



European Network of
Transmission System Operators
for Electricity

NETWORK CODES CANONICAL EXTENSIONS SPECIFICATION

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1610		

1611 1 Introduction

1612 This document describes CIM extensions that were designed for the purpose of network codes
1613 related exchanges. The set of profiles which use these extensions could be applied for other
1614 exchanges too. Therefore, the objective is to propose these extensions for appropriate
1615 standardisation in IEC.

1616 The Coordinated Security Analysis data exchange specification by ENTSO-E shall be used as
1617 a reference to understand the context, use cases and the terms and definitions considered while
1618 designing the canonical extensions.

1619 This document is describing extensions to support:

- 1620 - proper modelling required for CSA process, long-term network and market simulations,
- 1621 - be more explicit about various DER types, and,
- 1622 - uniformly support energy allocation to any kind of energy resource.

1623 2 Specification documents references

1624 The following specification documents, in whole or in part, are referenced in this document and
1625 are indispensable for its application. For dated references, only the edition cited applies. For
1626 undated references, the latest edition of the referenced document (including any amendments)
1627 applies.

- 1628 • ENTSO-E Regional Coordination Processes Data Exchange Specification;

1629 The class SimulationEvents is part of the IEC 61970-302:2024 and IEC 61970-457:2024 that is
1630 not part of CGMES 3.0 but will be included in upcoming version of CGMES. For technical reason
1631 this has not been tagged with the NC namespace because it is only referred to, not initiated.
1632 SimulationSetting profile is part of the header and metadata document.

1633 3 Namespaces

1634 The following namespaces apply for NC profiles:

- 1635 • rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
- 1636 • dcterms="http://purl.org/dc/terms/"
- 1637 • nc="https://cim4.eu/ns/nc#"
- 1638 • cim="https://cim.ucaiug.io/ns#"
- 1639 • owl="http://www.w3.org/2002/07/owl#"
- 1640 • cims="http://iec.ch/TC57/1999/rdf-schema-extensions-19990926#"
- 1641 • eu="https://cim.ucaiug.io/ns/eu#"
- 1642 • dcat="http://www.w3.org/ns/dcat#"
- 1643 • rdfs="http://www.w3.org/2000/01/rdf-schema#"
- 1644 • profcim="https://cim.ucaiug.io/ns/prof-cim#"

1645 4 Network codes extensions

1646 4.1 General

1647 This package contains the extensions defined for the need of Network codes (NC) data
1648 exchanges.

1649 4.2 ExtNetworkCodesCIMVersion root class

1650 The version information assigned to the extensions defined for the need of network codes data
1651 exchanges.

1652 Table 1 shows all attributes of ExtNetworkCodesCIMVersion.

1653 **Table 1 – Attributes of ExtNetworkCodes::ExtNetworkCodesCIMVersion**

name	mult	type	description
date	0..1	Date	(const=2025-09-11) 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	(const=2.4.0) 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.

1654

1655 4.3 Package ExtArea

1656 4.3.1 General

1657 This package contains the extensions related to the areas.

Figure 1: The diagram contains classes related to energy area.

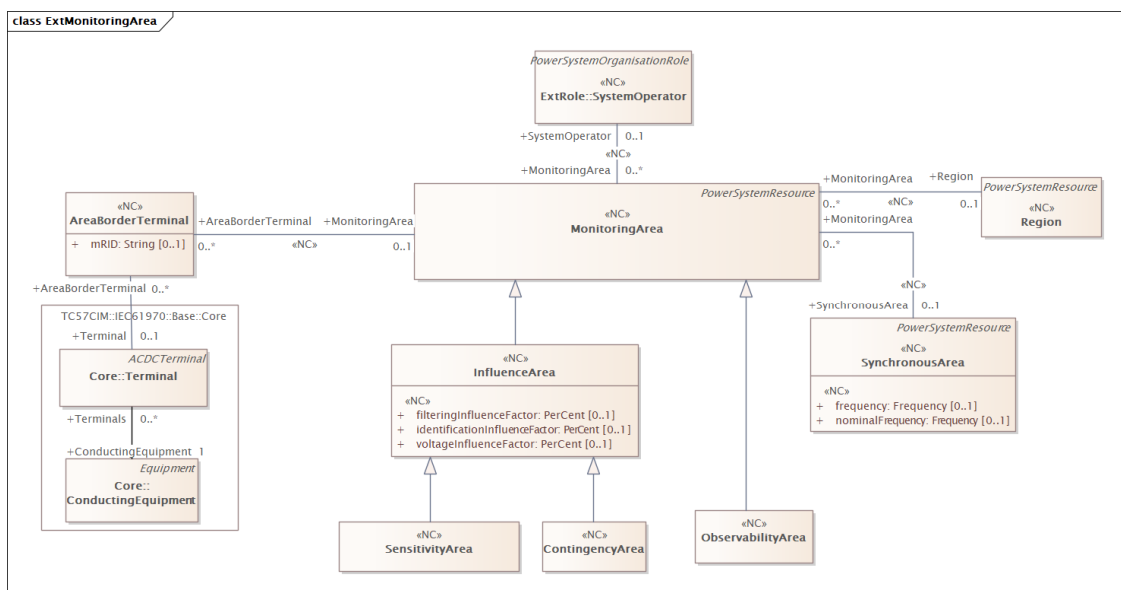


Figure 2 – Class diagram ExtArea::ExtMonitoringArea

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

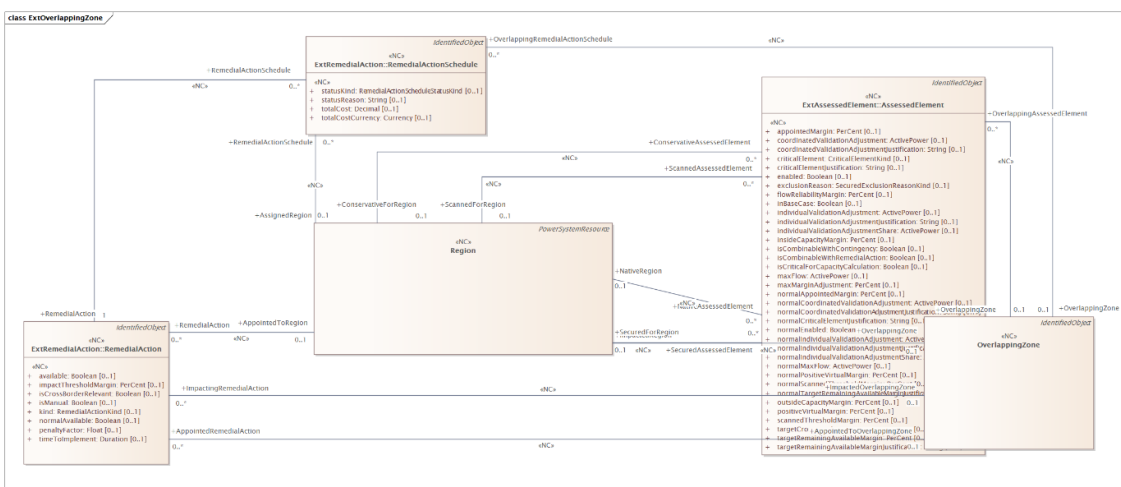


Figure 3 – Class diagram ExtArea::ExtOverlappingZone

Figure 3: The diagram contains classes related to overlapping zone.

4.3.2 (NC) AreaBorderTerminal root class

Area border terminal defines the terminals that are defining a monitoring area. Table 2 shows all attributes of AreaBorderTerminal.

Table 2 – 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

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 3 shows all association ends of AreaBorderTerminal with other classes.

Table 3 – 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.

4.3.3 (NC) BiddingZone

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

A bidding zone is a market-based method for handling power transmission congestion. It consists of scheduling areas that include the relevant production (supply) and consumption (demand) to form an electrical area with the same market price without capacity allocation.

Table 4 shows all attributes of BiddingZone.

Table 4 – 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

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

Table 5 – 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.

mult from	name	mult to	type	description
0..*	PowerCapacity	0..1	PowerCapacity	(NC) 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.
1..1	BiddingZoneAction	0..*	BiddingZoneAction	(NC) The bidding zone action that relates to this bidding zone.
0..1	CapacitySchedule	0..*	CapacitySchedule	(NC) Capacity schedule which contains information on the referred 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

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4.3.4 (NC) BiddingZoneBorder

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Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

1688

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.

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Table 6 shows all attributes of BiddingZoneBorder.

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1695

Table 6 – 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.

name	mult	type	description
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.
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.
compliesTo70percent	0..1	Boolean	(NC) Indicates whether the flow across the border complies to the 70% exchange capacity target.
numberOfInterconnectors	0..1	Integer	(NC) Total number of interconnectors for the border, including DC poles, cables, overhead lines, etc. For instance a double circuit AC overhead line - interconnector is counted as 2.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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

Table 7 – 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..1	TieCorridor	0..*	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.

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

4.3.5 (NC) CapacityCalculationRegion

Inheritance path = [Region](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject
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.
Table 8 shows all attributes of CapacityCalculationRegion.

Table 8 – Attributes of ExtArea::CapacityCalculationRegion

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

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

Table 9 – 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.
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	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: Region
0..1	ConservativeAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..1	RemedialAction	0..*	RemedialAction	(NC) inherited from: Region

mult from	name	mult to	type	description
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..*	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

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4.3.6 (NC) ContingencyArea

1711 Inheritance path = [InfluenceArea](#) : [MonitoringArea](#) : PowerSystemResource : IdentifiedObject :
 1712 ExtEulIdentifiedObject

1713 A monitoring area that defines the required contingency elements. This includes elements that
 1714 are part of the external contingency list.

1715 Table 10 shows all attributes of ContingencyArea.

1716

Table 10 – 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
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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

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Table 11 – 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..1	AreaBorderTerminal	0..*	AreaBorderTerminal	(NC) inherited from: MonitoringArea
0..*	SystemOperator	0..1	SystemOperator	(NC) inherited from: MonitoringArea
0..*	Region	0..1	Region	(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

1720

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4.3.7 (NC) EnergyCoordinationRegion

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

1723

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

1724

1725

Table 12 shows all attributes of EnergyCoordinationRegion.

1726

Table 12 – 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

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Table 13 shows all association ends of EnergyCoordinationRegion with other classes.

1729

Table 13 – 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	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: Region

mult from	name	mult to	type	description
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..*	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

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4.3.8 (NC) InfluenceArea

1732 Inheritance path = [MonitoringArea](#) : PowerSystemResource : IdentifiedObject :
 1733 ExtEuIdentifiedObject

1734 Influence area is a monitoring area that is defined by calculating the equipment that is affected
 1735 by the influence factors.

1736 Table 14 shows all attributes of InfluenceArea.

1737

Table 14 – 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 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].

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

Table 15 shows all association ends of InfluenceArea with other classes.

Table 15 – 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..1	AreaBorderTerminal	0..*	AreaBorderTerminal	(NC) inherited from: MonitoringArea
0..*	SystemOperator	0..1	SystemOperator	(NC) inherited from: MonitoringArea
0..*	Region	0..1	Region	(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

4.3.9 (NC) LoadFrequencyControlArea

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

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) areas, operated by one or more TSOs fulfilling the obligations of load-frequency control.

Table 16 shows all attributes of LoadFrequencyControlArea.

Table 16 – 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.

name	mult	type	description
frequencyRestorationReserveDelay	0..1	Seconds	(NC) FRR delay expressed in seconds. Must be a positive multiple of AGC's cycle duration.
frequencyRestorationReserveMaxRamp	0..1	ActivePowerChangeRate	(NC) Maximum authorized ramp for both FRR dispatching and ramp to zero.
frequencyRestorationReserveThreshold	0..1	ActivePower	(NC) Authorized threshold for both FRR dispatching and ramp to 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

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

Table 17 – 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

4.3.10 (NC) LoadFrequencyControlBlock

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

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 18 shows all attributes of LoadFrequencyControlBlock.

1760

Table 18 – Attributes of ExtArea::LoadFrequencyControlBlock

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

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

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Table 19 – Association ends of ExtArea::LoadFrequencyControlBlock with other classes

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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

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4.3.11 (NC) MonitoringArea

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Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

1768

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.

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1770

Table 20 shows all attributes of MonitoringArea.

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Table 20 – 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

1773

1774 Table 21 shows all association ends of MonitoringArea with other classes.

1775

Table 21 – 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..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..*	Region	0..1	Region	(NC) Region that has monitoring areas.
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

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4.3.12 (NC) ObservabilityArea

1778 Inheritance path = [MonitoringArea](#) : PowerSystemResource : IdentifiedObject :
 1779 ExtEulIdentifiedObject

1780 A monitoring area that is given by a real time measurement.

1781 Table 22 shows all attributes of ObservabilityArea.

1782

Table 22 – 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	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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1784 Table 23 shows all association ends of ObservabilityArea with other classes.

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

mult from	name	mult to	type	description
0..*	SynchronousArea	0..1	SynchronousArea	(NC) inherited from: MonitoringArea

mult from	name	mult to	type	description
0..1	AreaBorderTerminal	0..*	AreaBorderTerminal	(NC) inherited from: MonitoringArea
0..*	SystemOperator	0..1	SystemOperator	(NC) inherited from: MonitoringArea
0..*	Region	0..1	Region	(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

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4.3.13 (NC) OutageCoordinationRegion

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

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A region that has a common organisation or service responsible for outage planning and coordination and its impact on grid operation.

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Table 24 shows all attributes of OutageCoordinationRegion.

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Table 24 – Attributes of ExtArea::OutageCoordinationRegion

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

1793

1794

Table 25 shows all association ends of OutageCoordinationRegion with other classes.

1795

Table 25 – 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.

mult from	name	mult to	type	description
0..1	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: 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..*	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

1796

1797

4.3.14 (NC) OverlappingZone

1798

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

1799

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

1800

1801

Table 26 shows all attributes of OverlappingZone.

1802

Table 26 – Attributes of ExtArea::OverlappingZone

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

1803

1804

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

1805

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

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

1806

4.3.15 (NC) Region

1808 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

1809 A region where the system operator belongs to.

1810 Table 28 shows all attributes of Region.

1811

Table 28 – 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: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1812

1813 Table 29 shows all association ends of Region with other classes.

1814

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

mult from	name	mult to	type	description
0..1	MonitoringArea	0..*	MonitoringArea	(NC) Monitoring area which belongs to a region.
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.

mult from	name	mult to	type	description
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..*	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

1815

1816 **4.3.16 (NC) ScheduleResource**

1817 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

1818 A schedule resource is a market-based method for handling participation of small units,
 1819 particularly located on the lower voltage level that is controlled by a Distributed System
 1820 Operator (DSO). It is a collection of units that can operate in the market by providing bids, offers
 1821 and a resulting committed operational schedule for the collection.

1822 Table 30 shows all attributes of ScheduleResource.

1823

Table 30 – 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 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.
isLifeExtendable	0..1	Boolean	(NC)
mothballPossible	0..1	Boolean	(NC)
decommissionProtected	0..1	Boolean	(NC)

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

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

Table 31 – 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	AreaDispatchableUnit	0..1	AreaDispatchableUnit	(NC) The dispatchable unit for this scheduled 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.
0..*	PrimaryEnergySource	0..1	EnergyType	(NC) Primary energy reference type for this schedule resource.
0..1	ScheduleResourceController	0..1	ScheduleResourceController	(NC) Schedule resource controller for this schedule resource.
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

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

1827

1828

4.3.17 (NC) SchedulingArea

1829

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

1830

An area where production and/or consumption of energy can be forecasted, scheduled and measured. The area is operated by only one system operator, typically a Transmission System Operator (TSO). The area can consist of a sub area, which has the same definition as the main area, but it can be operated by another system operator (typically Distributed System Operator (DSO) or a Closed Distributed System Operator (CDSO)). This includes microgrid concept. A substation is the smallest grouping that can be included in the area. The area size should be considered in terms of the possibility of accumulated reading (settlement metering) and the capability of operating as an island.

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Table 32 shows all attributes of SchedulingArea.

1839

Table 32 – 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.
normalParticipationFactor or	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. $V=T/\sum(PF)$. 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.
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.
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

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

Table 33 – 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.
0..1	DCTieCorridor	0..1	DCTieCorridor	(NC) The DC tie corridor that is part of this scheduling area.
0..1	PowerSchedule	0..*	PowerSchedule	Power schedule which belongs to the scheduling area.
0..1	HasPart	0..*	SchedulingArea	(NC) The scheduling area has these scheduling area parts.
0..*	BiddingZone	0..1	BiddingZone	(NC) The bidding zone related to this scheduling area.
0..*	EnergyCoordinationRegion	0..1	EnergyCoordinationRegion	(NC) The energy coordination region that has this scheduling area.
0..*	LoadFrequencyControlArea	0..1	LoadFrequencyControlArea	(NC) The load frequency control area which has this scheduling area.
0..1	ScheduleResource	0..*	ScheduleResource	(NC) The schedule resource that belongs to this scheduled area.
1..1	AreaDispatchableUnit	0..*	AreaDispatchableUnit	(NC) The area dispatchable unit related to a scheduling area.
0..1	EnergyGroup	0..*	EnergyGroup	(NC) The energy group belonging to a given energy scheduling area.
0..*	SynchronousArea	0..1	SynchronousArea	(NC) The synchronous are that has this scheduling area.
0..*	SystemOperator	0..1	SystemOperator	(NC) The system operator for this scheduling area.
0..1	PowerShiftKeyStrategy	0..*	PowerShiftKeyStrategy	(NC) Power Shift Key Strategy which has a scheduling area.
0..*	PowerCapacity	0..1	PowerCapacity	(NC) Power capacity of this shaduling area.
1..1	SchedulingAreaExchangePoint	0..*	SchedulingAreaExchangePoint	(NC) The scheduling area exchange point for this 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

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

1843

1844 **4.3.18 (NC) SensitivityArea**

1845 Inheritance path = [InfluenceArea](#) : [MonitoringArea](#) : PowerSystemResource : IdentifiedObject :
 1846 ExtEulIdentifiedObject

1847 A monitoring area that defines the required observability area given by the sensitivity factors.

1848 Table 34 shows all attributes of SensitivityArea.

1849 **Table 34 – 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

1850

1851 Table 35 shows all association ends of SensitivityArea with other classes.

1852 **Table 35 – 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..1	AreaBorderTerminal	0..*	AreaBorderTerminal	(NC) inherited from: MonitoringArea
0..*	SystemOperator	0..1	SystemOperator	(NC) inherited from: MonitoringArea
0..*	Region	0..1	Region	(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

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

4.3.19 (NC) SubSchedulingArea

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

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

Table 36 shows all attributes of SubSchedulingArea.

Table 36 – 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
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

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

Table 37 – 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

mult from	name	mult to	type	description
0..1	PowerSchedule	0..*	PowerSchedule	inherited from: SchedulingArea
0..1	HasPart	0..*	SchedulingArea	(NC) inherited from: SchedulingArea
0..*	BiddingZone	0..1	BiddingZone	(NC) inherited from: SchedulingArea
0..*	EnergyCoordinationRegion	0..1	EnergyCoordinationRegion	(NC) inherited from: SchedulingArea
0..*	LoadFrequencyControlArea	0..1	LoadFrequencyControlArea	(NC) inherited from: SchedulingArea
0..1	ScheduleResource	0..*	ScheduleResource	(NC) inherited from: SchedulingArea
1..1	AreaDispatchableUnit	0..*	AreaDispatchableUnit	(NC) inherited from: SchedulingArea
0..1	EnergyGroup	0..*	EnergyGroup	(NC) inherited from: SchedulingArea
0..*	SynchronousArea	0..1	SynchronousArea	(NC) inherited from: SchedulingArea
0..*	SystemOperator	0..1	SystemOperator	(NC) inherited from: SchedulingArea
0..1	PowerShiftKeyStrategy	0..*	PowerShiftKeyStrategy	(NC) inherited from: SchedulingArea
0..*	PowerCapacity	0..1	PowerCapacity	(NC) inherited from: SchedulingArea
1..1	SchedulingAreaExchangePoint	0..*	SchedulingAreaExchangePoint	(NC) 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

1867

1868 **4.3.20 (NC) SynchronousArea**

1869 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

1870 A synchronous area is an electrical area covered by interconnect with a common system
1871 frequency in a steady-state.

1872 Table 38 shows all attributes of SynchronousArea.

1873

Table 38 – Attributes of ExtArea::SynchronousArea

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

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

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

Table 39 – 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	LoadFrequencyControlBlock	0..*	LoadFrequencyControlBlock	(NC) The load frequency control block that is part of this synchronous area.
0..1	MonitoringArea	0..*	MonitoringArea	(NC) The monitoring area 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

4.3.21 (NC) PowerCapacity root class

Power capacity defines the capacity in regard to generation, consumption and transmission (import and export) for a relevant power system resource, e.g. bidding zone, including maximum and minimum electrical power capacity and any capacity allocation.

Table 40 shows all attributes of PowerCapacity.

Table 40 – Attributes of ExtArea::PowerCapacity

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.

name	mult	type	description
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.

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

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

mult from	name	mult to	type	description
0..1	SchedulingArea	0..*	SchedulingArea	(NC) Scheduling area that has power capacity.
0..1	BiddingZone	0..*	BiddingZone	(NC) Bidding zone which has a power capacity.

4.4 Assessed element extensions

4.4.1 General

This package contains the extensions related to the assessed element.

Figure 4: The diagram contains classes related to assessed element.

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject

Table 42 – 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 considered as a limiting element for the optimization process.

name	mult	type	description
			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	(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 operating conditions. The maximum percentage shall by default be 10% of the remaining margin.

name	mult	type	description
			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). The allowed value range is [0,100].

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 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	(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 to show the actual reduction of Remaining

name	mult	type	description
			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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

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

Table 43 – 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.
0..*	NativeRegion	0..1	Region	(NC) The native region for an assessed element.

mult from	name	mult to	type	description
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

1906

1907

4.4.3 (NC) AssessedElementWithContingency root class

1908

Combination of an assessed element and a contingency.

1909

Table 44 shows all attributes of AssessedElementWithContingency.

1910

Table 44 – 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 4122, for the mRID. The use of UUID is strongly recommended.

name	mult	type	description
			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 45 shows all association ends of AssessedElementWithContingency with other classes.

**Table 45 – 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.

4.4.4 (NC) AssessedElementWithRemedialAction root class

Combination of an assessed element and a remedial action

Table 46 shows all attributes of AssessedElementWithRemedialAction.

Table 46 – 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 remedial action can be considered for this assessed element.

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

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

**Table 47 – 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.

4.4.5 (NC) SecuredExclusionReasonKind enumeration

The kind of secured exclusion reason.

Table 48 shows all literals of SecuredExclusionReasonKind.

Table 48 – 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.

4.4.6 (NC) ElementCombinationConstraintKind enumeration

Kind of constraint for an element combination.

Table 49 shows all literals of ElementCombinationConstraintKind.

Table 49 – Literals of ExtAssessedElement::ElementCombinationConstraintKind

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

4.4.7 (NC) CriticalElementKind enumeration

The kind of critical element.

1938 Table 50 shows all literals of CriticalElementKind.

1939 **Table 50 – 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).

1940

1941 4.4.8 (NC) CrossBorderRelevance root class

1942 Combination of an assessed element and one or more bidding zone border that are affected by
1943 the assessment.

1944 Table 51 shows all attributes of CrossBorderRelevance.

1945 **Table 51 – 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.

1946

1947 Table 52 shows all association ends of CrossBorderRelevance with other classes.

1948 **Table 52 – Association ends of ExtAssessedElement::CrossBorderRelevance with other**
1949 **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.

1950

1951 4.5 Package ExtAvailabilitySchedule

1952 4.5.1 General

1953 This package contains the extensions related to the availability schedule.

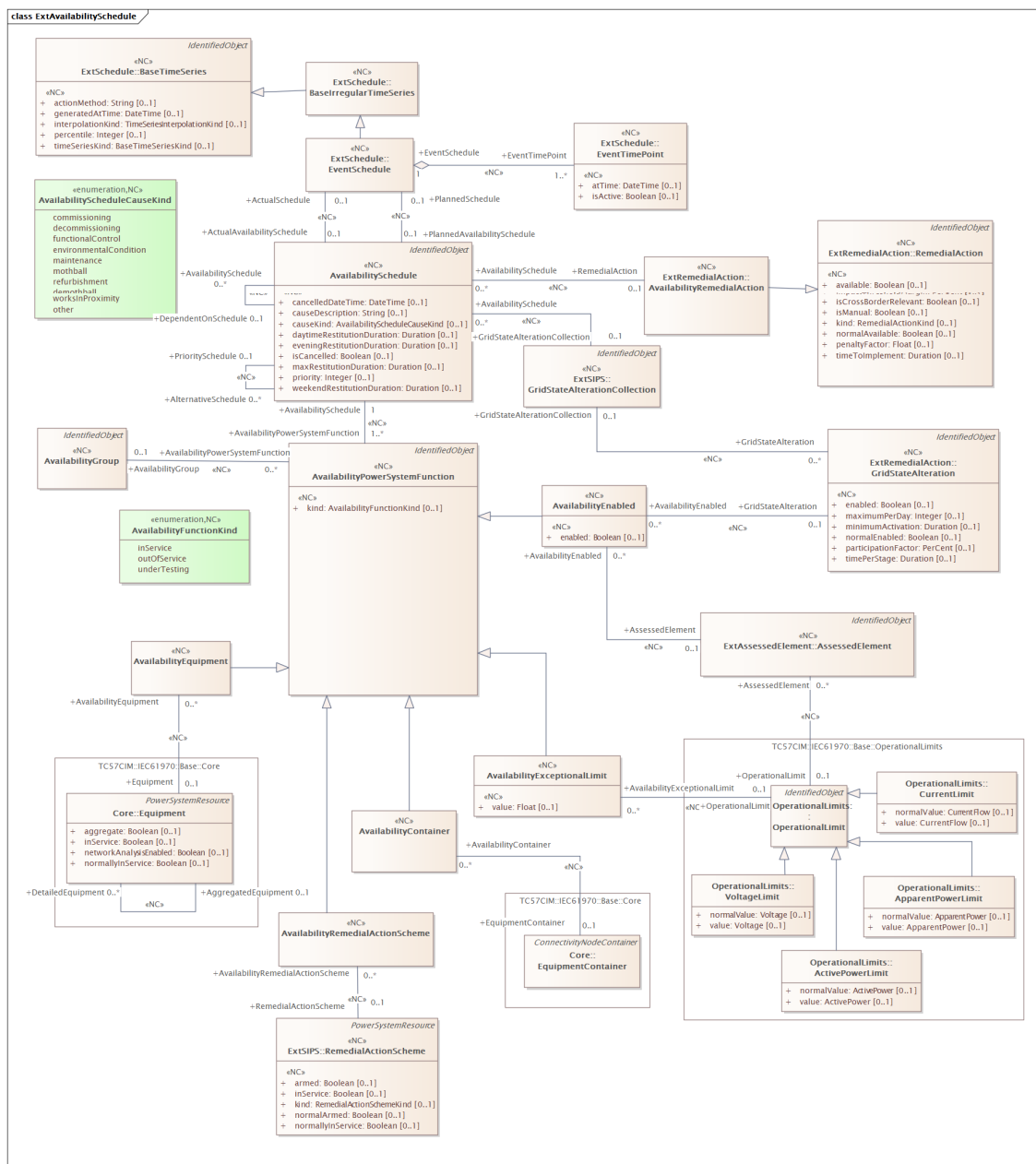


Figure 5 – Class diagram ExtAvailabilitySchedule::ExtAvailabilitySchedule

Figure 5: The diagram contains classes related to availability schedule.

4.5.2 (NC) AvailabilityEnabled

Inheritance path = [AvailabilityPowerSystemFunction](#) : IdentifiedObject : ExtEulIdentifiedObject
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 53 shows all attributes of AvailabilityEnabled.

1964

Table 53 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

1965

1966

Table 54 shows all association ends of AvailabilityEnabled with other classes.

1967

1968

Table 54 – Association ends of ExtAvailabilitySchedule::AvailabilityEnabled with other classes

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

1969

1970

4.5.3 (NC) AvailabilityContainer

1971

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

1972

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

1973

1974

Table 55 shows all attributes of AvailabilityContainer.

1975

1976

Table 55 – 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

Table 56 shows all association ends of AvailabilityContainer with other classes.

Table 56 – 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

4.5.4 (NC) AvailabilityEquipment

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

Table 57 shows all attributes of AvailabilityEquipment.

Table 57 – Attributes of ExtAvailabilitySchedule::AvailabilityEquipment

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

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

1991
1992**Table 58 – 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

1993

4.5.5 (NC) AvailabilityExceptionalLimit

1995 Inheritance path = [AvailabilityPowerSystemFunction](#) : IdentifiedObject : ExtEuIdentifiedObject

1996 Availability exceptional limit serves for associating an operational limit restriction with an

1997 availability schedule. For instance, enabling or disabling the current limit on ACLineSegment

1998 terminal in combination with other availability functions with the same availability schedule or

1999 de-rating due to fault.

2000 Table 59 shows all attributes of AvailabilityExceptionalLimit.

2001

Table 59 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

2002

2003 Table 60 shows all association ends of AvailabilityExceptionalLimit with other classes.

Table 60 – 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

2004
2005

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

2006

2007

4.5.6 (NC) AvailabilityGroup

2008

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

2009

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

2010

2011

Table 61 shows all attributes of AvailabilityGroup.

2012

Table 61 – 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

2013

2014

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

2015

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

2016

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.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2017

2018

4.5.7 (NC) AvailabilityPowerSystemFunction

2019

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

2020

Availability power system function describes the power system function that has a non-normal availability in the associated availability schedule. The availability of the function is needed as part of a power flow solution. This function is the cause and not the effect of the availability, if the effect can be calculated through power flow. For instance if only the step-up transformer for a generator is not available, the power flow will calculate that the generator is de-energized (outage). If both are tagged as not available it will not be possible to investigate remedial action for connecting the generator. It is expected that the power flow function is able to perform simple

2021

2022

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2026

2027 topology changes affected by a function taken out of service, e.g. open switches on both end
2028 of a ACLineSegment when the ACLineSegment is taken out of service. More complex changes,
2029 like change regulation set point, must be described in the linked GridStateAlterationCollection.
2030 Table 63 shows all attributes of AvailabilityPowerSystemFunction.

2031 **Table 63 – 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: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2032
2033 Table 64 shows all association ends of AvailabilityPowerSystemFunction with other classes.

2034 **Table 64 – Association ends of**
2035 **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
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2036
2037 **4.5.8 (NC) AvailabilityRemedialActionScheme**

2038 Inheritance path = [AvailabilityPowerSystemFunction](#) : IdentifiedObject : ExtEulIdentifiedObject
2039 Availability remedial action scheme serves for associating a remedial action scheme with an
2040 availability schedule. For instance, taking in or out of service a SIPS / SPS due to
2041 communication issue, in combination with other availability functions with the same availability
2042 schedule.

2043 Table 65 shows all attributes of AvailabilityRemedialActionScheme.

2044 **Table 65 – 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	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

Table 66 shows all association ends of AvailabilityRemedialActionScheme with other classes.

**Table 66 – Association ends of
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

4.5.9 (NC) AvailabilitySchedule

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

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

Table 67 shows all attributes of AvailabilitySchedule.

Table 67 – 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.

name	mult	type	description
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

Table 68 shows all association ends of AvailabilitySchedule with other classes.

Table 68 – Association ends of ExtAvailabilitySchedule::AvailabilitySchedule with other 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 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.
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.

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

2060

2061 **4.5.10 (NC) AvailabilityFunctionKind enumeration**

2062 Kind of availability that is affecting the function.

2063 Table 69 shows all literals of AvailabilityFunctionKind.

2064 **Table 69 – 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.

2065

2066 **4.5.11 (NC) AvailabilityScheduleCauseKind enumeration**

2067 The kinds of cause of the (un)availability schedule.

2068 Table 70 shows all literals of AvailabilityScheduleCauseKind.

2069 **Table 70 – 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).
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.

2070

2071 **4.6 Contingency extensions**2072 **4.6.1 General**

2073 This package contains the extensions related to the contingency.

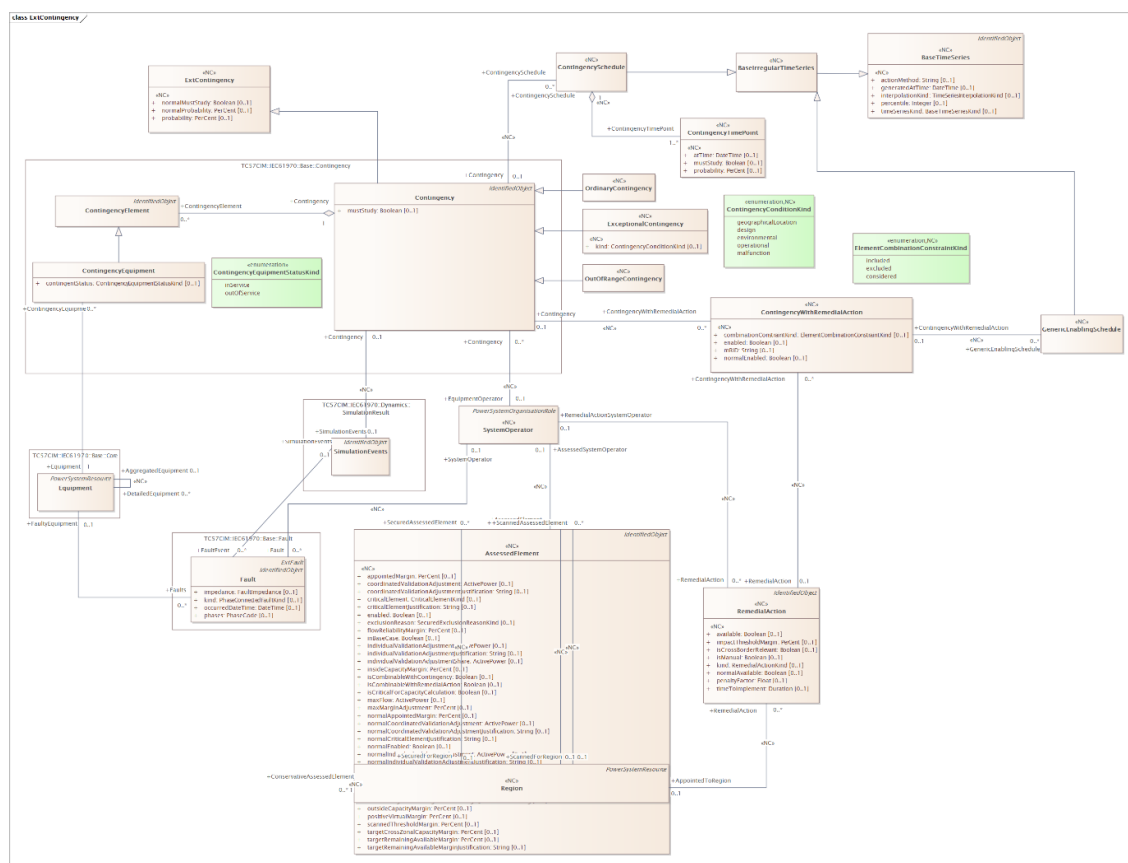


Figure 6 – Class diagram ExtContingency::ExtContingency

Figure 6: The diagram contains classes related to the contingency.

4.6.2 (NC) ContingencyWithRemedialAction root class

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

Table 71 shows all attributes of ContingencyWithRemedialAction.

Table 71 – Attributes of ExtContingency::ContingencyWithRemedialAction

name	mult	type	description
enabled	0..1	Boolean	(NC) If true, the contingency 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 Contingency and Remedial Action. If included, this remedial action can only be applied for this contingency. Else if excluded, this remedial

name	mult	type	description
			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 72 shows all association ends of ContingencyWithRemedialAction with other classes.

Table 72 – 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.

4.6.3 (NC) ExceptionalContingency

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

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

Table 73 shows all attributes of ExceptionalContingency.

Table 73 – 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: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
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 74 shows all association ends of ExceptionalContingency with other classes.

Table 74 – 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

4.6.4 (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 75 shows all attributes of ExtContingency.

Table 75 – 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].

4.6.5 (NC) OrdinaryContingency

Inheritance path = Contingency : IdentifiedObject : ExtEulIdentifiedObject : [ExtContingency](#)
Ordinary contingency means the occurrence of a contingency of a single branch or injection. Table 76 shows all attributes of OrdinaryContingency.

Table 76 – 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	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
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 77 shows all association ends of OrdinaryContingency with other classes.

Table 77 – 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

4.6.6 (NC) OutOfRangeContingency

Inheritance path = Contingency : IdentifiedObject : ExtEulIdentifiedObject : [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 78 shows all attributes of OutOfRangeContingency.

Table 78 – 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: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
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 79 shows all association ends of OutOfRangeContingency with other classes.

Table 79 – 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

4.6.7 (NC) ContingencyConditionKind enumeration

Kinds of occurrence criteria of application.

Table 80 shows all literals of ContingencyConditionKind.

Table 80 – 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.

4.7 Package ExtEquivalent

This package contains the extensions related to the equivalents.

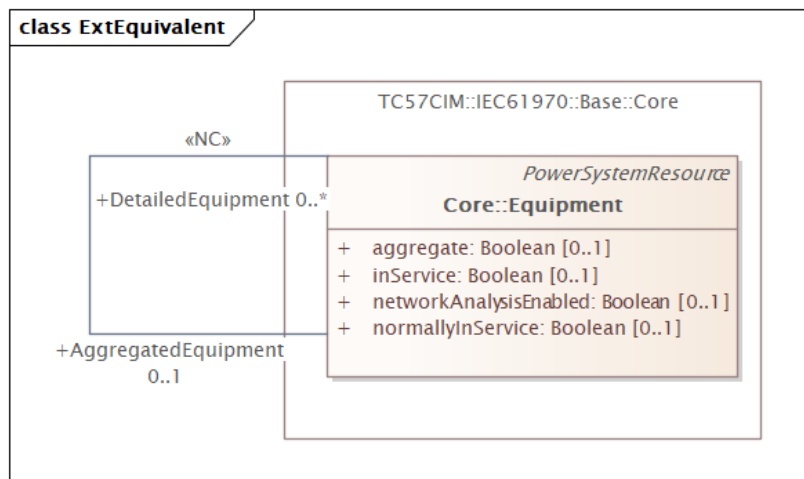


Figure 7 – Class diagram ExtEquivalent::ExtEquivalent

Figure 7: The diagram contains association related to equipment.

4.8 Package ExtPowerShiftKey

4.8.1 General

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

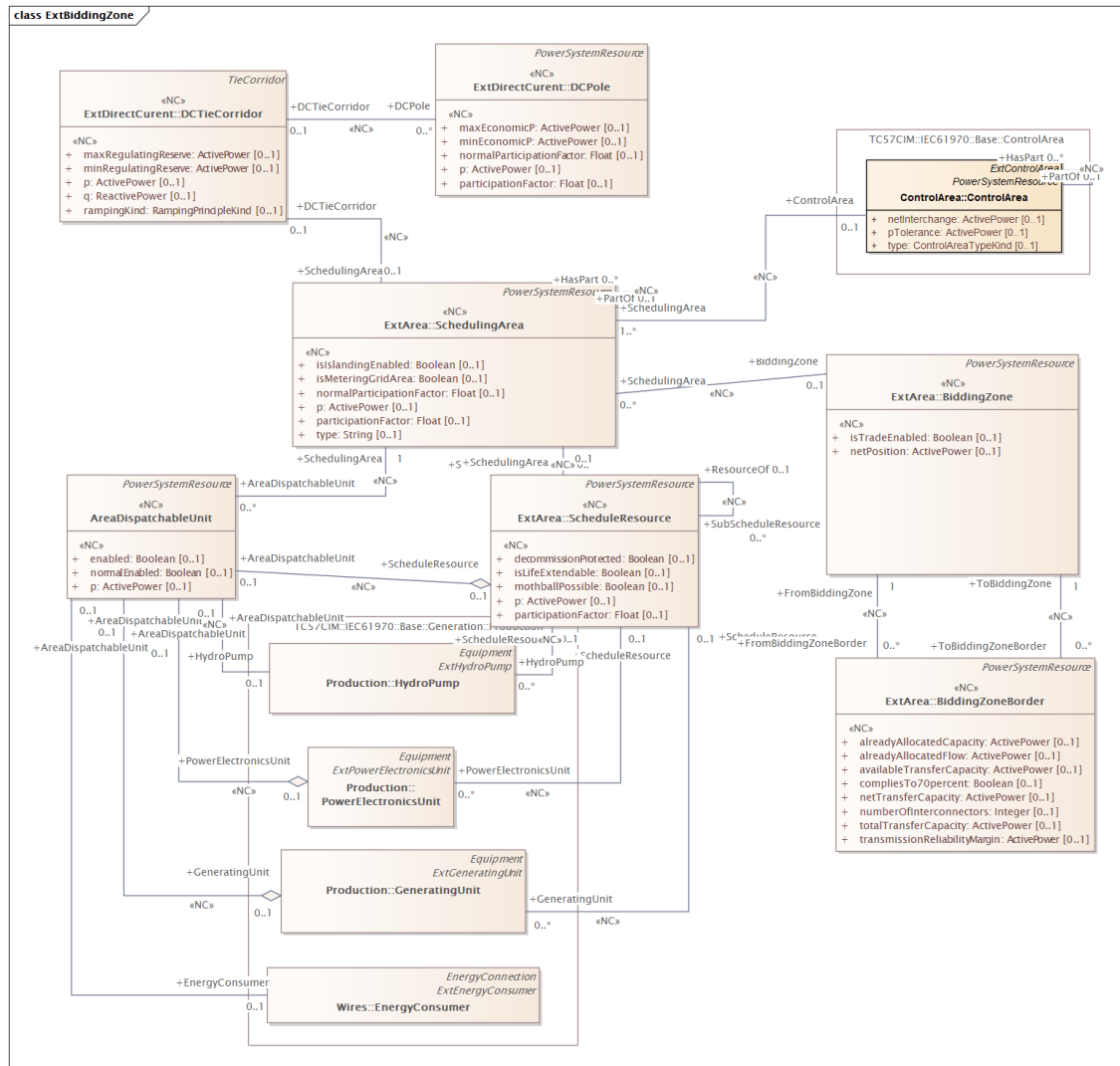


Figure 8 – Class diagram ExtPowerShiftKey::ExtBiddingZone

Figure 8: The diagram contains classes related to bidding zone.

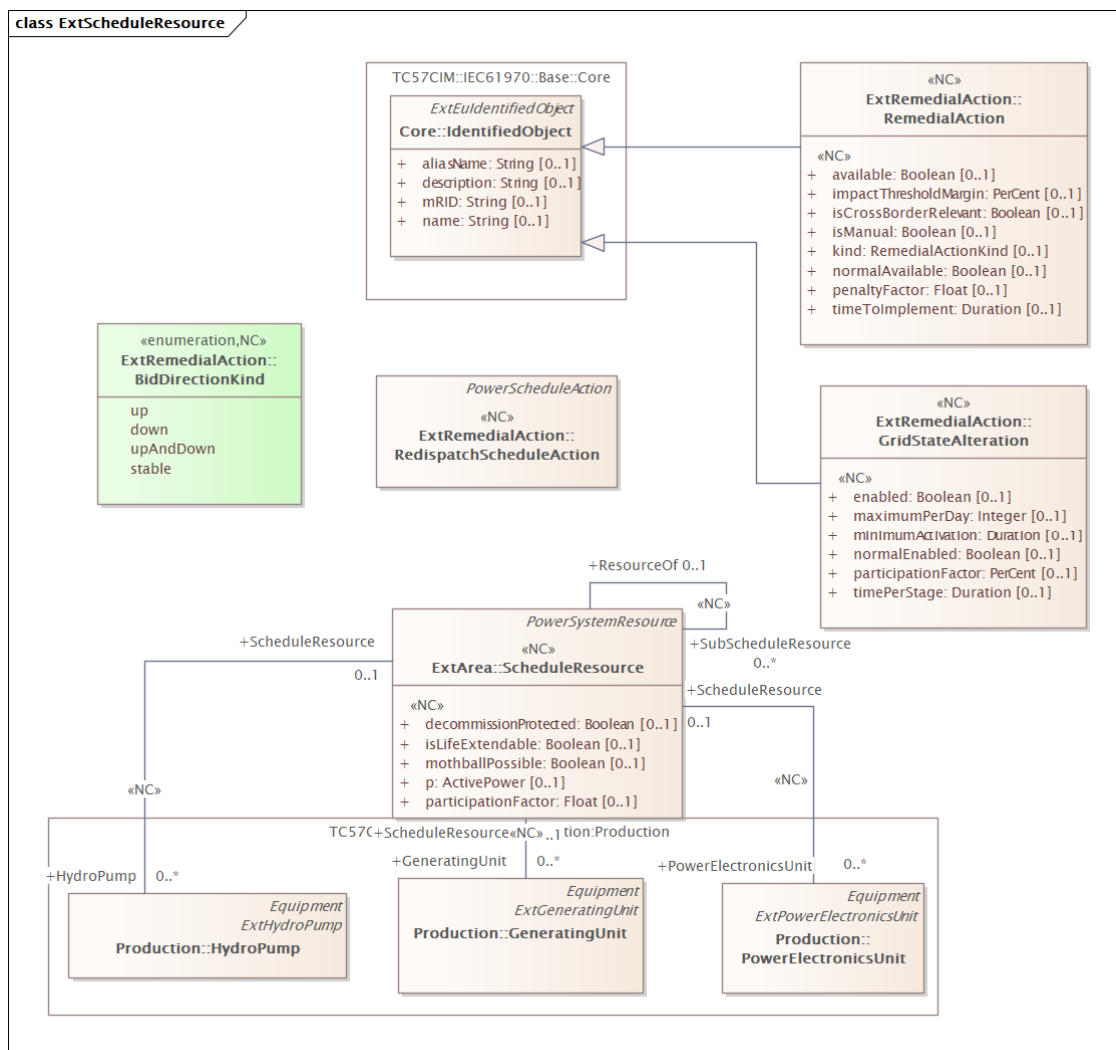


Figure 9 – Class diagram ExtPowerShiftKey::ExtScheduleResource

Figure 9: The diagram contains classes related to schedule resource.

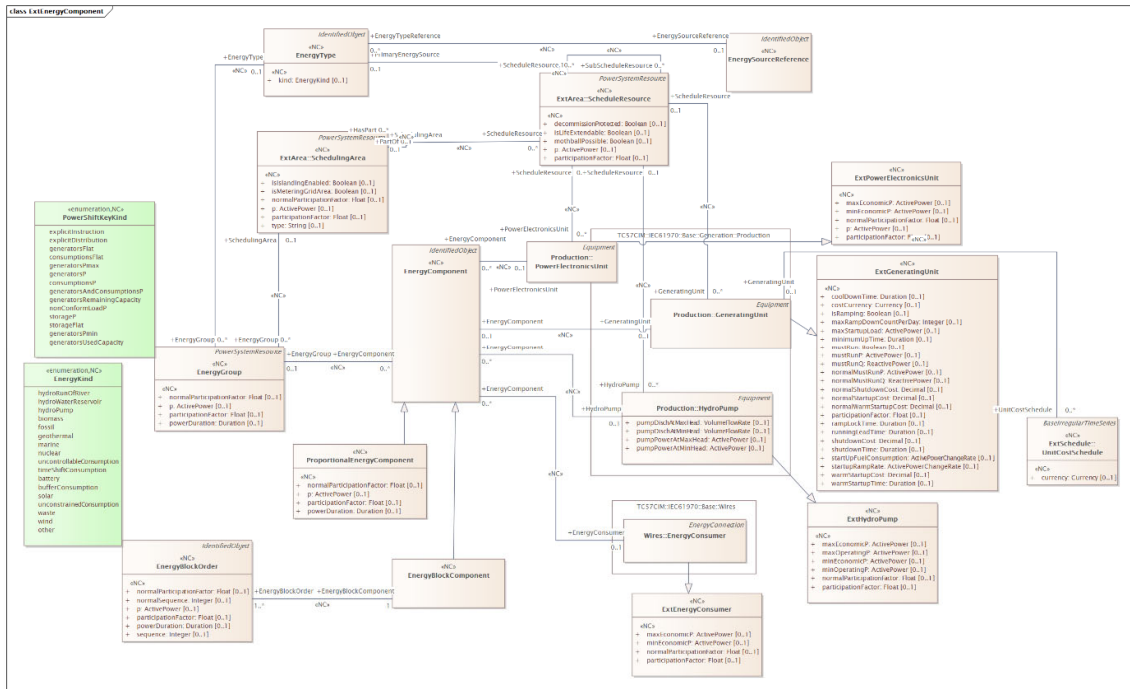


Figure 10 – Class diagram ExtPowerShiftKey::ExtEnergyComponent

Figure 10: The diagram contains classes related to GLSK.

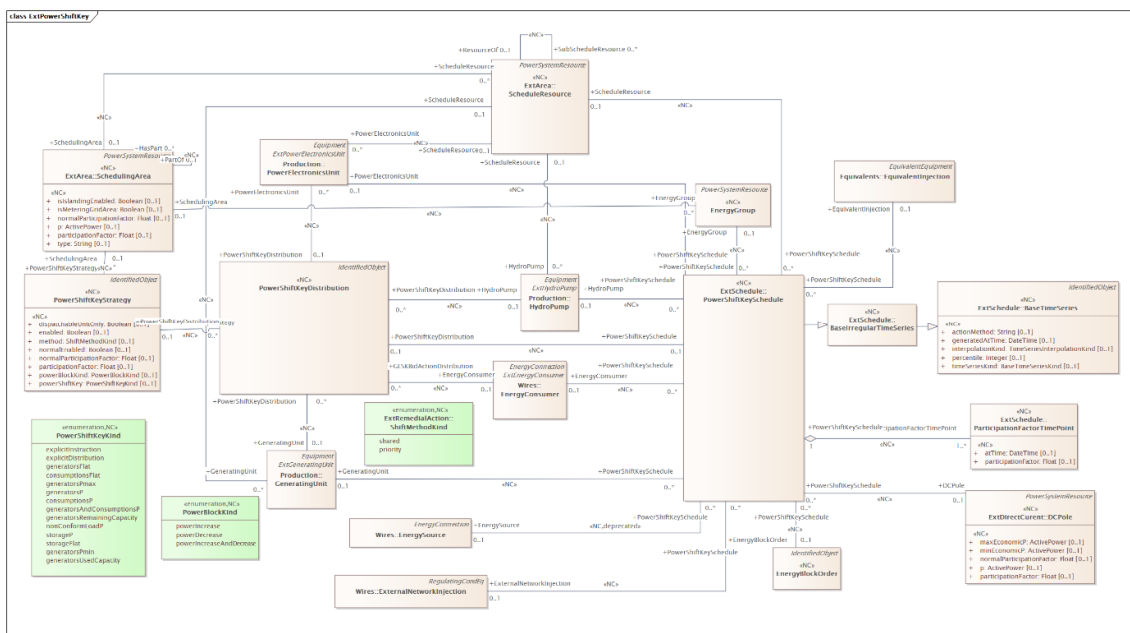


Figure 11 – Class diagram ExtPowerShiftKey::ExtPowerShiftKey

Figure 11: The diagram contains classes related to GLSK schedule.

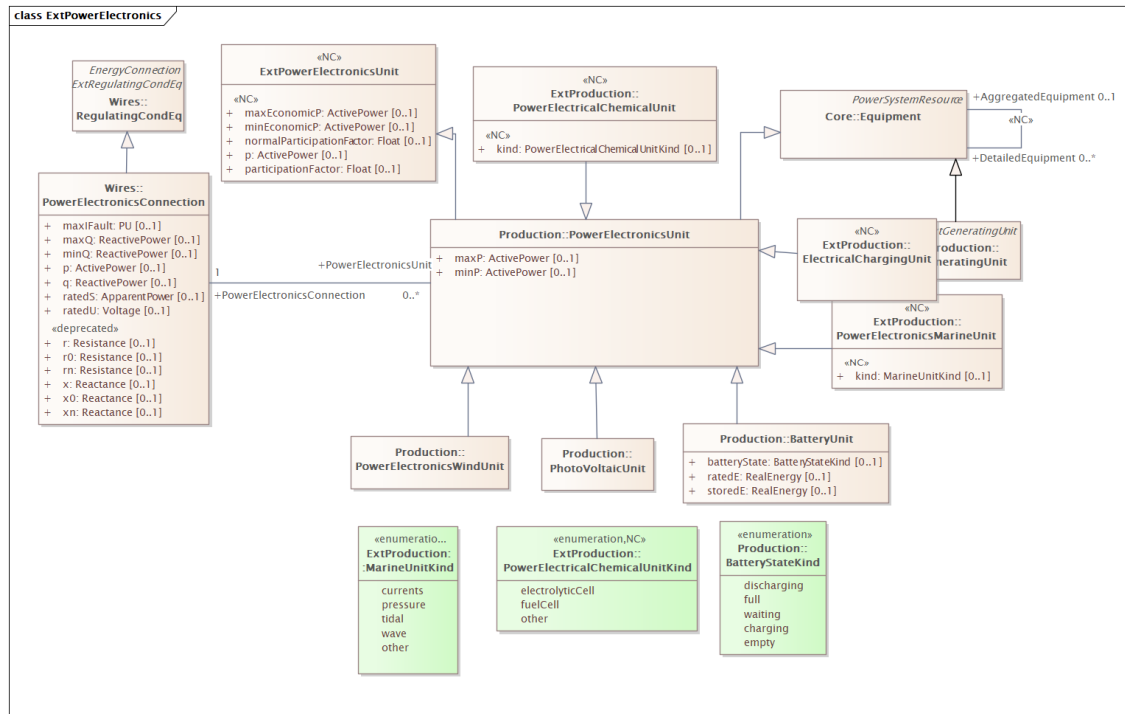


Figure 12 – Class diagram ExtPowerShiftKey::ExtPowerElectronics

Figure 12: The diagram contains classes related to power electronics.

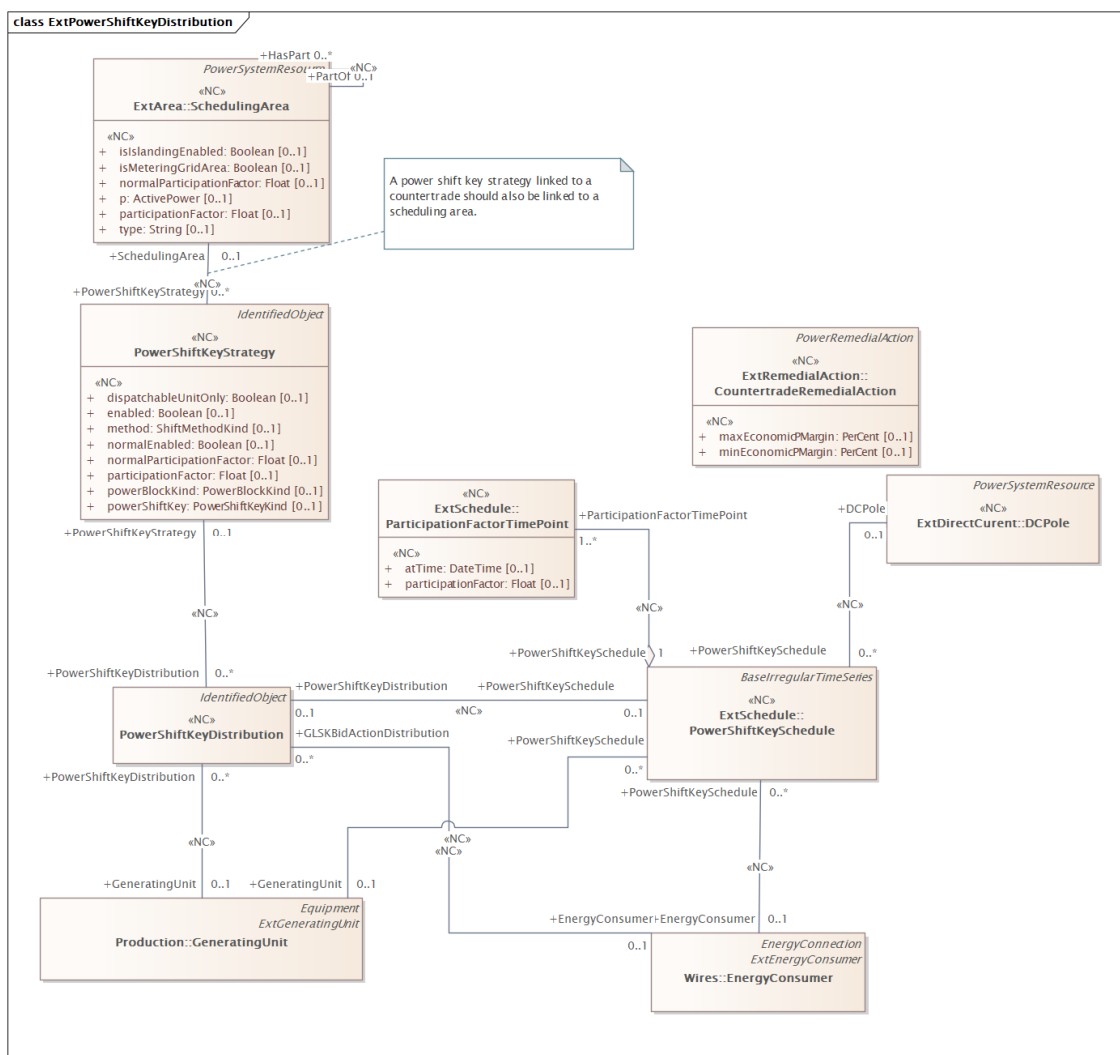


Figure 13 – Class diagram ExtPowerShiftKey::ExtPowerShiftKeyDistribution

Figure 13:

4.8.2 (NC) AreaDispatchableUnit

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Allocates a given producing or consuming unit, including direct current corridor and collection of units, to a given control area (through the scheduling area) for supporting the control of the given area through dispatch instruction.

Table 81 shows all attributes of `AreaDispatchableUnit`.

Table 81 – Attributes of ExtPowerShiftKey::AreaDispatchableUnit

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 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

name	mult	type	description
			enabled to accept a dispatch instruction. If false, the unit has the capability, but it is not enabled to receive a dispatch instruction.
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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

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

Table 82 – Association ends of ExtPowerShiftKey::AreaDispatchableUnit with other classes

mult from	name	mult to	type	description
0..1	EnergyConsumer	0..1	EnergyConsumer	Energy consumer for this area dispatchable unit.
0..1	GeneratingUnit	0..1	GeneratingUnit	(NC) The generating unit that belongs to area dispatchable unit.
0..1	HydroPump	0..1	HydroPump	(NC) Hydro Pump which is associated with the area dispatchable unit.
0..1	PowerElectronicsUnit	0..1	PowerElectronicsUnit	(NC) The power electronics unit that belongs to this area dispatchable unit.
0..*	SchedulingArea	1..1	SchedulingArea	(NC) The scheduling area that has this area dispatchable unit.
0..1	PowerSchedule	0..*	PowerSchedule	(NC) Power schedule which has area dispatchable units.
0..1	ScheduleResource	0..1	ScheduleResource	(NC) The resource which is mFRR for the EnergySchedulingArea to which the AreaDispatchableUnit is connected. Note that this can be different than the area for the energy schedule.
0..*	TieCorridor	0..1	TieCorridor	(NC) Tie Corridor which belongs to the Area Dispatchable Unit.
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

4.8.3 (NC) EnergyBlockComponent

Inheritance path = [EnergyComponent](#) : IdentifiedObject : ExtEulIdentifiedObject

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

Table 83 shows all attributes of EnergyBlockComponent.

Table 83 – Attributes of ExtPowerShiftKey::EnergyBlockComponent

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

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

Table 84 – 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..1	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..*	EnergyGroup	0..1	EnergyGroup	(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

4.8.4 (NC) EnergyBlockOrder

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

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 85 shows all attributes of EnergyBlockOrder.

Table 85 – 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.
normalParticipationFactor	0..1	Float	(NC) Normal participation factor.

name	mult	type	description
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, e.g. two order in the same instruction cannot have the same sequence.
powerDuration	0..1	Duration	(NC) Duration for the active power.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

Table 86 shows all association ends of EnergyBlockOrder with other classes.

Table 86 – 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

4.8.5 (NC) EnergyComponent

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

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

Table 87 shows all attributes of EnergyComponent.

Table 87 – 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

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

Table 88 shows all association ends of EnergyComponent with other classes.

Table 88 – 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..1	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..*	EnergyGroup	0..1	EnergyGroup	(NC) The energy group 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

4.8.6 (NC) EnergyGroup

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

An energy group is an aggregation of energy components which have the same energy characteristic, e.g. fuel type and technology. It can be used to allocate energy.

Table 89 shows all attributes of EnergyGroup.

Table 89 – Attributes of ExtPowerShiftKey::EnergyGroup

name	mult	type	description
normalParticipationFactor or	0..1	Float	(NC) Normal participation factor for the power group in relation to scheduling area. Must be a positive value.
powerDuration	0..1	Duration	(NC) Duration for the active power.
p	0..1	ActivePower	(NC) Active power for the energy group representing a particular energy type. e.g. WInd Power
participationFactor	0..1	Float	(NC) Participation factor for the power group in relation to scheduling area. Must be a positive value.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2208

2209 Table 90 shows all association ends of EnergyGroup with other classes.

2210 **Table 90 – Association ends of ExtPowerShiftKey::EnergyGroup 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..*	EnergyType	0..1	EnergyType	(NC) The energy type that the energy group are defined by.
0..1	PowerSchedule	0..*	PowerSchedule	(NC) Power schedule which is associated with an energy group.
0..1	EnergyComponent	0..*	EnergyComponent	(NC) The energy component that is part of this power group.
0..1	PowerShiftKeySchedule	0..*	PowerShiftKeySchedule	(NC) The Power Shift Key schedule for an energy group.
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

2211

2212 **4.8.7 (NC) EnergyType**

2213 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

2214 A source of the energy.

2215 An energy type reference refers to an energy characteristic that is needed for reporting, e.g. European Energy Certificate System (EECS). The kind of energy should be possible to be linked with different type of energy forecast, e.g. wind production for a given area based on wind forecast.

2219 Table 91 shows all attributes of EnergyType.

2220 **Table 91 – Attributes of ExtPowerShiftKey::EnergyType**

name	mult	type	description
kind	0..1	EnergyKind	(NC) The kind of energy type.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2221

2222 Table 92 shows all association ends of EnergyType with other classes.

2223

Table 92 – Association ends of ExtPowerShiftKey::EnergyType with other classes

mult from	name	mult to	type	description
0..1	ScheduleResource	0..*	ScheduleResource	(NC) Schedule resource unit that has an energy reference type.
0..*	EnergySourceReference	0..1	EnergySourceReference	(NC) Energy source reference which has energy type references.
0..1	EnergyGroup	0..*	EnergyGroup	(NC) The energy group that has this energy 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

2224

4.8.8 (NC) ExtEnergyConsumer root class

2226 EU Network Code extension of EnergyConsumer.

2227 Table 93 shows all attributes of ExtEnergyConsumer.

2228

Table 93 – Attributes of ExtPowerShiftKey::ExtEnergyConsumer

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. $V=T/\sum(PF)$. 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.

2229

4.8.9 (NC) ExtGeneratingUnit root class

2231 EU Network Code extension of GeneratingUnit.

2232 Table 94 shows all attributes of ExtGeneratingUnit.

2233 **Table 94 – 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.
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

name	mult	type	description
			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.
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.
startUpFuelConsumption	0..1	ActivePowerChangeRate	(NC) Fuel consumption during start-up.

2234

2235 **4.8.10 (NC) ExtHydroPump root class**

2236 EU Network Code extension of HydroPump.

2237 Table 95 shows all attributes of ExtHydroPump.

2238

Table 95 – 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. $V=T/\sum(PF)$. 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. $V=T/\sum(PF)$.

name	mult	type	description
			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.

2239

2240 **4.8.11 (NC) ExtPowerElectronicsUnit root class**

2241 EU Network Code extension of PowerElectronicsUnit.

2242 Table 96 shows all attributes of ExtPowerElectronicsUnit.

2243 **Table 96 – Attributes of ExtPowerShiftKey::ExtPowerElectronicsUnit**

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. 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.

2244

2245 **4.8.12 (NC) ProportionalEnergyComponent**2246 Inheritance path = [EnergyComponent](#) : IdentifiedObject : ExtEuIdentifiedObject

2247 Serves for grouping components within an energy group, with proportional energy allocation to
2248 all components.
2249 Table 97 shows all attributes of ProportionalEnergyComponent.

2250 **Table 97 – 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: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2251
2252 Table 98 shows all association ends of ProportionalEnergyComponent with other classes.

2253 **Table 98 – Association ends of ExtPowerShiftKey::ProportionalEnergyComponent with**
2254 **other classes**

mult from	name	mult to	type	description
0..*	EnergyConsumer	0..1	EnergyConsumer	(NC) inherited from: EnergyComponent
0..1	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..*	EnergyGroup	0..1	EnergyGroup	(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

2255
2256 **4.8.13 (NC) EnergyKind enumeration**
2257 Categories of energy used for energy groups.
2258 Table 99 shows all literals of EnergyKind.

2259 **Table 99 – Literals of ExtPowerShiftKey::EnergyKind**

literal	value	description
hydroRunOfRiver		Hydro run of river.
hydroWaterReservoir		Hydro water reservoir.
hydroPump		Hydro pump.
biomass		Biomass.

literal	value	description
fossil		Fossil.
geothermal		Geothermal.
marine		Marine.
nuclear		Nuclear.
uncontrollableConsumption		Consumption where there is no flexibility and it is measurable and under possibility to provide a forecast. e.g. TV, indoor lightning.
timeShiftConsumption		Operation can be shifted in time but can have a deadline e.g. washing machine, dishwasher.
battery		Battery storage.
bufferConsumption		Flexibility in operation but bound to some buffering capability e.g. battery, electrical vehicle, cooling system, freezer.
solar		Solar.
unconstrainedConsumption		Consumption is not constrained by any buffer and provides full flexibility. It is difficult to measure and to provide forecast. The consumption can be provided by local production. e.g. gas generator, diesel generator wood fire, etc.
waste		Waste.
wind		Wind.
other		Other.

2260

2261 **4.8.14 (NC) PowerShiftKeyKind enumeration**

2262 Kind of generating and load shift keys strategy.

2263 Table 100 shows all literals of PowerShiftKeyKind.

2264

Table 100 – 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.

literal	value	description
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)

2265

2266 **4.8.15 (NC) PowerShiftKeyDistribution**

2267 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

2268 Distribution of the bid action on the power shift keys.

2269 Table 101 shows all attributes of PowerShiftKeyDistribution.

2270

Table 101 – 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: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2271

2272 Table 102 shows all association ends of PowerShiftKeyDistribution with other classes.

2273

Table 102 – Association ends of ExtPowerShiftKey::PowerShiftKeyDistribution with other classes

2274

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.

mult from	name	mult to	type	description
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

2275

2276 **4.8.16 (NC) PowerShiftKeyStrategy**

2277 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

2278 Strategy of the power shift key.

2279 Table 103 shows all attributes of PowerShiftKeyStrategy.

2280

Table 103 – 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

Table 104 shows all association ends of PowerShiftKeyStrategy with other classes.

Table 104 – Association ends of ExtPowerShiftKey::PowerShiftKeyStrategy with other classes

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
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4.8.17 (NC) PowerBlockKind enumeration

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

Table 105 shows all literals of PowerBlockKind.

Table 105 – 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.

4.8.18 (NC) EnergySourceReference

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

An energy source reference refers to a set of fuel types characteristic for reporting, e.g. European Energy Certificate System (EECS). The kind of energy should be possible to be linked with different type of energy forecast, e.g. wind production for a given area based on wind forecast.

Table 106 shows all attributes of EnergySourceReference.

Table 106 – Attributes of ExtPowerShiftKey::EnergySourceReference

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

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

Table 107 shows all association ends of EnergySourceReference with other classes.

Table 107 – Association ends of ExtPowerShiftKey::EnergySourceReference with other classes

mult from	name	mult to	type	description
0..1	EnergyTypeReference	0..*	EnergyType	(NC) Energy type reference which belong to an energy source reference.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4.8.19 Package ObjectPowerShiftKey

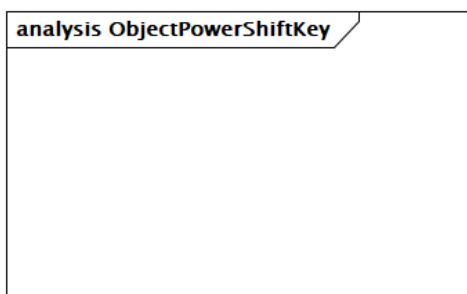


Figure 14 – Analysis diagram ObjectPowerShiftKey::ObjectPowerShiftKey

Figure 14:

4.9 Impact assessment matrix extensions

4.9.1 General

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

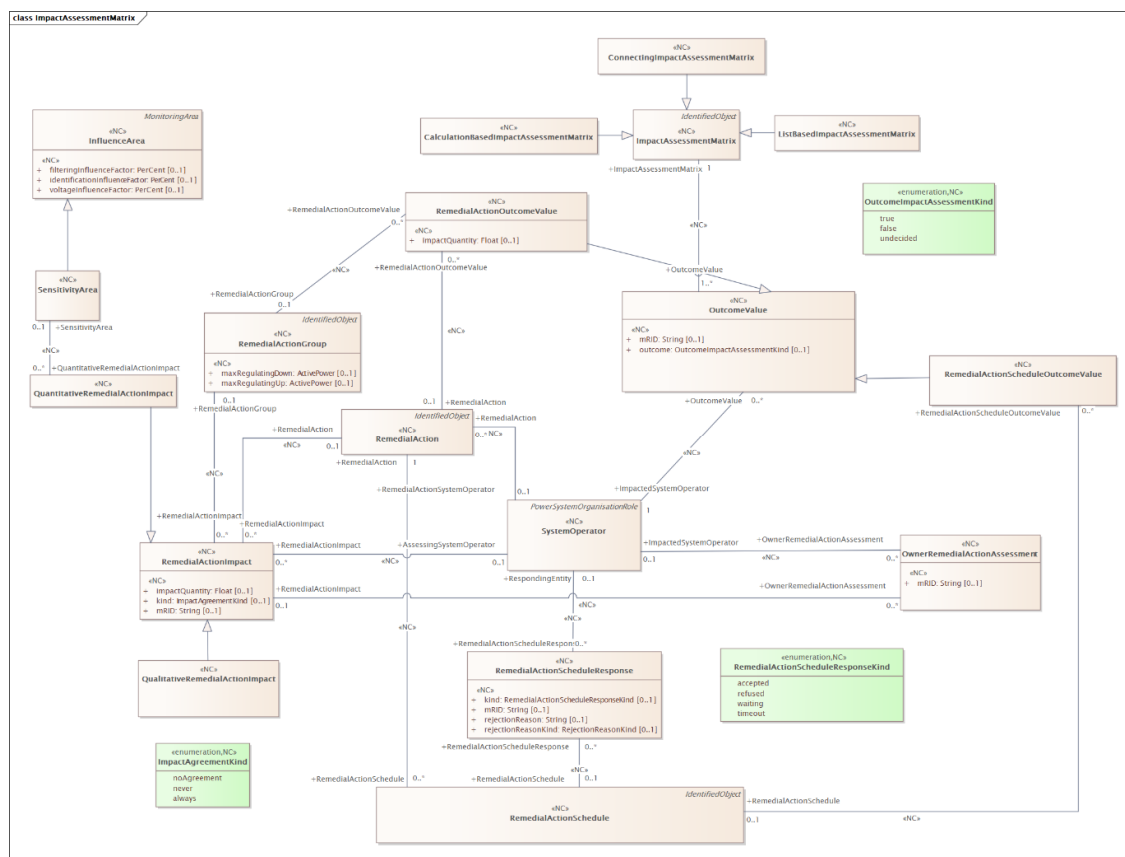


Figure 15 – Class diagram ExtImpactAssessmentMatrix::ImpactAssessmentMatrix

Figure 15: The diagram contains the classes related to the modelling of the impact assessment matrix.

4.9.2 (NC) CalculationBasedImpactAssessmentMatrix

Inheritance path = [ImpactAssessmentMatrix](#) : IdentifiedObject : ExtEuIdentifiedObject
 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 108 shows all attributes of CalculationBasedImpactAssessmentMatrix.

**Table 108 – 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

2326 Table 109 shows all association ends of CalculationBasedImpactAssessmentMatrix with other
2327 classes.

2328 **Table 109 – Association ends of**
2329 **ExtImpactAssessmentMatrix::CalculationBasedImpactAssessmentMatrix with other**
2330 **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

2331

2332 4.9.3 (NC) ConnectingImpactAssessmentMatrix

2333 Inheritance path = [ImpactAssessmentMatrix](#) : IdentifiedObject : ExtEuIdentifiedObject
2334 Connecting system operator matrix is the impact matrix indicating which system operators are
2335 connecting for that specific remedial action. The concept of connecting system operator for a
2336 remedial action is defined by CSAm Article 2.1(14).
2337 Table 110 shows all attributes of ConnectingImpactAssessmentMatrix.

2338 **Table 110 – Attributes of**
2339 **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	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

2340

2341 Table 111 shows all association ends of ConnectingImpactAssessmentMatrix with other
2342 classes.

2343 **Table 111 – Association ends of**
2344 **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

2345

4.9.4 (NC) ImpactAssessmentMatrix

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

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 112 shows all attributes of ImpactAssessmentMatrix.

Table 112 – 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: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

Table 113 shows all association ends of ImpactAssessmentMatrix with other classes.

Table 113 – 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
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4.9.5 (NC) ListBasedImpactAssessmentMatrix

Inheritance path = [ImpactAssessmentMatrix](#) : IdentifiedObject : ExtEulIdentifiedObject

List-Based is the impact matrix determined by agreement of the system operators involved. System operators jointly decide which Remedial Action (eventually scaled by the intensity of the remedial action) is impacting.

Table 114 shows all attributes of ListBasedImpactAssessmentMatrix.

Table 114 – Attributes of 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

Table 115 shows all association ends of ListBasedImpactAssessmentMatrix with other classes.

Table 115 – Association ends of 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

4.9.6 (NC) OutcomeValue root class

Outcome of an impact assessment matrix.

Table 116 shows all attributes of OutcomeValue.

Table 116 – 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 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 117 shows all association ends of OutcomeValue with other classes.

Table 117 – 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.

4.9.7 (NC) OwnerRemedialActionAssessment root class

Owner remedial action assessment of the impact of their remedial action on neighboring system operators.

Table 118 shows all attributes of OwnerRemedialActionAssessment.

2383
2384**Table 118 – 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.

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Table 119 shows all association ends of OwnerRemedialActionAssessment with other classes.

**Table 119 – 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.

2389
2390
2391
2392
2393
2394**4.9.8 (NC) RemedialActionOutcomeValue**Inheritance path = [OutcomeValue](#)

Outcome of an impact assessment matrix for a remedial action.

Table 120 shows all attributes of RemedialActionOutcomeValue.

Table 120 – 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

2395
2396
2397
2398

Table 121 shows all association ends of RemedialActionOutcomeValue with other classes.

**Table 121 – Association ends of
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.

mult from	name	mult to	type	description
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

2399

2400 4.9.9 (NC) RemedialActionScheduleOutcomeValue

2401 Inheritance path = [OutcomeValue](#)

2402 Outcome of an impact assessment matrix for a remedial action schedule.

2403 Table 122 shows all attributes of RemedialActionScheduleOutcomeValue.

2404

2405

**Table 122 – Attributes of
ExtImpactAssessmentMatrix::RemedialActionScheduleOutcomeValue**

name	mult	type	description
outcome	0..1	OutcomeImpactAssessmentKind	(NC) inherited from: OutcomeValue
mRID	0..1	String	(NC) inherited from: OutcomeValue

2406

2407 Table 123 shows all association ends of RemedialActionScheduleOutcomeValue with other
2408 classes.

2409

2410

2411

**Table 123 – 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

2412

2413 4.9.10 (NC) OutcomeImpactAssessmentKind enumeration

2414 Outcome impact assessments kinds.

2415 Table 124 shows all literals of OutcomeImpactAssessmentKind.

2416

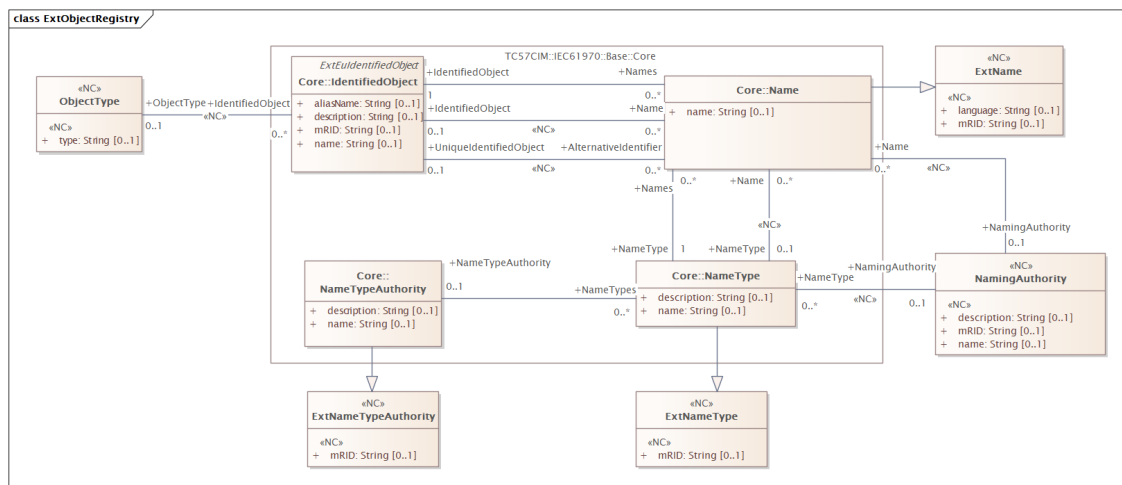
Table 124 – Literals of ExtImpactAssessmentMatrix::OutcomeImpactAssessmentKind

literal	value	description
true		True.
false		False.
undecided		Undecided. Used only for list-based impact assessment matrix.

2417

2418 **4.10 Package ExtObjectRegistry**2419 **4.10.1 General**

2420 This package contains the extensions related to the object registry.

2422 **Figure 16 – Class diagram ExtObjectRegistry::ExtObjectRegistry**

2423 Figure 16: The diagram contains classes related to the object registry extension.

2424 **4.10.2 (NC) ExtName root class**

2425 Extension of Name.

2426 Table 125 shows all attributes of ExtName.

2427 **Table 125 – Attributes of ExtObjectRegistry::ExtName**

name	mult	type	description
language	0..1	String	(NC) Shall be specified as an IETF BCP 47 language tag (e.g. en-US). Applies to the Name.name attribute. IETF language tags combine subtags from other standards such as ISO 639, ISO 15924, ISO 3166-1, and UN M.49. The tag structure has been standardized by the IETF in Best Current Practice (BCP) 47; the subtags are maintained by the IANA Language Subtag Registry.
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.

2429 **4.10.3 (NC) ExtNameType root class**

2430 An extension of NameType.

2431 Table 126 shows all attributes of ExtNameType.

2432

Table 126 – Attributes of ExtObjectRegistry::ExtNameType

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.

2433

4.10.4 (NC) ExtNameTypeAuthority root class

2435 Extension of NameTypeAuthority.

2436 Table 127 shows all attributes of ExtNameTypeAuthority.

2437

Table 127 – Attributes of ExtObjectRegistry::ExtNameTypeAuthority

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.

2438

4.10.5 (NC) NamingAuthority root class

2440 Authority responsible for creation and management of names of a given name type and/or name; typically an organization or an enterprise system.

2442 Table 128 shows all attributes of NamingAuthority.

2443

Table 128 – Attributes of ExtObjectRegistry::NamingAuthority

name	mult	type	description
description	0..1	String	(NC) Description of the name authority.
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.
name	0..1	String	(NC) Name of the name authority.

2444

2445 Table 129 shows all association ends of NamingAuthority with other classes.

2446 **Table 129 – Association ends of ExtObjectRegistry::NamingAuthority with other classes**

mult from	name	mult to	type	description
0..1	Name	0..*	Name	(NC) All names managed by this authority.
0..1	NameType	0..*	NameType	(NC) All name types managed by this authority.

2447

2448 **4.10.6 (NC) ObjectType root class**

2449 Identifies the specialised type of an object when the instance object is serialised using a
 2450 generalised class. It may be useful when the object type is not otherwise included in the
 2451 exchange. For example, a Meter may be serialised as an EndDevice in message exchanges
 2452 and need to have the ObjectType.type be specified as 'Meter' to provide context to the message
 2453 receiver.

2454 Table 130 shows all attributes of ObjectType.

2455 **Table 130 – Attributes of ExtObjectRegistry::ObjectType**

name	mult	type	description
type	0..1	String	(NC) The specialised type of an object when the instance object is serialised using a generalised class. For example, a Meter being serialised as an EndDevice in a message exchange should have the type attribute specified as 'Meter'.

2456

2457 Table 131 shows all association ends of ObjectType with other classes.

2458 **Table 131 – Association ends of ExtObjectRegistry::ObjectType with other classes**

mult from	name	mult to	type	description
0..1	IdentifiedObject	0..*	IdentifiedObject	(NC) The IdentifiedObject whose type is identified by ObjectType.

2459

2460 **4.11 Package ExtPowerTransferCorridor**2461 **4.11.1 General**

2462 This package contains the extensions related to the power transfer corridor.

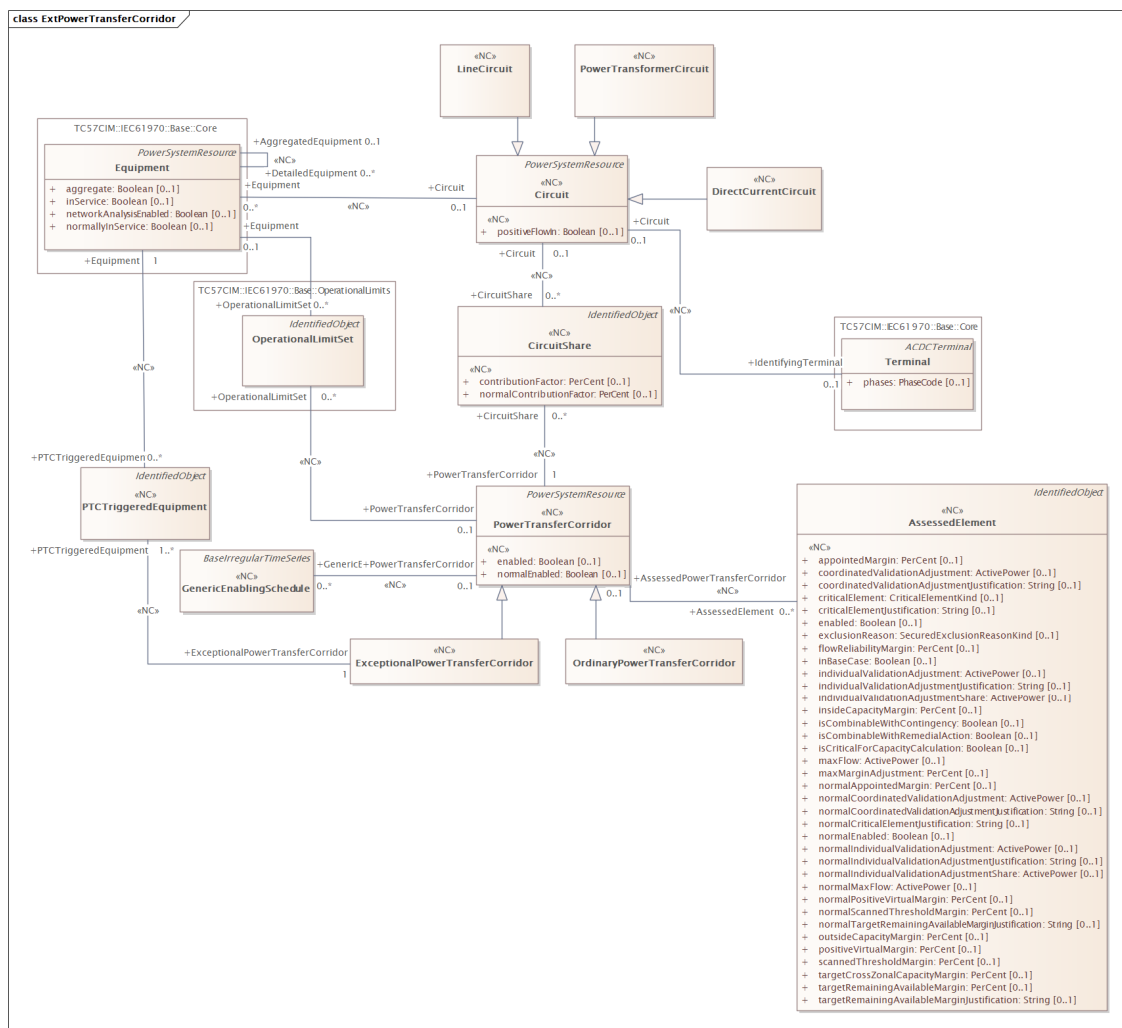


Figure 17 – Class diagram ExtPowerTransferCorridor::ExtPowerTransferCorridor

Figure 17: The diagram contains classes related to power transfer corridor.

4.11.2 (NC) Circuit

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

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 132 shows all attributes of Circuit.

Table 132 – 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

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

2475

2476

Table 133 shows all association ends of Circuit with other classes.

2477

Table 133 – 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

2478

2479

4.11.3 (NC) CircuitShare

2480

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

2481

Defines the share of the circuit which is part of an associated power transfer corridor.

2482

Table 134 shows all attributes of CircuitShare.

2483

Table 134 – 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

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

Table 135 shows all association ends of CircuitShare with other classes.

Table 135 – 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

4.11.4 (NC) ExceptionalPowerTransferCorridor

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

Potential power transfer corridor that can be triggered by equipment which changes its in service status or it is operating in an island.

Table 136 shows all attributes of ExceptionalPowerTransferCorridor.

Table 136 – 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

Table 137 shows all association ends of ExceptionalPowerTransferCorridor with other classes.

Table 137 – 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

2500

2501

4.11.5 (NC) LineCircuit2502 Inheritance path = [Circuit](#) : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

2503 A line circuit is a circuit that has at least one ACLineSegment and may or may not include related switching and/or auxiliary equipment.

2504 Table 138 shows all attributes of LineCircuit.

2506

Table 138 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

2507

2508 Table 139 shows all association ends of LineCircuit with other classes.

Table 139 – 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

4.11.6 (NC) OrdinaryPowerTransferCorridor

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

Power transfer corridor defined for normal operating network.

Table 140 shows all attributes of OrdinaryPowerTransferCorridor.

Table 140 – 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

Table 141 shows all association ends of OrdinaryPowerTransferCorridor with other classes.

Table 141 – 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

2522

2523

4.11.7 (NC) PowerTransferCorridor

2524

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

2525

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.

2526

2527

Table 142 shows all attributes of PowerTransferCorridor.

2528

2529

Table 142 – 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

2530

2531 Table 143 shows all association ends of PowerTransferCorridor with other classes.

2532 **Table 143 – Association ends of ExtPowerTransferCorridor::PowerTransferCorridor with**
2533 **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

2534

2535 4.11.8 (NC) PowerTransformerCircuit

2536 Inheritance path = [Circuit](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

2537 A power transformer circuit is a circuit that has at least one PowerTransformer and may or may
2538 not include related switching and/or auxiliary equipment.

2539 Table 144 shows all attributes of PowerTransformerCircuit.

2540 **Table 144 – 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
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

Table 145 shows all association ends of PowerTransformerCircuit with other classes.

Table 145 – 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

4.11.9 (NC) PTCTriggeredEquipment

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

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 146 shows all attributes of PTCTriggeredEquipment.

Table 146 – 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
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

Table 147 shows all association ends of PTCTriggeredEquipment with other classes.

Table 147 – 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.

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

2557

2558 **4.11.10 (NC) DirectCurrentCircuit**2559 Inheritance path = [Circuit](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

2560 A direct current circuit is a circuit consists of direct current equipment.

2561 Table 148 shows all attributes of DirectCurrentCircuit.

2562 **Table 148 – 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

2563

2564 Table 149 shows all association ends of DirectCurrentCircuit with other classes.

2565 **Table 149 – Association ends of ExtPowerTransferCorridor::DirectCurrentCircuit with other classes**

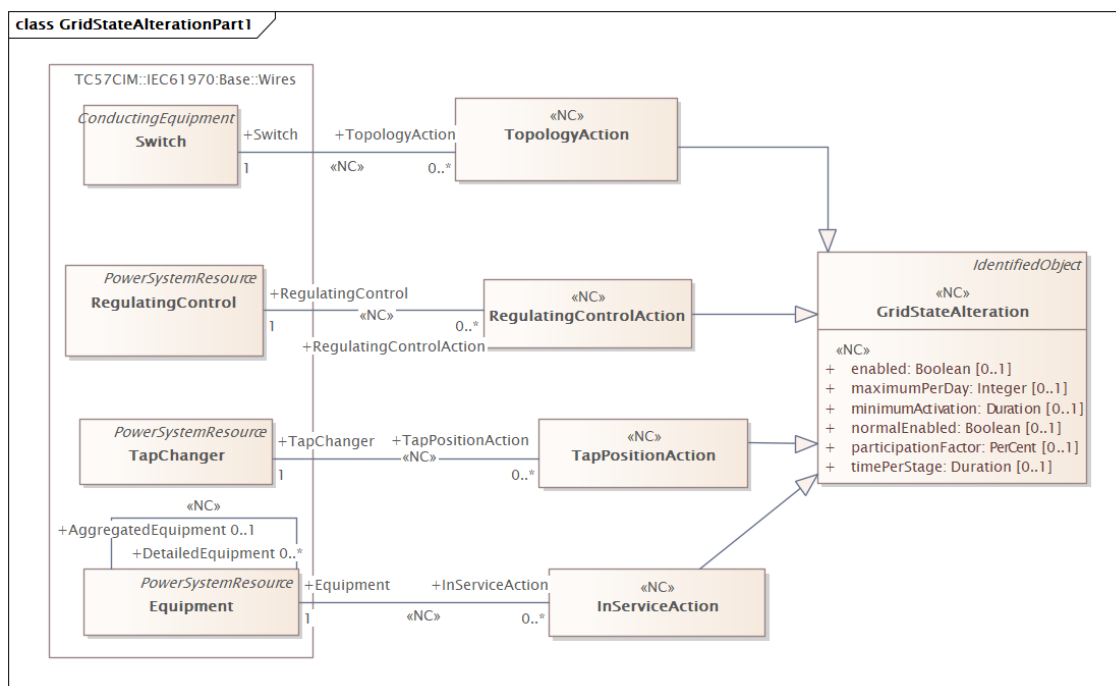
2566

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

2567

2568 **4.12 Remedial action extensions**2569 **4.12.1 General**

2570 This package contains the extensions related to the remedial action.



2571

2572 **Figure 18 – Class diagram ExtRemedialAction::GridStateAlterationPart1**

2573 Figure 18: This diagram contains extended classes for the purpose of the remedial action data
 2574 exchange.

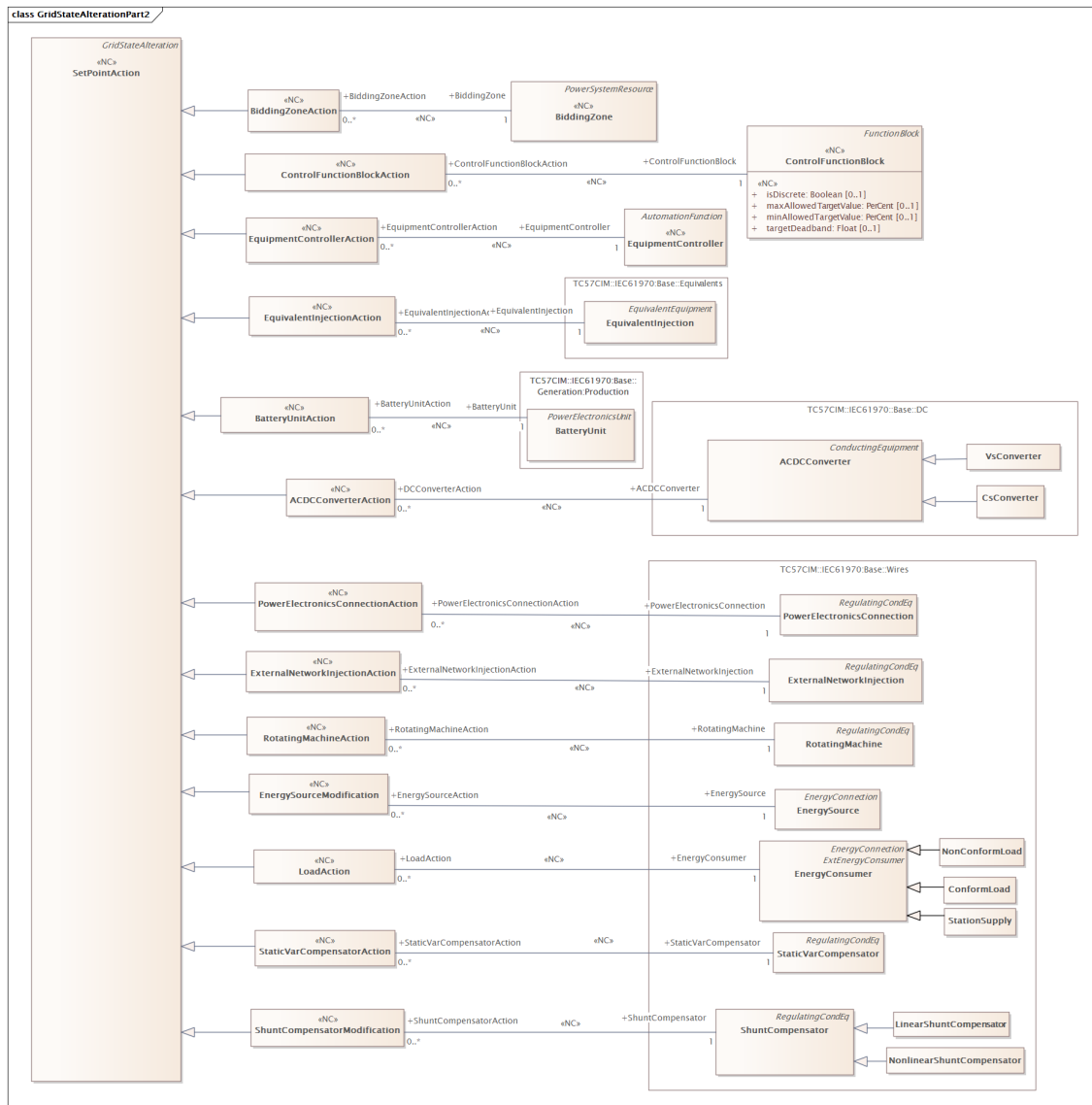


Figure 19 – Class diagram ExtRemedialAction::GridStateAlterationPart2

Figure 19: This diagram contains extended classes for the purpose of the remedial action data exchange.

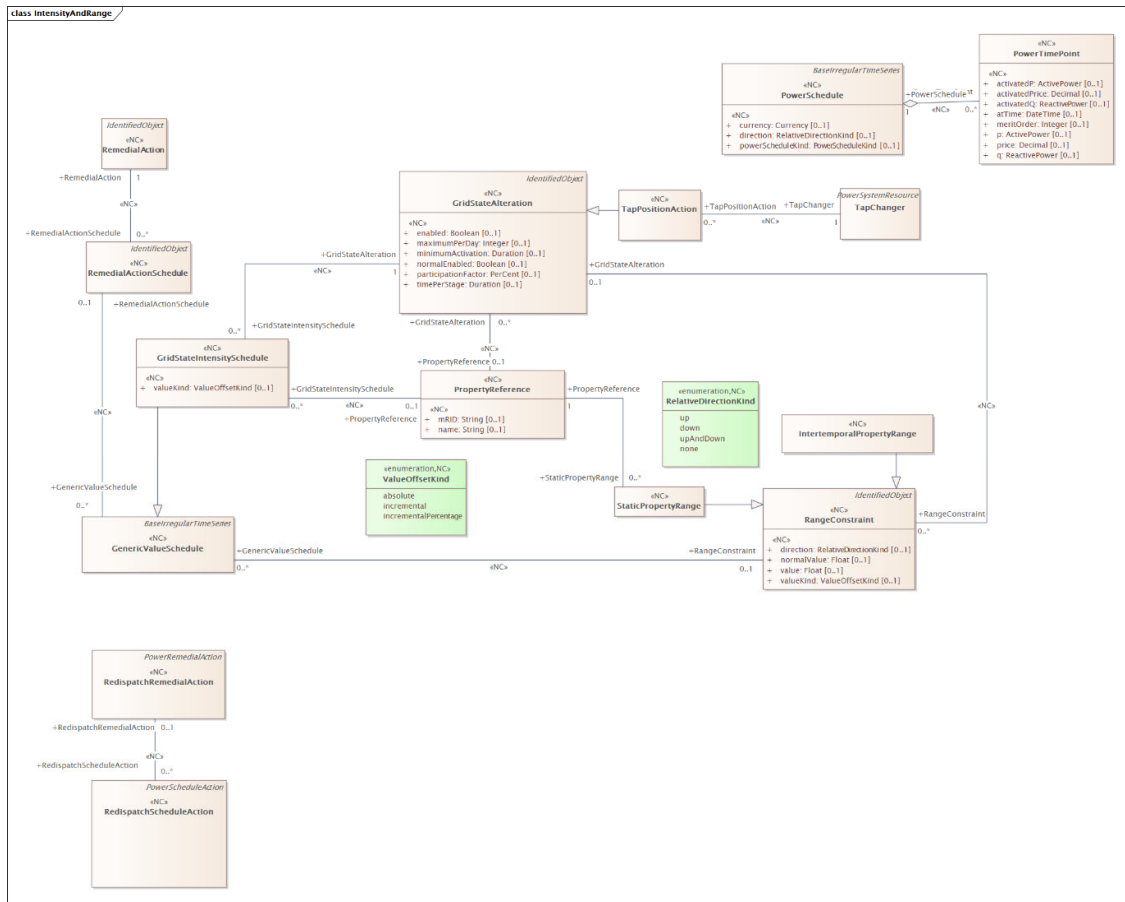


Figure 20 – Class diagram ExtRemedialAction::IntensityAndRange

Figure 20: This diagram contains extended classes related to the modelling of static, dynamic ranges and intensity.

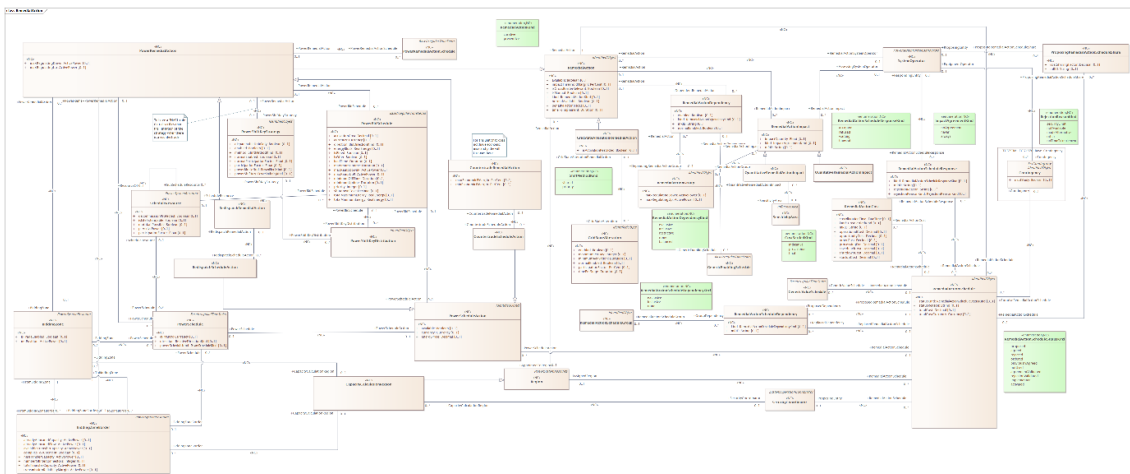


Figure 21 – Class diagram ExtRemedialAction::RemedialAction

Figure 21: The diagram contains main classes related to the remedial action.

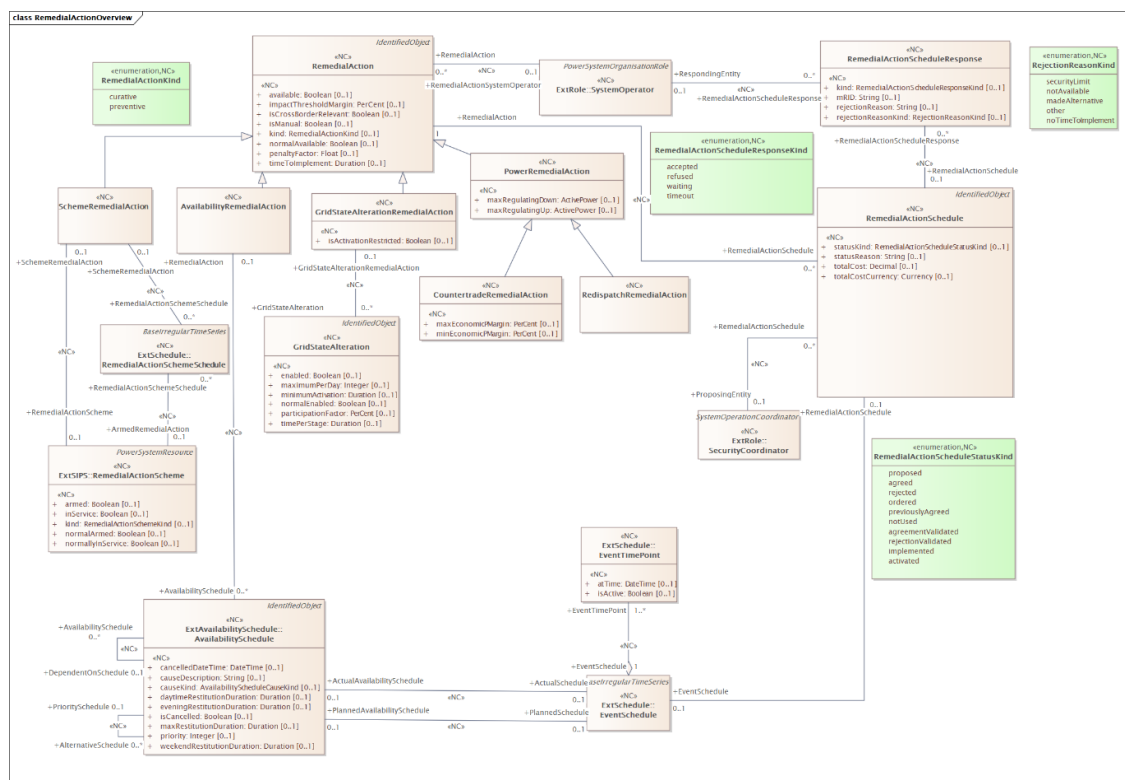


Figure 22 – Class diagram ExtRemedialAction::RemedialActionOverview

Figure 22: The diagram is an overview of the remedial action related extensions.

4.12.2 (NC) ACDCConverterAction

```
Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject :
ExtEuIdentifiedObject
```

Alternate current Direct current (ACDC) converter action.

Table 150 shows all attributes of `ACDCCConverterAction`.

Table 150 – Attributes of ExtRemedialAction::ACDCCConverterAction

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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

2596 Table 151 shows all association ends of ACDCConverterAction with other classes.

2597 **Table 151 – Association ends of ExtRemedialAction::ACDCConverterAction with other**
2598 **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
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

2599

2600 4.12.3 (NC) AvailabilityRemedialAction

2601 Inheritance path = [RemedialAction](#) : IdentifiedObject : ExtEulIdentifiedObject

2602 Availability remedial action is a remedial action that cancels or reschedules an availability
2603 schedule.

2604 Table 152 shows all attributes of AvailabilityRemedialAction.

2605 **Table 152 – 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

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

Table 153 shows all association ends of AvailabilityRemedialAction with other classes.

Table 153 – Association ends of ExtRemedialAction::AvailabilityRemedialAction with other classes

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
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

4.12.4 (NC) BatteryUnitAction

Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject : ExtEuIdentifiedObject

Battery unit setpoint action.

Table 154 shows all attributes of BatteryUnitAction.

Table 154 – Attributes of ExtRemedialAction::BatteryUnitAction

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

Table 155 shows all association ends of BatteryUnitAction with other classes.

Table 155 – 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

4.12.5 (NC) CountertradeRemedialAction

Inheritance path = [PowerRemedialAction](#) : [RemedialAction](#) : IdentifiedObject : ExtEuIdentifiedObject

Countertrade is a remedial action to relieve physical congestions where the location of activated resources within the bidding zone is not known.

Table 156 shows all attributes of CountertradeRemedialAction.

2628

Table 156 – 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). 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: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 157 shows all association ends of CountertradeRemedialAction with other classes.

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Table 157 – 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

mult from	name	mult to	type	description
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

2633

2634 **4.12.6 (NC) ControlFunctionBlockAction**2635 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :

2636 ExtEuIdentifiedObject

2637 Action for setting the control function block target values.

2638 Table 158 shows all attributes of ControlFunctionBlockAction.

2639

Table 158 – 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

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

Table 159 shows all association ends of ControlFunctionBlockAction with other classes.

Table 159 – 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

4.12.7 (NC) EnergySourceModification

Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject
Energy source action.

Table 160 shows all attributes of EnergySourceModification.

Table 160 – Attributes of ExtRemedialAction::EnergySourceModification

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

Table 161 shows all association ends of EnergySourceModification with other classes.

Table 161 – 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

4.12.8 (NC) EquivalentInjectionAction

Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject

Equivalent injection action.

Table 162 shows all attributes of EquivalentInjectionAction.

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Table 162 – 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
description	0..1	String	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

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Table 163 shows all association ends of EquivalentInjectionAction with other classes.

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Table 163 – 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

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4.12.9 (NC) ExternalNetworkInjectionAction

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Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :

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ExtEuIdentifiedObject

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External network injection action.

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Table 164 shows all attributes of ExternalNetworkInjectionAction.

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Table 164 – 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
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

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Table 165 shows all association ends of ExternalNetworkInjectionAction with other classes.

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Table 165 – 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

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4.12.10 (NC) GridStateAlteration

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Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

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Grid state alteration is a change of values describing state (operating point) of one element in the grid model compared to the base case.

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Table 166 shows all attributes of GridStateAlteration.

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Table 166 – 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.
normalEnabled	0..1	Boolean	(NC) The default/normal value used when other active signal/values are missing.
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

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Table 167 shows all association ends of GridStateAlteration with other classes.

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Table 167 – 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.

mult from	name	mult to	type	description
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) The intensity associated with a given GridStateAlterationSchedule.
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

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2689 **4.12.11 (NC) GridStateAlterationRemedialAction**2690 Inheritance path = [RemedialAction](#) : IdentifiedObject : ExtEulIdentifiedObject2691 Grid state alteration remedial action describes one or many grid state alterations applied to a
2692 grid model state or a particular scenario in order to resolve one or more identified constraints.

2693 Table 168 shows all attributes of GridStateAlterationRemedialAction.

2694 **Table 168 – 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

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

Table 169 shows all association ends of GridStateAlterationRemedialAction with other classes.

Table 169 – 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

4.12.12 (NC) GridStateIntensitySchedule

Inheritance path = [GenericValueSchedule](#) : [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

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.

2706 Table 170 shows all attributes of GridStateIntensitySchedule.

2707 **Table 170 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

2708

2709 Table 171 shows all association ends of GridStateIntensitySchedule with other classes.

2710 **Table 171 – Association ends of ExtRemedialAction::GridStateIntensitySchedule with**
2711 **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

2712

2713 **4.12.13 (NC) IntertemporalPropertyRange**

2714 Inheritance path = [RangeConstraint](#) : IdentifiedObject : ExtEuIdentifiedObject

2715 It represents the intertemporal range, which means that this is the maximum change of an
2716 attribute value between two time stamps or per time unit (e.g. hour). Both up and down
2717 directions are defined by the direction attribute, i.e. There are different schedules per direction.
2718 The class is not instantiated for PropertyReference which refers to Boolean type attributes.

2719 For instance the following example illustrates the approach:

2720 - A tap changer related grid state alteration having two intertemporal range schedules.

- 2721 - For a particular point in time, the value from up schedule is 6 and the value from down
2722 schedule is 3.
2723 - Then, the GridStateIntensity for the same point in time cannot be more than plus 6 taps from
2724 the current, or more than minus 3 taps from the current.
2725 Table 172 shows all attributes of IntertemporalPropertyRange.

2726 **Table 172 – 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: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

- 2727
2728 Table 173 shows all association ends of IntertemporalPropertyRange with other classes.

2729 **Table 173 – Association ends of ExtRemedialAction::IntertemporalPropertyRange with**
2730 **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

- 2731
2732 **4.12.14 (NC) LoadAction**
2733 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :
2734 ExtEulIdentifiedObject
2735 Load action.
2736 Table 174 shows all attributes of LoadAction.

2737 **Table 174 – 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
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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 175 shows all association ends of LoadAction with other classes.

Table 175 – 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

4.12.15 (NC) PowerElectronicsConnectionAction

Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject : ExtEuIdentifiedObject

Power electronics setpoint action.

Table 176 shows all attributes of PowerElectronicsConnectionAction.

Table 176 – Attributes of ExtRemedialAction::PowerElectronicsConnectionAction

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

name	mult	type	description
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

Table 177 shows all association ends of PowerElectronicsConnectionAction with other classes.

**Table 177 – Association ends of
ExtRemedialAction::PowerElectronicsConnectionAction with other classes**

mult from	name	mult to	type	description
0..*	PowerElectronicsConne ction	1..1	PowerElectronicsConne ction	(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..*	GridStateAlterationColle ction	0..1	GridStateAlterationColle ction	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySched ule	0..*	GridStateIntensitySched ule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRem edialAction	0..1	GridStateAlterationRem edialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	GridStateAlterationSche dule	0..*	GridStateAlterationSche dule	(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

4.12.16 (NC) PropertyReference root class

The reference to a class and one of its properties.

Table 178 shows all attributes of PropertyReference.

Table 178 – Attributes of ExtRemedialAction::PropertyReference

name	mult	type	description
name	0..1	String	(NC) Describes the property as combination of the class and one of its attributes names (e.g. PowerElectronicsConnection.p).
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

name	mult	type	description
			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 179 shows all association ends of PropertyReference with other classes.

Table 179 – 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	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.

4.12.17 (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 180 shows all attributes of QualitativeRemedialActionImpact.

Table 180 – 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 181 shows all association ends of QualitativeRemedialActionImpact with other classes.

Table 181 – 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

2772

2773 **4.12.18 (NC) QuantitativeRemedialActionImpact**2774 Inheritance path = [RemedialActionImpact](#)

2775 Defines the quantitative impact for a remedial action. The value if the impact quantity is derived
 2776 through offline calculation that has caused an impact of an element that is monitored by the
 2777 assessed system operator higher than the relevant threshold for the conducting equipment.

2778 Table 182 shows all attributes of QuantitativeRemedialActionImpact.

2779 **Table 182 – 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

2780

2781 Table 183 shows all association ends of QuantitativeRemedialActionImpact with other classes.

2782 **Table 183 – Association ends of ExtRemedialAction::QuantitativeRemedialActionImpact**
 2783 **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

2784

2785 **4.12.19 (NC) RedispatchScheduleAction**2786 Inheritance path = [PowerScheduleAction](#) : IdentifiedObject : ExtEuIdentifiedObject

2787 Redispatch schedule action is an action to rearrange power schedules for a scheduled resource
 2788 to obtain a feasible and secure operational state of the power electricity system.

2789 Table 184 shows all attributes of RedispatchScheduleAction.

2790 **Table 184 – 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: ExtEuIdentifiedObject

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

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

Table 185 – 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

4.12.20 (NC) RedispatchRemedialAction

Inheritance path = [PowerRemedialAction](#) : [RemedialAction](#) : IdentifiedObject : ExtEulIdentifiedObject

Redispatch remedial action is a remedial action that through rearranging power schedules is eliminating breaches of constraints.

Table 186 shows all attributes of RedispatchRemedialAction.

Table 186 – 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

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

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

Table 187 – Association ends of ExtRemedialAction::RedispatchRemedialAction with 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

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

2807

2808 **4.12.21 (NC) RegulatingControlAction**2809 Inheritance path = [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject

2810 Control action means the set point change of a regulating control power system resource in the grid model compared to the base case.

2812 Table 188 shows all attributes of RegulatingControlAction.

2813 **Table 188 – 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

2814

2815 Table 189 shows all association ends of RegulatingControlAction with other classes.

2816 **Table 189 – Association ends of ExtRemedialAction::RegulatingControlAction with other classes**

2817

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

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

2818

2819 **4.12.22 (NC) RemedialAction**

2820 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

2821 Remedial action describes one or more actions that can be performed on a given power system
 2822 model situation to eliminate one or more identified breaches of constraints. The remedial action
 2823 can be costly, and have a cost characteristic, or non costly.

2824 Table 190 shows all attributes of RemedialAction.

2825

Table 190 – 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

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

2826

2827

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

2828

Table 191 – 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

2829

2830 **4.12.23 (NC) RemedialActionCost root class**

2831 Remedial action cost is the total cost itemised cost by category and type for the remedial action.

2832 Table 192 shows all attributes of RemedialActionCost.

2833 **Table 192 – Attributes of ExtRemedialAction::RemedialActionCost**

name	mult	type	description
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.
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.
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.

2834

2835 Table 193 shows all association ends of RemedialActionCost with other classes.

2836 **Table 193 – Association ends of ExtRemedialAction::RemedialActionCost with other classes**

2837

mult from	name	mult to	type	description
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) Remedial action schedule for which this remedial action cost relates to.

2838

2839 **4.12.24 (NC) RemedialActionImpact root class**

2840 Remedial action impact assessment based on a given agreement with a specific system operator.

2842 Table 194 shows all attributes of RemedialActionImpact.

2843

Table 194 – 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 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.

2844

2845

Table 195 shows all association ends of RemedialActionImpact with other classes.

2846

Table 195 – Association ends of ExtRemedialAction::RemedialActionImpact with other classes

2847

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.

2848

2849

4.12.25 (NC) RemedialActionSchedule

2850

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

2851

A schedule for a determined remedial action.

2852

Table 196 shows all attributes of RemedialActionSchedule.

2853

Table 196 – 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

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

Table 197 shows all association ends of RemedialActionSchedule with other classes.

Table 197 – 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

4.12.26 (NC) RemedialActionScheduleResponse root class

The response on the remedial action schedule by a given system operator.

2861 Table 198 shows all attributes of RemedialActionScheduleResponse.

2862 **Table 198 – 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.

2863

2864 Table 199 shows all association ends of RemedialActionScheduleResponse with other classes.

2865 **Table 199 – Association ends of ExtRemedialAction::RemedialActionScheduleResponse**
2866 **with other classes**

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.

2867

2868 4.12.27 (NC) RotatingMachineAction

2869 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :
2870 ExtEulIdentifiedObject

2871 Rotating machine action.

2872 Table 200 shows all attributes of RotatingMachineAction.

2873 **Table 200 – Attributes of ExtRemedialAction::RotatingMachineAction**

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

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

Table 201 shows all association ends of RotatingMachineAction with other classes.

Table 201 – 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

4.12.28 (NC) SetPointAction

Inheritance path = [GridStateAlteration](#) : IdentifiedObject : ExtEuIdentifiedObject

Setpoint action.

Table 202 shows all attributes of SetPointAction.

Table 202 – 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

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

Table 203 – 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

4.12.29 (NC) SchemeRemedialAction

Inheritance path = [RemedialAction](#) : IdentifiedObject : ExtEulIdentifiedObject

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 204 shows all attributes of SchemeRemedialAction.

Table 204 – 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
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

Table 205 shows all association ends of SchemeRemedialAction with other classes.

Table 205 – Association ends of ExtRemedialAction::SchemeRemedialAction with other classes

mult from	name	mult to	type	description
0..1	RemedialActionSchemeSchedule	0..*	RemedialActionSchemeSchedule	(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

4.12.30 (NC) ShuntCompensatorModification

Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject

2904 Shunt compensator action.
2905 Table 206 shows all attributes of ShuntCompensatorModification.

2906 **Table 206 – 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

2907
2908 Table 207 shows all association ends of ShuntCompensatorModification with other classes.

2909 **Table 207 – Association ends of ExtRemedialAction::ShuntCompensatorModification**
2910 **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

2911
2912 **4.12.31 (NC) StaticPropertyRange**
2913 Inheritance path = [RangeConstraint](#) : IdentifiedObject : ExtEulIdentifiedObject

2914 Defines the static range, which means that this is the minimum and/or maximum of an attribute
2915 value. The value provided by the schedule replaces the value of the attribute to which the
2916 schedule refers to.

2917 In case that the PropertyReference refers to Boolean type attributes, RangeConstraint.direction
2918 shall be none or upAndDown and the RangeConstraint.valueKind shall be absolute. If the
2919 direction is none then optimization of the attribute referenced by the PropertyReference is not
2920 possible if the current status is already as the value in the range. Otherwise if the direction is
2921 upAndDown, the optimization can change from true to false or vice versa independently of the
2922 initial value in the operational scenario.

2923 For instance for a tap changer related grid state alteration for a particular point in time, if the
2924 range of TapChanger.step is to be restricted, the value of the schedule will represent that new
2925 TapChanger.step range.

2926 Table 208 shows all attributes of StaticPropertyRange.

2927 **Table 208 – 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

2928

2929 Table 209 shows all association ends of StaticPropertyRange with other classes.

2930 **Table 209 – Association ends of ExtRemedialAction::StaticPropertyRange with other**
2931 **classes**

mult from	name	mult to	type	description
0..*	PropertyReference	1..1	PropertyReference	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

2932

2933 4.12.32 (NC) StaticVarCompensatorAction

2934 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :
2935 ExtEulIdentifiedObject

2936 Static Var compensator action.

2937 Table 210 shows all attributes of StaticVarCompensatorAction.

2938

Table 210 – 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

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2940

Table 211 shows all association ends of StaticVarCompensatorAction with other classes.

2941

2942

Table 211 – Association ends of ExtRemedialAction::StaticVarCompensatorAction with 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

2943

2944

4.12.33 (NC) TapPositionAction

2945

Inheritance path = [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject

2946

Tap position action represents a change of a tap changer position in the grid model compared to the base case.

2947

2948

Table 212 shows all attributes of TapPositionAction.

2949

Table 212 – 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

2950

2951

Table 213 shows all association ends of TapPositionAction with other classes.

2952

2953

Table 213 – Association ends of ExtRemedialAction::TapPositionAction with other 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
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2954

4.12.34 (NC) TopologyAction

2955

Inheritance path = [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject

2956

2957

Topology action means the connection or disconnection of a switch in the grid model compared

2958

to the base case.

2959

Table 214 shows all attributes of TopologyAction.

2960

Table 214 – 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

2961

2962

Table 215 shows all association ends of TopologyAction with other classes.

2963

Table 215 – 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
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2964

2965

4.12.35 (NC) CostSettledKind enumeration

2966

Kind describing how settled the cost is in regards to changes.

2967

Table 216 shows all literals of CostSettledKind.

2968

Table 216 – 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.

2969

4.12.36 (NC) ImpactAgreementKind enumeration

2971 The impact agreement for the remedial action.

2972 Table 217 shows all literals of ImpactAgreementKind.

2973

Table 217 – 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.
always		An agreement is reached that the remedial action is always impacting whichever the intensity.

2974

4.12.37 (NC) BidDirectionKind enumeration

2976 Kind of direction of the bid.

2977 Table 218 shows all literals of BidDirectionKind.

2978

Table 218 – 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.

2979

4.12.38 (NC) RelativeDirectionKind enumeration

2981 Kind of direction for the changes.

2982 Table 219 shows all literals of RelativeDirectionKind.

2983

Table 219 – 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.

2984

2985 **4.12.39 (NC) RemedialActionScheduleResponseKind enumeration**

2986 The kind of response for a remedial action schedule.

2987 Table 220 shows all literals of RemedialActionScheduleResponseKind.

2988 **Table 220 – 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.

2989

2990 **4.12.40 (NC) RemedialActionKind enumeration**

2991 The different kinds for a remedial action.

2992 Table 221 shows all literals of RemedialActionKind.

2993 **Table 221 – 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.

2994

2995 **4.12.41 (NC) RemedialActionScheduleStatusKind enumeration**

2996 Remedial action schedule status kinds.

2997 Table 222 shows all literals of RemedialActionScheduleStatusKind.

2998 **Table 222 – 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.

literal	value	description
rejectionValidated		The rejection is validated for the remedial action schedule.
implemented		An ordered remedial action is implemented.
activated		Activated remedial action schedule.

2999

3000 **4.12.42 (NC) ValueOffsetKind enumeration**

3001 The kind of the value offset.

3002 Table 223 shows all literals of ValueOffsetKind.

3003 **Table 223 – 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 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.

3004

3005 **4.12.43 (NC) RemedialActionDependency root class**

3006 Remedial action dependency is making two remedial actions depending on each other. Multiple
 3007 dependency is done by multiple instances of this class. The dependency can arrive by having
 3008 one of the following examples.

3009 - The dependent remedial action is controlled by different system operator (Modeling Authority)
 3010 (e.g. SIPS that goes across control area).

3011 - The dependent remedial action is representing two or more remedial action that represent
 3012 the same grid state alteration but with different modeling resolution (e.g. detail direct current
 3013 model versus a simplified model).

3014 - The remedial action can be combined with other remedial action without the need to create
 3015 multiple remedial action with the same grid alteration for enabling dependency.

3016 Table 224 shows all attributes of RemedialActionDependency.

3017 **Table 224 – 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.

name	mult	type	description
			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 225 shows all association ends of RemedialActionDependency with other classes.

Table 225 – Association ends of ExtRemedialAction::RemedialActionDependency with 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.

4.12.44 (NC) BiddingZoneAction

Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject

Bidding zone set point action.

Table 226 shows all attributes of BiddingZoneAction.

Table 226 – 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

Table 227 shows all association ends of BiddingZoneAction with other classes.

Table 227 – Association ends of ExtRemedialAction::BiddingZoneAction with other 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

mult from	name	mult to	type	description
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

4.12.45 (NC) RemedialActionScheduleGroup

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

Remedial action schedule group collects two or more remedial action schedules together. The remedial action schedule group needs to be set up for the same remedial action or proposing alternative remedial action by including a reference to another remedial action.

Table 228 shows all attributes of RemedialActionScheduleGroup.

Table 228 – 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

Table 229 shows all association ends of RemedialActionScheduleGroup with other classes.

Table 229 – Association ends of ExtRemedialAction::RemedialActionScheduleGroup 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

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

4.12.46 (NC) RangeConstraint

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

Defines the range constraint.

Table 230 shows all attributes of RangeConstraint.

Table 230 – 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 equals true and 0 equals false. If the valueKind is incremental or incrementalPercentage, then the attribute value shall be positive (greater than zero). If the valueKind is absolute, it does not constraint attribute value to be positive. If the valueKind is incrementalPercentage, then the attribute value "100" shall represent 100%. However, the attribute value can be greater than 100 but not negative.
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 equals true and 0 equals false. If the valueKind is incremental or incrementalPercentage, then the attribute value shall be positive (greater than zero). If the valueKind is absolute, it does not constraint attribute value to be positive. If the valueKind is incrementalPercentage, then the attribute value "100" shall represent 100%. However, the attribute value can be greater than 100 but not negative.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

Table 231 shows all association ends of RangeConstraint with other classes.

Table 231 – 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

4.12.47 (NC) ProposingRemedialActionScheduleShare root class

Proposing entity (System Operator) with a proper cost share for a given remedial action schedule.

Table 232 shows all attributes of ProposingRemedialActionScheduleShare.

Table 232 – 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.

Table 233 shows all association ends of ProposingRemedialActionScheduleShare with other classes.

Table 233 – Association ends of 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.

4.12.48 (NC) RemedialActionDependencyKind enumeration

Kind of dependency between remedial actions.

Table 234 shows all literals of RemedialActionDependencyKind.

3070

Table 234 – 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.

3071

3072 4.12.49 (NC) ShiftMethodKind enumeration

3073 Kind of shift method. Describes the way a power schedule should be distributed amongst
 3074 production and consumption. e.g. Type of generating and load shift key.

3075 Table 235 shows all literals of ShiftMethodKind.

3076

Table 235 – 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.

3077

3078 4.12.50 (NC) CountertradeScheduleAction

3079 Inheritance path = [PowerScheduleAction](#) : IdentifiedObject : ExtEuIdentifiedObject

3080 Countertrade schedule action is an action to rearrange power schedules based on a Generation
 3081 and Load Shift Key (GLSK) strategy.

3082 Table 236 shows all attributes of CountertradeScheduleAction.

3083

Table 236 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

3084

3085

Table 237 shows all association ends of CountertradeScheduleAction with other classes.

3086

3087

Table 237 – Association ends of ExtRemedialAction::CountertradeScheduleAction with 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

3088

3089

4.12.51 (NC) PowerScheduleAction

3090

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject

3091

Power schedule action is an action to rearrange power schedules.

3092

Table 238 shows all attributes of PowerScheduleAction.

3093

Table 238 – 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

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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 239 shows all association ends of PowerScheduleAction with other classes.

Table 239 – Association ends of ExtRemedialAction::PowerScheduleAction with other classes

mult from	name	mult to	type	description
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) Remedial action schedule which power schedule actions.
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

4.12.52 (NC) PowerRemedialAction

Inheritance path = [RemedialAction](#) : IdentifiedObject : ExtEuIdentifiedObject

Energy remedial action describes actions to rearrange power schedules.

Table 240 shows all attributes of PowerRemedialAction.

Table 240 – 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

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

Table 241 shows all association ends of PowerRemedialAction with other classes.

Table 241 – Association ends of ExtRemedialAction::PowerRemedialAction with other classes

mult from	name	mult to	type	description
0..*	BiddingZone	0..1	BiddingZone	(NC) The Bidding Zone where the power remedial action is done.
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

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

3108

3109 **4.12.53 (NC) EquipmentControllerAction**

3110 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :

3111 ExtEulIdentifiedObject

3112 Action for setting the equipment controller action.

3113 Table 242 shows all attributes of EquipmentControllerAction.

3114 **Table 242 – Attributes of ExtRemedialAction::EquipmentControllerAction**

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

3115

3116 Table 243 shows all association ends of EquipmentControllerAction with other classes.

3117 **Table 243 – Association ends of ExtRemedialAction::EquipmentControllerAction with**

3118 **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

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

3119

3120 **4.12.54 (NC) RemedialActionGroup**

3121 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

3122 Grouping of remedial actions that can be operated together.

3123 Table 244 shows all attributes of RemedialActionGroup.

3124

Table 244 – 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

3125

3126 Table 245 shows all association ends of RemedialActionGroup with other classes.

3127 **Table 245 – Association ends of ExtRemedialAction::RemedialActionGroup with other**
3128 **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

3129

3130 **4.12.55 (NC) InServiceAction**3131 Inheritance path = [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject3132 In service action represents a change of the status of the equipment in the grid model compared
3133 to the base case.

3134 Table 246 shows all attributes of InServiceAction.

3135 **Table 246 – 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
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

3136

3137 Table 247 shows all association ends of InServiceAction with other classes.

3138 **Table 247 – 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

3139

3140 4.12.56 (NC) RemedialActionScheduleDependency root class

3141 Remedial action schedule dependency is making two remedial action schedules depending on
3142 each other.

3143 Table 248 shows all attributes of RemedialActionScheduleDependency.

3144 **Table 248 – 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 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.

3145

3146 Table 249 shows all association ends of RemedialActionScheduleDependency with other
3147 classes.

3148

3149 **Table 249 – 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.

3150

3151 **4.12.57 (NC) RemedialActionScheduleDependencyKind enumeration**

3152 Kind of dependency between remedial action schedules.

3153 Table 250 shows all literals of RemedialActionScheduleDependencyKind.

3154 **Table 250 – 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.

3155

3156 **4.12.58 (NC) RejectionReasonKind enumeration**

3157 The kind of rejection reason.

3158 Table 251 shows all literals of RejectionReasonKind.

3159

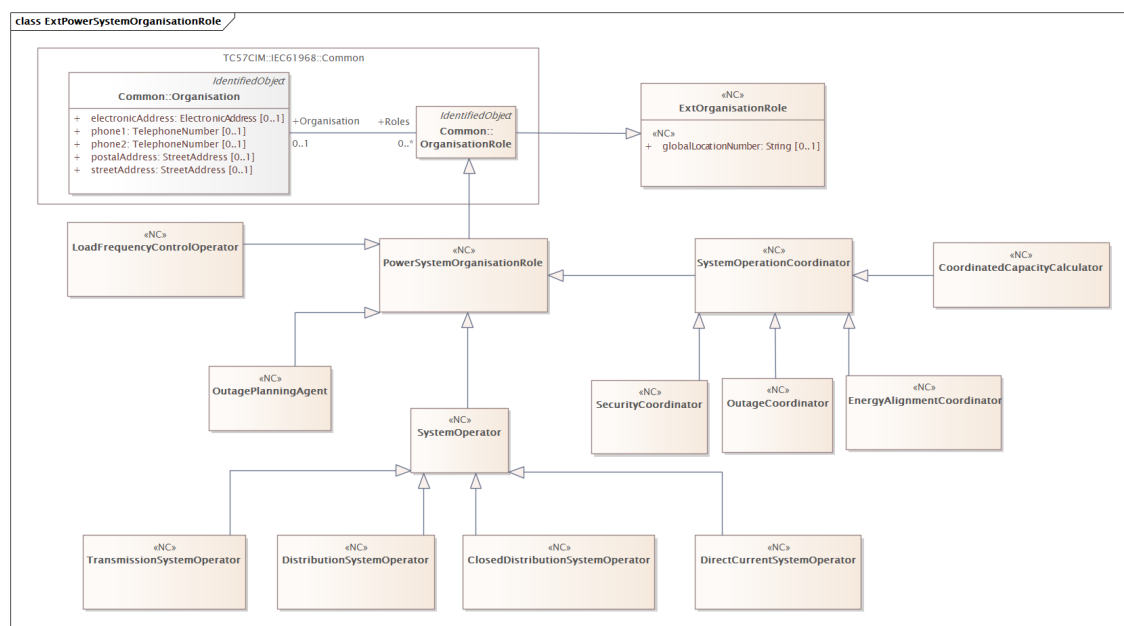
Table 251 – Literals of ExtRemedialAction::RejectionReasonKind

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.
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.

3160

4.13 Package ExtRole**4.13.1 General**

This package contains the extensions related to the roles.



3164

Figure 23 – Class diagram ExtRole::ExtPowerSystemOrganisationRole

3165

Figure 23: The diagram contains classes related to power system organization role.

3166

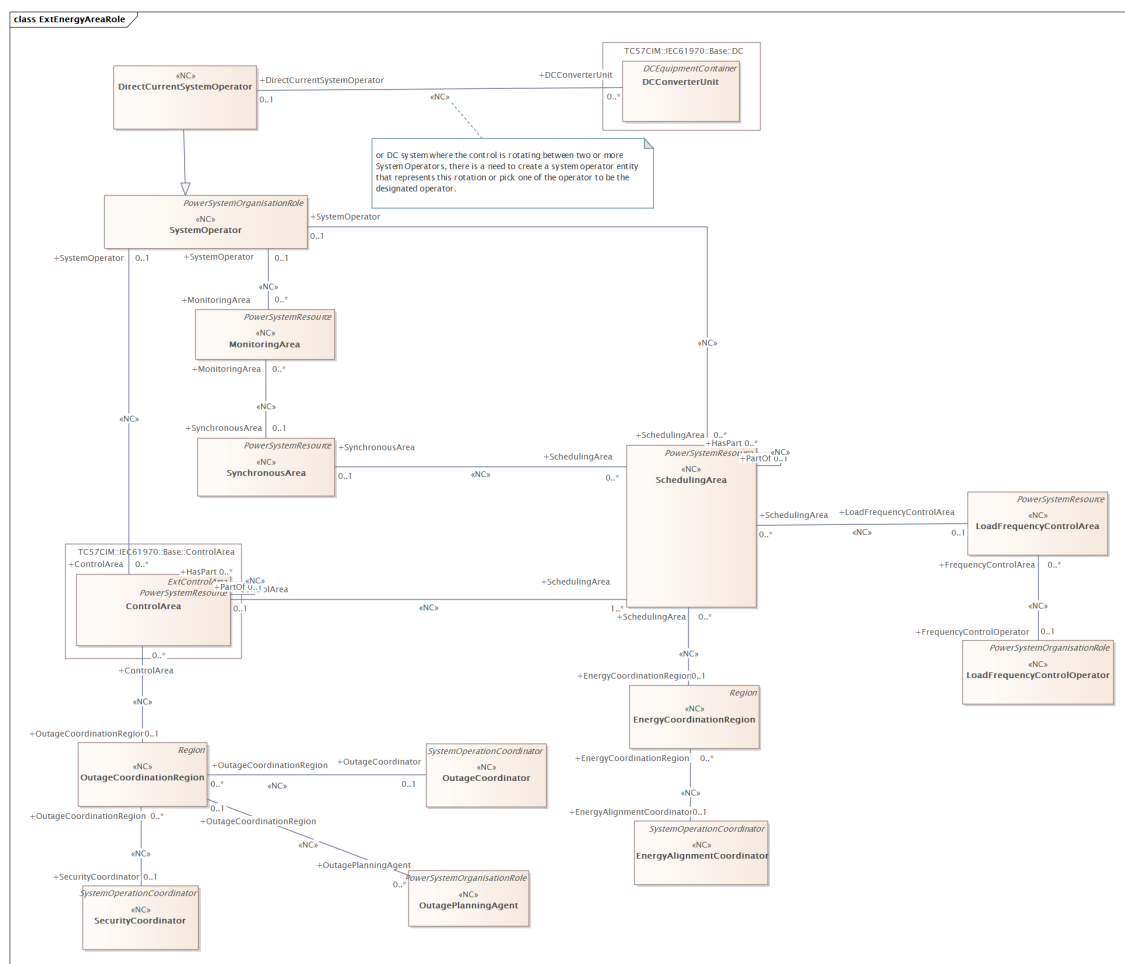


Figure 24 – Class diagram ExtRole::ExtEnergyAreaRole

Figure 24: The diagram contains classes related to energy area role.

4.13.2 (NC) CoordinatedCapacityCalculator

Inheritance path = [SystemOperationCoordinator](#) : [PowerSystemOrganisationRole](#) : [OrganisationRole](#) : [IdentifiedObject](#) : [ExtEulIdentifiedObject](#) : [ExtOrganisationRole](#)

A role that coordinates and executes the task of calculating transmission capacity.

Table 252 shows all attributes of CoordinatedCapacityCalculator.

Table 252 – Attributes of ExtRole::CoordinatedCapacityCalculator

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
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

3177 Table 253 shows all association ends of CoordinatedCapacityCalculator with other classes.

3178 **Table 253 – Association ends of ExtRole::CoordinatedCapacityCalculator with other**
3179 **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.
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3180

3181 4.13.3 (NC) ClosedDistributionSystemOperator

3182 Inheritance path = [SystemOperator](#) : [PowerSystemOrganisationRole](#) : OrganisationRole :
3183 IdentifiedObject : ExtEulIdentifiedObject : [ExtOrganisationRole](#)

3184 A system operator which distributes electricity (or gas) within a geographically confined
3185 industrial, commercial or shared services and does not supply household customers.

3186 Table 254 shows all attributes of ClosedDistributionSystemOperator.

3187 **Table 254 – Attributes of ExtRole::ClosedDistributionSystemOperator**

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
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

3188

3189 Table 255 shows all association ends of ClosedDistributionSystemOperator with other classes.

3190 **Table 255 – Association ends of ExtRole::ClosedDistributionSystemOperator with other**
3191 **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	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: SystemOperator
0..1	SchedulingArea	0..*	SchedulingArea	(NC) inherited from: SystemOperator
1..1	OutcomeValue	0..*	OutcomeValue	(NC) inherited from: SystemOperator
0..1	RemedialAction	0..*	RemedialAction	(NC) inherited from: SystemOperator

mult from	name	mult to	type	description
0..1	ProposingRemedialActionScheduleShare	0..*	ProposingRemedialActionScheduleShare	(NC) inherited from: SystemOperator
0..1	AssessedElement	0..*	AssessedElement	(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
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4.13.4 (NC) DirectCurrentSystemOperator

Inheritance path = [SystemOperator](#) : [PowerSystemOrganisationRole](#) : OrganisationRole : IdentifiedObject : ExtEulIdentifiedObject : [ExtOrganisationRole](#)

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 256 shows all attributes of DirectCurrentSystemOperator.

Table 256 – Attributes of ExtRole::DirectCurrentSystemOperator

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
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 257 shows all association ends of DirectCurrentSystemOperator with other classes.

Table 257 – Association ends of ExtRole::DirectCurrentSystemOperator with other classes

mult from	name	mult to	type	description
0..1	DCCConverterUnit	0..*	DCCConverterUnit	(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

mult from	name	mult to	type	description
0..1	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: SystemOperator
0..1	SchedulingArea	0..*	SchedulingArea	(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	AssessedElement	0..*	AssessedElement	(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
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4.13.5 (NC) DistributionSystemOperator

Inheritance path = [SystemOperator](#) : [PowerSystemOrganisationRole](#) : OrganisationRole : IdentifiedObject : ExtEulIdentifiedObject : [ExtOrganisationRole](#)

A system operator that is responsible for operating of energy distribution network from transmission level down to low voltage levels including the connection to household.

Table 258 shows all attributes of DistributionSystemOperator.

Table 258 – Attributes of ExtRole::DistributionSystemOperator

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
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 259 shows all association ends of DistributionSystemOperator with other classes.

Table 259 – Association ends of ExtRole::DistributionSystemOperator 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

mult from	name	mult to	type	description
0..1	Fault	0..*	Fault	(NC) inherited from: SystemOperator
0..1	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: SystemOperator
0..1	SchedulingArea	0..*	SchedulingArea	(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	AssessedElement	0..*	AssessedElement	(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
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4.13.6 (NC) EnergyAlignmentCoordinator

Inheritance path = [SystemOperationCoordinator](#) : [PowerSystemOrganisationRole](#) : OrganisationRole : IdentifiedObject : ExtEulIdentifiedObject : [ExtOrganisationRole](#)

A role that is responsible for alignment of forecast and schedule energy to a given energy coordination region.

Table 260 shows all attributes of EnergyAlignmentCoordinator.

Table 260 – Attributes of ExtRole::EnergyAlignmentCoordinator

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
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 261 shows all association ends of EnergyAlignmentCoordinator with other classes.

Table 261 – 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.
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4.13.7 (NC) ExtOrganisationRole root class

Organisation role NC extension class.

Table 262 shows all attributes of ExtOrganisationRole.

Table 262 – 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.

4.13.8 (NC) LoadFrequencyControlOperator

Inheritance path = [PowerSystemOrganisationRole](#) : OrganisationRole : IdentifiedObject : ExtEulIdentifiedObject : [ExtOrganisationRole](#)

A role that is responsible for operational security by operating the load frequency control (LFC) mechanism.

Table 263 shows all attributes of LoadFrequencyControlOperator.

Table 263 – Attributes of ExtRole::LoadFrequencyControlOperator

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
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 264 shows all association ends of LoadFrequencyControlOperator with other classes.

Table 264 – 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.
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4.13.9 (NC) OutageCoordinator

Inheritance path = [SystemOperationCoordinator](#) : [PowerSystemOrganisationRole](#) : OrganisationRole : IdentifiedObject : ExtEulIdentifiedObject : [ExtOrganisationRole](#)

A role 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 265 shows all attributes of OutageCoordinator.

Table 265 – Attributes of ExtRole::OutageCoordinator

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
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 266 shows all association ends of OutageCoordinator with other classes.

Table 266 – 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..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3258 **4.13.10 (NC) OutagePlanningAgent**

3259 Inheritance path = [PowerSystemOrganisationRole](#) : OrganisationRole : IdentifiedObject :
3260 ExtEulIdentifiedObject : [ExtOrganisationRole](#)

3261 An entity with the task of planning the availability status of a relevant power generating module,
3262 a relevant demand facility or a relevant grid element.

3263 Table 267 shows all attributes of OutagePlanningAgent.

3264 **Table 267 – Attributes of ExtRole::OutagePlanningAgent**

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
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

3265

3266 Table 268 shows all association ends of OutagePlanningAgent with other classes.

3267 **Table 268 – 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..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3268

3269 **4.13.11 (NC) PowerSystemOrganisationRole**

3270 Inheritance path = OrganisationRole : IdentifiedObject : ExtEulIdentifiedObject :
3271 [ExtOrganisationRole](#)

3272 A role that is responsible for the functional operational of a power system resource.

3273 Table 269 shows all attributes of PowerSystemOrganisationRole.

3274 **Table 269 – Attributes of ExtRole::PowerSystemOrganisationRole**

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
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 270 shows all association ends of PowerSystemOrganisationRole with other classes.

Table 270 – Association ends of ExtRole::PowerSystemOrganisationRole with other classes

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

4.13.12 (NC) SecurityCoordinator

Inheritance path = [SystemOperationCoordinator](#) : [PowerSystemOrganisationRole](#) : OrganisationRole : IdentifiedObject : ExtEulIdentifiedObject : [ExtOrganisationRole](#)

A role that coordinates the relevant remedial actions and their optimisation to ensure efficient use to achieve required operational security of the power system.

Table 271 shows all attributes of SecurityCoordinator.

Table 271 – Attributes of ExtRole::SecurityCoordinator

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
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 272 shows all association ends of SecurityCoordinator with other classes.

Table 272 – Association ends of ExtRole::SecurityCoordinator with other classes

mult from	name	mult to	type	description
0..1	CapacityCalculationRegion	0..*	CapacityCalculationRegion	(NC) The capacity calculation region operated by this security coordinator.
0..1	OutageCoordinationRegion	0..*	OutageCoordinationRegion	(NC) The outage coordination region that has this security coordinator.
0..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) Remedial action schedule for this security coordinator.
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole

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

3290

3291 **4.13.13 (NC) SystemOperator**3292 Inheritance path = [PowerSystemOrganisationRole](#) : OrganisationRole : IdentifiedObject :3293 ExtEulIdentifiedObject : [ExtOrganisationRole](#)

3294 System operator.

3295 Table 273 shows all attributes of SystemOperator.

3296 **Table 273 – Attributes of ExtRole::SystemOperator**

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
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

3297

3298 Table 274 shows all association ends of SystemOperator with other classes.

3299 **Table 274 – 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.
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	MonitoringArea	0..*	MonitoringArea	(NC) The monitoring area that is operated by this system operator.
0..1	SchedulingArea	0..*	SchedulingArea	(NC) The scheduling 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	AssessedElement	0..*	AssessedElement	(NC) All relevant network elements on which operational security violations need to be managed in a coordinated way.

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

3300

3301 **4.13.14 (NC) SystemOperationCoordinator**

3302 Inheritance path = [PowerSystemOrganisationRole](#) : OrganisationRole : IdentifiedObject :
 3303 ExtEulIdentifiedObject : [ExtOrganisationRole](#)

3304 A role that coordinates relevant information and impact in regards to operating the power
 3305 system.

3306 Table 275 shows all attributes of SystemOperationCoordinator.

3307 **Table 275 – Attributes of ExtRole::SystemOperationCoordinator**

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
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

3308

3309 Table 276 shows all association ends of SystemOperationCoordinator with other classes.

3310 **Table 276 – Association ends of ExtRole::SystemOperationCoordinator with other**
 3311 **classes**

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

3312

3313 **4.13.15 (NC) TransmissionSystemOperator**3314 Inheritance path = [SystemOperator](#) : [PowerSystemOrganisationRole](#) : OrganisationRole :3315 IdentifiedObject : ExtEulIdentifiedObject : [ExtOrganisationRole](#)

3316 A system operator role that is responsible for operating of an energy transmission network.

3317 Table 277 shows all attributes of TransmissionSystemOperator.

3318 **Table 277 – Attributes of ExtRole::TransmissionSystemOperator**

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
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

3319

3320 Table 278 shows all association ends of TransmissionSystemOperator with other classes.

3321 **Table 278 – Association ends of ExtRole::TransmissionSystemOperator with other**
3322 **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	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: SystemOperator
0..1	SchedulingArea	0..*	SchedulingArea	(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	AssessedElement	0..*	AssessedElement	(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
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3323

4.14 Security analysis result extensions

4.14.1 General

This package contains the extensions related to the security analysis result.

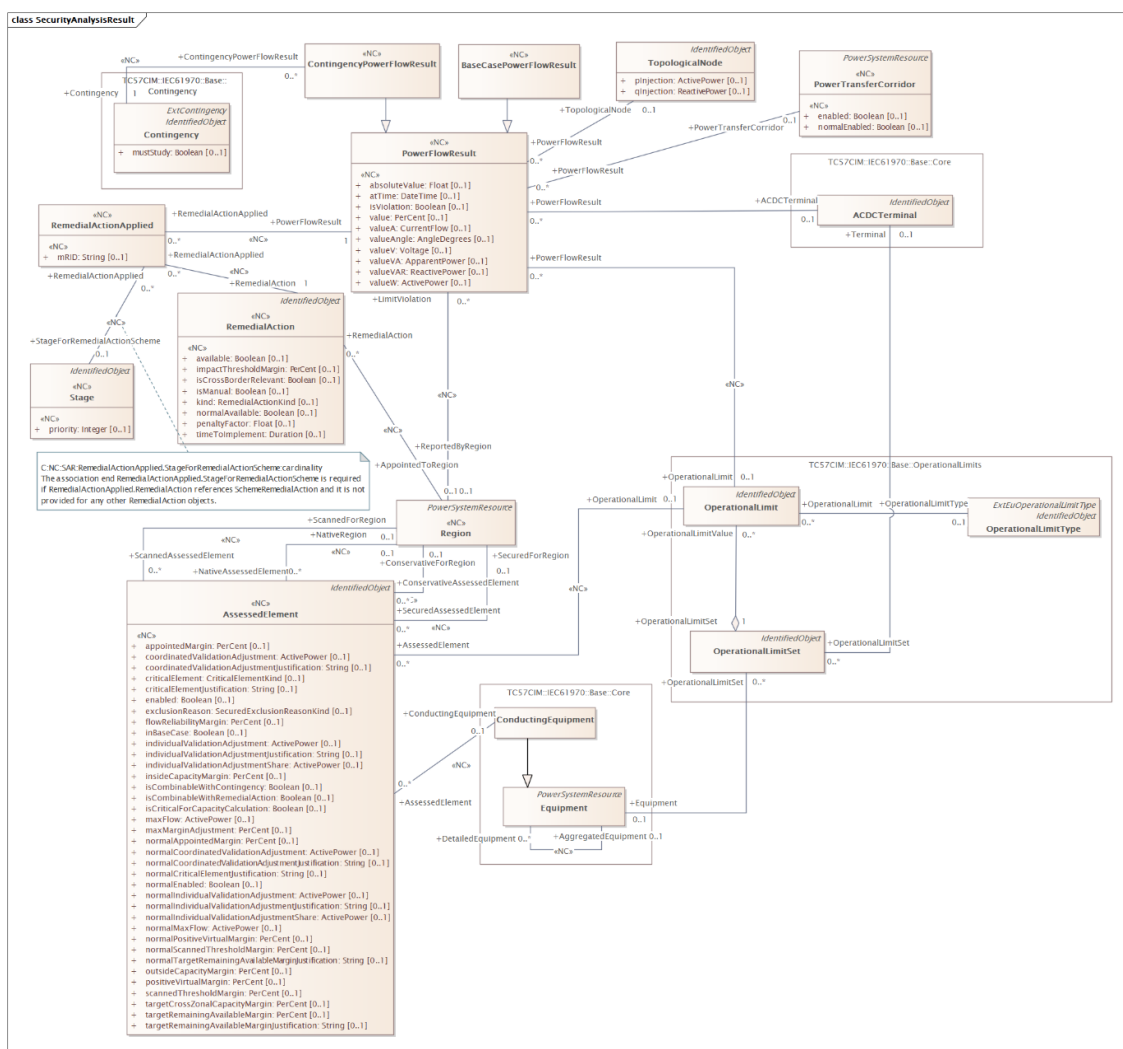


Figure 25 – Class diagram ExtSecurityAnalysisResult::SecurityAnalysisResult

Figure 25: The diagram contains classes related to the security analysis result.

4.14.2 (NC) BaseCasePowerFlowResult

Inheritance path = PowerFlowResult

Base case power flow result for a given terminal.

Table 279 shows all attributes of BaseCasePowerFlowResult.

Table 279 – 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

name	mult	type	description
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 280 shows all association ends of BaseCasePowerFlowResult with other classes.

Table 280 – 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

4.14.3 (NC) ContingencyPowerFlowResult

Inheritance path = [PowerFlowResult](#)

Contingency power flow result on a given terminal for a given contingency.

Table 281 shows all attributes of ContingencyPowerFlowResult.

Table 281 – 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 282 shows all association ends of ContingencyPowerFlowResult with other classes.

3347
3348**Table 282 – 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
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

3349

4.14.4 (NC) PowerFlowResult root class

3351 Power flow result including any operational limit violation.

3352 Table 283 shows all attributes of PowerFlowResult.

Table 283 – 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.

name	mult	type	description
			Load sign convention is used, i.e. positive sign means flow out from a TopologicalNode (bus) into the conducting equipment.

Table 284 shows all association ends of PowerFlowResult with other classes.

Table 284 – 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.

4.14.5 (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 285 shows all attributes of RemedialActionApplied.

Table 285 – 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 286 shows all association ends of RemedialActionApplied with other classes.

Table 286 – 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.

4.15 Package ExtSensitivityMatrix**4.15.1 General**

This package contains extensions related to sensitivity matrix.

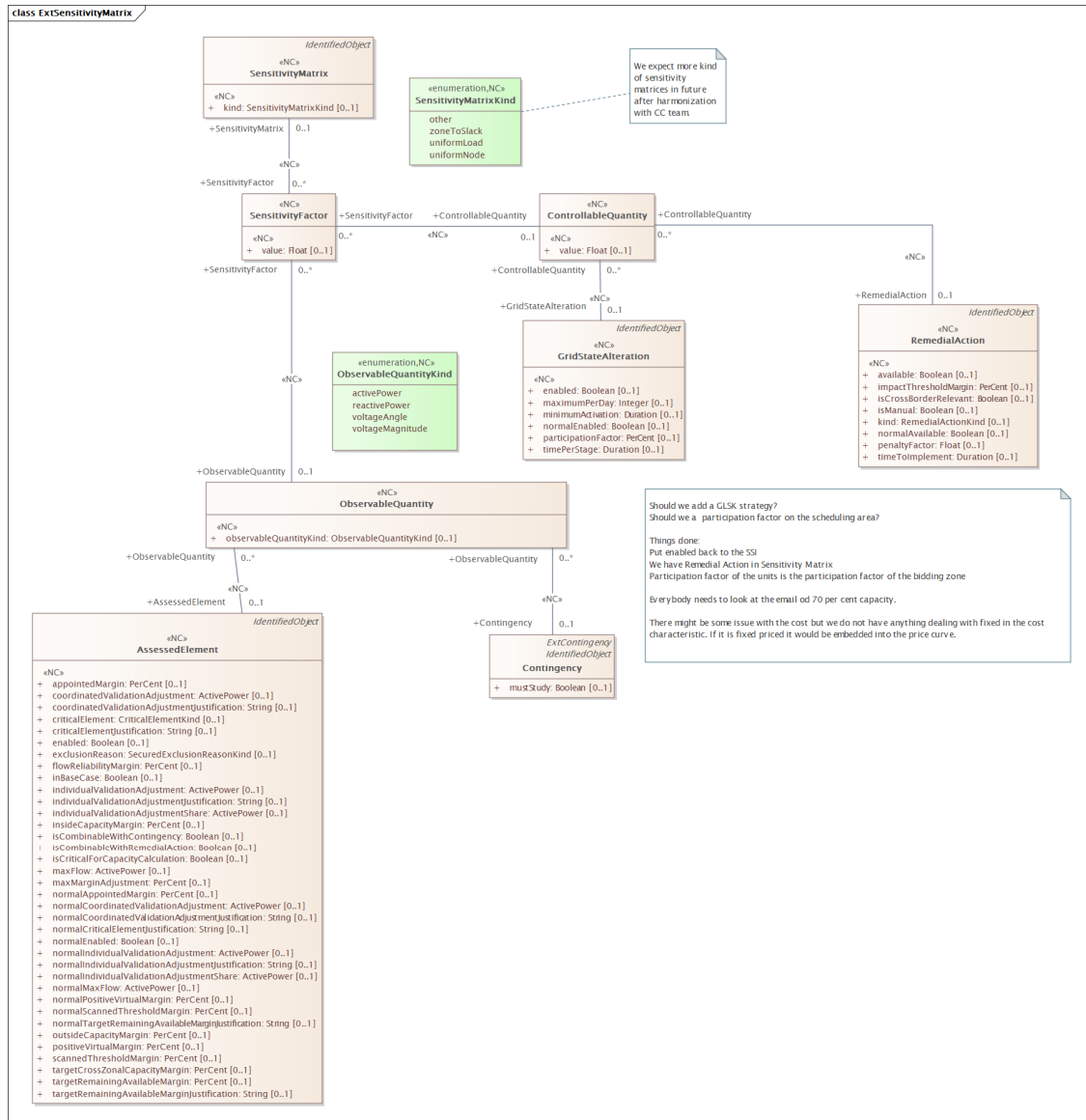


Figure 26 – Class diagram ExtSensitivityMatrix::ExtSensitivityMatrix

Figure 26: The diagram contains classes related to sensitivity matrix.

4.15.2 (NC) ControllableQuantity root class

Controllable quantity is a set point quantity on a grid state alteration or on a remedial action.

Table 287 shows all attributes of ControllableQuantity.

3378

Table 287 – 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.

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3380

Table 288 shows all association ends of ControllableQuantity with other classes.

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Table 288 – Association ends of ExtSensitivityMatrix::ControllableQuantity with other classes

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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.

3383

3384

4.15.3 (NC) ObservableQuantity root class

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Observable quantity is an electrical quantity on an assessed element or an assessed element with contingency.

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3387

Table 289 shows all attributes of ObservableQuantity.

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Table 289 – Attributes of ExtSensitivityMatrix::ObservableQuantity

name	mult	type	description
observableQuantityKind	0..1	ObservableQuantityKind	(NC) Kind of observable quantity.

3389

3390

Table 290 shows all association ends of ObservableQuantity with other classes.

3391

Table 290 – Association ends of ExtSensitivityMatrix::ObservableQuantity with other classes

3392

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.

3393

3394

4.15.4 (NC) SensitivityFactor root class

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The sensitivity factor which represents the sensitivity between observable and controllable elements.

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3397

Table 291 shows all attributes of SensitivityFactor.

3398

Table 291 – Attributes of ExtSensitivityMatrix::SensitivityFactor

name	mult	type	description
value	0..1	Float	(NC) The value of the sensitivity factor.

3399

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Table 292 shows all association ends of SensitivityFactor with other classes.

3401

3402

Table 292 – Association ends of ExtSensitivityMatrix::SensitivityFactor with other classes

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.

3403

3404

4.15.5 (NC) SensitivityMatrix

3405

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

3406

The sensitivity matrix which represents the sensitivity factors between observable and controllable elements.

3407

3408

Table 293 shows all attributes of SensitivityMatrix.

3409

Table 293 – 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

3410

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Table 294 shows all association ends of SensitivityMatrix with other classes.

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3413

Table 294 – Association ends of ExtSensitivityMatrix::SensitivityMatrix with other classes

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

3414

3415 **4.15.6 (NC) ObservableQuantityKind enumeration**

3416 Kind of observable quantity.

3417 Table 295 shows all literals of ObservableQuantityKind.

3418 **Table 295 – 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.

3419

3420 **4.15.7 (NC) SensitivityMatrixKind enumeration**

3421 Kinds of sensitivity matrix.

3422 Table 296 shows all literals of SensitivityMatrixKind.

3423 **Table 296 – 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.

3424

3425 **4.16 Package ExtSchedule**3426 **4.16.1 General**

3427 This package contains the extensions related to the schedule.

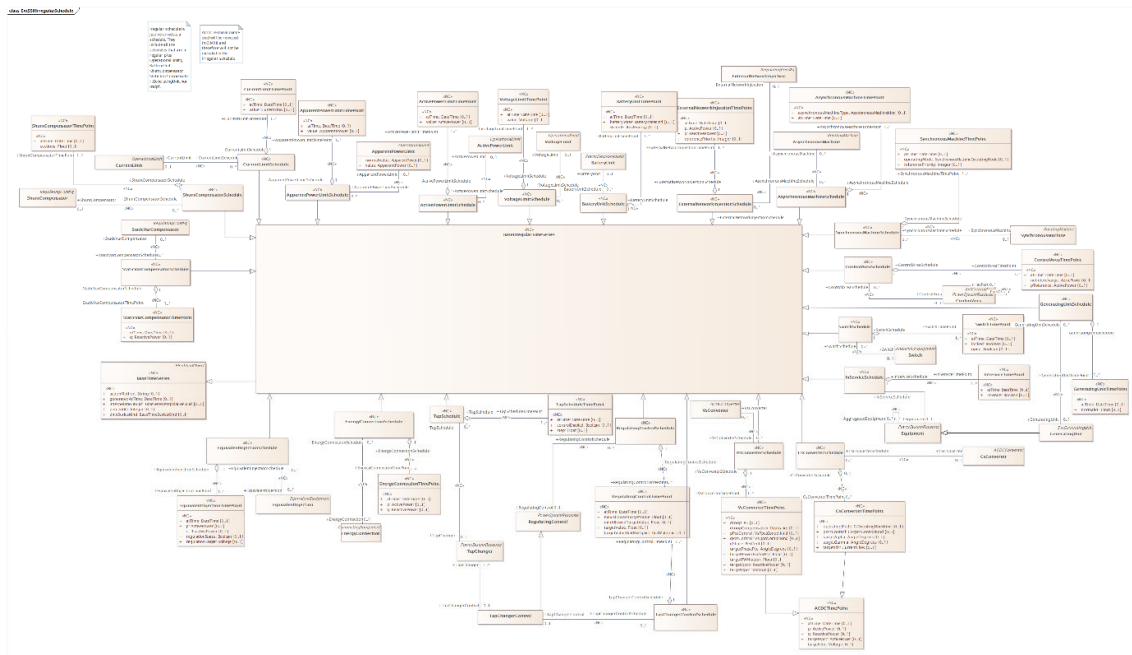


Figure 27 – Class diagram ExtSchedule::ExtSSHIrregularSchedule

Figure 27:

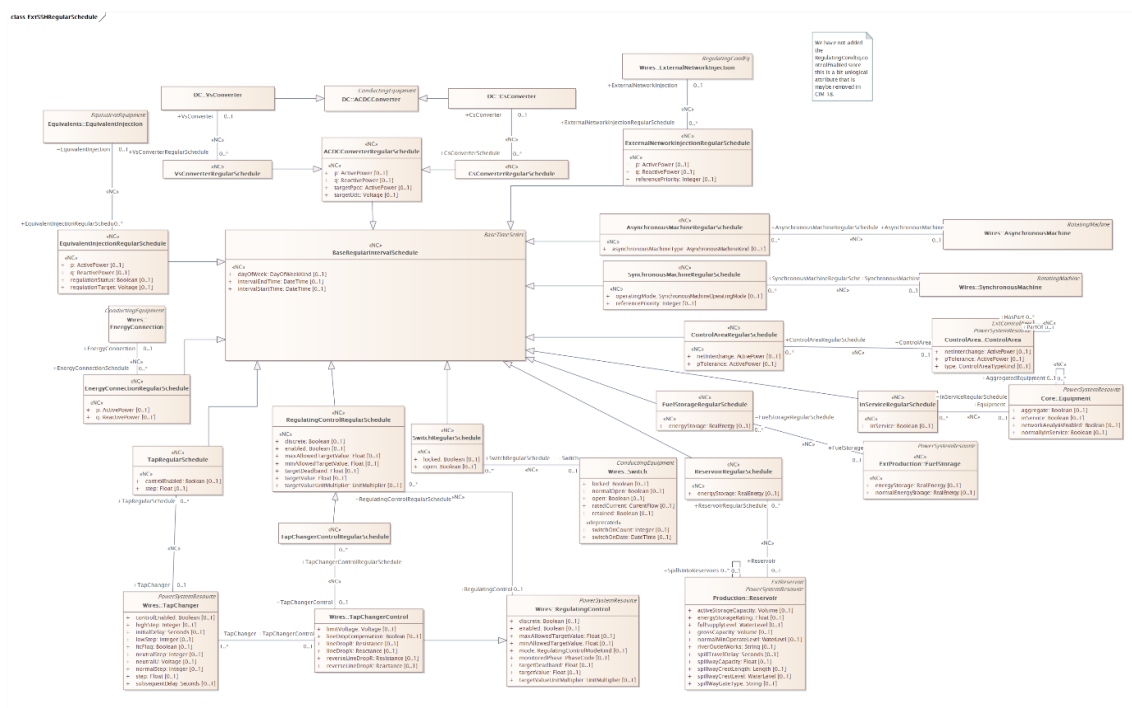


Figure 28 – Class diagram ExtSchedule::ExtSSHRegularSchedule

Figure 28:

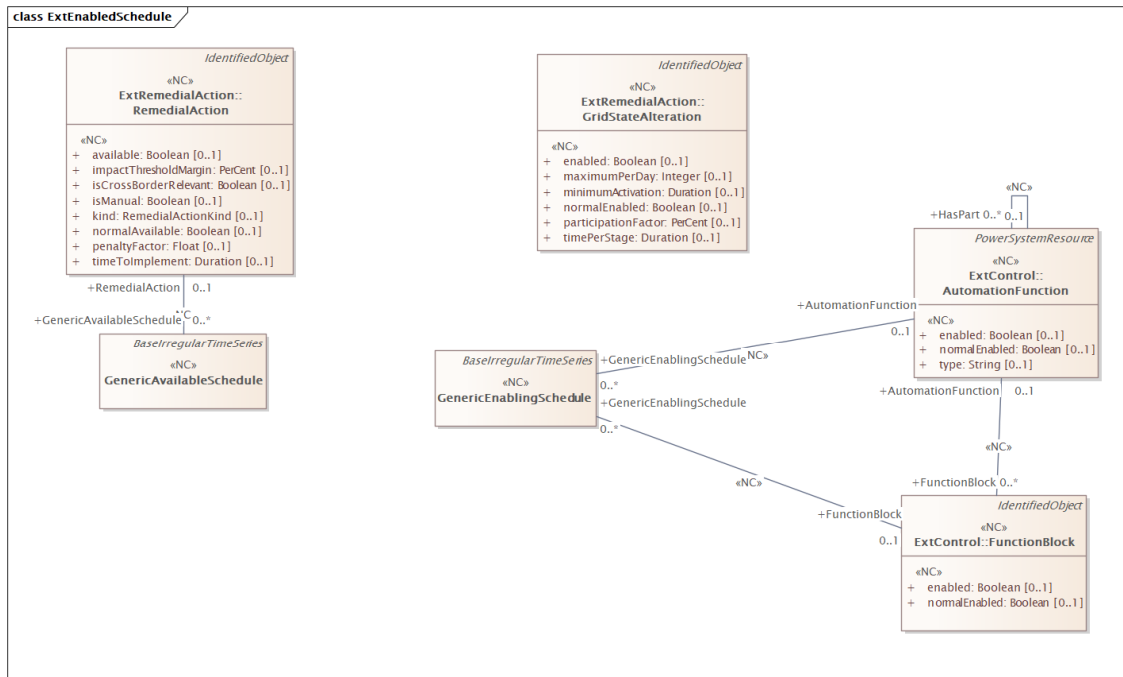


Figure 29 – Class diagram ExtSchedule::ExtEnabledSchedule

Figure 29: The diagram contains classes related to enabled schedule.

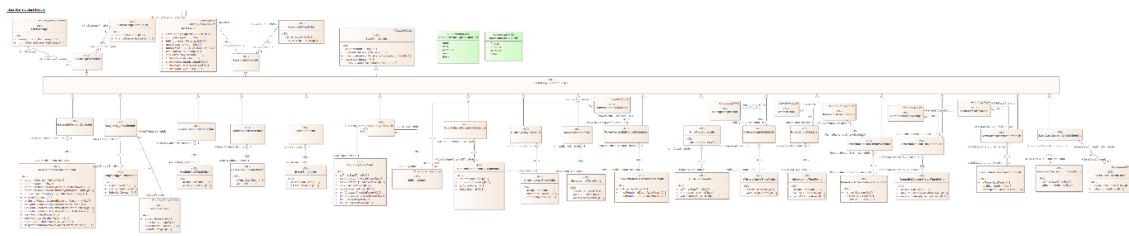


Figure 30 – Class diagram ExtSchedule::ExtIrregularSchedule

Figure 30: The diagram contains classes related to schedule.

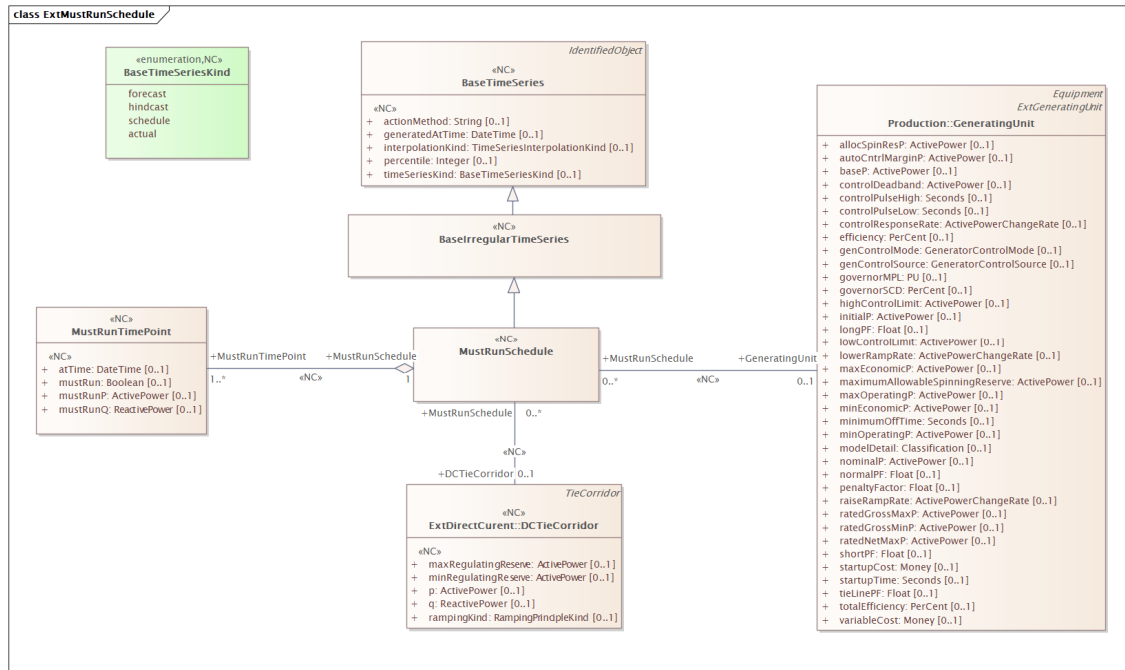


Figure 31 – Class diagram ExtSchedule::ExtMustRunSchedule

Figure 31: The diagram contains classes related to must run schedule.

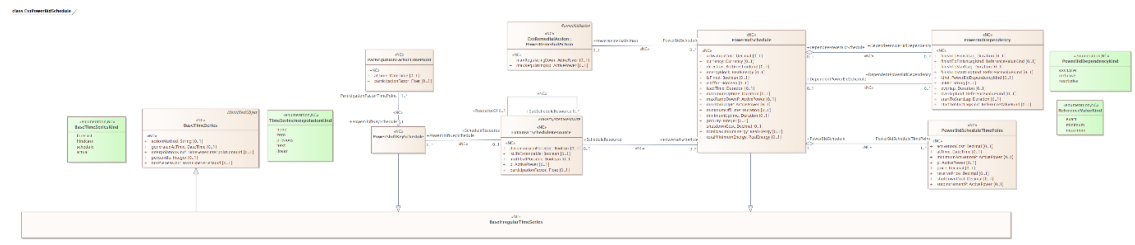


Figure 32 – Class diagram ExtSchedule::ExtPowerBidSchedule

Figure 32: The diagram contains classes related to power bid schedule.

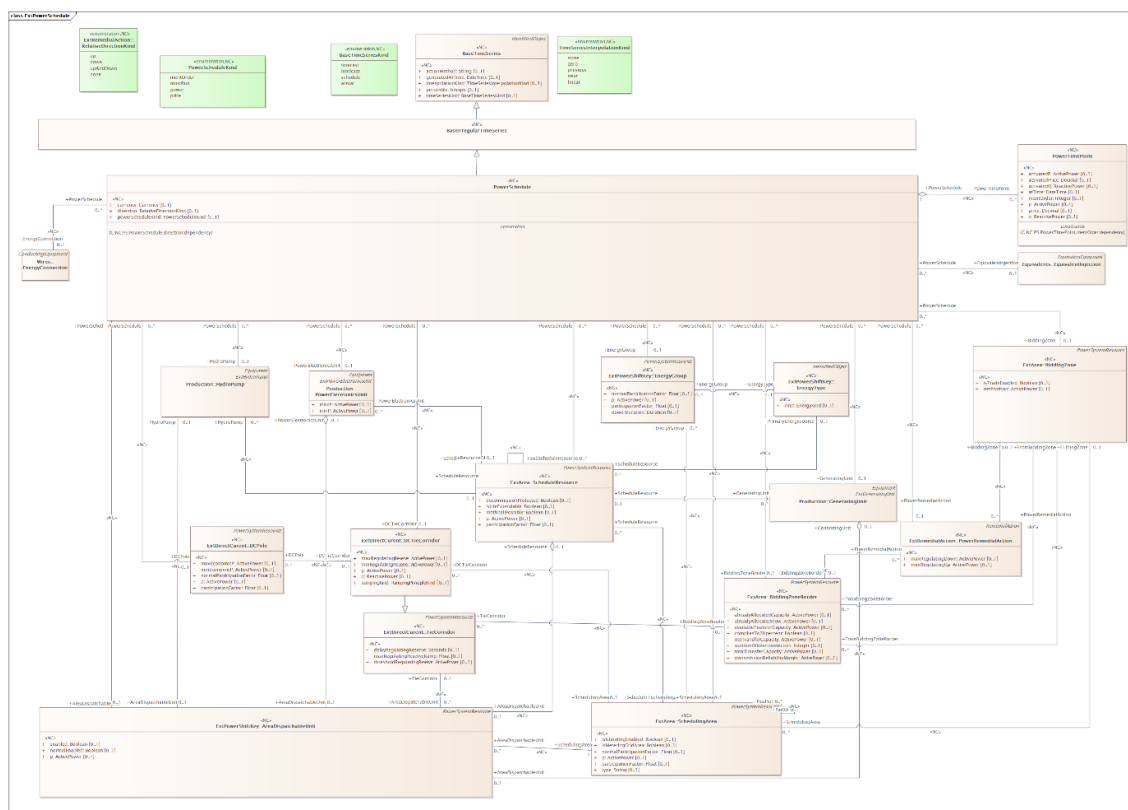


Figure 33 – Class diagram ExtSchedule::ExtPowerSchedule

Figure 33: The diagram contains classes related to schedule.

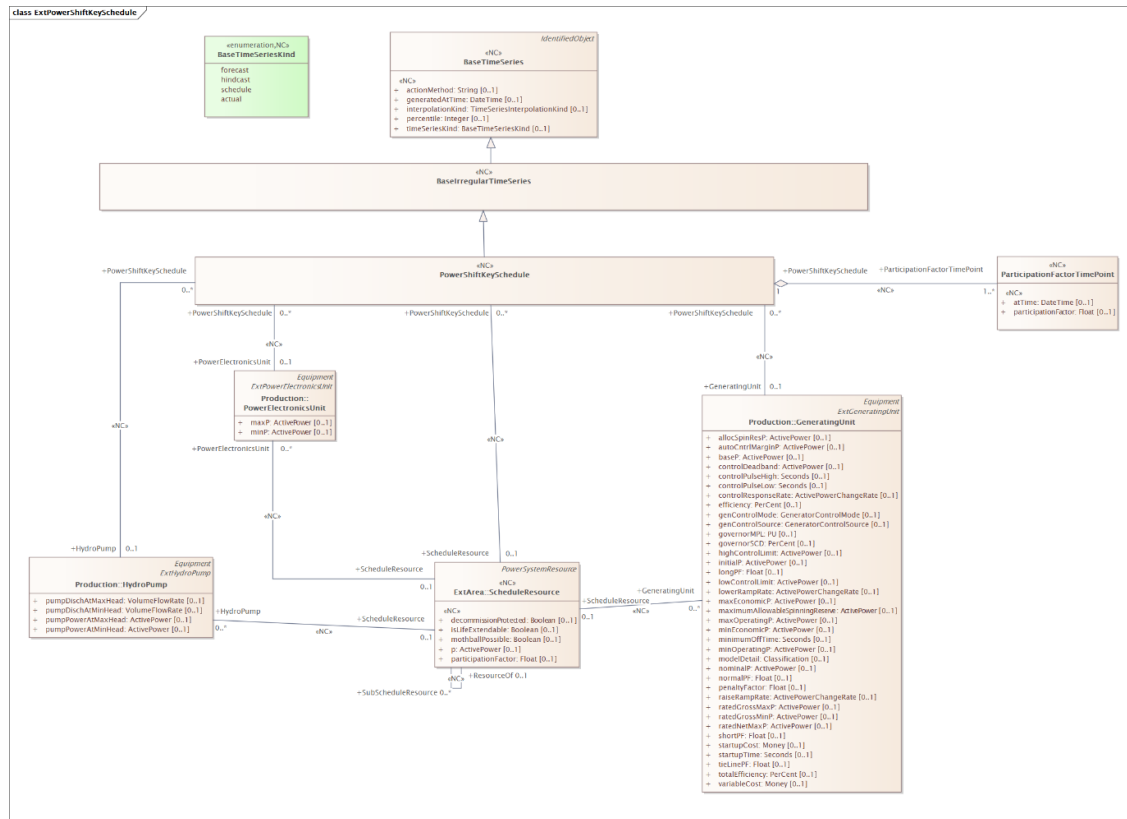


Figure 34 – Class diagram ExtSchedule::ExtPowerShiftKeySchedule

Figure 34: The diagram contains classes related to GLSK schedule.

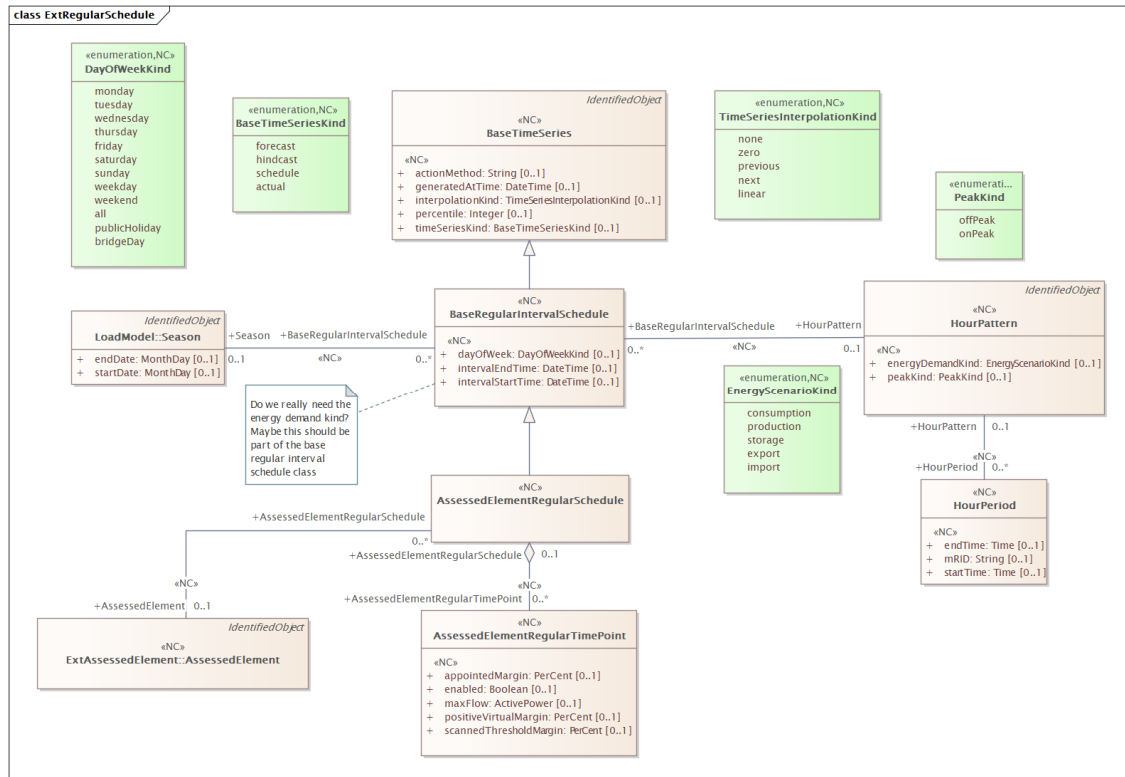


Figure 35 – Class diagram ExtSchedule::ExtRegularSchedule

Figure 35:

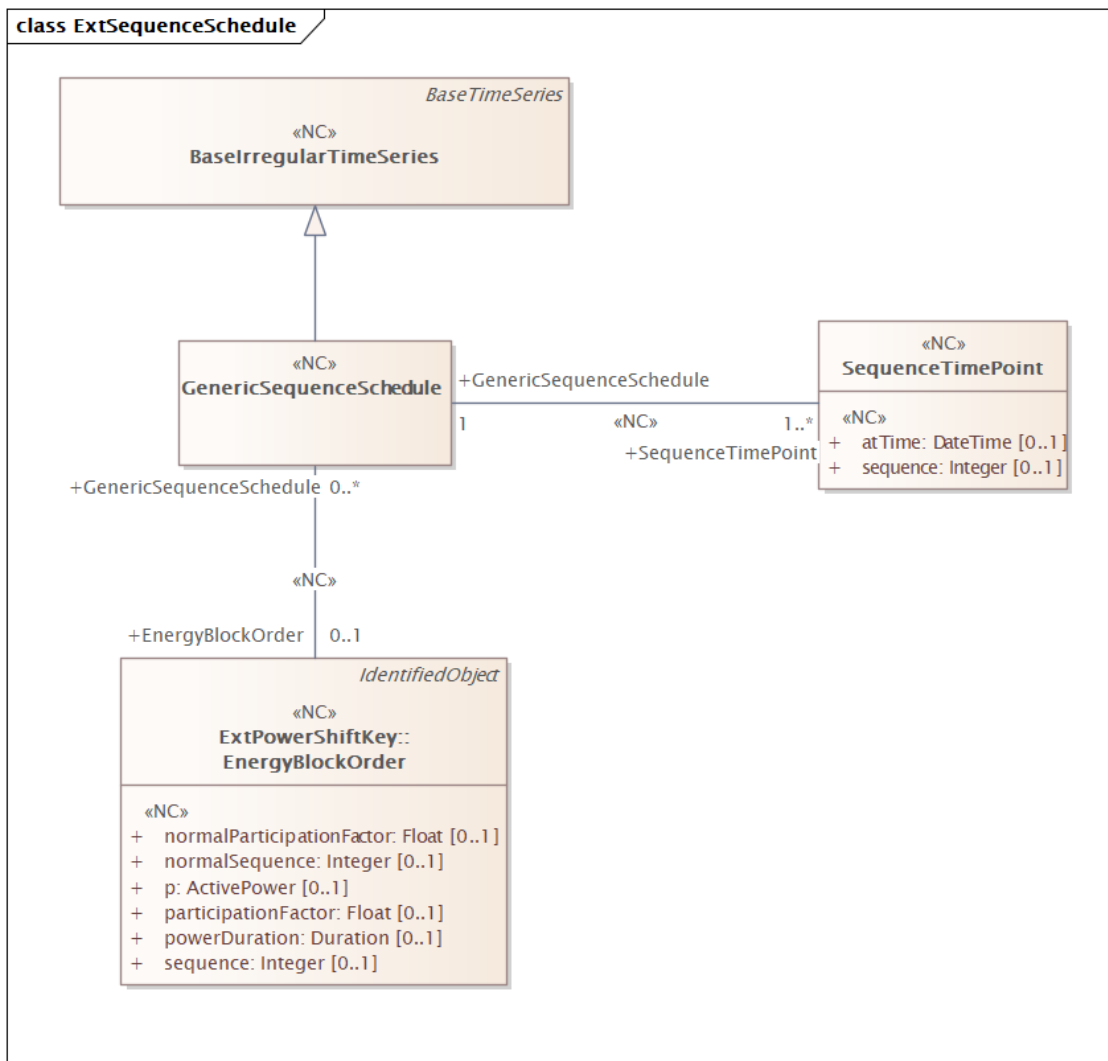


Figure 36 – Class diagram ExtSchedule::ExtSequenceSchedule

Figure 36: The diagram contains classes related to sequence schedule.

4.16.2 (NC) PowerShiftKeySchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

ExtEulIdentifiedObject

The schedule for Power Shift Keys.

Table 297 shows all attributes of PowerShiftKeySchedule.

Table 297 – 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

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

Table 298 shows all association ends of PowerShiftKeySchedule with other classes.

Table 298 – Association ends of ExtSchedule::PowerShiftKeySchedule with other 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..*	EnergyGroup	0..1	EnergyGroup	(NC) The energy group 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..*	DCPole	0..1	DCPole	(NC) A DC Pole which has a 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

4.16.3 (NC) BaselIrregularTimeSeries

Inheritance path = [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

Time series that has irregular points in time.

Table 299 shows all attributes of BaselIrregularTimeSeries.

Table 299 – Attributes of ExtSchedule::BaselIrregularTimeSeries

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

Table 300 shows all association ends of BaselIrregularTimeSeries with other classes.

Table 300 – Association ends of ExtSchedule::BaselIrregularTimeSeries 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

4.16.4 (NC) BaseTimeSeries

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

Time series of values at points in time.

Table 301 shows all attributes of BaseTimeSeries.

Table 301 – 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.

name	mult	type	description
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
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

Table 302 shows all association ends of BaseTimeSeries with other classes.

Table 302 – 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

4.16.5 (NC) EventSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEuIdentifiedObject

Time series represent irregular event described by event points in time.

Table 303 shows all attributes of EventSchedule.

Table 303 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 304 shows all association ends of EventSchedule with other classes.

3496

Table 304 – 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

3497

4.16.6 (NC) EventTimePoint root class

3499 Event valid for a given point in time.

3500 Table 305 shows all attributes of EventTimePoint.

3501

Table 305 – 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.

3502

3503 Table 306 shows all association ends of EventTimePoint with other classes.

3504

Table 306 – 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.

3505

4.16.7 (NC) GenericValueSchedule3507 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
3508 ExtEulIdentifiedObject3509 Time series represent irregular generic value at given points in time. The type of value is given
3510 by the reference association.

3511 Table 307 shows all attributes of GenericValueSchedule.

3512

Table 307 – 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

Table 308 shows all association ends of GenericValueSchedule with other classes.

Table 308 – 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

4.16.8 (NC) GenericValueTimePoint root class

Generic value for a given point in time.

Table 309 shows all attributes of GenericValueTimePoint.

Table 309 – 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 equals true and 0 equals false.

Table 310 shows all association ends of GenericValueTimePoint with other classes.

Table 310 – Association ends of ExtSchedule::GenericValueTimePoint with other classes

mult from	name	mult to	type	description
1..*	GenericValueSchedule	1..1	GenericValueSchedule	(NC) Time series the time point values belongs to.

4.16.9 (NC) MustRunSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

Time series represent irregular must-run instruction values at given points in time. This could be instruction to a reliability must-run (RMR) generation facility that is necessary to run to meet certain operating conditions in order to maintain the security of power systems in a competitive environment.

Table 311 shows all attributes of MustRunSchedule.

Table 311 – 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

Table 312 shows all association ends of MustRunSchedule with other classes.

Table 312 – 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.
1..1	MustRunTimePoint	1..*	MustRunTimePoint	(NC) Value for the point in time.
0..*	DCTieCorridor	0..1	DCTieCorridor	(NC) Hydro pump which belongs to 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

4.16.10 (NC) MustRunTimePoint root class

Must-run instruction value at a given point in time.

Table 313 shows all attributes of MustRunTimePoint.

Table 313 – Attributes of ExtSchedule::MustRunTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.

name	mult	type	description
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.

Table 314 shows all association ends of MustRunTimePoint with other classes.

Table 314 – 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.

4.16.11 (NC) PowerSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

Time series represent irregular power, active and reactive, values at given points in time.

Constraints:

C:NC:PS:PowerSchedule.direction:dependency:

Mandatory if PowerSchedule.powerScheduleKind equal PowerScheduleKind.meritOrder.

Table 315 shows all attributes of PowerSchedule.

Table 315 – 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
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

Table 316 shows all association ends of PowerSchedule with other classes.

3558

Table 316 – 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..*	BiddingZoneBorder	0..1	BiddingZoneBorder	(NC) Bidding zone border which belongs to the power schedule.
0..*	ScheduleResource	0..1	ScheduleResource	(NC) Schedule resource which has power schedules.
0..*	SchedulingArea	0..1	SchedulingArea	Scheduling area which has power schedules.
0..*	AreaDispatchableUnit	0..1	AreaDispatchableUnit	(NC) Area dispatchable unit which belongs to the power schedule.
0..*	EnergyGroup	0..1	EnergyGroup	(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.
0..*	DCTieCorridor	0..1	DCTieCorridor	(NC) DC tie corridor which belongs to the power schedule.
0..*	DCPole	0..1	DCPole	(NC) DC pole which belongs to 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

3559

3560 4.16.12 (NC) PowerTimePoint root class

3561 Power, active and reactive, value at a given point in time.

3562 Constraints:

3563 C:NC:PS:PowerTimePoint.meritOrder.dependency:

3564 Mandatory field in the case of PowerSchedule.kind equals meritOrder.

3565 Table 317 shows all attributes of PowerTimePoint.

3566

Table 317 – 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.
q	0..1	ReactivePower	(NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node.
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.

3567

3568

Table 318 shows all association ends of PowerTimePoint with other classes.

3569

Table 318 – 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.

3570

4.16.13 (NC) BaseTimeSeriesKind enumeration

Kind of time series.

Table 319 shows all literals of BaseTimeSeriesKind.

3574

Table 319 – 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 forecast data that has been through a quality control and could incur penalty when not followed.

literal	value	description
actual		Time series is actual data. The values represent measured or calculated values that represent the actual behaviour.

3575

3576 **4.16.14 (NC) TimeSeriesInterpolationKind enumeration**

3577 Kinds of interpolation of values between two time point.

3578 Table 320 shows all literals of TimeSeriesInterpolationKind.

3579 **Table 320 – 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.

3580

3581 **4.16.15 (NC) ParticipationFactorTimePoint root class**

3582 Participation factor for a given point in time.

3583 Table 321 shows all attributes of ParticipationFactorTimePoint.

3584 **Table 321 – 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.

3585

3586 Table 322 shows all association ends of ParticipationFactorTimePoint with other classes.

3587 **Table 322 – Association ends of ExtSchedule::ParticipationFactorTimePoint with other classes**
3588

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.

3589

3590 **4.16.16 (NC) CapacitySchedule**3591 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

3592 ExtEulIdentifiedObject

3593 The schedule for the capacity.

3594 Table 323 shows all attributes of CapacitySchedule.

3595 **Table 323 – Attributes of ExtSchedule::CapacitySchedule**

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

3596

3597 Table 324 shows all association ends of CapacitySchedule with other classes.

3598 **Table 324 – Association ends of ExtSchedule::CapacitySchedule with other classes**

mult from	name	mult to	type	description
0..*	BiddingZone	0..1	BiddingZone	(NC) Bidding zone which is referred by the capacity schedule.
1..1	CapacityTimePoint	1..*	CapacityTimePoint	(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

3599

3600 **4.16.17 (NC) CapacityTimePoint root class**

3601 Capacity instruction value at a given point in time.

3602 Table 325 shows all attributes of CapacityTimePoint.

3603 **Table 325 – Attributes of ExtSchedule::CapacityTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
maxAllocatedP	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.

name	mult	type	description
minAllocatedP	0..1	ActivePower	(NC) The minimum 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.
maxP	0..1	ActivePower	(NC) Maximum active power.
minP	0..1	ActivePower	(NC) Minimum active power.
maxAllocatedQ	0..1	ReactivePower	(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.
minAllocatedQ	0..1	ReactivePower	(NC) The minimum 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.
maxQ	0..1	ReactivePower	(NC) Maximum reactive power.
minQ	0..1	ReactivePower	(NC) Minimum reactive power.

Table 326 shows all association ends of CapacityTimePoint with other classes.

Table 326 – Association ends of ExtSchedule::CapacityTimePoint with other classes

mult from	name	mult to	type	description
1..*	CapacitySchedule	1..1	CapacitySchedule	(NC) The capacity schedule which belongs to the capacity timepoint.

4.16.18 (NC) CostVolumePotentialSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

The schedule for the cost volume potential.

Table 327 shows all attributes of CostVolumePotentialSchedule.

Table 327 – 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

Table 328 shows all association ends of CostVolumePotentialSchedule with other classes.

Table 328 – 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

4.16.19 (NC) CostVolumePotentialTimePoint root class

Cost volume potential value at a given point in time.

Table 329 shows all attributes of CostVolumePotentialTimePoint.

Table 329 – 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 330 shows all association ends of CostVolumePotentialTimePoint with other classes.

Table 330 – 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.

4.16.20 (NC) ContingencySchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

ExtEulIdentifiedObject

The schedule for Contingency.

Table 331 shows all attributes of ContingencySchedule.

Table 331 – 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

Table 332 shows all association ends of ContingencySchedule with other classes.

Table 332 – 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

4.16.21 (NC) ContingencyTimePoint root class

Contingency instruction value at a given point in time.

Table 333 shows all attributes of ContingencyTimePoint.

Table 333 – 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 334 shows all association ends of ContingencyTimePoint with other classes.

Table 334 – 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.

3646 **4.16.22 (NC) AssessedElementSchedule**3647 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

3648 ExtEulIdentifiedObject

3649 Schedule for assessed element.

3650 Table 335 shows all attributes of AssessedElementSchedule.

3651 **Table 335 – 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

3652

3653 Table 336 shows all association ends of AssessedElementSchedule with other classes.

3654 **Table 336 – Association ends of ExtSchedule::AssessedElementSchedule with other**
3655 **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

3656

3657 **4.16.23 (NC) AssessedElementTimePoint root class**

3658 Assessed element instruction value at a given point in time.

3659 Table 337 shows all attributes of AssessedElementTimePoint.

3660 **Table 337 – 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.
maxFlow	0..1	ActivePower	(NC) Maximum flow on an a conducting equipment or a collection of conducting

name	mult	type	description
			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 Individual Validation Adjustment (IVA). This justification is not intended for any application

name	mult	type	description
			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.
criticalElementContingencyJustification	0..1	String	(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 338 shows all association ends of AssessedElementTimePoint with other classes.

Table 338 – 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.

4.16.24 (NC) PowerBidScheduleTimePoint root class

Time series represent irregular power, active and reactive, values at given points in time.

Table 339 shows all attributes of PowerBidScheduleTimePoint.

Table 339 – 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 given in the time point.
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 340 shows all association ends of PowerBidScheduleTimePoint with other classes.

Table 340 – 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.

4.16.25 (NC) PowerBidSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

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 341 shows all attributes of PowerBidSchedule.

Table 341 – 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	BidDirectionKind	(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

Table 342 shows all association ends of PowerBidSchedule with other classes.

Table 342 – 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..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.
0..1	DependeePowerBidDependency	0..*	PowerBidDependency	(NC) The dependee (parent) power bid dependency associated with a dependee power bid schedule.
0..1	DependentPowerBidDependency	0..*	PowerBidDependency	(NC) The dependent (child) power bid dependency associated with a dependent power bid 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

4.16.26 (NC) PowerBidDependency root class

Dependency between the related power bids.

Table 343 shows all attributes of PowerBidDependency.

Table 343 – Attributes of ExtSchedule::PowerBidDependency

name	mult	type	description
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.
finishToFinishLag	0..1	Duration	(NC) Time between the deactivation of the dependee (parent) bids and the deactivation of dependent (child) bids. It cannot be used when the PowerBidDependency.kind is set to exclusive. Depending on the finishToFinishLagKind the value has the following meaning: - exact: the indicated lag should be exactly respected. - minimum: the indicated lag should be the minimum respected one, and a greater or equal lag for the deactivation of the dependent (child) after the deactivation of the dependee (parent) is allowed. - maximum: the indicated lag is the maximum that can occur, and a less or equal lag for the deactivation of the dependent (child) after the deactivation of the dependee (parent) is allowed.
kind	0..1	PowerBidDependencyKind	(NC) Type of dependency between bids. It indicates the activation dependency between dependee (parent) and dependent (child) bids. It does not indicate any running condition between dependee and dependent bids. If PowerBidDependencyKind equals to restrictive, a combination of the following attributes PowerBidDependency.startToStartLag, PowerBidDependency.finishToStartLag, PowerBidDependency.finishToFinishLag, or PowerBidDependency.overlap shall be used.
finishToFinishLagKind	0..1	ReferenceValueKind	(NC) It indicates the finishToFinishLag kind between the deactivation of the dependee (parent) bids and the deactivation of dependent (child) bids. It is required if PowerBidDependency.finishToFinishLag is used.
overlap	0..1	Duration	(NC) It indicates the duration the dependee (parent) and dependent (child) bids are active (run) at the same time. It cannot be used when the PowerBidDependency.kind is set to exclusive. Depending on the overlapKind the value has the following meaning: - exact: the dependee (parent) and the dependent (child) should be active (running) for the exact (equal) specified duration. - minimum: the dependee (parent) and the dependent (child) should be active (running) at least (greater than or equal) for the specified duration. - maximum: the dependee (parent) and the dependent (child) should be active (running) at the most (less than or equal) for the specified duration.
overlapKind	0..1	ReferenceValueKind	(NC) It indicates the overlap kind for the duration the parent (dependee) and child (dependent)

name	mult	type	description
			bids are active at the same time. It is required when PowerBidDependency.overlap is used.
finishToStartLag	0..1	Duration	(NC) Time between the deactivation of the dependee (parent) bids and the activation of dependent (child) bids. It cannot be used when the PowerBidDependency.kind is set to exclusive. Depending on the finishToStartLagKind the value has the following meaning: - exact: the indicated lag should be exactly respected. - minimum: the indicated lag should be the minimum respected one, and a greater or equal lag for the activation of the dependent (child) after the deactivation of the dependee (parent) is allowed. - maximum: the indicated lag is the maximum that can occur, and a less or equal lag for the activation of the dependent (child) after the deactivation of the dependee (parent) is allowed.
startToStartLag	0..1	Duration	(NC) Time between the activation of dependee (parent) bids and the activation of dependent (child) bids. It cannot be used when the PowerBidDependency.kind is set to exclusive. Depending on the startToStartLagKind the value has the following meaning: - exact - the indicated lag should be exactly respected. - minimum - the indicated lag should be the minimum respected one and a higher or equal lag for the activation of the dependent (child) after the activation of the dependee (parent) is allowed. - maximum - the indicated lag is the maximum that can occur, and a smaller or equal lag for the activation of the dependent (child) after the activation of the dependee (parent) is allowed.
finishToStartLagKind	0..1	ReferenceValueKind	(NC) It indicates the finishToStartLag kind between the deactivation of the dependee (parent) bids and the activation of dependent (child) bids. It is required if PowerBidDependency.finishToStartLag is used.
startToStartLagKind	0..1	ReferenceValueKind	(NC) Indicates the startToStartLag kind between the activation of the dependee (parent) bid and the activation of dependent (child) bid. It is required if PowerBidDependency.startToStartLag is used.

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3692

Table 344 shows all association ends of PowerBidDependency with other classes.

3693

Table 344 – Association ends of ExtSchedule::PowerBidDependency with other classes

mult from	name	mult to	type	description
0..*	DependeePowerBidSchedule	0..1	PowerBidSchedule	(NC) The dependee (parent) power bid schedule for this dependency.
0..*	DependentPowerBidSchedule	0..1	PowerBidSchedule	(NC) The dependent (child) power bid schedule for this dependency.

3694

3695 **4.16.27 (NC) GenericEnablingSchedule**

3696 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
3697 ExtEulIdentifiedObject

3698 The schedule for the enabling of elements.

3699 Table 345 shows all attributes of GenericEnablingSchedule.

3700 **Table 345 – 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

3701

3702 Table 346 shows all association ends of GenericEnablingSchedule with other classes.

3703 **Table 346 – Association ends of ExtSchedule::GenericEnablingSchedule with other**
3704 **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..*	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

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

3705

3706 **4.16.28 (NC) GenericAvailableSchedule**

3707 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
 3708 ExtEulIdentifiedObject

3709 The schedule for the availability of elements.

3710 Table 347 shows all attributes of GenericAvailableSchedule.

3711 **Table 347 – 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
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3712

3713 Table 348 shows all association ends of GenericAvailableSchedule with other classes.

3714 **Table 348 – Association ends of ExtSchedule::GenericAvailableSchedule with other**
 3715 **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

3716

3717 **4.16.29 (NC) EnablingTimePoint root class**

3718 Enabling instruction value at a given point in time.

3719 Table 349 shows all attributes of EnablingTimePoint.

3720

Table 349 – 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.

3721

3722 Table 350 shows all association ends of EnablingTimePoint with other classes.

3723

Table 350 – 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.

3724

4.16.30 (NC) AvailabilityTimePoint root class

3726 Availability instruction value at a given point in time.

3727 Table 351 shows all attributes of AvailabilityTimePoint.

3728

Table 351 – 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.

3729

3730 Table 352 shows all association ends of AvailabilityTimePoint with other classes.

3731

Table 352 – 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.

3732

4.16.31 (NC) PowerBidDependencyKind enumeration

3734 Kind of power bid activation dependency.

3735 Table 353 shows all literals of PowerBidDependencyKind.

3736

Table 353 – Literals of ExtSchedule::PowerBidDependencyKind

literal	value	description
exclusive		Bids are exclusive depending on each other. Only dependee (parent) bids can be activated if dependent (child) is activated or vice versa. For instance, dependent (child) must not be activated if the dependee (parent) is activated.
inclusive		Bids are inclusive depending on each other. Both dependee (parent) and dependent (child) bids must be activated, i.e., dependent (child) must be activated if the dependee (parent) is activated.
restrictive		Bids are restrictive depending on each other. The activation of dependent (child) bids is optional if the dependee (parent) is activated.

3737

3738 **4.16.32 (NC) InfeedLimitSchedule**3739 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
3740 ExtEulIdentifiedObject

3741 The schedule for an infeed limit.

3742 Table 354 shows all attributes of InfeedLimitSchedule.

3743 **Table 354 – 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

3744

3745 Table 355 shows all association ends of InfeedLimitSchedule with other classes.

3746 **Table 355 – Association ends of ExtSchedule::InfeedLimitSchedule with other classes**

mult from	name	mult to	type	description
1..1	InfeedLimitTimePoint	1..*	InfeedLimitTimePoint	(NC) The time point that relates to this infeed 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

3747

3748 **4.16.33 (NC) InfeedLimitTimePoint root class**

3749 Infeed limit values at a given point in time.

3750 Table 356 shows all attributes of InfeedLimitTimePoint.

3751 **Table 356 – 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.

3752

3753 Table 357 shows all association ends of InfeedLimitTimePoint with other classes.

3754 **Table 357 – Association ends of ExtSchedule::InfeedLimitTimePoint with other classes**

mult from	name	mult to	type	description
1..*	InfeedLimitSchedule	1..1	InfeedLimitSchedule	(NC) The infeed limit schedule that has this time point.

3755

3756 **4.16.34 (NC) PowerRemedialActionSchedule**

3757 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
3758 ExtEulIdentifiedObject

3759 The schedule for a power remedial action.

3760 Table 358 shows all attributes of PowerRemedialActionSchedule.

3761 **Table 358 – 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

3762

3763 Table 359 shows all association ends of PowerRemedialActionSchedule with other classes.

3764 **Table 359 – Association ends of ExtSchedule::PowerRemedialActionSchedule with**
3765 **other classes**

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

3766

3767 **4.16.35 (NC) PowerRemedialActionTimePoint root class**

3768 Regulating values at a given point in time.

3769 Table 360 shows all attributes of PowerRemedialActionTimePoint.

3770

Table 360 – 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.

3771

3772

Table 361 shows all association ends of PowerRemedialActionTimePoint with other classes.

3773

3774

Table 361 – Association ends of ExtSchedule::PowerRemedialActionTimePoint with 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.

3775

3776

4.16.36 (NC) UnitCostSchedule

3777

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

3778

ExtEulIdentifiedObject

3779

The schedule for a unit cost.

3780

Table 362 shows all attributes of UnitCostSchedule.

3781

Table 362 – 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

3782

3783

Table 363 shows all association ends of UnitCostSchedule with other classes.

3784

Table 363 – 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.

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

3785

3786 **4.16.37 (NC) UnitCostTimePoint root class**

3787 Unit cost at a given point in time.

3788 Table 364 shows all attributes of UnitCostTimePoint.

3789 **Table 364 – 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.

3790

3791 Table 365 shows all association ends of UnitCostTimePoint with other classes.

3792 **Table 365 – 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.

3793

3794 **4.16.38 (NC) RemedialActionSchemeSchedule**3795 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
3796 ExtEulIdentifiedObject

3797 The schedule for a remedial action scheme.

3798 Table 366 shows all attributes of RemedialActionSchemeSchedule.

3799 **Table 366 – 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

Table 367 shows all association ends of RemedialActionSchemeSchedule with other classes.

Table 367 – 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

4.16.39 (NC) RemedialActionSchemeTimePoint root class

Remedial action scheme at a given point in time.

Table 368 shows all attributes of RemedialActionSchemeTimePoint.

Table 368 – 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 369 shows all association ends of RemedialActionSchemeTimePoint with other classes.

Table 369 – 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.

4.16.40 (NC) RemedialActionGroupSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

ExtEulIdentifiedObject

The schedule for a remedial action group.

3818 Table 370 shows all attributes of RemedialActionGroupSchedule.

3819 **Table 370 – 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

3820

3821 Table 371 shows all association ends of RemedialActionGroupSchedule with other classes.

3822 **Table 371 – Association ends of ExtSchedule::RemedialActionGroupSchedule with**
3823 **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

3824

3825 **4.16.41 (NC) RemedialActionGroupTimePoint root class**

3826 Remedial action group at a given point in time.

3827 Table 372 shows all attributes of RemedialActionGroupTimePoint.

3828 **Table 372 – 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.

3829

3830 Table 373 shows all association ends of RemedialActionGroupTimePoint with other classes.

Table 373 – Association ends of ExtSchedule::RemedialActionGroupTimePoint with other classes

mult from	name	mult to	type	description
1..*	RemedialActionGroupSchedule	1..1	RemedialActionGroupSchedule	(NC) Remedial action group schedule that has time point.

4.16.42 (NC) GridStateAlterationSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

Schedule for a grid state alteration.

Table 374 shows all attributes of GridStateAlterationSchedule.

Table 374 – 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

Table 375 shows all association ends of GridStateAlterationSchedule with other classes.

Table 375 – Association ends of ExtSchedule::GridStateAlterationSchedule with other 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

4.16.43 (NC) GridStateAlterationTimePoint root class

Grid state alteration at a given point in time.

3847 Table 376 shows all attributes of GridStateAlterationTimePoint.

3848 **Table 376 – 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. $V=T/\text{sum}(PF)$. 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%.

3849

3850 Table 377 shows all association ends of GridStateAlterationTimePoint with other classes.

3851 **Table 377 – Association ends of ExtSchedule::GridStateAlterationTimePoint with other**
3852 **classes**

mult from	name	mult to	type	description
1..*	GridStateAlterationSchedule	1..1	GridStateAlterationSchedule	(NC) Grid state alteration schedule that has time point.

3853

3854 **4.16.44 (NC) BaseRegularIntervalSchedule**

3855 Inheritance path = [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

3856 Time series that has regular points in time.

3857 Table 378 shows all attributes of BaseRegularIntervalSchedule.

3858 **Table 378 – 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

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

Table 379 shows all association ends of BaseRegularIntervalSchedule with other classes.

Table 379 – Association ends of ExtSchedule::BaseRegularIntervalSchedule with other 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

4.16.45 (NC) DayOfWeekKind enumeration

The kind of day to be included in a regular schedule.

Table 380 shows all literals of DayOfWeekKind.

Table 380 – 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

literal	value	description
		bridge day due to the schedule will not have a normal Friday consumption and production.

3868

3869 **4.16.46 (NC) HourPattern**

3870 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

3871 Pattern of hourly period in a day with the same kind of intensity.

3872 Table 381 shows all attributes of HourPattern.

3873

Table 381 – 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

3874

3875 Table 382 shows all association ends of HourPattern with other classes.

3876

Table 382 – 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

3877

3878 **4.16.47 (NC) PeakKind enumeration**

3879 Kind of time period with similar intensity.

3880 Table 383 shows all literals of PeakKind.

3881

Table 383 – 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.

3882

4.16.48 (NC) EnergyScenarioKind enumeration

Kind of energy scenario.

Table 384 shows all literals of EnergyScenarioKind.

Table 384 – Literals of ExtSchedule::EnergyScenarioKind

literal	value	description
consumption		Scenario focus on consumption of energy.
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.

4.16.49 (NC) HourPeriod root class

Period of hours in a day.

Table 385 shows all attributes of HourPeriod.

Table 385 – 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.

Table 386 shows all association ends of HourPeriod with other classes.

Table 386 – 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.

4.16.50 (NC) AssessedElementRegularSchedule

Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

Regular schedule for assessed element.

Table 387 shows all attributes of AssessedElementRegularSchedule.

3901

Table 387 – 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
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

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Table 388 shows all association ends of AssessedElementRegularSchedule with other classes.

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Table 388 – 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

3906

3907

4.16.51 (NC) AssessedElementRegularTimePoint root class

3908

Assessed element instruction value at a given point in time.

3909

Table 389 shows all attributes of AssessedElementRegularTimePoint.

3910

Table 389 – 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].
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].

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Table 390 shows all association ends of AssessedElementRegularTimePoint with other classes.

3913

Table 390 – Association ends of ExtSchedule::AssessedElementRegularTimePoint with other classes

3914

mult from	name	mult to	type	description
0..*	AssessedElementRegularSchedule	0..1	AssessedElementRegularSchedule	(NC) Assessed element regular schedule which has assessed element regular time points.

3915

4.16.52 (NC) VoltageAngleScheduleInheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

ExtEuIdentifiedObject

The schedule for a voltage angle.

Table 391 shows all attributes of VoltageAngleSchedule.

3921

Table 391 – 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
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

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Table 392 shows all association ends of VoltageAngleSchedule with other classes.

3924

Table 392 – Association ends of ExtSchedule::VoltageAngleSchedule with other classes

mult from	name	mult to	type	description
1..1	VoltageAngleTimePoint	1..*	VoltageAngleTimePoint	(NC) The voltage angle time point that relates to this voltage angle schedule.
0..*	VoltageAngleLimit	0..1	VoltageAngleLimit	(NC) Voltage angle limit which has 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

3925

4.16.53 (NC) VoltageAngleTimePoint root class

Voltage angle at a given point in time.

Table 393 shows all attributes of VoltageAngleTimePoint.

3929

Table 393 – Attributes of ExtSchedule::VoltageAngleTimePoint

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).
atTime	0..1	DateTime	(NC) The time the data is valid for.

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3931

Table 394 shows all association ends of VoltageAngleTimePoint with other classes.

Table 394 – Association ends of ExtSchedule::VoltageAngleTimePoint with other classes

mult from	name	mult to	type	description
1..*	VoltageAngleSchedule	1..1	VoltageAngleSchedule	(NC) The voltage angle schedule that has time point.

4.16.54 (NC) PowerScheduleKind enumeration

Kind of power schedule.

Table 395 shows all literals of PowerScheduleKind.

Table 395 – 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.

4.16.55 (NC) InfeedLimitSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

The schedule for an infeed limit.

Table 396 shows all attributes of InfeedLimitSchedule.

Table 396 – 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

Table 397 shows all association ends of InfeedLimitSchedule with other classes.

3948 **Table 397 – 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.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3949

3950 **4.16.56 (NC) InfeedLimitTimePoint root class**

3951 Infeed limit at a given point in time.

3952 Table 398 shows all attributes of InfeedLimitTimePoint.

3953 **Table 398 – 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.

3954

3955 Table 399 shows all association ends of InfeedLimitTimePoint with other classes.

3956 **Table 399 – 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.

3957

3958 **4.16.57 (NC) RegulatingControlRegularSchedule**3959 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :
3960 ExtEulIdentifiedObject

3961 Regular schedule for regulating control.

3962 Table 400 shows all attributes of RegulatingControlRegularSchedule.

3963 **Table 400 – Attributes of ExtSchedule::RegulatingControlRegularSchedule**

name	mult	type	description
discrete	0..1	NullCIM	(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	NullCIM	(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

name	mult	type	description
			for the mode. The attribute shall be a positive value or zero. If RegulatingControl.discrete is set 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 401 shows all association ends of RegulatingControlRegularSchedule with other classes.

Table 401 – 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

3968

3969 **4.16.58 (NC) TapChangerControlRegularSchedule**3970 Inheritance path = [RegulatingControlRegularSchedule](#) : [BaseRegularIntervalSchedule](#) :3971 [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

3972 Regular schedule for tap changer control.

3973 Table 402 shows all attributes of TapChangerControlRegularSchedule.

3974 **Table 402 – Attributes of ExtSchedule::TapChangerControlRegularSchedule**

name	mult	type	description
discrete	0..1	NullCIM	(NC) inherited from: RegulatingControlRegularSchedule
enabled	0..1	NullCIM	(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

3975

3976 Table 403 shows all association ends of TapChangerControlRegularSchedule with other
3977 classes.

3978 **Table 403 – Association ends of ExtSchedule::TapChangerControlRegularSchedule with**
 3979 **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

3980

3981 **4.16.59 (NC) TapRegularSchedule**

3982 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :
 3983 ExtEulIdentifiedObject

3984 Regular schedule for tap.

3985 Table 404 shows all attributes of TapRegularSchedule.

3986 **Table 404 – 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
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

Table 405 shows all association ends of TapRegularSchedule with other classes.

Table 405 – 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

4.16.60 (NC) SwitchRegularSchedule

Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

Regular schedule for switch.

Table 406 shows all attributes of SwitchRegularSchedule.

Table 406 – 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
intervalStartTime	0..1	DateTime	(NC) inherited from: BaseRegularIntervalSchedule

name	mult	type	description
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

Table 407 shows all association ends of SwitchRegularSchedule with other classes.

Table 407 – 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

4.16.61 (NC) EnergyConnectionRegularSchedule

Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

Regular schedule for energy connection.

Table 408 shows all attributes of EnergyConnectionRegularSchedule.

Table 408 – 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. 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.

name	mult	type	description
			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

Table 409 shows all association ends of EnergyConnectionRegularSchedule with other classes.

Table 409 – Association ends of ExtSchedule::EnergyConnectionRegularSchedule with other classes

mult from	name	mult to	type	description
0..*	EnergyConnection	0..1	EnergyConnection	(NC) EnergyConnection which has EnergyConnectionSchedule.
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

4.16.62 (NC) InServiceRegularSchedule

Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

Regular schedule for elements having in service.

Table 410 shows all attributes of InServiceRegularSchedule.

4018

Table 410 – 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

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4020

Table 411 shows all association ends of InServiceRegularSchedule with other classes.

4021

4022

Table 411 – Association ends of ExtSchedule::InServiceRegularSchedule with other 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

4023

4024

4.16.63 (NC) ControlAreaRegularSchedule

4025

Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :

4026

ExtEulIdentifiedObject

4027

Regular schedule for control area.

4028 Table 412 shows all attributes of ControlAreaRegularSchedule.

4029 **Table 412 – 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

4030

4031 Table 413 shows all association ends of ControlAreaRegularSchedule with other classes.

4032 **Table 413 – Association ends of ExtSchedule::ControlAreaRegularSchedule with other**
4033 **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
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4034

4035 4.16.64 (NC) SynchronousMachineRegularSchedule

4036 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :
4037 ExtEulIdentifiedObject

4038 Regular schedule for synchronous machine.

4039 Table 414 shows all attributes of SynchronousMachineRegularSchedule.

4040 **Table 414 – 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

4041

4042 Table 415 shows all association ends of SynchronousMachineRegularSchedule with other
4043 classes.

4044 **Table 415 – Association ends of ExtSchedule::SynchronousMachineRegularSchedule**
4045 **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
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

4046

4047 **4.16.65 (NC) AsynchronousMachineRegularSchedule**4048 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :

4049 ExtEulIdentifiedObject

4050 Regular schedule for asynchronous machine.

4051 Table 416 shows all attributes of AsynchronousMachineRegularSchedule.

4052 **Table 416 – 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: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4053

4054 Table 417 shows all association ends of AsynchronousMachineRegularSchedule with other
4055 classes.4056 **Table 417 – Association ends of ExtSchedule::AsynchronousMachineRegularSchedule**
4057 **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

4058

4059 **4.16.66 (NC) ExternalNetworkInjectionRegularSchedule**4060 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :
4061 ExtEulIdentifiedObject

4062 Regular schedule for external network injection.

4063 Table 418 shows all attributes of ExternalNetworkInjectionRegularSchedule.

4064 **Table 418 – 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
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4065
4066 Table 419 shows all association ends of ExternalNetworkInjectionRegularSchedule with other
4067 classes.4068 **Table 419 – Association ends of**
4069 **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

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

4070

4071 **4.16.67 (NC) EquivalentInjectionRegularSchedule**4072 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :
4073 ExtEulIdentifiedObject

4074 Regular schedule for equivalent injection.

4075 Table 420 shows all attributes of EquivalentInjectionRegularSchedule.

4076 **Table 420 – 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
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

4077

4078 Table 421 shows all association ends of EquivalentInjectionRegularSchedule with other
4079 classes.

4080 **Table 421 – Association ends of ExtSchedule::EquivalentInjectionRegularSchedule with**
4081 **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

4082

4083 4.16.68 (NC) ACDCCConverterRegularSchedule

4084 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :

4085 ExtEulIdentifiedObject

4086 Regular schedule for ACDC converter.

4087 Table 422 shows all attributes of ACDCCConverterRegularSchedule.

4088 **Table 422 – Attributes of ExtSchedule::ACDCCConverterRegularSchedule**

name	mult	type	description
p	0..1	NullCIM	(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.
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

Table 423 shows all association ends of ACDCCConverterRegularSchedule with other classes.

Table 423 – Association ends of ExtSchedule::ACDCCConverterRegularSchedule with other classes

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

4.16.69 (NC) CsConverterRegularSchedule

Inheritance path = [ACDCCConverterRegularSchedule](#) : [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject
Regular schedule for CS converter.

Table 424 shows all attributes of CsConverterRegularSchedule.

Table 424 – 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 $\min\alpha \leq \text{targetAlpha} \leq \max\alpha$. 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

name	mult	type	description
			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	NullCIM	(NC) inherited from: ACDCConverterRegularSchedule
q	0..1	NullCIM	(NC) inherited from: ACDCConverterRegularSchedule
targetPpcc	0..1	NullCIM	(NC) inherited from: ACDCConverterRegularSchedule
targetUdc	0..1	NullCIM	(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
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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4101

Table 425 shows all association ends of CsConverterRegularSchedule with other classes.

4102

Table 425 – Association ends of ExtSchedule::CsConverterRegularSchedule with other classes

4103

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

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

4104

4105 **4.16.70 (NC) VsConverterRegularSchedule**4106 Inheritance path = [ACDCCConverterRegularSchedule](#) : [BaseRegularIntervalSchedule](#) :4107 [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

4108 Regular schedule for VS converter.

4109 Table 426 shows all attributes of VsConverterRegularSchedule.

4110 **Table 426 – 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 U_{ac} 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 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	NullCIM	(NC) inherited from: ACDCCConverterRegularSchedule
q	0..1	NullCIM	(NC) inherited from: ACDCCConverterRegularSchedule
targetPpcc	0..1	NullCIM	(NC) inherited from: ACDCCConverterRegularSchedule
targetUdc	0..1	NullCIM	(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

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

Table 427 shows all association ends of VsConverterRegularSchedule with other classes.

Table 427 – 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.
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

4.16.71 (NC) EquivalentInjectionSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

Regular schedule for equivalent injection.

Table 428 shows all attributes of EquivalentInjectionSchedule.

Table 428 – 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

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

Table 429 shows all association ends of EquivalentInjectionSchedule with other classes.

Table 429 – Association ends of ExtSchedule::EquivalentInjectionSchedule with other 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
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4.16.72 (NC) EnergyConnectionSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject
Schedule for energy connection.

Table 430 shows all attributes of EnergyConnectionSchedule.

Table 430 – Attributes of ExtSchedule::EnergyConnectionSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolation Kind	(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

Table 431 shows all association ends of EnergyConnectionSchedule with other classes.

Table 431 – Association ends of ExtSchedule::EnergyConnectionSchedule with other classes

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

4.16.73 (NC) TapSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

ExtEulIdentifiedObject

Schedule for tap.

Table 432 shows all attributes of TapSchedule.

Table 432 – 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

Table 433 shows all association ends of TapSchedule with other classes.

Table 433 – 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

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

4147

4148 **4.16.74 (NC) EquivalentInjectionTimePoint root class**

4149 Equivalent injection values for a given point in time.

4150 Table 434 shows all attributes of EquivalentInjectionTimePoint.

4151 **Table 434 – 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. 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.

4152

4153 Table 435 shows all association ends of EquivalentInjectionTimePoint with other classes.

4154 **Table 435 – Association ends of ExtSchedule::EquivalentInjectionTimePoint with other classes**

4155

mult from	name	mult to	type	description
1..*	EquivalentInjectionSchedule	1..1	EquivalentInjectionSchedule	(NC) The EquivalentInjection schedule that has this time point.

4156

4157 **4.16.75 (NC) RegulatingControlSchedule**4158 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
4159 ExtEulIdentifiedObject

4160 Schedule for regulating control.

4161 Table 436 shows all attributes of RegulatingControlSchedule.

4162 **Table 436 – 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

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

Table 437 shows all association ends of RegulatingControlSchedule with other classes.

Table 437 – 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
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4.16.76 (NC) TapChangerControlSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject
Schedule for tap changer control.

Table 438 shows all attributes of TapChangerControlSchedule.

Table 438 – 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

Table 439 shows all association ends of TapChangerControlSchedule with other classes.

Table 439 – Association ends of ExtSchedule::TapChangerControlSchedule with other 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

4.16.77 (NC) RegulatingControlTimePoint root class

Regulating control values for a given point in time.

Table 440 shows all attributes of RegulatingControlTimePoint.

Table 440 – Attributes of ExtSchedule::RegulatingControlTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
targetValue	0..1	NumCIM	(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	NumCIM	(NC) Specify the multiplier for used for the targetValue.
maxAllowedTargetValue	0..1	NumCIM	(NC) Maximum allowed target value (RegulatingControl.targetValue).
minAllowedTargetValue	0..1	NumCIM	(NC) Minimum allowed target value (RegulatingControl.targetValue).

Table 441 shows all association ends of RegulatingControlTimePoint with other classes.

Table 441 – Association ends of ExtSchedule::RegulatingControlTimePoint with other 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.

4.16.78 (NC) SwitchSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

ExtEulIdentifiedObject

Schedule for switch.

Table 442 shows all attributes of SwitchSchedule.

4193

Table 442 – 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

4194

4195

Table 443 shows all association ends of SwitchSchedule with other classes.

4196

Table 443 – 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

4197

4.16.79 (NC) InServiceScheduleInheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

ExtEulIdentifiedObject

Schedule for elements having in service.

Table 444 shows all attributes of InServiceSchedule.

4203

Table 444 – 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

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

Table 445 shows all association ends of InServiceSchedule with other classes.

Table 445 – 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.
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

4.16.80 (NC) ControlAreaSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject
Schedule for control area.

Table 446 shows all attributes of ControlAreaSchedule.

Table 446 – 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

Table 447 shows all association ends of ControlAreaSchedule with other classes.

4216 **Table 447 – 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

4217

4218 **4.16.81 (NC) SynchronousMachineSchedule**4219 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

4220 ExtEulIdentifiedObject

4221 Schedule for synchronous machine.

4222 Table 448 shows all attributes of SynchronousMachineSchedule.

4223 **Table 448 – 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

4224

4225 Table 449 shows all association ends of SynchronousMachineSchedule with other classes.

4226 **Table 449 – Association ends of ExtSchedule::SynchronousMachineSchedule with other classes**

4227

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

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

4228

4229 **4.16.82 (NC) AsynchronousMachineSchedule**4230 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

4231 ExtEulIdentifiedObject

4232 Schedule for asynchronous machine.

4233 Table 450 shows all attributes of AsynchronousMachineSchedule.

4234 **Table 450 – Attributes of ExtSchedule::AsynchronousMachineSchedule**

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

4235

4236 Table 451 shows all association ends of AsynchronousMachineSchedule with other classes.

4237 **Table 451 – Association ends of ExtSchedule::AsynchronousMachineSchedule with**
4238 **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

4239

4240 **4.16.83 (NC) ExternalNetworkInjectionSchedule**4241 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

4242 ExtEulIdentifiedObject

4243 Schedule for external network injection.

4244 Table 452 shows all attributes of ExternalNetworkInjectionSchedule.

4245

Table 452 – 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
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4246

4247

Table 453 shows all association ends of ExternalNetworkInjectionSchedule with other classes.

4248

4249

Table 453 – 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

4250

4251

4.16.84 (NC) VsConverterSchedule

4252

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

4253

ExtEulIdentifiedObject

4254

Schedule for VS converter.

4255

Table 454 shows all attributes of VsConverterSchedule.

4256

Table 454 – 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

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

Table 455 shows all association ends of VsConverterSchedule with other classes.

Table 455 – 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

4.16.85 (NC) CsConverterSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject
Schedule for CS converter.

Table 456 shows all attributes of CsConverterSchedule.

Table 456 – 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

Table 457 shows all association ends of CsConverterSchedule with other classes.

4269 **Table 457 – 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
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4270

4271 **4.16.86 (NC) ACDCTimePoint root class**

4272 ACDC values for a given point in time.

4273 Table 458 shows all attributes of ACDCTimePoint.

4274 **Table 458 – Attributes of ExtSchedule::ACDCTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
p	0..1	NuIICIM	(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	NuIICIM	(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	NuIICIM	(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	NuIICIM	(NC) Target value for DC voltage magnitude. The attribute shall be a positive value.

4275

4276 **4.16.87 (NC) VsConverterTimePoint**4277 Inheritance path = [ACDCTimePoint](#)

4278 VS converter values for a given point in time.

4279 Table 459 shows all attributes of VsConverterTimePoint.

4280 **Table 459 – Attributes of ExtSchedule::VsConverterTimePoint**

name	mult	type	description
droop	0..1	NuIICIM	(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	NuIICIM	(NC) Compensation constant. Used to compensate for voltage drop when controlling voltage at a distant bus. The attribute shall be a positive value.

name	mult	type	description
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 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	NullCIM	(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

Table 460 shows all association ends of VsConverterTimePoint with other classes.

Table 460 – 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.

4.16.88 (NC) CsConverterTimePoint

Inheritance path = [ACDCTimePoint](#)

CSConverter values for a given point in time.

Table 461 shows all attributes of CsConverterTimePoint.

Table 461 – 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 $\min\alpha \leq \text{targetAlpha} \leq \max\alpha$. The attribute shall be a positive value.

name	mult	type	description
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.
atTime	0..1	DateTime	(NC) inherited from: ACDCTimePoint
p	0..1	NullCIM	(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

Table 462 shows all association ends of CsConverterTimePoint with other classes.

Table 462 – 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.

4.16.89 (NC) TapScheduleTimePoint root class

Tap schedule values for a given point in time.

Table 463 shows all attributes of TapScheduleTimePoint.

Table 463 – 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.

Table 464 shows all association ends of TapScheduleTimePoint with other classes.

Table 464 – Association ends of ExtSchedule::TapScheduleTimePoint with other classes

mult from	name	mult to	type	description
1..*	TapSchedule	1..1	TapSchedule	(NC) The tap schedule that has this time point.

4302

4303 **4.16.90 (NC) EnergyConnectionTimePoint root class**

4304 Energy connection values for a given point in time.

4305 Table 465 shows all attributes of EnergyConnectionTimePoint.

4306 **Table 465 – 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.

4307

4308 Table 466 shows all association ends of EnergyConnectionTimePoint with other classes.

4309 **Table 466 – Association ends of ExtSchedule::EnergyConnectionTimePoint with other classes**
4310

mult from	name	mult to	type	description
1..*	EnergyConnectionSchedule	1..1	EnergyConnectionSchedule	(NC) The energy connection schedule that has this time point.

4311

4312 **4.16.91 (NC) SwitchTimePoint root class**

4313 Switch values for a given point in time.

4314 Table 467 shows all attributes of SwitchTimePoint.

4315 **Table 467 – 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.

4316

4317 Table 468 shows all association ends of SwitchTimePoint with other classes.

4318 **Table 468 – 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.

4319

4320 **4.16.92 (NC) InServiceTimePoint root class**

4321 In service values for a given point in time.

4322 Table 469 shows all attributes of InServiceTimePoint.

4323 **Table 469 – 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.

4324

4325 Table 470 shows all association ends of InServiceTimePoint with other classes.

4326 **Table 470 – 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.

4327

4328 **4.16.93 (NC) ControlAreaTimePoint root class**

4329 Participation factor for a given point in time.

4330 Table 471 shows all attributes of ControlAreaTimePoint.

4331 **Table 471 – 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.

4332

4333 Table 472 shows all association ends of ControlAreaTimePoint with other classes.

4334 **Table 472 – 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.

4335

4336 **4.16.94 (NC) SynchronousMachineTimePoint root class**

4337 Synchronous machine values for a given point in time.

4338 Table 473 shows all attributes of SynchronousMachineTimePoint.

4339 **Table 473 – Attributes of ExtSchedule::SynchronousMachineTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.

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.

Table 474 shows all association ends of SynchronousMachineTimePoint with other classes.

Table 474 – 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.

4.16.95 (NC) AsynchronousMachineTimePoint root class

Asynchronous machine values for a given point in time.

Table 475 shows all attributes of AsynchronousMachineTimePoint.

Table 475 – 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 476 shows all association ends of AsynchronousMachineTimePoint with other classes.

Table 476 – 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.

4.16.96 (NC) ExternalNetworkInjectionTimePoint root class

External network injection values for a given point in time.

Table 477 shows all attributes of ExternalNetworkInjectionTimePoint.

Table 477 – 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.

name	mult	type	description
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 478 shows all association ends of ExternalNetworkInjectionTimePoint with other classes.

Table 478 – 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.

4.16.97 (NC) BatteryUnitSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

ExtEulIdentifiedObject

Schedule for battery unit.

Table 479 shows all attributes of BatteryUnitSchedule.

Table 479 – 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

Table 480 shows all association ends of BatteryUnitSchedule with other classes.

Table 480 – 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

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

4372

4373 **4.16.98 (NC) BatteryUnitTimePoint root class**

4374 Battery unit values for a given point in time.

4375 Table 481 shows all attributes of BatteryUnitTimePoint.

4376 **Table 481 – 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.

4377

4378 Table 482 shows all association ends of BatteryUnitTimePoint with other classes.

4379 **Table 482 – 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.

4380

4381 **4.16.99 (NC) VoltageLimitSchedule**4382 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

4383 ExtEulIdentifiedObject

4384 Schedule for voltage limit.

4385 Table 483 shows all attributes of VoltageLimitSchedule.

4386 **Table 483 – 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

4387

4388 Table 484 shows all association ends of VoltageLimitSchedule with other classes.

4389 **Table 484 – 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.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4390

4391 **4.16.100 (NC) ActivePowerLimitSchedule**4392 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
4393 ExtEulIdentifiedObject

4394 Schedule for active power limit.

4395 Table 485 shows all attributes of ActivePowerLimitSchedule.

4396 **Table 485 – 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

4397

4398 Table 486 shows all association ends of ActivePowerLimitSchedule with other classes.

4399 **Table 486 – Association ends of ExtSchedule::ActivePowerLimitSchedule with other**
4400 **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

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

4401

4402 **4.16.101 (NC) ApparentPowerLimitSchedule**4403 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

4404 ExtEulIdentifiedObject

4405 Schedule for apparent power limit.

4406 Table 487 shows all attributes of ApparentPowerLimitSchedule.

4407 **Table 487 – 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

4408

4409 Table 488 shows all association ends of ApparentPowerLimitSchedule with other classes.

4410 **Table 488 – Association ends of ExtSchedule::ApparentPowerLimitSchedule with other classes**

4411

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

4412

4413 **4.16.102 (NC) CurrentLimitSchedule**4414 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

4415 ExtEulIdentifiedObject

4416 Schedule for current limit.

4417 Table 489 shows all attributes of CurrentLimitSchedule.

4418

Table 489 – Attributes of ExtSchedule::CurrentLimitSchedule

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

4419

4420

Table 490 shows all association ends of CurrentLimitSchedule with other classes.

4421

Table 490 – 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

4422

4.16.103 (NC) CurrentLimitTimePoint root class

4424 Current limit values for a given point in time.

4425 Table 491 shows all attributes of CurrentLimitTimePoint.

4426

Table 491 – 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.

4427

4428

Table 492 shows all association ends of CurrentLimitTimePoint with other classes.

4429

Table 492 – 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.

4430

4431 **4.16.104 (NC) ApparentPowerLimitTimePoint root class**

4432 Apparent power limit for a given point in time.

4433 Table 493 shows all attributes of ApparentPowerLimitTimePoint.

4434 **Table 493 – 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.

4435

4436 Table 494 shows all association ends of ApparentPowerLimitTimePoint with other classes.

4437 **Table 494 – Association ends of ExtSchedule::ApparentPowerLimitTimePoint with other classes**

4438

mult from	name	mult to	type	description
1..*	ApparentPowerLimitSchedule	1..1	ApparentPowerLimitSchedule	(NC) The apparent power limit schedule that has this time point.

4439

4440 **4.16.105 (NC) ActivePowerLimitTimePoint root class**

4441 Active power limit for a given point in time.

4442 Table 495 shows all attributes of ActivePowerLimitTimePoint.

4443 **Table 495 – 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.

4444

4445 Table 496 shows all association ends of ActivePowerLimitTimePoint with other classes.

4446 **Table 496 – Association ends of ExtSchedule::ActivePowerLimitTimePoint with other classes**

4447

mult from	name	mult to	type	description
1..*	ActivePowerLimitSchedule	1..1	ActivePowerLimitSchedule	(NC) The active power limit schedule that has this time point.

4448

4449 **4.16.106 (NC) VoltageLimitTimePoint root class**

4450 Voltage limit values for a given point in time.

4451 Table 497 shows all attributes of VoltageLimitTimePoint.

4452 **Table 497 – 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.

4453

4454 Table 498 shows all association ends of VoltageLimitTimePoint with other classes.

4455 **Table 498 – 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.

4456

4457 **4.16.107 (NC) ShuntCompensatorSchedule**4458 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

4459 ExtEulIdentifiedObject

4460 Schedule for shunt compensator.

4461 Table 499 shows all attributes of ShuntCompensatorSchedule.

4462 **Table 499 – 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

4463

4464 Table 500 shows all association ends of ShuntCompensatorSchedule with other classes.

4465 **Table 500 – Association ends of ExtSchedule::ShuntCompensatorSchedule with other classes**

4466

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

4467

4468 **4.16.108 (NC) ShuntCompensatorTimePoint root class**

4469 Shunt compensator values for a given point in time.

4470 Table 501 shows all attributes of ShuntCompensatorTimePoint.

4471 **Table 501 – 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.

4472

4473 Table 502 shows all association ends of ShuntCompensatorTimePoint with other classes.

4474 **Table 502 – Association ends of ExtSchedule::ShuntCompensatorTimePoint with other**
4475 **classes**

mult from	name	mult to	type	description
1..*	ShuntCompensatorSchedule	1..1	ShuntCompensatorSchedule	(NC) The shunt compensator schedule that has this time point.

4476

4477 **4.16.109 (NC) GeneratingUnitSchedule**

4478 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :
4479 ExtEulIdentifiedObject

4480 Schedule for generating unit.

4481 Table 503 shows all attributes of GeneratingUnitSchedule.

4482 **Table 503 – 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	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

Table 504 shows all association ends of GeneratingUnitSchedule with other classes.

Table 504 – 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

4.16.110 (NC) GeneratingUnitTimePoint root class

Generating unit values for a given point in time.

Table 505 shows all attributes of GeneratingUnitTimePoint.

Table 505 – Attributes of ExtSchedule::GeneratingUnitTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
normalIPF	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 506 shows all association ends of GeneratingUnitTimePoint with other classes.

Table 506 – 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.

4.16.111 (NC) StaticVarCompensatorSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

Schedule for static var compensator.

Table 507 shows all attributes of StaticVarCompensatorSchedule.

4502

Table 507 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

4503

4504

Table 508 shows all association ends of StaticVarCompensatorSchedule with other classes.

4505

4506

Table 508 – 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

4507

4508

4.16.112 (NC) StaticVarCompensatorTimePoint root class

4509

Static var compensator values for a given point in time.

4510

Table 509 shows all attributes of StaticVarCompensatorTimePoint.

4511

Table 509 – 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.

4512

4513

Table 510 shows all association ends of StaticVarCompensatorTimePoint with other classes.

Table 510 – 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.

4.16.113 (NC) StageTriggerSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

Schedule for a stage trigger.

Table 511 shows all attributes of StageTriggerSchedule.

Table 511 – 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

Table 512 shows all association ends of StageTriggerSchedule with other classes.

Table 512 – 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

4.16.114 (NC) StageTriggerTimePoint root class

Stage trigger values at a given point in time.

Table 513 shows all attributes of StageTriggerTimePoint.

4530

Table 513 – 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.

4531

4532

Table 514 shows all association ends of StageTriggerTimePoint with other classes.

4533

Table 514 – Association ends of ExtSchedule::StageTriggerTimePoint with other classes

4534

mult from	name	mult to	type	description
1..*	StageTriggerSchedule	1..1	StageTriggerSchedule	(NC) Stage trigger schedule that has time point.

4535

4536

4.16.115 (NC) GenericSequenceSchedule

4537

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

4538

ExtEulIdentifiedObject

4539

Schedule for sequence.

4540

Table 515 shows all attributes of GenericSequenceSchedule.

4541

Table 515 – 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

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4543

Table 516 shows all association ends of GenericSequenceSchedule with other classes.

Table 516 – Association ends of ExtSchedule::GenericSequenceSchedule with other 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

4.16.116 (NC) SequenceTimePoint root class

Sequence at a given point in time.

Table 517 shows all attributes of SequenceTimePoint.

Table 517 – 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.

Table 518 shows all association ends of SequenceTimePoint with other classes.

Table 518 – 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.

4.16.117 (NC) ReferenceValueKind enumeration

Kind of reference value.

Table 519 shows all literals of ReferenceValueKind.

Table 519 – Literals of ExtSchedule::ReferenceValueKind

literal	value	description
exact		Exact value applies.
minimum		The value is a minimum.
maximum		The value is a maximum.

4.16.118 (NC) BaseCaseCurrentLimitSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

The schedule for a base case current limit.

Table 520 shows all attributes of BaseCaseCurrentLimitSchedule.

4565

Table 520 – 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
description	0..1	String	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

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Table 521 shows all association ends of BaseCaseCurrentLimitSchedule with other classes.

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Table 521 – 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

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4.16.119 (NC) BaseCaseCurrentLimitTimePoint root class

4572

Base case current limit at a given point in time.

4573

Table 522 shows all attributes of BaseCaseCurrentLimitTimePoint.

4574

Table 522 – 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.

4575

4576

Table 523 shows all association ends of BaseCaseCurrentLimitTimePoint with other classes.

Table 523 – 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.

4.16.120 (NC) FuelStorageSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

Fuel storage schedule for elements.

Table 524 shows all attributes of FuelStorageSchedule.

Table 524 – 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: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

Table 525 shows all association ends of FuelStorageSchedule with other classes.

Table 525 – Association ends of ExtSchedule::FuelStorageSchedule with other classes

mult from	name	mult to	type	description
1..1	FuelStorageTimePoint	1..*	FuelStorageTimePoint	(NC) The time point that relates to this fuel storage schedule.
0..*	FuelStorage	0..1	FuelStorage	(NC) Fuel storage of 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

4.16.121 (NC) FuelStorageTimePoint root class

Fuel storage values for a given point in time.

Table 526 shows all attributes of FuelStorageTimePoint.

4593

Table 526 – 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.

4594

4595

Table 527 shows all association ends of FuelStorageTimePoint with other classes.

4596

Table 527 – 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.

4597

4598

4.16.122 (NC) ReservoirSchedule

4599

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

4600

ExtEulIdentifiedObject

4601

Reservoir schedule for elements.

4602

Table 528 shows all attributes of ReservoirSchedule.

4603

Table 528 – 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

4604

4605

Table 529 shows all association ends of ReservoirSchedule with other classes.

4606

Table 529 – 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

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

4607

4608 **4.16.123 (NC) ReservoirTimePoint root class**

4609 Reservoir values for a given point in time.

4610 Table 530 shows all attributes of ReservoirTimePoint.

4611 **Table 530 – 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.

4612

4613 Table 531 shows all association ends of ReservoirTimePoint with other classes.

4614 **Table 531 – 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.

4615

4616 **4.16.124 (NC) FuelStorageRegularSchedule**4617 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

4619 Regular schedule for fuel storage.

4620 Table 532 shows all attributes of FuelStorageRegularSchedule.

4621 **Table 532 – 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

Table 533 shows all association ends of FuelStorageRegularSchedule with other classes.

Table 533 – Association ends of ExtSchedule::FuelStorageRegularSchedule with other 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

4.16.125 (NC) ReservoirRegularSchedule

Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

Regular schedule for reservoir.

Table 534 shows all attributes of ReservoirRegularSchedule.

Table 534 – 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

Table 535 shows all association ends of ReservoirRegularSchedule with other classes.

Table 535 – 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

4.17 Package ExtFaultsPRA

4.17.1 General

The package includes extensions related to reporting fault situations in the power system.

4.17.2 Package ExtFaultCause

4.17.2.1 General

Extensions related to fault cause.

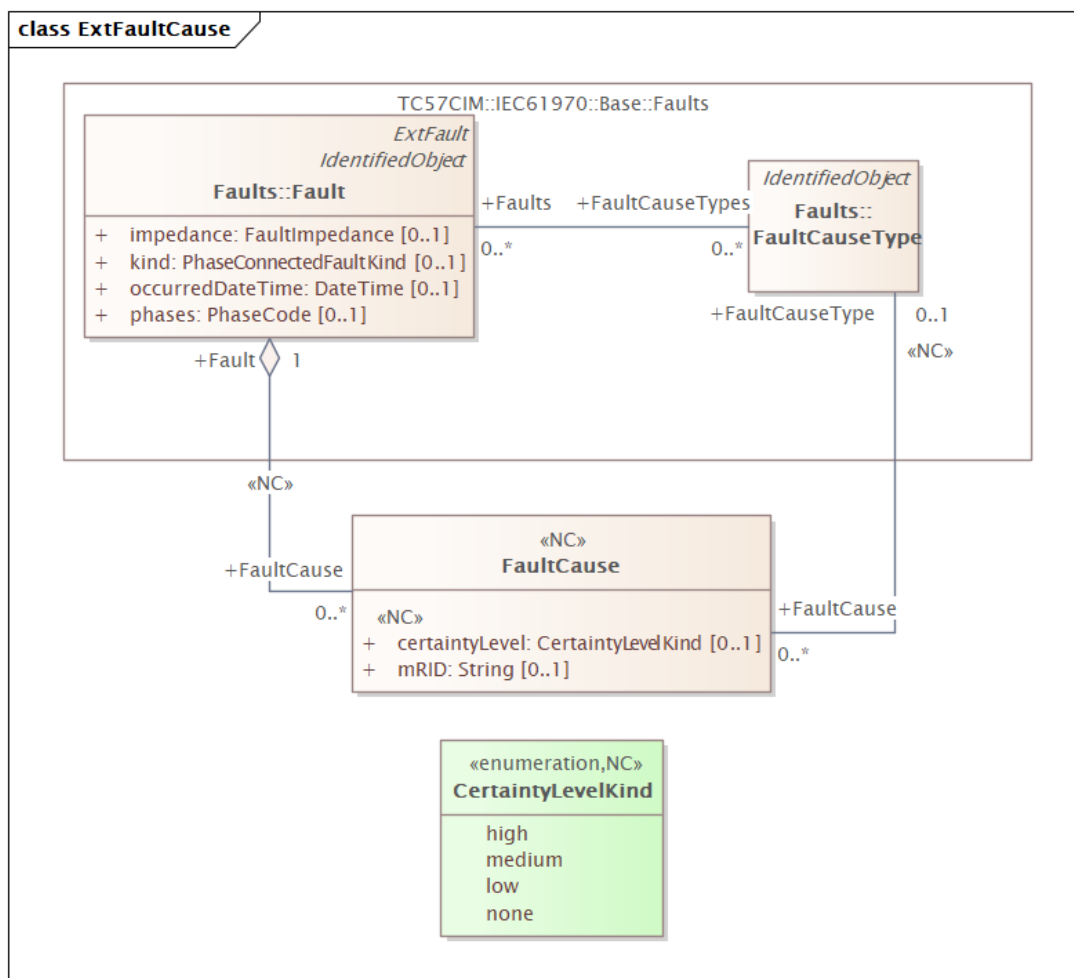


Figure 37 – Class diagram ExtFaultCause::ExtFaultCause

Figure 37: The diagram contains classes and attributes related to the extensions.

4.17.2.2 (NC) FaultCause root class

Fault cause.

Table 536 shows all attributes of FaultCause.

Table 536 – 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.

name	mult	type	description
			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.

Table 537 shows all association ends of FaultCause with other classes.

Table 537 – 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.

4.17.2.3 (NC) CertaintyLevelKind enumeration

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.

Table 538 shows all literals of CertaintyLevelKind.

Table 538 – 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.

4.17.3 Package ExtGridDisturbance

4.17.3.1 General

Extensions relate to grid disturbance.

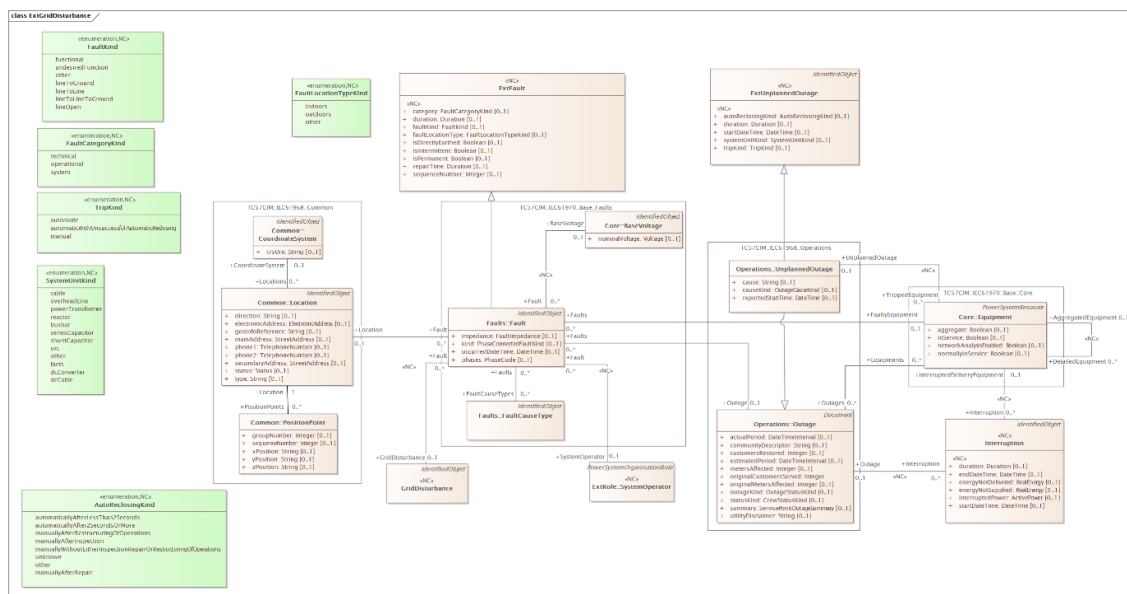


Figure 38 – Class diagram ExtGridDisturbance::ExtGridDisturbance

Figure 38: The diagram contains classes and attributes related to the extensions.

4.17.3.2 (NC) FaultLocationTypeKind enumeration

Categories of fault location types.

Table 539 shows all literals of `FaultLocationTypeKind`.

Table 539 – Literals of ExtGridDisturbance::FaultLocationTypeKind

literal	value	description
indoors		Fault occurs indoors.
outdoors		Fault occurs outdoors.
other		Fault occurs in other location.

4.17.3.3 (NC) ExtFault root class

A fault of a component is defined as the inability to perform as required, due to an internal state.

Table 540 shows all attributes of ExtFault.

Table 540 – 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.
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

name	mult	type	description
			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 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.

name	mult	type	description
			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.

4676

4677 **4.17.3.4 (NC) ExtUnplannedOutage**

4678 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

4679 An event where a component or unit gets partially or fully isolated from the system.

4680 Table 541 shows all attributes of ExtUnplannedOutage.

4681

Table 541 – 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 always be. A system unit may therefore contain more than one component. Note 2: the circuit breakers are not included in the system unit.

name	mult	type	description
			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

Table 542 shows all association ends of ExtUnplannedOutage with other classes.

Table 542 – 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

4.17.3.5 (NC) GridDisturbance

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

Automatic, unintended, or manual undeferrable switching of breakers as a result of faults in the power grid.

Table 543 shows all attributes of GridDisturbance.

Table 543 – 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

Table 544 shows all association ends of GridDisturbance with other classes.

Table 544 – 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

4.17.3.6 (NC) Interruption

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

Disappearance of the supply voltage at a delivery point.

Table 545 shows all attributes of Interruption.

Table 545 – 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

Table 546 shows all association ends of Interruption with other classes.

Table 546 – 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.

mult from	name	mult to	type	description
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

4706

4707

4.17.3.7 (NC) AutoReclosingKind enumeration

4708

The type of autoreclosing that occurred with the trip.

4709

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.

4710

4711

In this document, high-speed automatic reclosing refers to automatic reclosing after less than 2 seconds.

4712

4713

Table 547 shows all literals of AutoReclosingKind.

4714

Table 547 – 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.

4715

4716

4.17.3.8 (NC) FaultCategoryKind enumeration

4717

Available kinds of fault categories.

4718

Table 548 shows all literals of FaultCategoryKind.

4719

Table 548 – 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

literal	value	description
		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.

4720

4721 **4.17.3.9 (NC) FaultKind enumeration**

4722 One fault can consist of several fault types. If a fault consists of several fault types, the most
4723 significant fault type is used.

4724 In case of developing faults, that is in faults changing from one type to another, the final type
4725 is given.

4726 Table 549 shows all literals of FaultKind.

4727

Table 549 – 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 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.

4728

4729 **4.17.3.10 (NC) SystemUnitKind enumeration**

4730 A system unit is defined as:

4731 A group of components which are delimited by one or more circuit breakers.

4732 Note 1: the system unit concept has been defined to simplify the calculation of availability. While
4733 a system unit is always delimited by circuit breakers, an individual component may not always
4734 be. A system unit may therefore contain more than one component.

4735 Note 2: the circuit breakers are not included in the system unit.

4736 Note 3: a tripped element is synonymous to a tripped system unit.

4737 Note 4: the type of a system unit is determined by its dominant component. The available system
4738 unit types are power transformer, overhead line, cable, reactor, busbar, series capacitor, shunt
4739 capacitor and SVC.4740 Note 5: when a system unit is no longer transporting or supplying electrical energy, the system
4741 unit is affected by an outage. The system unit is unavailable after the outage has occurred.

4742 Table 550 shows all literals of SystemUnitKind.

4743 **Table 550 – 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.

4744

4745 **4.17.3.11 (NC) TripKind enumeration**4746 Whether the type of the trip due to the outage was automatic, automatic with successful
4747 automatic reclosing or manual.4748 In case of a fault in the reclosing automatics resulting in lack of reclosing, automatic should be
4749 chosen as an alternative.

4750 Table 551 shows all literals of TripKind.

4751 **Table 551 – Literals of ExtGridDisturbance::TripKind**

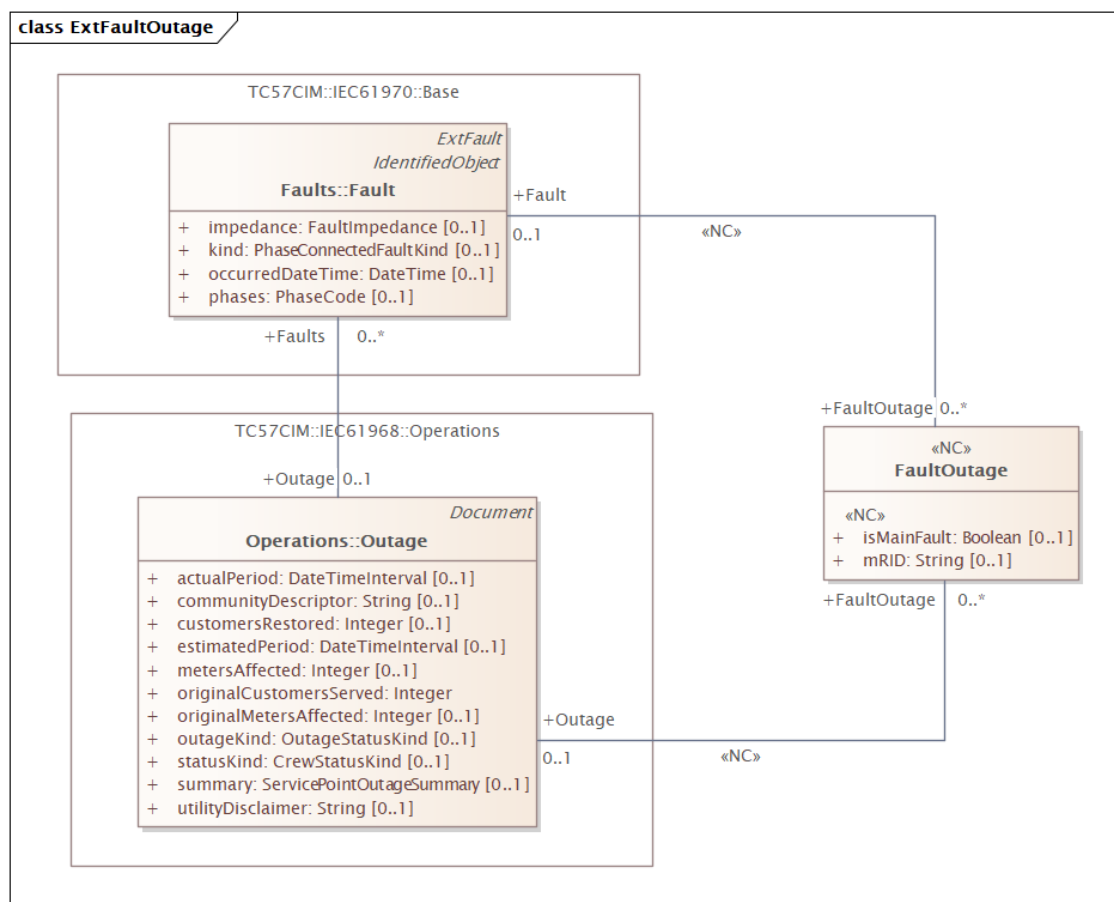
literal	value	description
automatic		The trip that resulted in the outage was automatic.

literal	value	description
		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.

4752

4753 **4.17.4 Package ExtFaultOutage**4754 **4.17.4.1 General**

4755 Extensions related to fault outage.



4756

4757 **Figure 39 – Class diagram ExtFaultOutage::ExtFaultOutage**

4758 Figure 39: The diagram contains classes and attributes related to the extensions.

4759 **4.17.4.2 (NC) FaultOutage root class**

4760 Association class for relating one fault and one outage.

4761 Table 552 shows all attributes of FaultOutage.

4762

Table 552 – 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.

4763

4764

Table 553 shows all association ends of FaultOutage with other classes.

4765

Table 553 – 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.

4766

4767

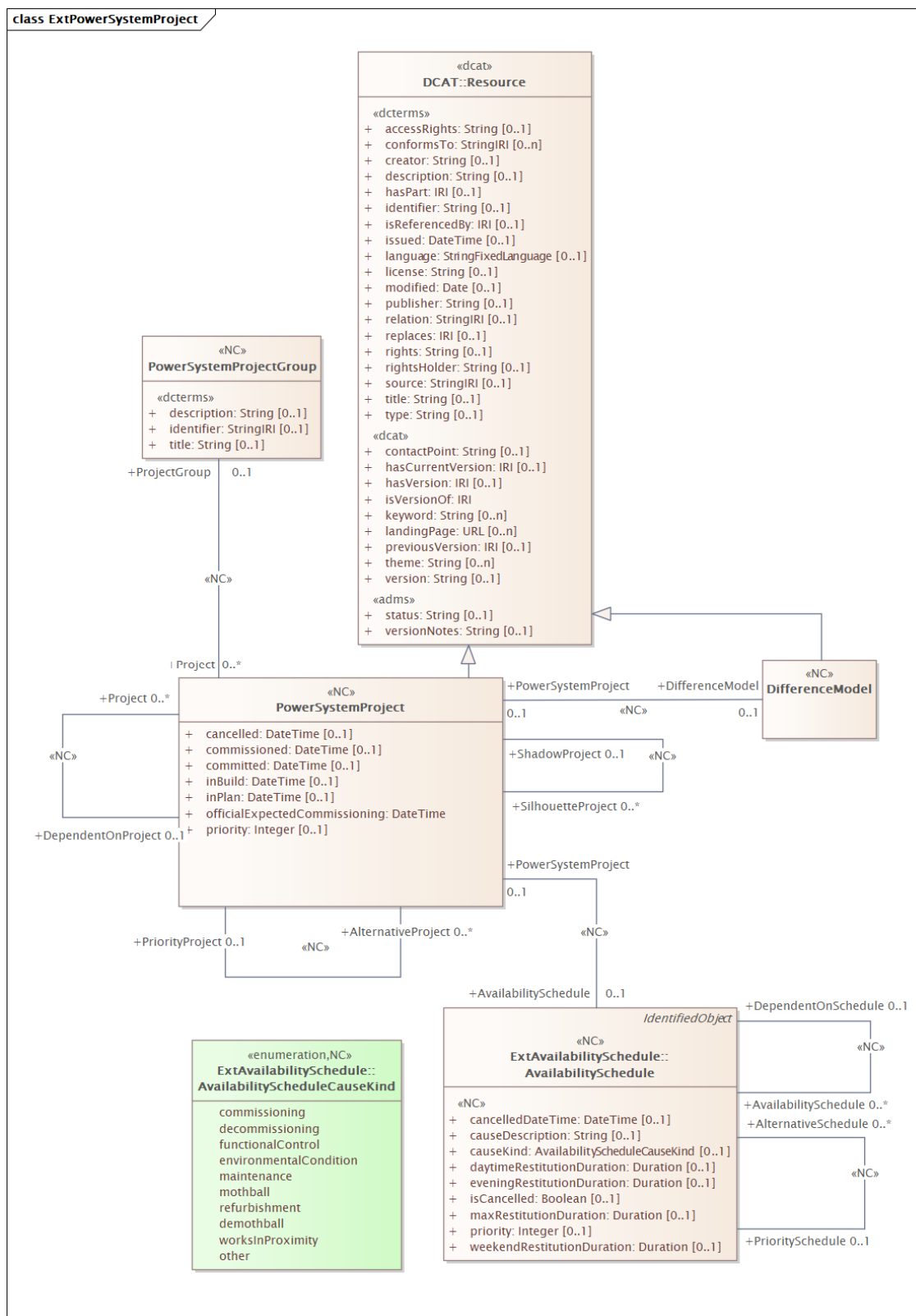
4.18 Package ExtPowerSystemProject

4768

4.18.1 General

4769

The package includes extensions related to power system project.



4771 **Figure 40 – Class diagram ExtPowerSystemProject::ExtPowerSystemProject**

4772 Figure 40: The diagram shows the extensions related to power system project.

4773 **4.18.2 (NC) DifferenceModel**

4774 Inheritance path = Resource

4775 A set of statements describing the changes in the network model. The statement is defined in
4776 the difference model.

4777 Table 554 shows all attributes of DifferenceModel.

4778 **Table 554 – 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

4779

4780 Table 555 shows all association ends of DifferenceModel with other classes.

4781 **Table 555 – Association ends of ExtPowerSystemProject::DifferenceModel with other**
 4782 **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

4783

4784 **4.18.3 (NC) PowerSystemProject**

4785 Inheritance path = Resource

4786 Knowledge data for the power system project that describe the status and the planned
 4787 implementation of the changes into the as-built model.

4788 Table 556 shows all attributes of PowerSystemProject.

4789 **Table 556 – 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

4790

4791

Table 557 shows all association ends of PowerSystemProject with other classes.

4792

4793

Table 557 – 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

4794

4795 **4.18.4 (NC) PowerSystemProjectGroup root class**

4796 A container with project that are grouped together. Primarily used for navigation and to highlight
 4797 the phases that an overall project can go through.

4798 Table 558 shows all attributes of PowerSystemProjectGroup.

4799 **Table 558 – 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.

4800

4801 Table 559 shows all association ends of PowerSystemProjectGroup with other classes.

4802 **Table 559 – Association ends of ExtPowerSystemProject::PowerSystemProjectGroup**
 4803 **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.

4804

4805 **4.19 Package ExtCIM18**4806 **4.19.1 General**

4807

4808 **4.19.2 (NC) VoltageAngleLimit**

4809 Inheritance path = OperationalLimit : IdentifiedObject : ExtEuIdentifiedObject

4810 Voltage angle limit between two terminals. The association end OperationalLimitSet.Terminal
4811 defines one end and the host of the limit. The association end
4812 VoltageAngleLimit.AngleReferenceTerminal defines the reference terminal.
4813 Table 560 shows all attributes of VoltageAngleLimit.

4814 **Table 560 – Attributes of ExtCIM18::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 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

4815
4816 Table 561 shows all association ends of VoltageAngleLimit with other classes.

4817 **Table 561 – Association ends of ExtCIM18::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

4818
4819 **4.19.3 Package ExtControl**
4820 **4.19.3.1 General**
4821 The package contains extensions related to control.

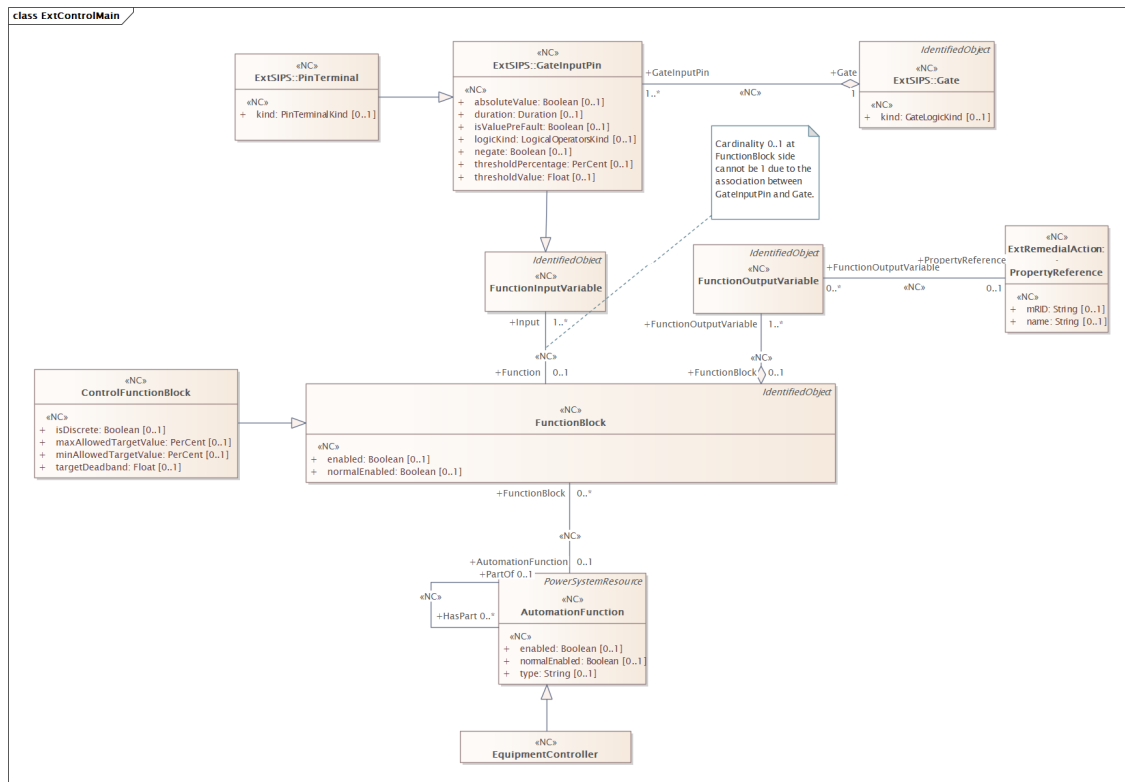


Figure 41 – Class diagram ExtControl::ExtControlMain

Figure 41: The diagram contains main classes and associations related to control.

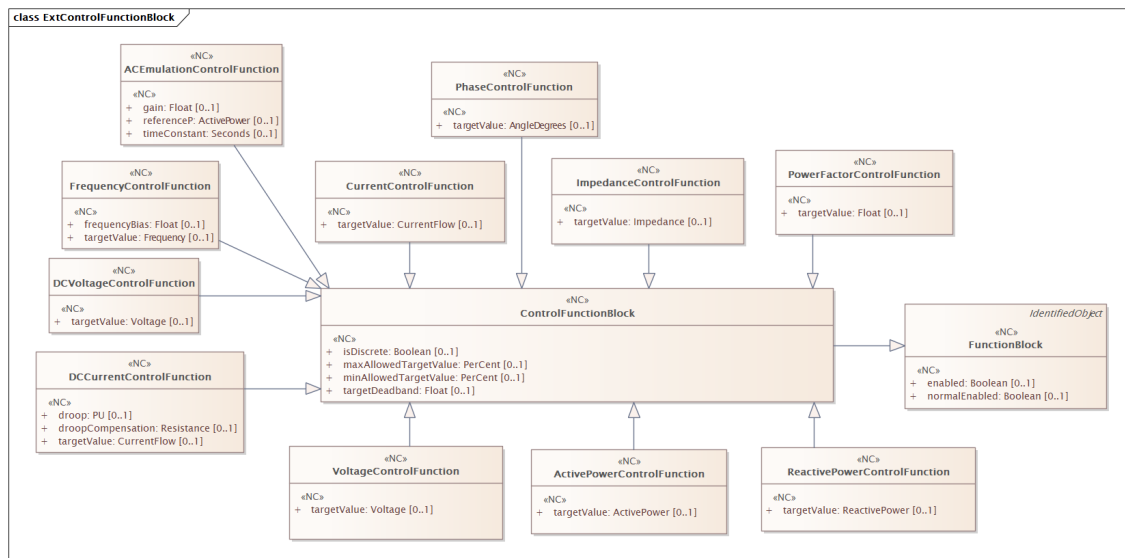


Figure 42 – Class diagram ExtControl::ExtControlFunctionBlock

Figure 42: The diagram contains classes and association related to control function block.

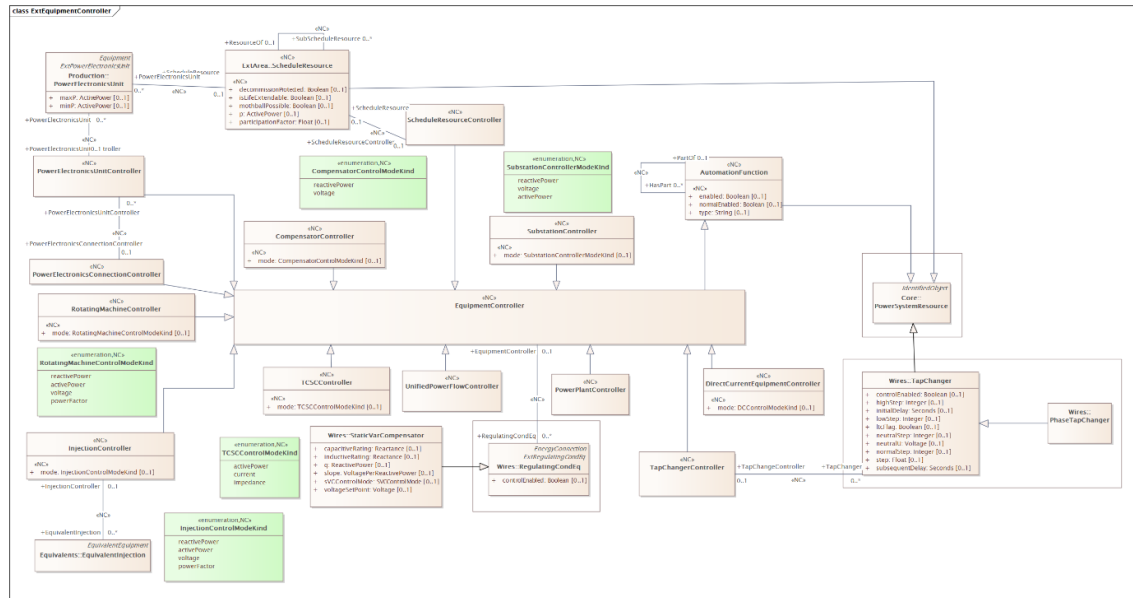


Figure 43 – Class diagram ExtControl::ExtEquipmentController

Figure 43:

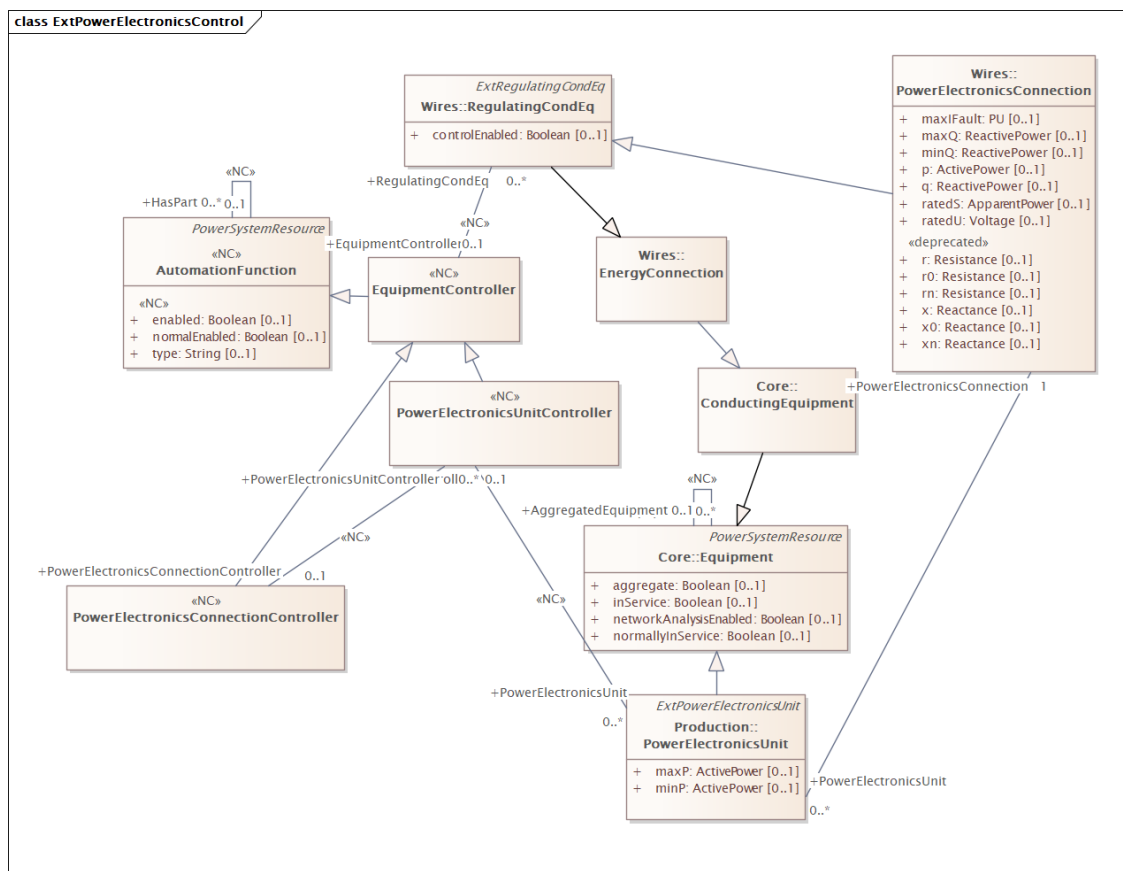
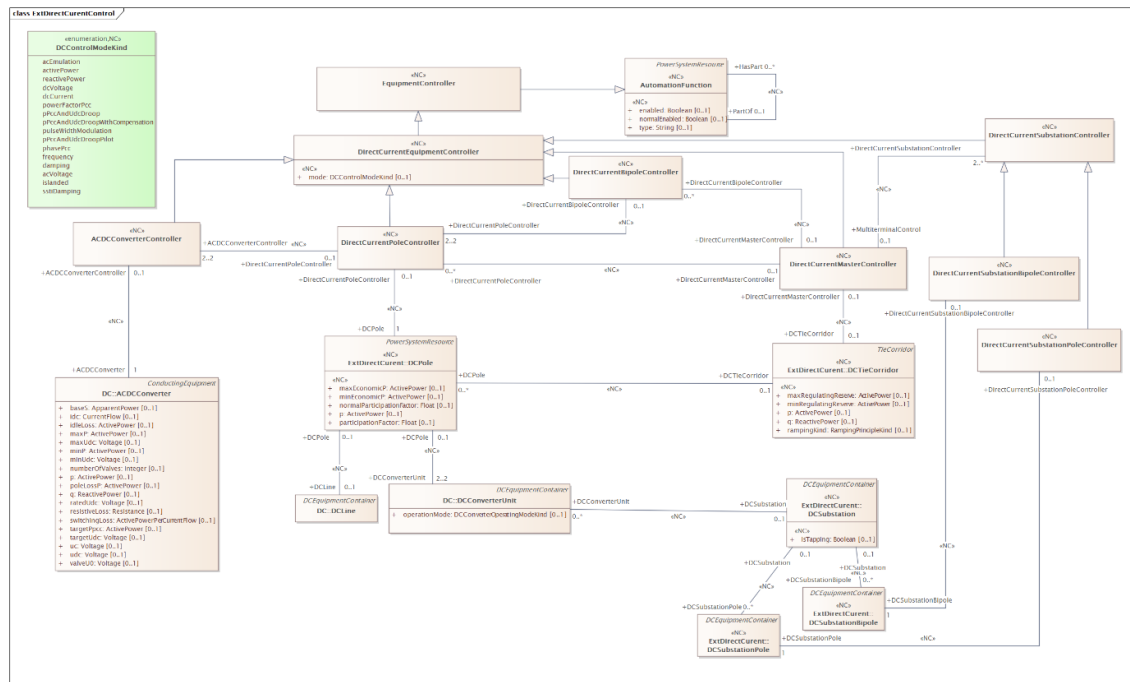


Figure 44 – Class diagram ExtControl::ExtPowerElectronicsControl

4833 Figure 44:



4834

4835

Figure 45 – Class diagram ExtControl::ExtDirectCurrentControl

4836

Figure 45: The diagram contains classes related to direct current control.

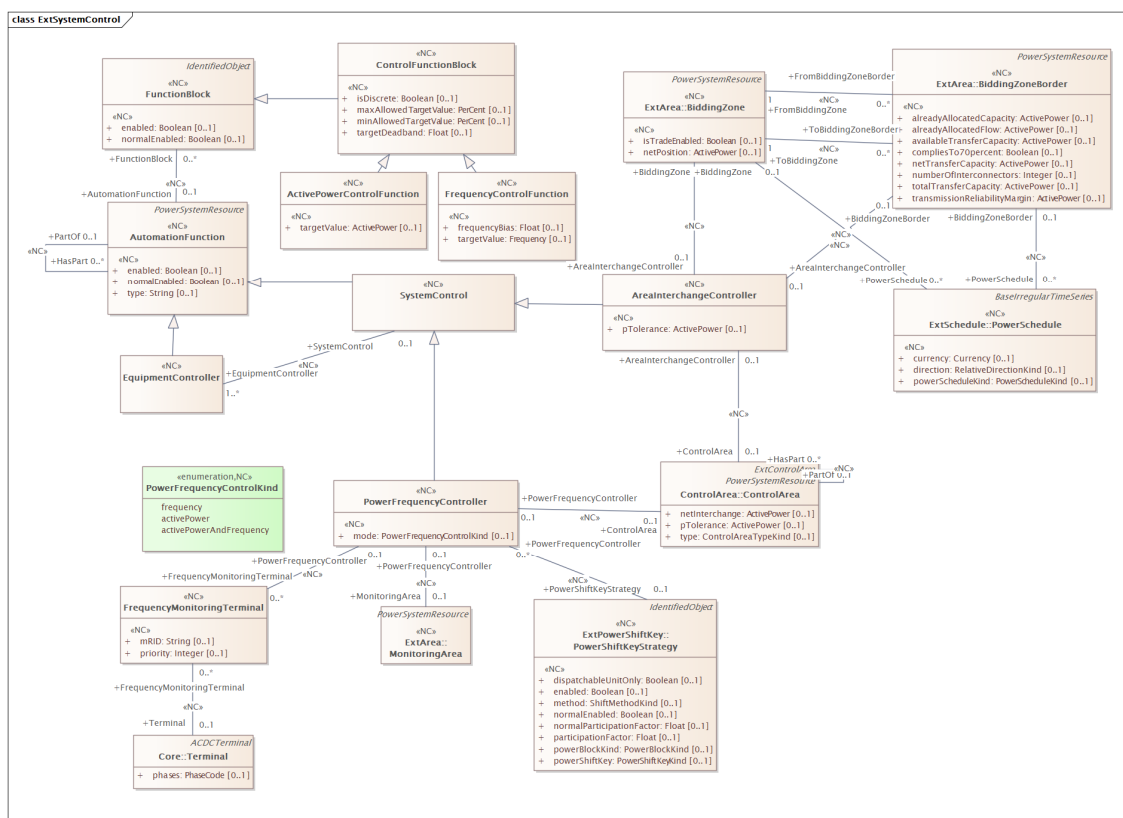


Figure 46 – Class diagram ExtControl::ExtSystemControl

Figure 46: The diagram contains classes related to integrated AC and DC system control.

4.19.3.2 (NC) ActivePowerControlFunction

```
Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject
```

Active power control function is a function block that calculates operating point of the controlled equipment to achieve the target active power.

Table 562 shows all attributes of `ActivePowerControlFunction`.

Table 562 – 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
targetDeadband	0..1	Float	(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

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

Table 563 shows all association ends of ActivePowerControlFunction with other classes.

Table 563 – Association ends of ExtControl::ActivePowerControlFunction with other classes

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
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(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

4.19.3.3 (NC) AutomationFunction

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

Automation function is a collection of functional block or other automation function that can be executed as a work cycle program as part of an automated system.

Table 564 shows all attributes of AutomationFunction.

Table 564 – 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

Table 565 shows all association ends of AutomationFunction with other classes.

4860

Table 565 – 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
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4861

4.19.3.4 (NC) CompensatorController

4863 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :
 4864 IdentifiedObject : ExtEulIdentifiedObject

4865 Compensator controller is controlling the equipment to optimize the use of the compensators.

4866 Table 566 shows all attributes of CompensatorController.

4867

Table 566 – 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

4868

4869 Table 567 shows all association ends of CompensatorController with other classes.

4870 **Table 567 – 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
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

4871

4872 **4.19.3.5 (NC) ControlFunctionBlock**4873 Inheritance path = [FunctionBlock](#) : IdentifiedObject : ExtEulIdentifiedObject

4874 Control function block is a function block that contains an algorithm for controlling the equipment.

4875 Table 568 shows all attributes of ControlFunctionBlock.

4877

Table 568 – 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.
targetDeadband	0..1	Float	(NC) Target deadband 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 targetDeadband is 2 kV 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].

name	mult	type	description
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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 569 shows all association ends of ControlFunctionBlock with other classes.

Table 569 – 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
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(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

4.19.3.6 (NC) DirectCurrentMasterController

Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Direct current system control is a control system which governs the operation of an entire DC system consisting of more than one DC substation and performs those functions of controlling, monitoring and protection which require information from more than one substation. This can also be a multiterminal control which is a DC system control for more than two DC substations or a DC master control, which is a general concept for control coordination of a DC system. The DC master control may be implemented at the bipole and/or pole level as defined in IEC 60633. The DC system control/multiterminal control/master control is part of the hierarchical structure of an HVDC control system that has an integrated AC/DC system control as the highest level of control which governs the integrated operation of AC and DC systems of a power system. This control system is under the responsibility of the system operator.

Table 570 shows all attributes of DirectCurrentMasterController.

4896

Table 570 – 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

4897

4898

Table 571 shows all association ends of DirectCurrentMasterController with other classes.

4899

Table 571 – Association ends of ExtControl::DirectCurrentMasterController with other classes

4900

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
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

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

4901

4902

4.19.3.7 (NC) EquipmentController

4903

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

4904

4905

Equipment controller is an automation function that can control one or multiple equipment function to achieve all the targets inside the given tolerance.

4906

4907

Table 572 shows all attributes of EquipmentController.

4908

Table 572 – 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

4909

4910

Table 573 shows all association ends of EquipmentController with other classes.

4911

Table 573 – 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

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

4912

4913 **4.19.3.8 (NC) ScheduleResourceController**4914 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :

4915 IdentifiedObject : ExtEulIdentifiedObject

4916 Schedule resource controller is controlling the equipment to optimize the schedule resource.

4917 Table 574 shows all attributes of ScheduleResourceController.

4918

Table 574 – 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

4919

4920 Table 575 shows all association ends of ScheduleResourceController with other classes.

4921 **Table 575 – Association ends of ExtControl::ScheduleResourceController with other**
4922 **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
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

4923

4924 **4.19.3.9 (NC) FunctionBlock**

4925 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

4926 Function block is a function described as a set of elementary blocks. The blocks describe the
4927 function between input variables and output variables.

4928 Table 576 shows all attributes of FunctionBlock.

4929

Table 576 – 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 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

4930

4931 Table 577 shows all association ends of FunctionBlock with other classes.

4932

Table 577 – 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.
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.

mult from	name	mult to	type	description
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(NC) Automation block group which has function blocks.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4933

4934 **4.19.3.10 (NC) FunctionInputVariable**

4935 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

4936 Functional input variable defines the domain of the function.

4937 Table 578 shows all attributes of FunctionInputVariable.

4938 **Table 578 – 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

4939

4940 Table 579 shows all association ends of FunctionInputVariable with other classes.

4941 **Table 579 – 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
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4942

4943 **4.19.3.11 (NC) FunctionOutputVariable**

4944 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

4945 Functional output variable defines the codomain of the function.

4946 Table 580 shows all attributes of FunctionOutputVariable.

4947 **Table 580 – Attributes of ExtControl::FunctionOutputVariable**

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

Table 581 shows all association ends of FunctionOutputVariable with other classes.

Table 581 – 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

4.19.3.12 (NC) ImpedanceControlFunction

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

Impedance control function is a function block that calculates the operating point of the controlled equipment to achieve the target impedance.

Table 582 shows all attributes of ImpedanceControlFunction.

Table 582 – 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
targetDeadband	0..1	Float	(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

Table 583 shows all association ends of ImpedanceControlFunction with other classes.

Table 583 – Association ends of ExtControl::ImpedanceControlFunction with other classes

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
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(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

4.19.3.13 (NC) PowerFactorControlFunction

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

Power factor control function is a function block that calculates the operating point of the controlled equipment to achieve the target power factor.

Table 584 shows all attributes of PowerFactorControlFunction.

Table 584 – Attributes of ExtControl::PowerFactorControlFunction

name	mult	type	description
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.
isDiscrete	0..1	Boolean	(NC) inherited from: ControlFunctionBlock
targetDeadband	0..1	Float	(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

Table 585 shows all association ends of PowerFactorControlFunction with other classes.

4973 **Table 585 – Association ends of ExtControl::PowerFactorControlFunction with other**
4974 **classes**

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
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(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

4975

4976 **4.19.3.14 (NC) PowerPlantController**

4977 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :
4978 IdentifiedObject : ExtEulIdentifiedObject

4979 Power plant controller is controlling the equipment of a power plant.

4980 Table 586 shows all attributes of PowerPlantController.

4981

Table 586 – 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
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4982

4983 Table 587 shows all association ends of PowerPlantController with other classes.

4984 **Table 587 – 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

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
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4985

4986 **4.19.3.15 (NC) ReactivePowerControlFunction**

4987 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :
 4988 ExtEulIdentifiedObject

4989 Reactive power control function is a function block that calculate the operating point of the
 4990 controlled equipment to achieve the target reactive power.

4991 Table 588 shows all attributes of ReactivePowerControlFunction.

4992 **Table 588 – 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
targetDeadband	0..1	Float	(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

4993

4994 Table 589 shows all association ends of ReactivePowerControlFunction with other classes.

4995 **Table 589 – Association ends of ExtControl::ReactivePowerControlFunction with other**
4996 **classes**

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
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(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

4997

4998 **4.19.3.16 (NC) StaticSynchronousSeriesCompensator**

4999 Inheritance path = [FACTSEquipment](#) : RegulatingCondEq : EnergyConnection :
5000 ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :
5001 ExtEulIdentifiedObject

5002 Static synchronous series compensator (SSSC) is a type of flexible AC transmission system
5003 which consists of a solid-state voltage source inverter coupled with a transformer that is
5004 connected in series with a transmission line. This device can inject an almost sinusoidal voltage
5005 in series with the line. This injected voltage could be considered as an inductive or capacitive
5006 reactance, which is connected in series with the transmission line. This feature can provide
5007 controllable voltage compensation. In addition, SSSC is able to reverse the power flow by
5008 injecting a sufficiently large series reactive compensating voltage. Moreover it can inject a
5009 voltage proportional to the difference between the line current and the pre-configured current
5010 threshold. It shall have two Terminal-s associated with it.

5011 Table 590 shows all attributes of StaticSynchronousSeriesCompensator.

5012 **Table 590 – 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

Table 591 shows all association ends of StaticSynchronousSeriesCompensator with other classes.

Table 591 – 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
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

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

5018

5019 **4.19.3.17 (NC) SubstationController**

5020 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :
 5021 IdentifiedObject : ExtEulIdentifiedObject

5022 Substation controller is controlling the equipment to optimize the use of the controlling
 5023 equipment within a substation.

5024 Table 592 shows all attributes of SubstationController.

5025 **Table 592 – 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

5026

5027 Table 593 shows all association ends of SubstationController with other classes.

5028 **Table 593 – 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
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

4.19.3.18 (NC) TapChangerController

Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

Tap changer controller is an equipment controller that controls a tap changer, e.g. how the voltage at the end of a line varies with the load level and compensation of the voltage drop by tap adjustment.

Table 594 shows all attributes of TapChangerController.

Table 594 – 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

Table 595 shows all association ends of TapChangerController with other classes.

Table 595 – 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
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

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

5041

5042 **4.19.3.19 (NC) UnifiedPowerFlowController**5043 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :
5044 IdentifiedObject : ExtEulIdentifiedObject5045 Unified power flow controller (UPFC) is providing fast-acting reactive power compensation on
5046 high-voltage electricity transmission networks.

5047 Table 596 shows all attributes of UnifiedPowerFlowController.

5048 **Table 596 – 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

5049

5050 Table 597 shows all association ends of UnifiedPowerFlowController with other classes.

5051 **Table 597 – Association ends of ExtControl::UnifiedPowerFlowController with other**
5052 **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

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

5053

5054 **4.19.3.20 (NC) VoltageControlFunction**5055 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :
5056 ExtEuIdentifiedObject5057 Voltage control function is a function block that calculate the operating point of the controlled
5058 equipment to achieve the target voltage.

5059 Table 598 shows all attributes of VoltageControlFunction.

5060

Table 598 – 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
targetDeadband	0..1	Float	(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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

5061

5062 Table 599 shows all association ends of VoltageControlFunction with other classes.

5063 **Table 599 – Association ends of ExtControl::VoltageControlFunction with other classes**

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
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(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

5064

5065 **4.19.3.21 (NC) CompensatorControlModeKind enumeration**

5066 Kind of compensator controller mode.

5067 Table 600 shows all literals of CompensatorControlModeKind.

5068 **Table 600 – Literals of ExtControl::CompensatorControlModeKind**

literal	value	description
reactivePower		Reactive power control.
voltage		Voltage control.

5069

5070 **4.19.3.22 (NC) SubstationControllerModeKind enumeration**

5071 Kind of substation controller mode.

5072 Table 601 shows all literals of SubstationControllerModeKind.

5073 **Table 601 – 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..

5074

5075 **4.19.3.23 (NC) CurrentControlFunction**5076 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :
5077 ExtEulIdentifiedObject5078 Current control function is a function block that calculates the operating point of the controlled
5079 equipment to achieve the target current.

5080 Table 602 shows all attributes of CurrentControlFunction.

5081

Table 602 – 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
targetDeadband	0..1	Float	(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

5082

5083

Table 603 shows all association ends of CurrentControlFunction with other classes.

5084

Table 603 – Association ends of ExtControl::CurrentControlFunction with other classes

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
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(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

5085

5086

4.19.3.24 (NC) DCControlModeKind enumeration

5087

Kind of DC control mode.

5088

Table 604 shows all literals of DCControlModeKind.

5089

Table 604 – 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

literal	value	description
		of the reactive power exchanged between a converter unit, or DC substation and the connected AC network.
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 ACDCConverterController.
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.

5090

5091 **4.19.3.25 (NC) PhaseControlFunction**

5092 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :
 5093 ExtEulIdentifiedObject

5094 Phase control function is a function block that calculate the operating point of the controlled
 5095 equipment to achieve the target voltage.

5096 Table 605 shows all attributes of PhaseControlFunction.

5097

Table 605 – 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
targetDeadband	0..1	Float	(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

5098

5099 Table 606 shows all association ends of PhaseControlFunction with other classes.

5100 **Table 606 – Association ends of ExtControl::PhaseControlFunction with other classes**

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
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock

mult from	name	mult to	type	description
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(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

4.19.3.26 (NC) DCVoltageControlFunction

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

DC voltage control function is a function block that calculate the operating point of the controlled equipment to achieve the target voltage.

Table 607 shows all attributes of DCVoltageControlFunction.

Table 607 – 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
targetDeadband	0..1	Float	(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

Table 608 shows all association ends of DCVoltageControlFunction with other classes.

Table 608 – Association ends of ExtControl::DCVoltageControlFunction with other classes

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

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
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(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

5113

5114 **4.19.3.27 (NC) DCCurrentControlFunction**

5115 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :
 5116 ExtEulIdentifiedObject

5117 DC current control function is a function block that calculates the operating point of the
 5118 controlled equipment to achieve the target current.

5119 Table 609 shows all attributes of DCCurrentControlFunction.

5120

Table 609 – 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
targetDeadband	0..1	Float	(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

5121

5122 Table 610 shows all association ends of DCCurrentControlFunction with other classes.

5123
5124**Table 610 – Association ends of ExtControl::DCCurrentControlFunction with other classes**

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
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(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

5125

4.19.3.28 (NC) TCSCController

5127 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :
 5128 IdentifiedObject : ExtEulIdentifiedObject

5129 TCSC controller is controlling the equipment to optimize the performance of the TCSC.

5130 Table 611 shows all attributes of TCSCController.

5131

Table 611 – 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

5132

5133 Table 612 shows all association ends of TCSCController with other classes.

5134

Table 612 – 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

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

5135

5136 **4.19.3.29 (NC) TCSCControlModeKind enumeration**

5137 Kind of TCSC control mode.

5138 Table 613 shows all literals of TCSCControlModeKind.

5139 **Table 613 – Literals of ExtControl::TCSCControlModeKind**

literal	value	description
activePower		Control is active power.
current		Control is current.
impedance		Control is impedance.

5140

5141 **4.19.3.30 (NC) RotatingMachineController**5142 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :

5143 IdentifiedObject : ExtEulIdentifiedObject

5144 Rotating machine controller is controlling the equipment which may be used as a generator or motor.

5146 Table 614 shows all attributes of RotatingMachineController.

5147 **Table 614 – 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

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

Table 615 shows all association ends of RotatingMachineController with other classes.

Table 615 – 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
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

4.19.3.31 (NC) InjectionController

Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

Injection controller is controlling the equipment which represents an injection or an external network.

Table 616 shows all attributes of InjectionController.

Table 616 – Attributes of ExtControl::InjectionController

name	mult	type	description
mode	0..1	InjectionControlModeKind	(NC) Mode of the injection controller.

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

Table 617 shows all association ends of InjectionController with other classes.

Table 617 – 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
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

4.19.3.32 (NC) RotatingMachineControlModeKind enumeration

Kind of rotating machine controller mode.

Table 618 shows all literals of RotatingMachineControlModeKind.

5167

Table 618 – Literals of ExtControl::RotatingMachineControlModeKind

literal	value	description
reactivePower		Reactive power control.
voltage		Voltage control.
powerFactor		Power factor is specified.
activePower		Active power is specified.

5168

4.19.3.33 (NC) InjectionControlModeKind enumeration

5170 Kind of injection controller mode.

5171 Table 619 shows all literals of InjectionControlModeKind.

5172

Table 619 – Literals of ExtControl::InjectionControlModeKind

literal	value	description
reactivePower		Reactive power control.
activePower		Active power is specified.
voltage		Voltage control.
powerFactor		Power factor is specified.

5173

4.19.3.34 (NC) DirectCurrentBipoleController5175 Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) :5176 [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

5177 DC system bipole control that is the control system of a bipole in accordance with IEC 60633.

5178 Table 620 shows all attributes of DirectCurrentBipoleController.

5179

Table 620 – 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	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5180

5181 Table 621 shows all association ends of DirectCurrentBipoleController with other classes.

5182 **Table 621 – Association ends of ExtControl::DirectCurrentBipoleController with other**
5183 **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

5184

5185 **4.19.3.35 (NC) DirectCurrentPoleController**

5186 Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) :
5187 [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject
5188 DC system pole control, which is the control system of a pole in accordance with IEC 60633.
5189 Table 622 shows all attributes of DirectCurrentPoleController.

5190 **Table 622 – 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

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

Table 623 shows all association ends of DirectCurrentPoleController with other classes.

Table 623 – 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..*	DirectCurrentMasterController	0..1	DirectCurrentMasterController	(NC) DC master controller that has a 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..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

4.19.3.36 (NC) ACDCConverterController

Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject
ACDC converter unit control. According to IEC 60633, it is the control system used for the controlling, monitoring and protection of a single converter unit.

5201 Table 624 shows all attributes of ACDCConverterController.

5202 **Table 624 – Attributes of ExtControl::ACDCConverterController**

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

5203

5204 Table 625 shows all association ends of ACDCConverterController with other classes.

5205 **Table 625 – Association ends of ExtControl::ACDCConverterController with other**
5206 **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

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

5207

5208 **4.19.3.37 (NC) DirectCurrentEquipmentController**

5209 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :
 5210 IdentifiedObject : ExtEulIdentifiedObject

5211 Direct current equipment controller used to control different parts of the hierarchical structure
 5212 of the DC control system defined by IEC 60633.

5213 Table 626 shows all attributes of DirectCurrentEquipmentController.

5214 **Table 626 – Attributes of ExtControl::DirectCurrentEquipmentController**

name	mult	type	description
mode	0..1	DCCControlModeKind	(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

5215

5216 Table 627 shows all association ends of DirectCurrentEquipmentController with other classes.

5217 **Table 627 – Association ends of ExtControl::DirectCurrentEquipmentController with**
 5218 **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

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

5219

5220 **4.19.3.38 (NC) DirectCurrentSubstationController**5221 Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) :5222 [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject5223 Control system used for the controlling, monitoring and protection within a DC substation (IEC
5224 60633). A DC substation control may be implemented at the bipole and/or pole level and may
5225 be referred to as local control.

5226 Table 628 shows all attributes of DirectCurrentSubstationController.

5227 **Table 628 – 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

5228

5229 Table 629 shows all association ends of DirectCurrentSubstationController with other classes.

5230 **Table 629 – Association ends of ExtControl::DirectCurrentSubstationController with**
5231 **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

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

5232

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4.19.3.39 (NC) DirectCurrentSubstationPoleController

5234

Inheritance path = [DirectCurrentSubstationController](#) : [DirectCurrentEquipmentController](#) : [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

5235

5236

5237

Control system of a substation pole (IEC 60633).

5238

Table 630 shows all attributes of DirectCurrentSubstationPoleController.

5239

Table 630 – 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

5240

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5242

Table 631 shows all association ends of DirectCurrentSubstationPoleController with other classes.

5243

Table 631 – Association ends of ExtControl::DirectCurrentSubstationPoleController with other classes

5244

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.

mult from	name	mult to	type	description
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

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4.19.3.40 (NC) DirectCurrentSubstationBipoleController

5247

Inheritance path = [DirectCurrentSubstationController](#) : [DirectCurrentEquipmentController](#) : [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

5248

5249

5250

Control system of a substation bipole (IEC 60633).

5251

Table 632 shows all attributes of DirectCurrentSubstationBipoleController.

5252

Table 632 – Attributes of ExtControl::DirectCurrentSubstationBipoleController

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

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

Table 633 shows all association ends of DirectCurrentSubstationBipoleController with other classes.

Table 633 – 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

4.19.3.41 (NC) SystemControl

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

System control is the management and regulation of various parameters within the electrical grid to ensure its stable and reliable operation. The primary goal of system control is to maintain the balance between electricity generation and consumption, while also managing factors such as voltage, frequency, and power quality. This involves the use of control devices, automation, and monitoring systems to respond to changes in the grid and maintain its overall stability. This serves as Integrated AC and DC control system (IEC 60633) which governs the integrated operation of AC and DC systems of a power system.

Table 634 shows all attributes of SystemControl.

5270

Table 634 – 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

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Table 635 shows all association ends of SystemControl with other classes.

5273

Table 635 – 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
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

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4.19.3.42 (NC) FrequencyControlFunction

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

5277

5278

Frequency control function is a function block that calculate the operating point of the controlled equipment to achieve the target frequency.

5279

5280

Table 636 shows all attributes of FrequencyControlFunction.

5281

Table 636 – 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) 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
targetDeadband	0..1	Float	(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

5282

5283

Table 637 shows all association ends of FrequencyControlFunction with other classes.

5284

5285

Table 637 – Association ends of ExtControl::FrequencyControlFunction with other classes

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
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(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

5286

4.19.3.43 (NC) ACEmulationControlFunction

5288

5289

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

5290 The AC emulation control function is used when AC emulation model is activated for a DC
5291 system. It consists in computing the active power set point of the DC system as a function of
5292 the voltage angle difference between both points of common coupling with the AC network in
5293 order to mimic the behavior of an AC transmission line. This control mode enables the automatic
5294 adjustment of the active power reference following variations of the AC system operational
5295 point.

5296 The setpoint of the DC system is calculated by $P_{setpoint} = P_{ref} + K_{dc} * (angle1 - angle2)$, where

5297 - P_{ref} is the existing active power setpoint;

5298 - K_{dc} is the control system gain and

5299 - angle1 and angle2 are the phase angle measurement (measured at points of common coupling
5300 with the AC network) respectively at the side 1 and 2 of the DC system.

5301 Table 638 shows all attributes of ACEmulationControlFunction.

5302 **Table 638 – 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
targetDeadband	0..1	Float	(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

5303

5304 Table 639 shows all association ends of ACEmulationControlFunction with other classes.

5305 **Table 639 – Association ends of ExtControl::ACEmulationControlFunction with other**
5306 **classes**

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAct ion	0..*	ControlFunctionBlockAct ion	(NC) inherited from: ControlFunctionBlock

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
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(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

5307

5308 **4.19.3.44 (NC) PowerFrequencyController**

5309 Inheritance path = [SystemControl](#) : [AutomationFunction](#) : PowerSystemResource :
 5310 IdentifiedObject : ExtEulIdentifiedObject

5311 Power frequency controller is controlling the active power balance as typically done by the
 5312 secondary control. If an unbalance between the scheduled active power values of each
 5313 generation unit and the loads plus losses occurs, primary control will adapt (increase/decrease)
 5314 the active power production of each unit (depending on the power shift key strategy), leading
 5315 to an over- or under-frequency situation. The secondary frequency controller will then control
 5316 the frequency back to its nominal value, re- establishing a cost-efficient generation delivered
 5317 by each unit.

5318 Table 640 shows all attributes of PowerFrequencyController.

5319

Table 640 – Attributes of ExtControl::PowerFrequencyController

name	mult	type	description
mode	0..1	PowerFrequencyControllerKind	(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

5320

5321 Table 641 shows all association ends of PowerFrequencyController with other classes.

Table 641 – Association ends of ExtControl::PowerFrequencyController with other classes

5322

5323

mult from	name	mult to	type	description
0..1	ControlArea	0..1	ControlArea	(NC) Control area which has a power frequency controller.

mult from	name	mult to	type	description
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

5324

5325 **4.19.3.45 (NC) PowerElectronicsUnitController**5326 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :
5327 IdentifiedObject : ExtEulIdentifiedObject5328 Power electronics unit controller is controlling the equipment to optimize the power electronics
5329 unit.

5330 Table 642 shows all attributes of PowerElectronicsUnitController.

5331 **Table 642 – 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

5332

5333 Table 643 shows all association ends of PowerElectronicsUnitController with other classes.

5334
5335**Table 643 – Association ends of ExtControl::PowerElectronicsUnitController with other classes**

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

5336

5337 4.19.3.46 (NC) PowerElectronicsConnectionController

5338 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :
 5339 IdentifiedObject : ExtEulIdentifiedObject

5340 Power electronics connection controller is controlling the equipment to optimize the power
 5341 electronics connection.

5342 Table 644 shows all attributes of PowerElectronicsConnectionController.

5343 Table 644 – 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
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

Table 645 shows all association ends of PowerElectronicsConnectionController with other classes.

Table 645 – 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

4.19.3.47 (NC) PowerFrequencyControlKind enumeration

Kinds of power frequency control modes.

Table 646 shows all literals of PowerFrequencyControlKind.

Table 646 – Literals of ExtControl::PowerFrequencyControlKind

literal	value	description
frequency		Frequency control mode.
activePower		Active power control mode.
activePowerAndFrequency		Active power and frequency control mode.

5354

5355 **4.19.3.48 (NC) AreaInterchangeController**5356 Inheritance path = [SystemControl](#) : [AutomationFunction](#) : PowerSystemResource :

5357 IdentifiedObject : ExtEulIdentifiedObject

5358 Area interchange control is set to control active power of an area.

5359 Table 647 shows all attributes of AreaInterchangeController.

5360

Table 647 – 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

5361

5362 Table 648 shows all association ends of AreaInterchangeController with other classes.

Table 648 – Association ends of ExtControl::AreaInterchangeController with other 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

5365

5366 **4.19.3.49 (NC) FrequencyMonitoringTerminal root class**5367 Frequency monitoring terminal provides location in the model where the frequency is monitored
5368 for the purpose of power frequency control.

5369 Table 649 shows all attributes of FrequencyMonitoringTerminal.

5370

Table 649 – 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.

5371

5372 Table 650 shows all association ends of FrequencyMonitoringTerminal with other classes.

5373 **Table 650 – Association ends of ExtControl::FrequencyMonitoringTerminal with other**
5374 **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.

5375

5376 **4.19.4 Package ExtCore**5377 **4.19.4.1 General**

5378 This package contains the extensions related to the core.

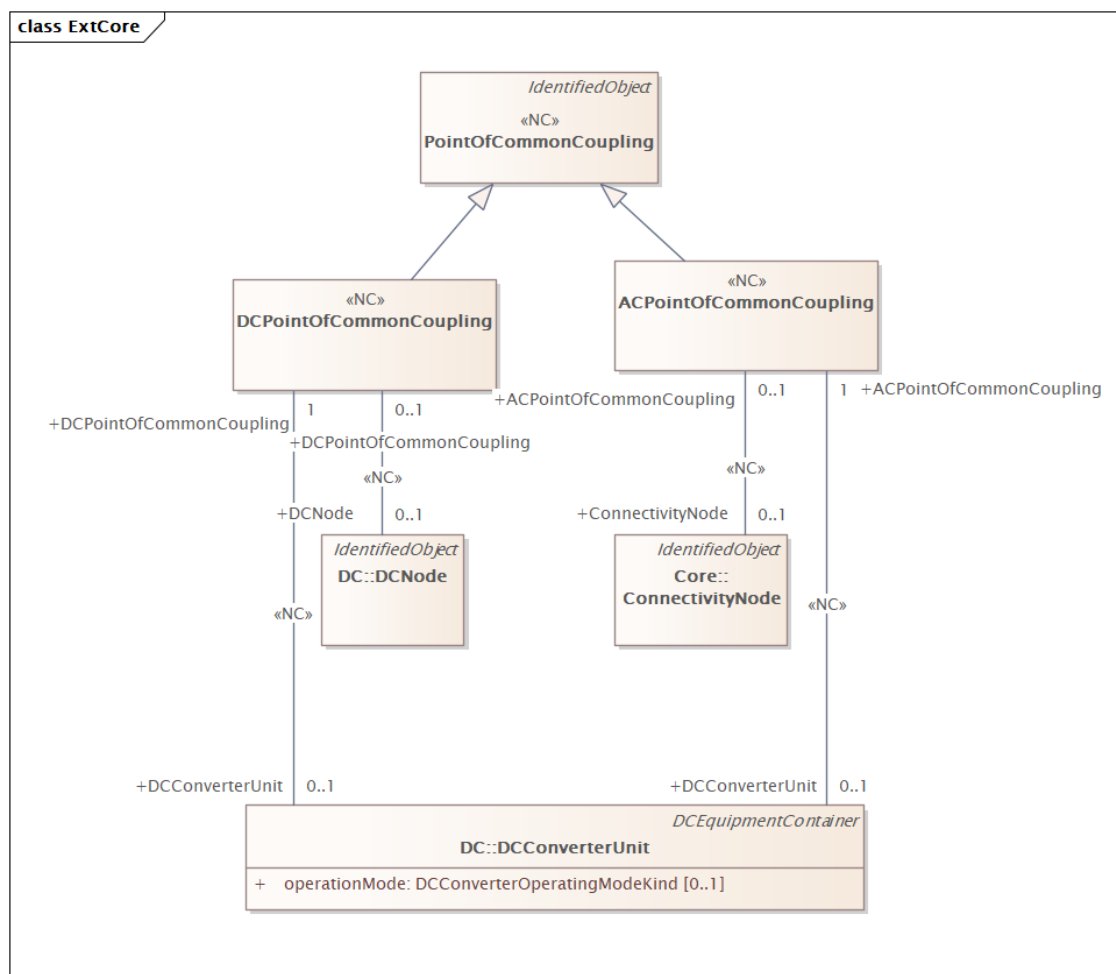


Figure 47 – Class diagram ExtCore::ExtCore

Figure 47: The diagram contains classes related to core.

4.19.4.2 (NC) PointOfCommonCoupling

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

Point of Common Coupling (PCC) refers to the location where multiple electrical sources or loads are electrically connected and provide a reference point where the voltages and currents from different parts of the system are considered to be common. The PCC is used to support system analysis, control, and monitoring, as it provides a reference for understanding the interactions and power flow between various components within the system. It is also relevant to define the requirement and responsibility between different actors in operating a power system.

Table 651 shows all attributes of PointOfCommonCoupling.

Table 651 – Attributes of ExtCore::PointOfCommonCoupling

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

Table 652 shows all association ends of PointOfCommonCoupling with other classes.

Table 652 – Association ends of ExtCore::PointOfCommonCoupling 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

4.19.4.3 (NC) ACPointOfCommonCoupling

Inheritance path = [PointOfCommonCoupling](#) : IdentifiedObject : ExtEuIdentifiedObject

Point of interconnection of the DC converter station to the adjacent AC system (IEC 60633).

Table 653 shows all attributes of ACPointOfCommonCoupling.

Table 653 – Attributes of ExtCore::ACPointOfCommonCoupling

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

Table 654 shows all association ends of ACPointOfCommonCoupling with other classes.

Table 654 – Association ends of ExtCore::ACPointOfCommonCoupling with other classes

mult from	name	mult to	type	description
0..1	ConnectivityNode	0..1	ConnectivityNode	(NC) Connectivity node which is a point of common coupling AC.
1..1	DCCConverterUnit	0..1	DCCConverterUnit	(NC) DC converter unit that has AC point of common coupling.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5407 **4.19.4.4 (NC) DCPointOfCommonCoupling**5408 Inheritance path = [PointOfCommonCoupling](#) : IdentifiedObject : ExtEulIdentifiedObject

5409 Point of interconnection of the DC converter station to the DC transmission line (IEC 60633).

5410 Table 655 shows all attributes of DCPointOfCommonCoupling.

5411 **Table 655 – Attributes of ExtCore::DCPointOfCommonCoupling**

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

5412

5413 Table 656 shows all association ends of DCPointOfCommonCoupling with other classes.

5414 **Table 656 – Association ends of ExtCore::DCPointOfCommonCoupling with other**
5415 **classes**

mult from	name	mult to	type	description
1..1	DCConverterUnit	0..1	DCConverterUnit	(NC) DC converter unit that has DC point of common coupling.
0..1	DCNode	0..1	DCNode	(NC) The DCNode that is a point of common coupling DC.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5416

5417 **4.19.5 Package ExtDirectCurent**5418 **4.19.5.1 General**

5419 This package contains the extensions related to the direct current (DC).

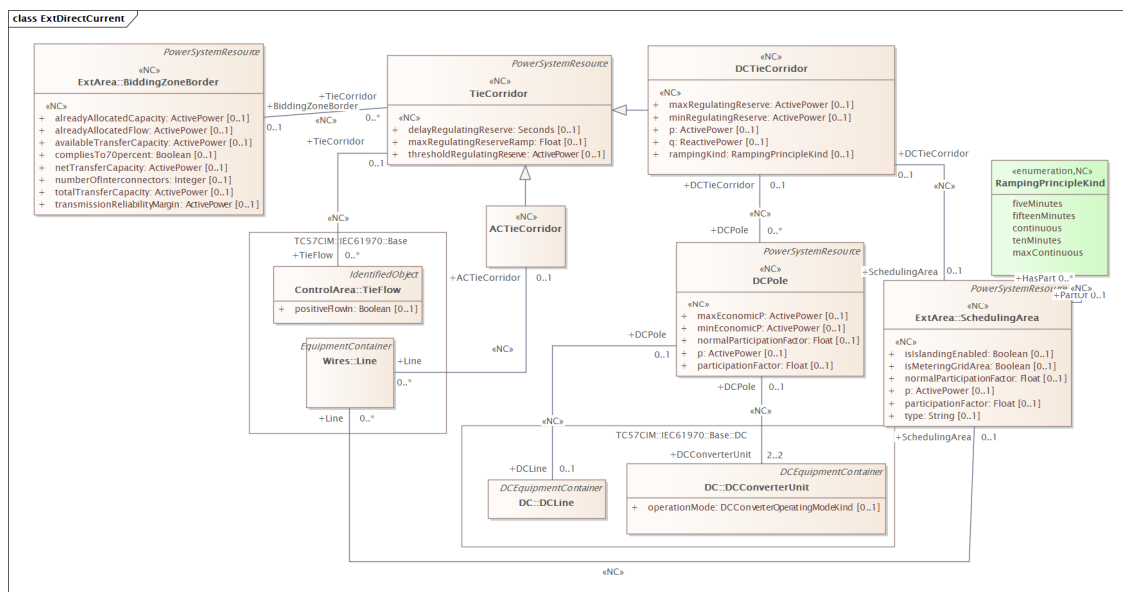


Figure 48 – Class diagram ExtDirectCurent::ExtDirectCurrent

Figure 48: The diagram contains classes related to direct current.

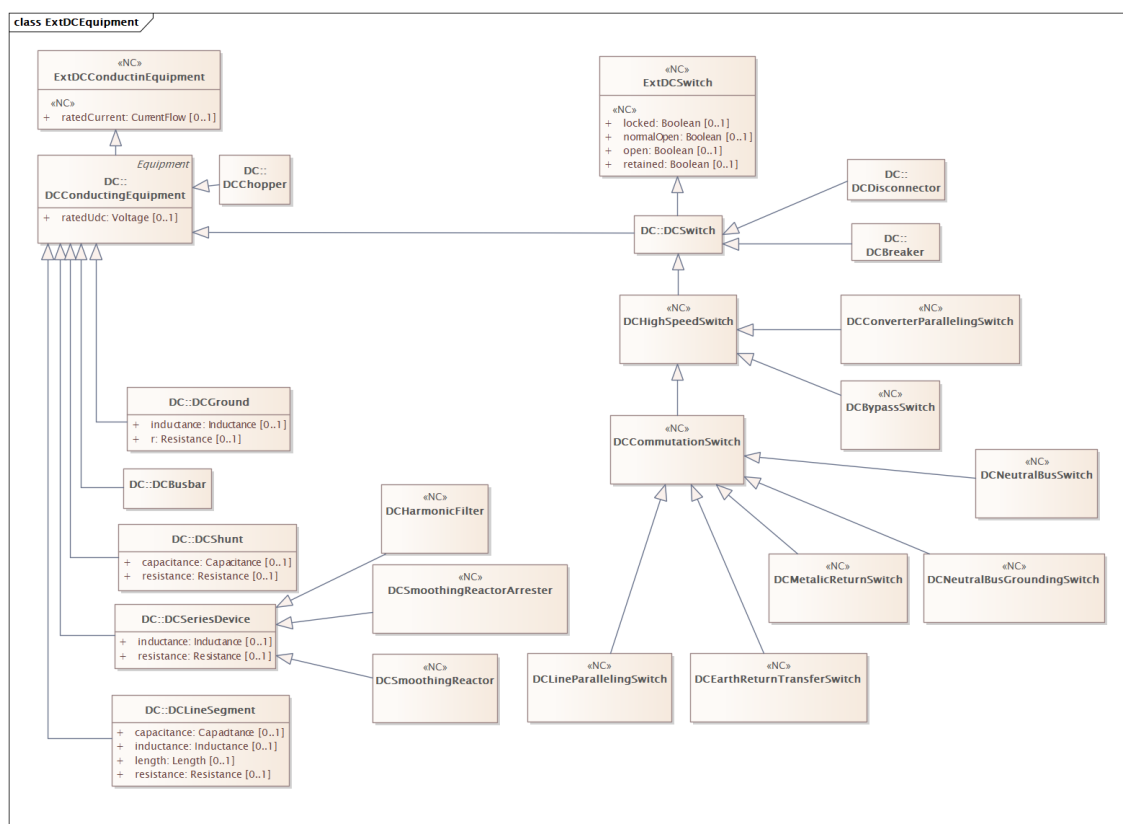


Figure 49 – Class diagram ExtDirectCurent::ExtDCEquipment

Figure 49: The diagram shows the DC equipment model.

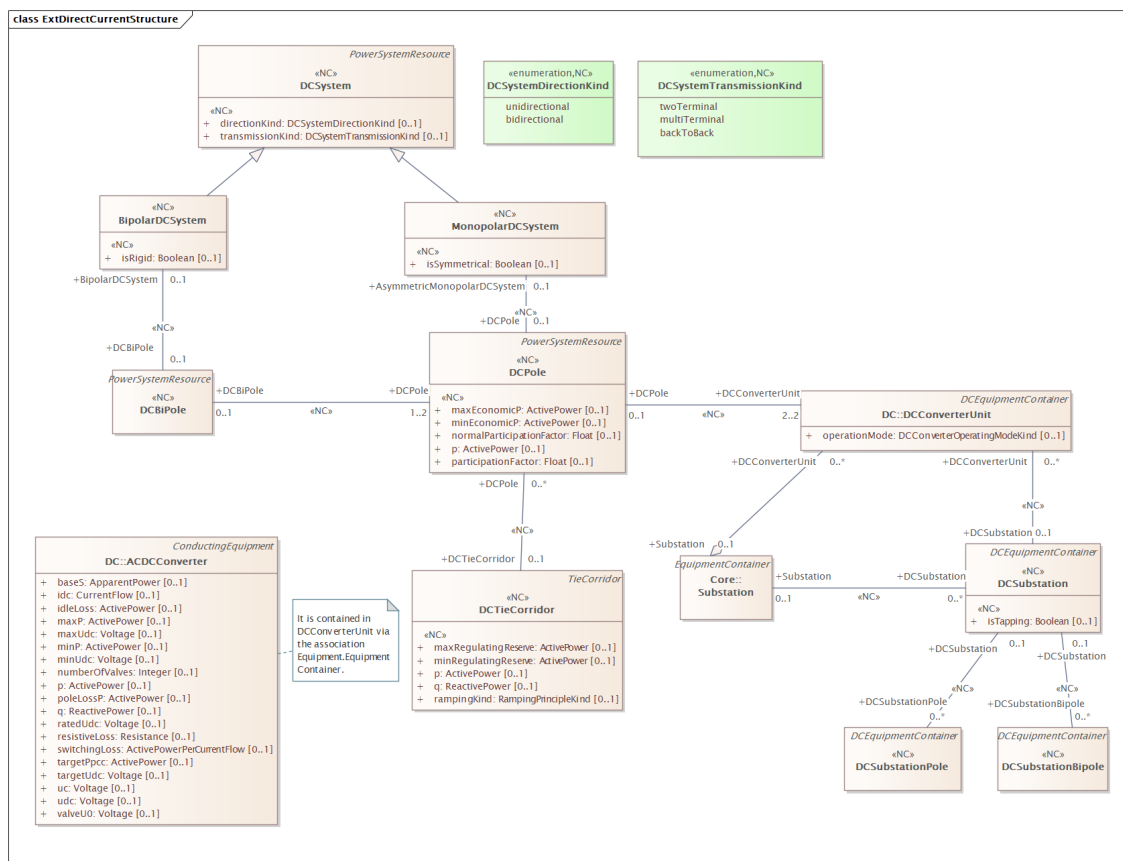


Figure 50 – Class diagram ExtDirectCurent::ExtDirectCurrentStructure

Figure 50: The diagram contains classes related to direct current structure.

4.19.5.2 (NC) ACTieCorridor

Inheritance path = [TieCorridor](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject
A collection of one or more AC tie lines that connect two different control areas.
Table 657 shows all attributes of ACTieCorridor.

Table 657 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

5435

5436 Table 658 shows all association ends of ACTieCorridor with other classes.

5437

Table 658 – 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..*	BiddingZoneBorder	0..1	BiddingZoneBorder	(NC) inherited from: TieCorridor
0..*	LoadFrequencyControlArea	0..1	LoadFrequencyControlArea	(NC) inherited from: TieCorridor
0..1	AreaDispatchableUnit	0..*	AreaDispatchableUnit	(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

5438

4.19.5.3 (NC) DCPole

5440 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

5441 The direct current (DC) system pole (IEC 60633) is part of a DC system consisting of all the
 5442 equipment in the DC substations and the interconnecting transmission lines, if any, which during
 5443 normal operation exhibit a common direct voltage polarity with respect to earth.

5444 Table 659 shows all attributes of DCPole.

5445

Table 659 – 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.
p	0..1	ActivePower	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node.
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

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

5446

5447

5448

Table 660 shows all association ends of DCPole with other classes.

Table 660 – 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..1	PowerShiftKeySchedule	0..*	PowerShiftKeySchedule	(NC) The Power Shift Key schedule for a DCPole.
0..1	PowerSchedule	0..*	PowerSchedule	(NC) Power schedule which has DC poles.
1..1	DirectCurrentPoleController	0..1	DirectCurrentPoleController	(NC) DC pole controller that controls this DC pole.
0..*	DCTieCorridor	0..1	DCTieCorridor	(NC) The DCTieCorridor that has this DC pole.
1..2	DCBiPole	0..1	DCBiPole	(NC) DC system bipole that has two independently operatable DC system poles.
0..1	AsymmetricMonopolarDCSystem	0..1	MonopolarDCSystem	(NC) Asymmetric monopolar DC system that has this DC 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

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

5449

5450 **4.19.5.4 (NC) DCTieCorridor**

5451 Inheritance path = [TieCorridor](#) : PowerSystemResource : IdentifiedObject :
 5452 ExtEulIdentifiedObject

5453 A collection of one or more direct current poles that connect two different control areas.

5454 Table 661 shows all attributes of DCTieCorridor.

5455 **Table 661 – 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.
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.
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

5456

5457 Table 662 shows all association ends of DCTieCorridor with other classes.

5458 **Table 662 – Association ends of ExtDirectCurent::DCTieCorridor with other classes**

mult from	name	mult to	type	description
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.

mult from	name	mult to	type	description
0..1	PowerSchedule	0..*	PowerSchedule	(NC) Power schedule which has DC tie corridors.
0..1	SchedulingArea	0..1	SchedulingArea	(NC) The scheduling area that has this DC tie corridor.
0..1	DirectCurrentMasterController	0..1	DirectCurrentMasterController	(NC) Direct current master controller for this DCTieCorridor.
0..1	DCPole	0..*	DCPole	(NC) The DCPole which is part of the DC corridor.
0..1	TieFlow	0..*	TieFlow	(NC) inherited from: TieCorridor
0..*	BiddingZoneBorder	0..1	BiddingZoneBorder	(NC) inherited from: TieCorridor
0..*	LoadFrequencyControlArea	0..1	LoadFrequencyControlArea	(NC) inherited from: TieCorridor
0..1	AreaDispatchableUnit	0..*	AreaDispatchableUnit	(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

5459

5460 **4.19.5.5 (NC) TieCorridor**

5461 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

5462 A collection of one or more tie-lines or direct current poles that connect two different control areas.

5463 Table 663 shows all attributes of TieCorridor.

5465

Table 663 – 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

5466

5467 Table 664 shows all association ends of TieCorridor with other classes.

5468

Table 664 – 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	AreaDispatchableUnit	0..*	AreaDispatchableUnit	(NC) AreaDispatchableUnit for the Tie 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

5469

4.19.5.6 (NC) ExtDCSwitch root class

5471

European network codes extension to base CIM counterpart.

5472

Table 665 shows all attributes of ExtDCSwitch.

5473

Table 665 – 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.

5474

5475 **4.19.5.7 (NC) ExtDCConductinEquipment root class**

5476 European network codes extension to base CIM counterpart.

5477 Table 666 shows all attributes of ExtDCConductinEquipment.

5478 **Table 666 – 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.

5479

5480 **4.19.5.8 (NC) RampingPrincipleKind enumeration**

5481 Kind of ramping principle.

5482 Table 667 shows all literals of RampingPrincipleKind.

5483 **Table 667 – 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).

5484

5485 **4.19.5.9 (NC) DCSytem**

5486 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

5487 Electrical power system which transfers energy in the form of direct current between two or more AC buses (defined in IEC 60633).

5489 Table 668 shows all attributes of DCSytem.

5490 **Table 668 – Attributes of ExtDirectCurent::DCSytem**

name	mult	type	description
directionKind	0..1	DCSystemDirectionKind	(NC) Direction kind of the DC system.

name	mult	type	description
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

Table 669 shows all association ends of DCSystem with other classes.

Table 669 – 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

4.19.5.10 (NC) BipolarDCSystem

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

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

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

Table 670 shows all attributes of BipolarDCSystem.

Table 670 – 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

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

5502

5503

Table 671 shows all association ends of BipolarDCSystem with other classes.

5504

Table 671 – 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

5505

5506

4.19.5.11 (NC) MonopolarDCSystem

5507

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

5508

5509

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

5510

Table 672 shows all attributes of MonopolarDCSystem.

5511

Table 672 – 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

name	mult	type	description
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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 673 shows all association ends of MonopolarDCSystem with other classes.

Table 673 – Association ends of ExtDirectCurrent::MonopolarDCSystem with other 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
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4.19.5.12 (NC) DCSystemDirectionKind enumeration

Direction kinds of the DC system.

Table 674 shows all literals of DCSystemDirectionKind.

Table 674 – Literals of ExtDirectCurrent::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.

4.19.5.13 (NC) DCBiPole

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

5524 DC system bipole (IEC 60633), which is part of an DC system consisting of two independently
5525 operable DC system poles, which during normal operation, exhibit opposite direct voltage
5526 polarities with respect to earth.
5527 Table 675 shows all attributes of DCBiPole.

5528

Table 675 – 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

5529

5530

Table 676 shows all association ends of DCBiPole with other classes.

5531

Table 676 – 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

5532

5533 4.19.5.14 (NC) DCSystemTransmissionKind enumeration

5534 DC system transmission kind.

5535 Table 677 shows all literals of DCSystemTransmissionKind.

5536

Table 677 – 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.

literal	value	description
backToBack		DC back-to-back system (IEC 60633) is a DC system which transfers energy between AC buses at the same location.

5537

5538 **4.19.5.15 (NC) DCSubstation**

5539 Inheritance path = DCEquipmentContainer : EquipmentContainer : ConnectivityNodeContainer :
 5540 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

5541 DC substation or DC converter station (IEC 60633) is part of an DC system which consists of
 5542 one or more converter units installed in a single location together with buildings, reactors, filters,
 5543 reactive power supply, control, monitoring, protective, measuring and auxiliary equipment. A
 5544 DC substation forming part of an DC transmission system may be referred to as an DC
 5545 transmission substation.

5546 Table 678 shows all attributes of DCSubstation.

5547 **Table 678 – Attributes of ExtDirectCurent::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

5548

5549 Table 679 shows all association ends of DCSubstation with other classes.

5550 **Table 679 – Association ends of ExtDirectCurent::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

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

5551

5552 **4.19.5.16 (NC) DCSubstationBipole**

5553 Inheritance path = DCEquipmentContainer : EquipmentContainer : ConnectivityNodeContainer :
 5554 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

5555 Part of a bipolar DC system (IEC 60633) contained within a DC substation.

5556 Table 680 shows all attributes of DCSubstationBipole.

5557 **Table 680 – Attributes of ExtDirectCurent::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

5558

5559 Table 681 shows all association ends of DCSubstationBipole with other classes.

5560 **Table 681 – Association ends of ExtDirectCurent::DCSubstationBipole with other**
 5561 **classes**

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

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

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5563 **4.19.5.17 (NC) DCSubstationPole**

5564 Inheritance path = DCEquipmentContainer : EquipmentContainer : ConnectivityNodeContainer :
 5565 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

5566 Part of an DC system pole (IEC 60633) which is contained within a DC substation.

5567 Table 682 shows all attributes of DCSubstationPole.

5568 **Table 682 – Attributes of ExtDirectCurent::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

5569

5570 Table 683 shows all association ends of DCSubstationPole with other classes.

5571 **Table 683 – Association ends of ExtDirectCurent::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

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

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5573 **4.19.5.18 (NC) DC Smoothing Reactor**

5574 Inheritance path = DC Series Device : DC Conducting Equipment : Equipment :
5575 Power System Resource : Identified Object : Ext Eu Identified Object : [Ext DC Conducting Equipment](#)
5576 Reactor (IEC 60633) connected in series with a converter unit or converter units on the DC side
5577 for the primary purpose of smoothing the direct current and reducing current transients.
5578 Table 684 shows all attributes of DC Smoothing Reactor.

5579

Table 684 – Attributes of Ext Direct Current::DC Smoothing Reactor

name	mult	type	description
inductance	0..1	Inductance	inherited from: DC Series Device
resistance	0..1	Resistance	inherited from: DC Series Device
ratedUdc	0..1	Voltage	inherited from: DC Conducting Equipment
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: Identified Object
description	0..1	String	inherited from: Identified Object
mRID	0..1	String	inherited from: Identified Object
name	0..1	String	inherited from: Identified Object
energyIdentCodeEic	0..1	String	(European) inherited from: Ext Eu Identified Object
shortName	0..1	String	(European) inherited from: Ext Eu Identified Object
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: Ext DC Conducting Equipment

5580

5581 Table 685 shows all association ends of DC Smoothing Reactor with other classes.

5582
5583**Table 685 – Association ends of ExtDirectCurent::DCSmoothingReactor 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

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4.19.5.19 (NC) DCSmoothingReactorArrester

5586 Inheritance path = DCSeriesDevice : DCConductingEquipment : Equipment :
5587 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : [ExtDCConductingEquipment](#)
5588 Arrester (IEC 60633) connected between the terminals of a smoothing reactor.
5589 Table 686 shows all attributes of DCSmoothingReactorArrester.

5590

Table 686 – 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	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
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment

Table 687 shows all association ends of DCSmoothingReactorArrester with other classes.

Table 687 – 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

4.19.5.20 (NC) DCHarmonicFilter

Inheritance path = DCSeriesDevice : DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : [ExtDCConductinEquipment](#)
DC harmonic filter (IEC 60633) is a filter which, in conjunction with the DC reactor(s) and with the DC surge capacitor(s), if any, serves the primary function of reducing (current or voltage) ripple on the DC transmission line and/or earth electrode line.

Table 688 shows all attributes of DCHarmonicFilter.

Table 688 – 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

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
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductinEquipment

Table 689 shows all association ends of DCHarmonicFilter with other classes.

Table 689 – 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..*	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

4.19.5.21 (NC) DCHighSpeedSwitch

Inheritance path = DCSwitch : DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : [ExtDCConductinEquipment](#) : [ExtDCSwitch](#)
 High-speed DC switch (IEC 60633) is a type of switchgear used on a DC scheme, required to open or close rapidly (< 1 s), including in some cases the need to commutate load current into a parallel conducting path, but with no requirement to interrupt fault or load current. DC switchgear is usually based on a single-phase unit of an AC circuit-breaker, appropriately

5615 modified for their DC applications. Their capabilities to perform faster opening and closing than
5616 disconnect switches are used but the function of breaking short-circuit currents is not required.
5617 Table 690 shows all attributes of DCHighSpeedSwitch.

5618 **Table 690 – 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
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

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5620 Table 691 shows all association ends of DCHighSpeedSwitch with other classes.

5621 **Table 691 – Association ends of ExtDirectCurent::DCHighSpeedSwitch with other**
5622 **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

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

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4.19.5.22 (NC) DCCommutationSwitch

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

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

Table 692 shows all attributes of DCCommutationSwitch.

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Table 692 – 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
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

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Table 693 shows all association ends of DCCommutationSwitch with other classes.

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Table 693 – Association ends of ExtDirectCurent::DCCommutationSwitch 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

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4.19.5.23 (NC) DCMetalicReturnSwitch

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

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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 694 shows all attributes of DCMetalicReturnSwitch.

Table 694 – Attributes of ExtDirectCurent::DCMetalicReturnSwitch

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
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 695 shows all association ends of DCMetalicReturnSwitch with other classes.

Table 695 – 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..*	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

4.19.5.24 (NC) DCEarthReturnTransferSwitch

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

Earth return transfer switch (IEC 60633) DC commutation switch used to transfer DC current from a metallic return path to an earth return path. In some applications, this function is performed by a by-pass switch. Although the term "earth 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 696 shows all attributes of DCEarthReturnTransferSwitch.

Table 696 – 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

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
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 697 shows all association ends of DCEarthReturnTransferSwitch with other classes.

Table 697 – Association ends of ExtDirectCurrent::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

4.19.5.25 (NC) DCNeutralBusSwitch

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

5672 Neutral bus switch (IEC 60633) is a DC commutation switch connected in series with the neutral
5673 bus on a bipolar DC scheme, designed to commutate current out of the pole conductor or neutral
5674 bus and into the electrode line or dedicated metallic return conductor or earth in response to a
5675 fault in a converter or neutral bus.

5676 Table 698 shows all attributes of DCNeutralBusSwitch.

5677 **Table 698 – Attributes of ExtDirectCurrent::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
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: ExtDCConductingEquipment
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

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5679 Table 699 shows all association ends of DCNeutralBusSwitch with other classes.

5680 **Table 699 – Association ends of ExtDirectCurrent::DCNeutralBusSwitch with other**
5681 **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

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

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5683 **4.19.5.26 (NC) DCNeutralBusGroundingSwitch**

5684 Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : DCSwitch :
 5685 DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :
 5686 ExtEulIdentifiedObject : [ExtDCConductinEquipment](#) : [ExtDCSwitch](#)

5687 Neutral bus grounding switch (IEC 60633) or a neutral bus earthing switch is a DC commutation
 5688 switch connected from the neutral bus to the station earth mat on a bipolar DC scheme,
 5689 designed to provide a temporary earth connection in the event of an open circuit fault on the
 5690 electrode line until the imbalance of current between the two poles can be reduced to a safe
 5691 minimum level or the electrode line connection can be restored.

5692 Table 700 shows all attributes of DCNeutralBusGroundingSwitch.

5693 **Table 700 – 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
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

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5695 Table 701 shows all association ends of DCNeutralBusGroundingSwitch with other classes.

5696 **Table 701 – Association ends of ExtDirectCurent::DCNeutralBusGroundingSwitch with**
 5697 **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

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4.19.5.27 (NC) DCConverterParallelingSwitch

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

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Converter paralleling switch (IEC 60633) is a high-speed DC switch connected in series with each converter at the DC terminal in DC schemes where two or more converters are connected in parallel onto a common pole conductor, designed to allow additional converter(s) to be connected in parallel or disconnected without affecting the load current in the other converter. Table 702 shows all attributes of DCConverterParallelingSwitch.

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Table 702 – Attributes of ExtDirectCurrent::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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

name	mult	type	description
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 703 shows all association ends of DCConverterParallelingSwitch with other classes.

Table 703 – Association ends of ExtDirectCurent::DCConverterParallelingSwitch 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

4.19.5.28 (NC) DCLineParallelingSwitch

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

Line paralleling switch (IEC 60633) DC commutation switch placed in series with one or more high-voltage pole conductors, allowing two or more lines to be connected in parallel or to revert to single-line operation while conducting load current.

Table 704 shows all attributes of DCLineParallelingSwitch.

Table 704 – Attributes of ExtDirectCurent::DCLineParallelingSwitch

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

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
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 705 shows all association ends of DCLineParallelingSwitch with other classes.

Table 705 – 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..*	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

5728 **4.19.5.29 (NC) DCBypassSwitch**

5729 Inheritance path = [DCHighSpeedSwitch](#) : DCSwitch : DCConductingEquipment : Equipment :
 5730 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : [ExtDCConductinEquipment](#) :
 5731 [ExtDCSwitch](#)

5732 By-pass switch (IEC 60633) is a high-speed DC switch connected across each converter valve
 5733 group in DC schemes using more than one independent converter per pole, designed to close
 5734 rapidly to bypass a converter group that is being taken out of service and commutate the current
 5735 back into a valve group that is being taken back in service. A by-pass switch may also be used
 5736 for prolonged shunting of the bridge(s).

5737 Table 706 shows all attributes of DCBypassSwitch.

5738 **Table 706 – 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
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
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

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5740 Table 707 shows all association ends of DCBypassSwitch with other classes.

5741 **Table 707 – Association ends of ExtDirectCurent::DCBypassSwitch with other classes**

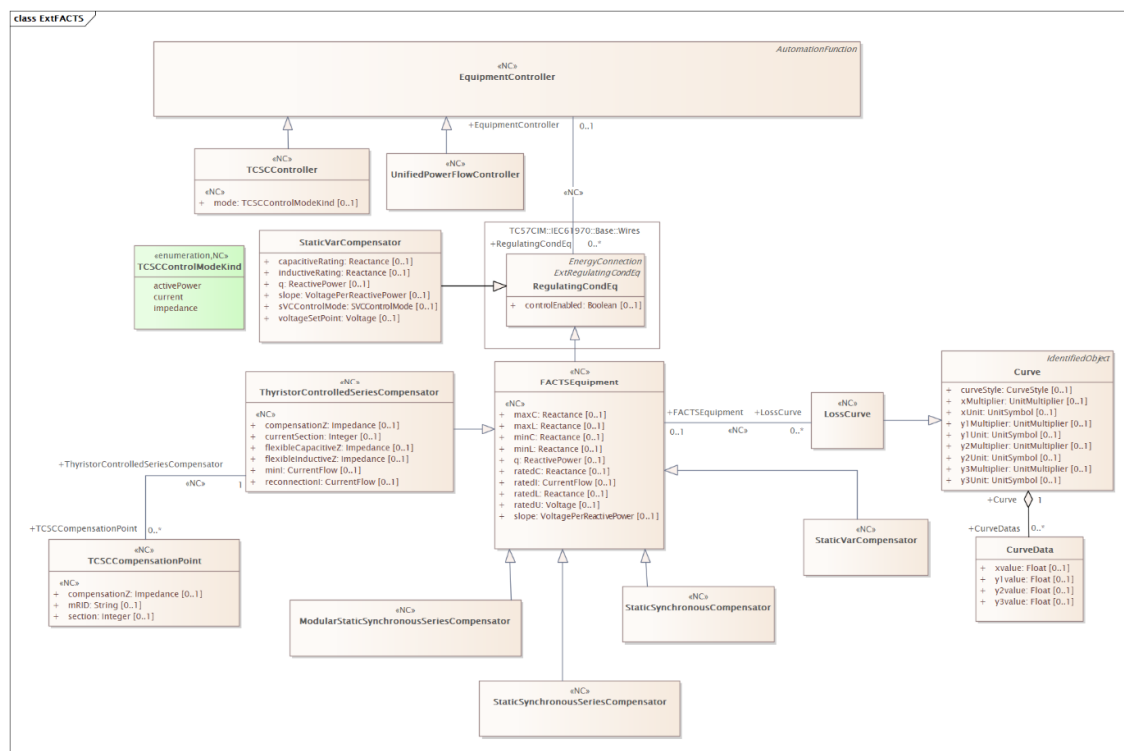
mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment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

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

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5743 **4.19.6 Package ExtFACTS**5744 **4.19.6.1 General**

5745 This package contains the extensions related to the FACTS.

5747 **Figure 51 – Class diagram ExtFACTS::ExtFACTS**

5748 Figure 51: The diagram contains association related to FACTS.

5749 **4.19.6.2 (NC) FACTSEquipment**

5750 Inheritance path = RegulatingCondEq : EnergyConnection : ConductingEquipment :
5751 Equipment : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject
5752 Flexible Alternating Current Transmission System regulating equipment.
5753 Table 708 shows all attributes of FACTSEquipment.

5754

Table 708 – 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.
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

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Table 709 shows all association ends of FACTSEquipment with other classes.

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Table 709 – 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

mult from	name	mult to	type	description
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

5758

5759

4.19.6.3 (NC) LossCurve

5760

Inheritance path = Curve : IdentifiedObject : ExtEulIdentifiedObject

5761

Represents the losses in the equipment due to operation position.

5762

Table 710 shows all attributes of LossCurve.

5763

Table 710 – 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

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

Table 711 shows all association ends of LossCurve with other classes.

Table 711 – 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
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4.19.6.4 (NC) ModularStaticSynchronousSeriesCompensator

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

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

Table 712 shows all attributes of ModularStaticSynchronousSeriesCompensator.

Table 712 – 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

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

Table 713 shows all association ends of ModularStaticSynchronousSeriesCompensator with other classes.

**Table 713 – 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

5787 **4.19.6.5 (NC) StaticSynchronousCompensator**

5788 Inheritance path = [FACTSEquipment](#) : RegulatingCondEq : EnergyConnection :
 5789 ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :
 5790 ExtEulIdentifiedObject

5791 Static synchronous compensator (STATCOM), also known as a static synchronous condenser
 5792 (STATCON), is a type of flexible AC transmission system regulating equipment used on
 5793 alternating current electricity transmission networks. It is based on a power electronics voltage-
 5794 source converter and can act as either a source or sink of reactive AC power to an electricity
 5795 network. If connected to a source of power it can also provide active AC power.

5796 Table 714 shows all attributes of StaticSynchronousCompensator.

5797 **Table 714 – Attributes of ExtFACTS::StaticSynchronousCompensator**

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

5798

5799 Table 715 shows all association ends of StaticSynchronousCompensator with other classes.

5800 **Table 715 – Association ends of ExtFACTS::StaticSynchronousCompensator with other**
 5801 **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

mult from	name	mult to	type	description
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

5802

5803 **4.19.6.6 (NC) StaticVarCompensator**

5804 Inheritance path = [FACTSEquipment](#) : RegulatingCondEq : EnergyConnection :
5805 ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :
5806 ExtEulIdentifiedObject

5807 A facility for providing variable and controllable shunt reactive power. The SVC typically
5808 consists of a stepdown transformer, filter, thyristor-controlled reactor, and thyristor-switched
5809 capacitor arms.

5810 The SVC may operate in fixed MVar output mode or in voltage control mode. When in voltage
5811 control mode, the output of the SVC will be proportional to the deviation of voltage at the
5812 controlled bus from the voltage setpoint. The SVC characteristic slope defines the proportion.
5813 If the voltage at the controlled bus is equal to the voltage setpoint, the SVC MVar output is zero.
5814 Table 716 shows all attributes of StaticVarCompensator.

5815

Table 716 – 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

name	mult	type	description
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

5816

5817

Table 717 shows all association ends of StaticVarCompensator with other classes.

5818

Table 717 – 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

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

5819

5820 **4.19.6.7 (NC) TCSCCompensationPoint root class**

5821 Compensation point of a TCSC compensator.

5822 Table 718 shows all attributes of TCSCCompensationPoint.

5823 **Table 718 – 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.

5824

5825 Table 719 shows all association ends of TCSCCompensationPoint with other classes.

5826 **Table 719 – Association ends of ExtFACTS::TCSCCompensationPoint with other classes**

5827

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

5828

5829 **4.19.6.8 (NC) ThyristorControlledSeriesCompensator**

5830 Inheritance path = [FACTSEquipment](#) : RegulatingCondEq : EnergyConnection :
 5831 ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :
 5832 ExtEulIdentifiedObject

5833 Thyristor-controlled series capacitors (TCSC) is a type of flexible AC transmission system
 5834 regulating equipment that is configured with controlled reactors in parallel with sections of a
 5835 capacitor bank. This combination allows smooth control of the fundamental frequency
 5836 capacitive reactance over a wide range. The thyristor valve contains a string of series connected
 5837 high power thyristors. TCSC can control power flows in order to achieve eliminating of line
 5838 overloads, reducing loop flows and minimising system losses.

5839 Table 720 shows all attributes of ThyristorControlledSeriesCompensator.

5840

Table 720 – 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.
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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

5841

5842

5843

Table 721 shows all association ends of ThyristorControlledSeriesCompensator with other classes.

5844
5845**Table 721 – 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
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

5846

5847 **4.19.6.9 Package ExtSSSC**5848 **4.19.6.9.1 General**

5849 This package contains the extensions related to the SSSC.

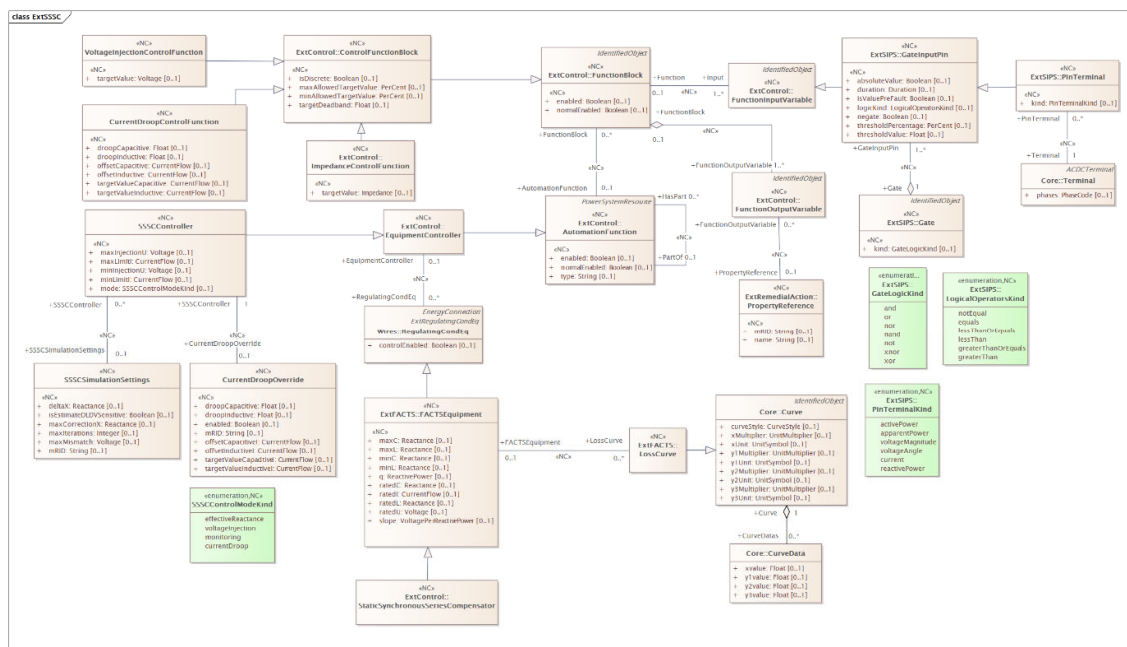


Figure 52 – Class diagram ExtSSSC::ExtSSSC

Figure 52: The diagram shows necessary extensions to model controls of SSSC controller.

4.19.6.9.2 (NC) CurrentDroopControlFunction

```
Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject :
ExtEuIdentifiedObject
```

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

Table 722 shows all attributes of `CurrentDroopControlFunction`.

Table 722 – 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
targetDeadband	0..1	Float	(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

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

Table 723 shows all association ends of CurrentDroopControlFunction with other classes.

Table 723 – Association ends of ExtSSSC::CurrentDroopControlFunction with other classes

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
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(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

4.19.6.9.3 (NC) CurrentDroopOverride root class

Current droop override uses the following logic:

- When the current exceeds a threshold the device executes the following transitions: 1) When injecting an inductive voltage or in monitoring mode the device tends to inject a voltage proportional to the difference between the line current and the aforementioned threshold. 2) When injecting a capacitive voltage the device transitions to monitoring mode.
- If the aforementioned proportional voltage is lower than the initial one, the voltage injection remains unchanged.

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

Table 724 shows all attributes of CurrentDroopOverride.

Table 724 – 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.

name	mult	type	description
targetValueInductivel	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.

Table 725 shows all association ends of CurrentDroopOverride with other classes.

Table 725 – 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.

4.19.6.9.4 (NC) SSSCController

Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

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

Table 726 shows all attributes of SSSCController.

Table 726 – 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

Table 727 shows all association ends of SSSCController with other classes.

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Table 727 – 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
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

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4.19.6.9.5 (NC) SSSCSimulationSettings root class

5891 SSSC control simulation settings used by the algorithm for power flow calculations.

5892 Table 728 shows all attributes of SSSCSimulationSettings.

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Table 728 – 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

name	mult	type	description
			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 dl/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 729 shows all association ends of SSSCSimulationSettings with other classes.

Table 729 – 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.

4.19.6.9.6 (NC) VoltageInjectionControlFunction

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

Voltage injection control function is a function block that calculates the operating point of the controlled equipment to achieve the target voltage injection. The controlled point is the Terminal with sequenceNumber = 1.

Table 730 shows all attributes of VoltageInjectionControlFunction.

Table 730 – 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
targetDeadband	0..1	Float	(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	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

Table 731 shows all association ends of VoltageInjectionControlFunction with other classes.

Table 731 – Association ends of ExtSSSC::VoltageInjectionControlFunction with other classes

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
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(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

4.19.6.9.7 (NC) SSSCControlModeKind enumeration

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

Table 732 shows all literals of SSSCControlModeKind.

Table 732 – 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.

4.19.7 Package ExtProduction

4.19.7.1 General

This package contains the extensions related to the production.

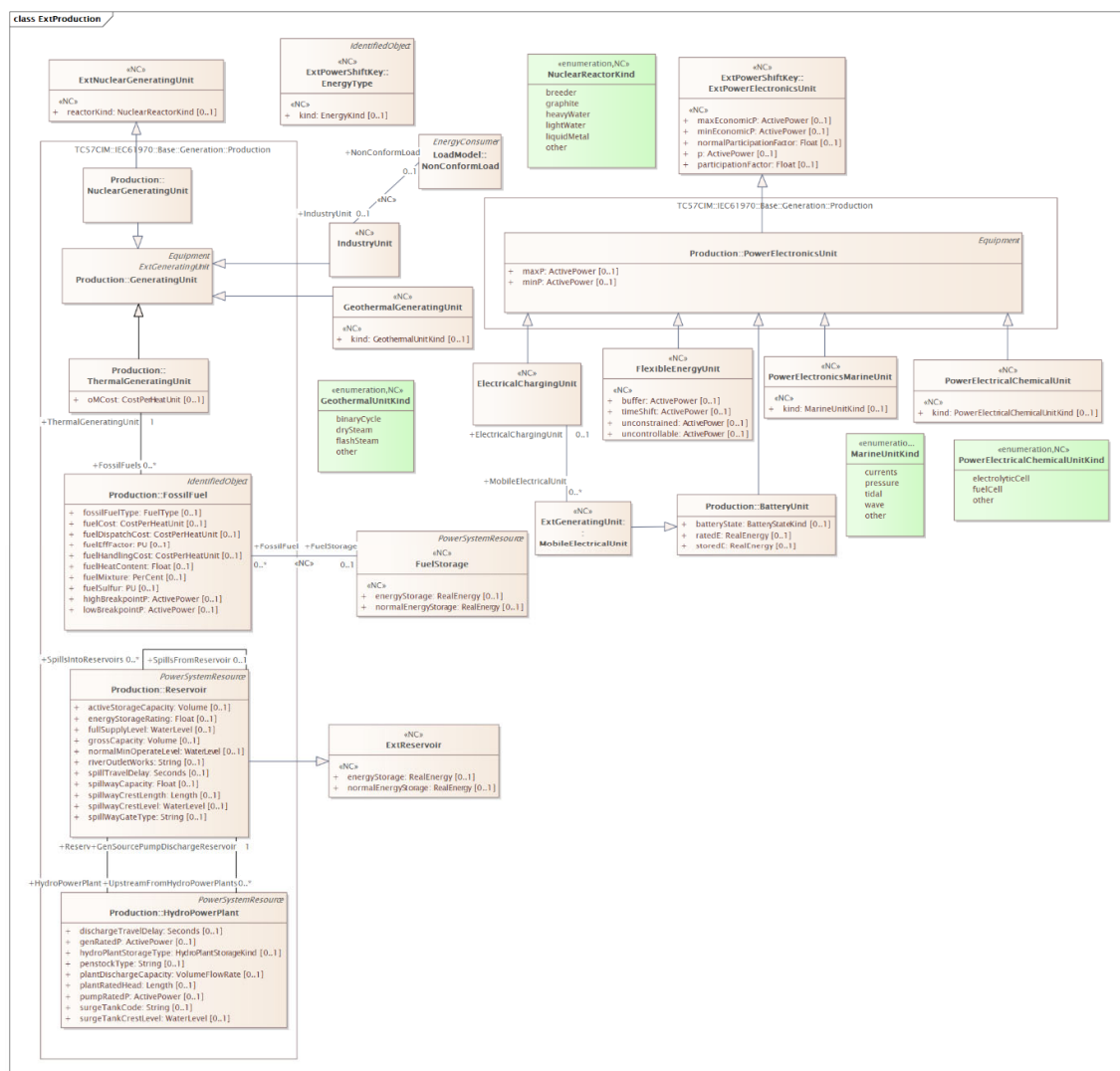


Figure 53 – Class diagram ExtProduction::ExtProduction

Figure 53: The diagram contains classes related to production.

4.19.7.2 (NC) IndustryUnit

Inheritance path = GeneratingUnit : Equipment : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : [ExtGeneratingUnit](#)

An industrial energy conversion facility that primarily consumes electrical energy for mechanical processes, typically involving large rotating machines (e.g., motors, compressors, pumps, or mills).

The IndustryUnit may represent one or more concrete machine installations or an equivalent aggregated model of an industrial process.

Table 733 shows all attributes of IndustryUnit.

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Table 733 – 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
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

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
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
startUpFuelConsumption	0..1	ActivePowerChangeRate	(NC) inherited from: ExtGeneratingUnit

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Table 734 shows all association ends of IndustryUnit with other classes.

Table 734 – 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

mult from	name	mult to	type	description
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
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

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4.19.7.3 (NC) FuelStorage

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Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

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Fuel storage. e.g. pile of coal that can be shared between multiple thermal generating units.

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Table 735 shows all attributes of FuelStorage.

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Table 735 – 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

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Table 736 shows all association ends of FuelStorage with other classes.

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Table 736 – 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

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4.19.7.4 (NC) ElectricalChargingUnit

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Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : [ExtPowerElectronicsUnit](#)

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A unit that supplies electrical power for charging electrical non-stationary entities, e.g. electrical vehicle, trucks, buses, ferries, boats and airplanes. The characteristic is that the energy consumption is highly schedule dependent.

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Table 737 shows all attributes of ElectricalChargingUnit.

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Table 737 – 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: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
p	0..1	NullCIM	(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 738 shows all association ends of ElectricalChargingUnit with other classes.

Table 738 – 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

4.19.7.5 (NC) ExtNuclearGeneratingUnit root class

European Network Code extension of NuclearGeneratingUnit.

Table 739 shows all attributes of ExtNuclearGeneratingUnit.

Table 739 – Attributes of ExtProduction::ExtNuclearGeneratingUnit

name	mult	type	description
reactorKind	0..1	NuclearReactorKind	(NC) Kind of nuclear reactor.

4.19.7.6 (NC) ExtReservoir root class

EU Network Code extension of Reservoir.

Table 740 shows all attributes of ExtReservoir.

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Table 740 – 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.

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5968 4.19.7.7 (NC) FlexibleEnergyUnit

5969 Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource :

5970 IdentifiedObject : ExtEulIdentifiedObject : [ExtPowerElectronicsUnit](#)

5971 Flexible consumer or embedded producer of energy. The unit cannot be a net producer.

5972 Table 741 shows all attributes of FlexibleEnergyUnit.

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Table 741 – 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
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
p	0..1	NullCIM	(NC) inherited from: ExtPowerElectronicsUnit

name	mult	type	description
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 742 shows all association ends of FlexibleEnergyUnit with other classes.

Table 742 – 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

4.19.7.8 (NC) GeothermalGeneratingUnit

Inheritance path = GeneratingUnit : Equipment : PowerSystemResource : IdentifiedObject :

ExtEulIdentifiedObject : [ExtGeneratingUnit](#)

Generating unit that is generating electrical power from geothermal energy.

Table 743 shows all attributes of GeothermalGeneratingUnit.

Table 743 – 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
baseP	0..1	ActivePower	inherited from: GeneratingUnit

name	mult	type	description
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
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
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
startUpFuelConsumption	0..1	ActivePowerChangeRate	(NC) inherited from: ExtGeneratingUnit

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Table 744 shows all association ends of GeothermalGeneratingUnit with other classes.

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Table 744 – 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
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

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

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4.19.7.9 (NC) PowerElectricalChemicalUnit

5990 Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource :
 5991 IdentifiedObject : ExtEulIdentifiedObject : [ExtPowerElectronicsUnit](#)

5992 A unit capable of either generating electrical energy from chemical reactions or using electrical
 5993 energy to cause chemical reactions.

5994 Table 745 shows all attributes of PowerElectricalChemicalUnit.

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Table 745 – 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
p	0..1	NullCIM	(NC) inherited from: ExtPowerElectronicsUnit

name	mult	type	description
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 746 shows all association ends of PowerElectricalChemicalUnit with other classes.

Table 746 – 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

4.19.7.10 (NC) PowerElectronicsMarineUnit

Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource :

IdentifiedObject : ExtEulIdentifiedObject : [ExtPowerElectronicsUnit](#)

A unit that capture energy from marine sources, e.g. waves, for generating electrical power.

Table 747 shows all attributes of PowerElectronicsMarineUnit.

Table 747 – 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

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
p	0..1	NullCIM	(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

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Table 748 shows all association ends of PowerElectronicsMarineUnit with other classes.

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Table 748 – 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

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6012 **4.19.7.11 (NC) GeothermalUnitKind enumeration**

6013 Kind of geothermal.

6014 Table 749 shows all literals of GeothermalUnitKind.

6015 **Table 749 – 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.

6016

6017 **4.19.7.12 (NC) MarineUnitKind enumeration**

6018 Kind of marine energy capture.

6019 Table 750 shows all literals of MarineUnitKind.

6020 **Table 750 – 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.

6021

6022 **4.19.7.13 (NC) NuclearReactorKind enumeration**

6023 Kind of nuclear reactor.

6024 Table 751 shows all literals of NuclearReactorKind.

6025 **Table 751 – 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.

literal	value	description
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 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.

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6027 **4.19.7.14 (NC) PowerElectricalChemicalUnitKind enumeration**

6028 Kind of power electrical chemical unit.

6029 Table 752 shows all literals of PowerElectricalChemicalUnitKind.

6030 **Table 752 – 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.

6031

6032 **4.19.8 Package ExtProtection**6033 **4.19.8.1 General**

6034 This package contains the extensions related to the protections.

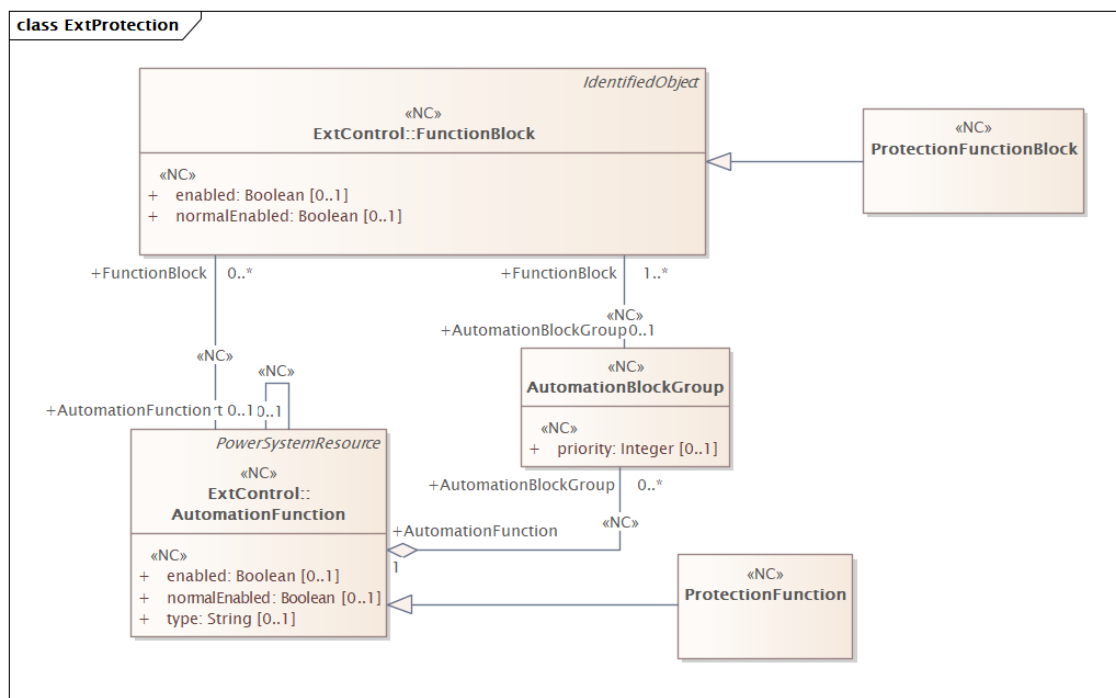


Figure 54 – Class diagram ExtProtection::ExtProtection

Figure 54:

4.19.8.2 (NC) ProtectionFunctionBlockInheritance path = [FunctionBlock](#) : IdentifiedObject : ExtEulIdentifiedObject

Protection function block is a function block that contains an algorithm for protecting the equipment.

Table 753 shows all attributes of ProtectionFunctionBlock.

Table 753 – 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

Table 754 shows all association ends of ProtectionFunctionBlock with other classes.

Table 754 – 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
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
1..*	AutomationBlockGroup	0..1	AutomationBlockGroup	(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

4.19.8.3 (NC) AutomationBlockGroup root class

Grouping of function block that are operated with the same priority as settings.

Table 755 shows all attributes of AutomationBlockGroup.

Table 755 – 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.

Table 756 shows all association ends of AutomationBlockGroup with other classes.

Table 756 – 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.

4.19.8.4 (NC) ProtectionFunction

Inheritance path = [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Protection function is an automation function that can protect one or multiple equipment.

Table 757 shows all attributes of ProtectionFunction.

Table 757 – 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

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

Table 758 shows all association ends of ProtectionFunction with other classes.

Table 758 – 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
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4.19.9 Package ExtReactiveCapabilityCurve

4.19.9.1 General

This package contains the extensions related to reactive capability curve.

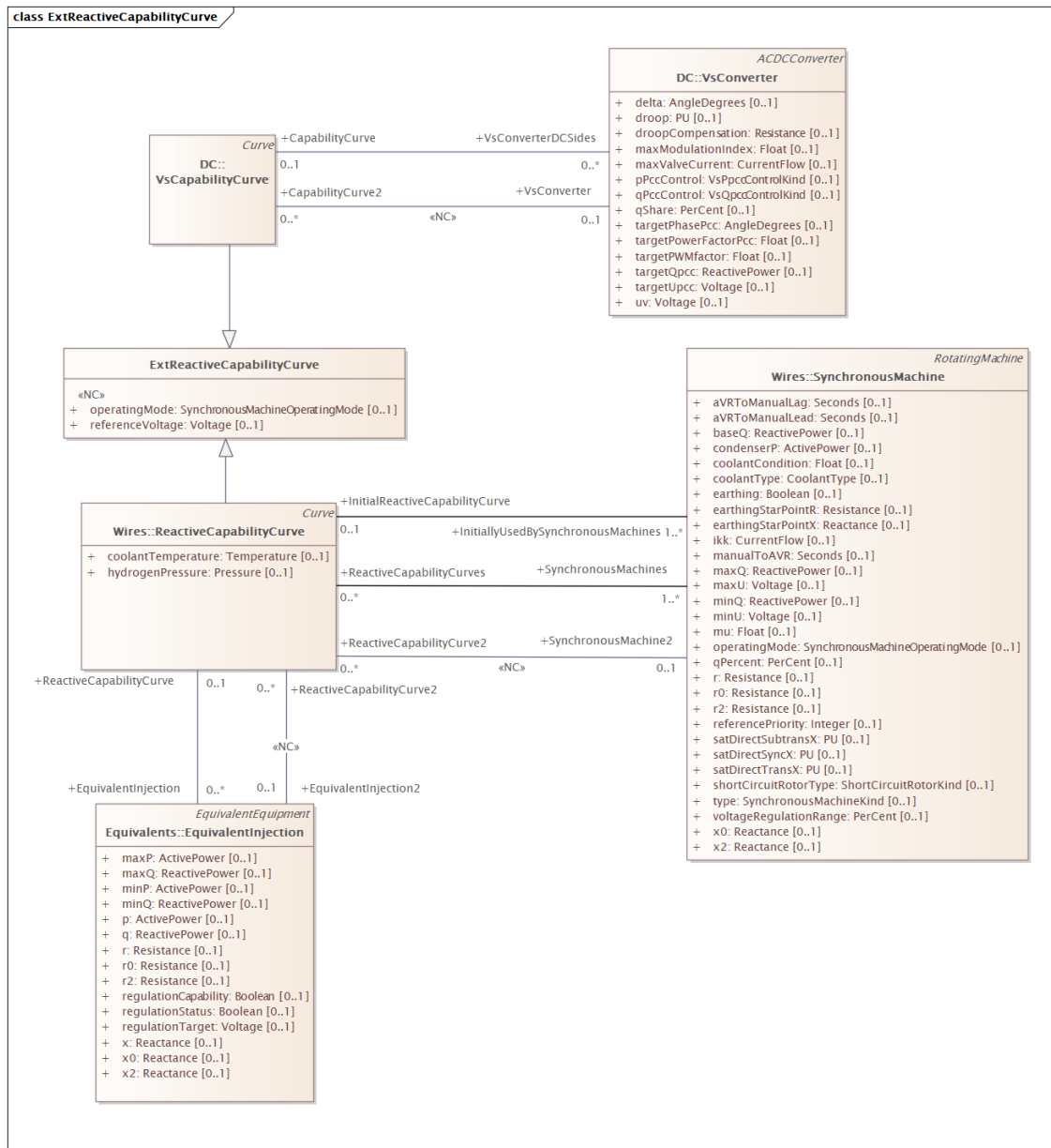


Figure 55 – Class diagram ExtReactiveCapabilityCurve::ExtReactiveCapabilityCurve

Figure 55: The diagram contains classes related to reactive capability curve.

4.19.9.2 ExtReactiveCapabilityCurve root class

European network codes extension to base CIM counterpart.

Table 759 shows all attributes of ExtReactiveCapabilityCurve.

Table 759 – Attributes of ExtReactiveCapabilityCurve::ExtReactiveCapabilityCurve

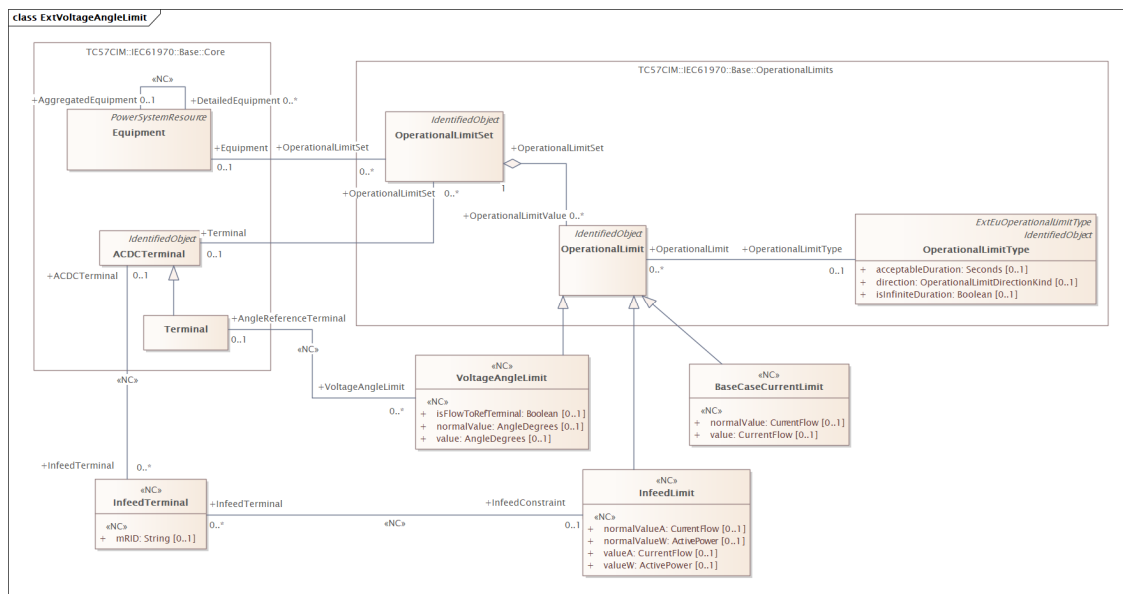
name	mult	type	description
referenceVoltage	0..1	Voltage	(NC) The reference voltage for which the capability curve is valid.

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.

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6079 **4.19.10 Package ExtSecurityLimit**6080 **4.19.10.1 General**

6081 This package contains the extensions related to the security limits.



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6083 **Figure 56 – Class diagram ExtSecurityLimit::ExtVoltageAngleLimit**

6084 Figure 56: The diagram contains classes related to voltage angle limit.

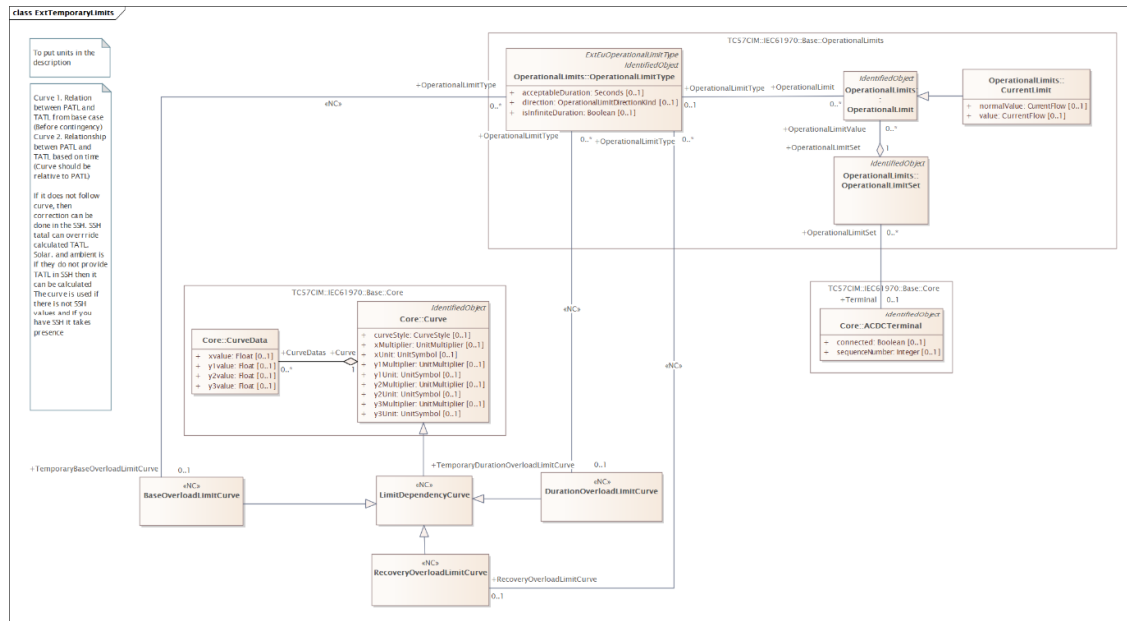


Figure 57 – Class diagram ExtSecurityLimit::ExtTemporaryLimits

Figure 57: The diagram contains classes related to temporary limits.

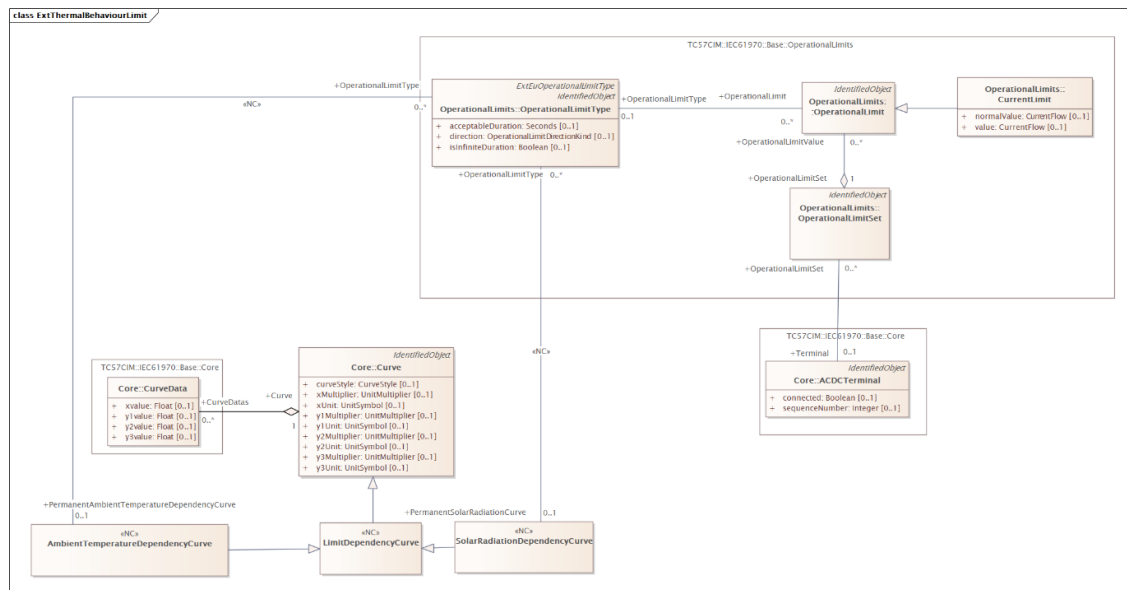


Figure 58 – Class diagram ExtSecurityLimit::ExtThermalBehaviourLimit

Figure 58: The diagram contains classes related to thermal behaviour limit.

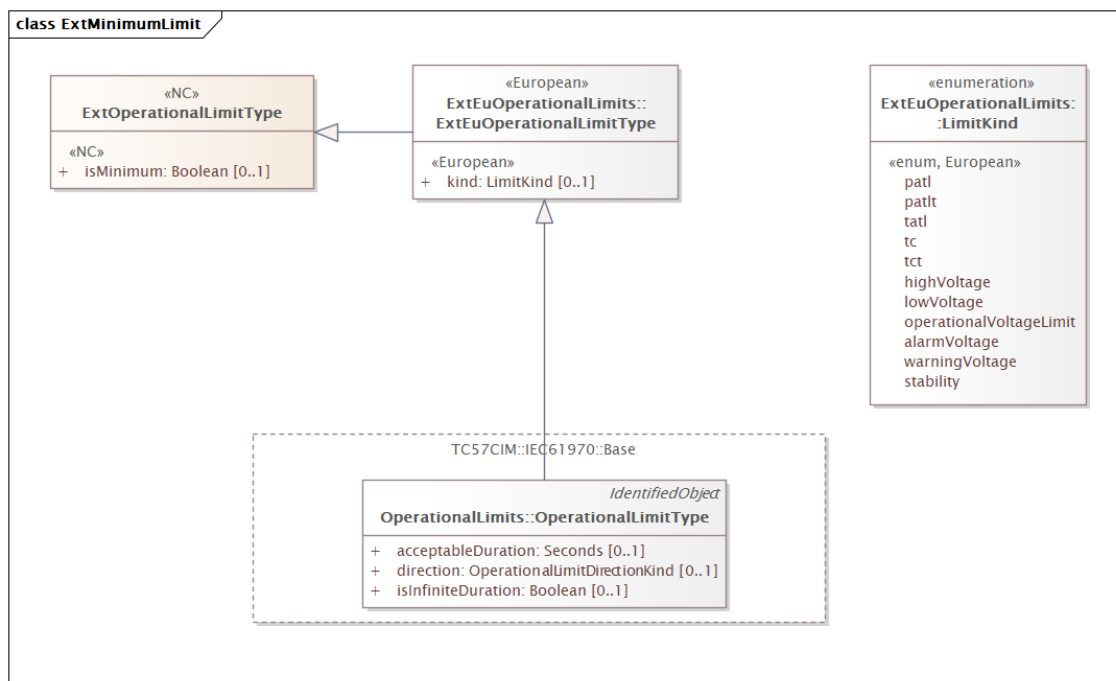


Figure 59 – Class diagram ExtSecurityLimit::ExtMinimumLimit

Figure 59: The diagram contains classes related to minimum limit.

4.19.10.2 (NC) AmbientTemperatureDependencyCurve

Inheritance path = [LimitDependencyCurve](#) : Curve : IdentifiedObject : ExtEuIdentifiedObject

A curve or functional relationship between the ambient temperature independent variable (X-axis) and relative temperature dependent (Y-axis) variables.

Table 760 shows all attributes of AmbientTemperatureDependencyCurve.

Table 760 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 761 shows all association ends of AmbientTemperatureDependencyCurve with other classes.

Table 761 – Association ends of 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

4.19.10.3 (NC) BaseOverloadLimitCurve

Inheritance path = [LimitDependencyCurve](#) : Curve : IdentifiedObject : ExtEulIdentifiedObject

A curve or functional relationship between

- the relative loading - current loading over permanent loading (PATL) independent variable (X-axis), and

- temporary overloading (TATL) limiting dependent (Y-axis) variables.

Table 762 shows all attributes of BaseOverloadLimitCurve.

Table 762 – 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

Table 763 shows all association ends of BaseOverloadLimitCurve with other classes.

Table 763 – Association ends of ExtSecurityLimit::BaseOverloadLimitCurve with other 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

4.19.10.4 (NC) DurationOverloadLimitCurve

Inheritance path = [LimitDependencyCurve](#) : Curve : IdentifiedObject : ExtEulIdentifiedObject

A curve or functional relationship between

- the overload duration independent variable (X-axis), and
- temporary overloading (TATL) limiting dependent (Y-axis) variables.

Table 764 shows all attributes of DurationOverloadLimitCurve.

Table 764 – 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

Table 765 shows all association ends of DurationOverloadLimitCurve with other classes.

Table 765 – Association ends of ExtSecurityLimit::DurationOverloadLimitCurve with 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

4.19.10.5 (NC) LimitDependencyCurve

Inheritance path = Curve : IdentifiedObject : ExtEulIdentifiedObject

A curve or functional relationship between an independent variable (X-axis) and limiting dependent (Y-axis) variables.

Table 766 shows all attributes of LimitDependencyCurve.

Table 766 – 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

Table 767 shows all association ends of LimitDependencyCurve with other classes.

Table 767 – Association ends of ExtSecurityLimit::LimitDependencyCurve with other classes

mult from	name	mult to	type	description
1..1	CurveDatas	0..*	CurveData	inherited from: Curve
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

6141

6142 **4.19.10.6 (NC) RecoveryOverloadLimitCurve**6143 Inheritance path = [LimitDependencyCurve](#) : Curve : IdentifiedObject : ExtEulIdentifiedObject

6144 The relation between the recovery time and an overload limit.

6145 Table 768 shows all attributes of RecoveryOverloadLimitCurve.

6146 **Table 768 – 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
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

6147

6148 Table 769 shows all association ends of RecoveryOverloadLimitCurve with other classes.

6149 **Table 769 – Association ends of ExtSecurityLimit::RecoveryOverloadLimitCurve with**
6150 **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

6151

6152 **4.19.10.7 (NC) SolarRadiationDependencyCurve**6153 Inheritance path = [LimitDependencyCurve](#) : Curve : IdentifiedObject : ExtEulIdentifiedObject

6154 A curve or functional relationship between

6155 - the solar radiation independent variable (X-axis), and

6156 - relative dependent (Y-axis) variables.

6157 Table 770 shows all attributes of SolarRadiationDependencyCurve.

6158 **Table 770 – 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
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

6159

6160 Table 771 shows all association ends of SolarRadiationDependencyCurve with other classes.

6161 **Table 771 – Association ends of ExtSecurityLimit::SolarRadiationDependencyCurve**
6162 **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

6163

6164 **4.19.10.8 (NC) ExtOperationalLimitType root class**

6165 European network codes extension to base CIM counterpart.

6166 Table 772 shows all attributes of ExtOperationalLimitType.

6167

Table 772 – 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.

6168

6169

4.19.10.9 (NC) InfeedLimit

6170

Inheritance path = OperationalLimit : IdentifiedObject : ExtEulIdentifiedObject

6171

Infeed limit set constraints fed in to the network by two or more terminals.

6172

Table 773 shows all attributes of InfeedLimit.

6173

Table 773 – 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: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

6174

6175

Table 774 shows all association ends of InfeedLimit with other classes.

6176

Table 774 – Association ends of ExtSecurityLimit::InfeedLimit with other classes

mult from	name	mult to	type	description
0..1	InfeedLimitSchedule	0..*	InfeedLimitSchedule	(NC) Infeed limit schedule associated with an infeed limit.
0..1	InfeedTerminal	0..*	InfeedTerminal	(NC) Infeed terminal that has infeed constraints.
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

6177

6178 **4.19.10.10 (NC) InfeedTerminal root class**

6179 Infeed terminal defines the terminals that are linked to an infeed limit.

6180 Table 775 shows all attributes of InfeedTerminal.

6181 **Table 775 – 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 or rdf:about attributes that identify CIM object elements.

6182

6183 Table 776 shows all association ends of InfeedTerminal with other classes.

6184 **Table 776 – 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.

6185

6186 **4.19.10.11 (NC) BaseCaseCurrentLimit**

6187 Inheritance path = OperationalLimit : IdentifiedObject : ExtEulIdentifiedObject

6188 Operational limit on current applicable for base case.

6189 Table 777 shows all attributes of BaseCaseCurrentLimit.

6190 **Table 777 – 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

6191

6192 Table 778 shows all association ends of BaseCaseCurrentLimit with other classes.

Table 778 – Association ends of ExtSecurityLimit::BaseCaseCurrentLimit with other classes

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

4.19.11 SIPS extensions

4.19.11.1 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.

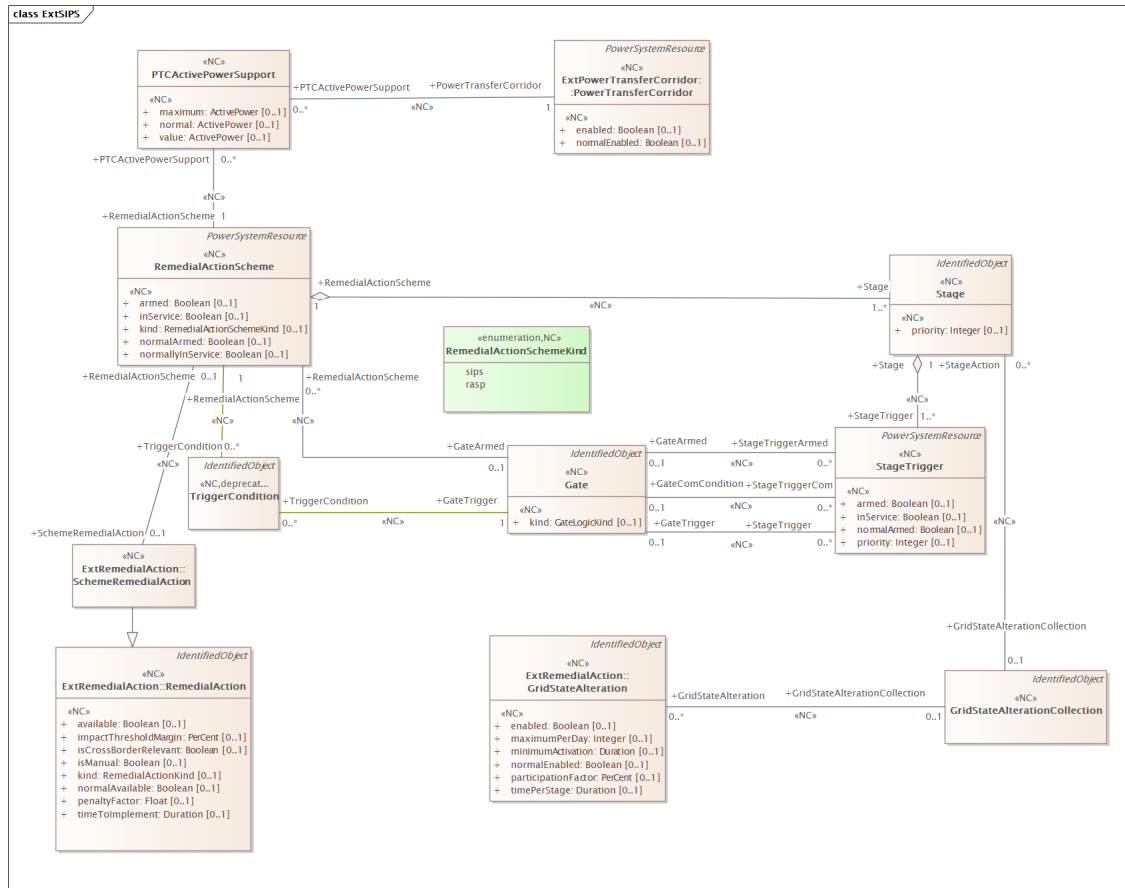


Figure 60 – Class diagram ExtSIPS::ExtSIPS

Figure 60: The diagram contains classes related to SIPS.

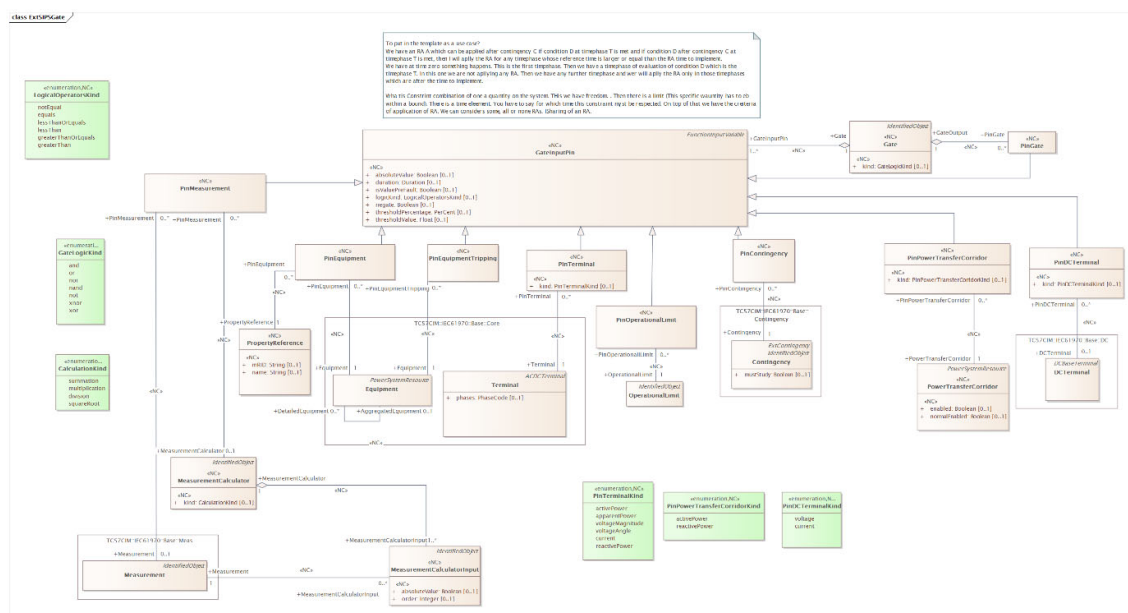


Figure 61 – Class diagram ExtSIPS::ExtSIPSGate

Figure 61: The diagram contains classes related to SIPS gate.

4.19.11.2 (NC) Gate

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject

Logical gate that supports a logical operation based on the input.

Table 779 shows all attributes of Gate.

Table 779 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 780 shows all association ends of Gate with other classes.

Table 780 – 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.
0..1	StageTriggerArmed	0..*	StageTrigger	(NC) The stage trigger associated with the armed gate.

mult from	name	mult to	type	description
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

6219

6220

4.19.11.3 (NC) GateInputPin

6221

Inheritance path = [FunctionInputVariable](#) : IdentifiedObject : ExtEulIdentifiedObject

6222

Input pin for a logical gate. The condition described in the input pin gives a logical true or false.

6223

The result from measurement and calculation are converted to a true or false.

6224

Table 781 shows all attributes of GateInputPin.

6225

Table 781 – 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.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

6226

6227

Table 782 shows all association ends of GateInputPin with other classes.

6228

Table 782 – 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.
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

6229

4.19.11.4 (NC) GridStateAlterationCollection

6231 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

6232 A collection of grid state alterations.

6233 Table 783 shows all attributes of GridStateAlterationCollection.

6234

Table 783 – 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

6235

6236 Table 784 shows all association ends of GridStateAlterationCollection with other classes.

Table 784 – Association ends of ExtSIPS::GridStateAlterationCollection with other classes

6237

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.
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

6239

6240 **4.19.11.5 (NC) MeasurementCalculator**

6241 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

6242 Result of a calculation of one or more measurement.

6243 Table 785 shows all attributes of MeasurementCalculator.

6244 **Table 785 – 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: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

6245

6246 Table 786 shows all association ends of MeasurementCalculator with other classes.

6247 **Table 786 – 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

6248

6249 **4.19.11.6 (NC) MeasurementCalculatorInput**

6250 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

6251 Input to measurement calculation. It supports Analog, Discrete and Accumulator measurements.

6253 Table 787 shows all attributes of MeasurementCalculatorInput.

6254 **Table 787 – 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

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

Table 788 shows all association ends of MeasurementCalculatorInput with other classes.

Table 788 – 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

4.19.11.7 (NC) PinContingency

Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject : ExtEuIdentifiedObject

Input pin associated with a Contingency. It is used for comparison.

Table 789 shows all attributes of PinContingency.

Table 789 – 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
isValuePreFault	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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 790 shows all association ends of PinContingency with other classes.

6268

Table 790 – 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
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

6269

4.19.11.8 (NC) PinDCTerminal

6271 Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject :
 6272 ExtEulIdentifiedObject

6273 Input pin associated with a DCTerminal. It is used for comparison.

6274 Table 791 shows all attributes of PinDCTerminal.

6275

Table 791 – 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
isValuePreFault	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

6276

6277 Table 792 shows all association ends of PinDCTerminal with other classes.

6278

Table 792 – 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

mult from	name	mult to	type	description
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

6279

6280 **4.19.11.9 (NC) PinEquipment**

6281 Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject :
 6282 ExtEulIdentifiedObject

6283 Input pin associated with an Equipment. It is used for the comparison.

6284 Table 793 shows all attributes of PinEquipment.

6285 **Table 793 – 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
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

6286

6287 Table 794 shows all association ends of PinEquipment with other classes.

6288 **Table 794 – 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
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

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

4.19.11.10 (NC) PinEquipmentTripping

Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject : ExtEulIdentifiedObject

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 795 shows all attributes of PinEquipmentTripping.

Table 795 – 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
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

Table 796 shows all association ends of PinEquipmentTripping with other classes.

Table 796 – 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
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

6302 **4.19.11.11 (NC) PinGate**

6303 Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject :
 6304 ExtEulIdentifiedObject

6305 An output from one gate represents an input to another gate.

6306 Table 797 shows all attributes of PinGate.

6307 **Table 797 – 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
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

6308

6309 Table 798 shows all association ends of PinGate with other classes.

6310 **Table 798 – 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
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

6311

6312 **4.19.11.12 (NC) PinMeasurement**

6313 Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject :
 6314 ExtEulIdentifiedObject

6315 Input pin associated with a Measurement. It is used for comparison.

6316 Table 799 shows all attributes of PinMeasurement.

6317 **Table 799 – Attributes of ExtSIPS::PinMeasurement**

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin

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

Table 800 shows all association ends of PinMeasurement with other classes.

Table 800 – 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
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

4.19.11.13 (NC) PinPowerTransferCorridor

Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject : ExtEulIdentifiedObject

Input pin associated with a PowerTransferCorridor. It is used for comparison.

Table 801 shows all attributes of PinPowerTransferCorridor.

Table 801 – 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

name	mult	type	description
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin
isValuePreFault	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

Table 802 shows all association ends of PinPowerTransferCorridor with other classes.

Table 802 – 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
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

4.19.11.14 (NC) PinTerminal

Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject : ExtEulIdentifiedObject

Input pin associated with a Terminal. It is used for comparison.

Table 803 shows all attributes of PinTerminal.

Table 803 – 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
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

Table 804 shows all association ends of PinTerminal with other classes.

Table 804 – 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
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

4.19.11.15 (NC) PinOperationalLimit

Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject : ExtEulIdentifiedObject

Input pin associated with the limits of a Terminal. It is used for comparison.

Table 805 shows all attributes of PinOperationalLimit.

Table 805 – 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
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

Table 806 shows all association ends of PinOperationalLimit with other classes.

6350 **Table 806 – 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
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

6351

6352 **4.19.11.16 (NC) PTCActivePowerSupport root class**6353 Defines the active power capability (support) of the scheme in relation to a
6354 PowerTransferCorridor.

6355 Table 807 shows all attributes of PTCActivePowerSupport.

6356 **Table 807 – 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).

6357

6358 Table 808 shows all association ends of PTCActivePowerSupport with other classes.

6359 **Table 808 – 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.

6360

6361 **4.19.11.17 (NC) RemedialActionScheme**6362 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject
6363 Remedial Action Scheme (RAS), Special Protection Schemes (SPS), System Protection
6364 Schemes (SPS) or System Integrity Protection Schemes (SIPS).6365 A Remedial Action Scheme consists of one or more stages that can trigger and execute a
6366 protection action.

6367 Table 809 shows all attributes of RemedialActionScheme.

6368 **Table 809 – 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	RemedialActionSchemeKind	(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

6369

6370 Table 810 shows all association ends of RemedialActionScheme with other classes.

6371 **Table 810 – 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.
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

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

6372

6373 **4.19.11.18 (NC) Stage**

6374 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

6375 Stage of a remedial action scheme.

6376 Table 811 shows all attributes of Stage.

6377

Table 811 – 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

6378

6379 Table 812 shows all association ends of Stage with other classes.

6380

Table 812 – 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

6381

6382 **4.19.11.19 (NC) StageTrigger**

6383 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

6384 Stage that is triggered either by TriggerCondition or by gate condition within a stage.

6385 Table 813 shows all attributes of StageTrigger.

6386 **Table 813 – 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

6387

6388 Table 814 shows all association ends of StageTrigger with other classes.

6389 **Table 814 – 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.
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

6390

6391 **4.19.11.20 (deprecated,NC) TriggerCondition**

6392 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

6393 The condition that triggers a remedial action scheme.

6394 Table 815 shows all attributes of TriggerCondition.

6395 **Table 815 – 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

6396

6397 Table 816 shows all association ends of TriggerCondition with other classes.

6398 **Table 816 – 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
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6399

6400 **4.19.11.21 (NC) CalculationKind enumeration**

6401 Kind of calculation operation that can be done to Measurement.

6402 Table 817 shows all literals of CalculationKind.

6403 **Table 817 – 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).

6404

6405 **4.19.11.22 (NC) GateLogicKind enumeration**

6406 Define the different logical operations.

6407 Table 818 shows all literals of GateLogicKind.

6408

Table 818 – 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.

6409

4.19.11.23 (NC) LogicalOperatorsKind enumeration

6411 Kinds of logical operators for comparison.

6412 Table 819 shows all literals of LogicalOperatorsKind.

6413

Table 819 – 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.

6414

4.19.11.24 (NC) PinDCTerminalKind enumeration

6416 The kind of quantities that can serve as an input value for the DCTerminal pin.

6417 Table 820 shows all literals of PinDCTerminalKind.

6418

Table 820 – Literals of ExtSIPS::PinDCTerminalKind

literal	value	description
voltage		Direct current voltage in the DCTerminal.
current		Direct current in the DCTerminal.

6419

4.19.11.25 (NC) PinPowerTransferCorridorKind enumeration

6421 The kind of quantities that can serve as an input value for the PowerTransferCorridor pin.

6422 Table 821 shows all literals of PinPowerTransferCorridorKind.

6423

Table 821 – Literals of ExtSIPS::PinPowerTransferCorridorKind

literal	value	description
activePower		Active power in the branch group.
reactivePower		Reactive power in the branch group.

6424

6425 4.19.11.26 (NC) PinTerminalKind enumeration

6426 The kind of quantities that can serve as an input value for the pin.

6427 Table 822 shows all literals of PinTerminalKind.

6428

Table 822 – 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.

6429

6430 4.19.11.27 (NC) RemedialActionSchemeKind enumeration

6431 Classification of Remedial Action Scheme.

6432 Table 823 shows all literals of RemedialActionSchemeKind.

6433

Table 823 – 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.

6434

6435 4.20 Package ExtGeneratingUnit**6436 4.20.1 General**

6437 This package contains the extensions related to the generating unit.

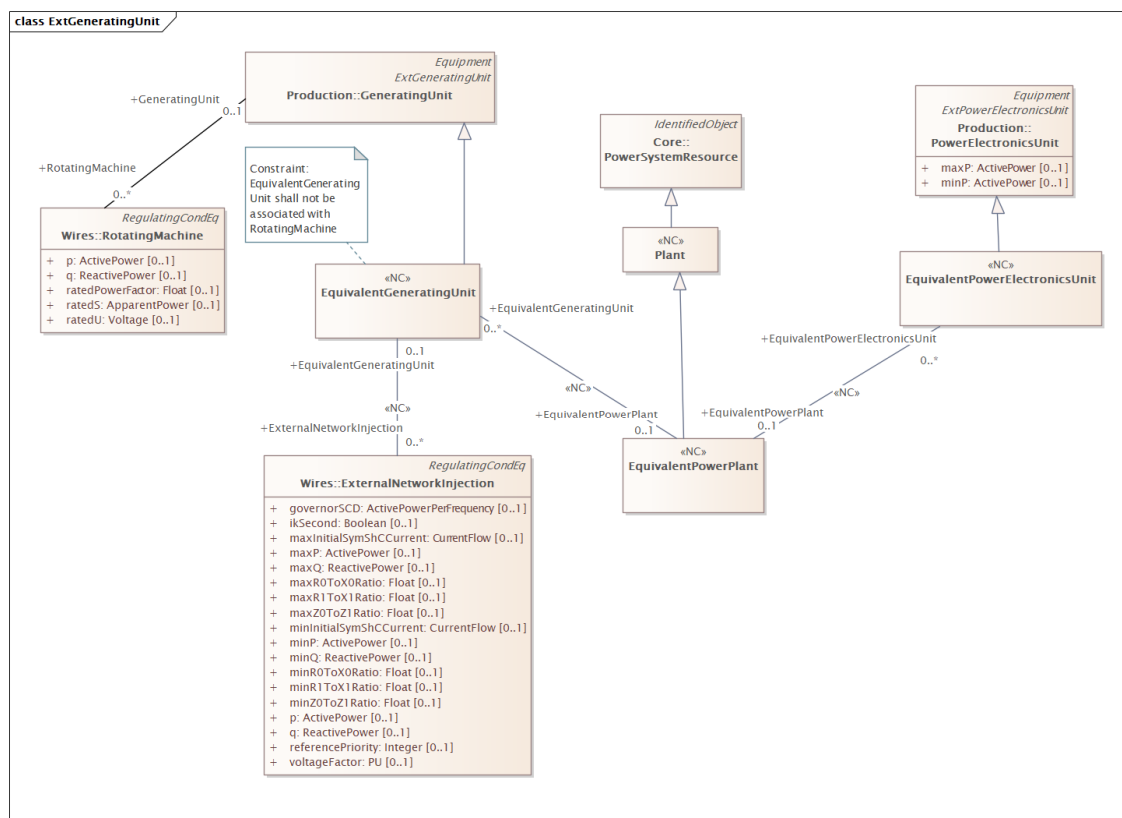


Figure 62 – Class diagram ExtGeneratingUnit::ExtGeneratingUnit

Figure 62: The diagram contains classes related to generating unit.

4.20.2 (NC) EquivalentGeneratingUnit

Inheritance path = GeneratingUnit : Equipment : PowerSystemResource : IdentifiedObject : ExtEulidentifiedObject : [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 824 shows all attributes of EquivalentGeneratingUnit.

Table 824 – 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

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
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
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
maxStartupLoad	0..1	ActivePower	(NC) inherited from: ExtGeneratingUnit
participationFactor	0..1	Float	(NC) inherited from: ExtGeneratingUnit

name	mult	type	description
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
startUpFuelConsumption	0..1	ActivePowerChangeRate	(NC) inherited from: ExtGeneratingUnit

Table 825 shows all association ends of EquivalentGeneratingUnit with other classes.

Table 825 – 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

mult from	name	mult to	type	description
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

6454

6455 **4.20.3 (NC) EquivalentPowerPlant**6456 Inheritance path = [Plant](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

6457 Collection of equivalent equipment for purposes of generation.

6458 Table 826 shows all attributes of EquivalentPowerPlant.

6459

Table 826 – Attributes of ExtGeneratingUnit::EquivalentPowerPlant

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

6460

6461 Table 827 shows all association ends of EquivalentPowerPlant with other classes.

6462 **Table 827 – Association ends of ExtGeneratingUnit::EquivalentPowerPlant with other classes**

6463

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..*	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

6464

6465 **4.20.4 (NC) Plant**

6466 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

6467 A Plant is a collection of equipment for purposes of generation.

6468 Table 828 shows all attributes of Plant.

6469

Table 828 – Attributes of ExtGeneratingUnit::Plant

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

6470

6471 Table 829 shows all association ends of Plant with other classes.

6472

Table 829 – Association ends of ExtGeneratingUnit::Plant 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

6473

6474 **4.20.5 (NC) EquivalentPowerElectronicsUnit**

6475 Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource :

6476 IdentifiedObject : ExtEulIdentifiedObject : [ExtPowerElectronicsUnit](#)6477 An equivalent unit or ensemble of units generating electricity, which is either non-synchronously
6478 connected to the network or connected through power electronics, and that also has a single
6479 connection point to a transmission system, distribution system including closed distribution

6480 system or an equivalent representation of a HVDC system. This is often referred as power park
6481 module.
6482 Table 830 shows all attributes of EquivalentPowerElectronicsUnit.

6483 **Table 830 – 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: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
p	0..1	NullCIM	(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

6484
6485 Table 831 shows all association ends of EquivalentPowerElectronicsUnit with other classes.

6486 **Table 831 – Association ends of ExtGeneratingUnit::EquivalentPowerElectronicsUnit**
6487 **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

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

6488

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4.20.6 (NC) MobileElectricalUnit

6490

Inheritance path = BatteryUnit : PowerElectronicsUnit : Equipment : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : [ExtPowerElectronicsUnit](#)

6491

6492

A MobileElectricalUnit represents a persistent power system resource that can act as a source or sink of electrical energy within the grid. It is designed to interface with the grid through defined connection points for charging or discharging, while the physical energy storage asset associated with it (e.g., an electric vehicle or battery trailer) may be mobile.

6493

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The MobileElectricalUnit abstracts the system-side functionality of mobile energy storage, independent of specific assets or charging events. It typically stores electrical energy in batteries or equivalent storage media and supports flexible, temporary, or location-variable integration into the power system.

6496

6497

6498

6499

Examples include, but are not limited to:

6500

6501

- Electric vehicles (EVs)

6502

- Electrically powered ferries

6503

- Trailer-based battery storage units

6504

- Mobile battery systems for backup or temporary grid support

6505

- This concept supports consistent modeling of mobile energy systems in grid studies by treating the grid-facing connection as a stable power system element, while the associated physical unit is managed as an asset.

6506

6507

Table 832 shows all attributes of MobileElectricalUnit.

6508

Table 832 – 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

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

6510

6511

Table 833 shows all association ends of MobileElectricalUnit with other classes.

6512

6513

Table 833 – 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
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

6514

6515

4.21 Package ExtContainmentDistribution

6516

4.21.1 General

6517

This package contains the extensions related to the containment for distribution.

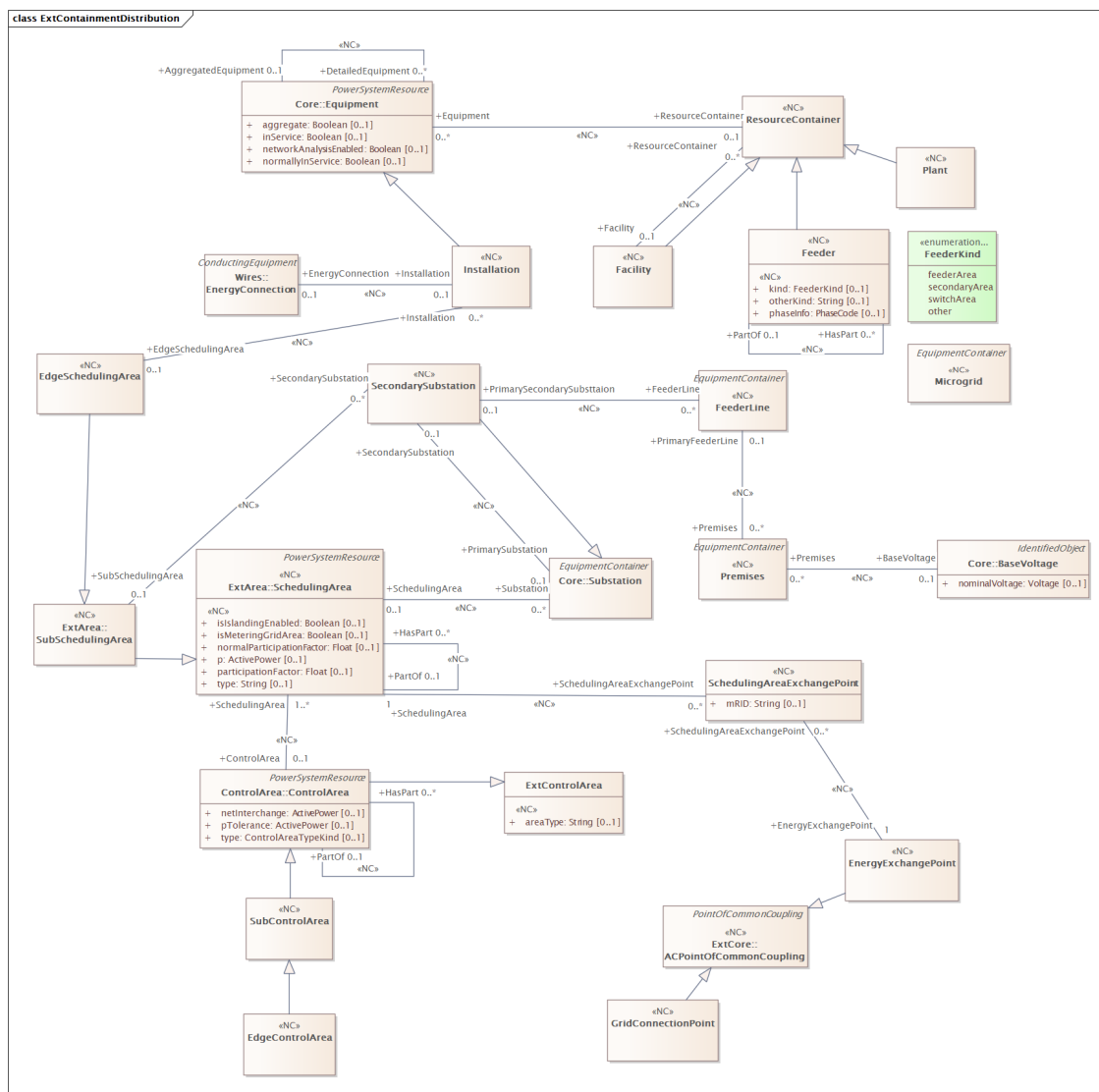


Figure 63 – Class diagram ExtContainmentDistribution::ExtContainmentDistribution

Figure 63: The diagram contains classes related to containment for distribution.

4.21.2 (NC) Plant

Inheritance path = ResourceContainer

A Plant is a ResourceContainer that groups together resources providing a specific industrial energy-related system function—typically generation, conversion, or storage. It serves as an operational unit with common measurement, scheduling, and control, and can be operated within defined capacity limits.

Table 834 shows all association ends of Plant with other classes.

Table 834 – Association ends of ExtContainmentDistribution::Plant with other classes

mult from	name	mult to	type	description
0..1	Equipment	0..*	Equipment	(NC) inherited from: ResourceContainer
0..*	Facility	0..1	Facility	(NC) inherited from: ResourceContainer

6529

6530 **4.21.3 (NC) Feeder**6531 Inheritance path = [ResourceContainer](#)

6532 A Feeder is a ResourceContainer that groups distribution resources as a system functional unit of the distribution network.

6533 It may represent equipment supplied from or supplying to one or more substations, and does not prescribe power flow direction or topology. A Feeder may contain installations, prosumers, or other feeders.

6534 A Feeder serves as an organizational and operational unit for applying measurement, scheduling, and operational limits, independent of its instantaneous connectivity or state.

6535 Table 835 shows all attributes of Feeder.

6540

Table 835 – Attributes of ExtContainmentDistribution::Feeder

name	mult	type	description
kind	0..1	FeederKind	(NC) Kind of Feeder.
phaseInfo	0..1	PhaseCode	(NC) Phase information.
otherKind	0..1	String	(NC) Text describing the feeder kind when other is selected in the kind.

6541

6542 Table 836 shows all association ends of Feeder with other classes.

6543 **Table 836 – Association ends of ExtContainmentDistribution::Feeder with other classes**

mult from	name	mult to	type	description
0..1	HasPart	0..*	Feeder	(NC) The feeder has these feeder parts.
0..*	PartOf	0..1	Feeder	(NC) The feeder is part of this feeder.
0..1	Equipment	0..*	Equipment	(NC) inherited from: ResourceContainer
0..*	Facility	0..1	Facility	(NC) inherited from: ResourceContainer

6544

6545 **4.21.4 (NC) Facility**6546 Inheritance path = [ResourceContainer](#)

6547 A Facility in the power system context refers to any physical infrastructure, installation, or equipment designed for the generation, transmission, distribution, storage, or consumption of electrical energy.

6548 This includes, but is not limited to, power plants, substations, transmission lines, distribution networks, energy storage systems, and large-scale electrical installations directly connected to the grid. A facility may be owned or operated by a network operator, producer, consumer, or other market participant and is subject to regulatory and technical requirements to ensure the safe and reliable operation of the power system.

6550 Table 837 shows all association ends of Facility with other classes.

6556 **Table 837 – Association ends of ExtContainmentDistribution::Facility with other classes**

mult from	name	mult to	type	description
0..1	ResourceContainer	0..*	ResourceContainer	(NC) The resource container for this facility.
0..1	Equipment	0..*	Equipment	(NC) inherited from: ResourceContainer
0..*	Facility	0..1	Facility	(NC) inherited from: ResourceContainer

6557

6558 **4.21.5 (NC) Installation**

6559 Inheritance path = Equipment : PowerSystemResource : IdentifiedObject :
6560 ExtEulIdentifiedObject

6561 An Installation represents a functionally integrated system at a premises or facility that is
6562 connected to an energy infrastructure, but is not itself an energy device (e.g., generator, load,
6563 or storage).

6564 It serves as a system-level abstraction of the internal infrastructure—such as intake cable,
6565 switchboards, internal cabling, distribution panels, protection devices, and auxiliary equipment
6566—that enables and constraints the connection to one or more energy connections (electrical,
6567 thermal, gas, etc.).

6568 Installations are typically owned and operated by the site holder, not the utility, and exist within
6569 buildings, industrial sites, or campus.

6570 Table 838 shows all attributes of Installation.

6571 **Table 838 – Attributes of ExtContainmentDistribution::Installation**

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

6572

6573 Table 839 shows all association ends of Installation with other classes.

6574 **Table 839 – Association ends of ExtContainmentDistribution::Installation with other**
6575 **classes**

mult from	name	mult to	type	description
0..1	EnergyConnection	0..1	EnergyConnection	(NC) The energy connection that is connected to the installation.
0..*	EdgeSchedulingArea	0..1	EdgeSchedulingArea	(NC) The edge scheduling area for this installation.
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

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

6576

6577

4.21.6 (NC) ResourceContainer root class

6578

Containment of resources that collectively provide a system function and are subject to measurement, scheduling and operable within defined limits.

6579

6580

Table 840 shows all association ends of ResourceContainer with other classes.

6581

6582

Table 840 – Association ends of ExtContainmentDistribution::ResourceContainer with other classes

mult from	name	mult to	type	description
0..1	Equipment	0..*	Equipment	(NC) The equipment part of the resource container.
0..*	Facility	0..1	Facility	(NC) The facility that the resource container is part of.

6583

6584

4.21.7 (NC) Microgrid

6585

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

6586

6587

Contains equipment that is constructed and operated as a self-contained, controllable electrical subsystem, either connected to or normally isolated from the wider grid.

6588

6589

Table 841 shows all attributes of Microgrid.

6590

Table 841 – Attributes of ExtContainmentDistribution::Microgrid

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

6591

6592

Table 842 shows all association ends of Microgrid with other classes.

6593

6594

Table 842 – Association ends of ExtContainmentDistribution::Microgrid with other classes

mult from	name	mult to	type	description
0..1	Equipments	0..*	Equipment	inherited from: EquipmentContainer

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

6595

6596

4.21.8 (NC) EdgeSchedulingArea

6597 Inheritance path = [SubSchedulingArea](#) : [SchedulingArea](#) : PowerSystemResource :
 6598 IdentifiedObject : ExtEulIdentifiedObject

6599 An EdgeSchedulingArea is a electrical area that is part of a SubSchedulingArea with one or
 6600 more Installations connected.

6601 It serves as the smallest energy level scheduling, forecasting and aggregated measurement
 6602 used for coordinating energy production, consumption, and storage across its constituent
 6603 connections.

6604 An EdgeSchedulingArea may represent physical locations with multiple grid connection, such
 6605 as a shopping mall, university campus, industrial facility, or private microgrid that are normally
 6606 connected to the grid.

6607 Table 843 shows all attributes of EdgeSchedulingArea.

6608

Table 843 – Attributes of ExtContainmentDistribution::EdgeSchedulingArea

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
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

6609

6610

Table 844 shows all association ends of EdgeSchedulingArea with other classes.

6611

Table 844 – Association ends of ExtContainmentDistribution::EdgeSchedulingArea with other classes

6612

mult from	name	mult to	type	description
0..1	Installation	0..*	Installation	(NC) The installation that is connected to the edge scheduling area.
0..1	Feeder	0..*	Feeder	(NC) inherited from: SubSchedulingArea
0..1	SecondarySubstation	0..*	SecondarySubstation	(NC) inherited from: SubSchedulingArea
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	inherited from: SchedulingArea
0..1	HasPart	0..*	SchedulingArea	(NC) inherited from: SchedulingArea
0..*	BiddingZone	0..1	BiddingZone	(NC) inherited from: SchedulingArea
0..*	EnergyCoordinationRegion	0..1	EnergyCoordinationRegion	(NC) inherited from: SchedulingArea
0..*	LoadFrequencyControlArea	0..1	LoadFrequencyControlArea	(NC) inherited from: SchedulingArea
0..1	ScheduleResource	0..*	ScheduleResource	(NC) inherited from: SchedulingArea
1..1	AreaDispatchableUnit	0..*	AreaDispatchableUnit	(NC) inherited from: SchedulingArea
0..1	EnergyGroup	0..*	EnergyGroup	(NC) inherited from: SchedulingArea
0..*	SynchronousArea	0..1	SynchronousArea	(NC) inherited from: SchedulingArea
0..*	SystemOperator	0..1	SystemOperator	(NC) inherited from: SchedulingArea
0..1	PowerShiftKeyStrategy	0..*	PowerShiftKeyStrategy	(NC) inherited from: SchedulingArea
0..*	PowerCapacity	0..1	PowerCapacity	(NC) inherited from: SchedulingArea
1..1	SchedulingAreaExchangePoint	0..*	SchedulingAreaExchangePoint	(NC) 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

6613

6614 **4.21.9 (NC) SecondarySubstation**

6615 Inheritance path = Substation : EquipmentContainer : ConnectivityNodeContainer :
6616 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

6617 A SecondarySubstation is a substation that is either supplied by or serves a primary substation.
6618 It is responsible for transforming, distributing, or aggregating power to and from installations
6619 such as homes, industrial facilities, or prosumer sites.

6620 A secondary substation supports bidirectional power flows, enabling both consumption and
6621 injection of energy within the distribution network.

6622 It typically includes transformers, switchgear, protection, and measurement equipment, and
6623 may be equipped for remote monitoring or autonomous control

6624 Table 845 shows all attributes of SecondarySubstation.

6625 **Table 845 – Attributes of ExtContainmentDistribution::SecondarySubstation**

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

6626

6627 Table 846 shows all association ends of SecondarySubstation with other classes.

6628 **Table 846 – Association ends of ExtContainmentDistribution::SecondarySubstation with**
6629 **other classes**

mult from	name	mult to	type	description
0..1	PrimarySubstation	0..1	Substation	(NC) The primary substation that serves the secondary substation.
0..*	SubSchedulingArea	0..1	SubSchedulingArea	(NC) The subscheduling area that has the secondary substation connected.
0..1	FeederLine	0..*	FeederLine	(NC) The feeder line that has secondary substation.
1..1	VoltageLevels	0..*	VoltageLevel	inherited from: Substation
0..1	Bays	0..*	Bay	inherited from: Substation
0..1	NormalEnergizedFeeder	0..*	Feeder	inherited from: Substation
0..*	NamingFeeder	0..1	Feeder	inherited from: Substation
0..*	NormalEnergizingFeeder	0..*	Feeder	inherited from: Substation
0..*	Region	0..1	SubGeographicalRegion	inherited from: Substation
0..1	DCConverterUnit	0..*	DCConverterUnit	inherited from: Substation
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

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

6630

6631

4.21.10 (NC) GridConnectionPoint

6632

Inheritance path = [ACPointOfCommonCoupling](#) : [PointOfCommonCoupling](#) : IdentifiedObject : ExtEulIdentifiedObject

6633

6634

A GridConnectionPoint is a Point of Common Coupling (PCC) that defines the contractual and operational interface between a grid operator (e.g., TSO, DSO, or CDSO) and a connecting entity, such as a person, company, prosumer, or facility operator.

6635

6636

6637

It represents the electrical location at which the connection agreement—as defined by applicable grid connection codes (e.g., EU RfG, DCC, HVDC)—is enacted, establishing the technical, legal, and compliance boundaries for power exchange between the public grid and the connected installation or energy system.

6638

6639

6640

6641

All operational conditions required by regulation—such as voltage and frequency ranges, fault ride-through capabilities, power quality limits, and observability—are applicable at this point.

6642

6643

The GridConnectionPoint may support bidirectional power flow, and is typically associated with metering, disconnection, and protection devices, but is independent of voltage level or specific technology.

6644

6645

Table 847 shows all attributes of GridConnectionPoint.

6646

6647

Table 847 – Attributes of ExtContainmentDistribution::GridConnectionPoint

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

6648

6649

Table 848 shows all association ends of GridConnectionPoint with other classes.

6650

6651

Table 848 – Association ends of ExtContainmentDistribution::GridConnectionPoint with other classes

mult from	name	mult to	type	description
0..1	ConnectivityNode	0..1	ConnectivityNode	(NC) inherited from: ACPointOfCommonCoupling
1..1	DCConverterUnit	0..1	DCConverterUnit	(NC) inherited from: ACPointOfCommonCoupling
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

6652

6653 **4.21.11 (NC) EnergyExchangePoint**

6654 Inheritance path = [ACPointOfCommonCoupling](#) : [PointOfCommonCoupling](#) : IdentifiedObject :
 6655 ExtEulIdentifiedObject

6656 An EnergyExchangePoint is a PointOfCommonCoupling that defines the electrical and
 6657 operational interface between two independent adjacent grid operators —such as two TSOs, a
 6658 TSO and a DSO, or two DSOs—who are responsible for coordinated operation of
 6659 interconnected power systems.

6660 It marks the electrical boundary point at which the energy exchange agreement between the
 6661 two grid operators is enacted, and where power flows, balancing responsibilities, and
 6662 observability requirements are formally managed. Operational conditions defined by applicable
 6663 regulation—such as exchange capacity, frequency and voltage support, fault ride-through,
 6664 protection coordination, and metering—can be defined at this point and in some cases enforced
 6665 at this point.

6666 It supports bidirectional power flow and may be associated with operational requirements such
 6667 as balancing, frequency and voltage control, telemetry, protection coordination, and energy
 6668 accounting.

6669 Table 849 shows all attributes of EnergyExchangePoint.

6670

Table 849 – Attributes of ExtContainmentDistribution::EnergyExchangePoint

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

6671

6672 Table 850 shows all association ends of EnergyExchangePoint with other classes.

6673 **Table 850 – Association ends of ExtContainmentDistribution::EnergyExchangePoint**
 6674 **with other 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..1	ConnectivityNode	0..1	ConnectivityNode	(NC) inherited from: ACPointOfCommonCoupling
1..1	DCConverterUnit	0..1	DCConverterUnit	(NC) inherited from: ACPointOfCommonCoupling
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	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

6675

6676 **4.21.12 (NC) SchedulingAreaExchangePoint root class**6677 Combination of scheduling area and one or more energy exchange point to define the relevant
6678 exchange point for a given scheduling area.

6679 Table 851 shows all attributes of SchedulingAreaExchangePoint.

6680 **Table 851 – Attributes of ExtContainmentDistribution::SchedulingAreaExchangePoint**

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.

6681

6682 Table 852 shows all association ends of SchedulingAreaExchangePoint with other classes.

6683 **Table 852 – Association ends of**
6684 **ExtContainmentDistribution::SchedulingAreaExchangePoint with other classes**

mult from	name	mult to	type	description
0..*	SchedulingArea	1..1	SchedulingArea	(NC) The scheduling area that has a scheduling area exchange point.
0..*	EnergyExchangePoint	1..1	EnergyExchangePoint	(NC) The energy exchange point associated with the scheduling area.

6685

6686 **4.21.13 (NC) SubControlArea**6687 Inheritance path = ControlArea : PowerSystemResource : IdentifiedObject :
6688 ExtEulIdentifiedObject : [ExtControlArea](#)6689 A SubControlArea representing the operational control domain within a higher-level control
6690 area. It is typically operated by a Distribution System Operator (DSO) and covers the
6691 monitoring, control, scheduling, and application of operational limits for distribution system
6692 resources and exchanges at its boundary.

6693 Table 853 shows all attributes of SubControlArea.

6694 **Table 853 – Attributes of ExtContainmentDistribution::SubControlArea**

name	mult	type	description
netInterchange	0..1	ActivePower	inherited from: ControlArea
pTolerance	0..1	ActivePower	inherited from: ControlArea
type	0..1	ControlAreaTypeKind	inherited from: ControlArea
aliasName	0..1	String	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
areaType	0..1	String	(NC) inherited from: ExtControlArea

Table 854 shows all association ends of SubControlArea with other classes.

Table 854 – Association ends of ExtContainmentDistribution::SubControlArea with other classes

mult from	name	mult to	type	description
0..1	EnergyArea	0..1	EnergyArea	inherited from: ControlArea
0..1	HasPart	0..*	ControlArea	(NC) inherited from: ControlArea
1..1	ControlAreaGeneratingUnit	0..*	ControlAreaGeneratingUnit	inherited from: ControlArea
1..1	TieFlow	0..*	TieFlow	inherited from: ControlArea
0..*	PartOf	0..1	ControlArea	(NC) inherited from: ControlArea
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

4.21.14 (NC) EdgeControlArea

Inheritance path = [SubControlArea](#) : ControlArea : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : [ExtControlArea](#)

An EdgeControlArea representing the local, site-level (edge) operational domain that coordinates one or more Installations and their connections. It is typically operated by an edge operator (e.g., a person/company operating a campus, mall, microgrid, or prosumer cluster) and supports local monitoring, control, scheduling, and limits—both islanded and grid-connected.

Table 855 shows all attributes of EdgeControlArea.

Table 855 – Attributes of ExtContainmentDistribution::EdgeControlArea

name	mult	type	description
netInterchange	0..1	ActivePower	inherited from: ControlArea
pTolerance	0..1	ActivePower	inherited from: ControlArea
type	0..1	ControlAreaTypeKind	inherited from: ControlArea
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
areaType	0..1	String	(NC) inherited from: ExtControlArea

Table 856 shows all association ends of EdgeControlArea with other classes.

Table 856 – Association ends of ExtContainmentDistribution::EdgeControlArea with other classes

mult from	name	mult to	type	description
0..1	EnergyArea	0..1	EnergyArea	inherited from: ControlArea
0..1	HasPart	0..*	ControlArea	(NC) inherited from: ControlArea
1..1	ControlAreaGeneratingUnit	0..*	ControlAreaGeneratingUnit	inherited from: ControlArea
1..1	TieFlow	0..*	TieFlow	inherited from: ControlArea
0..*	PartOf	0..1	ControlArea	(NC) inherited from: ControlArea
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

4.21.15 (NC) FeederKind enumeration

Kind describing the different type of feeder.

Table 857 shows all literals of FeederKind.

Table 857 – Literals of ExtContainmentDistribution::FeederKind

literal	value	description
feederArea		Feeder represent an energy area.
secondaryArea		Feeder represent a controllable area.
switchArea		Feeder represent an area that is under same switch control regime.
other		Other feeder kind.

4.21.16 ExtControlArea root class

Table 858 shows all attributes of ExtControlArea.

6723

Table 858 – Attributes of ExtContainmentDistribution::ExtControlArea

name	mult	type	description
areaType	0..1	String	(NC) Type of control area.

6724

4.21.17 (NC) FeederLine

6726 Inheritance path = EquipmentContainer : ConnectivityNodeContainer : PowerSystemResource :
 6727 IdentifiedObject : ExtEulIdentifiedObject

6728 Contains equipment belonging to a distribution feeder that connects a Secondary Substation to
 6729 one or more Premises.

6730 Table 859 shows all attributes of FeederLine.

6731

Table 859 – Attributes of ExtContainmentDistribution::FeederLine

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

6732

6733 Table 860 shows all association ends of FeederLine with other classes.

Table 860 – Association ends of ExtContainmentDistribution::FeederLine with other classes

6734

6735

mult from	name	mult to	type	description
0..*	PrimarySecondarySubstation	0..1	SecondarySubstation	(NC) The secondary substation for this feeder line.
0..1	Premises	0..*	Premises	(NC) The premises for this feeder line.
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
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6736

6737 **4.21.18 (NC) Premises**

6738 Inheritance path = EquipmentContainer : ConnectivityNodeContainer : PowerSystemResource :
6739 IdentifiedObject : ExtEulIdentifiedObject

6740 Contains equipment belonging to a site operated by a person or company, within which one or
6741 more installations are located. A premises may represent a household, building, shopping mall,
6742 campus, industrial facility, or other site that connects to the grid though one or more grid
6743 connections.

6744 Table 861 shows all attributes of Premises.

6745 **Table 861 – Attributes of ExtContainmentDistribution::Premises**

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

6746

6747 Table 862 shows all association ends of Premises with other classes.

6748 **Table 862 – Association ends of ExtContainmentDistribution::Premises with other**
6749 **classes**

mult from	name	mult to	type	description
0..*	BaseVoltage	0..1	BaseVoltage	(NC) The base voltage of the premises.
0..*	PrimaryFeederLine	0..1	FeederLine	(NC) The feeder line that has premises.
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
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6750