inherited from: DCValve
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment

name	mult	type	description
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment

Table 970 shows all association ends of DiodeValve with other classes.

Table 970 – Association ends of ExtDCEquivalent::DiodeValve with other classes

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.28.9 (NC) ThyristorValve

Inheritance path = [DCValve](#) : DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : Identity : [ExtDCConductinEquipment](#)

Thyristor is a semi-controlled valve. A thyristor valve can "block" voltage in both directions until a pulse is sent to its gate. Once it starts conducting, it stays on until the current naturally drops to zero.

Table 971 shows all attributes of ThyristorValve.

8024

Table 971 – Attributes of ExtDCEquivalent::ThyristorValve

name	mult	type	description
valveU0	0..1	Voltage	(NC) inherited from: DCValve
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment

8025

8026

Table 972 shows all association ends of ThyristorValve with other classes.

8027

Table 972 – Association ends of ExtDCEquivalent::ThyristorValve with other classes

mult from	name	mult to	type	description
0..*	CsConverter	0..1	CsConverter	(NC) The CsConverter that has ThyristorValve.
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

8028

8029 **3.28.10 (NC) InsulatedGateBipolarTransistorValve**8030 Inheritance path = [DCValve](#) : DCConductingEquipment : Equipment : PowerSystemResource :8031 IdentifiedObject : ExtEulIdentifiedObject : Identity : [ExtDCConductinEquipment](#)8032 Insulated Gate Bipolar Transistor (IGBT) is a fully controlled valve. Unlike thyristors, an IGBT
8033 valve can be turned on and off at any time by the gate signal. This allows for "Voltage Source
8034 Converters" (VSC) that provide more precise control over the electrical grid.

8035 Table 973 shows all attributes of InsulatedGateBipolarTransistorValve.

8036 **Table 973 – Attributes of ExtDCEquivalent::InsulatedGateBipolarTransistorValve**

name	mult	type	description
valveU0	0..1	Voltage	(NC) inherited from: DCValve
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment

8037

8038 Table 974 shows all association ends of InsulatedGateBipolarTransistorValve with other
8039 classes.8040 **Table 974 – Association ends of ExtDCEquivalent::InsulatedGateBipolarTransistorValve**
8041 **with other classes**

mult from	name	mult to	type	description
0..*	VsConverter	0..1	VsConverter	(NC) The VsConverter that has InsulatedGateBipolarTransistorValve.
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

8042

8043 **3.28.11 (NC) GateTurnOffThyristorValve**

8044 Inheritance path = [DCValve](#) : DCConductingEquipment : Equipment : PowerSystemResource :
 8045 IdentifiedObject : ExtEulIdentifiedObject : Identity : [ExtDCConductinEquipment](#)

8046 The Gate Turn-Off Thyristor (GTO) is an advanced version of a standard thyristor. While a
 8047 standard thyristor can only be turned on by a gate signal, the GTO can be turned both on and
 8048 off through its gate. Key advantage is that GTOs can handle massive power levels (higher
 8049 voltages and currents) than most standard IGBTs. Historically used in heavy industrial motor
 8050 drives and bulk power transmission, though they are increasingly being replaced by IGBTs.
 8051 Table 975 shows all attributes of GateTurnOffThyristorValve.

8052 **Table 975 – Attributes of ExtDCEquivalent::GateTurnOffThyristorValve**

name	mult	type	description
valveU0	0..1	Voltage	(NC) inherited from: DCValve
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment

8053

8054 Table 976 shows all association ends of GateTurnOffThyristorValve with other classes.

8055 **Table 976 – Association ends of ExtDCEquivalent::GateTurnOffThyristorValve with**
8056 **other classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment

mult from	name	mult to	type	description
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

8057

8058 **3.28.12 (NC) DCEquivalentInjection**

8059 Inheritance path = DCConductingEquipment : Equipment : PowerSystemResource :
 8060 IdentifiedObject : ExtEulIdentifiedObject : Identity : [ExtDCConductingEquipment](#)

8061 This class represents direct current equivalent injections (generation or load).

8062 Table 977 shows all attributes of DCEquivalentInjection.

8063 **Table 977 – Attributes of ExtDCEquivalent::DCEquivalentInjection**

name	mult	type	description
p	0..1	ActivePower	(NC) Equivalent DC active power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for steady state solutions.
maxP	0..1	ActivePower	(NC) Maximum active power limit.
minP	0..1	ActivePower	(NC) Minimum active power limit.
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment

Table 978 shows all association ends of DCEquivalentInjection with other classes.

Table 978 – Association ends of ExtDCEquivalent::DCEquivalentInjection with other classes

mult from	name	mult to	type	description
0..1	PowerShiftKeySchedule	0..*	PowerShiftKeySchedule	(NC) The schedule for DC equivalent injection.
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.28.13 (NC) ACDCCConverterControlStrategyKind enumeration

Kinds of converter control strategy.

Table 979 shows all literals of ACDCCConverterControlStrategyKind.

Table 979 – Literals of ExtDCEquivalent::ACDCCConverterControlStrategyKind

literal	value	description
gridForming		Converter control strategy in which the converter establishes or contributes to the AC voltage magnitude and frequency reference, operating as a controllable AC voltage source.
gridFollowing		Converter control strategy in which the converter synchronizes to an externally established AC

literal	value	description
		voltage and frequency reference, typically using phase-locked synchronization and controlled current injection.

8073

8074 **3.28.14 (NC) DCVoltageSource**

8075 Inheritance path = DCConductingEquipment : Equipment : PowerSystemResource :

8076 IdentifiedObject : ExtEulIdentifiedObject : Identity : [ExtDCConductinEquipment](#)

8077 DC conducting equipment capable of establishing, maintaining, or controlling a DC voltage difference between connected DC terminals.

8079 Table 980 shows all attributes of DCVoltageSource.

8080

Table 980 – Attributes of ExtDCEquivalent::DCVoltageSource

name	mult	type	description
voltageSetpoint	0..1	Voltage	(NC) Target or regulated DC voltage maintained by the source.
internalResistance	0..1	Resistance	(NC) Equivalent internal resistance of the DC voltage source.
internalInductance	0..1	Inductance	(NC) Equivalent internal inductance of the DC voltage source.
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment

8081

8082 Table 981 shows all association ends of DCVoltageSource with other classes.

8083 **Table 981 – Association ends of ExtDCEquivalent::DCVoltageSource with other classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment

mult from	name	mult to	type	description
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

8084

8085 **3.28.15 ExtDCTerminal root class**

8086

8087 Table 982 shows all attributes of ExtDCTerminal.

8088

Table 982 – Attributes of ExtDCEquivalent::ExtDCTerminal

name	mult	type	description
polarity	0..1	DCTerminalPolarityKind	(NC) Represents the normal network polarity condition.

8089

8090 **3.28.16 (NC) DCTerminalPolarityKind enumeration**

8091 Polarity for DC terminal.

8092 Table 983 shows all literals of DCTerminalPolarityKind.

8093

Table 983 – Literals of ExtDCEquivalent::DCTerminalPolarityKind

literal	value	description
positive		Positive terminal.
negative		Negative terminal.
neutral		Neutral terminal.

8094

8095 **3.29 Package ExtConnectionPoint**

8096

3.29.1 General

8097

This package contains the CIM extensions required to describe the connection point.

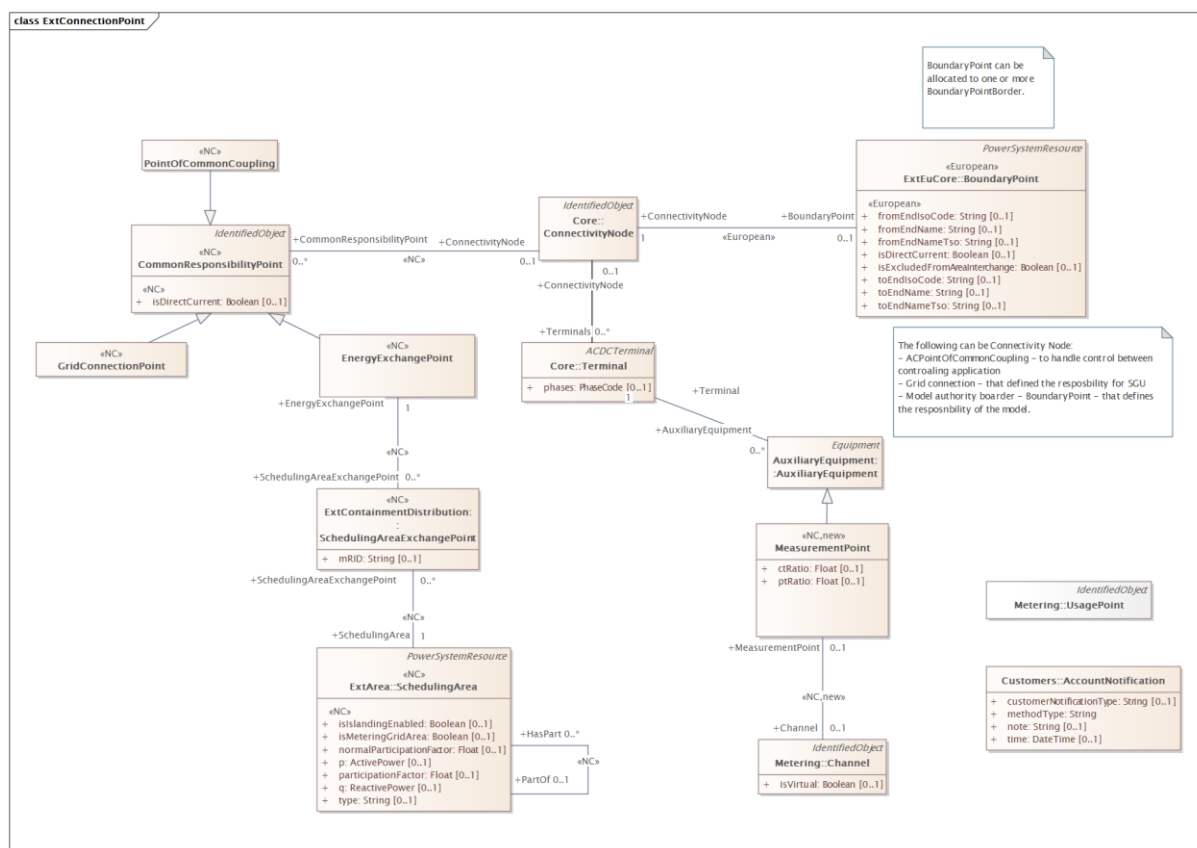


Figure 75 – Class diagram ExtConnectionPoint::ExtConnectionPoint

Figure 75: The diagram includes classes relevant to modelling of connection point.

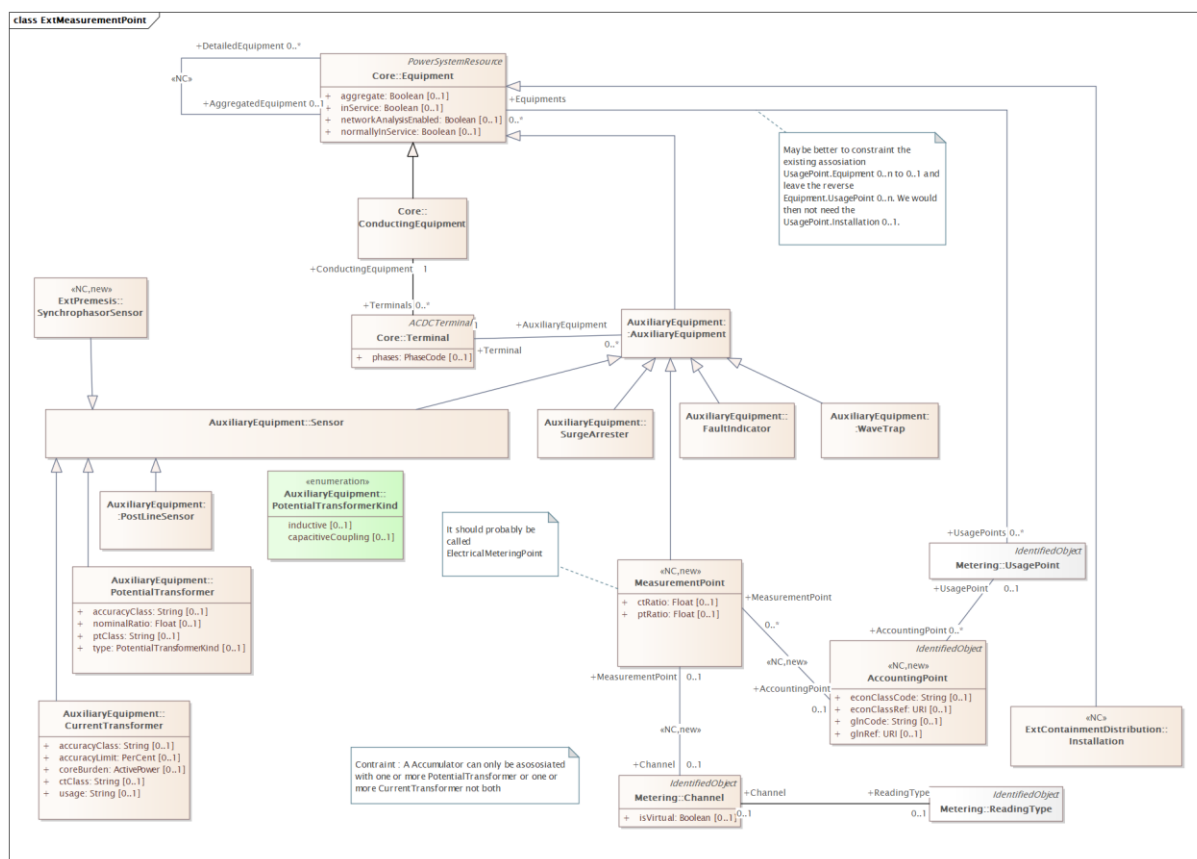


Figure 76 – Class diagram ExtConnectionPoint::ExtMeasurementPoint

Figure 76: The diagram includes classes relevant to modelling of measurement point.

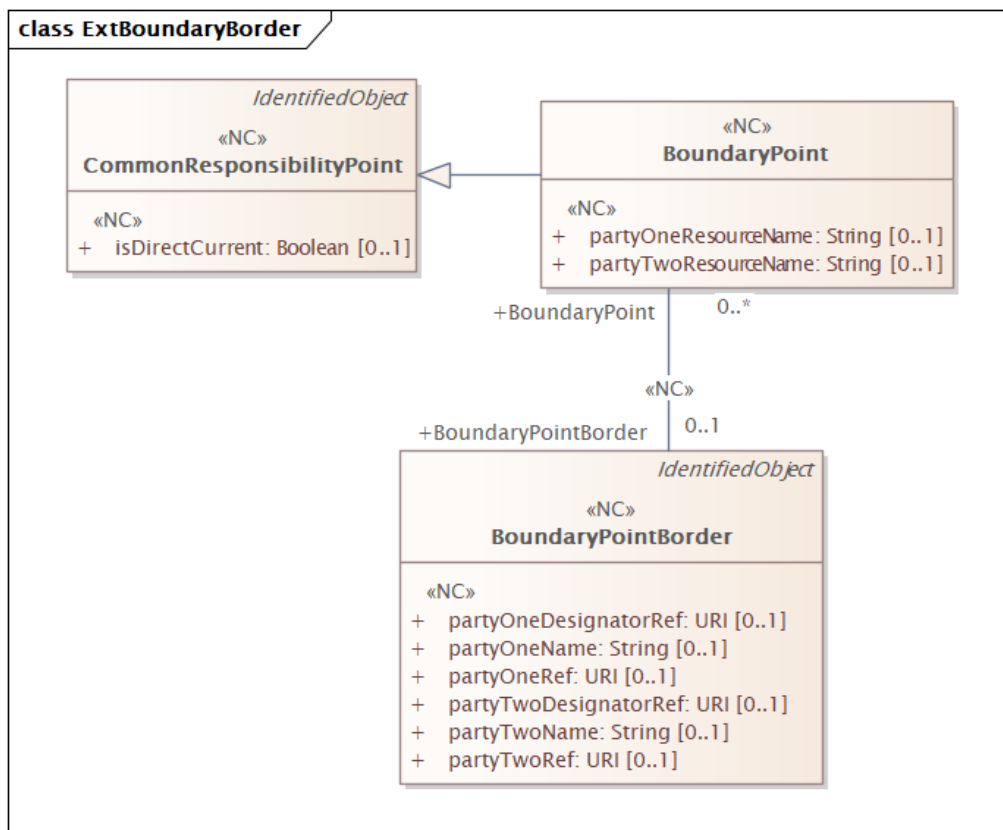


Figure 77 – Class diagram ExtConnectionPoint::ExtBoundaryBorder

Figure 77: The diagram includes classes relevant to modelling of boundary border.

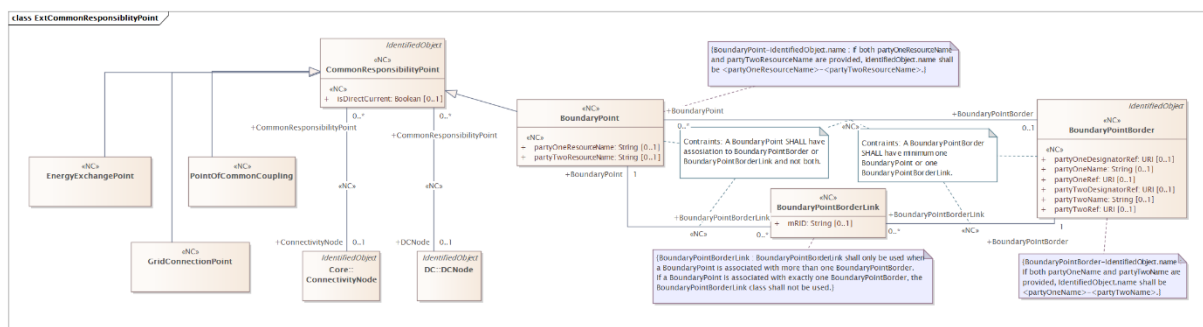


Figure 78 – Class diagram ExtConnectionPoint::ExtCommonResponsibilityPoint

Figure 78: The diagram includes classes relevant to modelling of common responsibility point.

3.29.2 (NC) PointOfCommonCoupling

Inheritance path = [CommonResponsibilityPoint](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

A PointOfCommonCoupling (PCC) is a CommonResponsibilityPoint that identifies the electrical location in a power system where voltage and current are considered common for the purpose of analysing, controlling, and coordinating the interaction between connected parts of the system.

The PCC serves as the reference location at which electrical characteristics and operational conditions—such as voltage quality, harmonic distortion, fault levels, power flow behaviour, and grid-code compliance—are defined, evaluated, or enforced.

8120 Note: Operational requirements associated with the PCC are typically achieved through
8121 coordinated control of equipment located on both sides of the point. These controls operate
8122 with a common reference objective for the electrical conditions at the PCC.

8123 A PCC may simultaneously serve multiple governance roles. In the CIM model, the same
8124 physical location in the network may therefore be represented by multiple specialised
8125 CommonResponsibilityPoint instances, such as:

- 8126 - GridConnectionPoint
- 8127 - EnergyExchangePoint
- 8128 - BoundaryPoint

8129 Each of these represents a different responsibility or agreement applied to the same electrical
8130 reference location.

8131 Table 984 shows all attributes of PointOfCommonCoupling.

8132 **Table 984 – Attributes of ExtConnectionPoint::PointOfCommonCoupling**

name	mult	type	description
isDirectCurrent	0..1	Boolean	(NC) inherited from: CommonResponsibilityPoint
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

8133 Table 985 shows all association ends of PointOfCommonCoupling with other classes.
8134

8135 **Table 985 – Association ends of ExtConnectionPoint::PointOfCommonCoupling with**
8136 **other classes**

mult from	name	mult to	type	description
0..1	DCConverterUnit	0..1	DCConverterUnit	(NC) The DCConverterUnit whose electrical interaction with the network is referenced at this PointOfCommonCoupling.
0..*	ConnectivityNode	0..1	ConnectivityNode	(NC) inherited from: CommonResponsibilityPoint
0..*	DCNode	0..1	DCNode	(NC) inherited from: CommonResponsibilityPoint
?..?		?..?	Geometry	(MixIn) inherited from: CommonResponsibilityPoint
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

8137
8138 **3.29.3 (NC) GridConnectionPoint**
8139 Inheritance path = [CommonResponsibilityPoint](#) : IdentifiedObject : ExtEulIdentifiedObject :
8140 Identity

8141 A GridConnectionPoint is a CommonResponsibilityPoint that identifies the point at which a grid
8142 operator and a connecting entity establish the shared responsibility for connection to the grid
8143 and where the connection agreement between the parties is applied.

8144 Note: The GridConnectionPoint represents the contractual and operational interface between a
8145 grid provider (for example a TSO, DSO, or CDSO) and a connecting entity such as a generating
8146 facility, industrial installation, distribution network, or other grid user.

8147 Conditions defined by applicable grid connection codes or agreements—such as voltage and
8148 frequency operating ranges, fault ride-through capability, power quality limits, protection
8149 coordination, and observability requirements—may be specified with reference to the
8150 GridConnectionPoint.

8151 The GridConnectionPoint is typically associated with the electrical reference location
8152 represented by a PointOfCommonCoupling and therefore serves as the point where compliance
8153 with connection requirements and operational responsibilities between the connected parties is
8154 evaluated.

8155 Table 986 shows all attributes of GridConnectionPoint.

8156 **Table 986 – Attributes of ExtConnectionPoint::GridConnectionPoint**

name	mult	type	description
isDirectCurrent	0..1	Boolean	(NC) inherited from: CommonResponsibilityPoint
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

8157
8158 Table 987 shows all association ends of GridConnectionPoint with other classes.

8159 **Table 987 – Association ends of ExtConnectionPoint::GridConnectionPoint with other**
8160 **classes**

mult from	name	mult to	type	description
1..*	GridAccessAgreement	0..1	GridAccessAgreement	
0..*	ConnectivityNode	0..1	ConnectivityNode	(NC) inherited from: CommonResponsibilityPoint
0..*	DCNode	0..1	DCNode	(NC) inherited from: CommonResponsibilityPoint
?..?		?..?	Geometry	(MixIn) inherited from: CommonResponsibilityPoint
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

8161
8162 **3.29.4 (NC) EnergyExchangePoint**

8163 Inheritance path = [CommonResponsibilityPoint](#) : IdentifiedObject : ExtEulIdentifiedObject :
8164 Identity

8165 An EnergyExchangePoint is a CommonResponsibilityPoint that identifies the point at which two
8166 or more adjacent grid providers establish shared responsibility for the measurement,
8167 accounting, and reconciliation of exchanged energy.

8168 Note: The EnergyExchangePoint represents the inter-operator interface used for energy
8169 measurement and energy accounting (including settlement-relevant quantities where
8170 applicable). It is the reference point at which the participating grid providers define and apply
8171 their agreed responsibilities for metering data, data quality, validation, and exchange
8172 processes.

8173 An EnergyExchangePoint may also be used as the reference for operational coordination
8174 requirements related to the exchange (for example observability/telemetry requirements,
8175 agreed transfer capability constraints, or coordination of switching and outage conditions),
8176 without changing its primary purpose as the responsibility point for energy measurement and
8177 accounting.

8178 Table 988 shows all attributes of EnergyExchangePoint.

8179 **Table 988 – Attributes of ExtConnectionPoint::EnergyExchangePoint**

name	mult	type	description
isDirectCurrent	0..1	Boolean	(NC) inherited from: CommonResponsibilityPoint
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

8180
8181 Table 989 shows all association ends of EnergyExchangePoint with other classes.

8182 **Table 989 – Association ends of ExtConnectionPoint::EnergyExchangePoint with other**
8183 **classes**

mult from	name	mult to	type	description
1..1	SchedulingAreaExchangePoint	0..*	SchedulingAreaExchangePoint	(NC) The scheduling area exchange point that is part of the scheduling area.
0..*	ConnectivityNode	0..1	ConnectivityNode	(NC) inherited from: CommonResponsibilityPoint
0..*	DCNode	0..1	DCNode	(NC) inherited from: CommonResponsibilityPoint
?..?		?..?	Geometry	(MixIn) inherited from: CommonResponsibilityPoint
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

8184
8185 **3.29.5 (NC,new) MeasurementPoint**

8186 Inheritance path = AuxiliaryEquipment : Equipment : PowerSystemResource : IdentifiedObject :
8187 ExtEulIdentifiedObject : Identity

8188 A MeasurementPoint represents a specific physical location in the electrical network at which
 8189 electrical quantities are observed or measured. A MeasurementPoint is directly associated with
 8190 a single Terminal, ensuring a clear correspondence between the topological connection and the
 8191 measurement location. MeasurementPoints serve as the anchor for linking sensors,
 8192 measurement channels, and derived electrical quantities.
 8193 Table 990 shows all attributes of MeasurementPoint .

8194 **Table 990 – Attributes of ExtConnectionPoint::MeasurementPoint**

name	mult	type	description
ptRatio	0..1	Float	Functional primary-to-secondary voltage ratio applied in this metering configuration, corresponding to the combined effect of any associated potential transformers.
ctRatio	0..1	Float	Functional primary-to-secondary current ratio applied in this metering configuration, corresponding to the combined effect of any associated current transformers.
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

8195
 8196 Table 991 shows all association ends of MeasurementPoint with other classes.

8197 **Table 991 – Association ends of ExtConnectionPoint::MeasurementPoint with other**
 8198 **classes**

mult from	name	mult to	type	description
0..1	Channel	0..1	Channel	(NC,new)
0..*	AccountingPoint	0..1	AccountingPoint	(NC,new)
0..*	Terminal	1..1	Terminal	inherited from: AuxiliaryEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

8199

8200 **3.29.6 (NC,new) AccountingPoint**

8201 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

8202

8203 Table 992 shows all attributes of AccountingPoint.

8204

Table 992 – Attributes of ExtConnectionPoint::AccountingPoint

name	mult	type	description
glnCode	0..1	String	Global Location Number (GLN) Code identifying an organisation, functional entity, or physical location according to the GS1 global identification system. Note: This attribute represents the globally unique identifier used to distinguish parties and locations in supply-chain, commercial, and operational processes. The GLN is defined by GS1, an international not-for-profit organisation that develops and maintains global standards for supply chains. This attribute represent the GLN of the accounting point that represent one or more service delivery point associated with an organisation. organisation function or services provided by the agent post. GLNs are widely used in supply-chain operations, electronic data interchange (EDI), market communication, and invoicing to ensure unambiguous identification of parties and locations across systems and jurisdictions. Example: "7080001234567" (GLN identifying an organisation headquarters)
glnRef	0..1	NullCIM	URI identifying the organisation, functional entity, or physical location represented by a Global Location Number (GLN). Note: The referenced resource represents the authoritative entity or location associated with the GLN identifier. The GLN identification system is governed by GS1, an international not-for-profit organisation that develops and maintains global standards for supply chains.

name	mult	type	description
			A GLN may identify a legal entity, organisational unit, functional entity such as an organisational post, site, facility, or service delivery point. This attribute represent the GLN of the accounting point that represent one or more service delivery point associated with an organisation. Example: "https://id.gs1.org/414/7080001234567", "urn:gs1:glN:7080001234567"
econClassCode	0..1	String	Economic activity Classification Code identifying the economic activity classification applicable to the organisation, organisation post, site, or accounting point. Note: This attribute represents the applicable economic classification used for statistical, regulatory, taxation, or market-related purposes. The meaning of the code depends on the governing classification scheme, which may be identified separately by a corresponding reference attribute. Relevant schemes may include the International Standard Industrial Classification of All Economic Activities (ISIC), NACE, or national extensions such as SN2007 for Norway. This attribute represent the economic classification of the accounting point for taxation or settlement purposes. Example: "35.111" (SN2007 economic classification for production of electricity from hydropower), "35.11" (NACE classification for production of electricity), "3511" (ISIC classification for electric power generation)
econClassRef	0..1	NullCIM	URI identifying the Economic activity Classification concept applicable to the organisation, organisation post, site, or accounting point. Note: The reference identifies the governing classification system used to interpret the economic classification code. The URI may be dereferenceable (resolvable) or non-dereferenceable, depending on the referenced scheme and implementation. This attribute represent the economic classification of the accounting point for taxation or settlement purposes. Relevant schemes may include the International Standard Industrial Classification of All Economic Activities (ISIC), "https://unstats.un.org/unsd/classifications/Econ/isic", NACE, "https://ec.europa.eu/eurostat/web/nace", or national extensions such as SN2007, "https://www.ssb.no/klasse/klassifikasjoner/6". When resolvable, the URI may provide documentation, hierarchy, or definitions of the classification codes. Example: "https://data.ssb.no/api/klasse/v1/classifications/6/codesAt?date=2026-03-15&selectCodes=35.111"
aliasName	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 993 shows all association ends of AccountingPoint with other classes.

Table 993 – Association ends of ExtConnectionPoint::AccountingPoint with other classes

mult from	name	mult to	type	description
0..*	UsagePoint	0..1	UsagePoint	
0..1	MeasurementPoint	0..*	MeasurementPoint	(NC,new)
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.29.7 (NC) CommonResponsibilityPoint

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject : Identity

A Common Responsibility Point represents a named and persistent point in a power system model where two or more parties share a formally agreed responsibility related to the power system. It provides a stable reference for expressing agreements, constraints, and conditions that apply at a specific location in the power system model and that are defined jointly by the involved parties.

Note:

A CommonResponsibilityPoint is anchored to the connectivity model by association to either a ConnectivityNode (AC grid) or a DCNode (DC grid). This separation allows the same responsibility-point concept to be used consistently for AC and DC networks without duplicating classes.

Table 994 shows all attributes of CommonResponsibilityPoint.

Table 994 – Attributes of ExtConnectionPoint::CommonResponsibilityPoint

name	mult	type	description
isDirectCurrent	0..1	Boolean	(NC) Indicates whether the CommonResponsibilityPoint is anchored to a DC grid node. If isDirectCurrent is true, the CommonResponsibilityPoint shall be associated to a DCNode and shall not be associated to a ConnectivityNode. If isDirectCurrent is false, the CommonResponsibilityPoint shall be associated to a ConnectivityNode and shall not be associated to a DCNode.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

Table 995 shows all association ends of CommonResponsibilityPoint with other classes.

Table 995 – Association ends of ExtConnectionPoint::CommonResponsibilityPoint with other classes

mult from	name	mult to	type	description
0..*	ConnectivityNode	0..1	ConnectivityNode	(NC) The ConnectivityNode that anchors this CommonResponsibilityPoint in the AC grid model.
0..*	DCNode	0..1	DCNode	(NC) The DCNode that anchors this CommonResponsibilityPoint in the DC grid model.
?..?		?..?	Geometry	(MixIn)
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3.29.8 (geo,new) Geometry root class

3.29.9 (NC) BoundaryPoint

Inheritance path = [CommonResponsibilityPoint](#) : IdentifiedObject : ExtEulIdentifiedObject : Identity

<<EU>> Designates a connection point at which one or more model authority sets shall connect to. The location of the connection point as well as other properties are agreed between organisations responsible for the interconnection, hence all attributes of the class represent this agreement. It is primarily used in a boundary model authority set which can contain one or many BoundaryPoint-s among other Equipment-s and their connections.

New:

A BoundaryPoint is a CommonResponsibilityPoint that identifies a location in the power system model where two or more parties establish a common agreement on modelling responsibility. It defines the point at which the representation of adjacent model responsibilities connect and where the agreed boundary between modelling domains is established.

Note: A BoundaryPoint represents the agreed location where modelling responsibility changes between organisations such as transmission system operators, distribution system operators, or other authorised model authorities.

The BoundaryPoint may be located on an interconnection between networks or at an internal location within a substation or facility where modelling responsibility is divided between parties. Table 996 shows all attributes of BoundaryPoint.

8250

Table 996 – Attributes of ExtConnectionPoint::BoundaryPoint

name	mult	type	description
partyOneResourceName	0..1	String	(NC) Name used by the first party to refer to the shared or connected resource associated with the BoundaryPoint. Note: This attribute records the name used in the model maintained by the first party for the resource or connection associated with the BoundaryPoint. It shall only be used when exactly two parties share modelling responsibility at the BoundaryPoint.
partyTwoResourceName	0..1	String	(NC) Name used by the second party to refer to the shared or connected resource associated with the BoundaryPoint. Note: This attribute records the name used in the model maintained by the second party for the resource or connection associated with the BoundaryPoint. It shall only be used when exactly two parties share modelling responsibility at the BoundaryPoint.
isDirectCurrent	0..1	Boolean	(NC) inherited from: CommonResponsibilityPoint
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

8251

8252 Table 997 shows all association ends of BoundaryPoint with other classes.

8253 **Table 997 – Association ends of ExtConnectionPoint::BoundaryPoint with other classes**

mult from	name	mult to	type	description
1..1	BoundaryPointBorderLink	0..*	BoundaryPointBorderLink	(NC) BoundaryPointBorderLink instances that relate this BoundaryPoint to multiple bilateral BoundaryPointBorder relationships.
0..*	BoundaryPointBorder	0..1	BoundaryPointBorder	(NC) The BoundaryPointBorder that identifies the bilateral border relationship between the two parties responsible for this BoundaryPoint.
0..*	ConnectivityNode	0..1	ConnectivityNode	(NC) inherited from: CommonResponsibilityPoint
0..*	DCNode	0..1	DCNode	(NC) inherited from: CommonResponsibilityPoint
?..?		?..?	Geometry	(MixIn) inherited from: CommonResponsibilityPoint
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

8254

8255 **3.29.10 (NC) BoundaryPointBorderLink root class**

8256 A BoundaryPointBorderLink identifies the relationship between a specific BoundaryPoint and a
 8257 specific BoundaryPointBorder. It is used when a BoundaryPoint is shared by more than two
 8258 parties and therefore needs to be related to multiple bilateral BoundaryPointBorder instances

8259 Note: When exactly two parties share a BoundaryPoint, the BoundaryPoint shall be directly
 8260 associated with a single BoundaryPointBorder and BoundaryPointBorderLink shall not be used.
 8261 BoundaryPointBorderLink does not imply direction or hierarchy between the two parties; it only
 8262 establishes that the BoundaryPoint participates in the bilateral border context.

8263 Table 998 shows all attributes of BoundaryPointBorderLink.

8264 **Table 998 – Attributes of ExtConnectionPoint::BoundaryPointBorderLink**

name	mult	type	description
mRID	0..1	String	Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

8265

8266 Table 999 shows all association ends of BoundaryPointBorderLink with other classes.

8267 **Table 999 – Association ends of ExtConnectionPoint::BoundaryPointBorderLink with**
 8268 **other classes**

mult from	name	mult to	type	description
0..*	BoundaryPoint	1..1	BoundaryPoint	(NC) BoundaryPoint that is linked to multiple BoundaryPointBorder through the BoundaryPointBorderLink.
0..*	BoundaryPointBorder	1..1	BoundaryPointBorder	(NC) The BoundaryPointBorder that is given by the BoundaryPointBorderLink.

8269

8270 **3.29.11 (NC) BoundaryPointBorder**

8271 Inheritance path = IdentifiedObject : ExtEuIdentifiedObject : Identity

8272 A BoundaryPointBorder identifies a specific border relationship between exactly two parties for
 8273 one or more BoundaryPoints. It provides a bilateral context used to describe and reference the
 8274 two parties that share responsibility for coordinating and exchanging boundary information
 8275 across that border.

8276 Note:

8277 A BoundaryPointBorder always represents exactly two parties, even when one or more
 8278 associated BoundaryPoints are shared among more than two parties (for example in multi-party
 8279 interconnections). In such cases, separate BoundaryPointBorder instances are used to
 8280 represent each bilateral border relationship.

8281 partyOne* and partyTwo* attributes are role-neutral and do not imply direction, hierarchy, or
 8282 electrical flow.

8283 Table 1000 shows all attributes of BoundaryPointBorder.

8284

Table 1000 – Attributes of ExtConnectionPoint::BoundaryPointBorder

name	mult	type	description
partyOneName	0..1	String	(NC) Human-readable name of the first party participating in the border relationship. Note: This name shall be suitable for unambiguous identification of the party within the exchange context. If partyOneRef is provided, partyOneName shall be aligned with the party identified by partyOneRef. Example: "Statnett"
partyOneRef	0..1	URI	(NC) Globally unique reference to the first party participating in the border relationship, expressed as a URI. Note: The reference may be a web URL identifying the party or another persistent identifier expressed in URI form. When resolvable, the URI may provide additional linked data describing the party. Example: "https://energy.referencedata.eu/party/statnett", "urn:uuid:6f3e3a4e-3d4e-4b1a-a1e4-2b2c3f1a9a8d", "https://virksomhet.brreg.no/nb/oppslag/enheter/962986633"
partyTwoName	0..1	String	(NC) Human-readable name of the second party participating in the border relationship. Note: This name shall be suitable for unambiguous identification of the party within the exchange context. If partyTwoRef is provided, partyTwoName shall be aligned with the party identified by partyTwoRef. Example: "SvenskaKraftnet"
partyTwoRef	0..1	URI	(NC) Globally unique reference to the second party participating in the border relationship, expressed as a URI. Note: The reference may be a web URL identifying the party or another persistent identifier expressed in URI form. When resolvable, the URI may provide additional linked data describing the party. Example: "https://energy.referencedata.eu/party/svk", "urn:uuid:0d4c7c30-cc7e-4f8f-bb6c-6d6b8c6f7f62", "https://www.allabolag.se/foretag/svenska-kraftn%C3%A4t/sundbyberg/energif%C3%B6rs%C3%B6rjning/XF94VWI5YE1K"
partyTwoDesignatorRef	0..1	URI	(NC) Globally unique reference to the designator associated with the second party, expressed as a URI. Note: The reference may be a web URL identifying the designator or another persistent identifier expressed in URI form. When resolvable, the URI may provide additional linked data describing the designator. The designator typically represents a jurisdictional or organisational designation that has empowered the party with the authority to provide the normative power system reference model.

name	mult	type	description
			This may refer to a country or to a specific regulatory or governing organisation. Example: "https://vocabulary.uncefact.org/unocode-countries#SE", "https://ei.se/"
partyOneDesignatorRef	0..1	URI	(NC) Globally unique reference to the designator associated with the first party, expressed as a URI. Note: The reference may be a web URL identifying the designator or another persistent identifier expressed in URI form. When resolvable, the URI may provide additional linked data describing the designator. The designator typically represents a jurisdictional or organisational designation that has empowered the party with the authority to provide the normative power system reference model. This may refer to a country or to a specific regulatory or governing organisation. Example: "https://vocabulary.uncefact.org/unocode-countries#NO", "https://www.nve.no/reguleringsmyndigheten/"
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
identifier	0..1	NullCIM	inherited from: Identity

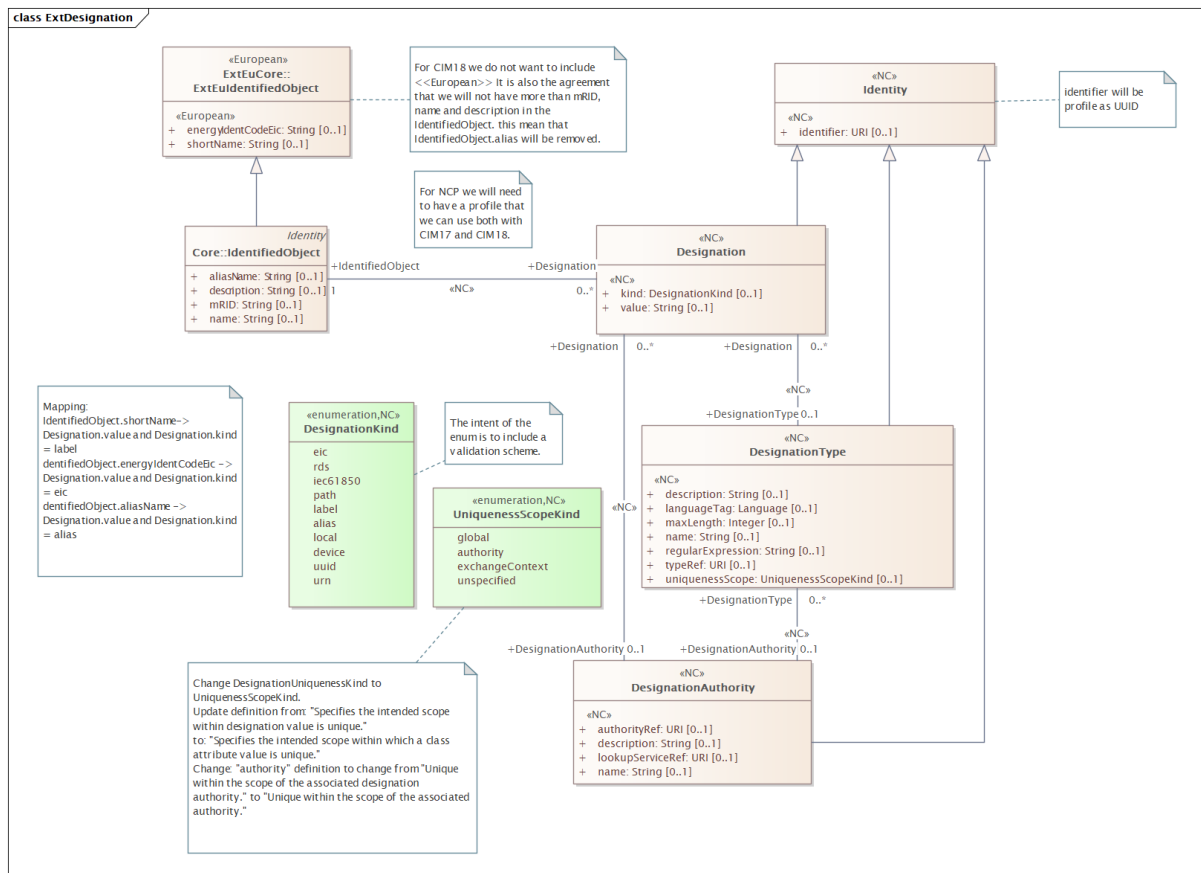
Table 1001 shows all association ends of BoundaryPointBorder with other classes.

Table 1001 – Association ends of ExtConnectionPoint::BoundaryPointBorder with other classes

mult from	name	mult to	type	description
1..1	BoundaryPointBorderLink	0..*	BoundaryPointBorderLink	(NC) The BoundaryPointBorderLink instances that identify the BoundaryPoints participating in this bilateral BoundaryPointBorder relationship.
0..1	BoundaryPoint	0..*	BoundaryPoint	(NC) BoundaryPoint that is part of a BoundaryPointBorder.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

8290 **3.30 Package ExtDesignation**8291 **3.30.1 General**

8292 This package contains the CIM extensions required to describe the designation model.



8293

8294 **Figure 79 – Class diagram ExtDesignation::ExtDesignation**

8295 Figure 79: The diagram includes classes relevant to modelling of designation.

8296 **3.30.2 (NC) Designation**8297 Inheritance path = [Identity](#)

8298 A designation is a string assigned to an IdentifiedObject to support recognition, presentation,
 8299 search, and interoperability with external systems. A designation may be a human-readable
 8300 label (e.g., display name, alias) or a system-issued code (e.g., EIC, IEC 61850 name, RDS
 8301 reference designation). Designations can be typed and scoped by a designation authority.

8302 Note:

8303 Inter-object relationships in exchanged models shall reference the target object using its
 8304 IdentifiedObject.mRID (or equivalent resolvable identifier), not by designation strings.

8305 A designation value may be unique within a stated scope (e.g., globally, within an authority, or
 8306 within an exchange context), but such uniqueness does not change the requirement to
 8307 reference objects by mRID in relationships.

8308 During transition and integration, multiple designations may be carried to support legacy
 8309 identifiers, vendor/system naming, and user-facing labels.

8310 Table 1002 shows all attributes of Designation.

8311

Table 1002 – Attributes of ExtDesignation::Designation

name	mult	type	description
kind	0..1	DesignationKind	(NC) Classification indicating the general type or intended usage of the designation. Note: The classification allows systems and profiles to interpret designation values consistently. Additional constraints or specialisations may be defined through DesignationType.
value	0..1	String	(NC) The textual value of the designation assigned to an IdentifiedObject. Note: The value may represent a name, label, code, or identifier used to refer to the object in a particular context. Designations may be used for display, engineering documentation, system integration, or external identification. Object relationships in exchanged models shall reference objects using IdentifiedObject.mRID, not designation values.
identifier	0..1	URI	(NC) inherited from: Identity

8312

8313 Table 1003 shows all association ends of Designation with other classes.

8314 **Table 1003 – Association ends of ExtDesignation::Designation with other classes**

mult from	name	mult to	type	description
0..*	IdentifiedObject	1..1	IdentifiedObject	(NC) The IdentifiedObject that is referred to in the Designation.
0..*	DesignationType	0..1	DesignationType	(NC) Reference to a non-standard type specification that further classifies or constrains this designation.
0..*	DesignationAuthority	0..1	DesignationAuthority	(NC) The authority responsible for issuing, assigning, or governing the designation.

8315

8316 **3.30.3 (NC) DesignationKind enumeration**

8317 A standardised classification of designation values used to refer to an IdentifiedObject in
 8318 different contexts. DesignationKind values are intended to be stable and directly usable in
 8319 profiles and implementation guidance without requiring external reference data.

8320 Table 1004 shows all literals of DesignationKind.

8321 **Table 1004 – Literals of ExtDesignation::DesignationKind**

literal	value	description
eic		An Energy Identification Code designation, typically used in European energy market and interoperability contexts. Example: "10YNO-0-----C"
rds		A designation following the Reference Designation System (RDS) defined in IEC 81346, used to uniquely identify systems, functions, and equipment within engineering documentation and technical installations. RDS designations express the position or role of an object within a structured engineering hierarchy and are widely used in electrical

literal	value	description
		engineering documentation, drawings, and plant documentation. Note: The Reference Designation System (RDS) provides a structured identification scheme where each segment represents an aspect of an object such as function ("="), product ("-"), or location ("+"). Example: "=N01+SA1-Q01"
iec61850		A designation used in IEC 61850 contexts (e.g., IED name, logical node naming, object references, or related 61850 naming forms as specified by the profile). Example: "LD0/XCBR1.Pos.stVal"
path		A hierarchical designation constructed from a sequence of name segments representing containment, structure, or functional decomposition. Example: "SubstationA/Bay3/Breakder1"
label		A short designation primarily intended for local display, compact user interfaces, and single-line diagrams. A label is generally preferred to be short and readable rather than globally unique. Example: "T1", "Bay3"
alias		An alternative designation used by a system, project, or user community that differs from the default or preferred designation.
local		A designation used within a local naming scope (site, system, organisation, or sub-hierarchy) where meaning is derived from the local context. The name shall be unique inside the container, e.g. substation.
device		A designation used to identify a device, component, or object instance within a vendor system, device platform, or operational system. Such designations are typically assigned by manufacturers, device firmware, automation systems, metering systems, or enterprise applications (e.g., ERP, asset management, monitoring platforms) and are used for configuration, monitoring, or asset tracking. Note: Device designations are often defined within the scope of a particular vendor, system, or installation and are therefore typically unique only within that system context. Example: "IED_BAY3_01", "Meter_102394", "SAP_EQ_000457812"
uuid		A designation expressed as a Universally Unique Identifier (UUID) as defined in IETF RFC 4122 (and its successor RFC 9562). UUIDs are 128-bit identifiers designed to be globally unique without requiring a central registration authority. UUID designations are commonly used in software systems and data exchanges to provide stable identifiers across distributed systems. Note: A UUID is typically represented as a 36-character string consisting of hexadecimal digits grouped in five sections separated by hyphens. Example: "550e8400-e29b-41d4-a716-446655440000"

literal	value	description
urn		A designation expressed as a Uniform Resource Name (URN), a persistent identifier defined using a registered namespace according to IETF RFC 8141. URN namespaces provide globally unique identifiers without requiring a resolvable URL and are commonly defined by standards bodies, industry communities, or organisations. Note: URN identifiers use the general structure: "urn:<namespace>:<identifier>" where <namespace> identifies a registered namespace and <identifier> is the value assigned within that namespace. Example: Object Identifier (OID) "urn:oid:1.3.6.1.4.1.4555", UUID namespace "urn:uuid:550e8400-e29b-41d4-a716-446655440000", EIC namespace "urn:eic:10YNO-0-----C"

8322

8323 **3.30.4 (NC) DesignationType**8324 Inheritance path = [Identity](#)

8325 A specification that defines an additional, non-standard designation type used to classify and
8326 constrain Designation values beyond the standardised DesignationKind enumeration. A
8327 DesignationType may be published by a designation authority and may provide validation and
8328 usage rules (e.g., maximum length, pattern, and intended uniqueness scope).

8329 Note:

8330 DesignationKind provides standardised categories that can be referenced directly in profiles
8331 (e.g., a diagram profile may require DesignationKind.local or DesignationKind.label).

8332 DesignationType is used only when the designation required is not covered by the standardised
8333 DesignationKind list, or when a community needs to define additional constraints or sub-typing
8334 within a kind.

8335 DesignationType is optional and should not be required for basic interoperability; consumers
8336 should be able to interpret Designation.kind without resolving external reference data.

8337 If both are present, Designation.kind carries the standard category, while
8338 Designation.DesignationType carries the additional or more specific classification.

8339 Table 1005 shows all attributes of DesignationType.

8340

Table 1005 – Attributes of ExtDesignation::DesignationType

name	mult	type	description
languageTag	0..1	Language	(NC) Language tag identifying the language used for the name and description. Note: Language tags should follow BCP 47 (e.g., en, nb, en-GB).
description	0..1	String	(NC) Textual description of the designation type. Note: Explains the intended usage, scope, or rules associated with designations of this type.
uniquenessScope	0..1	UniquenessScopeKind	(NC) Intended scope within which designation value of this type are unique.
name	0..1	String	(NC) Human-readable name of the designation type. Note: Provides a short label describing the purpose or usage of the designation type. Example: "DiagramLabel", "AssetIdentifier", "SCADAName"

name	mult	type	description
maxLength	0..1	Integer	(NC) Maximum allowed length of designation values of this type, expressed as number of characters.
regularExpression	0..1	String	(NC) Regular expression that a designation value shall conform to when this type is used.
typeRef	0..1	URI	(NC) URI reference to an external definition or specification describing the designation type. Note: The referenced resource may provide additional documentation, constraints, or governance information for the designation type. Example: https://energy.referencedata.eu/DesignationType/DiagramLabel
identifier	0..1	URI	(NC) inherited from: Identity

Table 1006 shows all association ends of DesignationType with other classes.

Table 1006 – Association ends of ExtDesignation::DesignationType with other classes

mult from	name	mult to	type	description
0..1	Designation	0..*	Designation	(NC) Designations that are classified by this designation type.
0..*	DesignationAuthority	0..1	DesignationAuthority	(NC) The authority that publishes or governs this type specification.

3.30.5 (NC) UniquenessScopeKind enumeration

Specifies the intended scope within which a class attribute value is unique.

Table 1007 shows all literals of UniquenessScopeKind.

Table 1007 – Literals of ExtDesignation::UniquenessScopeKind

literal	value	description
global		Intended to be globally unique (across organisations and exchanges).
authority		Unique within the scope of the associated authority.
exchangeContext		Unique only within the scope of a single exchange package/context (file set, model exchange).
unspecified		Uniqueness is not stated (do not assume uniqueness).

3.30.6 (NC) DesignationAuthority

Inheritance path = [Identity](#)

An organisation, system, or community responsible for defining, issuing, or managing designations or designation types within a particular designation scheme or namespace.

Note:

A designation authority may define:

- designation schemes or namespaces
- designation type specifications
- rules for generating or validating designation values

Examples include standards organisations, market operators, manufacturers, utilities, or enterprise systems.

8361 The designation authority may also provide a service or registry through which designation
8362 values or type definitions can be resolved or validated.

8363 Example:

8364 ENTSO-E

8365 Designation authority responsible for issuing Energy Identification Codes (EIC).

8366 GS1

8367 Designation authority managing GS1 identifiers used for asset and product identification in
8368 Digital Product Passport and supply-chain contexts.

8369 Equipment manufacturer

8370 A vendor may act as designation authority for identifiers assigned to devices or assets within
8371 its monitoring or asset management systems.

8372 Table 1008 shows all attributes of DesignationAuthority.

8373 **Table 1008 – Attributes of ExtDesignation::DesignationAuthority**

name	mult	type	description
description	0..1	String	(NC) Textual description of the designation authority. Note: Provides additional information about the role, scope, or responsibilities of the authority managing the designation scheme.
name	0..1	String	(NC) Human-readable name of the designation authority. Note: Identifies the organisation, system, or community responsible for defining, issuing, or managing the designation scheme or designation types. Example: "ENTSO-E", "GS1", "Statnett Asset Registry"
lookupServiceRef	0..1	URI	(NC) URI reference to a service or endpoint that can be used to resolve, validate, or obtain additional information about designations issued by this authority. Note: The lookup service may provide information about designation values, identifier registries, or related metadata. Example: "https://id.gs1.org/"
authorityRef	0..1	URI	(NC) URI reference identifying the designation authority. Note: The URI may refer to an organisation identifier, registry entry, or other authoritative source describing the authority. Example: "https://www.gs1.org", "https://www.entsoe.eu/data/energy-identification-codes-eic/"
identifier	0..1	URI	(NC) inherited from: Identity

8374
8375 Table 1009 shows all association ends of DesignationAuthority with other classes.

8376 **Table 1009 – Association ends of ExtDesignation::DesignationAuthority with other**
8377 **classes**

mult from	name	mult to	type	description
0..1	Designation	0..*	Designation	(NC) Designations issued, assigned, or managed by this designation authority.
0..1	DesignationType	0..*	DesignationType	(NC) The Designation type that is publishes or governs by the given Designation Authority.

8378

8379 **3.30.7 (NC) Identity root class**

8380 The Identity class represents the persistent identity of an object. It provides a globally unique
 8381 and stable identifier used to support lifecycle management, change tracking, cross-system
 8382 referencing, and model comparison.

8383 Note: The identifier represents the enduring identity of the object and should remain stable
 8384 throughout the object's lifecycle. In distributed systems this identifier is typically represented
 8385 using a UUID to ensure global uniqueness.

8386 The Identity class is intended to provide the stable identifier for an object, whereas classes
 8387 such as IdentifiedObject and Designation provide human-readable names, labels, or external
 8388 identifiers that may vary depending on context or system usage.

8389 Table 1010 shows all attributes of Identity.

8390

Table 1010 – Attributes of ExtDesignation::Identity

name	mult	type	description
identifier	0..1	URI	(NC) Globally unique identifier representing the persistent identity of the object. Note: The identifier is used to support lifecycle management, cross-system referencing, and comparison of objects across model exchanges and business processes. The identifier is expressed as a URI to allow compatibility with different identifier schemes. Profiles commonly restrict the identifier to a UUID to ensure global uniqueness and stable identity across distributed systems. Example: "urn:uuid:550e8400-e29b-41d4-a716-446655440000"

8391

8392 **3.30.8 (ConstrainedPrimitive) Language root class**

8393 Represents textual values that identifier a language based on a structured format that includes
 8394 language codes, optional region codes, and script subtags. This ensures consistency in
 8395 multilingual data processing, localization, metadata tagging, and content negotiation.

8396 Example: Valid examples: "en", "fr", "es-ES", "zh-Hans", "nb-NO". Not valid examples:
 8397 "english", "Français", "norwegian", "zh-hant-cn" (invalid format).

8398 **3.31 Package ExtCrossZonalNetworkElement**8399 **3.31.1 General**

8400 This package contains the CIM extensions required to describe the cross zonal network
 8401 element.

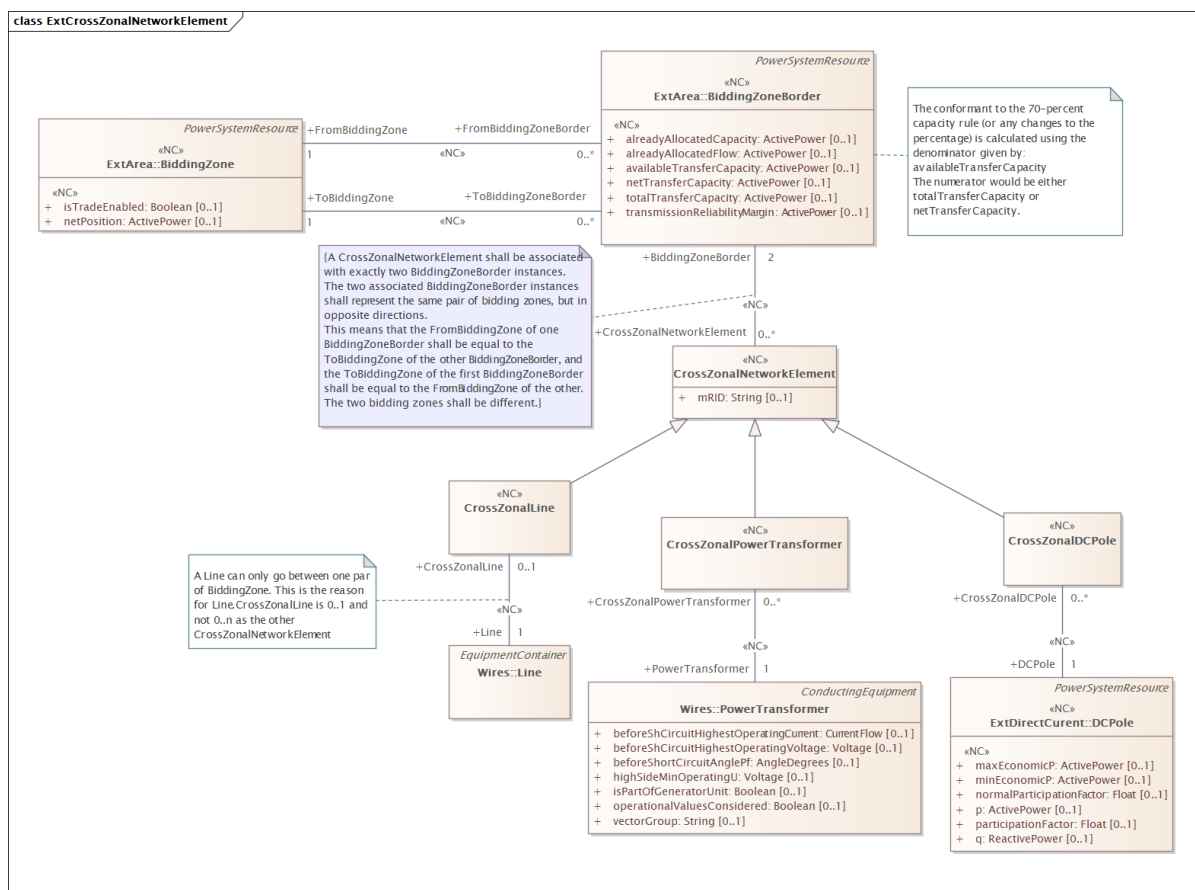


Figure 80 – Class diagram
ExtCrossZonalNetworkElement::ExtCrossZonalNetworkElement

Figure 80: The diagram contains classes related to cross zonal network element.

3.31.2 (NC) CrossZonalNetworkElement root class

A network element participating in the transfer of electrical power between two bidding zones and associated with the two opposite directional BiddingZoneBorder instances representing that bidding zone pair.

Table 1011 shows all attributes of CrossZonalNetworkElement.

Table 1011 – Attributes of ExtCrossZonalNetworkElement::CrossZonalNetworkElement

name	mult	type	description
mRID	0..1	String	Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

Table 1012 shows all association ends of CrossZonalNetworkElement with other classes.

Table 1012 – Association ends of ExtCrossZonalNetworkElement::CrossZonalNetworkElement with other classes

mult from	name	mult to	type	description
0..1	RegisteredInterTie	0..1	RegisteredInterTie	(NC)
0..*	BiddingZoneBorder	2..?	BiddingZoneBorder	(NC) The directional bidding zone borders associated with the cross-zonal network element. Exactly two borders shall be referenced, representing the same bidding zone pair in opposite directions.
0..1	CrossZonalResourceAvailability	0..*	CrossZonalResourceAvailability	(NC,new)

3.31.3 (NC) CrossZonalLine

Inheritance path = [CrossZonalNetworkElement](#)

A CrossZonalNetworkElement represented by an AC line participating in the transfer of electrical power between two bidding zones.

Table 1013 shows all attributes of CrossZonalLine.

Table 1013 – Attributes of ExtCrossZonalNetworkElement::CrossZonalLine

name	mult	type	description
mRID	0..1	String	inherited from: CrossZonalNetworkElement

Table 1014 shows all association ends of CrossZonalLine with other classes.

Table 1014 – Association ends of ExtCrossZonalNetworkElement::CrossZonalLine with other classes

mult from	name	mult to	type	description
0..1	Line	1..1	Line	(NC) The AC line represented by the CrossZonalLine.
0..1	RegisteredInterTie	0..1	RegisteredInterTie	(NC) inherited from: CrossZonalNetworkElement
0..*	BiddingZoneBorder	2..?	BiddingZoneBorder	(NC) inherited from: CrossZonalNetworkElement
0..1	CrossZonalResourceAvailability	0..*	CrossZonalResourceAvailability	(NC,new) inherited from: CrossZonalNetworkElement

3.31.4 (NC) CrossZonalPowerTransformer

Inheritance path = [CrossZonalNetworkElement](#)

A CrossZonalNetworkElement represented by a power transformer participating in the transfer of electrical power between two bidding zones.

Table 1015 shows all attributes of CrossZonalPowerTransformer.

Table 1015 – Attributes of ExtCrossZonalNetworkElement::CrossZonalPowerTransformer

name	mult	type	description
mRID	0..1	String	inherited from: CrossZonalNetworkElement

Table 1016 shows all association ends of CrossZonalPowerTransformer with other classes.

Table 1016 – Association ends of ExtCrossZonalNetworkElement::CrossZonalPowerTransformer with other classes

mult from	name	mult to	type	description
0..*	PowerTransformer	1..1	PowerTransformer	(NC) Power transformer represented by the CrossZonalPowerTransformer.
0..1	RegisteredInterTie	0..1	RegisteredInterTie	(NC) inherited from: CrossZonalNetworkElement
0..*	BiddingZoneBorder	2..?	BiddingZoneBorder	(NC) inherited from: CrossZonalNetworkElement
0..1	CrossZonalResourceAvailability	0..*	CrossZonalResourceAvailability	(NC,new) inherited from: CrossZonalNetworkElement

3.31.5 (NC) CrossZonalDCPole

Inheritance path = [CrossZonalNetworkElement](#)

A CrossZonalNetworkElement represented by an HVDC pole participating in the transfer of electrical power between two bidding zones.

Table 1017 shows all attributes of CrossZonalDCPole.

Table 1017 – Attributes of ExtCrossZonalNetworkElement::CrossZonalDCPole

name	mult	type	description
mRID	0..1	String	inherited from: CrossZonalNetworkElement

Table 1018 shows all association ends of CrossZonalDCPole with other classes.

Table 1018 – Association ends of ExtCrossZonalNetworkElement::CrossZonalDCPole with other classes

mult from	name	mult to	type	description
0..*	DCPole	1..1	DCPole	(NC) Direct current pole represented by the CrossZonalDCPole.
0..1	RegisteredInterTie	0..1	RegisteredInterTie	(NC) inherited from: CrossZonalNetworkElement
0..*	BiddingZoneBorder	2..?	BiddingZoneBorder	(NC) inherited from: CrossZonalNetworkElement
0..1	CrossZonalResourceAvailability	0..*	CrossZonalResourceAvailability	(NC,new) inherited from: CrossZonalNetworkElement

3.32 Package ExtCommon

3.32.1 General

This package contains the extensions related to Common classes similar to CIM Enterprise.Common..

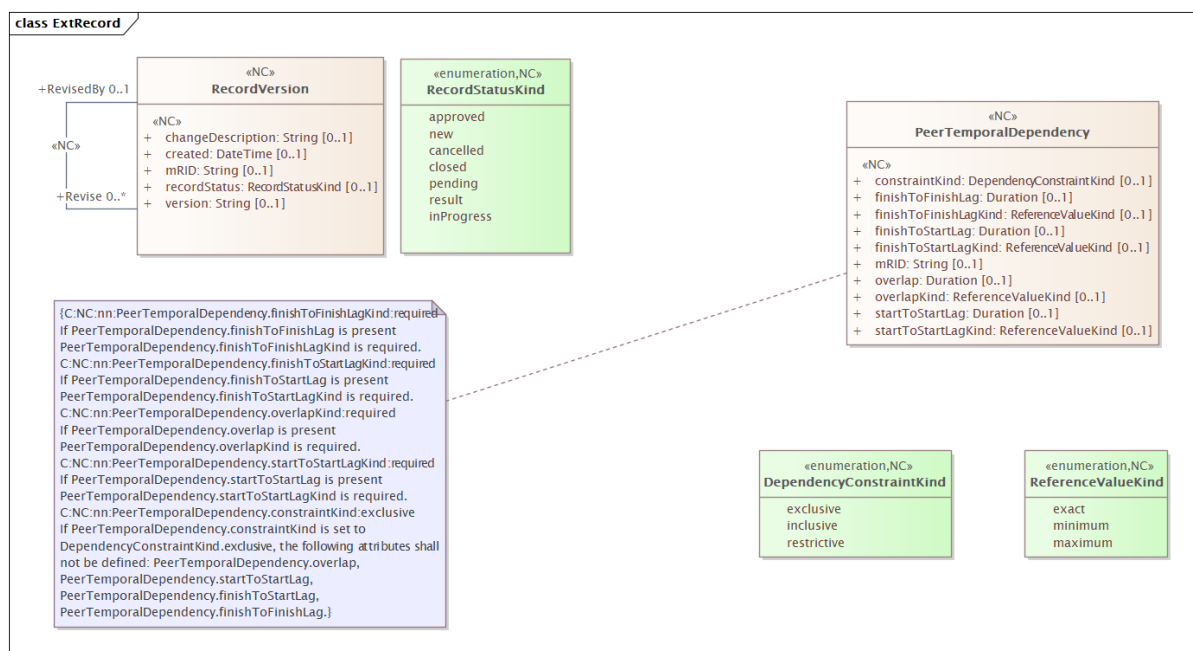


Figure 81 – Class diagram ExtCommon::ExtRecord

Figure 81:

3.32.2 (NC) PeerTemporalDependency root class

An abstract directed dependency between two peer instances of the same domain class that defines temporal and operational constraints governing their relative execution or operation.

Note: Temporal lag constraints relate the next applicable transition of the dependent to the latest applicable transition of the dependee. A dependee transition remains applicable while the dependee remains in the state resulting from that transition. If the dependee subsequently changes state before the corresponding transition of the dependent occurs, the previous transition is superseded and the constraint is evaluated from the next applicable transition. Once the corresponding transition of the dependent has occurred, the lag constraint is satisfied for that operating cycle.

Each lag is qualified by its corresponding ReferenceValueKind, which specifies whether the lag represents an exact, minimum, or maximum temporal constraint.

Table 1019 shows all attributes of PeerTemporalDependency.

Table 1019 – Attributes of ExtCommon::PeerTemporalDependency

name	mult	type	description
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
finishToFinishLag	0..1	Duration	(NC) The duration constraining the next finish or deactivation of the dependent relative to the latest applicable finish or deactivation of the dependee.

name	mult	type	description
constraintKind	0..1	DependencyConstraintKind	(NC) The kind of temporal or operational constraint defined between the dependee and the dependent. Note: Certain dependency constraint kinds may require or prohibit the use of temporal constraint attributes, depending on the semantics of the specialization.
finishToFinishLagKind	0..1	ReferenceValueKind	(NC) Specifies whether finishToFinishLag is an exact, minimum, or maximum temporal constraint. Note: This attribute shall be specified when finishToFinishLag is provided. Example: finishToFinishLag = 2D1H30M is interpreted together with finishToFinishLagKind: - exact: the dependent finishes exactly 2 days, 1 hour and 30 minutes after the latest applicable finish of the dependee. - minimum: the dependent may finish no earlier than 2 days, 1 hour and 30 minutes after the latest applicable finish of the dependee. - maximum: the dependent shall finish no later than 2 days, 1 hour and 30 minutes after the latest applicable finish of the dependee. In all cases, the dependee finish remains applicable only while the dependee remains in the state resulting from that finish. If the dependee subsequently changes state before the dependent finishes, the applicability of the previous finish is re-evaluated.
overlap	0..1	Duration	(NC) The duration constraining the period for which the dependee and dependent are simultaneously active or effective.
overlapKind	0..1	ReferenceValueKind	(NC) Specifies whether overlap is an exact, minimum, or maximum duration of simultaneous activity or effectiveness. Note: This attribute shall be specified when overlap is provided. Example: overlap = 1H28M45S is interpreted together with overlapKind: - exact: the dependee and dependent are simultaneously active or effective for exactly 1 hour, 28 minutes, and 45 seconds. - minimum: the dependee and dependent shall be simultaneously active or effective for at least 1 hour, 28 minutes, and 45 seconds. - maximum: the dependee and dependent shall be simultaneously active or effective for no more than 1 hour, 28 minutes, and 45 seconds. Unlike the lag attributes, overlap constrains the duration of a simultaneous state rather than the temporal separation between two state transitions.
finishToStartLag	0..1	Duration	(NC) The duration constraining the next start or activation of the dependent relative to the latest applicable finish or deactivation of the dependee.
startToStartLag	0..1	Duration	(NC) The duration constraining the next start or activation of the dependent relative to the latest applicable start or activation of the dependee.

name	mult	type	description
finishToStartLagKind	0..1	ReferenceValueKind	(NC) Specifies whether finishToStartLag is an exact, minimum, or maximum temporal constraint. Note: This attribute shall be specified when finishToStartLag is provided. Example: finishToStartLag = 20M is interpreted together with finishToStartLagKind: - exact: the dependent starts exactly 20 minutes after the latest applicable finish of the dependee. - minimum: the dependent may start no earlier than 20 minutes after the latest applicable finish of the dependee. - maximum: the dependent shall start no later than 20 minutes after the latest applicable finish of the dependee. In all cases, the dependee finish remains applicable only while the dependee remains in the state resulting from that finish. If the dependee subsequently changes state before the dependent starts, the constraint is evaluated from the next applicable finish of the dependee.
startToStartLagKind	0..1	ReferenceValueKind	(NC) Specifies whether startToStartLag is an exact, minimum, or maximum temporal constraint. Note: This attribute shall be specified when startToStartLag is provided. Example: startToStartLag = 2H is interpreted together with startToStartLagKind: - exact: the dependent starts exactly 2 hours after the latest applicable start of the dependee. - minimum: the dependent may start no earlier than 2 hours after the latest applicable start of the dependee. - maximum: the dependent shall start no later than 2 hours after the latest applicable start of the dependee. In all cases, the dependee start remains applicable only while the dependee remains in the state resulting from that start. If the dependee subsequently changes state before the dependent starts, the constraint is evaluated from the next applicable start of the dependee.

8472

8473 **3.32.3 (NC) DependencyConstraintKind enumeration**

8474 The kind of dependency constraint defined between the dependee and dependent peer objects.

8475 Note: The dependee is the peer object upon which another peer object depends. The dependent

8476 is the peer object whose temporal or operational behaviour is constrained by the dependee.

8477 Although dependee is not a commonly used English term, it is used here to distinguish this

8478 relationship from a parent-child hierarchy, as both objects are peer instances of the same class.

8479 Table 1020 shows all literals of DependencyConstraintKind.

8480

Table 1020 – Literals of ExtCommon::DependencyConstraintKind

literal	value	description
exclusive		The dependee and dependent shall not both be active or effective at the same time.
inclusive		The dependent shall only be active or effective while the dependee is active or effective.

literal	value	description
restrictive		The dependee constrains the dependent without requiring the dependent to become active or effective. Note: A restrictive dependency defines temporal or operational constraints on the behaviour of the dependent while leaving its activation or operation optional.

8481

8482 **3.32.4 (NC) ReferenceValueKind enumeration**

8483 Kind of reference value.

8484 Table 1021 shows all literals of ReferenceValueKind.

8485 **Table 1021 – Literals of ExtCommon::ReferenceValueKind**

literal	value	description
exact		The referenced value is to be met exactly.
minimum		The referenced value establishes a lower bound.
maximum		The referenced value establishes an upper bound.

8486

8487 **3.32.5 (NC) RecordStatusKind enumeration**

8488 Enumeration indicating the lifecycle status of a business record.

8489 Table 1022 shows all literals of RecordStatusKind.

8490 **Table 1022 – Literals of ExtCommon::RecordStatusKind**

literal	value	description
approved		Indicates that the record version has been reviewed and formally accepted by the responsible entity.
new		Indicates that the record version has been created but not yet submitted for review or coordination. It represents an initial draft state.
cancelled		Indicates that the record version has been withdrawn and is no longer valid for coordination. A cancelled record is retained only for audit and traceability.
closed		Indicates that the record version has completed its lifecycle and no further action is required. The record remains available for reference but is not active in any process.
pending		Indicates that the record version has been submitted and is awaiting responses or decisions from assigned agents.
result		Indicates that the record version represents a final outcome or result of any coordination process, typically summarising the consolidated decision or approved plan.
inProgress		Indicates that the record version is actively being processed, updated, or evaluated as part of any coordination workflow.

8491

8492 **3.32.6 (NC) RecordVersion root class**

8493 A RecordVersion captures the state of a record at a given point in time, including version
8494 identifiers, status, timestamps, and revision links to previous or subsequent versions, enabling
8495 controlled evolution and full traceability.

8496 Table 1023 shows all attributes of RecordVersion.

8497 **Table 1023 – Attributes of ExtCommon::RecordVersion**

name	mult	type	description
created	0..1	DateTime	(NC) Date and time when this record version was created.
version	0..1	String	(NC) Human-readable identifier of the version (for example "1", "1.1", "2025-01"), used for reference in business processes and documentation.
recordStatus	0..1	RecordStatusKind	(NC) Lifecycle status of this record version, indicating its current state in the business record.
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
changeDescription	0..1	String	(NC) Free-text description of the changes or rationale that distinguish this version from the previous one.

8498

8499 Table 1024 shows all association ends of RecordVersion with other classes.

8500 **Table 1024 – Association ends of ExtCommon::RecordVersion with other classes**

mult from	name	mult to	type	description
0..1	Revise	0..*	RecordVersion	(NC) Reference to the immediately preceding version of the same record from which this version is derived.
0..1	RecordInvolvement	0..*	RecordInvolvement	This version has these involvements
0..*	RevisedBy	0..1	RecordVersion	(NC) Reference to the next version that supersedes this record version.

8501

8502 **3.33 (CIM18) Package ExtCore**

8503

8504 **3.34 (CIM18) Package ExtContingency**

8505