European Network of
Transmission System Operators
for Electricity

# NETWORK CODES CANONICAL EXTENSIONS SPECIFICATION

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APPROVED DOCUMENT
VERSION 2.3.2

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# 1 Introduction

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

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

This document is describing extensions to support:

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

# 2 Specification documents references

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

- ENTSO-E Regional Coordination Processes Data Exchange Specification;

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

# 3 Network codes extensions

## 3.1 General

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

## 3.2 ExtNetworkCodesCIMVersion root class

The version information assigned to the extensions defined for the need of network codes data exchanges.
Table 1 shows all attributes of ExtNetworkCodesCIMVersion.

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

| name | mult | type | description |
|---|---|---|---|
| date | 0..1 | Date | (const=2025-01-04) 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=2.3.2) European namespace URI. The last two elements in the URI (http://iec.ch/TC57/CIM100-EuropeanExtension/yy/zzz#) indicate major and minor versions where:<br>- yy - indicates a major version;<br>- zzz - indicates a minor version. |

## 3.3 Package ExtArea

### 3.3.1 General

This package contains the extensions related to the areas.

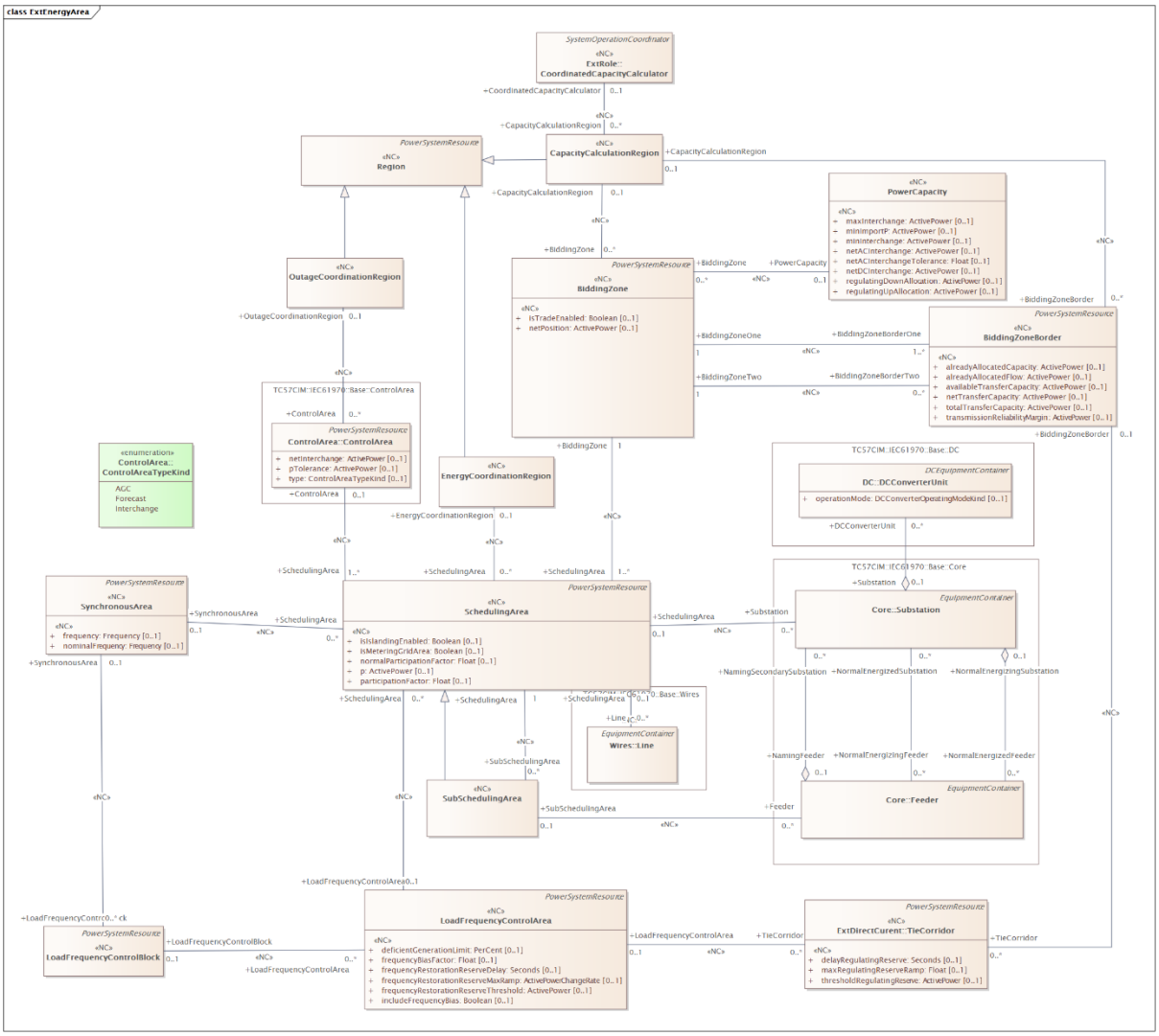



**Figure 1 – Class diagram ExtArea::ExtEnergyArea**

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

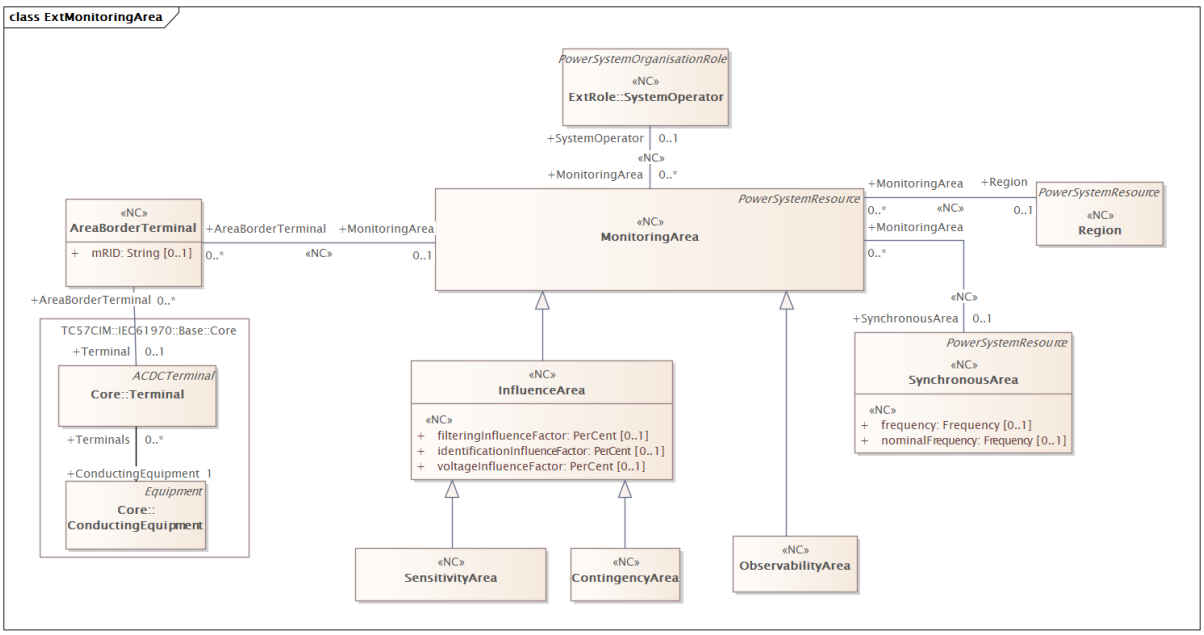



**Figure 2 – Class diagram ExtArea::ExtMonitoringArea**

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

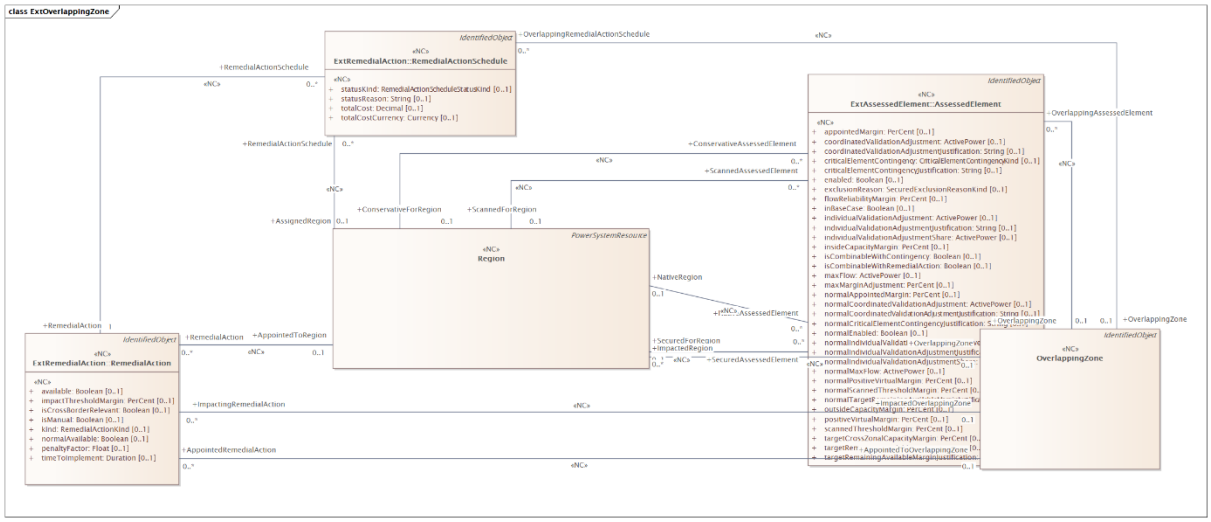



**Figure 3 – Class diagram ExtArea::ExtOverlappingZone**

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

### 3.3.2 (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.<br>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. |

### 3.3.3 (NC) BiddingZone

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

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 |
|---|---|---|---|---|
| 1..1 | SchedulingArea | 1..* | 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 whidh is asocciated to the bidding zone. |
| 1..1 | BiddingZoneBorderOne | 1..* | BiddingZoneBorder | (NC) The primary side of the border. |
| 1..1 | BiddingZoneBorderTwo | 0..* | BiddingZoneBorder | (NC) The secondary 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 |

### 3.3.4 (NC) BiddingZoneBorder

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
Defines the aggregated connection capacity between two Bidding Zones.
Table 6 shows all attributes of BiddingZoneBorder.

**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. |
| 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. |

| name | mult | type | description |
|---|---|---|---|
| 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. |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | 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 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 |
|---|---|---|---|---|
| 1..* | BiddingZoneOne | 1..1 | BiddingZone | (NC) The bidding zone for the primary side. |
| 0..* | BiddingZoneTwo | 1..1 | BiddingZone | (NC) The bidding zone for the secondary 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. |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |

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

### 3.3.5 (NC) CapacityCalculationRegion

Inheritance path = Region : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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 |
| 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 |

| 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 |

### 3.3.6 (NC) ContingencyArea

Inheritance path = InfluenceArea : MonitoringArea : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 10 shows all attributes of ContingencyArea.

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

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

**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 |

| 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 |

### 3.3.7 (NC) EnergyCoordinationRegion

Inheritance path = Region : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 12 shows all attributes of EnergyCoordinationRegion.

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

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

**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 |
| 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 |

| 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 |

### 3.3.8 (NC) InfluenceArea

Inheritance path = MonitoringArea : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 14 shows all attributes of InfluenceArea.

**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.<br>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.<br>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.<br>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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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 |

| 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 |

### 3.3.9 (NC) LoadFrequencyControlArea

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
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. |
| 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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 |

### 3.3.10 (NC) LoadFrequencyControlBlock

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
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.

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

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

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

| 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 |

### 3.3.11 (NC) MonitoringArea

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
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.
Table 20 shows all attributes of MonitoringArea.

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

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

**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. |

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 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 |

### 3.3.12 (NC) ObservabilityArea

Inheritance path = MonitoringArea : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 22 shows all attributes of ObservabilityArea.

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

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

**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 |
| 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 |

| 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 |

### 3.3.13 (NC) OutageCoordinationRegion

Inheritance path = Region : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 24 shows all attributes of OutageCoordinationRegion.

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

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

**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. |
| 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 |

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

### 3.3.14 (NC) OverlappingZone

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
A collection of all the overlapping cross border assessed elements which have the same sets of impacted and impacting regions.
Table 26 shows all attributes of OverlappingZone.

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

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

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

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | ImpactingRemedialAction | 0..* | RemedialAction | (NC) The remedial action that is impacting an overlapping zone. |
| 0..1 | AppointedRemedialAction | 0..* | RemedialAction | (NC) The appointed remedial action that is appointed to an overlapping zone. |
| 0..1 | OverlappingAssessedElement | 0..* | AssessedElement | (NC) The overlapping assessed element on which the physical flows are significantly impacted by<br>electricity exchanges in two or more regions or by remedial actions from two or more regions. |

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | OverlappingRemedialActionSchedule | 0..* | RemedialActionSchedule | (NC) The remedial action schedule which is overlapping for this zone. |
| 0..1 | ImpactedRegion | 0..* | Region | (NC) The region that is impacted by this overlapping zone. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.3.15 (NC) Region

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
A region where the system operator belongs to.
Table 28 shows all attributes of Region.

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

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

**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. |
| 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. |

| 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 |

### 3.3.16 (NC) ScheduleResource

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
A schedule resource is a market-based method for handling participation of small units, particularly located on the lower voltage level that is controlled by a Distributed System Operator (DSO). It is a collection of units that can operate in the market by providing bids, offers and a resulting committed operational schedule for the collection.
Table 30 shows all attributes of ScheduleResource.

**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.<br>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).<br>In the case of priority strategy, the item with the lowest number gets allocated energy first. |
| p | 0..1 | ActivePower | (NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node. |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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 | AreaDispatchableUnit | 0..1 | AreaDispatchableUnit | (NC) The dispatchable unit for this scheduled resource. |
| 0..1 | PowerElectronicsUnit | 0..* | PowerElectronicsUnit | (NC) The power electronics unit that relates to this schedule resource. |
| 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..* | 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 |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.3.17 (NC) SchedulingArea

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
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.
Table 32 shows all attributes of SchedulingArea.

**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 | 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.<br>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).<br>In the case of priority strategy, the item with the lowest number gets allocated energy first. |
| 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.<br>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).<br>In the case of priority strategy, the item with the lowest number gets allocated energy first. |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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 | DCTieCorridor | 0..1 | DCTieCorridor | (NC) The DC tie corridor that is part of this scheduling area. |
| 1..* | ControlArea | 0..1 | ControlArea | (NC) The control area for this scheduling area. |
| 0..1 | Line | 0..* | Line | (NC) The line that is part of this scheduling area. |

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | Substation | 0..* | Substation | (NC) The substation that is part of this scheduling area. |
| 0..1 | PowerSchedule | 0..* | PowerSchedule | Power schedule which belongs to the scheduling area. |
| 1..* | BiddingZone | 1..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. |
| 1..1 | SubSchedulingArea | 0..* | SubSchedulingArea | (NC) The subscheduling are that belongs to this 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..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.3.18 (NC) SensitivityArea

Inheritance path = InfluenceArea : MonitoringArea : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

A monitoring area that defines the required observability area given by the sensitivity factors. Table 34 shows all attributes of SensitivityArea.

**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 |

| 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 35 shows all association ends of SensitivityArea with other classes.

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

### 3.3.19 (NC) SubSchedulingArea

Inheritance path = SchedulingArea : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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 |

| name | mult | type | description |
|---|---|---|---|
| isMeteringGridArea | 0..1 | Boolean | (NC) inherited from: SchedulingArea |
| normalParticipationFactor | 0..1 | Float | (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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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..* | SchedulingArea | 1..1 | SchedulingArea | (NC) The scheduling area that has this subscheduling area. |
| 0..1 | Feeder | 0..* | Feeder | (NC) The feeder that is part of this subscheduling area. |
| 0..1 | DCTieCorridor | 0..1 | DCTieCorridor | (NC) inherited from: SchedulingArea |
| 1..* | ControlArea | 0..1 | ControlArea | (NC) inherited from: SchedulingArea |
| 0..1 | Line | 0..* | Line | (NC) inherited from: SchedulingArea |
| 0..1 | Substation | 0..* | Substation | (NC) inherited from: SchedulingArea |
| 0..1 | PowerSchedule | 0..* | PowerSchedule | inherited from: SchedulingArea |
| 1..* | BiddingZone | 1..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 |
| 1..1 | SubSchedulingArea | 0..* | SubSchedulingArea | (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..* | 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 |

### 3.3.20 (NC) SynchronousArea

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
A synchronous area is an electrical area covered by interconnect with a common system frequency in a steady-state.
Table 38 shows all attributes of SynchronousArea.

**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 |
| description | 0..1 | String | 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 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 |

| 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 |

### 3.3.21 (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. |
| 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 | BiddingZone | 0..* | BiddingZone | (NC) Bidding zone which has a power capacity. |

## 3.4 Assessed element extensions

### 3.4.1 General

This package contains the extensions related to the assessed element.

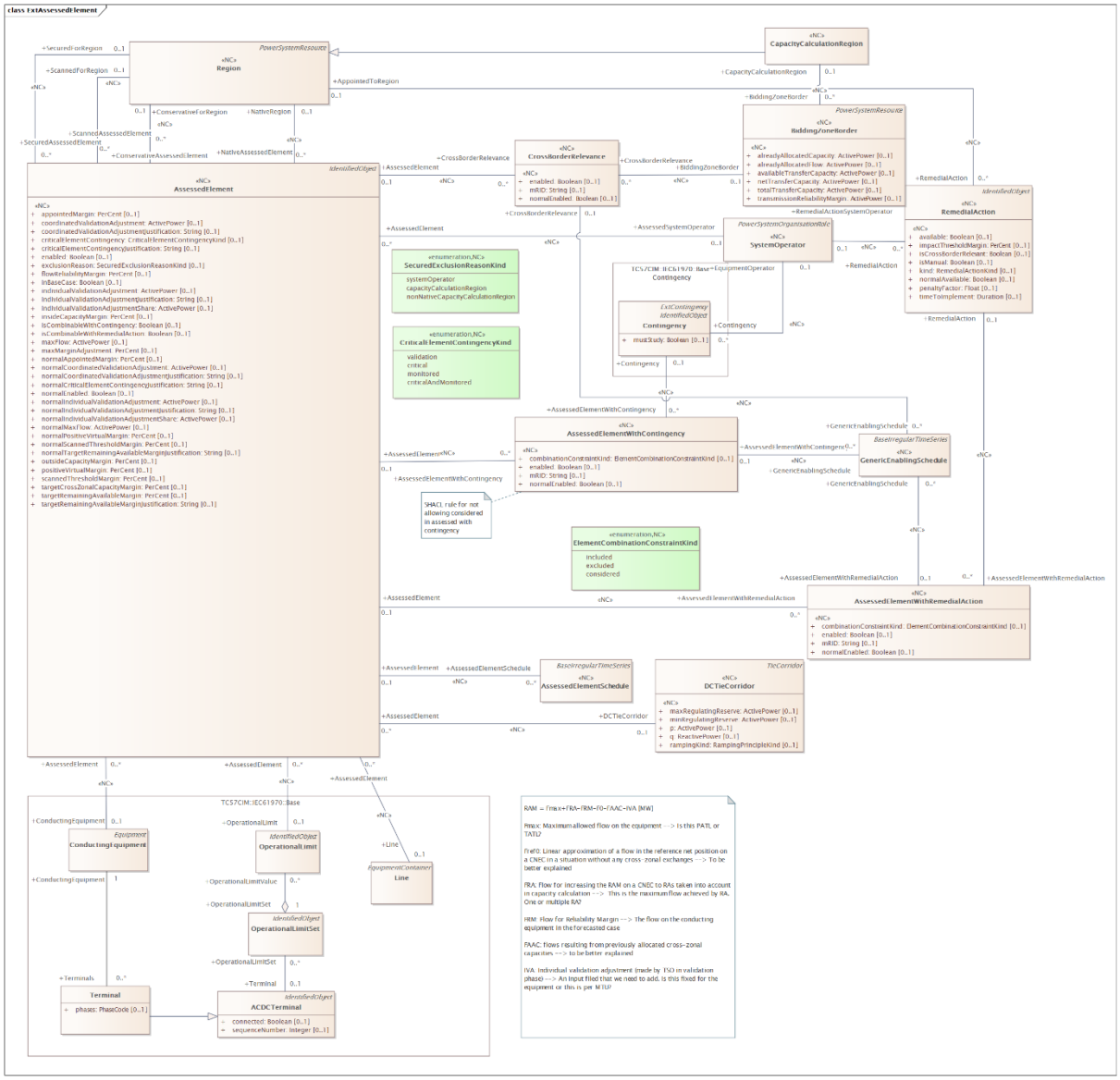



**Figure 4 – Class diagram ExtAssessedElement::ExtAssessedElement**

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

### 3.4.2 (NC) AssessedElement

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Assessed element is a network element for which the electrical state is evaluated in the regional or cross-regional process and which value is expected to fulfil regional rules function of the operational security limits.
The measurements and limits are as defined in the steady state hypothesis.
Table 42 shows all attributes of AssessedElement.

1760 **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.<br>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.<br>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%.<br>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.<br>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.<br>The allowed value range is [0,100]. |
| criticalElementContingency | 0..1 | CriticalElementContingencyKind | (NC) Indicates the type of the critical element contingency. |
| maxMarginAdjustment | 0..1 | PerCent | (NC) Maximum adjustment, relative to maximum flow allowed for exceeding the maximum flow of this assessed element.<br>The allowed value range is [0,100]. |
| flowReliabilityMargin | 0..1 | PerCent | (NC) Percentage of the maximum flow (margin) reserved to anticipate forecasting errors.<br>The allowed value range is [0,100]. |
| targetRemainingAvailableMargin | 0..1 | PerCent | (NC) Target for the remaining available margin as a percentage of maximum flow.<br>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 |

| name | mult | type | description |
|---|---|---|---|
| | | | 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.<br>It is only used when an assessed element is considered conservative for a region.<br>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.<br>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.<br>All relevant operational limits (e.g. PATL, TATL, etc) are modified by this margin value. The attribute represents the increase.<br>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).<br>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. |
| 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. |
| 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 |

| name | mult | type | description |
|---|---|---|---|
| | | | threshold margin, the new maximum is 115% of the limit (e.g. PATL, TATL, etc).<br>The allowed value range is [0,100]. |
| appointedMargin | 0..1 | PerCent | (NC) The percentage (appointed to a region) of the remaining margin obtained in the grid model to reach its current limit under normal operating conditions. The maximum percentage shall by default be 10% of the remaining margin.<br>It is only used when an assessed element is considered conservative for a region.<br>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. |
| criticalElementContingencyJustification | 0..1 | String | (NC) Free text describing the justification of critical element contingency 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. |

| name | mult | type | description |
|---|---|---|---|
| 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 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. |
| normalCriticalElementContingencyJustification | 0..1 | String | (NC) Normal free text describing the justification of critical element contingency 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. |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | 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..* | 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. |
| 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. |

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | OperationalLimit | 0..1 | OperationalLimit | (NC) The terminal limit that is being assessed against. |
| 0..* | AssessedPowerTransferCorridor | 0..1 | PowerTransferCorridor | (NC) The power transfer corridor that is designated as an assessed element. |
| 0..* | ConductingEquipment | 0..1 | ConductingEquipment | (NC) The conducting equipment that is designated as an assessed element, i.e. the equipment that is assessed. |
| 0..1 | AssessedElementSchedule | 0..* | AssessedElementSchedule | (NC) Assessed element schedule for an assessed element. |
| 0..* | Line | 0..1 | Line | (NC) The line that is designated as an assessed element, i.e. the equipment that is assessed. |
| 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 |

### 3.4.3 (NC) AssessedElementWithContingency root class

Combination of an assessed element and a contingency.
Table 44 shows all attributes of AssessedElementWithContingency.

**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 |

| name | mult | type | description |
|---|---|---|---|
| | | | 4122, for the mRID. The use of UUID is strongly recommended.<br>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. |

### 3.4.4 (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.<br>For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |
| combinationConstraintKind | 0..1 | ElementCombinationConstraintKind | (NC) Defines the combination constraint of the AssessedElement and Remedial Action. If included, this remedial action is only assessed for this assessed element. Else if excluded, this remedial action should not be used for this assessed element. Else if considered, this |

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

Table 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. |

### 3.4.5 (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. |

### 3.4.6 (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. |

### 3.4.7 (NC) CriticalElementContingencyKind enumeration

The kind of critical element contingency.
Table 50 shows all literals of CriticalElementContingencyKind.

**Table 50 – Literals of ExtAssessedElement::CriticalElementContingencyKind**

| 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). |

### 3.4.8 (NC) CrossBorderRelevance root class

Combination of an assessed element and one or more bidding zone border that are affected by the assessment.
Table 51 shows all attributes of CrossBorderRelevance.

**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.<br>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. |

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

**Table 52 – Association ends of ExtAssessedElement::CrossBorderRelevance with other classes**

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

## 3.5 Package ExtAvailabilitySchedule

### 3.5.1 General

This package contains the extensions related to the availability schedule.

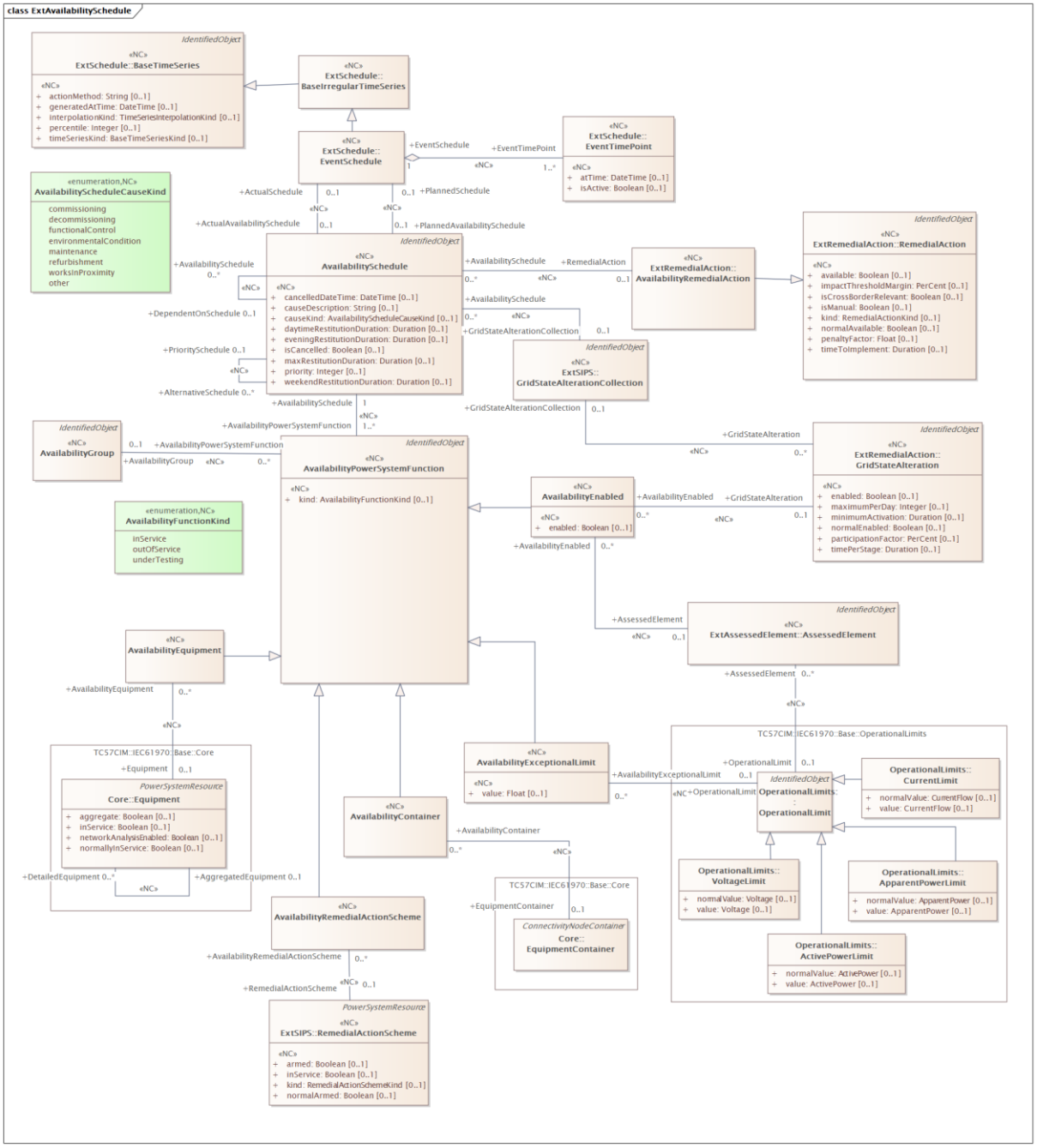



**Figure 5 – Class diagram ExtAvailabilitySchedule::ExtAvailabilitySchedule**

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

### 3.5.2 (NC) AvailabilityEnabled

Inheritance path = AvailabilityPowerSystemFunction : IdentifiedObject : ExtEuIdentifiedObject

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.

**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 |

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

**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 |

### 3.5.3 (NC) AvailabilityContainer

Inheritance path = AvailabilityPowerSystemFunction : IdentifiedObject : ExtEuIdentifiedObject
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.
Table 55 shows all attributes of AvailabilityContainer.

**Table 55 – Attributes of ExtAvailabilitySchedule::AvailabilityContainer**

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

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

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 |

### 3.5.4 (NC) AvailabilityEquipment

Inheritance path = AvailabilityPowerSystemFunction : IdentifiedObject : ExtEuIdentifiedObject
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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**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 |

### 3.5.5 (NC) AvailabilityExceptionalLimit

Inheritance path = AvailabilityPowerSystemFunction : IdentifiedObject : ExtEuIdentifiedObject
Availability exceptional limit serves for associating an operational limit restriction with an availability schedule. For instance, enabling or disabling the current limit on ACLineSegment terminal in combination with other availability functions with the same availability schedule or de-rating due to fault.
Table 59 shows all attributes of AvailabilityExceptionalLimit.

**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 |

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 |

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

### 3.5.6 (NC) AvailabilityGroup

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Container to link relevant equipment that is affected by (un)availability schedule across availability coordinator (e.g. TSO-TSO, TSO-DSO or DSO-DSO).
Table 61 shows all attributes of AvailabilityGroup.

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

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

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

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | AvailabilityPowerSystem Function | 0..* | AvailabilityPowerSystem Function | (NC) All availability power system functions linked through mutual dependency with other availability power system functions controlled by other system operators. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.5.7 (NC) AvailabilityPowerSystemFunction

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
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

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

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

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

**Table 64 – Association ends of 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 |

### 3.5.8 (NC) AvailabilityRemedialActionScheme

Inheritance path = AvailabilityPowerSystemFunction : IdentifiedObject : ExtEuIdentifiedObject
Availability remedial action scheme serves for associating a remedial action scheme with an availability schedule. For instance, taking in or out of service a SIPS / SPS due to communication issue, in combination with other availability functions with the same availability schedule.
Table 65 shows all attributes of AvailabilityRemedialActionScheme.

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

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 |

### 3.5.9 (NC) AvailabilitySchedule

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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/SPSs, 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 |

### 3.5.10 (NC) AvailabilityFunctionKind enumeration

Kind of availability that is affecting the function.
Table 69 shows all literals of AvailabilityFunctionKind.

**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. |

### 3.5.11 (NC) AvailabilityScheduleCauseKind enumeration

The kinds of cause of the (un)availability schedule.
Table 70 shows all literals of AvailabilityScheduleCauseKind.

**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. |

## 3.6 Package ExtCIM18

### 3.6.1 General

### 3.6.2 (NC) VoltageAngleLimit

Inheritance path = OperationalLimit : IdentifiedObject : ExtEuIdentifiedObject
Voltage angle limit between two terminals. The association end OperationalLimitSet.Terminal defines one end and the host of the limit. The association end VoltageAngleLimit.AngleReferenceTerminal defines the reference terminal.
Table 71 shows all attributes of VoltageAngleLimit.

**Table 71 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 72 – 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 |

### 3.6.3 Package ExtControl

#### 3.6.3.1 General

The package contains extensions related to control.

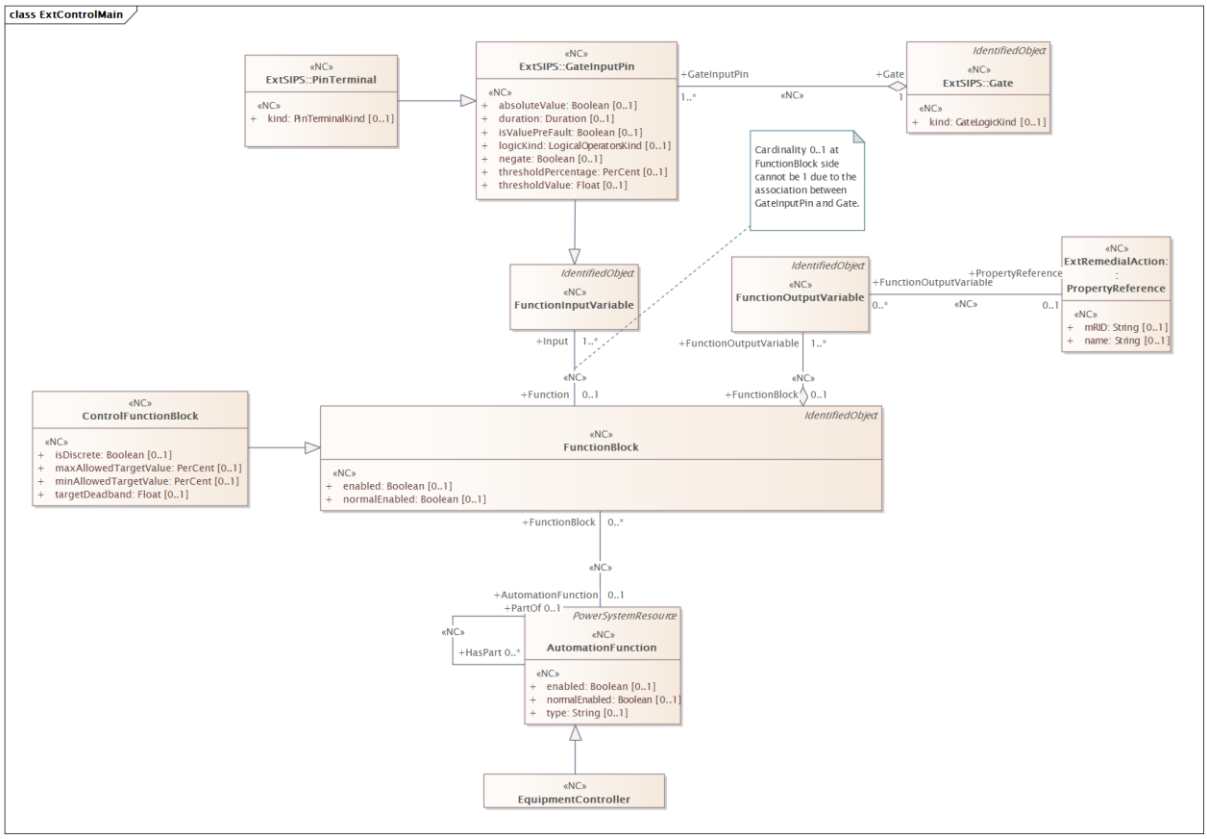



**Figure 6 – Class diagram ExtControl::ExtControlMain**

Figure 6: The diagram contains main classes and associations related to control.

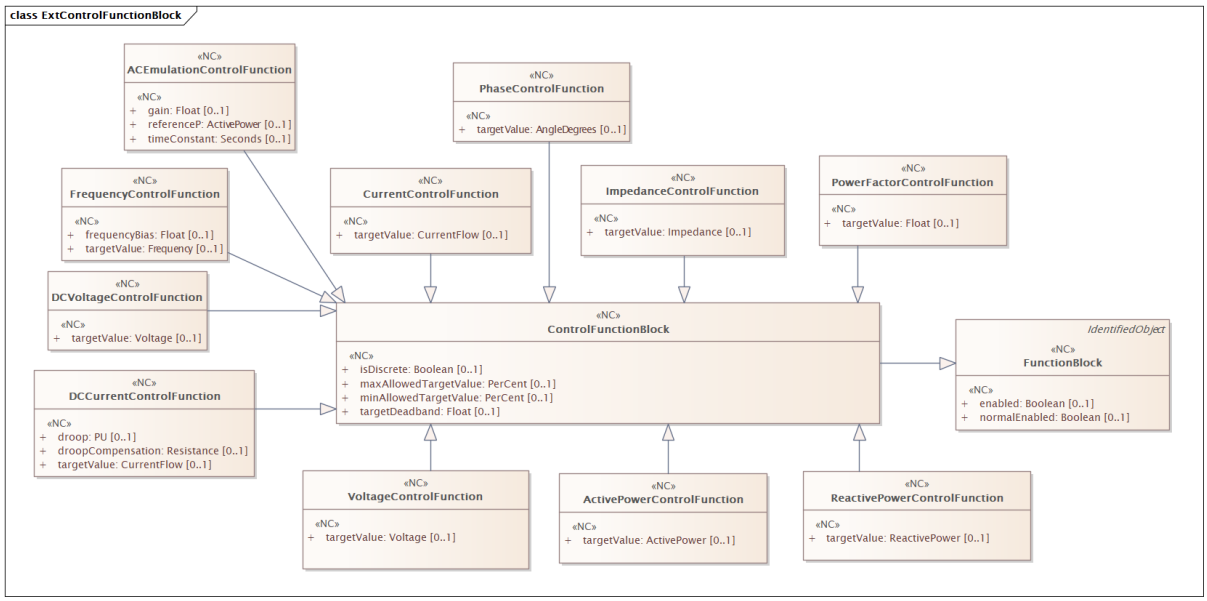



**Figure 7 – Class diagram ExtControl::ExtControlFunctionBlock**

Figure 7: The diagram contains classes and association related to control function block.

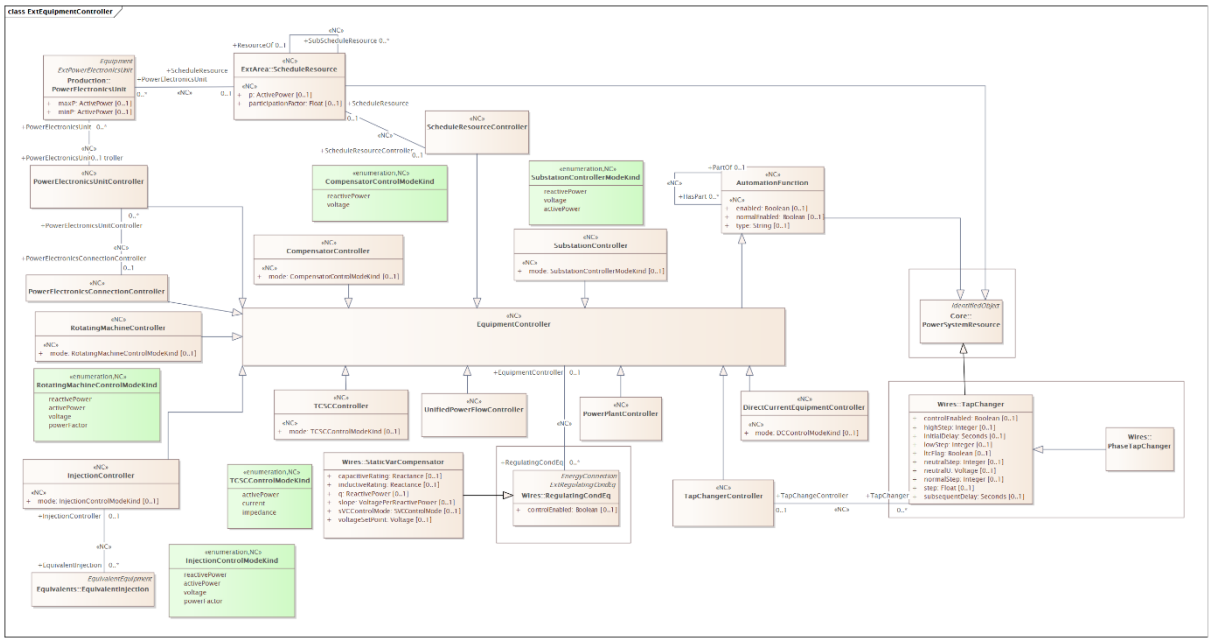



**Figure 8 – Class diagram ExtControl::ExtEquipmentController**

Figure 8:

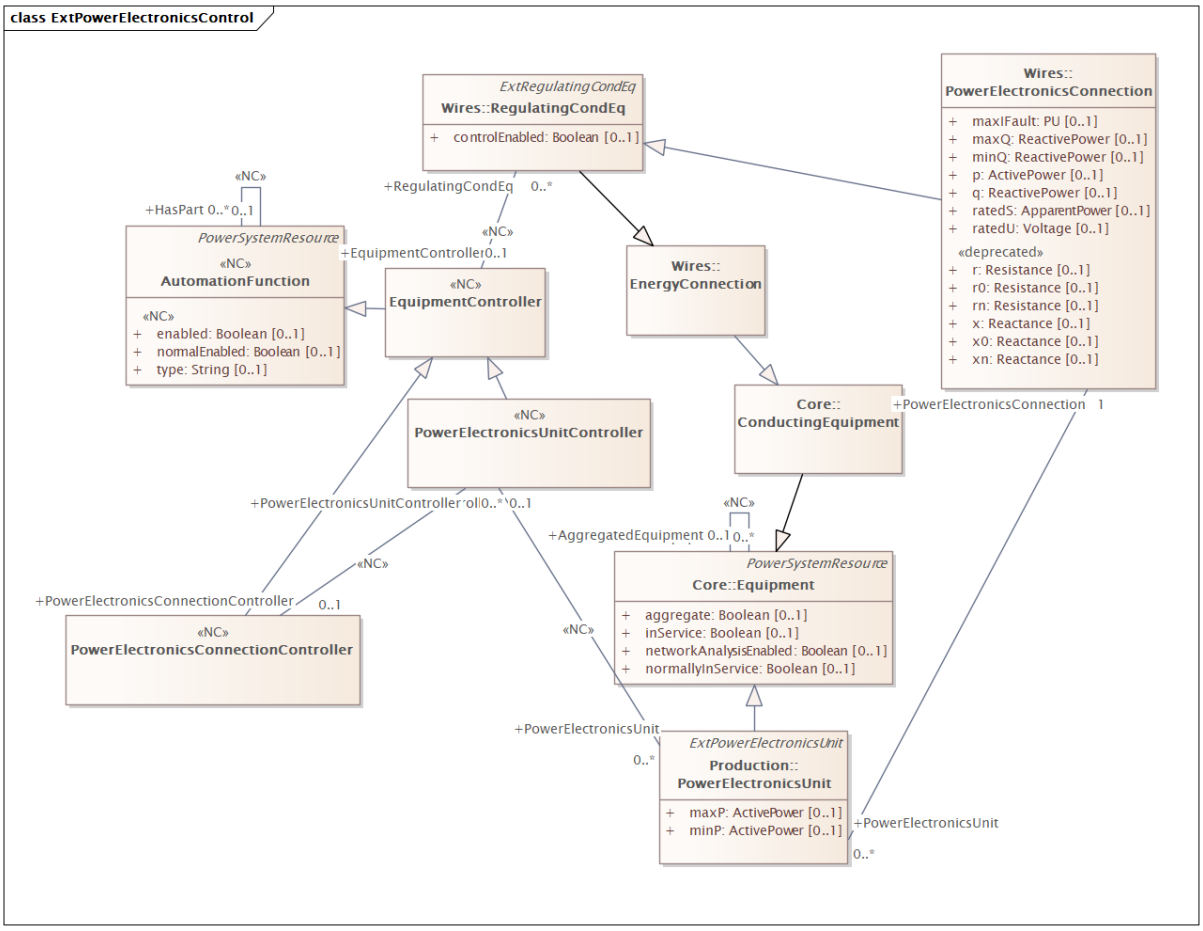



**Figure 9 – Class diagram ExtControl::ExtPowerElectronicsControl**

Figure 9:

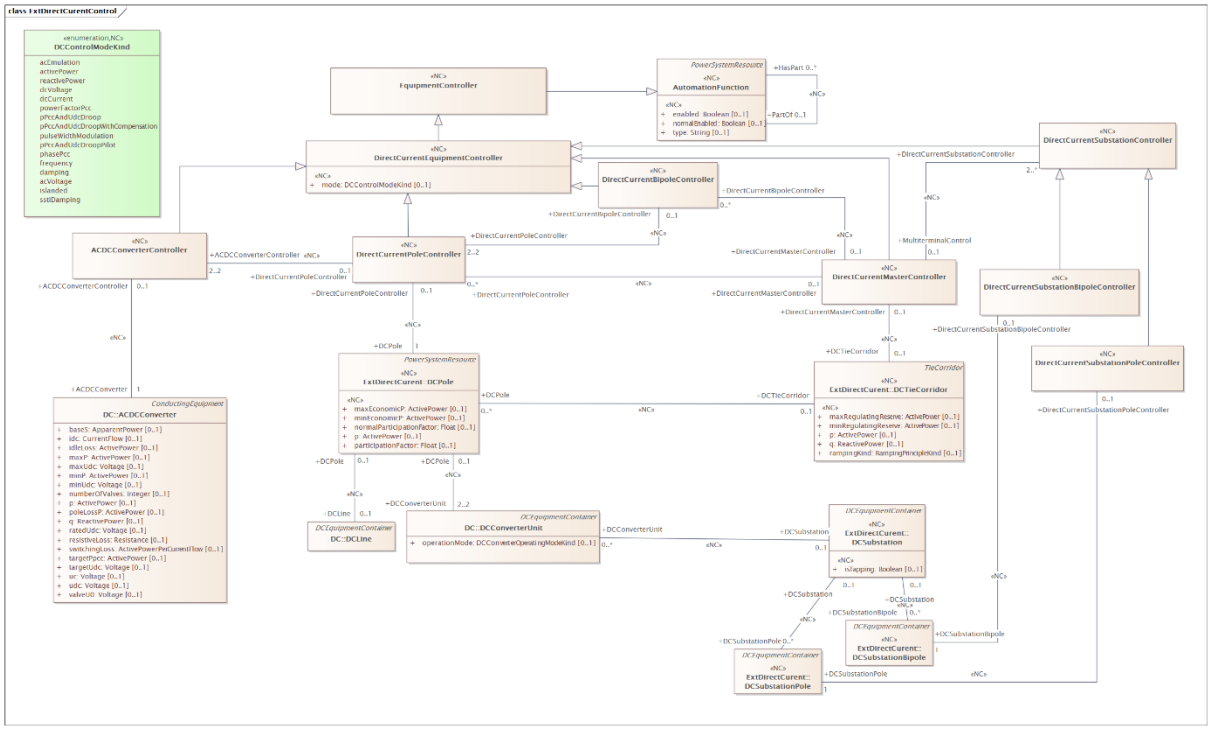



**Figure 10 – Class diagram ExtControl::ExtDirectCurentControl**

Figure 10: The diagram contains classes related to direct current control.

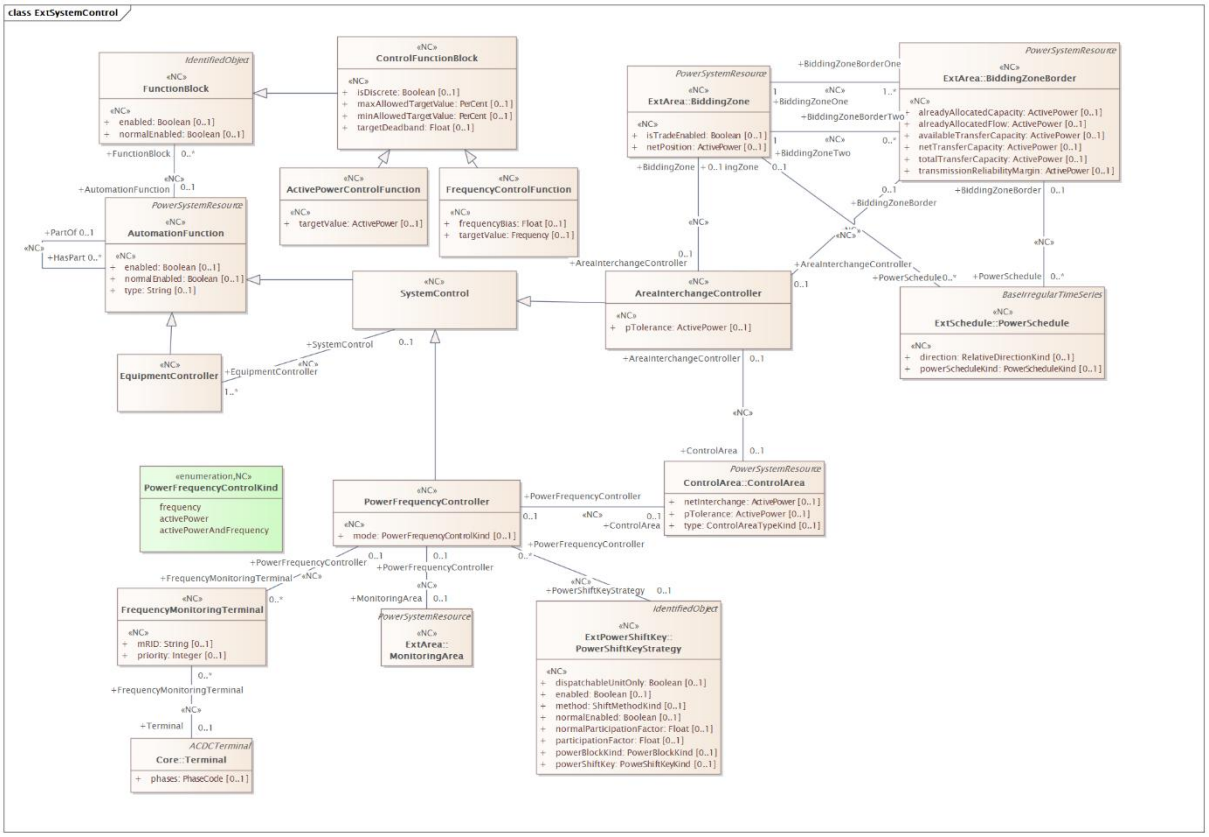



**Figure 11 – Class diagram ExtControl::ExtSystemControl**

Figure 11: The diagram contains classes related to integrated AC and DC system control.

### 3.6.3.2 (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 73 shows all attributes of ActivePowerControlFunction.

**Table 73 – 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 |
| 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 74 shows all association ends of ActivePowerControlFunction with other classes.

**Table 74 – 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..* | AutomationFunction | 0..1 | AutomationFunction | (NC) inherited from: FunctionBlock |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

#### 3.6.3.3 (NC) AutomationFunction

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
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 75 shows all attributes of AutomationFunction.

**Table 75 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 76 shows all association ends of AutomationFunction with other classes.

**Table 76 – Association ends of ExtControl::AutomationFunction with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) Automation block group which belongs to an automation function. |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (NC) Enabling schedule associated 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 |

### 3.6.3.4 (NC) CompensatorController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Compensator controller is controlling the equipment to optimize the use of the compensators.

Table 77 shows all attributes of CompensatorController.

**Table 77 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 78 shows all association ends of CompensatorController with other classes.

**Table 78 – 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 |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (NC) inherited from: AutomationFunction |
| 0..1 | HasPart | 0..* | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..1 | FunctionBlock | 0..* | FunctionBlock | (NC) inherited from: AutomationFunction |
| 0..* | PartOf | 0..1 | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.3.5 (NC) ControlFunctionBlock

Inheritance path = FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

Control function block is a function block that contains an algorithm for controlling the equipment.

Table 79 shows all attributes of ControlFunctionBlock.

**Table 79 – 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.<br>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.<br>The allowed value range is [0,100]. |
| minAllowedTargetValue | 0..1 | PerCent | (NC) Minimum allowed target value given by the percent of target value. |

| name | mult | type | description |
|---|---|---|---|
| | | | 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 80 shows all association ends of ControlFunctionBlock with other classes.

**Table 80 – 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..* | AutomationFunction | 0..1 | AutomationFunction | (NC) inherited from: FunctionBlock |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

#### 3.6.3.6 (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 that 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 81 shows all attributes of DirectCurrentMasterController.

**Table 81 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 82 – Association ends of ExtControl::DirectCurrentMasterController with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | DCTieCorridor | 0..1 | DCTieCorridor | (NC) DCTieCorridor controlled by this direct current master controller. |
| 0..1 | DirectCurrentPoleController | 0..* | DirectCurrentPoleController | (NC) DC pole controller that is controlled by this DC master controller. |
| 0..1 | DirectCurrentSubstationController | 2..* | DirectCurrentSubstationController | (NC) DC substation controller controlled by a multiterminal control. |
| 0..1 | DirectCurrentBipoleController | 0..* | DirectCurrentBipoleController | (NC) Direct current bipole controller which belongs to a direct current master controller. |
| 0..1 | RegulatingCondEq | 0..* | RegulatingCondEq | (NC) inherited from: EquipmentController |
| 1..1 | EquipmentControllerAction | 0..* | EquipmentControllerAction | (NC) inherited from: EquipmentController |
| 1..* | SystemControl | 0..1 | SystemControl | (NC) inherited from: EquipmentController |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

#### 3.6.3.7 (NC) EquipmentController

Inheritance path = AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Equipment controller is an automation function that can control one or multiple equipment function to achieve all the targets inside the given tolerance.

Table 83 shows all attributes of EquipmentController.

**Table 83 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 84 – 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. |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (NC) inherited from: AutomationFunction |
| 0..1 | HasPart | 0..* | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..1 | FunctionBlock | 0..* | FunctionBlock | (NC) inherited from: AutomationFunction |
| 0..* | PartOf | 0..1 | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |

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

#### 3.6.3.8 (NC) ScheduleResourceController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Schedule resource controller is controlling the equipment to optimize the schedule resource.

Table 85 shows all attributes of ScheduleResourceController.

**Table 85 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 86 – Association ends of ExtControl::ScheduleResourceController with other 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 |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (NC) inherited from: AutomationFunction |
| 0..1 | HasPart | 0..* | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..1 | FunctionBlock | 0..* | FunctionBlock | (NC) inherited from: AutomationFunction |
| 0..* | PartOf | 0..1 | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |

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

#### 3.6.3.9 (NC) FunctionBlock

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Function block is a function described as a set of elementary blocks. The blocks describe the function between input variables and output variables.
Table 87 shows all attributes of FunctionBlock.

**Table 87 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 88 – Association ends of ExtControl::FunctionBlock with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | AutomationFunction | 0..1 | AutomationFunction | (NC) Automation function describe automation that this function block is part of. |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (NC) Enabling schedule associated to a function block. |
| 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. |
| 1..* | AutomationBlockGroup | 0..1 | AutomationBlockGroup | (NC) Automation block group which has function blocks. |

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

### 3.6.3.10 (NC) FunctionInputVariable

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Functional input variable defines the domain of the function.
Table 89 shows all attributes of FunctionInputVariable.

**Table 89 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 90 shows all association ends of FunctionInputVariable with other classes.

**Table 90 – 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 |

### 3.6.3.11 (NC) FunctionOutputVariable

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Functional output variable defines the codomain of the function.
Table 91 shows all attributes of FunctionOutputVariable.

**Table 91 – Attributes of ExtControl::FunctionOutputVariable**

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

| name | 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 92 shows all association ends of FunctionOutputVariable with other classes.

**Table 92 – Association ends of ExtControl::FunctionOutputVariable with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | FunctionBlock | 0..1 | FunctionBlock | (NC) Function block describe the function that function output variable provides the codomain for. |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) Property reference refers to a given class and property that is populated by the function output variable. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.3.12 (NC) ImpedanceControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

Impedance control function is a function block that calculates the operating point of the controlled equipment to achieve the target impedance.

Table 93 shows all attributes of ImpedanceControlFunction.

**Table 93 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 94 shows all association ends of ImpedanceControlFunction with other classes.

**Table 94 – 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..* | AutomationFunction | 0..1 | AutomationFunction | (NC) inherited from: FunctionBlock |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

### 3.6.3.13 (NC) PowerFactorControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

Power factor control function is a function block that calculates the operating point of the controlled equipment to achieve the target power factor.

Table 95 shows all attributes of PowerFactorControlFunction.

**Table 95 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 96 shows all association ends of PowerFactorControlFunction with other classes.

**Table 96 – Association ends of ExtControl::PowerFactorControlFunction with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..1 | ControlFunctionBlockAction | 0..* | ControlFunctionBlockAction | (NC) inherited from: ControlFunctionBlock |
| 0..* | AutomationFunction | 0..1 | AutomationFunction | (NC) inherited from: FunctionBlock |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

### 3.6.3.14 (NC) PowerPlantController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Power plant controller is controlling the equipment of a power plant.

Table 97 shows all attributes of PowerPlantController.

**Table 97 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 98 shows all association ends of PowerPlantController with other classes.

**Table 98 – 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 |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |

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

#### 3.6.3.15 (NC) ReactivePowerControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

Reactive power control function is a function block that calculate the operating point of the controlled equipment to achieve the target reactive power.

Table 99 shows all attributes of ReactivePowerControlFunction.

**Table 99 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 100 – Association ends of ExtControl::ReactivePowerControlFunction with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..1 | ControlFunctionBlockAction | 0..* | ControlFunctionBlockAction | (NC) inherited from: ControlFunctionBlock |
| 0..* | AutomationFunction | 0..1 | AutomationFunction | (NC) inherited from: FunctionBlock |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

### 3.6.3.16 (NC) StaticSynchronousSeriesCompensator

Inheritance path = FACTSEquipment : RegulatingCondEq : EnergyConnection : ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Static synchronous series compensator (SSSC) is a type of flexible AC transmission system which consists of a solid-state voltage source inverter coupled with a transformer that is connected in series with a transmission line. This device can inject an almost sinusoidal voltage in series with the line. This injected voltage could be considered as an inductive or capacitive reactance, which is connected in series with the transmission line. This feature can provide controllable voltage compensation. In addition, SSSC is able to reverse the power flow by injecting a sufficiently large series reactive compensating voltage. Moreover it can inject a voltage proportional to the difference between the line current and the pre-configured current threshold. It shall have two Terminal-s associated with it.

Table 101 shows all attributes of StaticSynchronousSeriesCompensator.

**Table 101 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 102 – 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 | Faults | 0..* | Fault | 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..* | 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 |

### 3.6.3.17 (NC) SubstationController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Substation controller is controlling the equipment to optimize the use of the controlling equipment within a substation.

Table 103 shows all attributes of SubstationController.

**Table 103 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 104 – 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 |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

#### 3.6.3.18 (NC) TapChangerController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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 105 shows all attributes of TapChangerController.

**Table 105 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 106 shows all association ends of TapChangerController with other classes.

**Table 106 – 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 |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

#### 3.6.3.19 (NC) UnifiedPowerFlowController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
Unified power flow controller (UPFC) is providing fast-acting reactive power compensation on high-voltage electricity transmission networks.
Table 107 shows all attributes of UnifiedPowerFlowController.

**Table 107 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 108 – Association ends of ExtControl::UnifiedPowerFlowController with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | RegulatingCondEq | 0..* | RegulatingCondEq | (NC) inherited from: EquipmentController |
| 1..1 | EquipmentControllerAction | 0..* | EquipmentControllerAction | (NC) inherited from: EquipmentController |
| 1..* | SystemControl | 0..1 | SystemControl | (NC) inherited from: EquipmentController |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (NC) inherited from: AutomationFunction |
| 0..1 | HasPart | 0..* | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..1 | FunctionBlock | 0..* | FunctionBlock | (NC) inherited from: AutomationFunction |
| 0..* | PartOf | 0..1 | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |

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

### 3.6.3.20 (NC) VoltageControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

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

Table 109 shows all attributes of VoltageControlFunction.

**Table 109 – 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 |

Table 110 shows all association ends of VoltageControlFunction with other classes.

**Table 110 – 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..* | AutomationFunction | 0..1 | AutomationFunction | (NC) inherited from: FunctionBlock |

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

#### 3.6.3.21 (NC) CompensatorControlModeKind enumeration

Kind of compensator controller mode.
Table 111 shows all literals of CompensatorControlModeKind.

**Table 111 – Literals of ExtControl::CompensatorControlModeKind**

| literal | value | description |
|---|---|---|
| reactivePower | | Reactive power control. |
| voltage | | Voltage control. |

#### 3.6.3.22 (NC) SubstationControllerModeKind enumeration

Kind of substation controller mode.
Table 112 shows all literals of SubstationControllerModeKind.

**Table 112 – 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.. |

#### 3.6.3.23 (NC) RotatingMachineController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
Rotating machine controller is controlling the equipment which may be used as a generator or motor.
Table 113 shows all attributes of RotatingMachineController.

**Table 113 – 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 |

| name | mult | type | description |
|---|---|---|---|
| type | 0..1 | String | (NC) inherited from: AutomationFunction |
| normalEnabled | 0..1 | Boolean | (NC) inherited from: AutomationFunction |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 114 – 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 |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (NC) inherited from: AutomationFunction |
| 0..1 | HasPart | 0..* | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..1 | FunctionBlock | 0..* | FunctionBlock | (NC) inherited from: AutomationFunction |
| 0..* | PartOf | 0..1 | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.3.24 (NC) InjectionController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Injection controller is controlling the equipment which represents an injection or an external network.

Table 115 shows all attributes of InjectionController.

**Table 115 – Attributes of ExtControl::InjectionController**

| name | mult | type | description |
|---|---|---|---|
| mode | 0..1 | InjectionControlModeKind | (NC) Mode of the injection controller. |
| enabled | 0..1 | Boolean | (NC) inherited from: AutomationFunction |
| type | 0..1 | String | (NC) inherited from: AutomationFunction |
| normalEnabled | 0..1 | Boolean | (NC) inherited from: AutomationFunction |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 116 shows all association ends of InjectionController with other classes.

**Table 116 – 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 |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (NC) inherited from: AutomationFunction |
| 0..1 | HasPart | 0..* | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..1 | FunctionBlock | 0..* | FunctionBlock | (NC) inherited from: AutomationFunction |
| 0..* | PartOf | 0..1 | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.3.25 (NC) RotatingMachineControlModeKind enumeration

Kind of rotating machine controller mode.
Table 117 shows all literals of RotatingMachineControlModeKind.

**Table 117 – Literals of ExtControl::RotatingMachineControlModeKind**

| literal | value | description |
|---|---|---|
| reactivePower | | Reactive power control. |
| voltage | | Voltage control. |
| powerFactor | | Power factor is specified. |
| activePower | | Active power is specified. |

### 3.6.3.26 (NC) InjectionControlModeKind enumeration

Kind of injection controller mode.
Table 118 shows all literals of InjectionControlModeKind.

**Table 118 – Literals of ExtControl::InjectionControlModeKind**

| literal | value | description |
|---|---|---|
| reactivePower | | Reactive power control. |
| activePower | | Active power is specified. |
| voltage | | Voltage control. |
| powerFactor | | Power factor is specified. |

### 3.6.3.27 (NC) CurrentControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject
Current control function is a function block that calculates the operating point of the controlled equipment to achieve the target current.
Table 119 shows all attributes of CurrentControlFunction.

**Table 119 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 120 – 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..* | AutomationFunction | 0..1 | AutomationFunction | (NC) inherited from: FunctionBlock |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

### 3.6.3.28 (NC) DCControlModeKind enumeration

Kind of DC control mode.

Table 121 shows all literals of DCControlModeKind.

**Table 121 – Literals of ExtControl::DCControlModeKind**

| literal | value | description |
|---|---|---|
| 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). |
| reactivePower | | Control is reactive power control at AC side, at point of common coupling. According to IEC 60633 reactive power control mode is a control of the reactive power exchanged between a converter unit, or DC substation and the connected AC network. |
| 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 |

| literal | value | description |
|---|---|---|
| | | 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.<br>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.<br>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. |
| 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. |
| 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. |

### 3.6.3.29 (NC) PhaseControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

Phase control function is a function block that calculate the operating point of the controlled equipment to achieve the target voltage.

Table 122 shows all attributes of PhaseControlFunction.

**Table 122 – 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 |

| name | mult | type | description |
|---|---|---|---|
| | | | 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 |

Table 123 shows all association ends of PhaseControlFunction with other classes.

**Table 123 – 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..* | AutomationFunction | 0..1 | AutomationFunction | (NC) inherited from: FunctionBlock |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

### 3.6.3.30 (NC) DCVoltageControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

DC voltage control function is a function block that calculate the operating point of the controlled equipment to achieve the target voltage.

Table 124 shows all attributes of DCVoltageControlFunction.

**Table 124 – 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 |

| name | mult | type | description |
|---|---|---|---|
| | | | 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 |

Table 125 shows all association ends of DCVoltageControlFunction with other classes.

**Table 125 – 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..* | AutomationFunction | 0..1 | AutomationFunction | (NC) inherited from: FunctionBlock |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

#### 3.6.3.31 (NC) DCCurrentControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

DC current control function is a function block that calculates the operating point of the controlled equipment to achieve the target current.

Table 126 shows all attributes of DCCurrentControlFunction.

**Table 126 – Attributes of ExtControl::DCCurrentControlFunction**

| name | mult | type | description |
|---|---|---|---|
| droop | 0..1 | PU | (NC) Droop constant. The pu value is obtained as D [kV/MW] x Sb / Ubdc. 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 127 shows all association ends of DCCurrentControlFunction with other classes.

**Table 127 – 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..* | AutomationFunction | 0..1 | AutomationFunction | (NC) inherited from: FunctionBlock |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

#### 3.6.3.32 (NC) TCSCController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

TCSC controller is controlling the equipment to optimize the performance of the TCSC.

Table 128 shows all attributes of TCSCController.

**Table 128 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 129 shows all association ends of TCSCController with other classes.

**Table 129 – Association ends of ExtControl::TCSCController with other classes**

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

#### 3.6.3.33 (NC) TCSCControlModeKind enumeration

Kind of TCSC control mode.
Table 130 shows all literals of TCSCControlModeKind.

**Table 130 – Literals of ExtControl::TCSCControlModeKind**

| literal | value | description |
|---|---|---|
| activePower | | Control is active power. |
| current | | Control is current. |
| impedance | | Control is impedance. |

#### 3.6.3.34 (NC) DirectCurrentBipoleController

Inheritance path = DirectCurrentEquipmentController : EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
DC system bipole control that is the control system of a bipole in accordance with IEC 60633.
Table 131 shows all attributes of DirectCurrentBipoleController.

**Table 131 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 132 – Association ends of ExtControl::DirectCurrentBipoleController with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | DirectCurrentMasterController | 0..1 | DirectCurrentMasterController | (NC) Direct current master controller which has direct current bipole controllers. |
| 0..1 | DirectCurrentPoleController | 2..2 | DirectCurrentPoleController | (NC) DC pole controller that is controlled by a DC bipole controller. |
| 0..1 | RegulatingCondEq | 0..* | RegulatingCondEq | (NC) inherited from: EquipmentController |
| 1..1 | EquipmentControllerAction | 0..* | EquipmentControllerAction | (NC) inherited from: EquipmentController |
| 1..* | SystemControl | 0..1 | SystemControl | (NC) inherited from: EquipmentController |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

#### 3.6.3.35 (NC) DirectCurrentPoleController

Inheritance path = DirectCurrentEquipmentController : EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

DC system pole control, which is the control system of a pole in accordance with IEC 60633. Table 133 shows all attributes of DirectCurrentPoleController.

**Table 133 – Attributes of ExtControl::DirectCurrentPoleController**

| name | mult | type | description |
|---|---|---|---|
| mode | 0..1 | DCControlModeKind | (NC) inherited from: DirectCurrentEquipmentController |
| enabled | 0..1 | Boolean | (NC) inherited from: AutomationFunction |
| type | 0..1 | String | (NC) inherited from: AutomationFunction |
| normalEnabled | 0..1 | Boolean | (NC) inherited from: AutomationFunction |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 134 – 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. |

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

### 3.6.3.36 (NC) ACDCConverterController

Inheritance path = DirectCurrentEquipmentController : EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
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.
Table 135 shows all attributes of ACDCConverterController.

**Table 135 – 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: ExtEuIdentifiedObject |

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

Table 136 shows all association ends of ACDCConverterController with other classes.

**Table 136 – Association ends of ExtControl::ACDCConverterController with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 2..2 | DirectCurrentPoleController | 0..1 | DirectCurrentPoleController | (NC) DC pole controller that controls this ACDC controller. |
| 0..1 | ACDCConverter | 1..1 | ACDCConverter | (NC) ACDC converter controlled by the direct current 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 |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (NC) inherited from: AutomationFunction |
| 0..1 | HasPart | 0..* | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..1 | FunctionBlock | 0..* | FunctionBlock | (NC) inherited from: AutomationFunction |
| 0..* | PartOf | 0..1 | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.3.37 (NC) DirectCurrentEquipmentController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Direct current equipment controller used to control different parts of the hierarchical structure of the DC control system defined by IEC 60633.

Table 137 shows all attributes of DirectCurrentEquipmentController.

**Table 137 – Attributes of ExtControl::DirectCurrentEquipmentController**

| name | mult | type | description |
|---|---|---|---|
| mode | 0..1 | DCControlModeKind | (NC) Mode of the dc controller. |
| enabled | 0..1 | Boolean | (NC) inherited from: AutomationFunction |
| type | 0..1 | String | (NC) inherited from: AutomationFunction |
| normalEnabled | 0..1 | Boolean | (NC) inherited from: AutomationFunction |

| 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 138 shows all association ends of DirectCurrentEquipmentController with other classes.

**Table 138 – Association ends of ExtControl::DirectCurrentEquipmentController with other classes**

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

### 3.6.3.38 (NC) DirectCurrentSubstationController

Inheritance path = DirectCurrentEquipmentController : EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Control system used for the controlling, monitoring and protection within a DC substation (IEC 60633). A DC substation control may be implemented at the bipole and/or pole level and may be referred to as local control.

Table 139 shows all attributes of DirectCurrentSubstationController.

**Table 139 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 140 – Association ends of ExtControl::DirectCurrentSubstationController with 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 |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (NC) inherited from: AutomationFunction |
| 0..1 | HasPart | 0..* | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..1 | FunctionBlock | 0..* | FunctionBlock | (NC) inherited from: AutomationFunction |
| 0..* | PartOf | 0..1 | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.3.39 (NC) DirectCurrentSubstationPoleController

Inheritance path = DirectCurrentSubstationController : DirectCurrentEquipmentController : EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Control system of a substation pole (IEC 60633).

Table 141 shows all attributes of DirectCurrentSubstationPoleController.

**Table 141 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 142 – Association ends of ExtControl::DirectCurrentSubstationPoleController with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | DCSubstationPole | 1..1 | DCSubstationPole | (NC) DC substation pole that is controlled by a DC substation pole controller. |
| 2..* | MultiterminalControl | 0..1 | DirectCurrentMasterController | (NC) inherited from: DirectCurrentSubstationController |
| 0..1 | RegulatingCondEq | 0..* | RegulatingCondEq | (NC) inherited from: EquipmentController |
| 1..1 | EquipmentControllerAction | 0..* | EquipmentControllerAction | (NC) inherited from: EquipmentController |
| 1..* | SystemControl | 0..1 | SystemControl | (NC) inherited from: EquipmentController |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

#### 3.6.3.40 (NC) DirectCurrentSubstationBipoleController

Inheritance path = DirectCurrentSubstationController : DirectCurrentEquipmentController : EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Control system of a substation bipole (IEC 60633).

Table 143 shows all attributes of DirectCurrentSubstationBipoleController.

**Table 143 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 144 shows all association ends of DirectCurrentSubstationBipoleController with other classes.

**Table 144 – 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 |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

#### 3.6.3.41 (NC) SystemControl

Inheritance path = AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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 145 shows all attributes of SystemControl.

**Table 145 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 146 shows all association ends of SystemControl with other classes.

**Table 146 – Association ends of ExtControl::SystemControl with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | EquipmentController | 1..* | EquipmentController | (NC) Equipment controller controlles by this system control |

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

### 3.6.3.42 (NC) FrequencyControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

Frequency control function is a function block that calculate the operating point of the controlled equipment to achieve the target frequency.

Table 147 shows all attributes of FrequencyControlFunction.

**Table 147 – 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: ExtEuIdentifiedObject |

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

Table 148 shows all association ends of FrequencyControlFunction with other classes.

**Table 148 – 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..* | AutomationFunction | 0..1 | AutomationFunction | (NC) inherited from: FunctionBlock |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

### 3.6.3.43 (NC) ACEmulationControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

The AC emulation control function is used when AC emulation model is activated for a DC system. It consists in computing the active power set point of the DC system as a function of the voltage angle difference between both points of common coupling with the AC network in order to mimic the behavior of an AC transmission line. This control mode enables the automatic adjustment of the active power reference following variations of the AC system operational point.

The setpoint of the DC system is calculated by Psetpoint=Pref+Kdc*(angle1-angle2), where

- Pref is the existing active power setpoint;
- Kdc is the control system gain and
- angle1 and angle2 are the phase angle measurement (measured at points of common coupling with the AC network) respectively at the side 1 and 2 of the DC system.

Table 149 shows all attributes of ACEmulationControlFunction.

**Table 149 – 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. |

| name | mult | type | description |
|---|---|---|---|
| timeConstant | 0..1 | Seconds | (NC) Control system time constant in AC transmission emulation control. It affects the time needed to<br>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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 150 shows all association ends of ACEmulationControlFunction with other classes.

**Table 150 – Association ends of ExtControl::ACEmulationControlFunction with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..1 | ControlFunctionBlockAction | 0..* | ControlFunctionBlockAction | (NC) inherited from: ControlFunctionBlock |
| 0..* | AutomationFunction | 0..1 | AutomationFunction | (NC) inherited from: FunctionBlock |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

### 3.6.3.44 (NC) PowerFrequencyController

Inheritance path = SystemControl : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Power frequency controller is controlling the active power balance as typically done by the secondary control. If an unbalance between the scheduled active power values of each generation unit and the loads plus losses occurs, primary control will adapt (increase/decrease)

the active power production of each unit (depending on the power shift key strategy), leading to an over- or under-frequency situation. The secondary frequency controller will then control the frequency back to its nominal value, re- establishing a cost-efficient generation delivered by each unit.

Table 151 shows all attributes of PowerFrequencyController.

**Table 151 – Attributes of ExtControl::PowerFrequencyController**

| name | mult | type | description |
|---|---|---|---|
| mode | 0..1 | PowerFrequencyControlKind | (NC) Mode of the power frequency controller. |
| enabled | 0..1 | Boolean | (NC) inherited from: AutomationFunction |
| type | 0..1 | String | (NC) inherited from: AutomationFunction |
| normalEnabled | 0..1 | Boolean | (NC) inherited from: AutomationFunction |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 152 shows all association ends of PowerFrequencyController with other classes.

**Table 152 – Association ends of ExtControl::PowerFrequencyController with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | MonitoringArea | 0..1 | MonitoringArea | (NC) Monitoring area that has this power frequency controller. |
| 0..1 | ControlArea | 0..1 | ControlArea | (NC) Control area which has a 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 |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

#### 3.6.3.45 (NC) PowerElectronicsUnitController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Power electronics unit controller is controlling the equipment to optimize the power electronics unit.

Table 153 shows all attributes of PowerElectronicsUnitController.

**Table 153 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 154 – 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 |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

### 3.6.3.46 (NC) PowerElectronicsConnectionController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Power electronics connection controller is controlling the equipment to optimize the power electronics connection.

Table 155 shows all attributes of PowerElectronicsConnectionController.

**Table 155 – 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 | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 156 – 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 |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |

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

### 3.6.3.47 (NC) PowerFrequencyControlKind enumeration

Kinds of power frequency control modes.
Table 157 shows all literals of PowerFrequencyControlKind.

**Table 157 – Literals of ExtControl::PowerFrequencyControlKind**

| literal | value | description |
|---|---|---|
| frequency | | Frequency control mode. |
| activePower | | Active power control mode. |
| activePowerAndFrequency | | Active power and frequency control mode. |

### 3.6.3.48 (NC) AreaInterchangeController

Inheritance path = SystemControl : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
Area interchange control is set to control active power of an area.
Table 158 shows all attributes of AreaInterchangeController.

**Table 158 – 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 |

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

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

**Table 159 – Association ends of ExtControl::AreaInterchangeController with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 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 | ControlArea | 0..1 | ControlArea | (NC) Control area that has a area interchange controller. |
| 0..1 | EquipmentController | 1..* | EquipmentController | (NC) inherited from: SystemControl |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (NC) inherited from: AutomationFunction |
| 0..1 | HasPart | 0..* | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..1 | FunctionBlock | 0..* | FunctionBlock | (NC) inherited from: AutomationFunction |
| 0..* | PartOf | 0..1 | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.3.49 (NC) FrequencyMonitoringTerminal root class

Frequency monitoring terminal provides location in the model where the frequency is monitored for the purpose of power frequency control.
Table 160 shows all attributes of FrequencyMonitoringTerminal.

**Table 160 – 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.<br>For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID |

| name | mult | type | description |
|---|---|---|---|
| | | | or rdf:about attributes that identify CIM object elements. |
| priority | 0..1 | Integer | (NC) Value 0 means ignore priority. 1 means the highest priority, 2 is the second highest priority. |

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

**Table 161 – Association ends of ExtControl::FrequencyMonitoringTerminal with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | PowerFrequencyController | 0..1 | PowerFrequencyController | (NC) Power frequency controller that has this frequency monitoring terminal. |
| 0..* | Terminal | 0..1 | Terminal | (NC) The terminal for this frequency monitoring terminal. |

### 3.6.4 Package ExtCore

#### 3.6.4.1 General

This package contains the extensions related to the core.

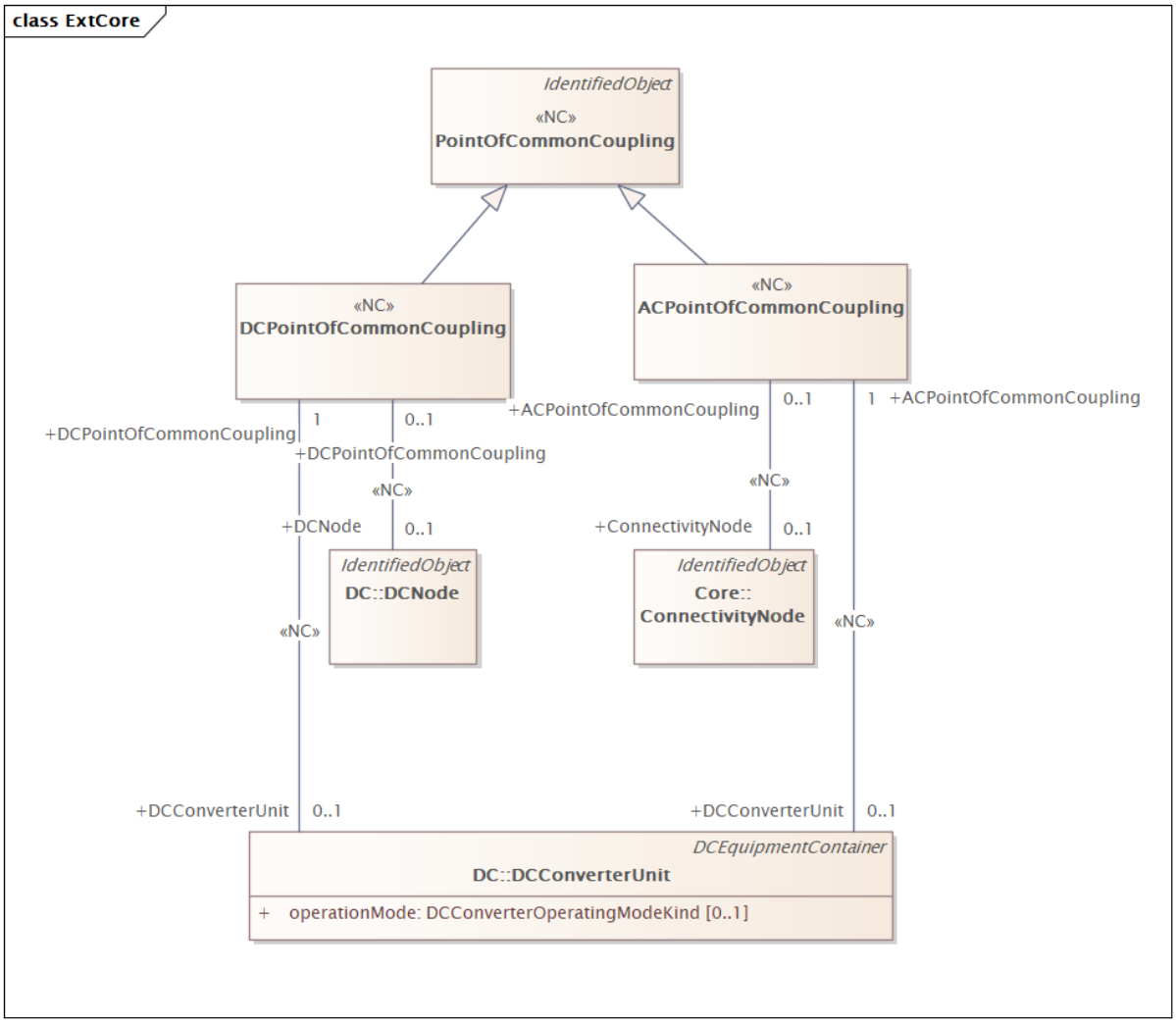



**Figure 12 – Class diagram ExtCore::ExtCore**

Figure 12: The diagram contains classes related to core.

#### 3.6.4.2 (NC) PointOfCommonCoupling

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
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 162 shows all attributes of PointOfCommonCoupling.

**Table 162 – 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 163 shows all association ends of PointOfCommonCoupling with other classes.

**Table 163 – 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 |

#### 3.6.4.3 (NC) ACPointOfCommonCoupling

Inheritance path = PointOfCommonCoupling : IdentifiedObject : ExtEuIdentifiedObject
Point of interconnection of the DC converter station to the adjacent AC system (IEC 60633).
Table 164 shows all attributes of ACPointOfCommonCoupling.

**Table 164 – 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 165 shows all association ends of ACPointOfCommonCoupling with other classes.

**Table 165 – Association ends of ExtCore::ACPointOfCommonCoupling with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..1 | DCConverterUnit | 0..1 | DCConverterUnit | (NC) DC converter unit that has AC point of common coupling. |
| 0..1 | ConnectivityNode | 0..1 | ConnectivityNode | (NC) Connectivity node which is a point of common coupling AC. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

#### 3.6.4.4 (NC) DCPointOfCommonCoupling

Inheritance path = PointOfCommonCoupling : IdentifiedObject : ExtEuIdentifiedObject
Point of interconnection of the DC converter station to the DC transmission line (IEC 60633).
Table 166 shows all attributes of DCPointOfCommonCoupling.

**Table 166 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 167 – Association ends of ExtCore::DCPointOfCommonCoupling with other 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 |

### 3.6.5 Package ExtDirectCurent

#### 3.6.5.1 General

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

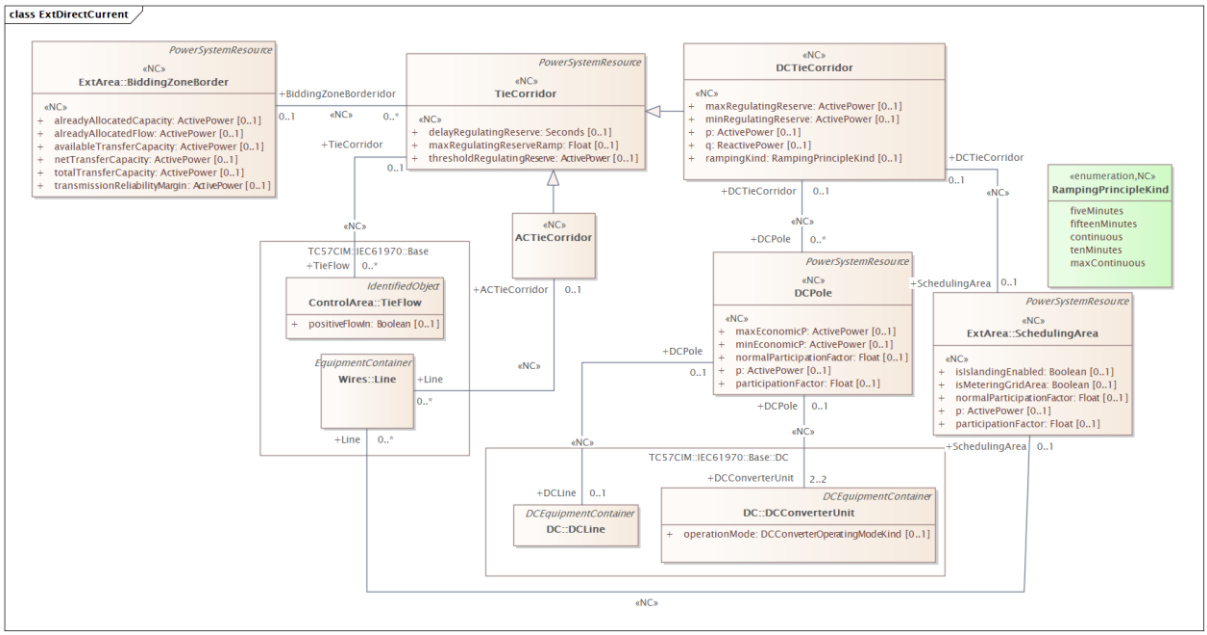



**Figure 13 – Class diagram ExtDirectCurent::ExtDirectCurrent**

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

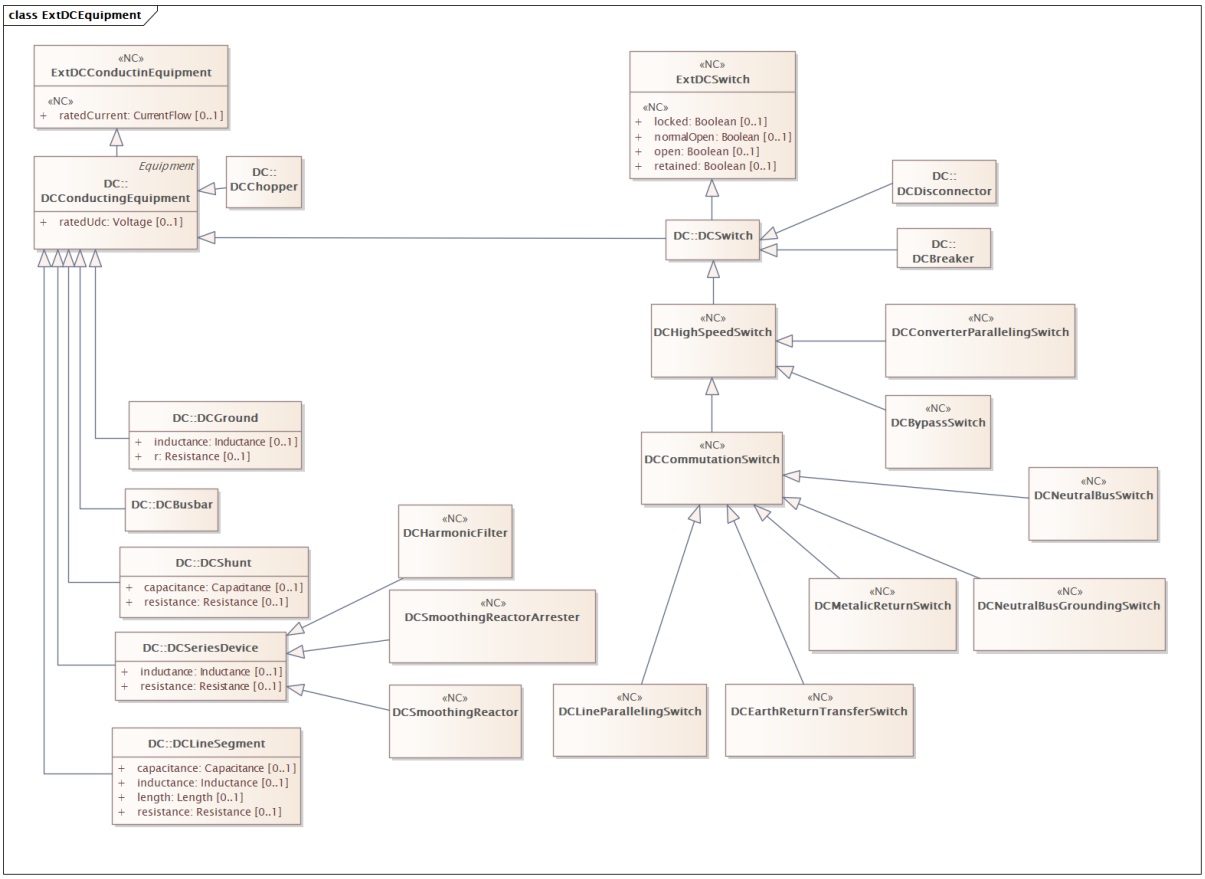



**Figure 14 – Class diagram ExtDirectCurent::ExtDCEquipment**

Figure 14: The diagram shows the DC equipment model.

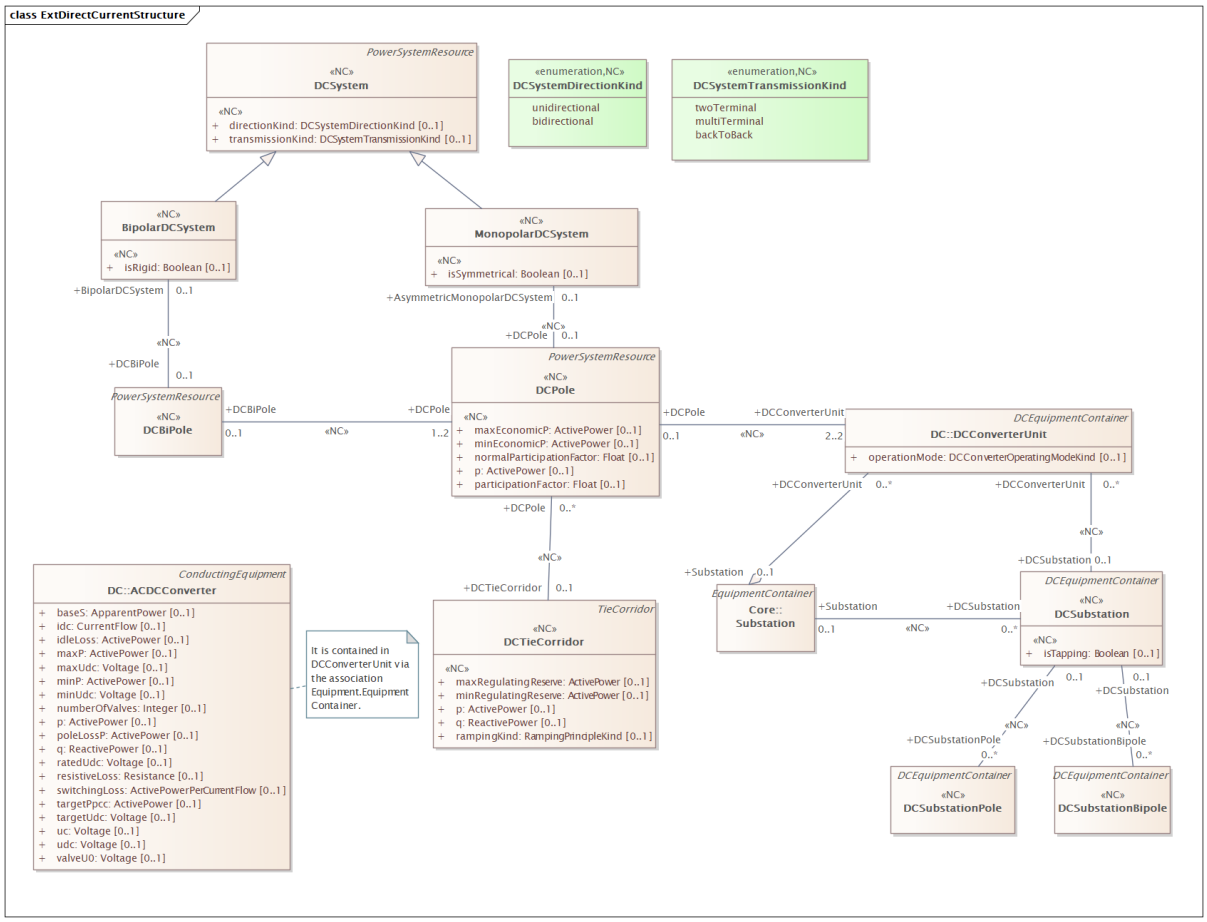



**Figure 15 – Class diagram ExtDirectCurent::ExtDirectCurrentStructure**

Figure 15: The diagram contains classes related to direct current structure.

### 3.6.5.2 (NC) ACTieCorridor

Inheritance path = TieCorridor : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 168 shows all attributes of ACTieCorridor.

**Table 168 – 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 |

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

**Table 169 – 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..* | 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..1 | TieFlow | 0..* | TieFlow | (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 |

### 3.6.5.3 (NC) DCPole

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
The direct current (DC) system pole (IEC 60633) is part of a DC system consisting of all the equipment in the DC substations and the interconnecting transmission lines, if any, which during normal operation exhibit a common direct voltage polarity with respect to earth.
Table 170 shows all attributes of DCPole.

**Table 170 – 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.<br>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).<br>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.<br>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).<br>In the case of priority strategy, the item with the lowest number gets allocated energy first. |
| maxEconomicP | 0..1 | ActivePower | (NC) Maximum high economic active power limit, that should not exceed the maximum operating active power limit. |
| minEconomicP | 0..1 | ActivePower | (NC) Low economic active power limit that shall be greater than or equal to the minimum operating active power limit. |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 171 shows all association ends of DCPole with other classes.

**Table 171 – Association ends of ExtDirectCurent::DCPole with other classes**

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

#### 3.6.5.4 (NC) DCTieCorridor

Inheritance path = TieCorridor : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

A collection of one or more direct current poles that connect two different control areas.

Table 172 shows all attributes of DCTieCorridor.

**Table 172 – 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.<br>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.<br>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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 173 shows all association ends of DCTieCorridor with other classes.

**Table 173 – 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..* | 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..1 | TieFlow | 0..* | TieFlow | (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 |

#### 3.6.5.5 (NC) TieCorridor

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
A collection of one or more tie-lines or direct current poles that connect two different control areas.
Table 174 shows all attributes of TieCorridor.

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

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

**Table 175 – Association ends of ExtDirectCurent::TieCorridor with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | BiddingZoneBorder | 0..1 | BiddingZoneBorder | (NC) Bidding zone border in which the tie corridor is located. |
| 0..* | LoadFrequencyControlArea | 0..1 | LoadFrequencyControlArea | (NC) LoadFrequencyControlArea controlling the TieCorridor. |
| 0..1 | AreaDispatchableUnit | 0..* | AreaDispatchableUnit | (NC) AreaDispatchableUnit for the Tie Corridor. |
| 0..1 | TieFlow | 0..* | TieFlow | (NC) Tie flow which belongs to 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 |

### 3.6.5.6 (NC) ExtDCSwitch root class

European network codes extension to base CIM counterpart.
Table 176 shows all attributes of ExtDCSwitch.

**Table 176 – 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:<br>- locked=true and DCSwitch.open=true. The resulting state is open and locked;<br>- locked=false and DCSwitch.open=true. The resulting state is open;<br>- locked=false and DCSwitch.open=false. The resulting state is closed. |

#### 3.6.5.7 (NC) ExtDCConductinEquipment root class

European network codes extension to base CIM counterpart.
Table 177 shows all attributes of ExtDCConductinEquipment.

**Table 177 – 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.<br>The attribute shall be a positive value. |

#### 3.6.5.8 (NC) RampingPrincipleKind enumeration

Kind of ramping principle.
Table 178 shows all literals of RampingPrincipleKind.

**Table 178 – 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). |

#### 3.6.5.9 (NC) DCSystem

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
Electrical power system which transfers energy in the form of direct current between two or more AC buses (defined in IEC 60633).
Table 179 shows all attributes of DCSystem.

**Table 179 – Attributes of ExtDirectCurent::DCSystem**

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

Table 180 shows all association ends of DCSystem with other classes.

**Table 180 – 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 |

### 3.6.5.10 (NC) BipolarDCSystem

Inheritance path = DCSystem : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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 181 shows all attributes of BipolarDCSystem.

**Table 181 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 182 shows all association ends of BipolarDCSystem with other classes.

**Table 182 – 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 |

### 3.6.5.11 (NC) MonopolarDCSystem

Inheritance path = DCSystem : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 183 shows all attributes of MonopolarDCSystem.

**Table 183 – 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 184 shows all association ends of MonopolarDCSystem with other classes.

**Table 184 – Association ends of ExtDirectCurent::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 |

### 3.6.5.12 (NC) DCSystemDirectionKind enumeration

Direction kinds of the DC system.
Table 185 shows all literals of DCSystemDirectionKind.

**Table 185 – Literals of ExtDirectCurent::DCSystemDirectionKind**

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

### 3.6.5.13 (NC) DCBiPole

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

DC system bipole (IEC 60633), which is part of an DC system consisting of two independently operable DC system poles, which during normal operation, exhibit opposite direct voltage polarities with respect to earth.
Table 186 shows all attributes of DCBiPole.

**Table 186 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 187 – 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 |

### 3.6.5.14 (NC) DCSystemTransmissionKind enumeration

DC system transmission kind.
Table 188 shows all literals of DCSystemTransmissionKind.

**Table 188 – 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. |

### 3.6.5.15 (NC) DCSubstation

Inheritance path = DCEquipmentContainer : EquipmentContainer : ConnectivityNodeContainer : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 189 shows all attributes of DCSubstation.

**Table 189 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 190 shows all association ends of DCSubstation with other classes.

**Table 190 – Association ends of ExtDirectCurent::DCSubstation with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | DCConverterUnit | 0..* | DCConverterUnit | (NC) DC converter unit that belongs to this DC substation. |
| 0..* | Substation | 0..1 | Substation | (NC) Substation that contains this DC susbstation. |
| 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 |

### 3.6.5.16 (NC) DCSubstationBipole

Inheritance path = DCEquipmentContainer : EquipmentContainer : ConnectivityNodeContainer : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
Part of a bipolar DC system (IEC 60633) contained within a DC substation.
Table 191 shows all attributes of DCSubstationBipole.

**Table 191 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 192 shows all association ends of DCSubstationBipole with other classes.

**Table 192 – Association ends of ExtDirectCurent::DCSubstationBipole with other 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..* | HVDCInterconnectionDy namics | 0..1 | HVDCInterconnectionDy namics | inherited from: DCEquipmentContainer |
| 0..1 | Equipments | 0..* | Equipment | inherited from: EquipmentContainer |
| 0..* | AdditionalGroupedEquip ment | 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 |

#### 3.6.5.17 (NC) DCSubstationPole

Inheritance path = DCEquipmentContainer : EquipmentContainer : ConnectivityNodeContainer : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 193 shows all attributes of DCSubstationPole.

**Table 193 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 194 shows all association ends of DCSubstationPole with other classes.

**Table 194 – 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..* | HVDCInterconnectionDy namics | 0..1 | HVDCInterconnectionDy namics | 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 |

### 3.6.5.18 (NC) DCSmoothingReactor

Inheritance path = DCSeriesDevice : DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : ExtDCConductinEquipment Reactor (IEC 60633) connected in series with a converter unit or converter units on the DC side for the primary purpose of smoothing the direct current and reducing current transients. Table 195 shows all attributes of DCSmoothingReactor.

**Table 195 – Attributes of ExtDirectCurent::DCSmoothingReactor**

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

Table 196 shows all association ends of DCSmoothingReactor with other classes.

**Table 196 – 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 | Faults | 0..* | Fault | 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..* | AdditionalEquipmentContainer | 0..* | EquipmentContainer | inherited from: Equipment |
| 0..1 | DetailedModelDynamics | 0..* | DetailedModelDynamics | inherited from: Equipment |
| 0..1 | DetailedEquipment | 0..* | Equipment | (NC) inherited from: Equipment |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.5.19 (NC) DCSmoothingReactorArrester

Inheritance path = DCSeriesDevice : DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : ExtDCConductinEquipment Arrester (IEC 60633) connected between the terminals of a smoothing reactor.
Table 197 shows all attributes of DCSmoothingReactorArrester.

**Table 197 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| ratedCurrent | 0..1 | CurrentFlow | (NC) inherited from: ExtDCConductinEquipment |

Table 198 shows all association ends of DCSmoothingReactorArrester with other classes.

**Table 198 – 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 | Faults | 0..* | Fault | 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..* | AdditionalEquipmentContainer | 0..* | EquipmentContainer | inherited from: Equipment |
| 0..1 | DetailedModelDynamics | 0..* | DetailedModelDynamics | inherited from: Equipment |
| 0..1 | DetailedEquipment | 0..* | Equipment | (NC) inherited from: Equipment |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.5.20 (NC) DCHarmonicFilter

Inheritance path = DCSeriesDevice : DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : 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 199 shows all attributes of DCHarmonicFilter.

**Table 199 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| ratedCurrent | 0..1 | CurrentFlow | (NC) inherited from: ExtDCConductinEquipment |

Table 200 shows all association ends of DCHarmonicFilter with other classes.

**Table 200 – 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 | Faults | 0..* | Fault | 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..* | AdditionalEquipmentContainer | 0..* | EquipmentContainer | inherited from: Equipment |
| 0..1 | DetailedModelDynamics | 0..* | DetailedModelDynamics | inherited from: Equipment |
| 0..1 | DetailedEquipment | 0..* | Equipment | (NC) inherited from: Equipment |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.5.21 (NC) DCHighSpeedSwitch

Inheritance path = DCSwitch : DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : 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

modified for their DC applications. Their capabilities to perform faster opening and closing than disconnect switches are used but the function of breaking short-circuit currents is not required. Table 201 shows all attributes of DCHighSpeedSwitch.

**Table 201 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| 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 202 shows all association ends of DCHighSpeedSwitch with other classes.

**Table 202 – Association ends of ExtDirectCurent::DCHighSpeedSwitch 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 | Faults | 0..* | Fault | 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..* | 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 |

| 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 |

### 3.6.5.22 (NC) DCCommutationSwitch

Inheritance path = DCHighSpeedSwitch : DCSwitch : DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : ExtDCConductinEquipment : ExtDCSwitch

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

Table 203 shows all attributes of DCCommutationSwitch.

**Table 203 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| 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 204 shows all association ends of DCCommutationSwitch with other classes.

**Table 204 – 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 | Faults | 0..* | Fault | 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..* | AdditionalEquipmentContainer | 0..* | EquipmentContainer | inherited from: Equipment |
| 0..1 | DetailedModelDynamics | 0..* | DetailedModelDynamics | inherited from: Equipment |
| 0..1 | DetailedEquipment | 0..* | Equipment | (NC) inherited from: Equipment |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

#### 3.6.5.23 (NC) DCMetalicReturnSwitch

Inheritance path = DCCommutationSwitch : DCHighSpeedSwitch : DCSwitch : DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : ExtDCConductinEquipment : ExtDCSwitch

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

Table 205 shows all attributes of DCMetalicReturnSwitch.

**Table 205 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| 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 206 shows all association ends of DCMetalicReturnSwitch with other classes.

**Table 206 – 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 | Faults | 0..* | Fault | 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..* | AdditionalEquipmentContainer | 0..* | EquipmentContainer | inherited from: Equipment |
| 0..1 | DetailedModelDynamics | 0..* | DetailedModelDynamics | inherited from: Equipment |
| 0..1 | DetailedEquipment | 0..* | Equipment | (NC) inherited from: Equipment |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.5.24 (NC) DCEarthReturnTransferSwitch

Inheritance path = DCCommutationSwitch : DCHighSpeedSwitch : DCSwitch : DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : 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 207 shows all attributes of DCEarthReturnTransferSwitch.

**Table 207 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| 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 208 shows all association ends of DCEarthReturnTransferSwitch with other classes.

**Table 208 – Association ends of ExtDirectCurent::DCEarthReturnTransferSwitch with other classes**

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

### 3.6.5.25 (NC) DCNeutralBusSwitch

Inheritance path = DCCommutationSwitch : DCHighSpeedSwitch : DCSwitch : DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : ExtDCConductinEquipment : ExtDCSwitch

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

Table 209 shows all attributes of DCNeutralBusSwitch.

**Table 209 – Attributes of ExtDirectCurent::DCNeutralBusSwitch**

| name | mult | type | description |
|---|---|---|---|
| ratedUdc | 0..1 | Voltage | inherited from: DCConductingEquipment |
| aggregate | 0..1 | Boolean | inherited from: Equipment |
| inService | 0..1 | Boolean | inherited from: Equipment |
| networkAnalysisEnabled | 0..1 | Boolean | inherited from: Equipment |
| normallyInService | 0..1 | Boolean | inherited from: Equipment |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| 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 210 shows all association ends of DCNeutralBusSwitch with other classes.

**Table 210 – Association ends of ExtDirectCurent::DCNeutralBusSwitch 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 | Faults | 0..* | Fault | 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..* | 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 |

#### 3.6.5.26 (NC) DCNeutralBusGroundingSwitch

Inheritance path = DCCommutationSwitch : DCHighSpeedSwitch : DCSwitch : DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : ExtDCConductinEquipment : ExtDCSwitch

Neutral bus grounding switch (IEC 60633) or a neutral bus earthing switch is a DC commutation switch connected from the neutral bus to the station earth mat on a bipolar DC scheme, designed to provide a temporary earth connection in the event of an open circuit fault on the electrode line until the imbalance of current between the two poles can be reduced to a safe minimum level or the electrode line connection can be restored.

Table 211 shows all attributes of DCNeutralBusGroundingSwitch.

**Table 211 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| 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 212 shows all association ends of DCNeutralBusGroundingSwitch with other classes.

**Table 212 – Association ends of ExtDirectCurent::DCNeutralBusGroundingSwitch with 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 | Faults | 0..* | Fault | 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..* | AdditionalEquipmentContainer | 0..* | EquipmentContainer | inherited from: Equipment |
| 0..1 | DetailedModelDynamics | 0..* | DetailedModelDynamics | inherited from: Equipment |
| 0..1 | DetailedEquipment | 0..* | Equipment | (NC) inherited from: Equipment |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.5.27 (NC) DCConverterParallelingSwitch

Inheritance path = DCHighSpeedSwitch : DCSwitch : DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : ExtDCConductinEquipment : ExtDCSwitch

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 213 shows all attributes of DCConverterParallelingSwitch.

**Table 213 – Attributes of ExtDirectCurent::DCConverterParallelingSwitch**

| name | mult | type | description |
|---|---|---|---|
| ratedUdc | 0..1 | Voltage | inherited from: DCConductingEquipment |
| aggregate | 0..1 | Boolean | inherited from: Equipment |
| inService | 0..1 | Boolean | inherited from: Equipment |
| networkAnalysisEnabled | 0..1 | Boolean | inherited from: Equipment |
| normallyInService | 0..1 | Boolean | inherited from: Equipment |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: 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 214 shows all association ends of DCConverterParallelingSwitch with other classes.

**Table 214 – 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 | Faults | 0..* | Fault | 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..* | AdditionalEquipmentContainer | 0..* | EquipmentContainer | inherited from: Equipment |
| 0..1 | DetailedModelDynamics | 0..* | DetailedModelDynamics | inherited from: Equipment |
| 0..1 | DetailedEquipment | 0..* | Equipment | (NC) inherited from: Equipment |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.5.28 (NC) DCLineParallelingSwitch

Inheritance path = DCCommutationSwitch : DCHighSpeedSwitch : DCSwitch : DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : 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 215 shows all attributes of DCLineParallelingSwitch.

**Table 215 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| 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 216 shows all association ends of DCLineParallelingSwitch with other classes.

**Table 216 – 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 | Faults | 0..* | Fault | 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..* | AdditionalEquipmentContainer | 0..* | EquipmentContainer | inherited from: Equipment |
| 0..1 | DetailedModelDynamics | 0..* | DetailedModelDynamics | inherited from: Equipment |
| 0..1 | DetailedEquipment | 0..* | Equipment | (NC) inherited from: Equipment |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.5.29 (NC) DCBypassSwitch

Inheritance path = DCHighSpeedSwitch : DCSwitch : DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : ExtDCConductinEquipment : ExtDCSwitch

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

Table 217 shows all attributes of DCBypassSwitch.

**Table 217 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| 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 218 shows all association ends of DCBypassSwitch with other classes.

**Table 218 – 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 | Faults | 0..* | Fault | 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..* | AdditionalEquipmentContainer | 0..* | EquipmentContainer | inherited from: Equipment |
| 0..1 | DetailedModelDynamics | 0..* | DetailedModelDynamics | inherited from: Equipment |
| 0..1 | DetailedEquipment | 0..* | Equipment | (NC) inherited from: Equipment |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |

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

### 3.6.6 Package ExtFACTS

#### 3.6.6.1 General

This package contains the extensions related to the FACTS.

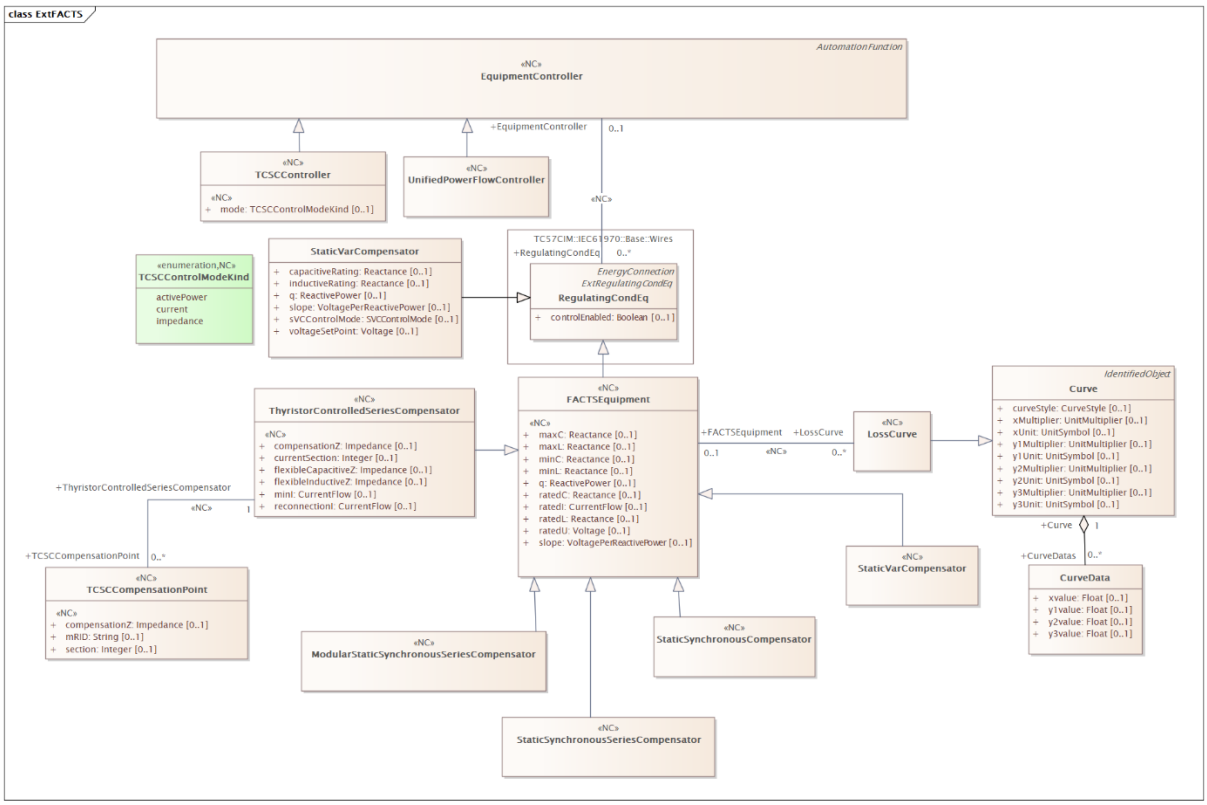



**Figure 16 – Class diagram ExtFACTS::ExtFACTS**

Figure 16: The diagram contains association related to FACTS.

#### 3.6.6.2 (NC) FACTSEquipment

Inheritance path = RegulatingCondEq : EnergyConnection : ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
Flexible Alternating Current Transmission System regulating equipment.
Table 219 shows all attributes of FACTSEquipment.

**Table 219 – 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.<br>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.<br>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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 220 shows all association ends of FACTSEquipment with other classes.

**Table 220 – 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 | Faults | 0..* | Fault | 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..* | AdditionalEquipmentContainer | 0..* | EquipmentContainer | inherited from: Equipment |
| 0..1 | DetailedModelDynamics | 0..* | DetailedModelDynamics | inherited from: Equipment |
| 0..1 | DetailedEquipment | 0..* | Equipment | (NC) inherited from: Equipment |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

#### 3.6.6.3 (NC) LossCurve

Inheritance path = Curve : IdentifiedObject : ExtEuIdentifiedObject
Represents the losses in the equipment due to operation position.
Table 221 shows all attributes of LossCurve.

**Table 221 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 222 shows all association ends of LossCurve with other classes.

**Table 222 – 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 |

#### 3.6.6.4 (NC) ModularStaticSynchronousSeriesCompensator

Inheritance path = FACTSEquipment : RegulatingCondEq : EnergyConnection : ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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 223 shows all attributes of ModularStaticSynchronousSeriesCompensator.

**Table 223 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 224 shows all association ends of ModularStaticSynchronousSeriesCompensator with other classes.

**Table 224 – 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 | Faults | 0..* | Fault | 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..* | AdditionalEquipmentContainer | 0..* | EquipmentContainer | inherited from: Equipment |
| 0..1 | DetailedModelDynamics | 0..* | DetailedModelDynamics | inherited from: Equipment |
| 0..1 | DetailedEquipment | 0..* | Equipment | (NC) inherited from: Equipment |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

#### 3.6.6.5 (NC) StaticSynchronousCompensator

Inheritance path = FACTSEquipment : RegulatingCondEq : EnergyConnection : ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 225 shows all attributes of StaticSynchronousCompensator.

**Table 225 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 226 shows all association ends of StaticSynchronousCompensator with other classes.

**Table 226 – Association ends of ExtFACTS::StaticSynchronousCompensator with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | LossCurve | 0..* | LossCurve | (NC) inherited from: FACTSEquipment |
| 0..* | RegulatingControl | 0..1 | RegulatingControl | inherited from: RegulatingCondEq |
| 0..* | BaseVoltage | 0..1 | BaseVoltage | inherited from: ConductingEquipment |
| 1..1 | SvStatus | 0..* | SvStatus | inherited from: ConductingEquipment |

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

#### 3.6.6.6 (NC) StaticVarCompensator

Inheritance path = FACTSEquipment : RegulatingCondEq : EnergyConnection : ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

The SVC may operate in fixed MVar output mode or in voltage control mode. When in voltage control mode, the output of the SVC will be proportional to the deviation of voltage at the controlled bus from the voltage setpoint. The SVC characteristic slope defines the proportion. If the voltage at the controlled bus is equal to the voltage setpoint, the SVC MVar output is zero. Table 227 shows all attributes of StaticVarCompensator.

**Table 227 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 228 shows all association ends of StaticVarCompensator with other classes.

**Table 228 – 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 | Faults | 0..* | Fault | 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..* | 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 |

#### 3.6.6.7 (NC) TCSCCompensationPoint root class

Compensation point of a TCSC compensator.
Table 229 shows all attributes of TCSCCompensationPoint.

**Table 229 – 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.<br>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. |

Table 230 shows all association ends of TCSCCompensationPoint with other classes.

**Table 230 – Association ends of ExtFACTS::TCSCCompensationPoint with other classes**

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

#### 3.6.6.8 (NC) ThyristorControlledSeriesCompensator

Inheritance path = FACTSEquipment : RegulatingCondEq : EnergyConnection : ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
Thyristor-controlled series capacitors (TCSC) is a type of flexible AC transmission system regulating equipment that is configured with controlled reactors in parallel with sections of a capacitor bank. This combination allows smooth control of the fundamental frequency capacitive reactance over a wide range. The thyristor valve contains a string of series connected high power thyristors. TCSC can control power flows in order to achieve eliminating of line overloads, reducing loop flows and minimising system losses.
Table 231 shows all attributes of ThyristorControlledSeriesCompensator.

**Table 231 – 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 |

Table 232 shows all association ends of ThyristorControlledSeriesCompensator with other classes.

**Table 232 – 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 | Faults | 0..* | Fault | 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..* | AdditionalEquipmentContainer | 0..* | EquipmentContainer | inherited from: Equipment |
| 0..1 | DetailedModelDynamics | 0..* | DetailedModelDynamics | inherited from: Equipment |
| 0..1 | DetailedEquipment | 0..* | Equipment | (NC) inherited from: Equipment |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.6.9 Package ExtSSSC

#### 3.6.6.9.1 General

This package contains the extensions related to the SSSC.

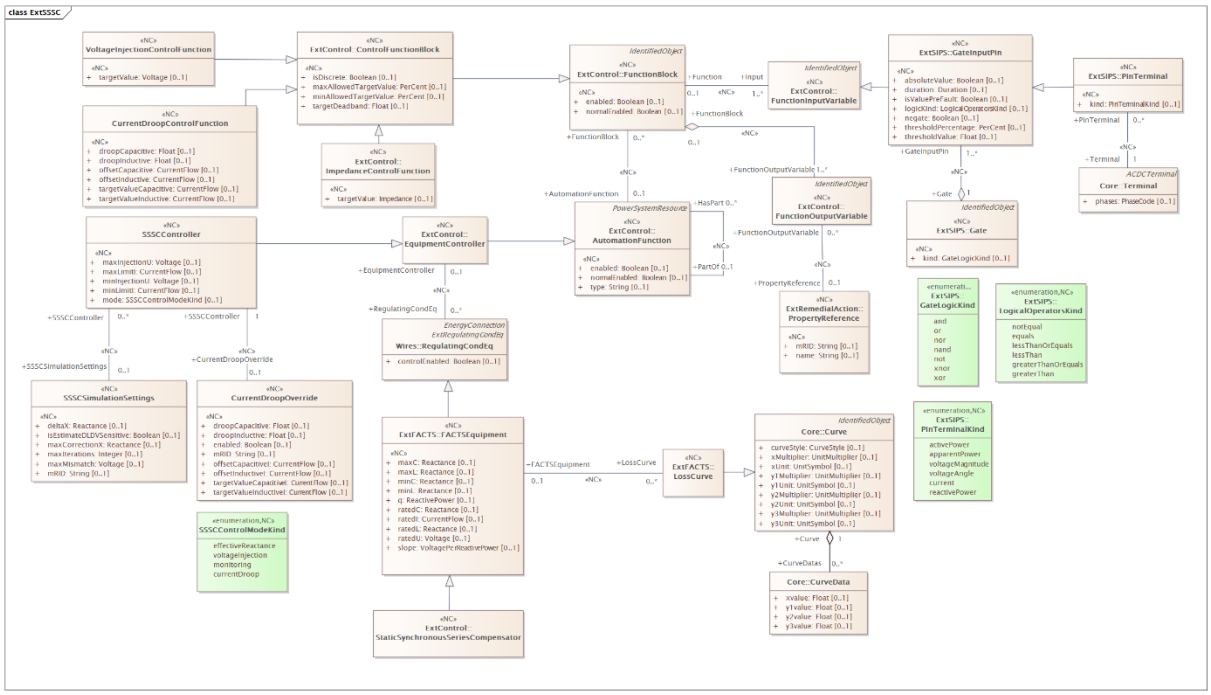



**Figure 17 – Class diagram ExtSSSC::ExtSSSC**

Figure 17: The diagram shows necessary extensions to model controls of SSSC controller.

#### 3.6.6.9.2 (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 233 shows all attributes of CurrentDroopControlFunction.

**Table 233 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 234 shows all association ends of CurrentDroopControlFunction with other classes.

**Table 234 – 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..* | AutomationFunction | 0..1 | AutomationFunction | (NC) inherited from: FunctionBlock |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

#### 3.6.6.9.3 (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 235 shows all attributes of CurrentDroopOverride.

**Table 235 – 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 |
|---|---|---|---|
| targetValueInductiveI | 0..1 | CurrentFlow | (NC) Setpoint when control is active in inductive region. |
| mRID | 0..1 | String | (NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.<br>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 236 shows all association ends of CurrentDroopOverride with other classes.

**Table 236 – 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. |

#### 3.6.6.9.4 (NC) SSSCController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 237 shows all attributes of SSSCController.

**Table 237 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 238 shows all association ends of SSSCController with other classes.

**Table 238 – 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 setings 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 |
| 1..1 | AutomationBlockGroup | 0..* | AutomationBlockGroup | (NC) inherited from: AutomationFunction |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (NC) inherited from: AutomationFunction |
| 0..1 | HasPart | 0..* | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..1 | FunctionBlock | 0..* | FunctionBlock | (NC) inherited from: AutomationFunction |
| 0..* | PartOf | 0..1 | AutomationFunction | (NC) inherited from: AutomationFunction |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

#### 3.6.6.9.5 (NC) SSSCSimulationSettings root class

SSSC control simulation settings used by the algorithm for power flow calculations.
Table 239 shows all attributes of SSSCSimulationSettings.

**Table 239 – Attributes of ExtSSSC::SSSCSimulationSettings**

| name | mult | type | description |
|---|---|---|---|
| maxCorrectionX | 0..1 | Reactance | (NC) Maximum value of the reactance correction applied between Iterations of the power flow calculation algorithm for the purpose of achieving control target value. |
| maxMismatch | 0..1 | Voltage | (NC) Maximum mismatch tolerance of voltage target value. If mismatch is lower, convergence is claimed. It is only used for voltageInjection and currentDroop control modes. |
| deltaX | 0..1 | Reactance | (NC) Reactance delta for the solution algorithm. The solution “outer-loop” algorithm is based on a secant method which needs two initial points. The second point is calculated from the first one by either adding or subtracting this “delta”. The “seed” is assumed to be 0 ohms. |

| name | mult | type | description |
|---|---|---|---|
| isEstimateDLDVSensitive | 0..1 | Boolean | (NC) Defines if the estimate is considering the dI/dV sensitivity (true) instead of the secant algorithm (false). |
| maxIterations | 0..1 | Integer | (NC) Maximum number of iterations before claiming an open line condition. The algorithm uses it to assess if a line is really open by making sure low-currents are observed on various consecutive iterations. |
| mRID | 0..1 | String | (NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.<br>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 240 shows all association ends of SSSCSimulationSettings with other classes.

**Table 240 – Association ends of ExtSSSC::SSSCSimulationSettings with other classes**

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

#### 3.6.6.9.6 (NC) VoltageInjectionControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

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 241 shows all attributes of VoltageInjectionControlFunction.

**Table 241 – 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 | 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: ExtEuIdentifiedObject |

Table 242 shows all association ends of VoltageInjectionControlFunction with other classes.

**Table 242 – 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..* | AutomationFunction | 0..1 | AutomationFunction | (NC) inherited from: FunctionBlock |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

#### 3.6.6.9.7 (NC) SSSCControlModeKind enumeration

Control modes of the Static Synchronous Series Compensator (SSSC).
Table 243 shows all literals of SSSCControlModeKind.

**Table 243 – 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. |

### 3.6.7 Package ExtProduction

#### 3.6.7.1 General

This package contains the extensions related to the production.

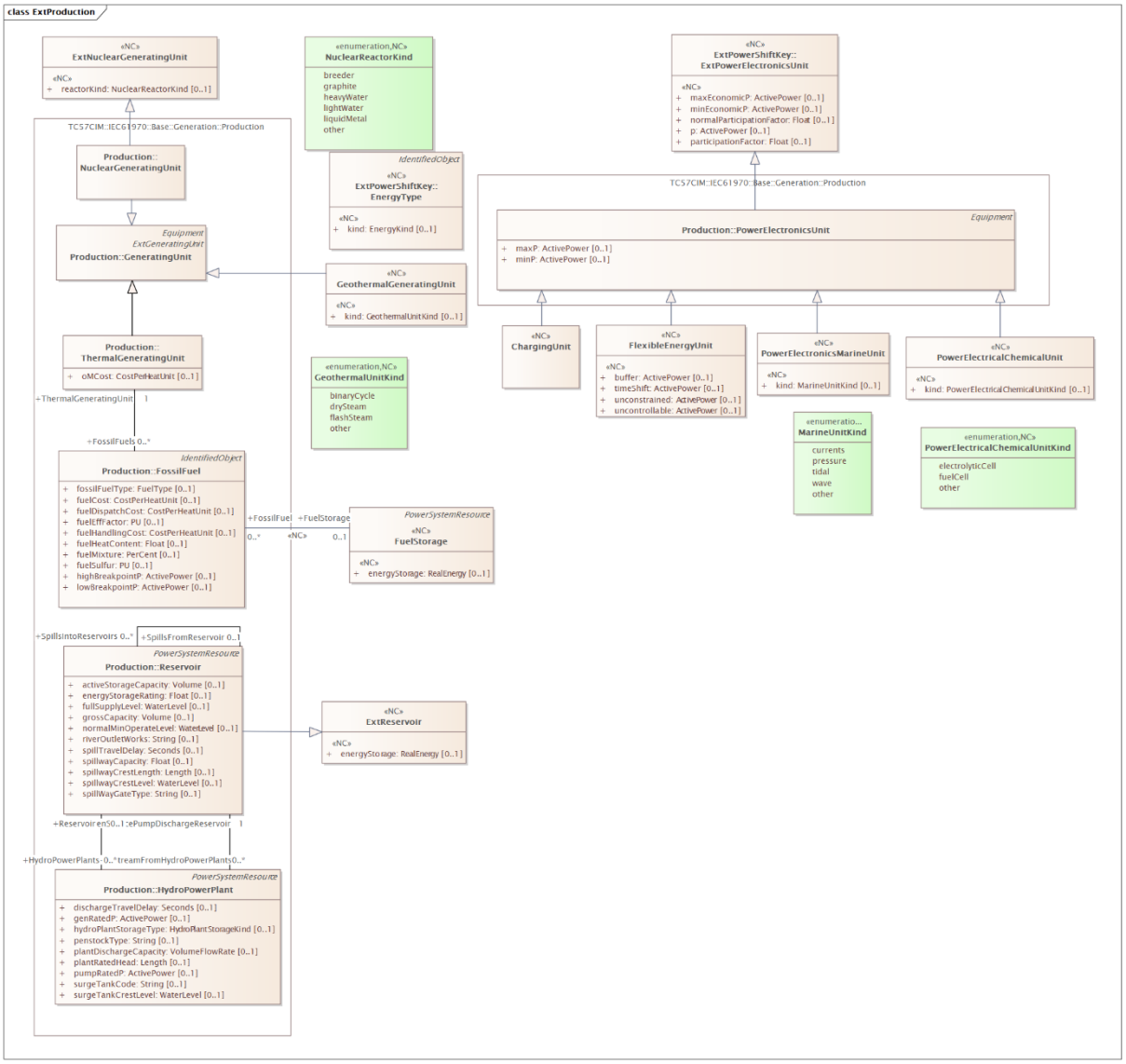



**Figure 18 – Class diagram ExtProduction::ExtProduction**

Figure 18: The diagram contains classes related to production.

#### 3.6.7.2 (NC) FuelStorage

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
Fuel storage. e.g. pile of coal that can be shared between multiple thermal generating units.
Table 244 shows all attributes of FuelStorage.

**Table 244 – Attributes of ExtProduction::FuelStorage**

| name | mult | type | description |
|---|---|---|---|
| energyStorage | 0..1 | RealEnergy | (NC) Amount of energy available in the storage. |
| 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 245 shows all association ends of FuelStorage with other classes.

**Table 245 – 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..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.7.3 (NC) ChargingUnit

Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : ExtPowerElectronicsUnit

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.

Table 246 shows all attributes of ChargingUnit.

**Table 246 – Attributes of ExtProduction::ChargingUnit**

| name | mult | type | description |
|---|---|---|---|
| maxP | 0..1 | ActivePower | inherited from: PowerElectronicsUnit |
| minP | 0..1 | ActivePower | inherited from: PowerElectronicsUnit |
| aggregate | 0..1 | Boolean | inherited from: Equipment |
| inService | 0..1 | Boolean | inherited from: Equipment |
| networkAnalysisEnabled | 0..1 | Boolean | inherited from: Equipment |
| normallyInService | 0..1 | Boolean | inherited from: Equipment |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

Table 247 shows all association ends of ChargingUnit with other classes.

**Table 247 – Association ends of ExtProduction::ChargingUnit 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 | Faults | 0..* | Fault | 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..* | AdditionalEquipmentContainer | 0..* | EquipmentContainer | inherited from: Equipment |
| 0..1 | DetailedModelDynamics | 0..* | DetailedModelDynamics | inherited from: Equipment |
| 0..1 | DetailedEquipment | 0..* | Equipment | (NC) inherited from: Equipment |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

#### 3.6.7.4 (NC) ExtNuclearGeneratingUnit root class

European Network Code extension of NuclearGeneratingUnit.
Table 248 shows all attributes of ExtNuclearGeneratingUnit.

**Table 248 – Attributes of ExtProduction::ExtNuclearGeneratingUnit**

| name | mult | type | description |
|---|---|---|---|
| reactorKind | 0..1 | NuclearReactorKind | (NC) Kind of nuclear reactor. |

#### 3.6.7.5 (NC) ExtReservoir root class

EU Network Code extension of Reservoir.
Table 249 shows all attributes of ExtReservoir.

**Table 249 – Attributes of ExtProduction::ExtReservoir**

| name | mult | type | description |
|---|---|---|---|
| energyStorage | 0..1 | RealEnergy | (NC) Amount of energy available in the storage. |

#### 3.6.7.6 (NC) FlexibleEnergyUnit

Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : ExtPowerElectronicsUnit
Flexible consumer or embedded producer of energy. The unit cannot be a net producer.
Table 250 shows all attributes of FlexibleEnergyUnit.

**Table 250 – Attributes of ExtProduction::FlexibleEnergyUnit**

| name | mult | type | description |
|---|---|---|---|
| uncontrollable | 0..1 | ActivePower | (NC) The active power, that forms the base consumption for the unit. This is measured and expected consumption. Load sign convention is used, i.e. positive sign means flow out from a node. |
| timeShift | 0..1 | ActivePower | (NC) The active power, that can be shifted from one pricing interval (market time unit) to another. It is expected to be a limited on the length of the shift. Example from household could be washing machine or dishwasher. Example from industry is the possible to shut down a machine for the relevant period. Load sign convention is used, i.e. positive sign means flow out from a node. |
| buffer | 0..1 | ActivePower | (NC) The active power, that has the flexibility to operate as production and/or consumption. The buffer is bound. Example are heat pump, cooling system, embedded batteries including electric vehicle. Load sign convention is used, i.e. positive sign means flow out from a node. |
| unconstrained | 0..1 | ActivePower | (NC) The active power, that has the flexibility to operate as production without any bound by a buffer. Example are alternative heating (wood, gas, diesel etc) or power generators. Load sign convention is used, i.e. positive sign means flow out from a node. |
| maxP | 0..1 | ActivePower | inherited from: PowerElectronicsUnit |
| minP | 0..1 | ActivePower | inherited from: PowerElectronicsUnit |
| aggregate | 0..1 | Boolean | inherited from: Equipment |
| inService | 0..1 | Boolean | inherited from: Equipment |
| networkAnalysisEnabled | 0..1 | Boolean | inherited from: Equipment |
| normallyInService | 0..1 | Boolean | inherited from: Equipment |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

| name | mult | type | description |
|---|---|---|---|
| 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 |

Table 251 shows all association ends of FlexibleEnergyUnit with other classes.

**Table 251 – Association ends of ExtProduction::FlexibleEnergyUnit with other classes**

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

### 3.6.7.7 (NC) GeothermalGeneratingUnit

Inheritance path = GeneratingUnit : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : ExtGeneratingUnit

Generating unit that is generating electrical power from geothermal energy.

Table 252 shows all attributes of GeothermalGeneratingUnit.

**Table 252 – Attributes of ExtProduction::GeothermalGeneratingUnit**

| name | mult | type | description |
|---|---|---|---|
| kind | 0..1 | GeothermalUnitKind | (NC) Kind of geothermal generating unit. |
| allocSpinResP | 0..1 | ActivePower | inherited from: GeneratingUnit |
| autoCntrlMarginP | 0..1 | ActivePower | inherited from: GeneratingUnit |

| name | mult | type | description |
|---|---|---|---|
| baseP | 0..1 | ActivePower | inherited from: GeneratingUnit |
| controlDeadband | 0..1 | ActivePower | inherited from: GeneratingUnit |
| controlPulseHigh | 0..1 | Seconds | inherited from: GeneratingUnit |
| controlPulseLow | 0..1 | Seconds | inherited from: GeneratingUnit |
| controlResponseRate | 0..1 | ActivePowerChangeRate | inherited from: GeneratingUnit |
| efficiency | 0..1 | PerCent | inherited from: GeneratingUnit |
| genControlMode | 0..1 | GeneratorControlMode | inherited from: GeneratingUnit |
| genControlSource | 0..1 | GeneratorControlSource | inherited from: GeneratingUnit |
| governorMPL | 0..1 | PU | inherited from: GeneratingUnit |
| governorSCD | 0..1 | PerCent | inherited from: GeneratingUnit |
| highControlLimit | 0..1 | ActivePower | inherited from: GeneratingUnit |
| initialP | 0..1 | ActivePower | inherited from: GeneratingUnit |
| longPF | 0..1 | Float | inherited from: GeneratingUnit |
| lowControlLimit | 0..1 | ActivePower | inherited from: GeneratingUnit |
| lowerRampRate | 0..1 | ActivePowerChangeRate | inherited from: GeneratingUnit |
| maxEconomicP | 0..1 | ActivePower | inherited from: GeneratingUnit |
| maximumAllowableSpinningReserve | 0..1 | ActivePower | inherited from: GeneratingUnit |
| maxOperatingP | 0..1 | ActivePower | inherited from: GeneratingUnit |
| minEconomicP | 0..1 | ActivePower | inherited from: GeneratingUnit |
| minimumOffTime | 0..1 | Seconds | inherited from: GeneratingUnit |
| minOperatingP | 0..1 | ActivePower | inherited from: GeneratingUnit |
| modelDetail | 0..1 | Classification | inherited from: GeneratingUnit |
| nominalP | 0..1 | ActivePower | inherited from: GeneratingUnit |
| normalPF | 0..1 | Float | inherited from: GeneratingUnit |
| penaltyFactor | 0..1 | Float | inherited from: GeneratingUnit |
| raiseRampRate | 0..1 | ActivePowerChangeRate | inherited from: GeneratingUnit |
| ratedGrossMaxP | 0..1 | ActivePower | inherited from: GeneratingUnit |
| ratedGrossMinP | 0..1 | ActivePower | inherited from: GeneratingUnit |
| ratedNetMaxP | 0..1 | ActivePower | inherited from: GeneratingUnit |
| shortPF | 0..1 | Float | inherited from: GeneratingUnit |
| startupCost | 0..1 | Money | inherited from: GeneratingUnit |
| startupTime | 0..1 | Seconds | inherited from: GeneratingUnit |
| tieLinePF | 0..1 | Float | inherited from: GeneratingUnit |
| totalEfficiency | 0..1 | PerCent | inherited from: GeneratingUnit |
| variableCost | 0..1 | Money | inherited from: GeneratingUnit |
| aggregate | 0..1 | Boolean | inherited from: Equipment |
| inService | 0..1 | Boolean | inherited from: Equipment |
| networkAnalysisEnabled | 0..1 | Boolean | inherited from: Equipment |
| normallyInService | 0..1 | Boolean | inherited from: Equipment |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |

| name | mult | type | description |
|---|---|---|---|
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| maxStartupLoad | 0..1 | ActivePower | (NC) inherited from: ExtGeneratingUnit |
| participationFactor | 0..1 | Float | (NC) inherited from: ExtGeneratingUnit |
| shutdownCost | 0..1 | Money | (NC) inherited from: ExtGeneratingUnit |
| shutdownTime | 0..1 | Duration | (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 |
| warmStartupTime | 0..1 | Duration | (NC) inherited from: ExtGeneratingUnit |
| coolDownTime | 0..1 | Duration | (NC) inherited from: ExtGeneratingUnit |
| warmStartupCost | 0..1 | Money | (NC) inherited from: ExtGeneratingUnit |
| startupRampRate | 0..1 | ActivePowerChangeRate | (NC) inherited from: ExtGeneratingUnit |
| normalStartupCost | 0..1 | Money | (NC) inherited from: ExtGeneratingUnit |
| normalWarmStartupCost | 0..1 | Money | (NC) inherited from: ExtGeneratingUnit |
| mustRunQ | 0..1 | ReactivePower | (NC) inherited from: ExtGeneratingUnit |
| normalMustRunQ | 0..1 | ReactivePower | (NC) inherited from: ExtGeneratingUnit |
| mustRun | 0..1 | Boolean | (NC) inherited from: ExtGeneratingUnit |

Table 253 shows all association ends of GeothermalGeneratingUnit with other classes.

**Table 253 – 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 | Faults | 0..* | Fault | 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..* | AdditionalEquipmentContainer | 0..* | EquipmentContainer | inherited from: Equipment |
| 0..1 | DetailedModelDynamics | 0..* | DetailedModelDynamics | inherited from: Equipment |

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

#### 3.6.7.8 (NC) PowerElectricalChemicalUnit

Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : ExtPowerElectronicsUnit
A unit capable of either generating electrical energy from chemical reactions or using electrical energy to cause chemical reactions.
Table 254 shows all attributes of PowerElectricalChemicalUnit.

**Table 254 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| 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 |

Table 255 shows all association ends of PowerElectricalChemicalUnit with other classes.

**Table 255 – 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 | Faults | 0..* | Fault | 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..* | AdditionalEquipmentContainer | 0..* | EquipmentContainer | inherited from: Equipment |
| 0..1 | DetailedModelDynamics | 0..* | DetailedModelDynamics | inherited from: Equipment |
| 0..1 | DetailedEquipment | 0..* | Equipment | (NC) inherited from: Equipment |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.7.9 (NC) PowerElectronicsMarineUnit

Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : ExtPowerElectronicsUnit

A unit that capture energy from marine sources, e.g. waves, for generating electrical power.

Table 256 shows all attributes of PowerElectronicsMarineUnit.

**Table 256 – Attributes of ExtProduction::PowerElectronicsMarineUnit**

| name | mult | type | description |
|---|---|---|---|
| kind | 0..1 | MarineUnitKind | (NC) Kind of marine unit. |
| maxP | 0..1 | ActivePower | inherited from: PowerElectronicsUnit |
| minP | 0..1 | ActivePower | inherited from: PowerElectronicsUnit |
| aggregate | 0..1 | Boolean | inherited from: Equipment |
| inService | 0..1 | Boolean | inherited from: Equipment |
| networkAnalysisEnabled | 0..1 | Boolean | inherited from: Equipment |
| normallyInService | 0..1 | Boolean | inherited from: Equipment |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |

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

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

**Table 257 – 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 | Faults | 0..* | Fault | 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..* | AdditionalEquipmentContainer | 0..* | EquipmentContainer | inherited from: Equipment |
| 0..1 | DetailedModelDynamics | 0..* | DetailedModelDynamics | inherited from: Equipment |
| 0..1 | DetailedEquipment | 0..* | Equipment | (NC) inherited from: Equipment |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.7.10 (NC) GeothermalUnitKind enumeration

Kind of geothermal.
Table 258 shows all literals of GeothermalUnitKind.

**Table 258 – 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. |

### 3.6.7.11 (NC) MarineUnitKind enumeration

Kind of marine energy capture.
Table 259 shows all literals of MarineUnitKind.

**Table 259 – 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. |

### 3.6.7.12 (NC) NuclearReactorKind enumeration

Kind of nuclear reactor.
Table 260 shows all literals of NuclearReactorKind.

**Table 260 – Literals of ExtProduction::NuclearReactorKind**

| literal | value | description |
|---|---|---|
| breeder | | Reactor whose heat source is a nuclear reactor that generates more fissile material than it consumes. |
| graphite | | Reactor whose heat source is a graphite-moderated reactor that is a nuclear reactor that uses carbon as a neutron moderator, which allows natural uranium to be used as nuclear fuel. |
| heavyWater | | Reactor whose heat source is a pressurized heavy-water reactor (PHWR) that uses heavy water (deuterium oxide D2O) as its coolant and neutron moderator. |
| lightWater | | Reactor whose heat source is a light-water reactor (LWR) that is a type of thermal-neutron reactor that uses normal water, as both its coolant and neutron moderator – furthermore a solid form of fissile elements is used as fuel. |

| literal | value | description |
|---|---|---|
| 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. |

#### 3.6.7.13 (NC) PowerElectricalChemicalUnitKind enumeration

Kind of power electrical chemical unit.
Table 261 shows all literals of PowerElectricalChemicalUnitKind.

**Table 261 – 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. |

### 3.6.8 Package ExtProtection

#### 3.6.8.1 General

This package contains the extensions related to the protections.

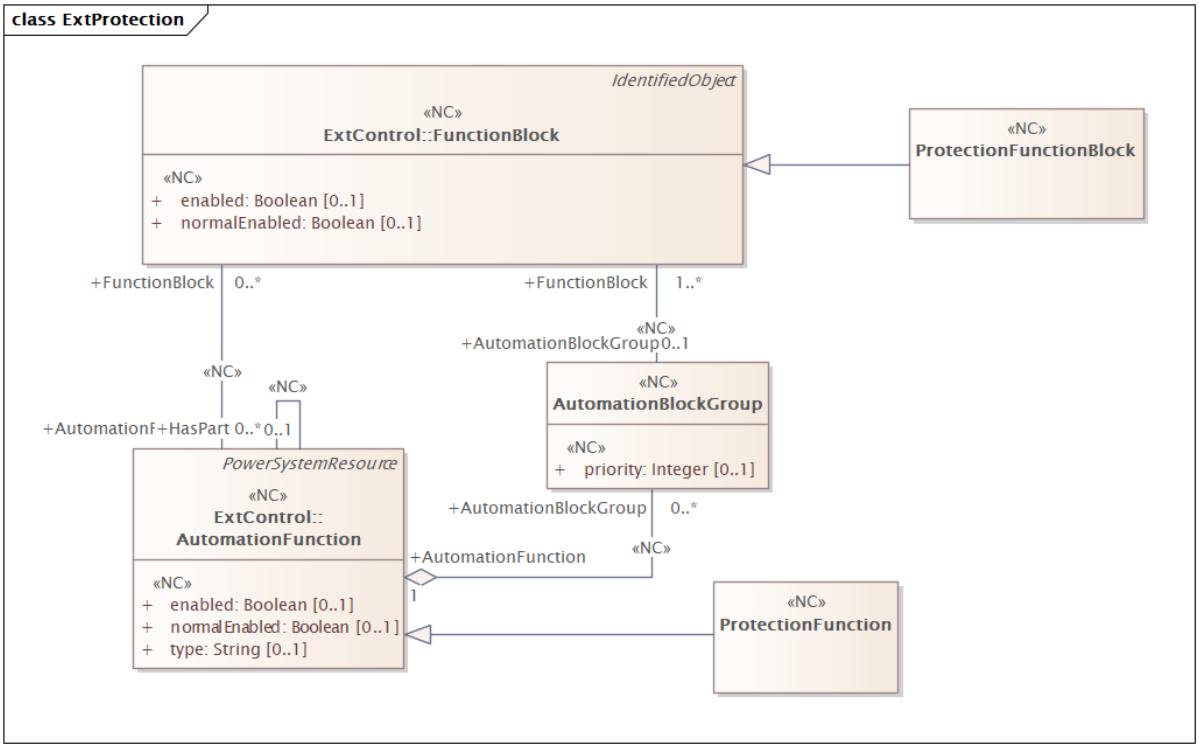



**Figure 19 – Class diagram ExtProtection::ExtProtection**

Figure 19:

### 3.6.8.2 (NC) ProtectionFunctionBlock

Inheritance path = FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject
Protection function block is a function block that contains an algorithm for protecting the equipment.
Table 262 shows all attributes of ProtectionFunctionBlock.

**Table 262 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 263 shows all association ends of ProtectionFunctionBlock with other classes.

**Table 263 – Association ends of ExtProtection::ProtectionFunctionBlock with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | AutomationFunction | 0..1 | AutomationFunction | (NC) inherited from: FunctionBlock |

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (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 |

#### 3.6.8.3 (NC) AutomationBlockGroup root class

Grouping of function block that are operated with the same priority as settings.
Table 264 shows all attributes of AutomationBlockGroup.

**Table 264 – 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 265 shows all association ends of AutomationBlockGroup with other classes.

**Table 265 – Association ends of ExtProtection::AutomationBlockGroup with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | FunctionBlock | 1..* | FunctionBlock | (NC) Function block which belongs to an automation block group. |
| 0..* | AutomationFunction | 1..1 | AutomationFunction | (NC) Automation function which has automation block group. |

#### 3.6.8.4 (NC) ProtectionFunction

Inheritance path = AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
Protection function is an automation function that can protect one or multiple equipment.
Table 266 shows all attributes of ProtectionFunction.

**Table 266 – Attributes of ExtProtection::ProtectionFunction**

| name | mult | type | description |
|---|---|---|---|
| enabled | 0..1 | Boolean | (NC) inherited from: AutomationFunction |
| type | 0..1 | String | (NC) inherited from: AutomationFunction |
| normalEnabled | 0..1 | Boolean | (NC) inherited from: AutomationFunction |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |

| name | 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 267 shows all association ends of ProtectionFunction with other classes.

**Table 267 – Association ends of ExtProtection::ProtectionFunction with other classes**

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

### 3.6.9 Package ExtReactiveCapabilityCurve

#### 3.6.9.1 General

This package contains the extensions related to reactive capability curve.

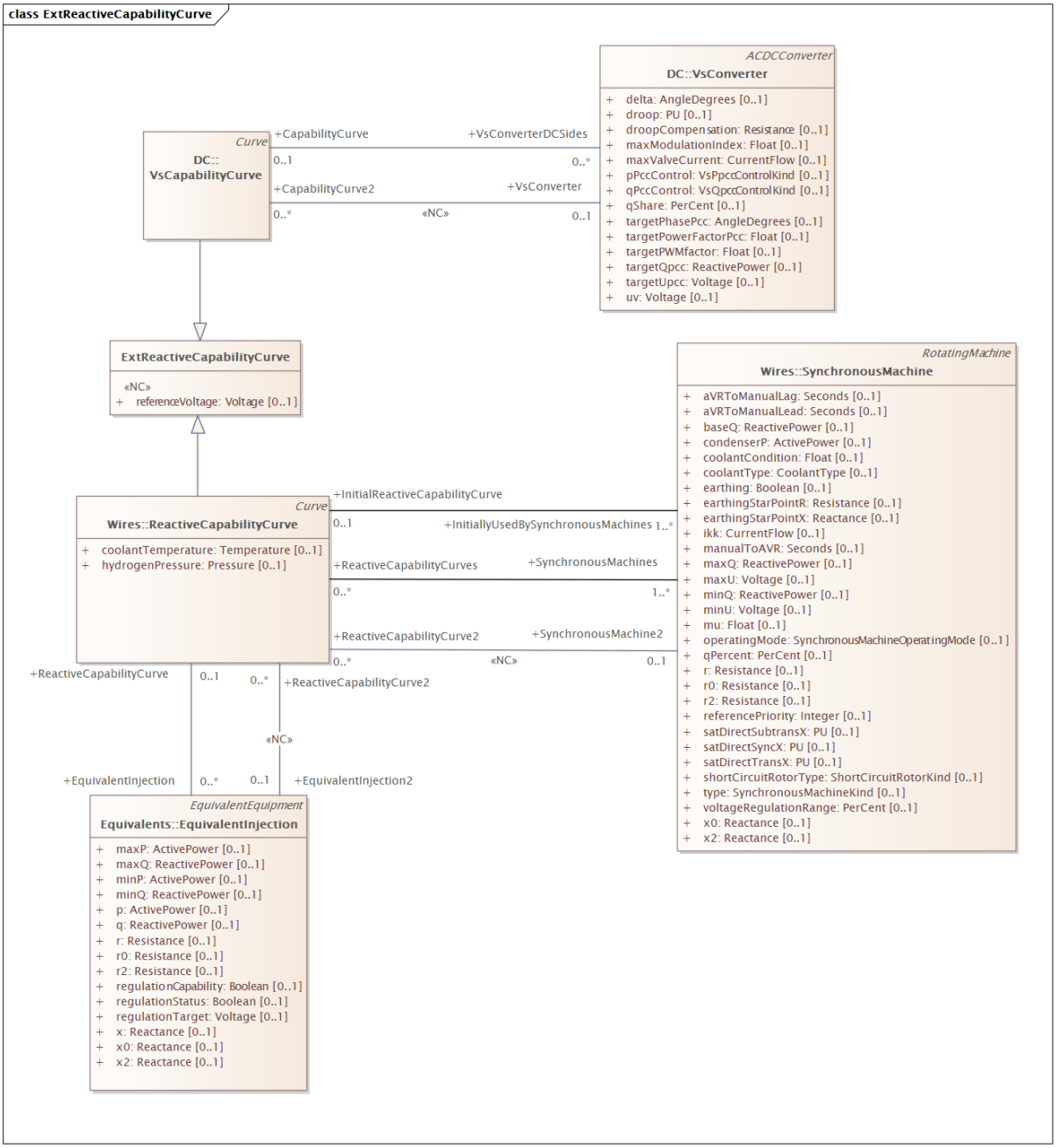



**Figure 20 – Class diagram ExtReactiveCapabilityCurve::ExtReactiveCapabilityCurve**

Figure 20: The diagram contains classes related to reactive capability curve.

### 3.6.9.2 ExtReactiveCapabilityCurve root class

European network codes extension to base CIM counterpart.
Table 268 shows all attributes of ExtReactiveCapabilityCurve.

**Table 268 – Attributes of ExtReactiveCapabilityCurve::ExtReactiveCapabilityCurve**

| name | mult | type | description |
|---|---|---|---|
| referenceVoltage | 0..1 | Voltage | (NC) The reference voltage for which the capability curve is valid. |

### 3.6.10 Package ExtSecurityLimit

#### 3.6.10.1 General

This package contains the extensions related to the security limits.

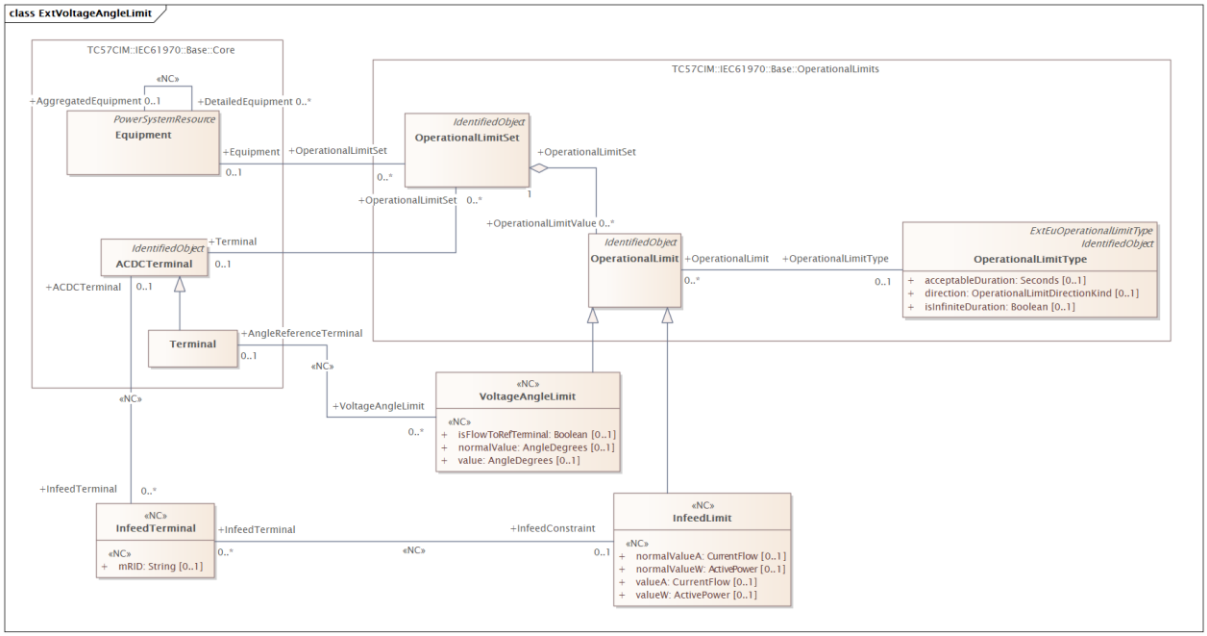



**Figure 21 – Class diagram ExtSecurityLimit::ExtVoltageAngleLimit**

Figure 21: The diagram contains classes related to voltage angle limit.

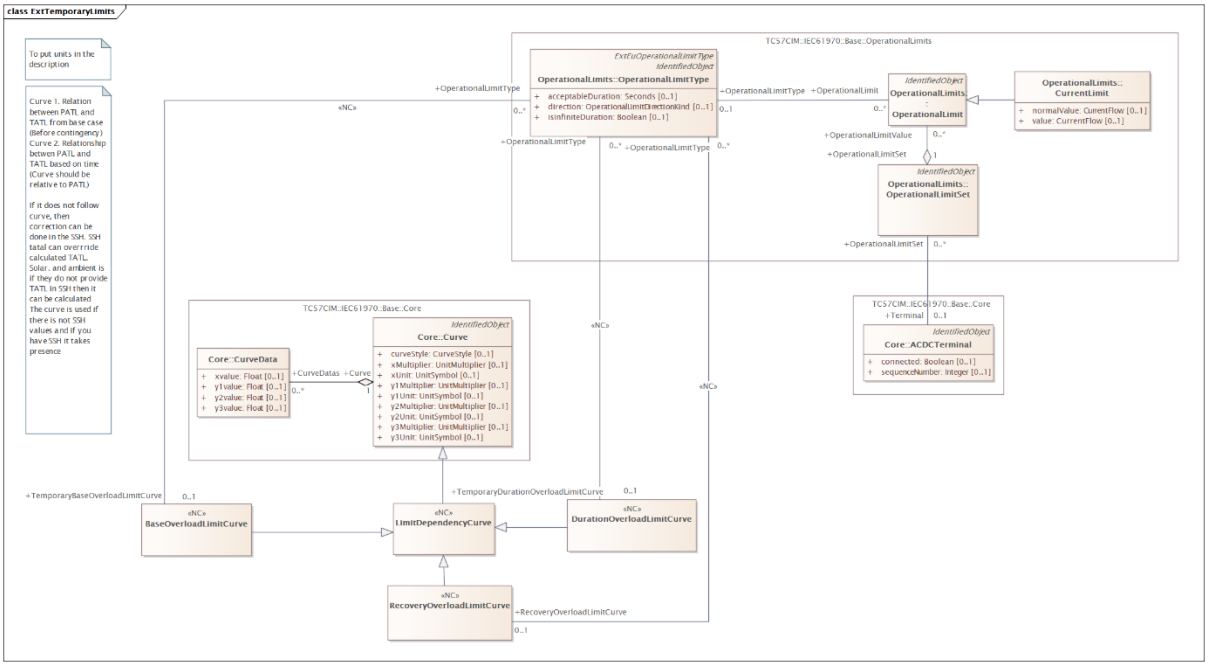



**Figure 22 – Class diagram ExtSecurityLimit::ExtTemporaryLimits**

Figure 22: The diagram contains classes related to temporary limits.

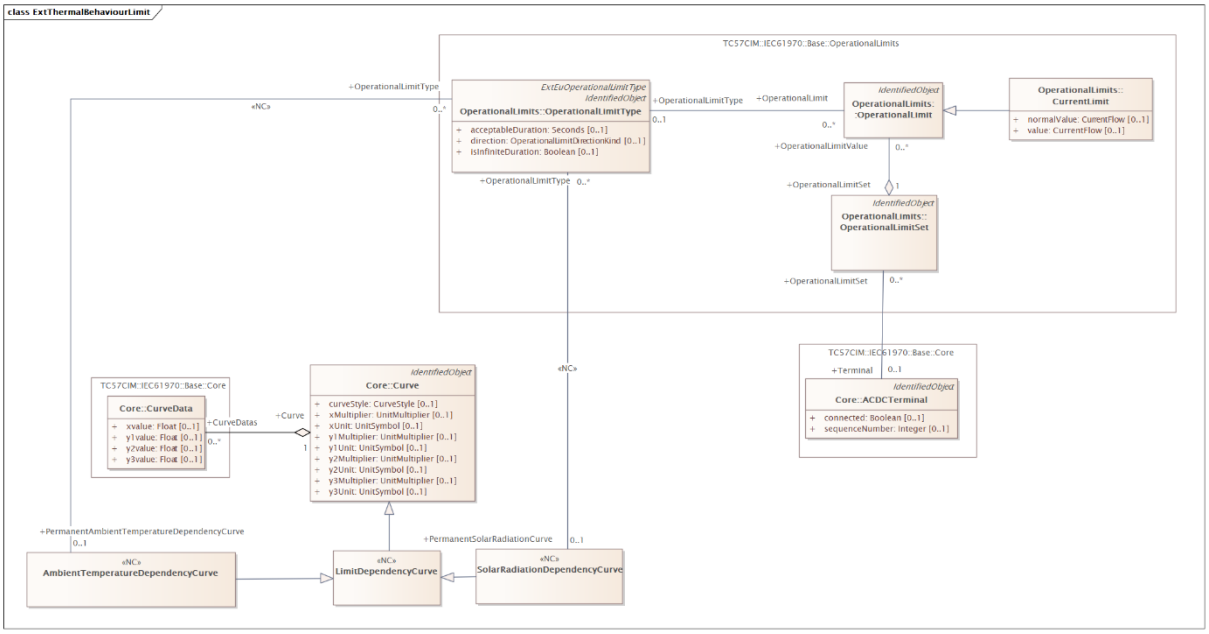



**Figure 23 – Class diagram ExtSecurityLimit::ExtThermalBehaviourLimit**

Figure 23: The diagram contains classes related to thermal behaviour limit.

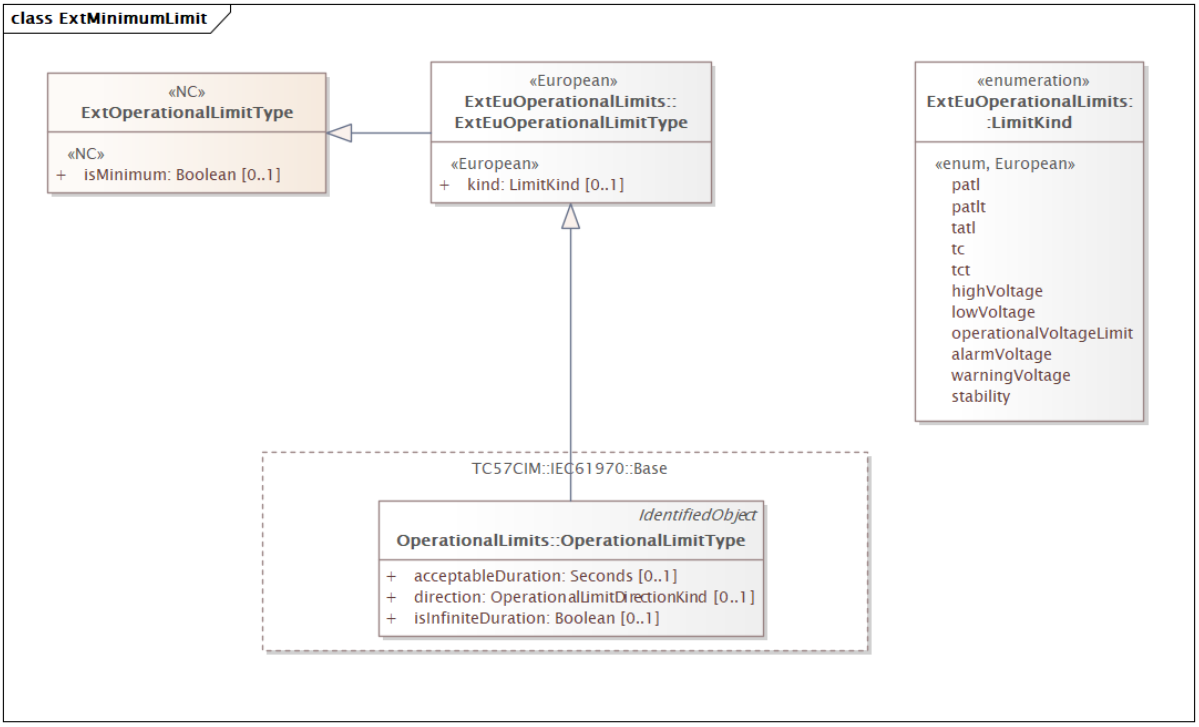



**Figure 24 – Class diagram ExtSecurityLimit::ExtMinimumLimit**

Figure 24: The diagram contains classes related to minimum limit.

### 3.6.10.2 (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 269 shows all attributes of AmbientTemperatureDependencyCurve.

**Table 269 – 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 270 shows all association ends of AmbientTemperatureDependencyCurve with other classes.

**Table 270 – 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 |

### 3.6.10.3 (NC) BaseOverloadLimitCurve

Inheritance path = LimitDependencyCurve : Curve : IdentifiedObject : ExtEuIdentifiedObject
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 271 shows all attributes of BaseOverloadLimitCurve.

**Table 271 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 272 – 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 |

### 3.6.10.4 (NC) DurationOverloadLimitCurve

Inheritance path = LimitDependencyCurve : Curve : IdentifiedObject : ExtEuIdentifiedObject
A curve or functional relationship between
- the overload duration independent variable (X-axis), and
- temporary overloading (TATL) limiting dependent (Y-axis) variables.
Table 273 shows all attributes of DurationOverloadLimitCurve.

**Table 273 – 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 |

| name | mult | type | description |
|---|---|---|---|
| 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 274 shows all association ends of DurationOverloadLimitCurve with other classes.

**Table 274 – 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 |

### 3.6.10.5 (NC) LimitDependencyCurve

Inheritance path = Curve : IdentifiedObject : ExtEuIdentifiedObject
A curve or functional relationship between an independent variable (X-axis) and limiting dependent (Y-axis) variables.
Table 275 shows all attributes of LimitDependencyCurve.

**Table 275 – 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 |

| name | mult | type | description |
|---|---|---|---|
| y3Multiplier | 0..1 | UnitMultiplier | inherited from: Curve |
| y3Unit | 0..1 | UnitSymbol | inherited from: Curve |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 276 shows all association ends of LimitDependencyCurve with other classes.

**Table 276 – 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 |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.10.6 (NC) RecoveryOverloadLimitCurve

Inheritance path = LimitDependencyCurve : Curve : IdentifiedObject : ExtEuIdentifiedObject
The relation between the recovery time and an overload limit.
Table 277 shows all attributes of RecoveryOverloadLimitCurve.

**Table 277 – 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: ExtEuIdentifiedObject |

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

Table 278 shows all association ends of RecoveryOverloadLimitCurve with other classes.

**Table 278 – Association ends of ExtSecurityLimit::RecoveryOverloadLimitCurve with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | OperationalLimitType | 0..* | OperationalLimitType | (NC) The operational limit type which has recovery time characteristic. |
| 1..1 | CurveDatas | 0..* | CurveData | inherited from: Curve |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.10.7 (NC) SolarRadiationDependencyCurve

Inheritance path = LimitDependencyCurve : Curve : IdentifiedObject : ExtEuIdentifiedObject
A curve or functional relationship between
- the solar radiation independent variable (X-axis), and
- relative dependent (Y-axis) variables.

Table 279 shows all attributes of SolarRadiationDependencyCurve.

**Table 279 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 280 shows all association ends of SolarRadiationDependencyCurve with other classes.

**Table 280 – Association ends of ExtSecurityLimit::SolarRadiationDependencyCurve with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | OperationalLimitType | 0..* | OperationalLimitType | (NC) The operational limit type that has this permanent solar radiation curve. |
| 1..1 | CurveDatas | 0..* | CurveData | inherited from: Curve |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.10.8 (NC) InfeedLimit

Inheritance path = OperationalLimit : IdentifiedObject : ExtEuIdentifiedObject
Infeed limit set constraints fed in to the network by two or more terminals.
Table 281 shows all attributes of InfeedLimit.

**Table 281 – Attributes of ExtSecurityLimit::InfeedLimit**

| name | mult | type | description |
|---|---|---|---|
| normalValueW | 0..1 | ActivePower | (NC) The normal value of active power limit. The attribute shall be a positive value or zero. |
| valueW | 0..1 | ActivePower | (NC) Value of active power limit. The attribute shall be a positive value or zero. |
| normalValueA | 0..1 | CurrentFlow | (NC) The normal current limit. The attribute shall be a positive value or zero. |
| valueA | 0..1 | CurrentFlow | (NC) Value of current limit. The attribute shall be a positive value or zero. |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 282 shows all association ends of InfeedLimit with other classes.

**Table 282 – Association ends of ExtSecurityLimit::InfeedLimit with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | InfeedTerminal | 0..* | InfeedTerminal | (NC) Infeed terminal that has infeed constraints. |
| 0..1 | InfeedLimitSchedule | 0..* | InfeedLimitSchedule | (NC) Infeed limit schedule associated with an infeed limit. |
| 0..* | OperationalLimitSet | 1..1 | OperationalLimitSet | inherited from: OperationalLimit |
| 0..* | OperationalLimitType | 0..1 | OperationalLimitType | inherited from: OperationalLimit |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |

| 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 |

#### 3.6.10.9 (NC) InfeedTerminal root class

Infeed terminal defines the terminals that are linked to an infeed limit.
Table 283 shows all attributes of InfeedTerminal.

**Table 283 – 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.<br>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 284 shows all association ends of InfeedTerminal with other classes.

**Table 284 – Association ends of ExtSecurityLimit::InfeedTerminal with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | InfeedConstraint | 0..1 | InfeedLimit | (NC) Infeed constraint which belongs to an infeed terminal. |
| 0..* | ACDCTerminal | 0..1 | ACDCTerminal | (NC) ACDCTerminal which is connected to an infeed terminal. |

#### 3.6.10.10 (NC) ExtOperationalLimitType root class

European network codes extension to base CIM counterpart.
Table 285 shows all attributes of ExtOperationalLimitType.

**Table 285 – Attributes of ExtSecurityLimit::ExtOperationalLimitType**

| name | mult | type | description |
|---|---|---|---|
| isMinimum | 0..1 | Boolean | (NC) Defines if the operational limit type is minimum. If true, the value is a minimum value of the same kind. This applies to stability and PATL. If false, the limit has the normal behaviour. OperationalLimitType.direction attribute shall be absoluteValue. |

### 3.6.11 SIPS extensions

#### 3.6.11.1 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.

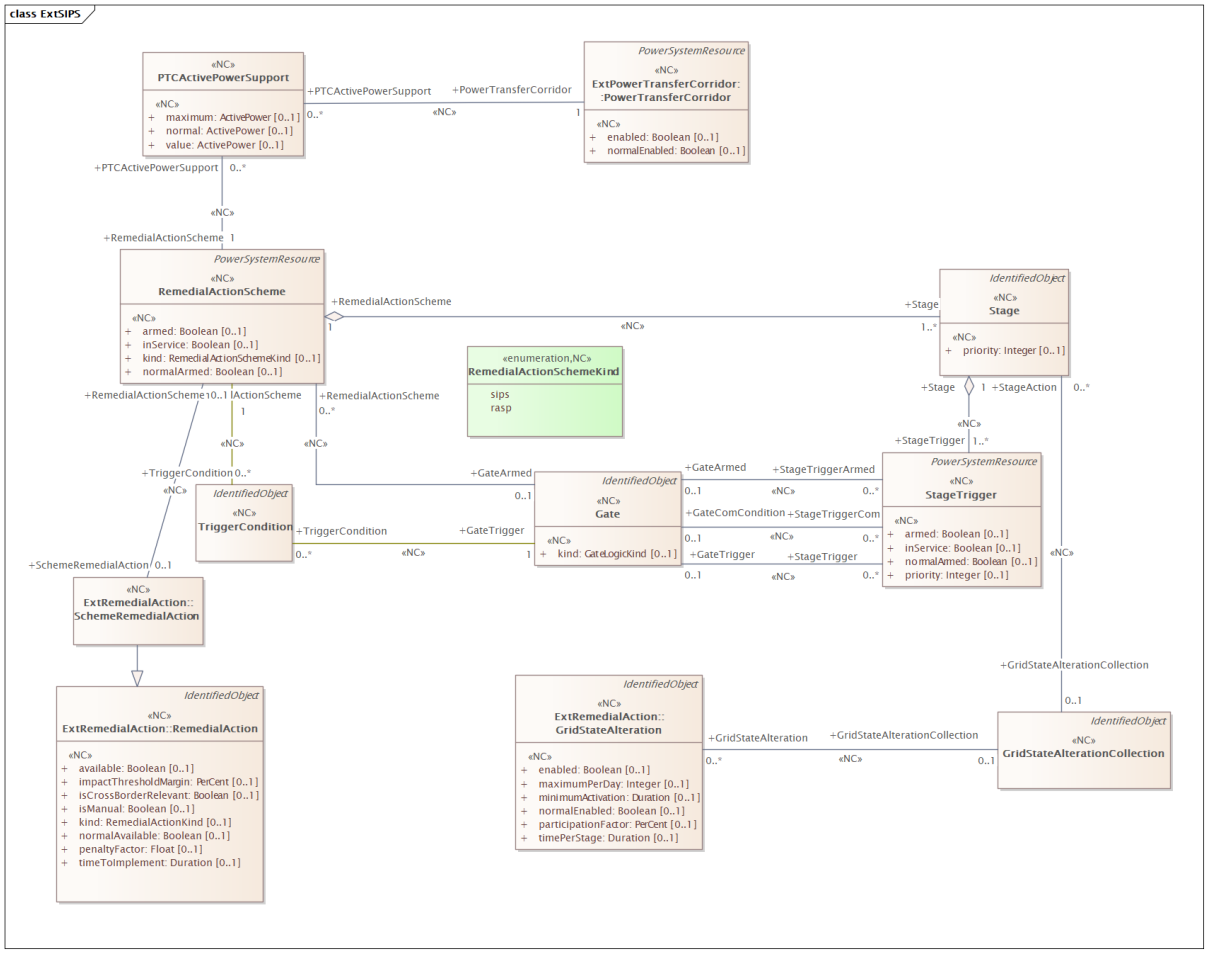



**Figure 25 – Class diagram ExtSIPS::ExtSIPS**

Figure 25: The diagram contains classes related to SIPS.

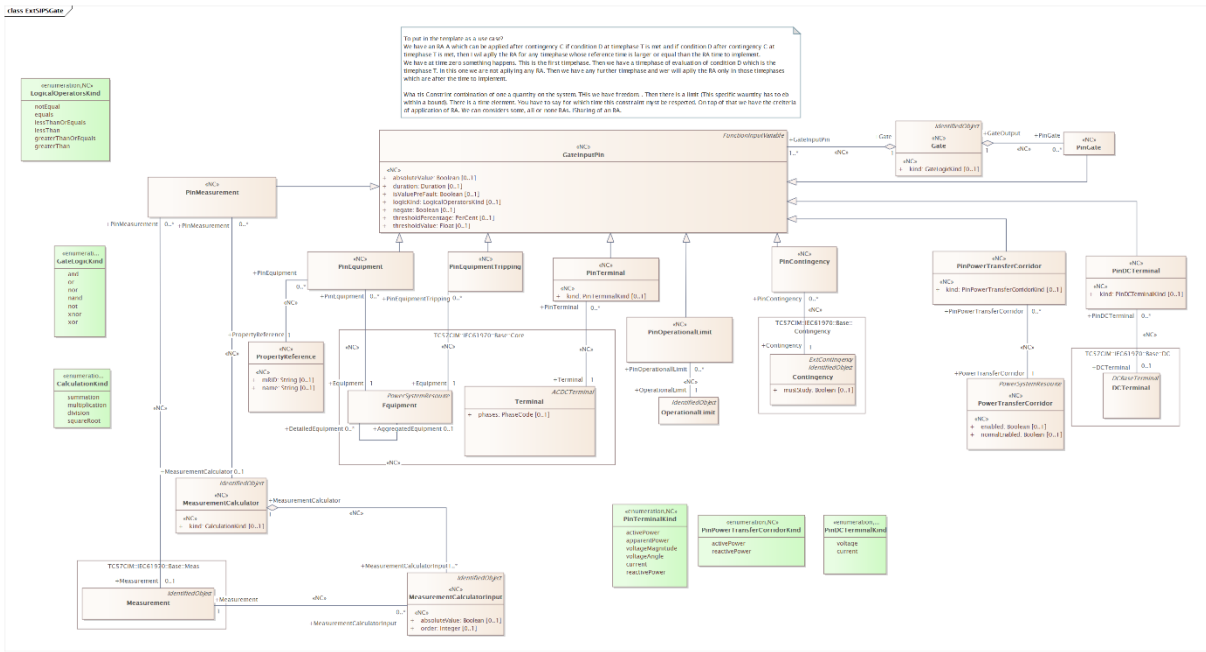


**Figure 26 – Class diagram ExtSIPS::ExtSIPSGate**

Figure 26: The diagram contains classes related to SIPS gate.

### 3.6.11.2 (NC) Gate

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Logical gate that supports a logical operation based on the input.
Table 286 shows all attributes of Gate.

**Table 286 – 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 287 shows all association ends of Gate with other classes.

**Table 287 – 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 | (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 |

### 3.6.11.3 (NC) GateInputPin

Inheritance path = FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject
Input pin for a logical gate. The condition described in the input pin gives a logical true or false. The result from measurement and calculation are converted to a true or false.
Table 288 shows all attributes of GateInputPin.

**Table 288 – 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.<br>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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 289 shows all association ends of GateInputPin with other classes.

**Table 289 – 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 |

### 3.6.11.4 (NC) GridStateAlterationCollection

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
A collection of grid state alterations.
Table 290 shows all attributes of GridStateAlterationCollection.

**Table 290 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 291 shows all association ends of GridStateAlterationCollection with other classes.

**Table 291 – Association ends of ExtSIPS::GridStateAlterationCollection with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | AvailabilitySchedule | 0..* | AvailabilitySchedule | (NC) Availability schedule that require the a collection of grid state alteration to provide a valid power flow solution. For instance, a set of switching plans. |
| 0..1 | StageAction | 0..* | Stage | (NC) The stage action related to this GridStateAlterationCollection. |
| 0..1 | GridStateAlteration | 0..* | GridStateAlteration | (NC) The GridStateAlteration that belongs to the collection. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.11.5 (NC) MeasurementCalculator

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Result of a calculation of one or more measurement.
Table 292 shows all attributes of MeasurementCalculator.

**Table 292 – Attributes of ExtSIPS::MeasurementCalculator**

| name | mult | type | description |
|---|---|---|---|
| kind | 0..1 | CalculationKind | (NC) Calculation operation executed on the operands. |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 293 shows all association ends of MeasurementCalculator with other classes.

**Table 293 – 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 |

### 3.6.11.6 (NC) MeasurementCalculatorInput

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Input to measurement calculation. It supports Analog, Discrete and Accumulator measurements.
Table 294 shows all attributes of MeasurementCalculatorInput.

**Table 294 – 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 295 shows all association ends of MeasurementCalculatorInput with other classes.

**Table 295 – Association ends of ExtSIPS::MeasurementCalculatorInput with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | MeasurementCalculator | 1..1 | MeasurementCalculator | (NC) The measurement calculator using this calculator input. |
| 0..* | Measurement | 1..1 | Measurement | (NC) Measurement used as input to a calculation. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.6.11.7 (NC) PinContingency

Inheritance path = GateInputPin : FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject

Input pin associated with a Contingency. It is used for comparison.

Table 296 shows all attributes of PinContingency.

**Table 296 – 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 297 shows all association ends of PinContingency with other classes.

**Table 297 – 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 |

### 3.6.11.8 (NC) PinDCTerminal

Inheritance path = GateInputPin : FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject

Input pin associated with a DCTerminal. It is used for comparison.

Table 298 shows all attributes of PinDCTerminal.

**Table 298 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 299 shows all association ends of PinDCTerminal with other classes.

**Table 299 – 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 |

#### 3.6.11.9 (NC) PinEquipment

Inheritance path = GateInputPin : FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject

Input pin associated with an Equipment. It is used for the comparison.

Table 300 shows all attributes of PinEquipment.

**Table 300 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 301 shows all association ends of PinEquipment with other classes.

**Table 301 – 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 |

#### 3.6.11.10 (NC) PinEquipmentTripping

Inheritance path = GateInputPin : FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject

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 302 shows all attributes of PinEquipmentTripping.

**Table 302 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 303 shows all association ends of PinEquipmentTripping with other classes.

**Table 303 – 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 |

#### 3.6.11.11 (NC) PinGate

Inheritance path = GateInputPin : FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject

An output from one gate represents an input to another gate.

Table 304 shows all attributes of PinGate.

**Table 304 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 305 shows all association ends of PinGate with other classes.

**Table 305 – 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 |

#### 3.6.11.12 (NC) PinMeasurement

Inheritance path = GateInputPin : FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject

Input pin associated with a Measurement. It is used for comparison.

Table 306 shows all attributes of PinMeasurement.

**Table 306 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 307 shows all association ends of PinMeasurement with other classes.

**Table 307 – 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 |

### 3.6.11.13 (NC) PinPowerTransferCorridor

Inheritance path = GateInputPin : FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject

Input pin associated with a PowerTransferCorridor. It is used for comparison.

Table 308 shows all attributes of PinPowerTransferCorridor.

**Table 308 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 309 shows all association ends of PinPowerTransferCorridor with other classes.

**Table 309 – 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 |

#### 3.6.11.14 (NC) PinTerminal

Inheritance path = GateInputPin : FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject

Input pin associated with a Terminal. It is used for comparison.

Table 310 shows all attributes of PinTerminal.

**Table 310 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 311 shows all association ends of PinTerminal with other classes.

**Table 311 – 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 |

### 3.6.11.15 (NC) PinOperationalLimit

Inheritance path = GateInputPin : FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject

Input pin associated with the limits of a Terminal. It is used for comparison.

Table 312 shows all attributes of PinOperationalLimit.

**Table 312 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 313 shows all association ends of PinOperationalLimit with other classes.

**Table 313 – 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 |

### 3.6.11.16 (NC) PTCActivePowerSupport root class

Defines the active power capability (support) of the scheme in relation to a PowerTransferCorridor.

Table 314 shows all attributes of PTCActivePowerSupport.

**Table 314 – Attributes of ExtSIPS::PTCActivePowerSupport**

| name | mult | type | description |
|---|---|---|---|
| maximum | 0..1 | ActivePower | (NC) Maximum support that a System Integrity Protection Scheme (SIPS) can provide to a Power Transfer Corridor (PTC). This is normally limited by the maximum power system disconnect allowed. |
| normal | 0..1 | ActivePower | (NC) Normal support that a System Integrity Protection Scheme (SIPS) is expected to provide when enabled to a Power Transfer Corridor (PTC). |
| value | 0..1 | ActivePower | (NC) The support that a System Integrity Protection Scheme (SIPS) gives to a Power Transfer Corridor (PTC). |

Table 315 shows all association ends of PTCActivePowerSupport with other classes.

**Table 315 – Association ends of ExtSIPS::PTCActivePowerSupport with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | RemedialActionScheme | 1..1 | RemedialActionScheme | (NC) The RemedialActionScheme which has active power support from the PowerTransferCorridor. |
| 0..* | PowerTransferCorridor | 1..1 | PowerTransferCorridor | (NC) The PowerTransferCorridor that has a specific active power support. |

### 3.6.11.17 (NC) RemedialActionScheme

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Remedial Action Scheme (RAS), Special Protection Schemes (SPS), System Protection Schemes (SPS) or System Integrity Protection Schemes (SIPS).

A Remedial Action Scheme consists of one or more stages that can trigger and execute a protection action.

Table 316 shows all attributes of RemedialActionScheme.

**Table 316 – 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. |
| 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. |
| 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. |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | 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 317 shows all association ends of RemedialActionScheme with other classes.

**Table 317 – 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 availabiltiy that affect this remedial action scheme. |
| 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. |
| 0..1 | RemedialActionSchemeSchedule | 0..* | RemedialActionSchemeSchedule | (NC) Remedial action scheme schedule that has this armed remedial action. |
| 1..1 | TriggerCondition | 0..* | TriggerCondition | (NC) The triggering condition of this Remedial Action Scheme. |
| 1..1 | Stage | 1..* | Stage | (NC) The stage for this remedial action scheme. |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |

| 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 |

#### 3.6.11.18 (NC) Stage

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Stage of a remedial action scheme.
Table 318 shows all attributes of Stage.

**Table 318 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 319 shows all association ends of Stage with other classes.

**Table 319 – 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..* | 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 | RemedialActionApplied | 0..* | RemedialActionApplied | (NC) The applied relationship between remedial action and a power flow result. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

#### 3.6.11.19 (NC) StageTrigger

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
Stage that is triggered either by TriggerCondition or by gate condition within a stage.
Table 320 shows all attributes of StageTrigger.

**Table 320 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 321 shows all association ends of StageTrigger with other classes.

**Table 321 – 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 |

#### 3.6.11.20 (NC) TriggerCondition

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
The condition that triggers a remedial action scheme.
Table 322 shows all attributes of TriggerCondition.

**Table 322 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 323 shows all association ends of TriggerCondition with other classes.

**Table 323 – Association ends of ExtSIPS::TriggerCondition with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | GateTrigger | 1..1 | Gate | (NC) The gate that is the condition for the trigger. |
| 0..* | RemedialActionScheme | 1..1 | RemedialActionScheme | (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 |

### 3.6.11.21 (NC) CalculationKind enumeration

Kind of calculation operation that can be done to Measurement.
Table 324 shows all literals of CalculationKind.

**Table 324 – 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). |

### 3.6.11.22 (NC) GateLogicKind enumeration

Define the different logical operations.
Table 325 shows all literals of GateLogicKind.

**Table 325 – Literals of ExtSIPS::GateLogicKind**

| literal | value | description |
|---|---|---|
| and | | A logical AND operation. True when all inputs are true. |

| literal | value | description |
|---|---|---|
| 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. |

#### 3.6.11.23 (NC) LogicalOperatorsKind enumeration

Kinds of logical operators for comparison.
Table 326 shows all literals of LogicalOperatorsKind.

**Table 326 – 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. |

#### 3.6.11.24 (NC) PinDCTerminalKind enumeration

The kind of quantities that can serve as an input value for the DCTerminal pin.
Table 327 shows all literals of PinDCTerminalKind.

**Table 327 – Literals of ExtSIPS::PinDCTerminalKind**

| literal | value | description |
|---|---|---|
| voltage | | Direct current voltage in the DCTerminal. |
| current | | Direct current in the DCTerminal. |

#### 3.6.11.25 (NC) PinPowerTransferCorridorKind enumeration

The kind of quantities that can serve as an input value for the PowerTransferCorridor pin.
Table 328 shows all literals of PinPowerTransferCorridorKind.

**Table 328 – Literals of ExtSIPS::PinPowerTransferCorridorKind**

| literal | value | description |
|---|---|---|
| activePower | | Active power in the branch group. |
| reactivePower | | Reactive power in the branch group. |

#### 3.6.11.26 (NC) PinTerminalKind enumeration

The kind of quantities that can serve as an input value for the pin.
Table 329 shows all literals of PinTerminalKind.

**Table 329 – 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. |

#### 3.6.11.27 (NC) RemedialActionSchemeKind enumeration

Classification of Remedial Action Scheme.
Table 330 shows all literals of RemedialActionSchemeKind.

**Table 330 – 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. |

## 3.7 Contingency extensions

### 3.7.1 General

This package contains the extensions related to the contingency.

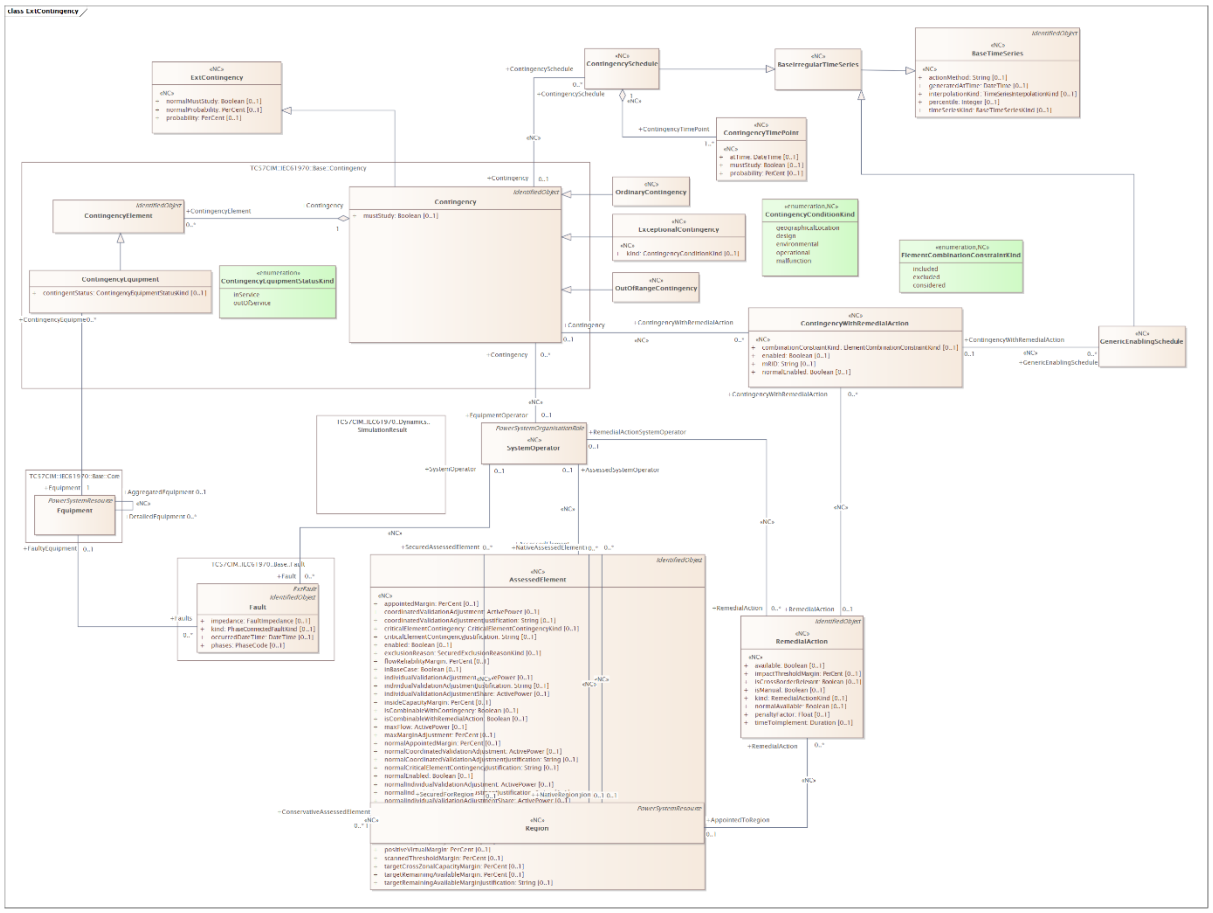



**Figure 27 – Class diagram ExtContingency::ExtContingency**

Figure 27: The diagram contains classes related to the contingency.

### 3.7.2 (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 331 shows all attributes of ContingencyWithRemedialAction.

**Table 331 – 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.<br>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 332 shows all association ends of ContingencyWithRemedialAction with other classes.

**Table 332 – Association ends of ExtContingency::ContingencyWithRemedialAction with other classes**

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

### 3.7.3 (NC) ExceptionalContingency

Inheritance path = Contingency : IdentifiedObject : ExtEuIdentifiedObject : ExtContingency
Exceptional contingency means the simultaneous occurrence of multiple contingencies with a common cause.
Table 333 shows all attributes of ExceptionalContingency.

**Table 333 – Attributes of ExtContingency::ExceptionalContingency**

| name | mult | type | description |
|---|---|---|---|
| kind | 0..1 | ContingencyConditionKind | (NC) Defines the kind of relevance and criteria of application of the exceptional contingency. |
| mustStudy | 0..1 | Boolean | inherited from: Contingency |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| 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 334 shows all association ends of ExceptionalContingency with other classes.

**Table 334 – 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 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.7.4 (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 335 shows all attributes of ExtContingency.

**Table 335 – 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.<br>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.<br>The allowed value range is [0,100]. |

### 3.7.5 (NC) OrdinaryContingency

Inheritance path = Contingency : IdentifiedObject : ExtEuIdentifiedObject : ExtContingency
Ordinary contingency means the occurrence of a contingency of a single branch or injection. Table 336 shows all attributes of OrdinaryContingency.

**Table 336 – 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 |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

| name | mult | type | description |
|---|---|---|---|
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| 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 337 shows all association ends of OrdinaryContingency with other classes.

**Table 337 – 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 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.7.6 (NC) OutOfRangeContingency

Inheritance path = Contingency : IdentifiedObject : ExtEuIdentifiedObject : 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 338 shows all attributes of OutOfRangeContingency.

**Table 338 – Attributes of ExtContingency::OutOfRangeContingency**

| name | mult | type | description |
|---|---|---|---|
| mustStudy | 0..1 | Boolean | inherited from: Contingency |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| 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 339 shows all association ends of OutOfRangeContingency with other classes.

**Table 339 – Association ends of ExtContingency::OutOfRangeContingency with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..1 | ContingencyElement | 0..* | ContingencyElement | inherited from: Contingency |

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

### 3.7.7 (NC) ContingencyConditionKind enumeration

Kinds of occurrence criteria of application.
Table 340 shows all literals of ContingencyConditionKind.

**Table 340 – Literals of ExtContingency::ContingencyConditionKind**

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

## 3.8 Package ExtEquivalent

This package contains the extensions related to the equivalents.

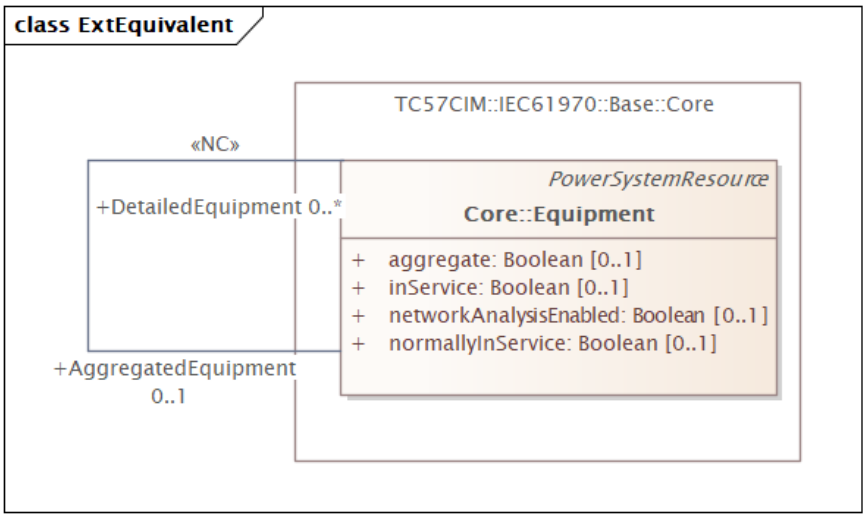



**Figure 28 – Class diagram ExtEquivalent::ExtEquivalent**

Figure 28: The diagram contains association related to equipment.

## 3.9 Package ExtFaultsPRA

### 3.9.1 General

The package includes extensions related to reporting fault situations in the power system.

### 3.9.2 Package ExtFaultCause

#### 3.9.2.1 General

Extensions related to fault cause.

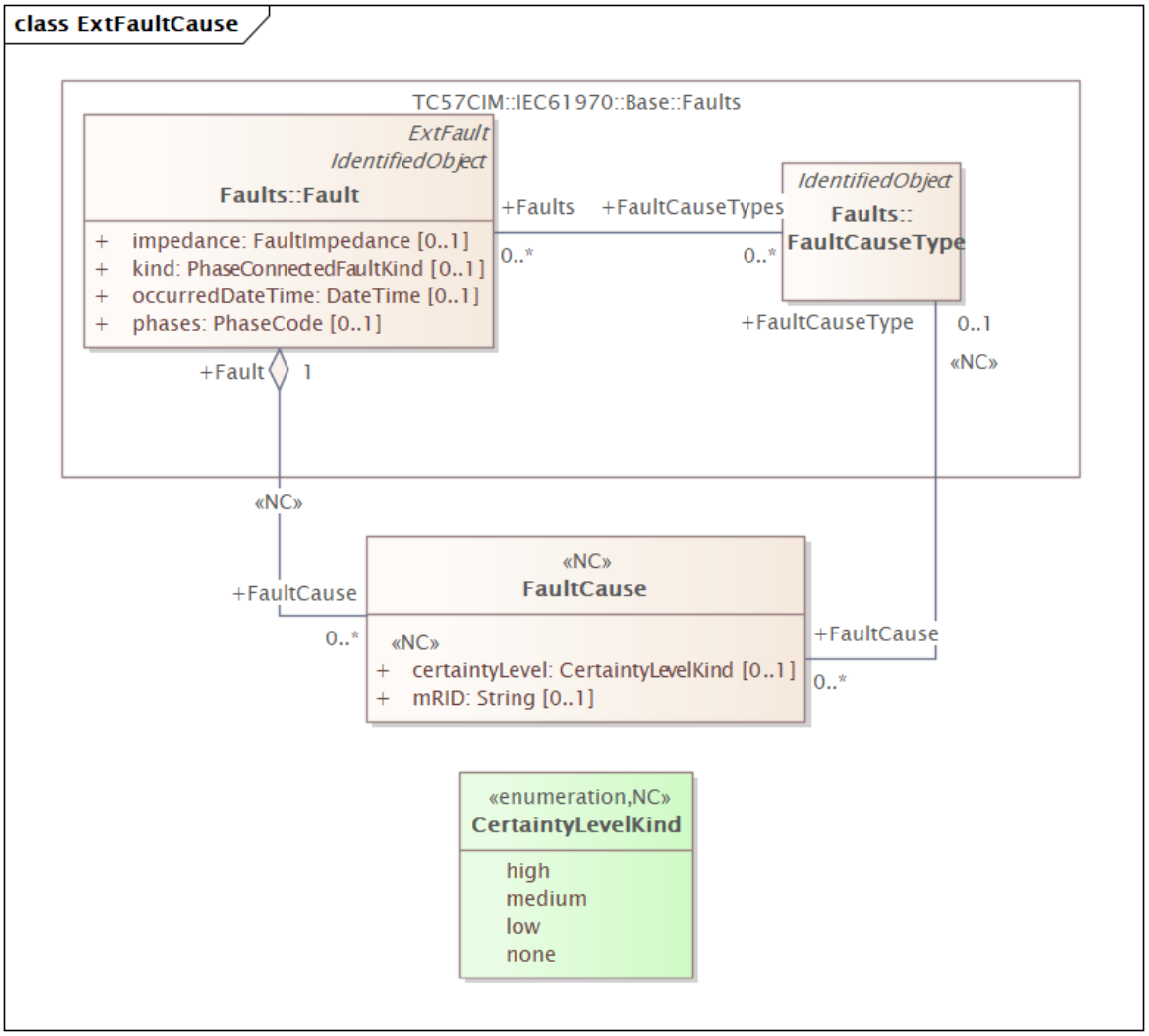



**Figure 29 – Class diagram ExtFaultCause::ExtFaultCause**

Figure 29: The diagram contains classes and attributes related to the extensions.

#### 3.9.2.2 (NC) FaultCause root class

Fault cause.
Table 341 shows all attributes of FaultCause.

**Table 341 – 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. |

| name | mult | type | description |
|---|---|---|---|
| | | | 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.<br>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.<br>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 342 shows all association ends of FaultCause with other classes.

**Table 342 – Association ends of ExtFaultCause::FaultCause with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | FaultCauseType | 0..1 | FaultCauseType | (NC) The fault and cause combination to be simulated for this cause. |
| 0..* | Fault | 1..1 | Fault | (NC) The fault defined for this fault and cause combination. |

#### 3.9.2.3 (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 343 shows all literals of CertaintyLevelKind.

**Table 343 – 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. |

### 3.9.3 Package ExtGridDisturbance

#### 3.9.3.1 General

Extensions relate to grid disturbance.

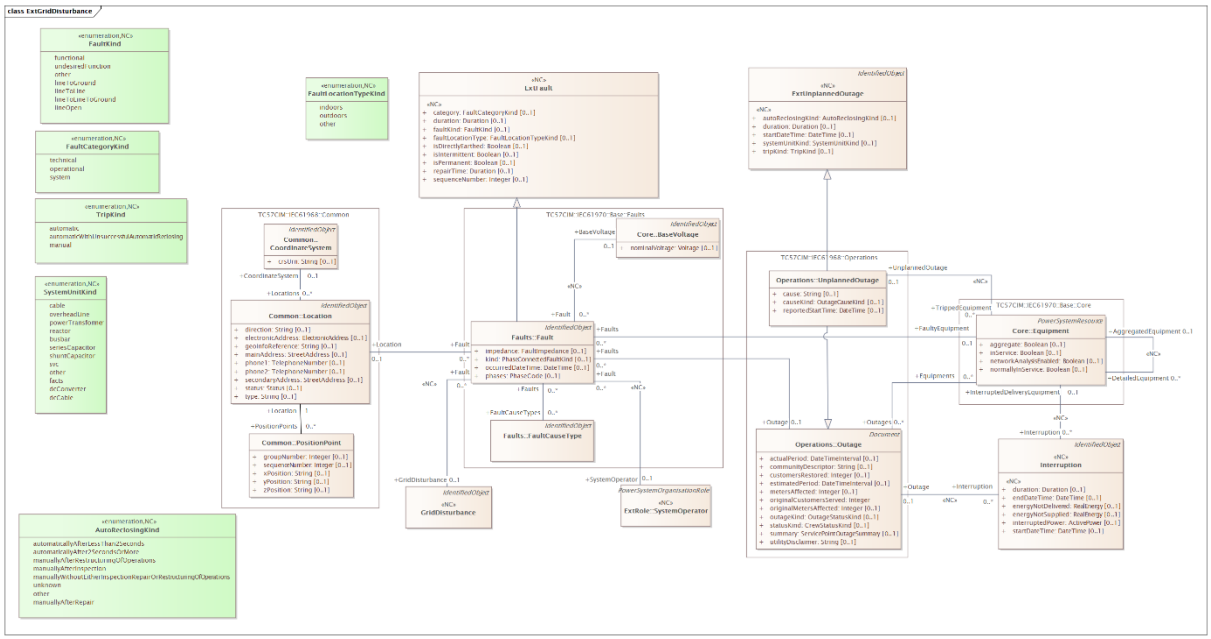



**Figure 30 – Class diagram ExtGridDisturbance::ExtGridDisturbance**

Figure 30: The diagram contains classes and attributes related to the extensions.

### 3.9.3.2 (NC) FaultLocationTypeKind enumeration

Categories of fault location types.
Table 344 shows all literals of FaultLocationTypeKind.

**Table 344 – Literals of ExtGridDisturbance::FaultLocationTypeKind**

| literal | value | description |
|---|---|---|
| indoors | | Fault occurs indoors. |
| outdoors | | Fault occurs outdoors. |
| other | | Fault occurs in other location. |

### 3.9.3.3 (NC) ExtFault root class

A fault of a component is defined as the inability to perform as required, due to an internal state.
Table 345 shows all attributes of ExtFault.

**Table 345 – 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.<br>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).<br>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].<br>A non-intermittent fault occurs only once.<br>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.<br>Note 2: one example of an intermittent fault is galloping lines.<br>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.<br>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.<br>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.<br>Note 2: the repair time is zero if a fault is left unrepaired deliberately.<br>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.<br>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).<br>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.<br>A permanent fault is a fault that will remain unless it is removed by some intervention.<br>Note 1 to entry: The "intervention" may be modification or maintenance.<br>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.<br>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.<br>Note 1: a temporary fault does not require measures other than the reconnection of circuit breakers, replacement of fuses or signal acknowledgement.<br>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. |

#### 3.9.3.4 (NC) ExtUnplannedOutage

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
An event where a component or unit gets partially or fully isolated from the system.
Table 346 shows all attributes of ExtUnplannedOutage.

**Table 346 – 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.<br>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.<br>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.<br>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.<br>A system unit is defined as:<br>A group of components which are delimited by one or more circuit breakers.<br>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.<br>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.<br>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.<br>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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 347 shows all association ends of ExtUnplannedOutage with other classes.

**Table 347 – Association ends of ExtGridDisturbance::ExtUnplannedOutage with other classes**

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

#### 3.9.3.5 (NC) GridDisturbance

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Automatic, unintended, or manual undeferrable switching of breakers as a result of faults in the power grid.
Table 348 shows all attributes of GridDisturbance.

**Table 348 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 349 shows all association ends of GridDisturbance with other classes.

**Table 349 – Association ends of ExtGridDisturbance::GridDisturbance with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | Fault | 0..* | Fault | (NC) Faults that are related to one grid disturbance. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.9.3.6 (NC) Interruption

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Disappearance of the supply voltage at a delivery point.
Table 350 shows all attributes of Interruption.

**Table 350 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 351 shows all association ends of Interruption with other classes.

**Table 351 – 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 |

#### 3.9.3.7 (NC) AutoReclosingKind enumeration

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.
Table 352 shows all literals of AutoReclosingKind.

**Table 352 – Literals of ExtGridDisturbance::AutoReclosingKind**

| literal | value | description |
|---|---|---|
| automaticallyAfterLessThan2Seconds | | If the automatic reclosing was successful in 2 seconds or less.<br>Also known as "successful high-speed reclosing". |
| automaticallyAfter2SecondsOrMore | | If the automatic reclosing was successful in 2 seconds or more.<br>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. |

#### 3.9.3.8 (NC) FaultCategoryKind enumeration

Available kinds of fault categories.
Table 353 shows all literals of FaultCategoryKind.

**Table 353 – Literals of ExtGridDisturbance::FaultCategoryKind**

| literal | value | description |
|---|---|---|
| technical | | A fault due to a technical error. |
| operational | | A fault due to a temporary human error.<br>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.<br>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. |

#### 3.9.3.9 (NC) FaultKind enumeration

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.
Table 354 shows all literals of FaultKind.

**Table 354 – 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.<br>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. |

### 3.9.3.10 (NC) SystemUnitKind enumeration

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.
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.
Table 355 shows all literals of SystemUnitKind.

**Table 355 – 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 DCConverter. |
| dcCable | | If the main function of the system unit is DCCable. |

### 3.9.3.11 (NC) TripKind enumeration

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.
Table 356 shows all literals of TripKind.

**Table 356 – 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.<br>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. |

### 3.9.4 Package ExtFaultOutage

#### 3.9.4.1 General

Extensions related to fault outage.

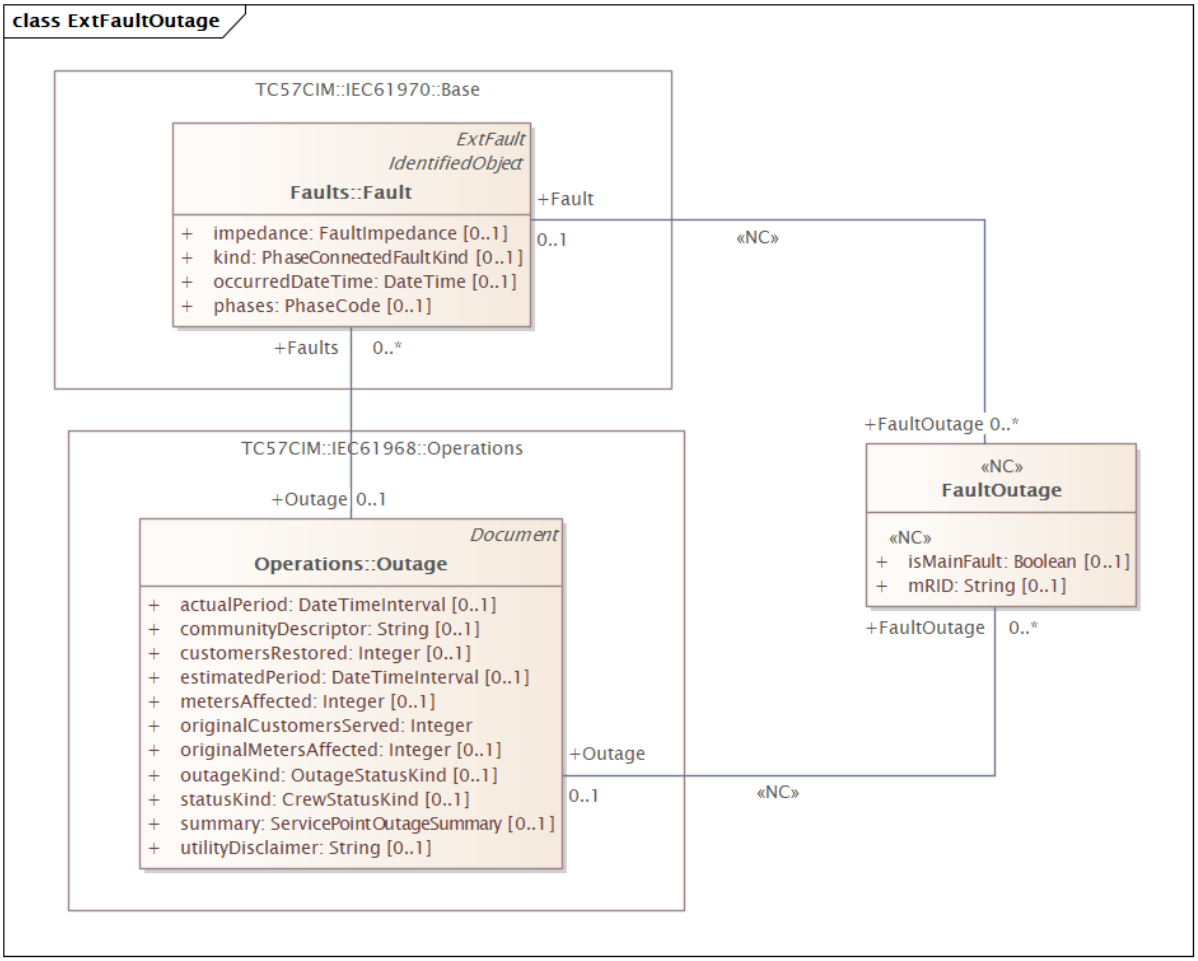



**Figure 31 – Class diagram ExtFaultOutage::ExtFaultOutage**

Figure 31: The diagram contains classes and attributes related to the extensions.

#### 3.9.4.2 (NC) FaultOutage root class

Association class for relating one fault and one outage.
Table 357 shows all attributes of FaultOutage.

**Table 357 – 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.<br>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 358 shows all association ends of FaultOutage with other classes.

**Table 358 – 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. |

## 3.10 Package ExtPowerShiftKey

### 3.10.1 General

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

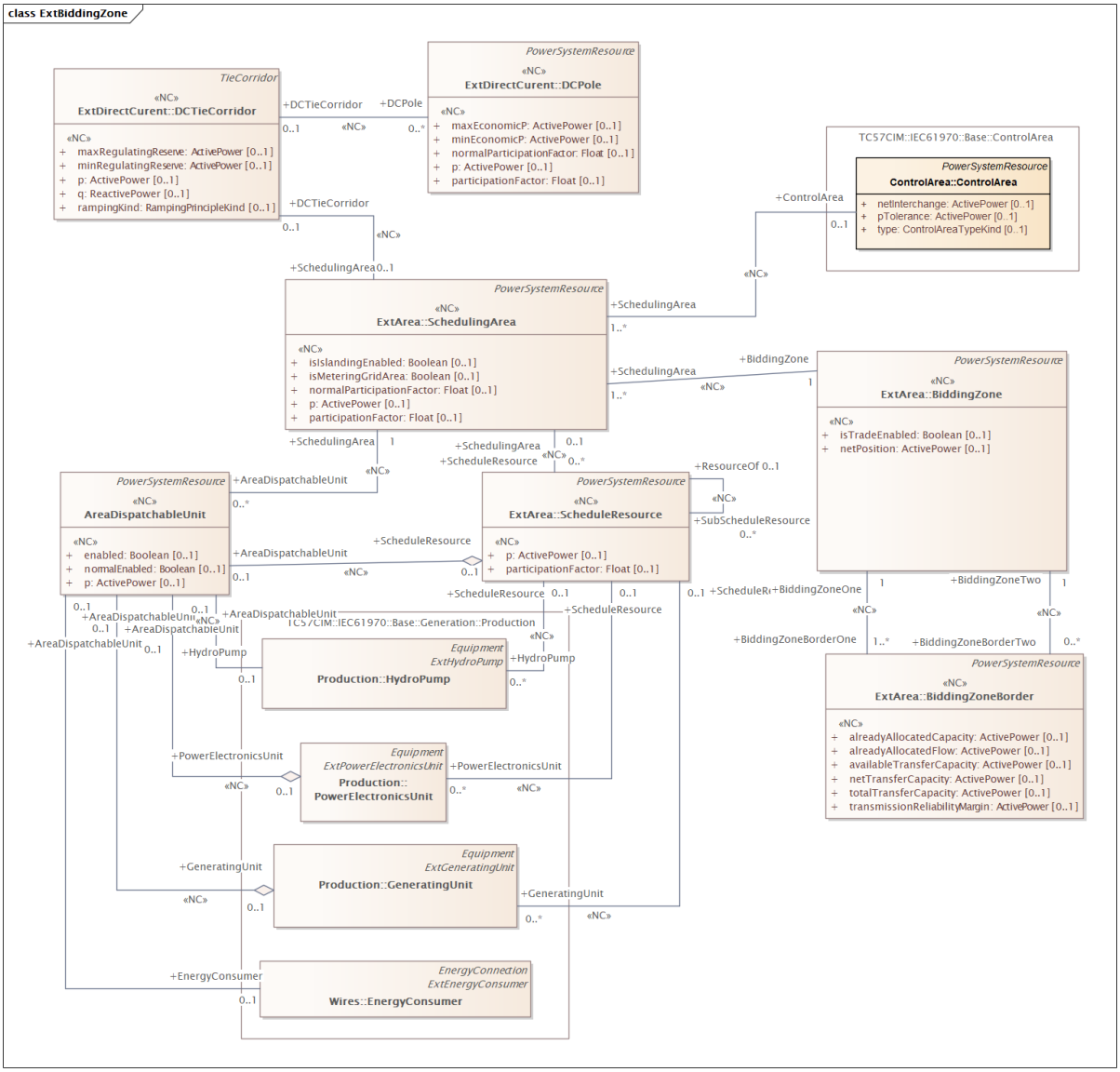



**Figure 32 – Class diagram ExtPowerShiftKey::ExtBiddingZone**

Figure 32: The diagram contains classes related to bidding zone.

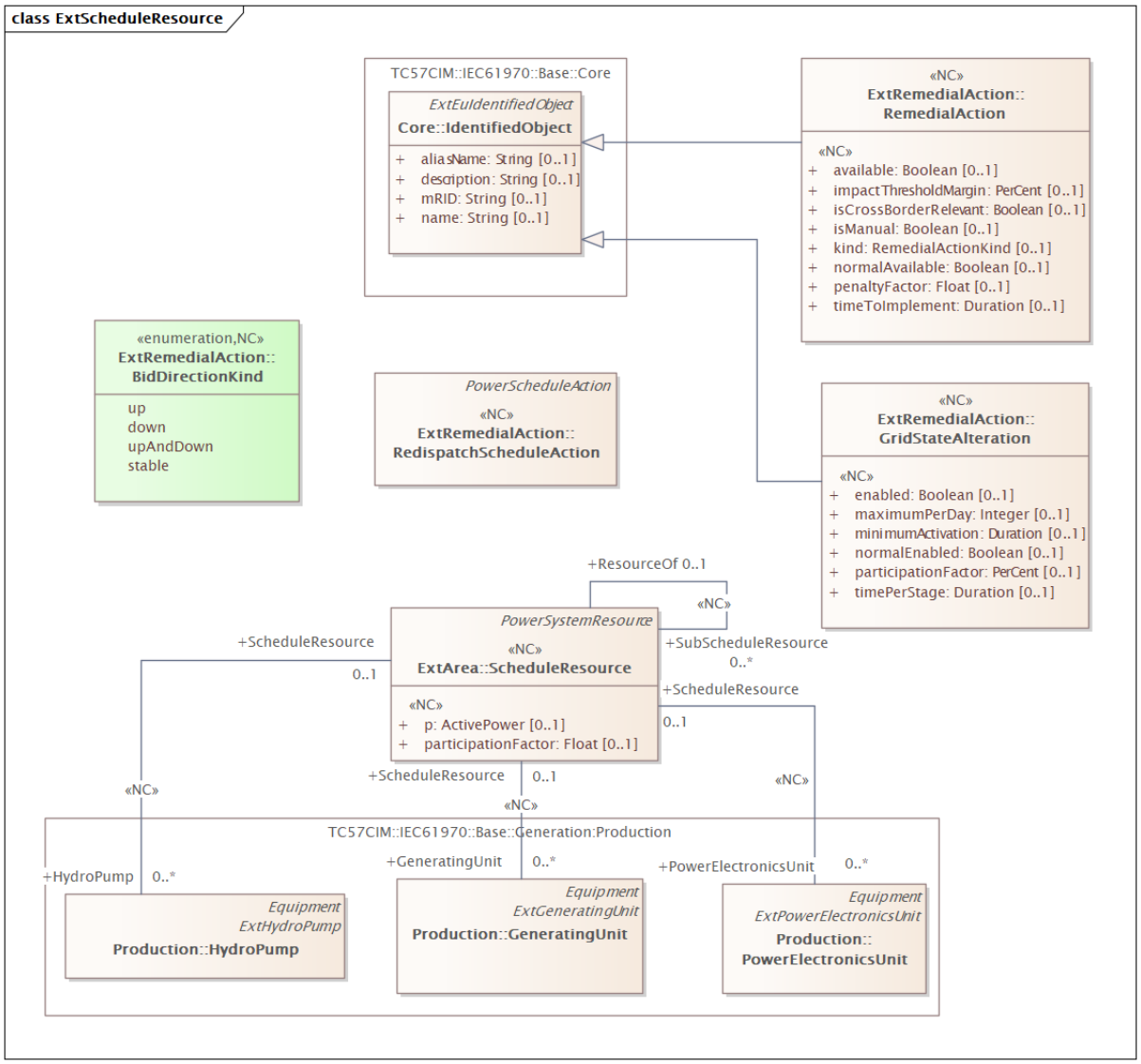



**Figure 33 – Class diagram ExtPowerShiftKey::ExtScheduleResource**

Figure 33: The diagram contains classes related to schedule resource.

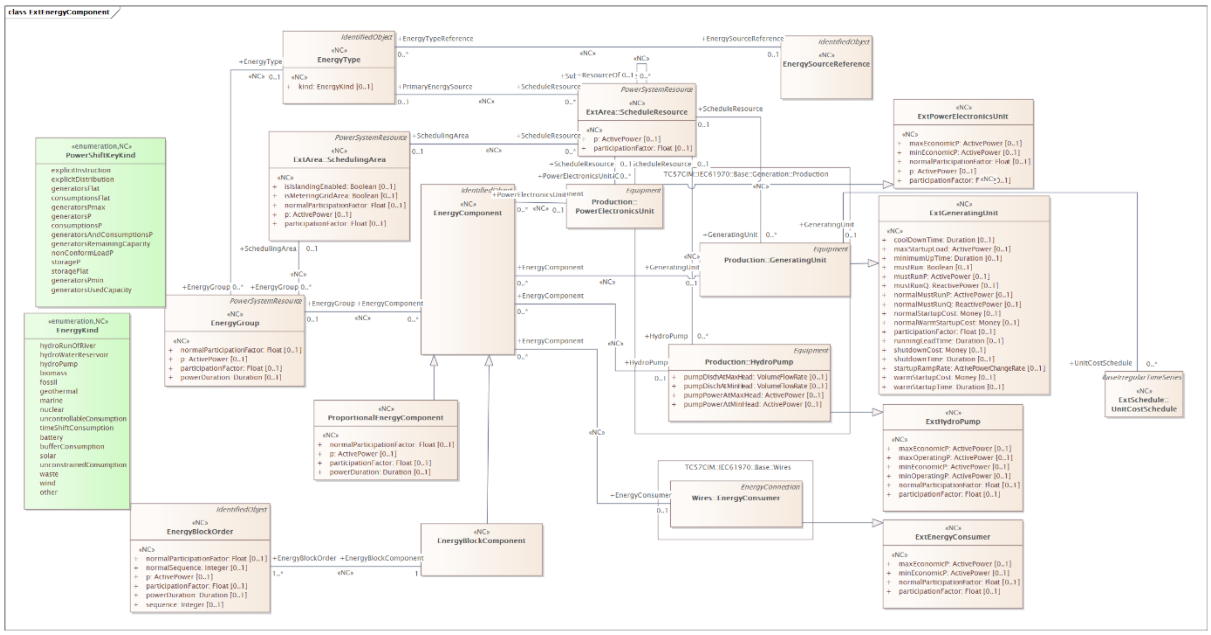



**Figure 34 – Class diagram ExtPowerShiftKey::ExtEnergyComponent**

Figure 34: The diagram contains classes related to GLSK.

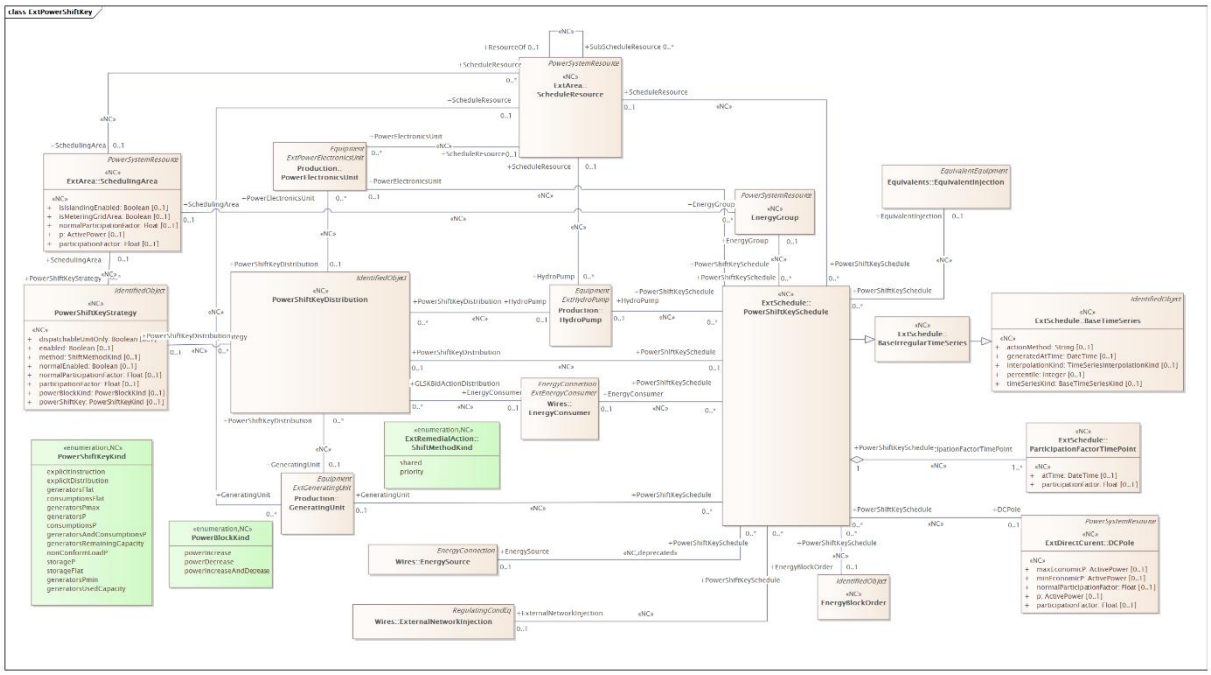



**Figure 35 – Class diagram ExtPowerShiftKey::ExtPowerShiftKey**

Figure 35: The diagram contains classes related to GLSK schedule.

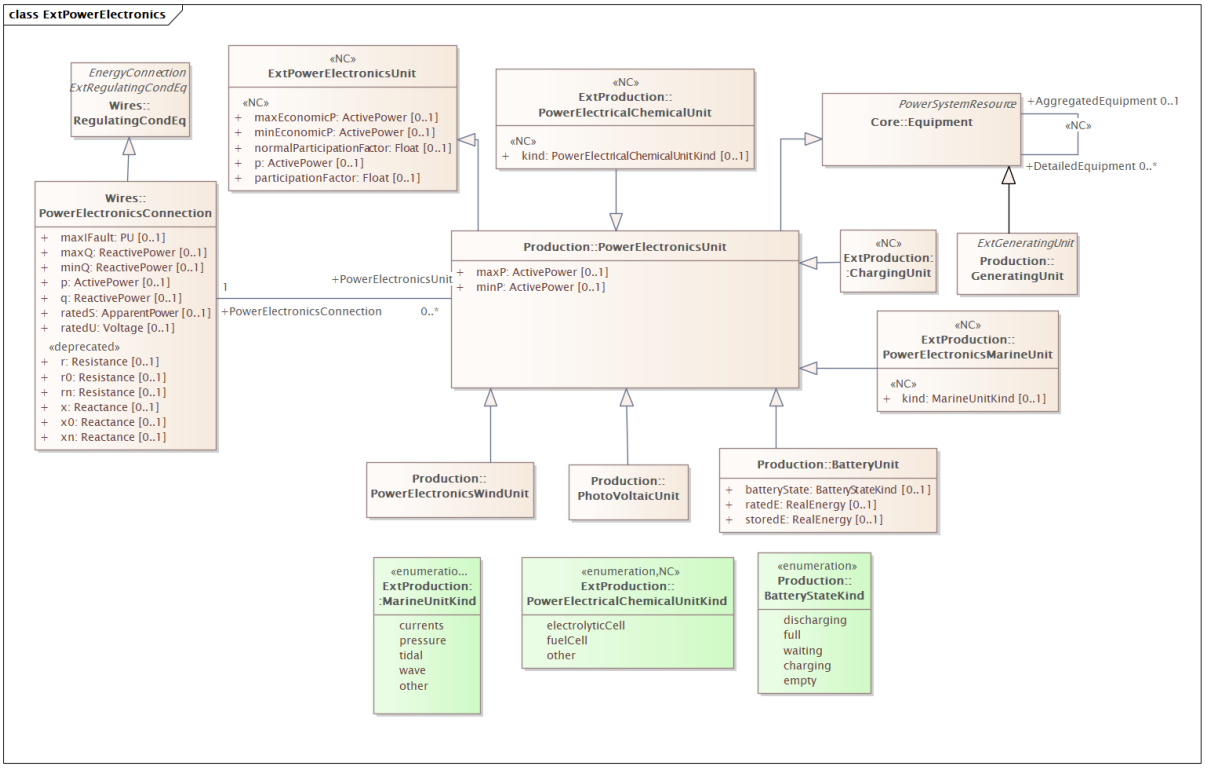



**Figure 36 – Class diagram ExtPowerShiftKey::ExtPowerElectronics**

Figure 36: The diagram contains classes related to power electronics.

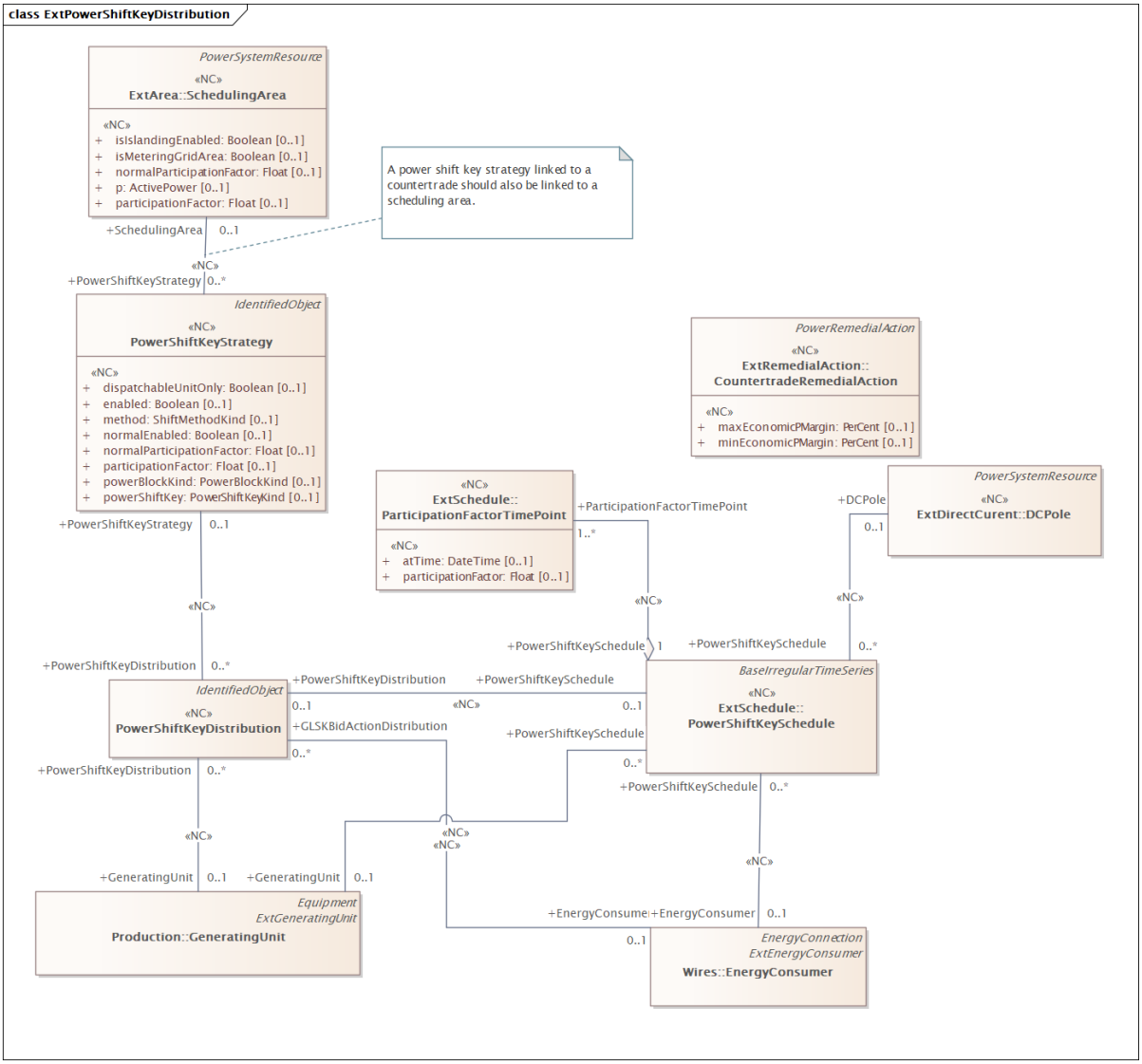



**Figure 37 – Class diagram ExtPowerShiftKey::ExtPowerShiftKeyDistribution**

Figure 37:

### 3.10.2 (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 359 shows all attributes of AreaDispatchableUnit.

**Table 359 – 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 360 shows all association ends of AreaDispatchableUnit with other classes.

**Table 360 – Association ends of ExtPowerShiftKey::AreaDispatchableUnit with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | SchedulingArea | 1..1 | SchedulingArea | (NC) The scheduling area that has 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..1 | PowerSchedule | 0..* | PowerSchedule | (NC) Power schedule which has area dispatchable units. |
| 0..1 | EnergyConsumer | 0..1 | EnergyConsumer | Energy consumer for this area dispatchable unit. |
| 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 |

### 3.10.3 (NC) EnergyBlockComponent

Inheritance path = EnergyComponent : IdentifiedObject : ExtEuIdentifiedObject
Energy block component where the energy group is distributed according to the energy block order of each energy component in an energy group.
Table 361 shows all attributes of EnergyBlockComponent.

**Table 361 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 362 shows all association ends of EnergyBlockComponent with other classes.

**Table 362 – 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..* | HydroPump | 0..1 | HydroPump | (NC) inherited from: EnergyComponent |
| 0..* | GeneratingUnit | 0..1 | GeneratingUnit | (NC) inherited from: EnergyComponent |
| 0..* | EnergyGroup | 0..1 | EnergyGroup | (NC) inherited from: EnergyComponent |
| 0..* | PowerElectronicsUnit | 0..1 | PowerElectronicsUnit | (NC) inherited from: EnergyComponent |
| 0..* | EnergyConsumer | 0..1 | EnergyConsumer | (NC) inherited from: EnergyComponent |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.10.4 (NC) EnergyBlockOrder

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
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 363 shows all attributes of EnergyBlockOrder.

**Table 363 – 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.<br>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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 364 shows all association ends of EnergyBlockOrder with other classes.

**Table 364 – Association ends of ExtPowerShiftKey::EnergyBlockOrder with other classes**

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

### 3.10.5 (NC) EnergyComponent

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
The energy component for a producer or a consumer that has the same energy characteristic, e.g. fuel type and technology.
Table 365 shows all attributes of EnergyComponent.

**Table 365 – 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: ExtEuIdentifiedObject |

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

Table 366 shows all association ends of EnergyComponent with other classes.

**Table 366 – Association ends of ExtPowerShiftKey::EnergyComponent with other classes**

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

### 3.10.6 (NC) EnergyGroup

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
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 367 shows all attributes of EnergyGroup.

**Table 367 – Attributes of ExtPowerShiftKey::EnergyGroup**

| name | mult | type | description |
|---|---|---|---|
| normalParticipationFactor | 0..1 | Float | (NC) Normal participation factor for the power group in relation to scheduling area. Must be a positive value. |
| 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 368 shows all association ends of EnergyGroup with other classes.

**Table 368 – 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 |

### 3.10.7 (NC) EnergyType

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
A source of the energy.
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.
Table 369 shows all attributes of EnergyType.

**Table 369 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 370 shows all association ends of EnergyType with other classes.

**Table 370 – 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 refrence 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 |

### 3.10.8 (NC) ExtEnergyConsumer root class

EU Network Code extension of EnergyConsumer.
Table 371 shows all attributes of ExtEnergyConsumer.

**Table 371 – 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.<br>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).<br>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.<br>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).<br>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. |

### 3.10.9 (NC) ExtGeneratingUnit root class

EU Network Code extension of GeneratingUnit.

Table 372 shows all attributes of ExtGeneratingUnit.

**Table 372 – 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.<br>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).<br>In the case of priority strategy, the item with the lowest number gets allocated energy first. |
| shutdownCost | 0..1 | Money | (NC) The shutdown cost incurred for each shutdown of the GeneratingUnit. |
| shutdownTime | 0..1 | Duration | (NC) Time it takes to shutdown the unit. |
| 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. |
| 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 | Money | (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.<br>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. |
| normalStartupCost | 0..1 | Money | (NC) The normal initial startup cost incurred for each start of the GeneratingUnit. |
| normalWarmStartupCost | 0..1 | Money | (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. |
| 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. |

### 3.10.10 (NC) ExtHydroPump root class

EU Network Code extension of HydroPump.
Table 373 shows all attributes of ExtHydroPump.

**Table 373 – 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.<br>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).<br>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.<br>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).<br>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. |

### 3.10.11 (NC) ExtPowerElectronicsUnit root class

EU Network Code extension of PowerElectronicsUnit.
Table 374 shows all attributes of ExtPowerElectronicsUnit.

**Table 374 – 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.<br>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.<br>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).<br>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.<br>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).<br>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. |

### 3.10.12 (NC) ProportionalEnergyComponent

Inheritance path = EnergyComponent : IdentifiedObject : ExtEuIdentifiedObject
Serves for grouping components within an energy group, with proportional energy allocation to all components.
Table 375 shows all attributes of ProportionalEnergyComponent.

**Table 375 – 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 |

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

Table 376 shows all association ends of ProportionalEnergyComponent with other classes.

**Table 376 – Association ends of ExtPowerShiftKey::ProportionalEnergyComponent with other classes**

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

### 3.10.13 (NC) EnergyKind enumeration

Categories of energy used for energy groups.
Table 377 shows all literals of EnergyKind.

**Table 377 – Literals of ExtPowerShiftKey::EnergyKind**

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

| literal | value | description |
|---|---|---|
| | | 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. |

### 3.10.14 (NC) PowerShiftKeyKind enumeration

Kind of generating and load shift keys strategy.
Table 378 shows all literals of PowerShiftKeyKind.

**Table 378 – Literals of ExtPowerShiftKey::PowerShiftKeyKind**

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

| literal | value | description |
|---|---|---|
| generatorsUsedCapacity | | The distribution is based on the used capacity, the difference between the minimum operation and operating p (GeneratingUnit.minOperatingP) |

### 3.10.15 (NC) PowerShiftKeyDistribution

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Distribution of the bid action on the power shift keys.
Table 379 shows all attributes of PowerShiftKeyDistribution.

**Table 379 – Attributes of ExtPowerShiftKey::PowerShiftKeyDistribution**

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

Table 380 shows all association ends of PowerShiftKeyDistribution with other classes.

**Table 380 – Association ends of ExtPowerShiftKey::PowerShiftKeyDistribution with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | PowerBidSchedule | 0..1 | PowerBidSchedule | (NC) Power bid schedule for the given distribution. |
| 0..* | GeneratingUnit | 0..1 | GeneratingUnit | (NC) Generating unit distribution for a given bid. |
| 0..1 | PowerElectronicsUnit | 0..* | PowerElectronicsUnit | (NC) Power electronics unit distribution for a given bid. |
| 0..* | HydroPump | 0..1 | HydroPump | (NC) Hydro pump distribution for a given bid. |
| 0..* | EnergyConsumer | 0..1 | EnergyConsumer | (NC) Energy consumers distribution for a given bid. |
| 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 |

### 3.10.16 (NC) PowerShiftKeyStrategy

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Strategy of the power shift key.
Table 381 shows all attributes of PowerShiftKeyStrategy.

**Table 381 – 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.<br>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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 382 shows all association ends of PowerShiftKeyStrategy with other classes.

**Table 382 – 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 acion 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 |

| 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 |

### 3.10.17 (NC) PowerBlockKind enumeration

Power block kind describes the increase and/or decrease of power.
Table 383 shows all literals of PowerBlockKind.

**Table 383 – 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. |

### 3.10.18 (NC) EnergySourceReference

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
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 384 shows all attributes of EnergySourceReference.

**Table 384 – 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 |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 385 shows all association ends of EnergySourceReference with other classes.

**Table 385 – 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 |

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

### 3.10.19 Package ObjectPowerShiftKey

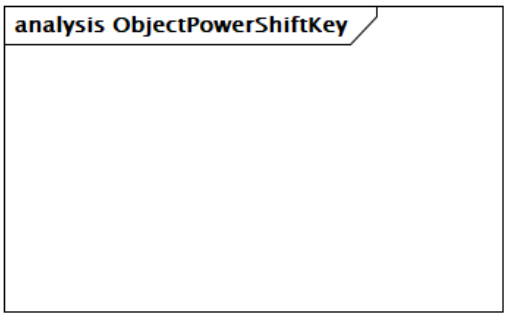


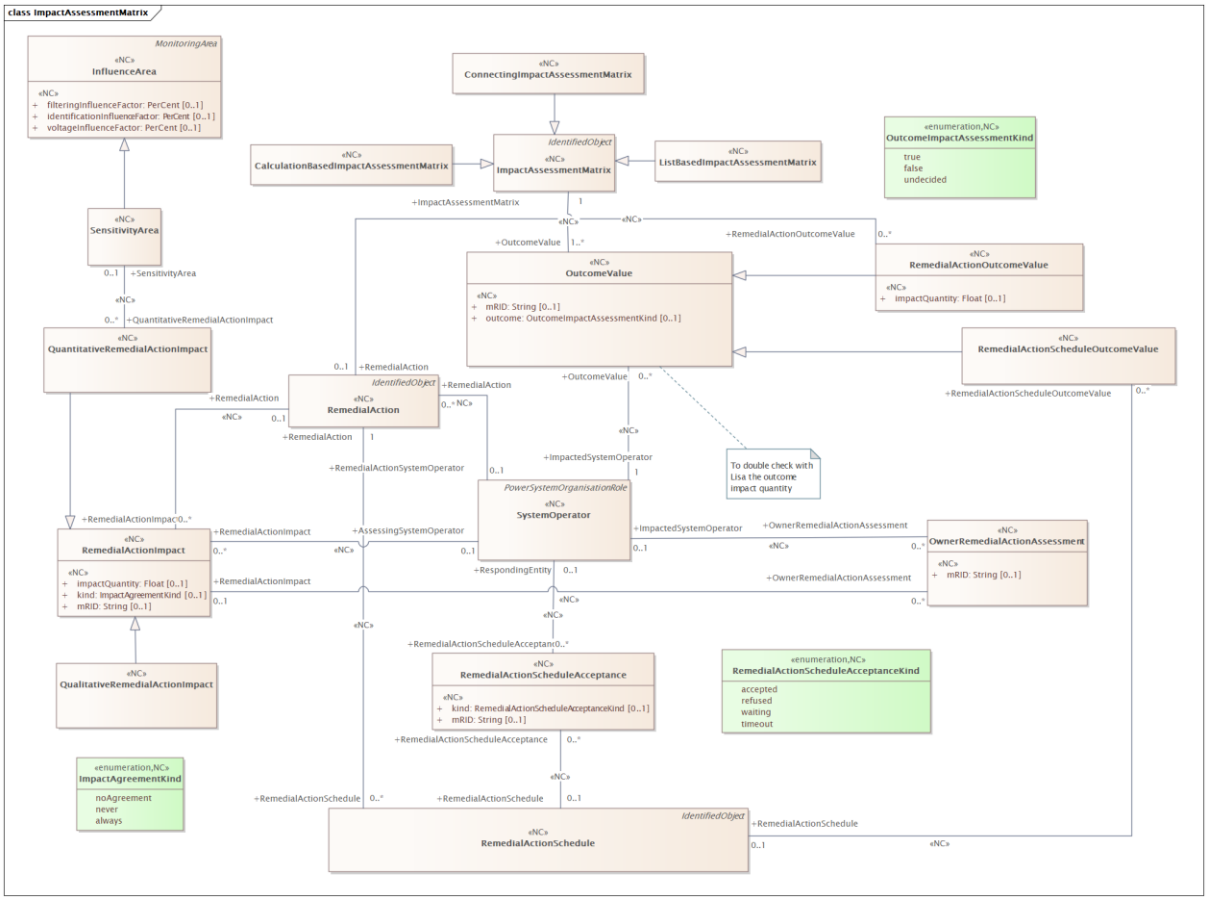

**Figure 38 – Analysis diagram ObjectPowerShiftKey::ObjectPowerShiftKey**

Figure 38:

## 3.11 Impact assessment matrix extensions

### 3.11.1 General

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




3906

3907 **Figure 39 – Class diagram ExtImpactAssessmentMatrix::ImpactAssessmentMatrix**

3908 Figure 39: The diagram contains the classes related to the modelling of the impact assessment
3909 matrix.

3910 ### 3.11.2 (NC) CalculationBasedImpactAssessmentMatrix

3911 Inheritance path = ImpactAssessmentMatrix : IdentifiedObject : ExtEuIdentifiedObject
3912 Calculation based impact assessment matrix. It relates to the remedial action schedule.
3913 Calculation-Based is the impact matrix determined by calculating the impact factors (eventually
3914 scaled by the intensity of the remedial action) and matching them against a threshold in a
3915 determined way described by the methodologies.
3916 Table 386 shows all attributes of CalculationBasedImpactAssessmentMatrix.

3917 **Table 386 – Attributes of**
3918 **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 |

3919
3920 Table 387 shows all association ends of CalculationBasedImpactAssessmentMatrix with other
3921 classes.

**Table 387 – Association ends of ExtImpactAssessmentMatrix::CalculationBasedImpactAssessmentMatrix with other classes**

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

### 3.11.3 (NC) ConnectingImpactAssessmentMatrix

Inheritance path = ImpactAssessmentMatrix : IdentifiedObject : ExtEuIdentifiedObject
Connecting system operator matrix is the impact matrix indicating which system operators are connecting for that specific remedial action. The concept of connecting system operator for a remedial action is defined by CSAm Article 2.1(14).
Table 388 shows all attributes of ConnectingImpactAssessmentMatrix.

**Table 388 – Attributes of ExtImpactAssessmentMatrix::ConnectingImpactAssessmentMatrix**

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

Table 389 shows all association ends of ConnectingImpactAssessmentMatrix with other classes.

**Table 389 – Association ends of ExtImpactAssessmentMatrix::ConnectingImpactAssessmentMatrix with other classes**

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

### 3.11.4 (NC) ImpactAssessmentMatrix

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject

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 390 shows all attributes of ImpactAssessmentMatrix.

**Table 390 – Attributes of ExtImpactAssessmentMatrix::ImpactAssessmentMatrix**

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

Table 391 shows all association ends of ImpactAssessmentMatrix with other classes.

**Table 391 – 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 |

### 3.11.5 (NC) ListBasedImpactAssessmentMatrix

Inheritance path = ImpactAssessmentMatrix : IdentifiedObject : ExtEuIdentifiedObject
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 392 shows all attributes of ListBasedImpactAssessmentMatrix.

**Table 392 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 393 shows all association ends of ListBasedImpactAssessmentMatrix with other classes.

**Table 393 – 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 |

### 3.11.6 (NC) OutcomeValue root class

Outcome of an impact assessment matrix.
Table 394 shows all attributes of OutcomeValue.

**Table 394 – 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.<br>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 395 shows all association ends of OutcomeValue with other classes.

**Table 395 – Association ends of ExtImpactAssessmentMatrix::OutcomeValue with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | ImpactAssessmentMatrix | 1..1 | ImpactAssessmentMatrix | (NC) the impact assessment matrix which has this value. |
| 0..* | ImpactedSystemOperator | 1..1 | SystemOperator | (NC) The impacted system operator that has an outcome value. |

### 3.11.7 (NC) OwnerRemedialActionAssessment root class

Owner remedial action assessment of the impact of their remedial action on neighboring system operators.
Table 396 shows all attributes of OwnerRemedialActionAssessment.

**Table 396 – 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.<br>For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |

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

**Table 397 – Association ends of ExtImpactAssessmentMatrix::OwnerRemedialActionAssessment with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | RemedialActionImpact | 0..1 | RemedialActionImpact | (NC) Remedial action impact which is evaluated by the owner of the remedial action. |
| 0..* | ImpactedSystemOperator | 0..1 | SystemOperator | (NC) System operator that is evaluated to be impacted by the remedial action done by the remedial action owner. |

### 3.11.8 (NC) RemedialActionOutcomeValue

Inheritance path = OutcomeValue
Outcome of an impact assessment matrix for a remedial action.
Table 398 shows all attributes of RemedialActionOutcomeValue.

**Table 398 – 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.<br>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 |

Table 399 shows all association ends of RemedialActionOutcomeValue with other classes.

**Table 399 – 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 |
|---|---|---|---|---|
| 1..* | ImpactAssessmentMatrix | 1..1 | ImpactAssessmentMatrix | (NC) inherited from: OutcomeValue |
| 0..* | ImpactedSystemOperator | 1..1 | SystemOperator | (NC) inherited from: OutcomeValue |

### 3.11.9 (NC) RemedialActionScheduleOutcomeValue

Inheritance path = OutcomeValue
Outcome of an impact assessment matrix for a remedial action schedule.
Table 400 shows all attributes of RemedialActionScheduleOutcomeValue.

**Table 400 – Attributes of ExtImpactAssessmentMatrix::RemedialActionScheduleOutcomeValue**

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

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

**Table 401 – Association ends of ExtImpactAssessmentMatrix::RemedialActionScheduleOutcomeValue with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | RemedialActionSchedule | 0..1 | RemedialActionSchedule | (NC) The remedial action schedule that has a remedial action schedule outcome value. |
| 1..* | ImpactAssessmentMatrix | 1..1 | ImpactAssessmentMatrix | (NC) inherited from: OutcomeValue |
| 0..* | ImpactedSystemOperator | 1..1 | SystemOperator | (NC) inherited from: OutcomeValue |

### 3.11.10 (NC) OutcomeImpactAssessmentKind enumeration

Outcome impact assessments kinds.
Table 402 shows all literals of OutcomeImpactAssessmentKind.

**Table 402 – Literals of ExtImpactAssessmentMatrix::OutcomeImpactAssessmentKind**

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

## 3.12 Package ExtObjectRegistry

### 3.12.1 General

This package contains the extensions related to the object registry.

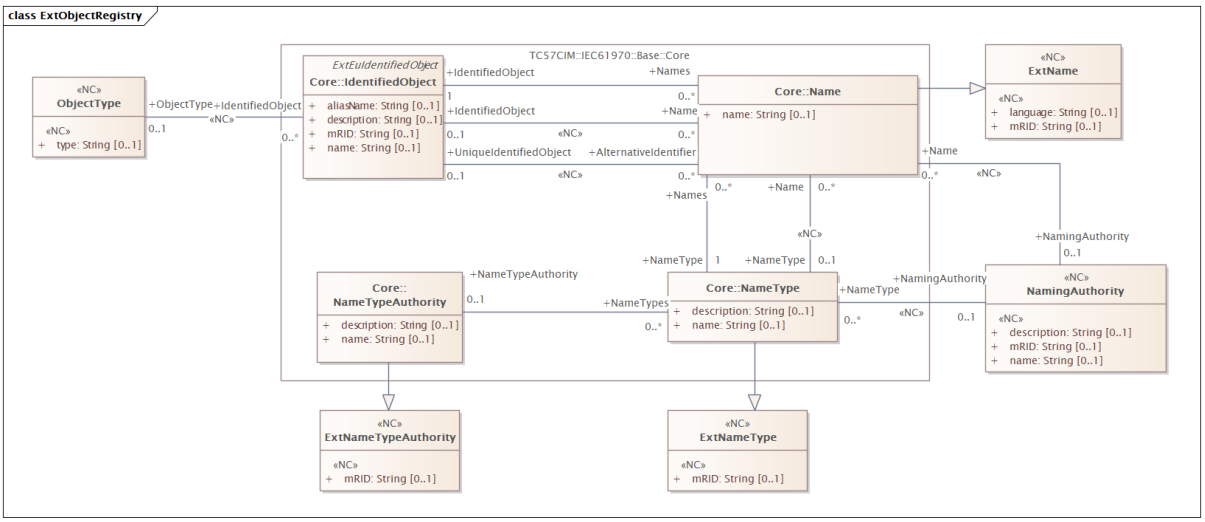



**Figure 40 – Class diagram ExtObjectRegistry::ExtObjectRegistry**

Figure 40: The diagram contains classes related to the object registry extension.

### 3.12.2 (NC) ExtName root class

Extension of Name.
Table 403 shows all attributes of ExtName.

**Table 403 – 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.<br>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.<br>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. |

### 3.12.3 (NC) ExtNameType root class

An extension of NameType.
Table 404 shows all attributes of ExtNameType.

**Table 404 – 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 |

| name | mult | type | description |
|---|---|---|---|
| | | | 4122, for the mRID. The use of UUID is strongly recommended.<br>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. |

### 3.12.4 (NC) ExtNameTypeAuthority root class

Extension of NameTypeAuthority.
Table 405 shows all attributes of ExtNameTypeAuthority.

**Table 405 – 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.<br>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. |

### 3.12.5 (NC) NamingAuthority root class

Authority responsible for creation and management of names of a given name type and/or name; typically an organization or an enterprise system.
Table 406 shows all attributes of NamingAuthority.

**Table 406 – 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.<br>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. |

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

**Table 407 – Association ends of ExtObjectRegistry::NamingAuthority with other classes**

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

### 3.12.6 (NC) ObjectType root class

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

Table 408 shows all attributes of ObjectType.

**Table 408 – 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'. |

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

**Table 409 – 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. |

## 3.13 Package ExtPowerTransferCorridor

### 3.13.1 General

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

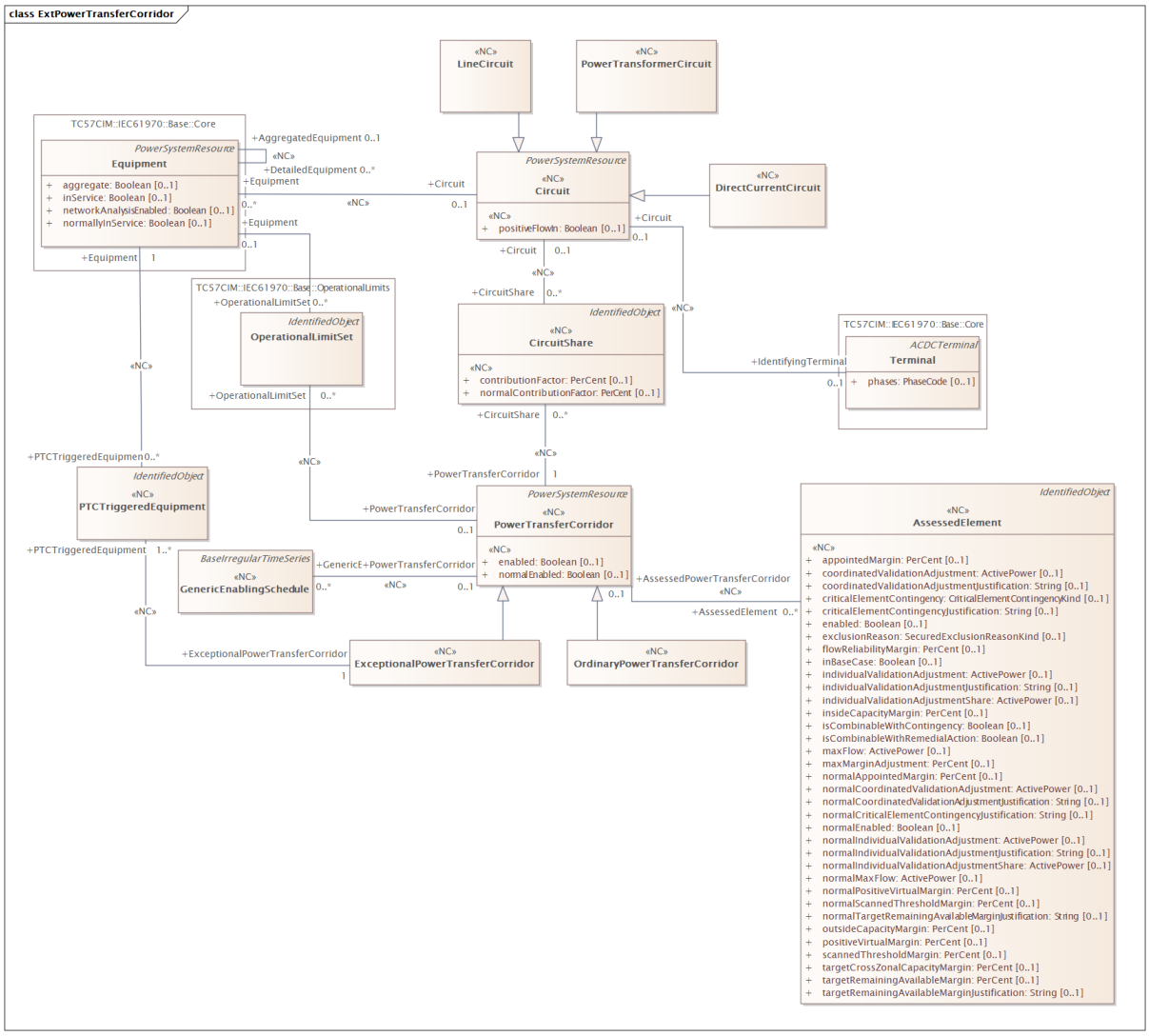



**Figure 41 – Class diagram ExtPowerTransferCorridor::ExtPowerTransferCorridor**

Figure 41: The diagram contains classes related to power transfer corridor.

### 3.13.2 (NC) Circuit

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
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 410 shows all attributes of Circuit.

**Table 410 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 411 – Association ends of ExtPowerTransferCorridor::Circuit with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | IdentifyingTerminal | 0..1 | Terminal | (NC) Terminal that identifies the circuit. |
| 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 | CircuitShare | 0..* | CircuitShare | (NC) The circuit share of the given power transfer corridor. |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.13.3 (NC) CircuitShare

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Defines the share of the circuit which is part of an associated power transfer corridor.
Table 412 shows all attributes of CircuitShare.

**Table 412 – 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.<br>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.<br>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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 413 shows all association ends of CircuitShare with other classes.

**Table 413 – Association ends of ExtPowerTransferCorridor::CircuitShare with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | Circuit | 0..1 | Circuit | (NC) The circuit that has a share of the power system corridor. |
| 0..* | PowerTransferCorridor | 1..1 | PowerTransferCorridor | (NC) The power transfer corridor that has this circuit share. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.13.4 (NC) ExceptionalPowerTransferCorridor

Inheritance path = PowerTransferCorridor : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 414 shows all attributes of ExceptionalPowerTransferCorridor.

**Table 414 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 415 shows all association ends of ExceptionalPowerTransferCorridor with other classes.

**Table 415 – 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 | PinPowerTransferCorridor | 0..* | PinPowerTransferCorridor | (NC) inherited from: PowerTransferCorridor |
| 1..1 | PTCActivePowerSupport | 0..* | PTCActivePowerSupport | (NC) inherited from: PowerTransferCorridor |
| 1..1 | CircuitShare | 0..* | CircuitShare | (NC) inherited from: PowerTransferCorridor |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (NC) 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 |

### 3.13.5 (NC) LineCircuit

Inheritance path = Circuit : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
A line circuit is a circuit that has at least one ACLineSegment and may or may not include related switching and/or auxiliary equipment.
Table 416 shows all attributes of LineCircuit.

**Table 416 – 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 |

Table 417 shows all association ends of LineCircuit with other classes.

**Table 417 – Association ends of ExtPowerTransferCorridor::LineCircuit with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | IdentifyingTerminal | 0..1 | Terminal | (NC) inherited from: Circuit |

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

### 3.13.6 (NC) OrdinaryPowerTransferCorridor

Inheritance path = PowerTransferCorridor : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Power transfer corridor defined for normal operating network.

Table 418 shows all attributes of OrdinaryPowerTransferCorridor.

**Table 418 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 419 shows all association ends of OrdinaryPowerTransferCorridor with other classes.

**Table 419 – 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 |
| 1..1 | PinPowerTransferCorridor | 0..* | PinPowerTransferCorridor | (NC) inherited from: PowerTransferCorridor |
| 1..1 | PTCActivePowerSupport | 0..* | PTCActivePowerSupport | (NC) inherited from: PowerTransferCorridor |

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..1 | CircuitShare | 0..* | CircuitShare | (NC) inherited from: PowerTransferCorridor |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (NC) 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 |

### 3.13.7 (NC) PowerTransferCorridor

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
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.
Table 420 shows all attributes of PowerTransferCorridor.

**Table 420 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 421 shows all association ends of PowerTransferCorridor with other classes.

**Table 421 – Association ends of ExtPowerTransferCorridor::PowerTransferCorridor with 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 | PinPowerTransferCorridor | 0..* | PinPowerTransferCorridor | (NC) The pin that uses this input. |
| 1..1 | PTCActivePowerSupport | 0..* | PTCActivePowerSupport | (NC) The active power capability associated with this PowerTransferCorridor. |
| 1..1 | CircuitShare | 0..* | CircuitShare | (NC) The circuit share for this power transfer corridor. |
| 0..1 | GenericEnablingSchedule | 0..* | GenericEnablingSchedule | (NC) Generic enabling schedule associated with a power transfer corridor. |
| 0..* | PSRType | 0..1 | PSRType | inherited from: PowerSystemResource |
| 0..1 | Controls | 0..* | Control | inherited from: PowerSystemResource |
| 0..1 | Measurements | 0..* | Measurement | inherited from: PowerSystemResource |
| 1..1 | OperatingShare | 0..* | OperatingShare | inherited from: PowerSystemResource |
| 0..* | ReportingGroup | 0..* | ReportingGroup | inherited from: PowerSystemResource |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.13.8 (NC) PowerTransformerCircuit

Inheritance path = Circuit : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
A power transformer circuit is a circuit that has at least one PowerTransformer and may or may not include related switching and/or auxiliary equipment.
Table 422 shows all attributes of PowerTransformerCircuit.

**Table 422 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 423 – Association ends of ExtPowerTransferCorridor::PowerTransformerCircuit with other classes**

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

### 3.13.9 (NC) PTCTriggeredEquipment

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
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 424 shows all attributes of PTCTriggeredEquipment.

**Table 424 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 425 – Association ends of ExtPowerTransferCorridor::PTCTriggeredEquipment with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | Equipment | 1..1 | Equipment | (NC) The equipment which is part of power transfer corridor triggering. |
| 1..* | ExceptionalPowerTransferCorridor | 1..1 | ExceptionalPowerTransferCorridor | (NC) The power transfer corridor which is triggered by this equipment. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |

| 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 |

### 3.13.10 (NC) DirectCurrentCircuit

Inheritance path = Circuit : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
A direct current circuit is a circuit consists of direct current equipment.
Table 426 shows all attributes of DirectCurrentCircuit.

**Table 426 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 427 – Association ends of ExtPowerTransferCorridor::DirectCurrentCircuit with other classes**

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

## 3.14 Package ExtPowerSystemProject

### 3.14.1 General

The package includes extensions related to power system project.

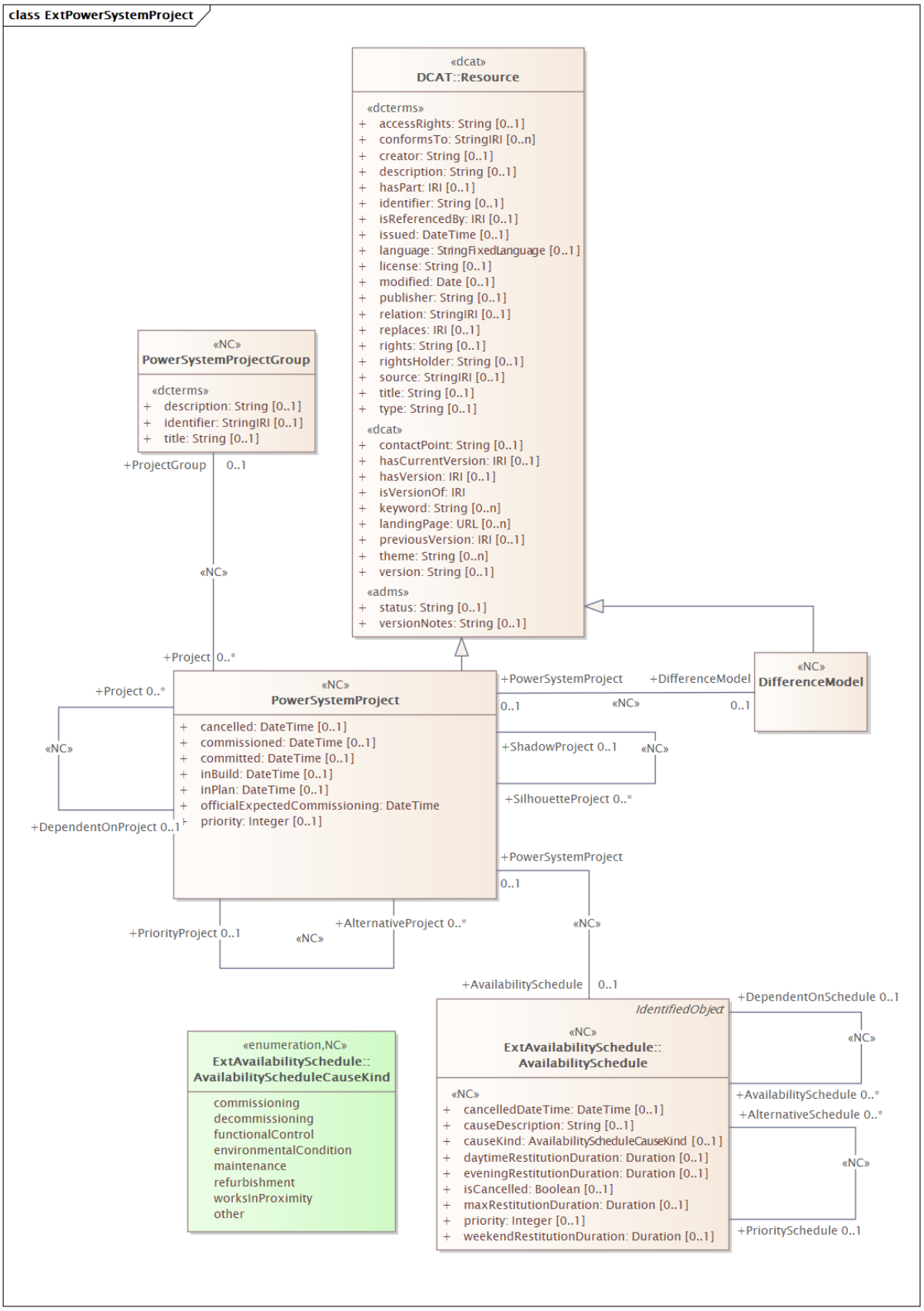



**Figure 42 – Class diagram ExtPowerSystemProject::ExtPowerSystemProject**

Figure 42: The diagram shows the extensions related to power system project.

### 3.14.2 (NC) DifferenceModel

Inheritance path = Resource
A set of statements describing the changes in the network model. The statement is defined in the difference model.
Table 428 shows all attributes of DifferenceModel.

**Table 428 – 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 |

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

**Table 429 – Association ends of ExtPowerSystemProject::DifferenceModel with other 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 | isForwardDifferenceSetOf | 0..1 | DifferenceSet | inherited from: Resource |
| 0..1 | isReverseDifferenceOf | 0..1 | DifferenceSet | inherited from: Resource |
| 0..1 | Relationship | 0..* | Relationship | (dct) inherited from: Resource |

### 3.14.3 (NC) PowerSystemProject

Inheritance path = Resource

Knowledge data for the power system project that describe the status and the planned implementation of the changes into the as-built model.

Table 430 shows all attributes of PowerSystemProject.

**Table 430 – Attributes of ExtPowerSystemProject::PowerSystemProject**

| name | mult | type | description |
|---|---|---|---|
| cancelled | 0..1 | DateTime | From this date the project is in cancelled state. No further development will be done to the project or associated change set in this state. |
| commissioned | 0..1 | DateTime | From this date the project is in commissioned state. Any conducting equipment in the change set can be energized from this day. No further changes will be done to the change set. |
| committed | 0..1 | DateTime | From this date the project is in committed state. The change set will from this day be part of the as-build model. |
| inBuild | 0..1 | DateTime | From this day the project is in build state. Alternative project have been evaluated. Any procurement has started and the change set is being updated to an as-build model. |
| inPlan | 0..1 | DateTime | From this date the project is in planning state. Study or procurement strategy has triggered the start of a project involving changes to one or more models. Alternative projects and change sets are evaluated. |
| priority | 0..1 | Integer | Priority between competing project. Use 0 for do not care. Use 1 for highest priority. Use 2 as priority is less than 1 and so on. |
| officialExpectedCommissioning | 1..1 | DateTime | Published official commissioning date. |
| accessRights | 0..1 | String | (dcterms) inherited from: Resource |
| conformsTo | 0..n | StringIRI | (dcterms) inherited from: Resource |
| contactPoint | 0..1 | String | (dcat) inherited from: Resource |
| creator | 0..1 | String | (dcterms) inherited from: Resource |
| description | 0..1 | String | (dcterms) inherited from: Resource |
| hasCurrentVersion | 0..1 | IRI | (dcat) inherited from: Resource |
| hasPart | 0..1 | IRI | (dcterms) inherited from: Resource |

| name | mult | type | description |
|---|---|---|---|
| hasVersion | 0..1 | IRI | (dcat) inherited from: Resource |
| identifier | 0..1 | String | (dcterms) inherited from: Resource |
| isReferencedBy | 0..1 | IRI | (dcterms) inherited from: Resource |
| issued | 0..1 | DateTime | (dcterms) inherited from: Resource |
| isVersionOf | 1..1 | IRI | (dcat) inherited from: Resource |
| keyword | 0..n | String | (dcat) inherited from: Resource |
| landingPage | 0..n | URL | (dcat) inherited from: Resource |
| language | 0..1 | StringFixedLanguage | (dcterms) inherited from: Resource |
| license | 0..1 | String | (dcterms) inherited from: Resource |
| modified | 0..1 | Date | (dcterms) inherited from: Resource |
| previousVersion | 0..1 | IRI | (dcat) inherited from: Resource |
| publisher | 0..1 | String | (dcterms) inherited from: Resource |
| relation | 0..1 | StringIRI | (dcterms) inherited from: Resource |
| replaces | 0..1 | IRI | (dcterms) inherited from: Resource |
| rights | 0..1 | String | (dcterms) inherited from: Resource |
| rightsHolder | 0..1 | String | (dcterms) inherited from: Resource |
| status | 0..1 | String | (adms) inherited from: Resource |
| theme | 0..n | String | (dcat) inherited from: Resource |
| title | 0..1 | String | (dcterms) inherited from: Resource |
| type | 0..1 | String | (dcterms) inherited from: Resource |
| version | 0..1 | String | (dcat) inherited from: Resource |
| versionNotes | 0..1 | String | (adms) inherited from: Resource |
| source | 0..1 | StringIRI | (dcterms) inherited from: Resource |

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

**Table 431 – Association ends of ExtPowerSystemProject::PowerSystemProject with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | AvailabilitySchedule | 0..1 | AvailabilitySchedule | (NC) The availability schedule associated with this power system project. |
| 0..1 | DifferenceModel | 0..1 | DifferenceModel | (NC) The difference model describing this power system project. |
| 0..* | ProjectGroup | 0..1 | PowerSystemProjectGroup | (NC) Power system project group to which this project belongs. |
| 0..* | DependentOnProject | 0..1 | PowerSystemProject | (NC) Grouping of projects that are depending on each other. A project can only be linked to one dependent project. |
| 0..* | ShadowProject | 0..1 | PowerSystemProject | (NC) A shadowing project that includes the same change set, but different timeline. |
| 0..1 | AlternativeProject | 0..* | PowerSystemProject | (NC) Alternative project. Only one of the projects will be commissioned. |

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | Project | 0..* | PowerSystemProject | (NC) The project that has a dependent on project. |
| 0..1 | SilhouetteProject | 0..* | PowerSystemProject | (NC) The project that has a shadow project. |
| 0..* | PriorityProject | 0..1 | PowerSystemProject | (NC) The project that has an alternative project. |
| 0..* | QualifiedRelation | 0..1 | Relationship | (dcat) inherited from: Resource |
| 0..1 | isForwardDifferenceSet Of | 0..1 | DifferenceSet | inherited from: Resource |
| 0..1 | isReverseDifferenceOf | 0..1 | DifferenceSet | inherited from: Resource |
| 0..1 | Relationship | 0..* | Relationship | (dct) inherited from: Resource |

### 3.14.4 (NC) PowerSystemProjectGroup root class

A container with project that are grouped together. Primarily used for navigation and to highlight the phases that an overall project can go though.
Table 432 shows all attributes of PowerSystemProjectGroup.

**Table 432 – Attributes of ExtPowerSystemProject::PowerSystemProjectGroup**

| name | mult | type | description |
|---|---|---|---|
| description | 0..1 | String | (dcterms) A free-text account of the resource.<br>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.<br>The identifier might be used as part of the IRI of the resource, but still having it represented explicitly is useful.<br>The identifier is a text string which is assigned to the resource to provide an unambiguous reference within a particular context. |
| title | 0..1 | String | (dcterms) A name given to the resource. |

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

**Table 433 – Association ends of ExtPowerSystemProject::PowerSystemProjectGroup with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | Project | 0..* | PowerSystemProject | (NC) The project included in the power system project group. |

## 3.15 Remedial action extensions

### 3.15.1 General

This package contains the extensions related to the remedial action.

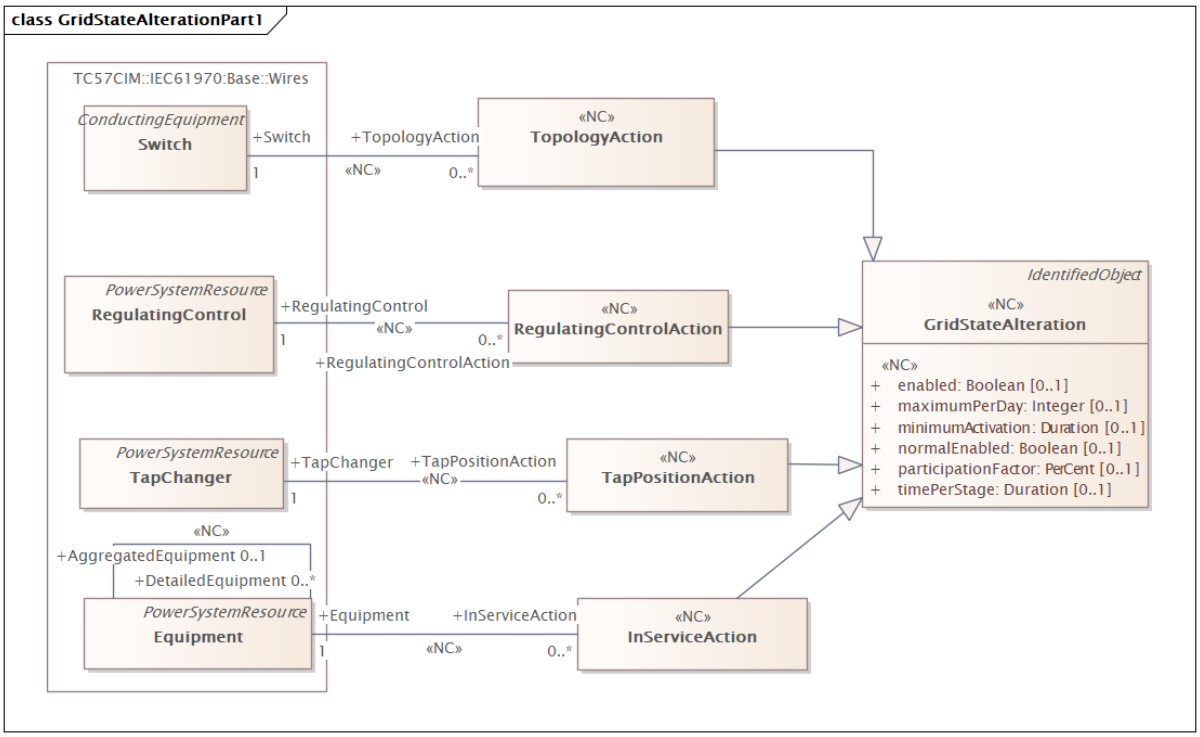



**Figure 43 – Class diagram ExtRemedialAction::GridStateAlterationPart1**

Figure 43: This diagram contains extended classes for the purpose of the remedial action data exchange.

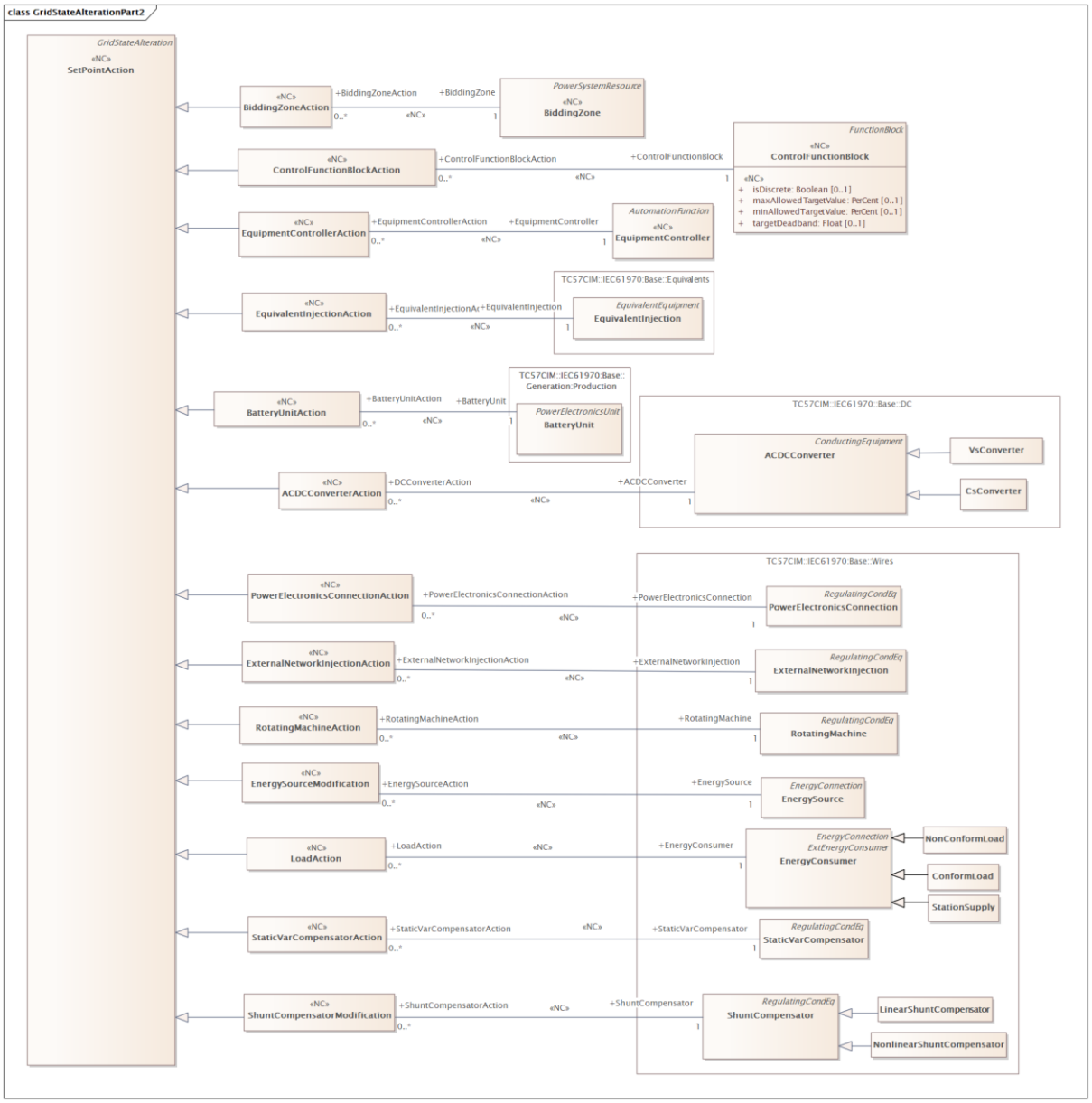



**Figure 44 – Class diagram ExtRemedialAction::GridStateAlterationPart2**

Figure 44: This diagram contains extended classes for the purpose of the remedial action data exchange.

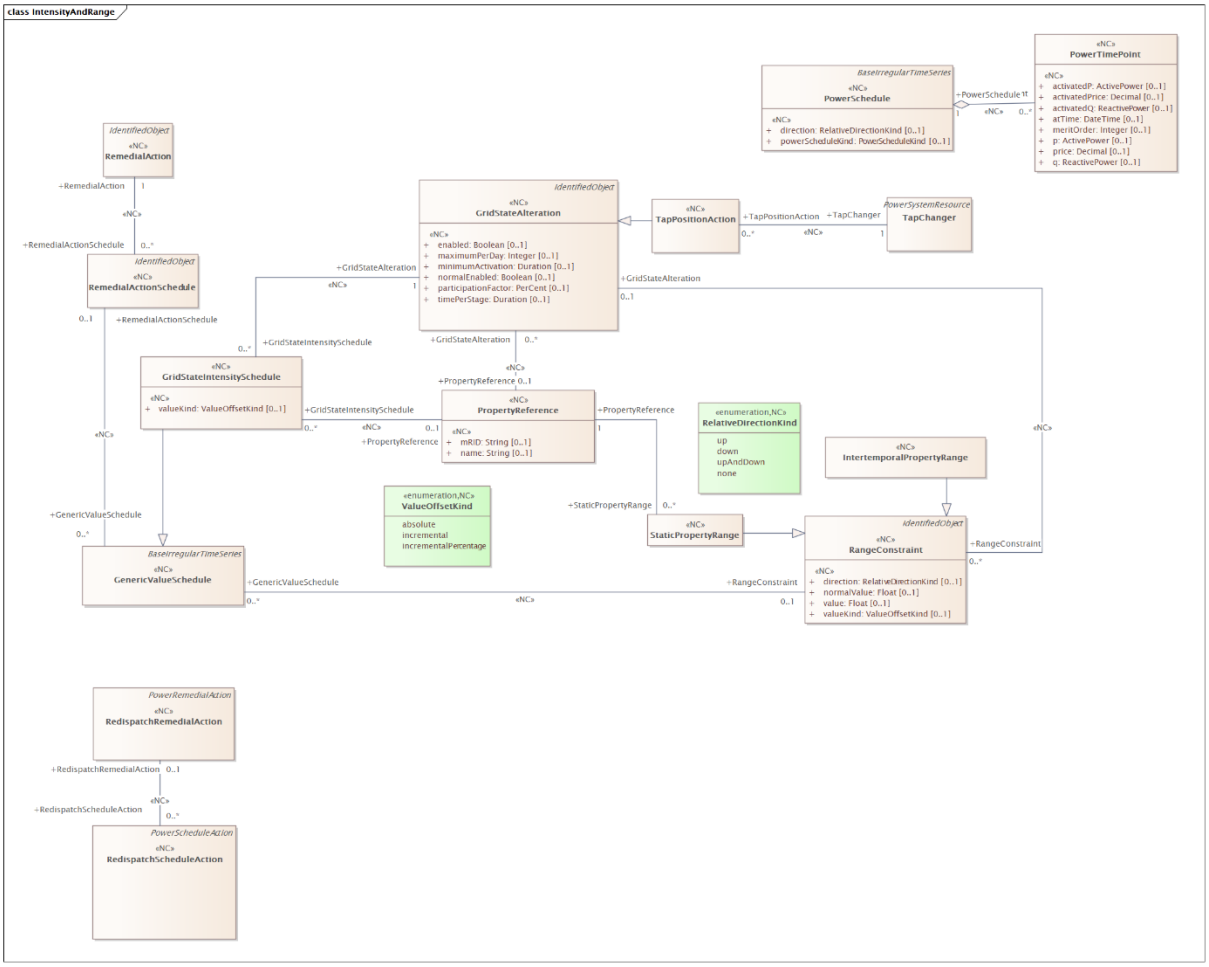



**Figure 45 – Class diagram ExtRemedialAction::IntensityAndRange**

Figure 45: This diagram contains extended classes related to the modelling of static, dynamic ranges and intensity.

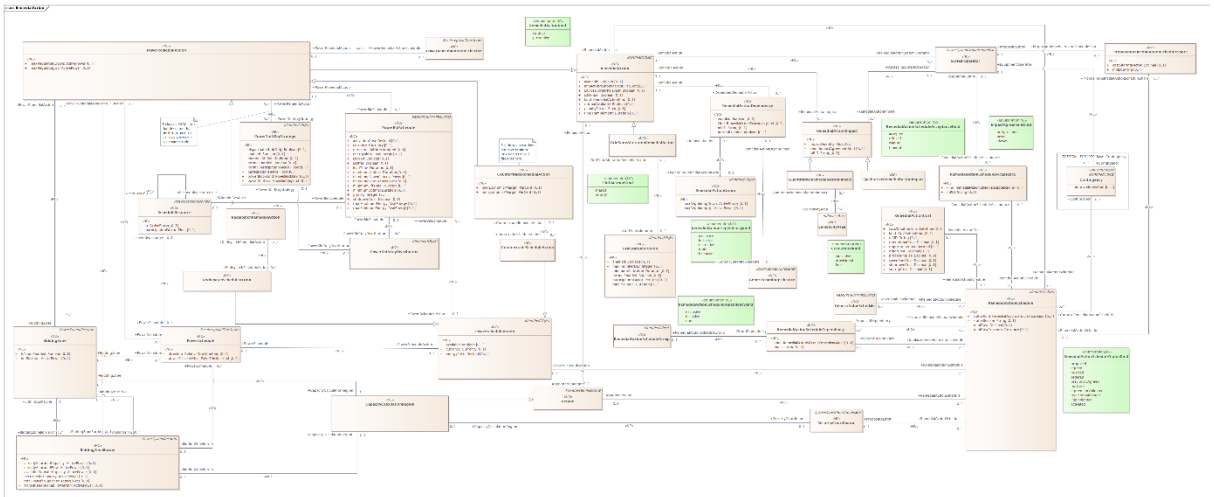
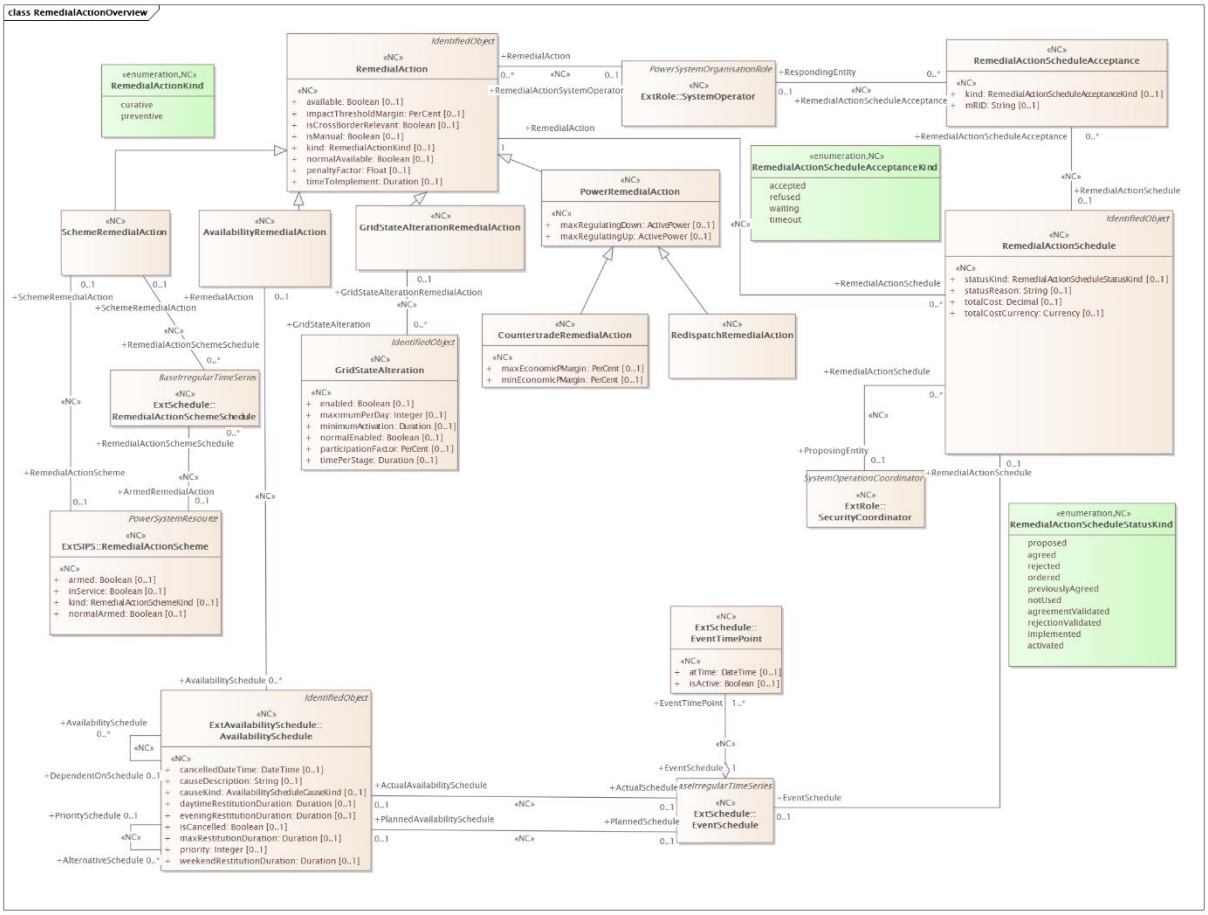


**Figure 46 – Class diagram ExtRemedialAction::RemedialAction**

Figure 46: The diagram contains main classes related to the remedial action.




4218

4219 **Figure 47 – Class diagram ExtRemedialAction::RemedialActionOverview**

4220 Figure 47: The diagram is an overview of the remedial action related extensions.

4221 ### 3.15.2 (NC) ACDCConverterAction

4222 Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject :
4223 ExtEuIdentifiedObject
4224 Alternate current Direct current (ACDC) converter action.
4225 Table 434 shows all attributes of ACDCConverterAction.

4226 **Table 434 – Attributes of ExtRemedialAction::ACDCConverterAction**

| name | mult | type | description |
|---|---|---|---|
| enabled | 0..1 | Boolean | (NC) inherited from: GridStateAlteration |
| normalEnabled | 0..1 | Boolean | (NC) inherited from: GridStateAlteration |
| participationFactor | 0..1 | PerCent | (NC) inherited from: GridStateAlteration |
| maximumPerDay | 0..1 | Integer | (NC) inherited from: GridStateAlteration |
| minimumActivation | 0..1 | Duration | (NC) inherited from: GridStateAlteration |
| timePerStage | 0..1 | Duration | (NC) inherited from: GridStateAlteration |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |

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

Table 435 shows all association ends of ACDCConverterAction with other classes.

**Table 435 – Association ends of ExtRemedialAction::ACDCConverterAction with other 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..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) inherited from: GridStateAlteration |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) inherited from: GridStateAlteration |
| 1..1 | GridStateIntensitySchedule | 0..* | GridStateIntensitySchedule | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationRemedialAction | 0..1 | GridStateAlterationRemedialAction | (NC) inherited from: GridStateAlteration |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: GridStateAlteration |
| 0..1 | RangeConstraint | 0..* | RangeConstraint | (NC) inherited from: GridStateAlteration |
| 0..1 | GridStateAlterationSchedule | 0..* | GridStateAlterationSchedule | (NC) inherited from: GridStateAlteration |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.3 (NC) AvailabilityRemedialAction

Inheritance path = RemedialAction : IdentifiedObject : ExtEuIdentifiedObject

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

Table 436 shows all attributes of AvailabilityRemedialAction.

**Table 436 – 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 |

| 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 437 shows all association ends of AvailabilityRemedialAction with other classes.

**Table 437 – 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 |

### 3.15.4 (NC) BatteryUnitAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Battery unit setpoint action.

Table 438 shows all attributes of BatteryUnitAction.

**Table 438 – Attributes of ExtRemedialAction::BatteryUnitAction**

| name | mult | type | description |
|---|---|---|---|
| enabled | 0..1 | Boolean | (NC) inherited from: GridStateAlteration |
| normalEnabled | 0..1 | Boolean | (NC) inherited from: GridStateAlteration |
| participationFactor | 0..1 | PerCent | (NC) inherited from: GridStateAlteration |
| maximumPerDay | 0..1 | Integer | (NC) inherited from: GridStateAlteration |
| minimumActivation | 0..1 | Duration | (NC) inherited from: GridStateAlteration |
| timePerStage | 0..1 | Duration | (NC) inherited from: GridStateAlteration |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 439 – 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..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) inherited from: GridStateAlteration |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) inherited from: GridStateAlteration |
| 1..1 | GridStateIntensitySchedule | 0..* | GridStateIntensitySchedule | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationRemedialAction | 0..1 | GridStateAlterationRemedialAction | (NC) inherited from: GridStateAlteration |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: GridStateAlteration |
| 0..1 | RangeConstraint | 0..* | RangeConstraint | (NC) inherited from: GridStateAlteration |
| 0..1 | GridStateAlterationSchedule | 0..* | GridStateAlterationSchedule | (NC) inherited from: GridStateAlteration |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.5 (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 440 shows all attributes of CountertradeRemedialAction.

**Table 440 – 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.<br>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.<br>The allowed value range is [0,100]. |
| maxRegulatingDown | 0..1 | ActivePower | (NC) inherited from: PowerRemedialAction |
| maxRegulatingUp | 0..1 | ActivePower | (NC) inherited from: PowerRemedialAction |
| available | 0..1 | Boolean | (NC) inherited from: RemedialAction |
| kind | 0..1 | RemedialActionKind | (NC) inherited from: RemedialAction |
| penaltyFactor | 0..1 | Float | (NC) inherited from: RemedialAction |
| isCrossBorderRelevant | 0..1 | Boolean | (NC) inherited from: RemedialAction |
| isManual | 0..1 | Boolean | (NC) inherited from: RemedialAction |
| timeToImplement | 0..1 | Duration | (NC) inherited from: RemedialAction |
| normalAvailable | 0..1 | Boolean | (NC) inherited from: RemedialAction |
| impactThresholdMargin | 0..1 | PerCent | (NC) inherited from: RemedialAction |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 441 – 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 |

### 3.15.6 (NC) ControlFunctionBlockAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Action for setting the control function block target values.

Table 442 shows all attributes of ControlFunctionBlockAction.

**Table 442 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 443 – 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..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) inherited from: GridStateAlteration |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) inherited from: GridStateAlteration |
| 1..1 | GridStateIntensitySchedule | 0..* | GridStateIntensitySchedule | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationRemedialAction | 0..1 | GridStateAlterationRemedialAction | (NC) inherited from: GridStateAlteration |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: GridStateAlteration |
| 0..1 | RangeConstraint | 0..* | RangeConstraint | (NC) inherited from: GridStateAlteration |
| 0..1 | GridStateAlterationSchedule | 0..* | GridStateAlterationSchedule | (NC) inherited from: GridStateAlteration |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.7 (NC) EnergySourceModification

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Energy source action.

Table 444 shows all attributes of EnergySourceModification.

**Table 444 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 445 – 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..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) inherited from: GridStateAlteration |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) inherited from: GridStateAlteration |
| 1..1 | GridStateIntensitySchedule | 0..* | GridStateIntensitySchedule | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationRemedialAction | 0..1 | GridStateAlterationRemedialAction | (NC) inherited from: GridStateAlteration |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: GridStateAlteration |
| 0..1 | RangeConstraint | 0..* | RangeConstraint | (NC) inherited from: GridStateAlteration |
| 0..1 | GridStateAlterationSchedule | 0..* | GridStateAlterationSchedule | (NC) inherited from: GridStateAlteration |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.8 (NC) EquivalentInjectionAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Equivalent injection action.

Table 446 shows all attributes of EquivalentInjectionAction.

**Table 446 – 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 |

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

**Table 447 – 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..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) inherited from: GridStateAlteration |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) inherited from: GridStateAlteration |
| 1..1 | GridStateIntensitySchedule | 0..* | GridStateIntensitySchedule | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationRemedialAction | 0..1 | GridStateAlterationRemedialAction | (NC) inherited from: GridStateAlteration |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: GridStateAlteration |
| 0..1 | RangeConstraint | 0..* | RangeConstraint | (NC) inherited from: GridStateAlteration |
| 0..1 | GridStateAlterationSchedule | 0..* | GridStateAlterationSchedule | (NC) inherited from: GridStateAlteration |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.9 (NC) ExternalNetworkInjectionAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

External network injection action.

Table 448 shows all attributes of ExternalNetworkInjectionAction.

**Table 448 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 449 shows all association ends of ExternalNetworkInjectionAction with other classes.

**Table 449 – 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..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) inherited from: GridStateAlteration |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) inherited from: GridStateAlteration |
| 1..1 | GridStateIntensitySchedule | 0..* | GridStateIntensitySchedule | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationRemedialAction | 0..1 | GridStateAlterationRemedialAction | (NC) inherited from: GridStateAlteration |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: GridStateAlteration |
| 0..1 | RangeConstraint | 0..* | RangeConstraint | (NC) inherited from: GridStateAlteration |
| 0..1 | GridStateAlterationSchedule | 0..* | GridStateAlterationSchedule | (NC) inherited from: GridStateAlteration |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.10 (NC) GridStateAlteration

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Grid state alteration is a change of values describing state (operating point) of one element in the grid model compared to the base case.
Table 450 shows all attributes of GridStateAlteration.

**Table 450 – 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.<br>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).<br>In the case of priority strategy, the item with the lowest number gets allocated energy first.<br>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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 451 shows all association ends of GridStateAlteration with other classes.

**Table 451 – 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..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) The collection that has a GridStateAlteration. |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) The property reference for this grid state alteration. |

| 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 |

### 3.15.11 (NC) GridStateAlterationRemedialAction

Inheritance path = RemedialAction : IdentifiedObject : ExtEuIdentifiedObject
Grid state alteration remedial action describes one or many grid state alterations applied to a grid model state or a particular scenario in order to resolve one or more identified constraints. Table 452 shows all attributes of GridStateAlterationRemedialAction.

**Table 452 – Attributes of ExtRemedialAction::GridStateAlterationRemedialAction**

| name | mult | type | description |
|---|---|---|---|
| available | 0..1 | Boolean | (NC) inherited from: RemedialAction |
| kind | 0..1 | RemedialActionKind | (NC) inherited from: RemedialAction |
| penaltyFactor | 0..1 | Float | (NC) inherited from: RemedialAction |
| isCrossBorderRelevant | 0..1 | Boolean | (NC) inherited from: RemedialAction |
| isManual | 0..1 | Boolean | (NC) inherited from: RemedialAction |
| timeToImplement | 0..1 | Duration | (NC) inherited from: RemedialAction |
| normalAvailable | 0..1 | Boolean | (NC) inherited from: RemedialAction |
| impactThresholdMargin | 0..1 | PerCent | (NC) inherited from: RemedialAction |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 453 – Association ends of ExtRemedialAction::GridStateAlterationRemedialAction with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | GridStateAlteration | 0..* | GridStateAlteration | (NC) The grid state alteration which is part of the grid state alteration remedial action. |
| 0..1 | ContingencyWithRemedialAction | 0..* | ContingencyWithRemedialAction | (NC) inherited from: RemedialAction |
| 1..1 | RemedialActionSchedule | 0..* | RemedialActionSchedule | (NC) inherited from: RemedialAction |
| 0..1 | DependentRemedialAction | 0..* | RemedialActionDependency | (NC) inherited from: RemedialAction |
| 0..1 | GenericAvailableSchedule | 0..* | GenericAvailableSchedule | (NC) inherited from: RemedialAction |
| 0..* | ImpactedOverlappingZone | 0..1 | OverlappingZone | (NC) inherited from: RemedialAction |
| 0..* | AppointedToOverlappingZone | 0..1 | OverlappingZone | (NC) inherited from: RemedialAction |
| 0..* | AppointedToRegion | 0..1 | Region | (NC) inherited from: RemedialAction |
| 0..1 | AssessedElementWithRemedialAction | 0..* | AssessedElementWithRemedialAction | (NC) inherited from: RemedialAction |
| 0..1 | RemedialActionOutcomeValue | 0..* | RemedialActionOutcomeValue | (NC) inherited from: RemedialAction |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: RemedialAction |
| 0..* | RemedialActionSystemOperator | 0..1 | SystemOperator | (NC) inherited from: RemedialAction |
| 0..1 | RemedialActionImpact | 0..* | RemedialActionImpact | (NC) inherited from: RemedialAction |
| 1..1 | RemedialActionApplied | 0..* | RemedialActionApplied | (NC) inherited from: RemedialAction |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.12 (NC) GridStateIntensitySchedule

Inheritance path = GenericValueSchedule : BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

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.

Table 454 shows all attributes of GridStateIntensitySchedule.

**Table 454 – 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 |

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

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

**Table 455 – Association ends of ExtRemedialAction::GridStateIntensitySchedule with 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 |

### 3.15.13 (NC) IntertemporalPropertyRange

Inheritance path = RangeConstraint : IdentifiedObject : ExtEuIdentifiedObject
It represents the intertemporal range, which means that this is the maximum change of an attribute value between two time stamps or per time unit (e.g. hour). Both up and down directions are defined by the direction attribute, i.e. There are different schedules per direction. The class is not instantiated for PropertyReference which refers to Boolean type attributes.
For instance the following example illustrates the approach:
- A tap changer related grid state alteration having two intertemporal range schedules.
- For a particular point in time, the value from up schedule is 6 and the value from down schedule is 3.
- Then, the GridStateIntensity for the same point in time cannot be more than plus 6 taps from the current, or more than minus 3 taps from the current.
Table 456 shows all attributes of IntertemporalPropertyRange.

**Table 456 – Attributes of ExtRemedialAction::IntertemporalPropertyRange**

| name | mult | type | description |
|---|---|---|---|
| valueKind | 0..1 | ValueOffsetKind | (NC) inherited from: RangeConstraint |
| direction | 0..1 | RelativeDirectionKind | (NC) inherited from: RangeConstraint |
| value | 0..1 | Float | (NC) inherited from: RangeConstraint |
| normalValue | 0..1 | Float | (NC) inherited from: RangeConstraint |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

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

**Table 457 – Association ends of ExtRemedialAction::IntertemporalPropertyRange with 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 |

### 3.15.14 (NC) LoadAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Load action.

Table 458 shows all attributes of LoadAction.

**Table 458 – 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 |
| timePerStage | 0..1 | Duration | (NC) inherited from: GridStateAlteration |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |

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

Table 459 shows all association ends of LoadAction with other classes.

**Table 459 – 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..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) inherited from: GridStateAlteration |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) inherited from: GridStateAlteration |
| 1..1 | GridStateIntensitySchedule | 0..* | GridStateIntensitySchedule | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationRemedialAction | 0..1 | GridStateAlterationRemedialAction | (NC) inherited from: GridStateAlteration |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: GridStateAlteration |
| 0..1 | RangeConstraint | 0..* | RangeConstraint | (NC) inherited from: GridStateAlteration |
| 0..1 | GridStateAlterationSchedule | 0..* | GridStateAlterationSchedule | (NC) inherited from: GridStateAlteration |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.15 (NC) PowerElectronicsConnectionAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Power electronics setpoint action.

Table 460 shows all attributes of PowerElectronicsConnectionAction.

**Table 460 – 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 |
| 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 |

| 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 461 shows all association ends of PowerElectronicsConnectionAction with other classes.

**Table 461 – Association ends of ExtRemedialAction::PowerElectronicsConnectionAction with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | PowerElectronicsConnection | 1..1 | PowerElectronicsConnection | (NC) The PowerElectronicsConnection that is applied to an action. |
| 0..1 | AvailabilityEnabled | 0..* | AvailabilityEnabled | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) inherited from: GridStateAlteration |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) inherited from: GridStateAlteration |
| 1..1 | GridStateIntensitySchedule | 0..* | GridStateIntensitySchedule | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationRemedialAction | 0..1 | GridStateAlterationRemedialAction | (NC) inherited from: GridStateAlteration |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: GridStateAlteration |
| 0..1 | RangeConstraint | 0..* | RangeConstraint | (NC) inherited from: GridStateAlteration |
| 0..1 | GridStateAlterationSchedule | 0..* | GridStateAlterationSchedule | (NC) inherited from: GridStateAlteration |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.16 (NC) PropertyReference root class

The reference to a class and one of its properties.
Table 462 shows all attributes of PropertyReference.

**Table 462 – 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 achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.<br>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 463 shows all association ends of PropertyReference with other classes.

**Table 463 – Association ends of ExtRemedialAction::PropertyReference with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..1 | PinEquipment | 0..* | PinEquipment | (NC) The pin equipment that has this property reference. |
| 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 | 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. |

### 3.15.17 (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 464 shows all attributes of QualitativeRemedialActionImpact.

**Table 464 – 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 465 shows all association ends of QualitativeRemedialActionImpact with other classes.

**Table 465 – 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..1 | OwnerRemedialActionAssessment | 0..* | OwnerRemedialActionAssessment | (NC) inherited from: RemedialActionImpact |

### 3.15.18 (NC) QuantitativeRemedialActionImpact

Inheritance path = RemedialActionImpact
Defines the quantitative impact for a remedial action. The value if the impact quantity is derived through offline calculation that has coursed an impact of an element that is monitored by the assessed system operator higher than the relevant threshold for the conducting equipment.
Table 466 shows all attributes of QuantitativeRemedialActionImpact.

**Table 466 – 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 |

Table 467 shows all association ends of QuantitativeRemedialActionImpact with other classes.

**Table 467 – Association ends of ExtRemedialAction::QuantitativeRemedialActionImpact 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..1 | OwnerRemedialActionAssessment | 0..* | OwnerRemedialActionAssessment | (NC) inherited from: RemedialActionImpact |

### 3.15.19 (NC) RedispatchScheduleAction

Inheritance path = PowerScheduleAction : IdentifiedObject : ExtEuIdentifiedObject
Redispatch schedule action is an action to rearrange power schedules for a scheduled resource to obtain a feasible and secure operational state of the power electricity system.
Table 468 shows all attributes of RedispatchScheduleAction.

**Table 468 – 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 |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 469 shows all association ends of RedispatchScheduleAction with other classes.

**Table 469 – Association ends of ExtRemedialAction::RedispatchScheduleAction with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | RedispatchRemedialAction | 0..1 | RedispatchRemedialAction | (NC) Redispatch remedial action that is supported by the redispatch schedule action. |
| 0..* | RemedialActionSchedule | 0..1 | RemedialActionSchedule | (NC) inherited from: PowerScheduleAction |
| 0..1 | PowerBidSchedule | 0..1 | PowerBidSchedule | (NC) inherited from: PowerScheduleAction |
| 0..1 | PowerSchedule | 0..1 | PowerSchedule | (NC) inherited from: PowerScheduleAction |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.20 (NC) RedispatchRemedialAction

Inheritance path = PowerRemedialAction : RemedialAction : IdentifiedObject : ExtEuIdentifiedObject

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

Table 470 shows all attributes of RedispatchRemedialAction.

**Table 470 – Attributes of ExtRemedialAction::RedispatchRemedialAction**

| name | mult | type | description |
|---|---|---|---|
| maxRegulatingDown | 0..1 | ActivePower | (NC) inherited from: PowerRemedialAction |
| maxRegulatingUp | 0..1 | ActivePower | (NC) inherited from: PowerRemedialAction |
| available | 0..1 | Boolean | (NC) inherited from: RemedialAction |
| kind | 0..1 | RemedialActionKind | (NC) inherited from: RemedialAction |
| penaltyFactor | 0..1 | Float | (NC) inherited from: RemedialAction |
| isCrossBorderRelevant | 0..1 | Boolean | (NC) inherited from: RemedialAction |
| isManual | 0..1 | Boolean | (NC) inherited from: RemedialAction |
| timeToImplement | 0..1 | Duration | (NC) inherited from: RemedialAction |
| normalAvailable | 0..1 | Boolean | (NC) inherited from: RemedialAction |
| impactThresholdMargin | 0..1 | PerCent | (NC) inherited from: RemedialAction |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 471 shows all association ends of RedispatchRemedialAction with other classes.

**Table 471 – 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 |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.21 (NC) RegulatingControlAction

Inheritance path = GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Control action means the set point change of a regulating control power system resource in the grid model compared to the base case.
Table 472 shows all attributes of RegulatingControlAction.

**Table 472 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 473 shows all association ends of RegulatingControlAction with other classes.

**Table 473 – Association ends of ExtRemedialAction::RegulatingControlAction with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | RegulatingControl | 1..1 | RegulatingControl | (NC) The regulating control which has an action. |
| 0..1 | AvailabilityEnabled | 0..* | AvailabilityEnabled | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) inherited from: GridStateAlteration |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) inherited from: GridStateAlteration |
| 1..1 | GridStateIntensitySchedule | 0..* | GridStateIntensitySchedule | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationRemedialAction | 0..1 | GridStateAlterationRemedialAction | (NC) inherited from: GridStateAlteration |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: GridStateAlteration |
| 0..1 | RangeConstraint | 0..* | RangeConstraint | (NC) inherited from: GridStateAlteration |
| 0..1 | GridStateAlterationSchedule | 0..* | GridStateAlterationSchedule | (NC) inherited from: GridStateAlteration |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.22 (NC) RemedialAction

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject

Remedial action describes one or more actions that can be performed on a given power system model situation to eliminate one or more identified breaches of constraints. The remedial action can be costly, and have a cost characteristic, or non costly.
Table 474 shows all attributes of RemedialAction.

**Table 474 – Attributes of ExtRemedialAction::RemedialAction**

| name | mult | type | description |
|---|---|---|---|
| available | 0..1 | Boolean | (NC) Identifies if the remedial action is available to be proposed. True means available, False means unavailable. |
| kind | 0..1 | RemedialActionKind | (NC) The kind of the remedial action. If curative remedial action, it is required to have an association with ContingencyWithRemedialAction.<br>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 – 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) It identifies if the remedial action is available under normal condition. True means available, False means unavailable. |
| impactThresholdMargin | 0..1 | PerCent | (NC) Impact threshold margin for the use of the remedial action. Meaning that the remedial action should not be used if it cannot resolve violation with more than the given impact threshold margin.<br>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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 475 shows all association ends of RemedialAction with other classes.

**Table 475 – Association ends of ExtRemedialAction::RemedialAction with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | ContingencyWithRemedialAction | 0..* | ContingencyWithRemedialAction | (NC) The contingency and remedial action combination. |
| 1..1 | RemedialActionSchedule | 0..* | RemedialActionSchedule | (NC) The remedial action schedule associated with a remedial action, i.e. the assigning a schedule to a remedial action. |
| 0..1 | DependentRemedialAction | 0..* | RemedialActionDependency | (NC) Remedial action dependent on a remedial action. |
| 0..1 | GenericAvailableSchedule | 0..* | GenericAvailableSchedule | (NC) Available schedule associated to a remedial action. |
| 0..* | ImpactedOverlappingZone | 0..1 | OverlappingZone | (NC) The impacted overlapping zone for this impacting remedial action. |
| 0..* | AppointedToOverlappingZone | 0..1 | OverlappingZone | (NC) The overlapping zone appointed to the remedial action. |
| 0..* | AppointedToRegion | 0..1 | Region | (NC) The region in which the remedial action is appointed. |
| 0..1 | AssessedElementWithRemedialAction | 0..* | AssessedElementWithRemedialAction | (NC) The assessed element and remedial action combination to be simulated for this remedial action. |
| 0..1 | RemedialActionOutcomeValue | 0..* | RemedialActionOutcomeValue | (NC) The remedial action outcome value associated with a remedial action. |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) The controllable quantity for a remedial action. |
| 0..* | RemedialActionSystemOperator | 0..1 | SystemOperator | (NC) System operator operating remedial actions. |
| 0..1 | RemedialActionImpact | 0..* | RemedialActionImpact | (NC) This is the impact for a given remedial action. |
| 1..1 | RemedialActionApplied | 0..* | RemedialActionApplied | (NC) The relationship of the applied remedial action and power flow result. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.23 (NC) RemedialActionCost root class

Remedial action cost is the total cost itemised cost by category and type for the remedial action. Table 476 shows all attributes of RemedialActionCost.

**Table 476 – 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. |

| name | mult | type | description |
|---|---|---|---|
| operationalCost | 0..1 | Decimal | (NC) Operational cost is the total cost directly related to operate the unit according to the remedial action, e.g. fuel cost. |
| opportunityCost | 0..1 | Decimal | (NC) Opportunity cost is the total cost of potential earning that is missed due to performing the remedial action. |
| otherCost | 0..1 | Decimal | (NC) Other cost is the total cost that cannot be directly allocated to any of the other items. |
| processingFee | 0..1 | Decimal | (NC) Processing fee is the total cost for processing the remedial action. |
| savedFuelCost | 0..1 | Decimal | (NC) Saved fuel cost is the total saving due to not consuming the expected fuel as part of the remedial action. |
| shutdownCost | 0..1 | Decimal | (NC) Shutdown cost is the total cost for shutting down a unit as part of the remedial action. |
| startupCost | 0..1 | Decimal | (NC) Start-up cost is the total cost for activating the remedial action, e.g. if a generator needs to be started before it can perform the remedial action. |
| 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.<br>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 477 shows all association ends of RemedialActionCost with other classes.

**Table 477 – Association ends of ExtRemedialAction::RemedialActionCost with other classes**

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

### 3.15.24 (NC) RemedialActionImpact root class

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

Table 478 shows all attributes of RemedialActionImpact.

**Table 478 – 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.<br>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. |

| 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.<br>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 479 shows all association ends of RemedialActionImpact with other classes.

**Table 479 – Association ends of ExtRemedialAction::RemedialActionImpact with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | RemedialAction | 0..1 | RemedialAction | (NC) The remedial action that has an impact. |
| 0..* | AssessingSystemOperator | 0..1 | SystemOperator | (NC) The impacted System Operator that assigns a remedial action impact. |
| 0..1 | OwnerRemedialActionAssessment | 0..* | OwnerRemedialActionAssessment | (NC) The owner's assessment to the impacted system operator. |

### 3.15.25 (NC) RemedialActionSchedule

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
A schedule for a determined remedial action.
Table 480 shows all attributes of RemedialActionSchedule.

**Table 480 – Attributes of ExtRemedialAction::RemedialActionSchedule**

| name | mult | type | description |
|---|---|---|---|
| statusKind | 0..1 | RemedialActionScheduleStatusKind | (NC) Indicates the status kind for the remedial action schedule. |
| statusReason | 0..1 | String | (NC) Description of reasoning for the status. For instance, in case of rejected remedial action, the reason for this rejection is described here. |
| totalCost | 0..1 | Decimal | (NC) Total cost of the remedial action. |
| totalCostCurrency | 0..1 | Currency | (NC) The currency of the total cost. |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 481 shows all association ends of RemedialActionSchedule with other classes.

**Table 481 – Association ends of ExtRemedialAction::RemedialActionSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 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..* | Contingency | 0..1 | Contingency | (NC) The contingency for a curative 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 | RemedialActionScheduleAcceptance | 0..* | RemedialActionScheduleAcceptance | (NC) The remedial action schedule acceptance related to a remedial action schedule. |
| 0..1 | GenericValueSchedule | 0..* | GenericValueSchedule | (NC) Generic value schedule which belongs to a remedial action schedule. |
| 0..1 | PowerScheduleAction | 0..* | PowerScheduleAction | (NC) Power schedule action which belongs to a remedial action schedule. |
| 0..1 | ProposedDependency | 0..* | RemedialActionScheduleDependency | (NC) Dependency for the proposed remedial action schedule. |
| 0..1 | ReplacedDependency | 0..* | RemedialActionScheduleDependency | (NC) Replaced dependency for this remedial action schedule. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.26 (NC) RemedialActionScheduleAcceptance root class

It identifies if the remedial action schedule is accepted for a given system operator. Table 482 shows all attributes of RemedialActionScheduleAcceptance.

**Table 482 – Attributes of ExtRemedialAction::RemedialActionScheduleAcceptance**

| name | mult | type | description |
|---|---|---|---|
| kind | 0..1 | RemedialActionScheduleAcceptanceKind | (NC) The kind of the remedial action acceptance. |
| 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.<br>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 483 shows all association ends of RemedialActionScheduleAcceptance with other classes.

**Table 483 – Association ends of ExtRemedialAction::RemedialActionScheduleAcceptance 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 acceptance is reported. |
| 0..* | RespondingEntity | 0..1 | SystemOperator | (NC) An entity for which a remedial action schedule acceptances are reported. |

### 3.15.27 (NC) RotatingMachineAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Rotating machine action.

Table 484 shows all attributes of RotatingMachineAction.

**Table 484 – 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 |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 485 shows all association ends of RotatingMachineAction with other classes.

**Table 485 – 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..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) inherited from: GridStateAlteration |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) inherited from: GridStateAlteration |
| 1..1 | GridStateIntensitySchedule | 0..* | GridStateIntensitySchedule | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationRemedialAction | 0..1 | GridStateAlterationRemedialAction | (NC) inherited from: GridStateAlteration |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: GridStateAlteration |
| 0..1 | RangeConstraint | 0..* | RangeConstraint | (NC) inherited from: GridStateAlteration |
| 0..1 | GridStateAlterationSchedule | 0..* | GridStateAlterationSchedule | (NC) inherited from: GridStateAlteration |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.28 (NC) SetPointAction

Inheritance path = GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject
Setpoint action.
Table 486 shows all attributes of SetPointAction.

**Table 486 – 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 | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 487 shows all association ends of SetPointAction with other classes.

**Table 487 – 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..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) inherited from: GridStateAlteration |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) inherited from: GridStateAlteration |
| 1..1 | GridStateIntensitySchedule | 0..* | GridStateIntensitySchedule | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationRemedialAction | 0..1 | GridStateAlterationRemedialAction | (NC) inherited from: GridStateAlteration |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: GridStateAlteration |
| 0..1 | RangeConstraint | 0..* | RangeConstraint | (NC) inherited from: GridStateAlteration |
| 0..1 | GridStateAlterationSchedule | 0..* | GridStateAlterationSchedule | (NC) inherited from: GridStateAlteration |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.29 (NC) SchemeRemedialAction

Inheritance path = RemedialAction : IdentifiedObject : ExtEuIdentifiedObject

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 488 shows all attributes of SchemeRemedialAction.

**Table 488 – 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 |
| description | 0..1 | String | 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 489 shows all association ends of SchemeRemedialAction with other classes.

**Table 489 – Association ends of ExtRemedialAction::SchemeRemedialAction with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | RemedialActionScheme | 0..1 | RemedialActionScheme | (NC) Remedial action scheme for this scheme remedial action. |
| 0..1 | RemedialActionSchemeSchedule | 0..* | RemedialActionSchemeSchedule | (NC) Remedial action scheme schedule associated with a remedial action scheme. |
| 0..1 | ContingencyWithRemedialAction | 0..* | ContingencyWithRemedialAction | (NC) inherited from: RemedialAction |
| 1..1 | RemedialActionSchedule | 0..* | RemedialActionSchedule | (NC) inherited from: RemedialAction |
| 0..1 | DependentRemedialAction | 0..* | RemedialActionDependency | (NC) inherited from: RemedialAction |
| 0..1 | GenericAvailableSchedule | 0..* | GenericAvailableSchedule | (NC) inherited from: RemedialAction |
| 0..* | ImpactedOverlappingZone | 0..1 | OverlappingZone | (NC) inherited from: RemedialAction |
| 0..* | AppointedToOverlappingZone | 0..1 | OverlappingZone | (NC) inherited from: RemedialAction |
| 0..* | AppointedToRegion | 0..1 | Region | (NC) inherited from: RemedialAction |
| 0..1 | AssessedElementWithRemedialAction | 0..* | AssessedElementWithRemedialAction | (NC) inherited from: RemedialAction |
| 0..1 | RemedialActionOutcomeValue | 0..* | RemedialActionOutcomeValue | (NC) inherited from: RemedialAction |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: RemedialAction |
| 0..* | RemedialActionSystemOperator | 0..1 | SystemOperator | (NC) inherited from: RemedialAction |
| 0..1 | RemedialActionImpact | 0..* | RemedialActionImpact | (NC) inherited from: RemedialAction |
| 1..1 | RemedialActionApplied | 0..* | RemedialActionApplied | (NC) inherited from: RemedialAction |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.30 (NC) ShuntCompensatorModification

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Shunt compensator action.

Table 490 shows all attributes of ShuntCompensatorModification.

**Table 490 – Attributes of ExtRemedialAction::ShuntCompensatorModification**

| name | mult | type | description |
|---|---|---|---|
| enabled | 0..1 | Boolean | (NC) inherited from: GridStateAlteration |
| normalEnabled | 0..1 | Boolean | (NC) inherited from: GridStateAlteration |

| name | mult | type | description |
|---|---|---|---|
| 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 491 shows all association ends of ShuntCompensatorModification with other classes.

**Table 491 – Association ends of ExtRemedialAction::ShuntCompensatorModification 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..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) inherited from: GridStateAlteration |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) inherited from: GridStateAlteration |
| 1..1 | GridStateIntensitySchedule | 0..* | GridStateIntensitySchedule | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationRemedialAction | 0..1 | GridStateAlterationRemedialAction | (NC) inherited from: GridStateAlteration |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: GridStateAlteration |
| 0..1 | RangeConstraint | 0..* | RangeConstraint | (NC) inherited from: GridStateAlteration |
| 0..1 | GridStateAlterationSchedule | 0..* | GridStateAlterationSchedule | (NC) inherited from: GridStateAlteration |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.31 (NC) StaticPropertyRange

Inheritance path = RangeConstraint : IdentifiedObject : ExtEuIdentifiedObject
Defines the static range, which means that this is the minimum and/or maximum of an attribute value. The value provided by the schedule replaces the value of the attribute to which the schedule refers to.
In case that the PropertyReference refers to Boolean type attributes, RangeConstraint.direction shall be none or upAndDown and the RangeConstraint.valueKind shall be absolute. If the direction is none then optimization of the attribute referenced by the PropertyReference is not possible if the current status is already as the value in the range. Otherwise if the direction is

upAndDown, the optimization can change from true to false or vice versa independently of the initial value in the operational scenario.
For instance for a tap changer related grid state alteration for a particular point in time, if the range of TapChanger.step is to be restricted, the value of the schedule will represent that new TapChanger.step range.
Table 492 shows all attributes of StaticPropertyRange.

**Table 492 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 493 shows all association ends of StaticPropertyRange with other classes.

**Table 493 – Association ends of ExtRemedialAction::StaticPropertyRange with other 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 |

### 3.15.32 (NC) StaticVarCompensatorAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject
Static Var compensator action.
Table 494 shows all attributes of StaticVarCompensatorAction.

**Table 494 – 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 |

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

Table 495 shows all association ends of StaticVarCompensatorAction with other classes.

**Table 495 – 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..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) inherited from: GridStateAlteration |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) inherited from: GridStateAlteration |
| 1..1 | GridStateIntensitySchedule | 0..* | GridStateIntensitySchedule | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationRemedialAction | 0..1 | GridStateAlterationRemedialAction | (NC) inherited from: GridStateAlteration |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: GridStateAlteration |
| 0..1 | RangeConstraint | 0..* | RangeConstraint | (NC) inherited from: GridStateAlteration |
| 0..1 | GridStateAlterationSchedule | 0..* | GridStateAlterationSchedule | (NC) inherited from: GridStateAlteration |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.33 (NC) TapPositionAction

Inheritance path = GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject
Tap position action represents a change of a tap changer position in the grid model compared to the base case.
Table 496 shows all attributes of TapPositionAction.

**Table 496 – Attributes of ExtRemedialAction::TapPositionAction**

| name | mult | type | description |
|---|---|---|---|
| enabled | 0..1 | Boolean | (NC) inherited from: GridStateAlteration |
| normalEnabled | 0..1 | Boolean | (NC) inherited from: GridStateAlteration |

| name | mult | type | description |
|---|---|---|---|
| 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 497 shows all association ends of TapPositionAction with other classes.

**Table 497 – 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..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) inherited from: GridStateAlteration |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) inherited from: GridStateAlteration |
| 1..1 | GridStateIntensitySchedule | 0..* | GridStateIntensitySchedule | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationRemedialAction | 0..1 | GridStateAlterationRemedialAction | (NC) inherited from: GridStateAlteration |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: GridStateAlteration |
| 0..1 | RangeConstraint | 0..* | RangeConstraint | (NC) inherited from: GridStateAlteration |
| 0..1 | GridStateAlterationSchedule | 0..* | GridStateAlterationSchedule | (NC) inherited from: GridStateAlteration |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.34 (NC) TopologyAction

Inheritance path = GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject
Topology action means the connection or disconnection of a switch in the grid model compared to the base case.
Table 498 shows all attributes of TopologyAction.

**Table 498 – Attributes of ExtRemedialAction::TopologyAction**

| 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 499 shows all association ends of TopologyAction with other classes.

**Table 499 – 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..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) inherited from: GridStateAlteration |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) inherited from: GridStateAlteration |
| 1..1 | GridStateIntensitySchedule | 0..* | GridStateIntensitySchedule | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationRemedialAction | 0..1 | GridStateAlterationRemedialAction | (NC) inherited from: GridStateAlteration |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: GridStateAlteration |
| 0..1 | RangeConstraint | 0..* | RangeConstraint | (NC) inherited from: GridStateAlteration |
| 0..1 | GridStateAlterationSchedule | 0..* | GridStateAlterationSchedule | (NC) inherited from: GridStateAlteration |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.35 (NC) CostSettledKind enumeration

Kind describing how settled the cost is in regards to changes.
Table 500 shows all literals of CostSettledKind.

**Table 500 – Literals of ExtRemedialAction::CostSettledKind**

| literal | value | description |
|---|---|---|
| indicative | | Indicative cost. |
| provisional | | Provisional cost. |

| literal | value | description |
|---|---|---|
| final | | Final cost. For instance, the cost is not expected to be changed on a later stage. |

### 3.15.36 (NC) ImpactAgreementKind enumeration

The impact agreement for the remedial action.
Table 501 shows all literals of ImpactAgreementKind.

**Table 501 – 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. |

### 3.15.37 (NC) BidDirectionKind enumeration

Kind of direction of the bid.
Table 502 shows all literals of BidDirectionKind.

**Table 502 – 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. |

### 3.15.38 (NC) RelativeDirectionKind enumeration

Kind of direction for the changes.
Table 503 shows all literals of RelativeDirectionKind.

**Table 503 – 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. |

### 3.15.39 (NC) RemedialActionScheduleAcceptanceKind enumeration

The kind of acceptance for a remedial action schedule.

Table 504 shows all literals of RemedialActionScheduleAcceptanceKind.

**Table 504 – Literals of ExtRemedialAction::RemedialActionScheduleAcceptanceKind**

| 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. |

### 3.15.40 (NC) RemedialActionKind enumeration

The different kinds for a remedial action.
Table 505 shows all literals of RemedialActionKind.

**Table 505 – 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. |

### 3.15.41 (NC) RemedialActionScheduleStatusKind enumeration

Remedial action schedule status kinds.
Table 506 shows all literals of RemedialActionScheduleStatusKind.

**Table 506 – Literals of ExtRemedialAction::RemedialActionScheduleStatusKind**

| literal | value | description |
|---|---|---|
| proposed | | Proposed remedial action schedule. |
| agreed | | Agreed remedial action schedule. |
| rejected | | Rejected remedial action schedule. |
| ordered | | Ordered remedial action schedule. |
| previouslyAgreed | | Previously agreed remedial action schedule. |
| notUsed | | Not used remedial action schedule. |
| agreementValidated | | The agreement is validated for the remedial action schedule. |
| rejectionValidated | | The rejection is validated for the remedial action schedule. |
| implemented | | An ordered remedial action is implemented. |
| activated | | Activated remedial action schedule. |

### 3.15.42 (NC) ValueOffsetKind enumeration

The kind of the value offset.
Table 507 shows all literals of ValueOffsetKind.

**Table 507 – 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. |

### 3.15.43 (NC) RemedialActionDependencyKind enumeration

Kind of dependency between remedial actions.
Table 508 shows all literals of RemedialActionDependencyKind.

**Table 508 – 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 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. |

### 3.15.44 (NC) ShiftMethodKind enumeration

Kind of shift method. Describes the way a power schedule should be distributed amongst production and consumption. e.g. Type of generating and load shift key.
Table 509 shows all literals of ShiftMethodKind.

**Table 509 – 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. |

### 3.15.45 (NC) RemedialActionDependency root class

Remedial action dependency is making two remedial actions depending on each other. Multiple dependency is done by multiple instances of this class. The dependency can arrive by having one of the following examples.
- The dependent remedial action is controlled by different system operator (Modeling Authority) (e.g. SIPS that goes across control area).
- The dependent remedial action is representing two or more remedial action that represent the same grid state alteration but with different modeling resolution (e.g. detail direct current model versus a simplified model).
- The remedial action can be combined with other remedial action without the need to create multiple remedial action with the same grid alteration for enabling dependency.

Table 510 shows all attributes of RemedialActionDependency.

**Table 510 – 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 with contingency 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.<br>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 511 shows all association ends of RemedialActionDependency with other classes.

**Table 511 – 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. |

### 3.15.46 (NC) BiddingZoneAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Bidding zone set point action.

Table 512 shows all attributes of BiddingZoneAction.

**Table 512 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 513 shows all association ends of BiddingZoneAction with other classes.

**Table 513 – 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 |
| 0..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) inherited from: GridStateAlteration |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) inherited from: GridStateAlteration |
| 1..1 | GridStateIntensitySchedule | 0..* | GridStateIntensitySchedule | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationRemedialAction | 0..1 | GridStateAlterationRemedialAction | (NC) inherited from: GridStateAlteration |

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: GridStateAlteration |
| 0..1 | RangeConstraint | 0..* | RangeConstraint | (NC) inherited from: GridStateAlteration |
| 0..1 | GridStateAlterationSchedule | 0..* | GridStateAlterationSchedule | (NC) inherited from: GridStateAlteration |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.47 (NC) RemedialActionScheduleGroup

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
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 514 shows all attributes of RemedialActionScheduleGroup.

**Table 514 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 515 shows all association ends of RemedialActionScheduleGroup with other classes.

**Table 515 – 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 |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.48 (NC) RangeConstraint

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Defines the rage constraint.
Table 516 shows all attributes of RangeConstraint.

**Table 516 – 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.<br>If the valueKind is incremental or incrementalPercentage, then the attribute value shall be positive (greater than zero).<br>If the valueKind is absolute, it does not constraint attribute value to be positive.<br>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.<br>If the valueKind is incremental or incrementalPercentage, then the attribute value shall be positive (greater than zero).<br>If the valueKind is absolute, it does not constraint attribute value to be positive.<br>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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 517 shows all association ends of RangeConstraint with other classes.

**Table 517 – 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 |

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

### 3.15.49 (NC) ProposingRemedialActionScheduleShare root class

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

Table 518 shows all attributes of ProposingRemedialActionScheduleShare.

**Table 518 – 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.<br>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 519 shows all association ends of ProposingRemedialActionScheduleShare with other classes.

**Table 519 – 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. |

### 3.15.50 (NC) CountertradeScheduleAction

Inheritance path = PowerScheduleAction : IdentifiedObject : ExtEuIdentifiedObject

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

Table 520 shows all attributes of CountertradeScheduleAction.

**Table 520 – 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 |

| 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 521 shows all association ends of CountertradeScheduleAction with other classes.

**Table 521 – 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 |

### 3.15.51 (NC) PowerScheduleAction

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Power schedule action is an action to rearrange power schedules.
Table 522 shows all attributes of PowerScheduleAction.

**Table 522 – Attributes of ExtRemedialAction::PowerScheduleAction**

| name | mult | type | description |
|---|---|---|---|
| currency | 0..1 | Currency | (NC) Currency the energy price is given in. |
| energyPrice | 0..1 | Decimal | (NC) Energy price for the power schedule action. |
| available | 0..1 | Boolean | (NC) Defines if the power schedule action is available and can be used. If true, the reserve action is available and can be used. If false, the reserve action is defined, but not available to be used. |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 523 shows all association ends of PowerScheduleAction with other classes.

**Table 523 – 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 |

### 3.15.52 (NC) PowerRemedialAction

Inheritance path = RemedialAction : IdentifiedObject : ExtEuIdentifiedObject
Energy remedial action describes actions to rearrange power schedules.
Table 524 shows all attributes of PowerRemedialAction.

**Table 524 – Attributes of ExtRemedialAction::PowerRemedialAction**

| name | mult | type | description |
|---|---|---|---|
| maxRegulatingDown | 0..1 | ActivePower | (NC) Maximum net amount of active power that the remedial action can regulate down. |
| maxRegulatingUp | 0..1 | ActivePower | (NC) Maximum net amount of active power that the remedial action can regulate up. |
| available | 0..1 | Boolean | (NC) inherited from: RemedialAction |
| kind | 0..1 | RemedialActionKind | (NC) inherited from: RemedialAction |
| penaltyFactor | 0..1 | Float | (NC) inherited from: RemedialAction |
| isCrossBorderRelevant | 0..1 | Boolean | (NC) inherited from: RemedialAction |
| isManual | 0..1 | Boolean | (NC) inherited from: RemedialAction |
| timeToImplement | 0..1 | Duration | (NC) inherited from: RemedialAction |
| normalAvailable | 0..1 | Boolean | (NC) inherited from: RemedialAction |
| impactThresholdMargin | 0..1 | PerCent | (NC) inherited from: RemedialAction |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 525 shows all association ends of PowerRemedialAction with other classes.

**Table 525 – 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 |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.53 (NC) EquipmentControllerAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Action for setting the equipment controller action.

Table 526 shows all attributes of EquipmentControllerAction.

**Table 526 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 527 shows all association ends of EquipmentControllerAction with other classes.

**Table 527 – Association ends of ExtRemedialAction::EquipmentControllerAction with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | EquipmentController | 1..1 | EquipmentController | (NC) Equipment controller that has associated equipment controller actions. |
| 0..1 | AvailabilityEnabled | 0..* | AvailabilityEnabled | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) inherited from: GridStateAlteration |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) inherited from: GridStateAlteration |
| 1..1 | GridStateIntensitySchedule | 0..* | GridStateIntensitySchedule | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationRemedialAction | 0..1 | GridStateAlterationRemedialAction | (NC) inherited from: GridStateAlteration |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: GridStateAlteration |
| 0..1 | RangeConstraint | 0..* | RangeConstraint | (NC) inherited from: GridStateAlteration |
| 0..1 | GridStateAlterationSchedule | 0..* | GridStateAlterationSchedule | (NC) inherited from: GridStateAlteration |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.54 (NC) RemedialActionGroup

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Grouping of remedial actions that can be operated together.
Table 528 shows all attributes of RemedialActionGroup.

**Table 528 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 529 shows all association ends of RemedialActionGroup with other classes.

**Table 529 – Association ends of ExtRemedialAction::RemedialActionGroup with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | RemedialAction | 0..* | RemedialActionDependency | (NC) Remedial action dependecy 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 |

### 3.15.55 (NC) InServiceAction

Inheritance path = GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject
In service action represents a change of the status of the equipment in the grid model compared to the base case.
Table 530 shows all attributes of InServiceAction.

**Table 530 – 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 | 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 531 shows all association ends of InServiceAction with other classes.

**Table 531 – 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..* | GridStateAlterationCollection | 0..1 | GridStateAlterationCollection | (NC) inherited from: GridStateAlteration |
| 0..* | PropertyReference | 0..1 | PropertyReference | (NC) inherited from: GridStateAlteration |
| 1..1 | GridStateIntensitySchedule | 0..* | GridStateIntensitySchedule | (NC) inherited from: GridStateAlteration |
| 0..* | GridStateAlterationRemedialAction | 0..1 | GridStateAlterationRemedialAction | (NC) inherited from: GridStateAlteration |
| 0..1 | ControllableQuantity | 0..* | ControllableQuantity | (NC) inherited from: GridStateAlteration |
| 0..1 | RangeConstraint | 0..* | RangeConstraint | (NC) inherited from: GridStateAlteration |
| 0..1 | GridStateAlterationSchedule | 0..* | GridStateAlterationSchedule | (NC) inherited from: GridStateAlteration |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.15.56 (NC) RemedialActionScheduleDependency root class

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

Table 532 shows all attributes of RemedialActionScheduleDependency.

**Table 532 – 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.<br>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 533 shows all association ends of RemedialActionScheduleDependency with other classes.

**Table 533 – Association ends of ExtRemedialAction::RemedialActionScheduleDependency with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | ProposedRemedialActionSchedule | 0..1 | RemedialActionSchedule | (NC) Proposed remedial action schedule that has dependency. |
| 0..* | ReplacedRemedialActionSchedule | 0..1 | RemedialActionSchedule | (NC) Remedial action schedule that is replaced by dependent remedial action schedule. |
| 0..* | RemedialActionScheduleGroup | 0..1 | RemedialActionScheduleGroup | (NC) Remedial action schedule group which has remedial action schedule dependency. |

### 3.15.57 (NC) RemedialActionScheduleDependencyKind enumeration

Kind of dependency between remedial action schedules.
Table 534 shows all literals of RemedialActionScheduleDependencyKind.

**Table 534 – Literals of ExtRemedialAction::RemedialActionScheduleDependencyKind**

| literal | value | description |
|---|---|---|
| exclusive | | Remedial action schedules are exclusive depending on each other. e.g. Only one of the remedial action schedules can be selected at the same time. |
| inclusive | | Remedial action schedules are inclusive depending on each other. e.g. Both remedial action schedules need to be picked if one of them is needed. |
| none | | Remedial action schedules are not depending on each other. However, the two remedial action schedules should be evaluated together. |

## 3.16 Package ExtRole

### 3.16.1 General

This package contains the extensions related to the roles.

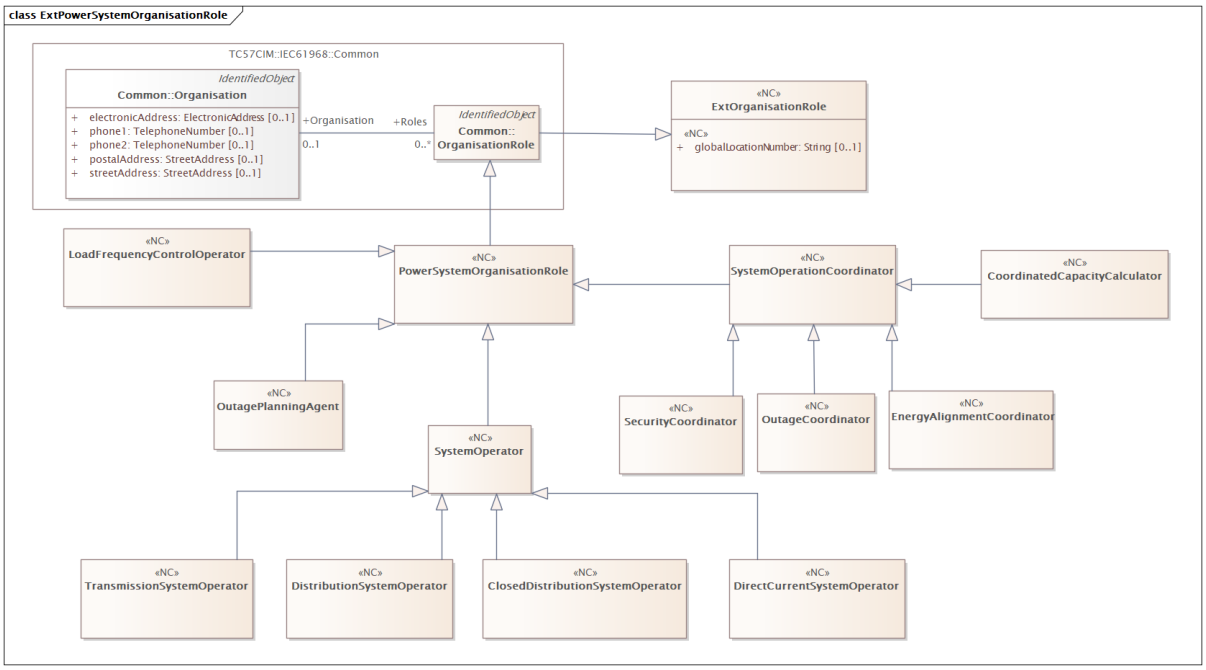



**Figure 48 – Class diagram ExtRole::ExtPowerSystemOrganisationRole**

Figure 48: The diagram contains classes related to power system organization role.

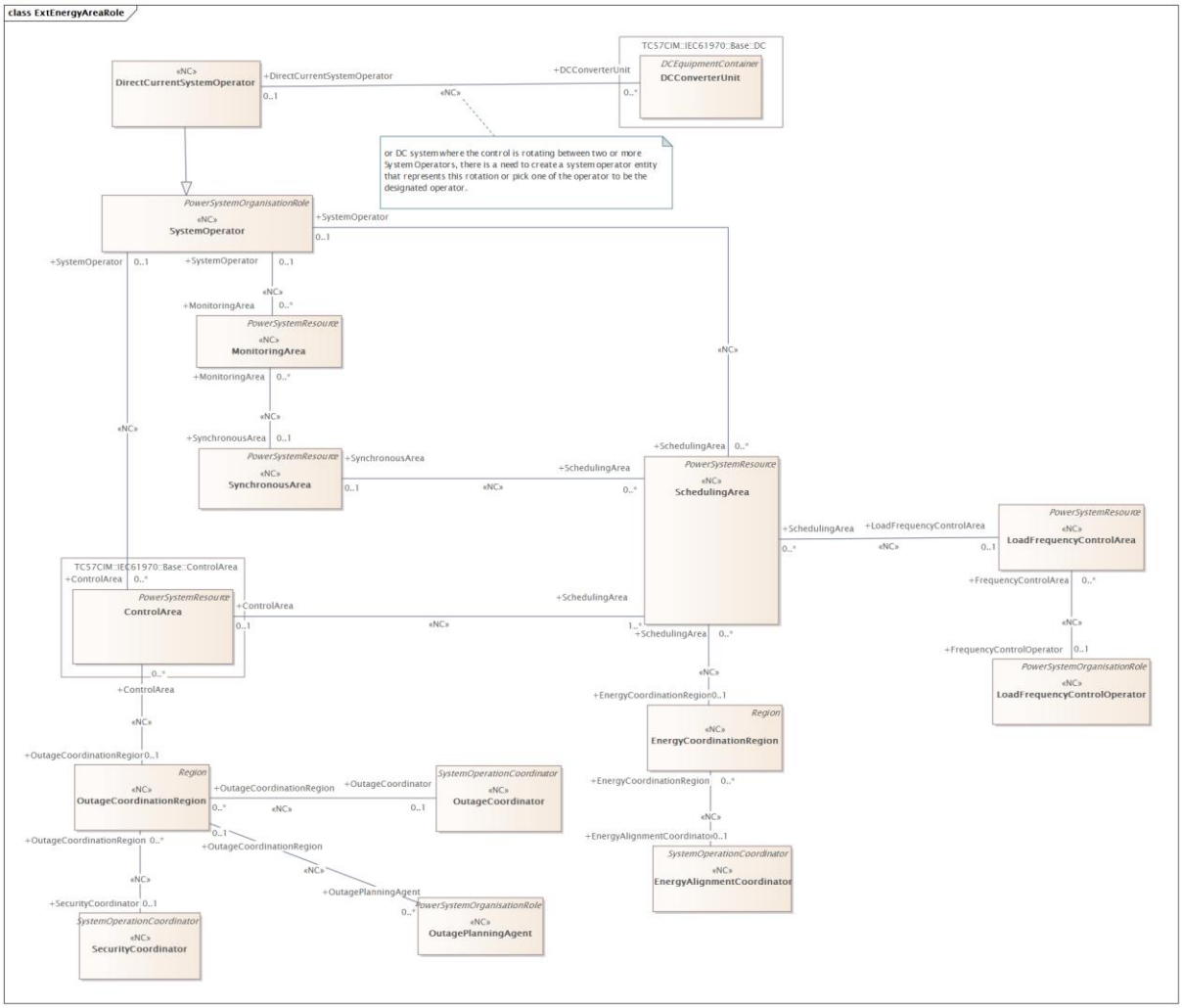



**Figure 49 – Class diagram ExtRole::ExtEnergyAreaRole**

Figure 49: The diagram contains classes related to energy area role.

### 3.16.2 (NC) CoordinatedCapacityCalculator

Inheritance path = SystemOperationCoordinator : PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole

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

Table 535 shows all attributes of CoordinatedCapacityCalculator.

**Table 535 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| globalLocationNumber | 0..1 | String | (NC) inherited from: ExtOrganisationRole |

Table 536 shows all association ends of CoordinatedCapacityCalculator with other classes.

**Table 536 – Association ends of ExtRole::CoordinatedCapacityCalculator with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | CapacityCalculationRegion | 0..* | CapacityCalculationRegion | (NC) Capacity calculation region in which the capacity is calculated by the coordinated capacity calculator. |
| 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 |

### 3.16.3 (NC) ClosedDistributionSystemOperator

Inheritance path = SystemOperator : PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole

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

Table 537 shows all attributes of ClosedDistributionSystemOperator.

**Table 537 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| globalLocationNumber | 0..1 | String | (NC) inherited from: ExtOrganisationRole |

Table 538 shows all association ends of ClosedDistributionSystemOperator with other classes.

**Table 538 – Association ends of ExtRole::ClosedDistributionSystemOperator with other classes**

| 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 | ControlArea | 0..* | ControlArea | (NC) inherited from: SystemOperator |

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | Contingency | 0..* | Contingency | (NC) inherited from: SystemOperator |
| 0..1 | Fault | 0..* | Fault | (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 | RemedialActionScheduleAcceptance | 0..* | RemedialActionScheduleAcceptance | (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 |

### 3.16.4 (NC) DirectCurrentSystemOperator

Inheritance path = SystemOperator : PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : 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 539 shows all attributes of DirectCurrentSystemOperator.

**Table 539 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| globalLocationNumber | 0..1 | String | (NC) inherited from: ExtOrganisationRole |

Table 540 shows all association ends of DirectCurrentSystemOperator with other classes.

**Table 540 – Association ends of ExtRole::DirectCurrentSystemOperator with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | DCConverterUnit | 0..* | DCConverterUnit | (NC) The DC converter unit operated by this direct current system operator. |
| 0..1 | 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 |

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | RemedialAction | 0..* | RemedialAction | (NC) inherited from: SystemOperator |
| 0..1 | ProposingRemedialActionScheduleShare | 0..* | ProposingRemedialActionScheduleShare | (NC) inherited from: SystemOperator |
| 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 | 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 | RemedialActionScheduleAcceptance | 0..* | RemedialActionScheduleAcceptance | (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 |

### 3.16.5 (NC) DistributionSystemOperator

Inheritance path = SystemOperator : PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : 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 541 shows all attributes of DistributionSystemOperator.

**Table 541 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| globalLocationNumber | 0..1 | String | (NC) inherited from: ExtOrganisationRole |

Table 542 shows all association ends of DistributionSystemOperator with other classes.

**Table 542 – Association ends of ExtRole::DistributionSystemOperator with other classes**

| 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 |

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 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 | 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 | 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 | RemedialActionScheduleAcceptance | 0..* | RemedialActionScheduleAcceptance | (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 |

### 3.16.6 (NC) EnergyAlignmentCoordinator

Inheritance path = SystemOperationCoordinator : PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole

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

Table 543 shows all attributes of EnergyAlignmentCoordinator.

**Table 543 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| globalLocationNumber | 0..1 | String | (NC) inherited from: ExtOrganisationRole |

Table 544 shows all association ends of EnergyAlignmentCoordinator with other classes.

**Table 544 – 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 |

### 3.16.7 (NC) ExtOrganisationRole root class

Organisation role NC extension class.
Table 545 shows all attributes of ExtOrganisationRole.

**Table 545 – 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).<br>GS1 is a neutral, not-for-profit, international organisation that develops and maintains standards for supply and demand chains across multiple sectors. |

### 3.16.8 (NC) LoadFrequencyControlOperator

Inheritance path = PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole
A role that is responsible for operational security by operating the load frequency control (LFC) mechanism.
Table 546 shows all attributes of LoadFrequencyControlOperator.

**Table 546 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| globalLocationNumber | 0..1 | String | (NC) inherited from: ExtOrganisationRole |

Table 547 shows all association ends of LoadFrequencyControlOperator with other classes.

**Table 547 – 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 |

### 3.16.9 (NC) OutageCoordinator

Inheritance path = SystemOperationCoordinator : PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : 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 548 shows all attributes of OutageCoordinator.

**Table 548 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| globalLocationNumber | 0..1 | String | (NC) inherited from: ExtOrganisationRole |

Table 549 shows all association ends of OutageCoordinator with other classes.

**Table 549 – 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 |

### 3.16.10 (NC) OutagePlanningAgent

Inheritance path = PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole

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

Table 550 shows all attributes of OutagePlanningAgent.

**Table 550 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| globalLocationNumber | 0..1 | String | (NC) inherited from: ExtOrganisationRole |

Table 551 shows all association ends of OutagePlanningAgent with other classes.

**Table 551 – 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 |

### 3.16.11 (NC) PowerSystemOrganisationRole

Inheritance path = OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole

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

Table 552 shows all attributes of PowerSystemOrganisationRole.

**Table 552 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

| name | mult | type | description |
|---|---|---|---|
| globalLocationNumber | 0..1 | String | (NC) inherited from: ExtOrganisationRole |

Table 553 shows all association ends of PowerSystemOrganisationRole with other classes.

**Table 553 – 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 |

### 3.16.12 (NC) SecurityCoordinator

Inheritance path = SystemOperationCoordinator : PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : 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 554 shows all attributes of SecurityCoordinator.

**Table 554 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| globalLocationNumber | 0..1 | String | (NC) inherited from: ExtOrganisationRole |

Table 555 shows all association ends of SecurityCoordinator with other classes.

**Table 555 – 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 |

### 3.16.13 (NC) SystemOperator

Inheritance path = PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole

System operator.

Table 556 shows all attributes of SystemOperator.

**Table 556 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| globalLocationNumber | 0..1 | String | (NC) inherited from: ExtOrganisationRole |

Table 557 shows all association ends of SystemOperator with other classes.

**Table 557 – Association ends of ExtRole::SystemOperator with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 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 | 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 | 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 | RemedialActionScheduleAcceptance | 0..* | RemedialActionScheduleAcceptance | (NC) Remedial action schedule acceptance 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 |

### 3.16.14 (NC) SystemOperationCoordinator

Inheritance path = PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole

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

Table 558 shows all attributes of SystemOperationCoordinator.

**Table 558 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| globalLocationNumber | 0..1 | String | (NC) inherited from: ExtOrganisationRole |

Table 559 shows all association ends of SystemOperationCoordinator with other classes.

**Table 559 – Association ends of ExtRole::SystemOperationCoordinator 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 |

### 3.16.15 (NC) TransmissionSystemOperator

Inheritance path = SystemOperator : PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole

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

Table 560 shows all attributes of TransmissionSystemOperator.

**Table 560 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| globalLocationNumber | 0..1 | String | (NC) inherited from: ExtOrganisationRole |

Table 561 shows all association ends of TransmissionSystemOperator with other classes.

**Table 561 – Association ends of ExtRole::TransmissionSystemOperator with other classes**

| 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 | 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 | 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 | RemedialActionScheduleAcceptance | 0..* | RemedialActionScheduleAcceptance | (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 |

## 3.17 Security analysis result extensions

### 3.17.1 General

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

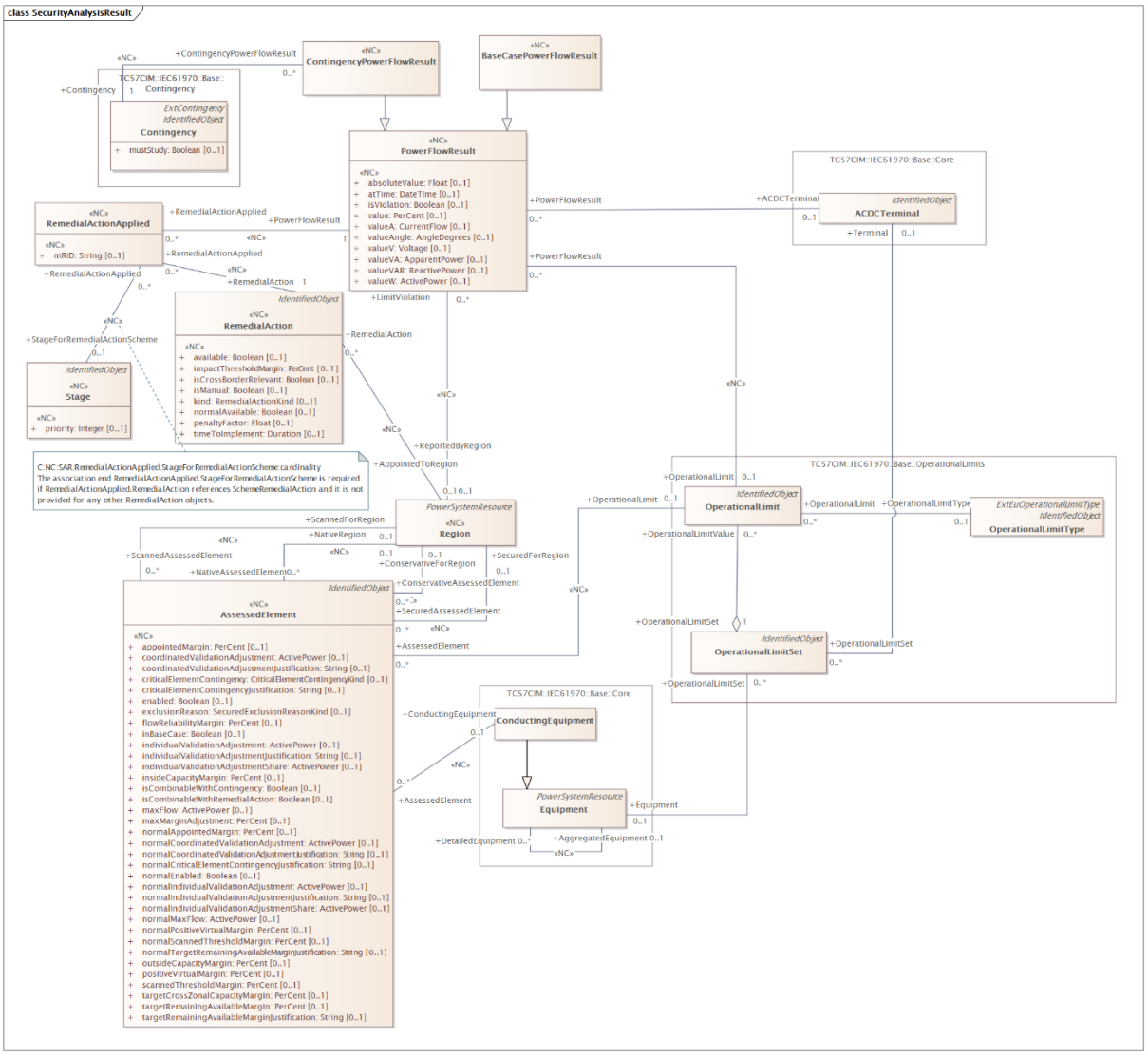



**Figure 50 – Class diagram ExtSecurityAnalysisResult::SecurityAnalysisResult**

Figure 50: The diagram contains classes related to the security analysis result.

### 3.17.2 (NC) BaseCasePowerFlowResult

Inheritance path = PowerFlowResult

Base case power flow result for a given terminal.

Table 562 shows all attributes of BaseCasePowerFlowResult.

**Table 562 – 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 563 shows all association ends of BaseCasePowerFlowResult with other classes.

**Table 563 – Association ends of ExtSecurityAnalysisResult::BaseCasePowerFlowResult with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | OperationalLimit | 0..1 | OperationalLimit | (NC) inherited from: PowerFlowResult |
| 0..* | ACDCTerminal | 0..1 | ACDCTerminal | inherited from: PowerFlowResult |
| 0..* | ReportedByRegion | 0..1 | Region | (NC) inherited from: PowerFlowResult |
| 1..1 | RemedialActionApplied | 0..* | RemedialActionApplied | (NC) inherited from: PowerFlowResult |

### 3.17.3 (NC) ContingencyPowerFlowResult

Inheritance path = PowerFlowResult
Contingency power flow result on a given terminal for a given contingency.
Table 564 shows all attributes of ContingencyPowerFlowResult.

**Table 564 – 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 565 shows all association ends of ContingencyPowerFlowResult with other classes.

**Table 565 – 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. |

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | OperationalLimit | 0..1 | OperationalLimit | (NC) inherited from: PowerFlowResult |
| 0..* | ACDCTerminal | 0..1 | ACDCTerminal | inherited from: PowerFlowResult |
| 0..* | ReportedByRegion | 0..1 | Region | (NC) inherited from: PowerFlowResult |
| 1..1 | RemedialActionApplied | 0..* | RemedialActionApplied | (NC) inherited from: PowerFlowResult |

### 3.17.4 (NC) PowerFlowResult root class

Power flow result including any operational limit violation.
Table 566 shows all attributes of PowerFlowResult.

**Table 566 – 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.<br>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.<br>Load sign convention is used, i.e. positive sign means flow out from a TopologicalNode (bus) into the conducting equipment. |

Table 567 shows all association ends of PowerFlowResult with other classes.

**Table 567 – Association ends of ExtSecurityAnalysisResult::PowerFlowResult with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | OperationalLimit | 0..1 | OperationalLimit | (NC) The operational limit that has this limit violation. |
| 0..* | ACDCTerminal | 0..1 | ACDCTerminal | ACDC terminal where the powerflow result is located. |
| 0..* | ReportedByRegion | 0..1 | Region | (NC) The region which reports this limit violation. |
| 1..1 | RemedialActionApplied | 0..* | RemedialActionApplied | (NC) Remedial action that is applied when the power flow result is calculated. |

### 3.17.5 (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 568 shows all attributes of RemedialActionApplied.

**Table 568 – 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.<br>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 569 shows all association ends of RemedialActionApplied with other classes.

**Table 569 – Association ends of ExtSecurityAnalysisResult::RemedialActionApplied with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | StageForRemedialActionScheme | 0..1 | Stage | (NC) The stage of the remedial action scheme that is applied. |
| 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. |

## 3.18 Package ExtSensitivityMatrix

### 3.18.1 General

This package contains extensions related to sensitivity matrix.

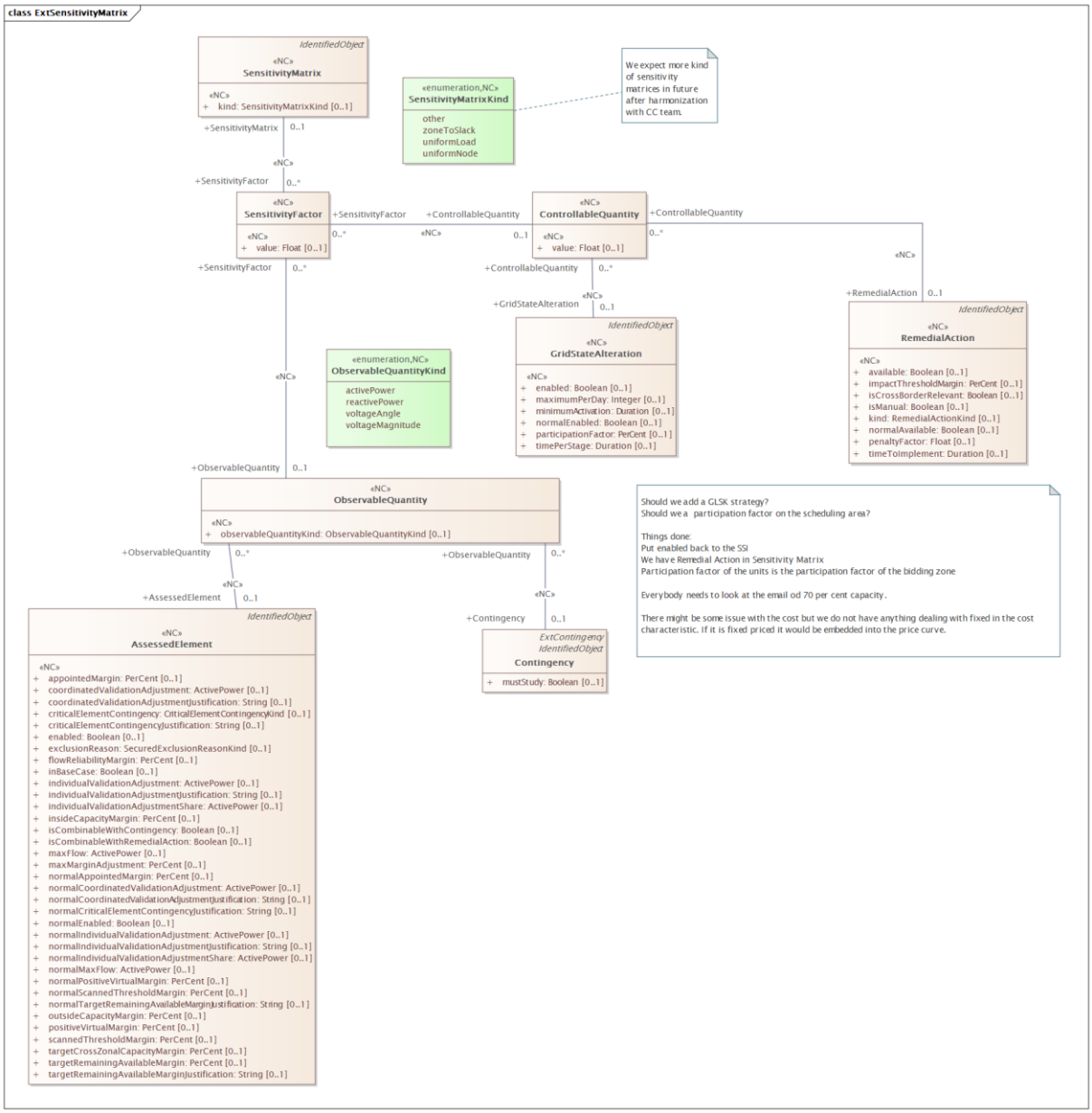



**Figure 51 – Class diagram ExtSensitivityMatrix::ExtSensitivityMatrix**

Figure 51: The diagram contains classes related to sensitivity matrix.

### 3.18.2 (NC) ControllableQuantity root class

Controllable quantity is a set point quantity on a grid state alteration or on a remedial action. Table 570 shows all attributes of ControllableQuantity.

**Table 570 – 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 |

| name | mult | type | description |
|---|---|---|---|
| | | | sensitivity factor. The value can be integer, float or boolean. In case of boolean 1 equals true and 0 equals false. |

Table 571 shows all association ends of ControllableQuantity with other classes.

**Table 571 – Association ends of ExtSensitivityMatrix::ControllableQuantity with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | GridStateAlteration | 0..1 | GridStateAlteration | (NC) The grid state alteration for this controllable quantity. |
| 0..* | RemedialAction | 0..1 | RemedialAction | (NC) Remedial action which is associated with the controllable quantity. |
| 0..1 | SensitivityFactor | 0..* | SensitivityFactor | (NC) The sensitivity factor associated with a controllable quantity. |

### 3.18.3 (NC) ObservableQuantity root class

Observable quantity is an electrical quantity on an assessed element or an assessed element with contingency.
Table 572 shows all attributes of ObservableQuantity.

**Table 572 – Attributes of ExtSensitivityMatrix::ObservableQuantity**

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

Table 573 shows all association ends of ObservableQuantity with other classes.

**Table 573 – Association ends of ExtSensitivityMatrix::ObservableQuantity with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | AssessedElement | 0..1 | AssessedElement | (NC) The assessed element with contingency associated with this observable quantity. |
| 0..* | Contingency | 0..1 | Contingency | (NC) The contingency associated with this observable quantity. |
| 0..1 | SensitivityFactor | 0..* | SensitivityFactor | (NC) The sensitivity factor associated with an observable quantity. |

### 3.18.4 (NC) SensitivityFactor root class

The sensitivity factor which represents the sensitivity between observable and controllable elements.
Table 574 shows all attributes of SensitivityFactor.

**Table 574 – Attributes of ExtSensitivityMatrix::SensitivityFactor**

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

Table 575 shows all association ends of SensitivityFactor with other classes.

**Table 575 – 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. |

### 3.18.5 (NC) SensitivityMatrix

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
The sensitivity matrix which represents the sensitivity factors between observable and controllable elements.
Table 576 shows all attributes of SensitivityMatrix.

**Table 576 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 577 shows all association ends of SensitivityMatrix with other classes.

**Table 577 – 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 |

### 3.18.6 (NC) ObservableQuantityKind enumeration

Kind of observable quantity.
Table 578 shows all literals of ObservableQuantityKind.

**Table 578 – 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. |

### 3.18.7 (NC) SensitivityMatrixKind enumeration

Kinds of sensitivity matrix.
Table 579 shows all literals of SensitivityMatrixKind.

**Table 579 – 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. |

## 3.19 Package ExtSchedule

### 3.19.1 General

This package contains the extensions related to the schedule.

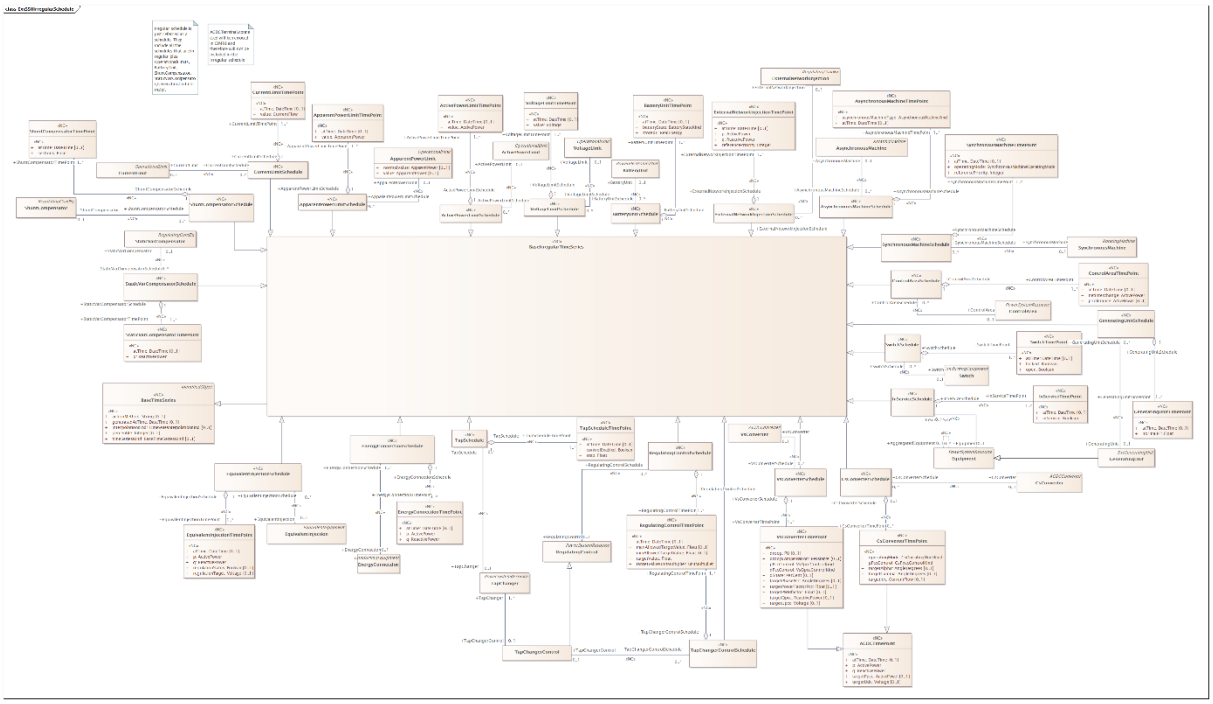


**Figure 52 – Class diagram ExtSchedule::ExtSSHIrregularSchedule**

Figure 52:

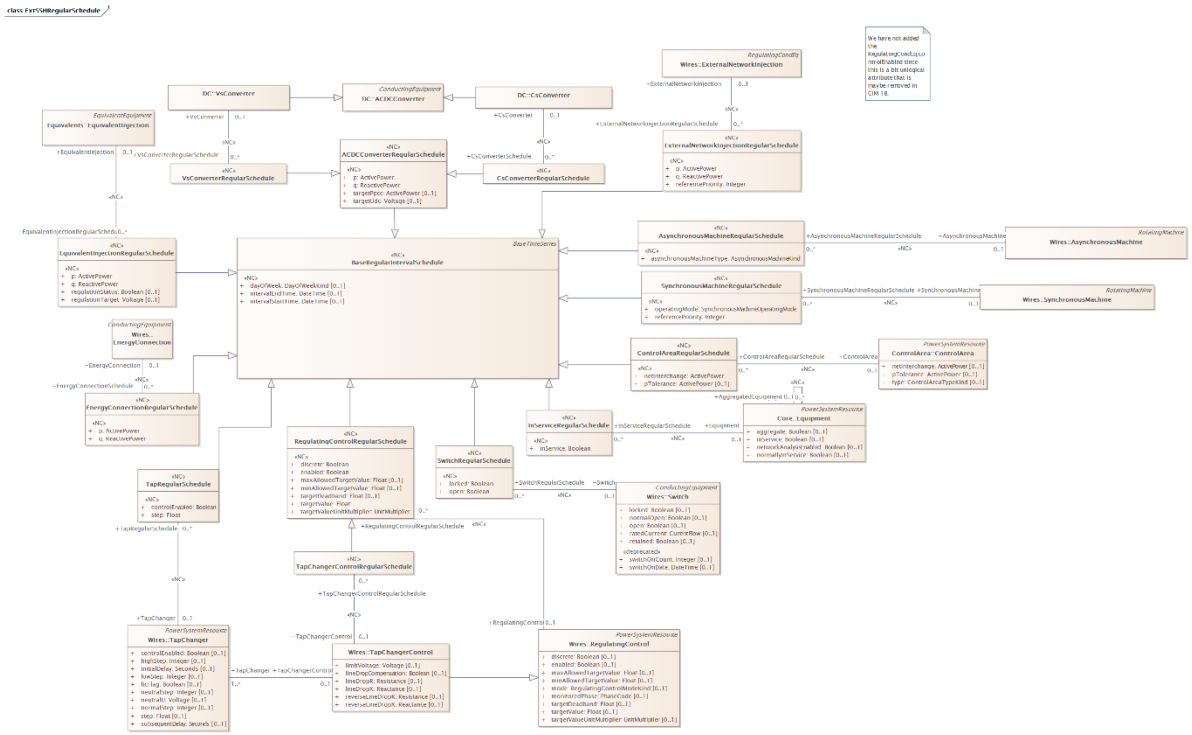


**Figure 53 – Class diagram ExtSchedule::ExtSSHRegularSchedule**

Figure 53:

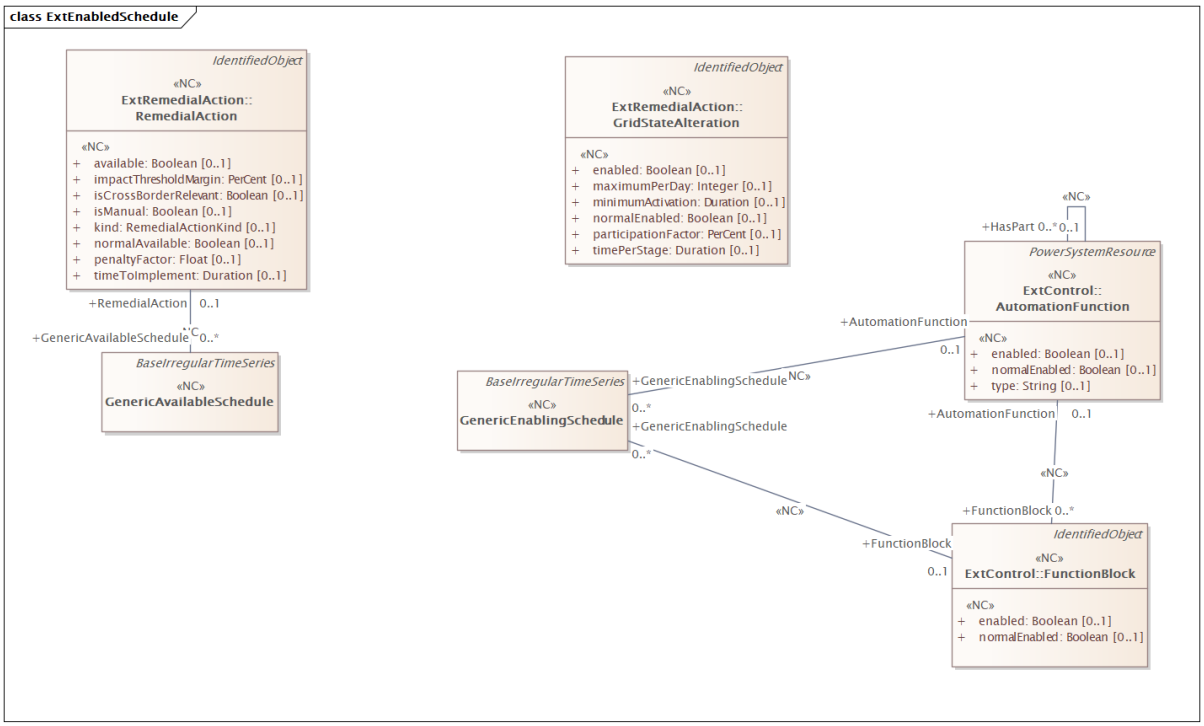



**Figure 54 – Class diagram ExtSchedule::ExtEnabledSchedule**

Figure 54: The diagram contains classes related to enabled schedule.

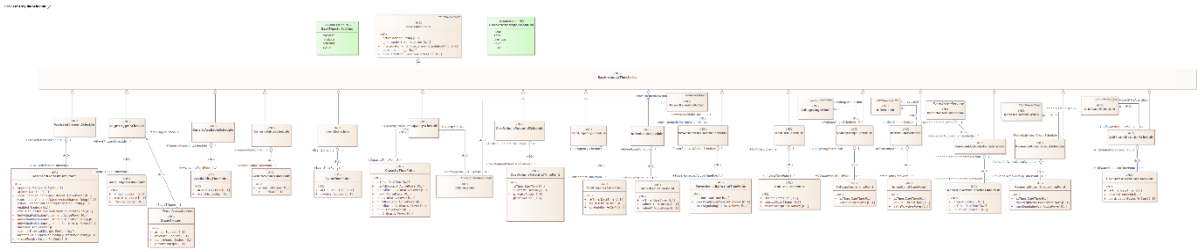


**Figure 55 – Class diagram ExtSchedule::ExtIrregularSchedule**

Figure 55: The diagram contains classes related to schedule.

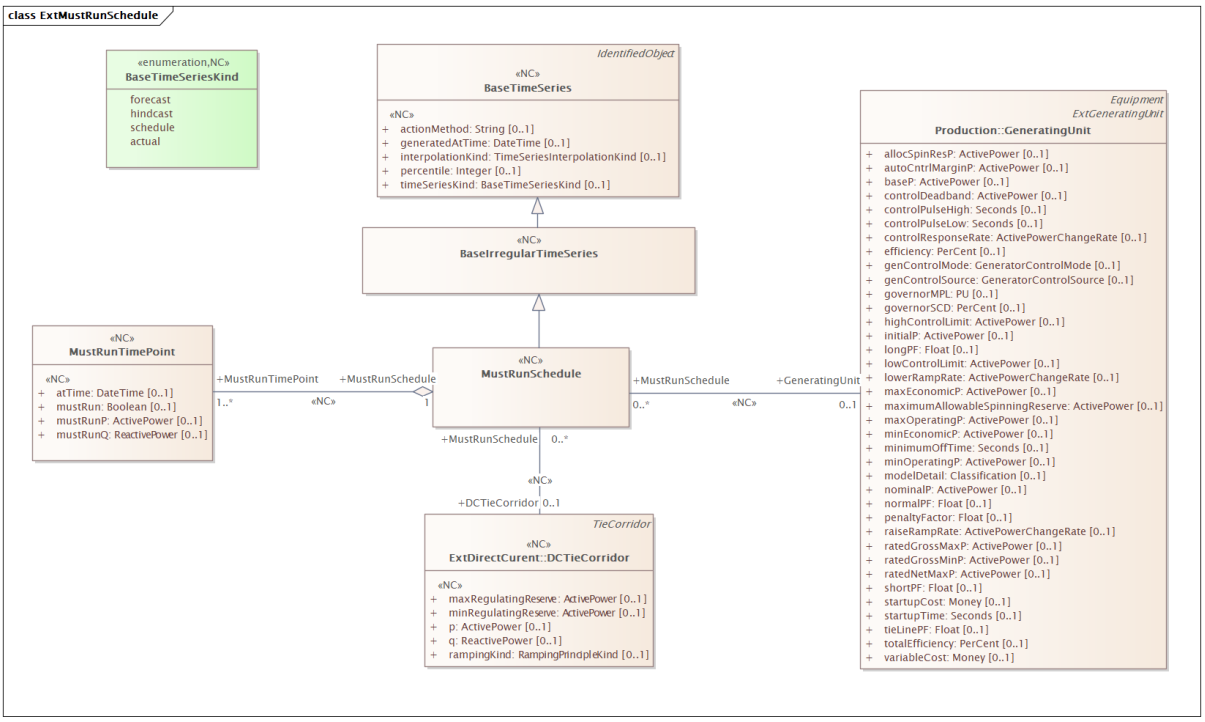



**Figure 56 – Class diagram ExtSchedule::ExtMustRunSchedule**

Figure 56: The diagram contains classes related to must run schedule.

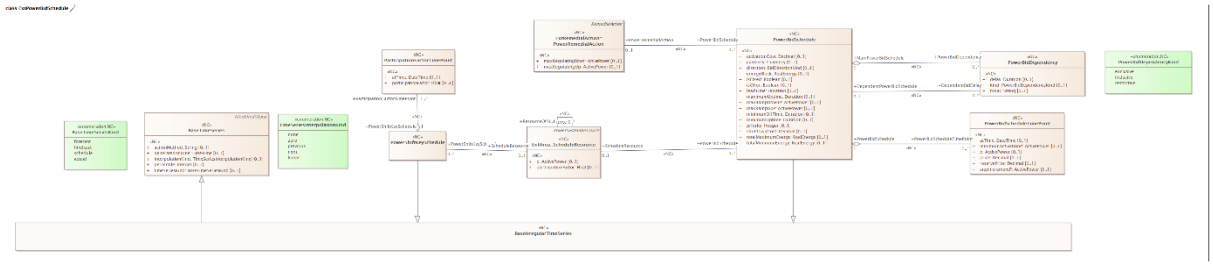


**Figure 57 – Class diagram ExtSchedule::ExtPowerBidSchedule**

Figure 57: The diagram contains classes related to power bid schedule.

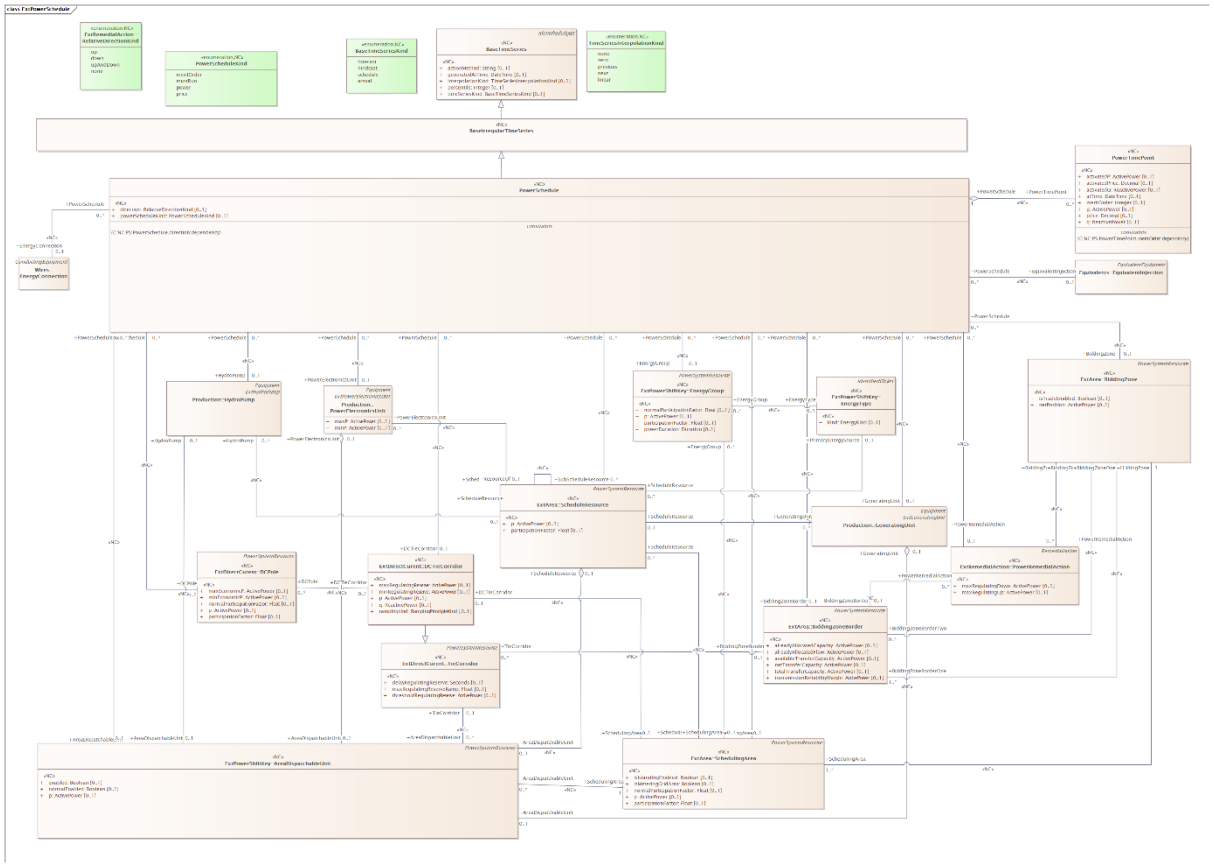
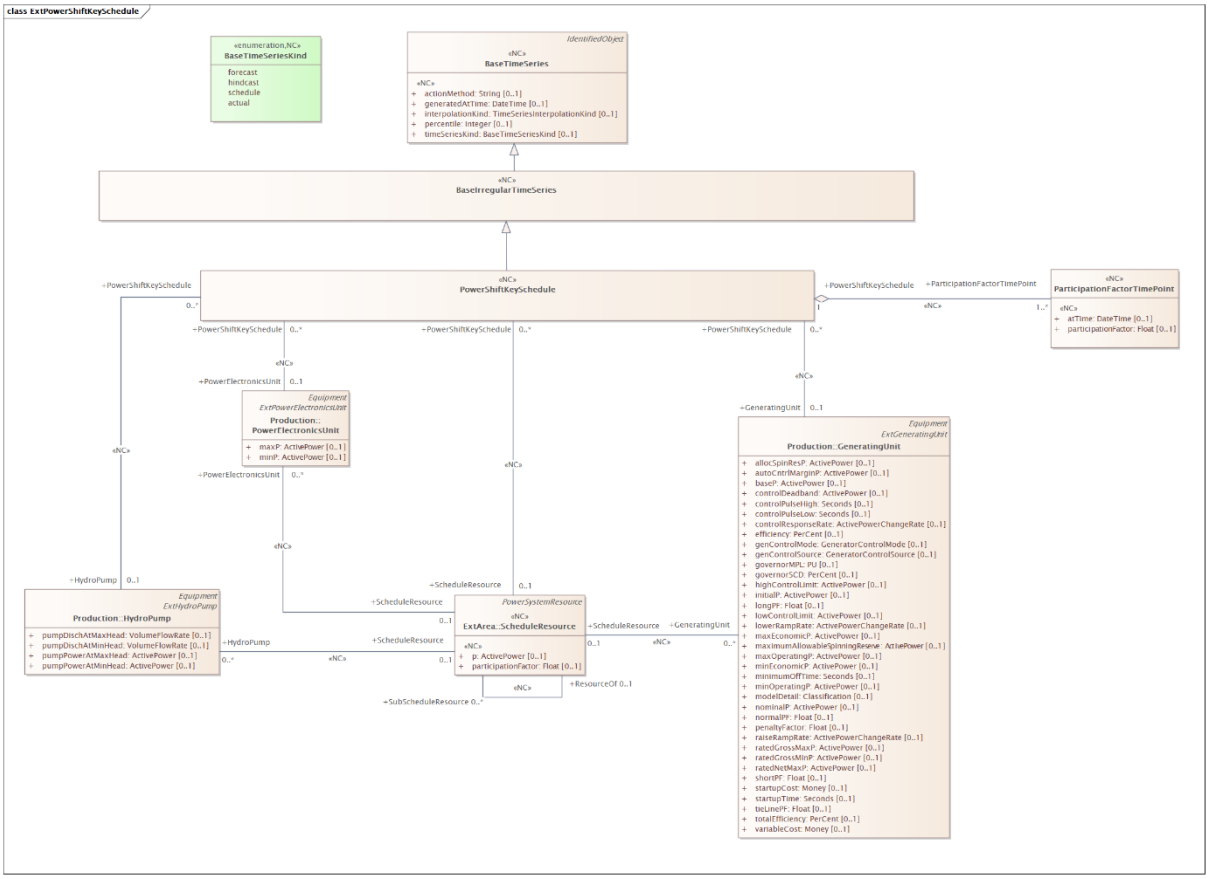


**Figure 58 – Class diagram ExtSchedule::ExtPowerSchedule**

Figure 58: The diagram contains classes related to schedule.




5077

5078 **Figure 59 – Class diagram ExtSchedule::ExtPowerShiftKeySchedule**

5079 Figure 59: The diagram contains classes related to GLSK schedule.

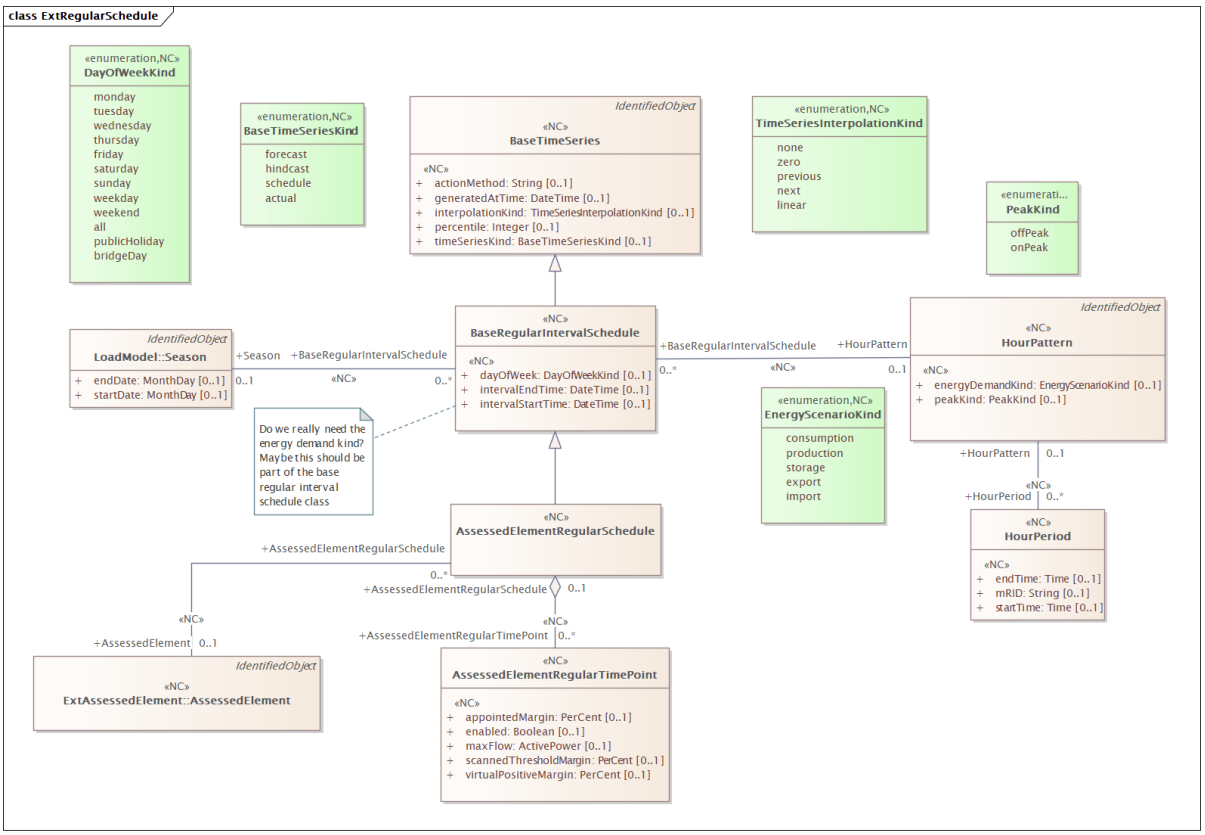



**Figure 60 – Class diagram ExtSchedule::ExtRegularSchedule**

Figure 60:

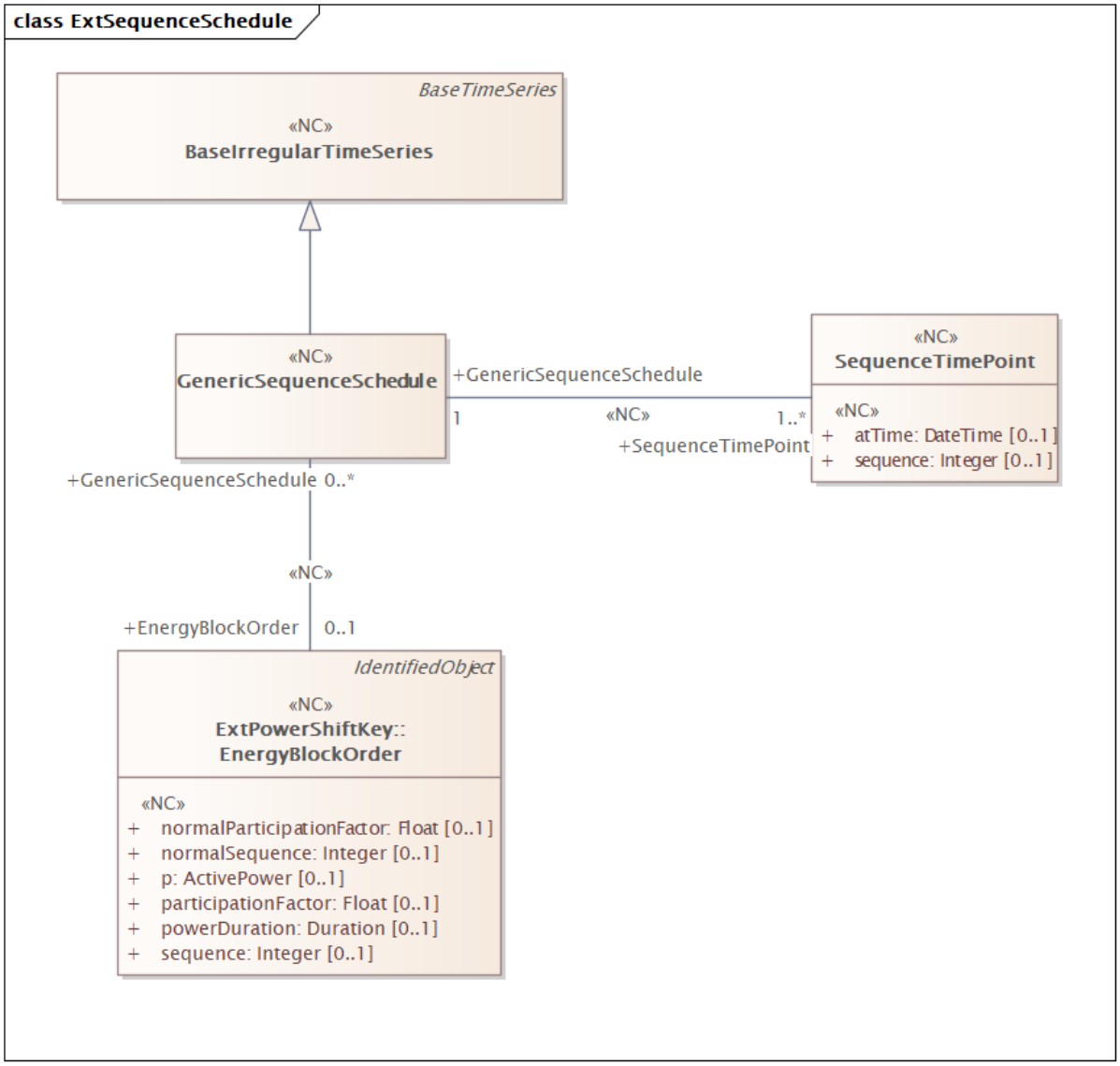



**Figure 61 – Class diagram ExtSchedule::ExtSequenceSchedule**

Figure 61: The diagram contains classes related to sequence schedule.

### 3.19.2 (NC) PowerShiftKeySchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

The schedule for Power Shift Keys.

Table 580 shows all attributes of PowerShiftKeySchedule.

**Table 580 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 581 shows all association ends of PowerShiftKeySchedule with other classes.

**Table 581 – Association ends of ExtSchedule::PowerShiftKeySchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 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..* | EnergyConsumer | 0..1 | EnergyConsumer | (NC) The EnergyConsumer that has a Power Shift Key schedule. |
| 0..* | PowerElectronicsUnit | 0..1 | PowerElectronicsUnit | (NC) The Power Electronics 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..* | GeneratingUnit | 0..1 | GeneratingUnit | (NC) The Generating Unit which has a Power Shift Key Schedule. |
| 0..* | EquivalentInjection | 0..1 | EquivalentInjection | (NC) Equivalent injection which is part of a powoer shift key schedule. |
| 0..* | ExternalNetworkInjection | 0..1 | ExternalNetworkInjection | (NC) The energy source which 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 PowerElecronicsUnit. |
| 0..* | DCPole | 0..1 | DCPole | (NC) A DC Pole which has a Power Shift Key Schedule. |
| 0..1 | PowerShiftKeyDistribution | 0..1 | PowerShiftKeyDistribution | (NC) Power Shift Key distribution for the Power Shift Key schedule. |
| 1..1 | ParticipationFactorTimePoint | 1..* | ParticipationFactorTimePoint | (NC) The participation factor timepoint for a Power Shift Key schedule. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.3 (NC) BaseIrregularTimeSeries

Inheritance path = BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
Time series that has irregular points in time.
Table 582 shows all attributes of BaseIrregularTimeSeries.

**Table 582 – Attributes of ExtSchedule::BaseIrregularTimeSeries**

| 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 583 shows all association ends of BaseIrregularTimeSeries with other classes.

**Table 583 – Association ends of ExtSchedule::BaseIrregularTimeSeries with other classes**

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

### 3.19.4 (NC) BaseTimeSeries

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Time series of values at points in time.
Table 584 shows all attributes of BaseTimeSeries.

**Table 584 – 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 585 shows all association ends of BaseTimeSeries with other classes.

**Table 585 – Association ends of ExtSchedule::BaseTimeSeries with other classes**

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

### 3.19.5 (NC) EventSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

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

Table 586 shows all attributes of EventSchedule.

**Table 586 – 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 587 shows all association ends of EventSchedule with other classes.

**Table 587 – 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 |

### 3.19.6 (NC) EventTimePoint root class

Event valid for a given point in time.
Table 588 shows all attributes of EventTimePoint.

**Table 588 – 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. |

Table 589 shows all association ends of EventTimePoint with other classes.

**Table 589 – 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. |

### 3.19.7 (NC) GenericValueSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
Time series represent irregular generic value at given points in time. The type of value is given by the reference association.
Table 590 shows all attributes of GenericValueSchedule.

**Table 590 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 591 shows all association ends of GenericValueSchedule with other classes.

**Table 591 – 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 |

### 3.19.8 (NC) GenericValueTimePoint root class

Generic value for a given point in time.
Table 592 shows all attributes of GenericValueTimePoint.

**Table 592 – 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 593 shows all association ends of GenericValueTimePoint with other classes.

**Table 593 – 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. |

### 3.19.9 (NC) MustRunSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

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 594 shows all attributes of MustRunSchedule.

**Table 594 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 595 shows all association ends of MustRunSchedule with other classes.

**Table 595 – Association ends of ExtSchedule::MustRunSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | GeneratingUnit | 0..1 | GeneratingUnit | (NC) Generating unit which belongs to the must run schedule. |
| 0..* | DCTieCorridor | 0..1 | DCTieCorridor | (NC) Hydro pump which belongs to the power schedule. |
| 1..1 | MustRunTimePoint | 1..* | MustRunTimePoint | (NC) Value for the point in time. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.10 (NC) MustRunTimePoint root class

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

Table 596 shows all attributes of MustRunTimePoint.

**Table 596 – 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 597 shows all association ends of MustRunTimePoint with other classes.

**Table 597 – 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. |

### 3.19.11 (NC) PowerSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

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 598 shows all attributes of PowerSchedule.

**Table 598 – Attributes of ExtSchedule::PowerSchedule**

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

Table 599 shows all association ends of PowerSchedule with other classes.

**Table 599 – Association ends of ExtSchedule::PowerSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 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..* | 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..* | PowerElectronicsUnit | 0..1 | PowerElectronicsUnit | (NC) Power electronics unit which belongs to the power schedule. |
| 0..* | HydroPump | 0..1 | HydroPump | (NC) Hydro pump 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..* | DCPole | 0..1 | DCPole | (NC) DC pole which belongs to the power schedule. |
| 0..* | DCTieCorridor | 0..1 | DCTieCorridor | (NC) DC tie corridor which belongs to the power schedule. |
| 0..* | AreaDispatchableUnit | 0..1 | AreaDispatchableUnit | (NC) Area disptachable 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..* | EquivalentInjection | 0..1 | EquivalentInjection | (NC) Equivalent injection 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 |

### 3.19.12 (NC) PowerTimePoint root class

Power, active and reactive, value at a given point in time.
Constraints:
C:NC:PS:PowerTimePoint.meritOrder:dependency:
Mandatory field in the case of PowerSchedule.kind equals meritOrder.
Table 600 shows all attributes of PowerTimePoint.

**Table 600 – 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. |

Table 601 shows all association ends of PowerTimePoint with other classes.

**Table 601 – 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. |

### 3.19.13 (NC) BaseTimeSeriesKind enumeration

Kind of time series.
Table 602 shows all literals of BaseTimeSeriesKind.

**Table 602 – 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. |

### 3.19.14 (NC) TimeSeriesInterpolationKind enumeration

Kinds of interpolation of values between two time point.
Table 603 shows all literals of TimeSeriesInterpolationKind.

**Table 603 – 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. |

### 3.19.15 (NC) ParticipationFactorTimePoint root class

Participation factor for a given point in time.
Table 604 shows all attributes of ParticipationFactorTimePoint.

**Table 604 – 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.<br>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).<br>In the case of priority strategy, the item with the lowest number gets allocated energy first. |

Table 605 shows all association ends of ParticipationFactorTimePoint with other classes.

**Table 605 – Association ends of ExtSchedule::ParticipationFactorTimePoint with other classes**

| 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. |

### 3.19.16 (NC) CapacitySchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

The schedule for the capacity.

Table 606 shows all attributes of CapacitySchedule.

**Table 606 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 607 shows all association ends of CapacitySchedule with other classes.

**Table 607 – 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 |

### 3.19.17 (NC) CapacityTimePoint root class

Capacity instruction value at a given point in time.

Table 608 shows all attributes of CapacityTimePoint.

**Table 608 – 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 609 shows all association ends of CapacityTimePoint with other classes.

**Table 609 – 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. |

### 3.19.18 (NC) CostVolumePotentialSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

The schedule for the cost volume potential.

Table 610 shows all attributes of CostVolumePotentialSchedule.

**Table 610 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 611 shows all association ends of CostVolumePotentialSchedule with other classes.

**Table 611 – Association ends of ExtSchedule::CostVolumePotentialSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..1 | CostVolumePotentialTimePoint | 1..* | CostVolumePotentialTimePoint | (NC) The time point that relates to this cost volume potential schedule. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.19 (NC) CostVolumePotentialTimePoint root class

Cost volume potential value at a given point in time.
Table 612 shows all attributes of CostVolumePotentialTimePoint.

**Table 612 – 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 613 shows all association ends of CostVolumePotentialTimePoint with other classes.

**Table 613 – Association ends of ExtSchedule::CostVolumePotentialTimePoint with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | CostVolumePotentialSchedule | 1..1 | CostVolumePotentialSchedule | (NC) The cost volume potential schedule that has this time point. |

### 3.19.20 (NC) ContingencySchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
The schedule for Contingency.
Table 614 shows all attributes of ContingencySchedule.

**Table 614 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 615 shows all association ends of ContingencySchedule with other classes.

**Table 615 – Association ends of ExtSchedule::ContingencySchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | Contingency | 0..1 | Contingency | (NC) Contingency which has a contingency schedule. |
| 1..1 | ContingencyTimePoint | 1..* | ContingencyTimePoint | (NC) The time point that relates to this contingency schedule. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.21 (NC) ContingencyTimePoint root class

Contingency instruction value at a given point in time.
Table 616 shows all attributes of ContingencyTimePoint.

**Table 616 – 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 617 shows all association ends of ContingencyTimePoint with other classes.

**Table 617 – 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. |

### 3.19.22 (NC) AssessedElementSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
Schedule for assessed element.
Table 618 shows all attributes of AssessedElementSchedule.

**Table 618 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 619 shows all association ends of AssessedElementSchedule with other classes.

**Table 619 – Association ends of ExtSchedule::AssessedElementSchedule with other 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 |

### 3.19.23 (NC) AssessedElementTimePoint root class

Assessed element instruction value at a given point in time.
Table 620 shows all attributes of AssessedElementTimePoint.

**Table 620 – 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.<br>It is only used when an assessed element is considered conservative for a region.<br>The allowed value range is [0,100]. |
| atTime | 0..1 | DateTime | (NC) The time the data is valid for. |
| virtualPositiveMargin | 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.<br>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.<br>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).<br>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 621 shows all association ends of AssessedElementTimePoint with other classes.

**Table 621 – Association ends of ExtSchedule::AssessedElementTimePoint with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | AssessedElementSchedule | 1..1 | AssessedElementSchedule | (NC) The assessed element schedule that has this time point. |

### 3.19.24 (NC) PowerBidScheduleTimePoint root class

Time series represent irregular power, active and reactive, values at given points in time. Table 622 shows all attributes of PowerBidScheduleTimePoint.

**Table 622 – 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) Quantity given in the time points. |
| 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. |

Table 623 shows all association ends of PowerBidScheduleTimePoint with other classes.

**Table 623 – Association ends of ExtSchedule::PowerBidScheduleTimePoint with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | PowerBidSchedule | 1..1 | PowerBidSchedule | (NC) Power bid schedule that has many power bid schedule time points. |

### 3.19.25 (NC) PowerBidSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

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 624 shows all attributes of PowerBidSchedule.

**Table 624 – Attributes of ExtSchedule::PowerBidSchedule**

| name | mult | type | description |
|---|---|---|---|
| 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. |
| 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. |
| 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. |
| 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 |

| 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 625 shows all association ends of PowerBidSchedule with other classes.

**Table 625 – 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 | PowerSchedulelAction | 0..1 | PowerScheduleAction | (NC) The power schedule action pointed by the power bid schedule. |
| 1..1 | PowerBidScheduleTimePoint | 1..* | PowerBidScheduleTimePoint | (NC) Power bid schedule time points which belong to a power bid schedule. |
| 1..1 | PowerBidDependency | 0..* | PowerBidDependency | (NC) Power bids which depends on main bid. |
| 0..1 | DependentBidDelay | 0..* | PowerBidDependency | (NC) Bid delay which depends on a main power bid. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.26 (NC) PowerBidDependency root class

Dependency between the related power bids.
Table 626 shows all attributes of PowerBidDependency.

**Table 626 – Attributes of ExtSchedule::PowerBidDependency**

| name | mult | type | description |
|---|---|---|---|
| kind | 0..1 | PowerBidDependencyKind | (NC) Type of dependency between bids. |
| delay | 0..1 | Duration | (NC) Time delay between activation of the parents until the dependent offer will be available. |
| 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.<br>For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID |

| name | mult | type | description |
|---|---|---|---|
| | | | or rdf:about attributes that identify CIM object elements. |

Table 627 shows all association ends of PowerBidDependency with other classes.

**Table 627 – Association ends of ExtSchedule::PowerBidDependency with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | MainPowerBidSchedule | 1..1 | PowerBidSchedule | (NC) Main power bid which some dependent power bids. |
| 0..* | DependentPowerBidSchedule | 0..1 | PowerBidSchedule | (NC) Dependent power bid which has some dependent bid delays. |

### 3.19.27 (NC) GenericEnablingSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

The schedule for the enabling of elements.

Table 628 shows all attributes of GenericEnablingSchedule.

**Table 628 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 629 shows all association ends of GenericEnablingSchedule with other classes.

**Table 629 – Association ends of ExtSchedule::GenericEnablingSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | ContingencyWithRemedialAction | 0..1 | ContingencyWithRemedialAction | (NC) Contingency with remedial action which has enabling schedules. |
| 0..* | PowerTransferCorridor | 0..1 | PowerTransferCorridor | (NC) Power transfer corridor which has generic enabling schedules. |
| 0..* | 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. |

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | CrossBorderRelevance | 0..1 | CrossBorderRelevance | (NC) Cross border relevant that has enabling schedules. |
| 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..* | 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..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.28 (NC) GenericAvailableSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

The schedule for the availability of elements.

Table 630 shows all attributes of GenericAvailableSchedule.

**Table 630 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 631 shows all association ends of GenericAvailableSchedule with other classes.

**Table 631 – Association ends of ExtSchedule::GenericAvailableSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | RemedialAction | 0..1 | RemedialAction | (NC) Remedial action which has available schedules. |

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..1 | AvailabilityTimePoint | 1..* | AvailabilityTimePoint | (NC) The availability timepoint for an available schedule. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.29 (NC) EnablingTimePoint root class

Enabling instruction value at a given point in time.
Table 632 shows all attributes of EnablingTimePoint.

**Table 632 – Attributes of ExtSchedule::EnablingTimePoint**

| name | mult | type | description |
|---|---|---|---|
| atTime | 0..1 | DateTime | (NC) The time the data is valid for. |
| enabled | 0..1 | Boolean | (NC) It identifies if the element is enabled. True means enabled, False means not enabled. |

Table 633 shows all association ends of EnablingTimePoint with other classes.

**Table 633 – Association ends of ExtSchedule::EnablingTimePoint with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | GenericEnablingSchedule | 1..1 | GenericEnablingSchedule | (NC) The enabling schedule which belongs to the enabling timepoint. |

### 3.19.30 (NC) AvailabilityTimePoint root class

Availability instruction value at a given point in time.
Table 634 shows all attributes of AvailabilityTimePoint.

**Table 634 – 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. |

Table 635 shows all association ends of AvailabilityTimePoint with other classes.

**Table 635 – 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. |

### 3.19.31 (NC) PowerBidDependencyKind enumeration

Kind of power bid dependency.
Table 636 shows all literals of PowerBidDependencyKind.

**Table 636 – Literals of ExtSchedule::PowerBidDependencyKind**

| literal | value | description |
|---|---|---|
| exclusive | | Bids are exclusive depending on each other. e.g. Only one of the bids can be activated at the same time. |
| inclusive | | Bids are inclusive depending on each other. e.g. Both bids need to be activated if one of them is activated. |
| restrictive | | Bids are restrictive depending on each other. e.g. You have to take the father bid before you might take the child bid. |

### 3.19.32 (NC) InfeedLimitSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

The schedule for an infeed limit.

Table 637 shows all attributes of InfeedLimitSchedule.

**Table 637 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 638 shows all association ends of InfeedLimitSchedule with other classes.

**Table 638 – 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 |

### 3.19.33 (NC) InfeedLimitTimePoint root class

Infeed limit values at a given point in time.
Table 639 shows all attributes of InfeedLimitTimePoint.

**Table 639 – 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. |

Table 640 shows all association ends of InfeedLimitTimePoint with other classes.

**Table 640 – 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. |

### 3.19.34 (NC) PowerRemedialActionSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
The schedule for a power remedial action.
Table 641 shows all attributes of PowerRemedialActionSchedule.

**Table 641 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 642 shows all association ends of PowerRemedialActionSchedule with other classes.

**Table 642 – Association ends of ExtSchedule::PowerRemedialActionSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | PowerRemedialAction | 0..1 | PowerRemedialAction | (NC) Power remedial action for the power remedial action schedule. |

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 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 |

### 3.19.35 (NC) PowerRemedialActionTimePoint root class

Regulating values at a given point in time.
Table 643 shows all attributes of PowerRemedialActionTimePoint.

**Table 643 – 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. |

Table 644 shows all association ends of PowerRemedialActionTimePoint with other classes.

**Table 644 – 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. |

### 3.19.36 (NC) UnitCostSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
The schedule for a unit cost.
Table 645 shows all attributes of UnitCostSchedule.

**Table 645 – Attributes of ExtSchedule::UnitCostSchedule**

| name | mult | type | description |
|---|---|---|---|
| generatedAtTime | 0..1 | DateTime | (NC) inherited from: BaseTimeSeries |
| interpolationKind | 0..1 | TimeSeriesInterpolationKind | (NC) inherited from: BaseTimeSeries |
| timeSeriesKind | 0..1 | BaseTimeSeriesKind | (NC) inherited from: BaseTimeSeries |
| actionMethod | 0..1 | String | (NC) inherited from: BaseTimeSeries |
| percentile | 0..1 | Integer | (NC) inherited from: BaseTimeSeries |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |

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

Table 646 shows all association ends of UnitCostSchedule with other classes.

**Table 646 – Association ends of ExtSchedule::UnitCostSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..1 | UnitCostTimePoint | 1..* | UnitCostTimePoint | (NC) The unit cost time point that relates to this unit cost schedule. |
| 0..* | GeneratingUnit | 0..1 | GeneratingUnit | (NC) GeneratingUnit which has unit cost schedules. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.37 (NC) UnitCostTimePoint root class

Unit cost at a given point in time.
Table 647 shows all attributes of UnitCostTimePoint.

**Table 647 – Attributes of ExtSchedule::UnitCostTimePoint**

| name | mult | type | description |
|---|---|---|---|
| atTime | 0..1 | DateTime | (NC) The time the data is valid for. |
| startupCost | 0..1 | Money | (NC) The initial startup cost incurred for each start of the GeneratingUnit. |
| warmStartupCost | 0..1 | Money | (NC) The warm startup cost incurred for each start of the GeneratingUnit. |

Table 648 shows all association ends of UnitCostTimePoint with other classes.

**Table 648 – 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. |

### 3.19.38 (NC) BaseRegularIntervalSchedule

Inheritance path = BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
Time series that has regular points in time.
Table 649 shows all attributes of BaseRegularIntervalSchedule.

**Table 649 – Attributes of ExtSchedule::BaseRegularIntervalSchedule**

| name | mult | type | description |
|---|---|---|---|
| dayOfWeek | 0..1 | DayOfWeekKind | (NC) Day of the week for which the schedule is valid for. |
| intervalStartTime | 0..1 | DateTime | (NC) Interval start time for which the schedule is valid for. |
| intervalEndTime | 0..1 | DateTime | (NC) Interval end time for which the schedule is valid for. |
| generatedAtTime | 0..1 | DateTime | (NC) inherited from: BaseTimeSeries |
| interpolationKind | 0..1 | TimeSeriesInterpolationKind | (NC) inherited from: BaseTimeSeries |
| timeSeriesKind | 0..1 | BaseTimeSeriesKind | (NC) inherited from: BaseTimeSeries |
| actionMethod | 0..1 | String | (NC) inherited from: BaseTimeSeries |
| percentile | 0..1 | Integer | (NC) inherited from: BaseTimeSeries |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 650 shows all association ends of BaseRegularIntervalSchedule with other classes.

**Table 650 – 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 |

### 3.19.39 (NC) DayOfWeekKind enumeration

The kind of day to be included in a regular schedule.
Table 651 shows all literals of DayOfWeekKind.

**Table 651 – 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. |

| literal | value | description |
|---|---|---|
| thursday | | Thursday as the day of the week. |
| friday | | Friday as the day of the week. |
| saturday | | Saturday as the day of the week. |
| sunday | | Sunday as the day of the week. |
| weekday | | Day of the week other than Sunday or Saturday. |
| weekend | | Day of the week which is Sunday or Saturday. |
| all | | All days of the week. |
| publicHoliday | | Public holiday is an officially designated day when most workplaces and schools are closed. |
| bridgeDay | | A day that is a gap between two distinguished days e.g holiday and weekend that leads to an abnormal scheduling behavior. e.g. if Ascension day falls on a Thursday, then Friday would be a bridge day due to the schedule will not have a normal Friday consumption and production. |

### 3.19.40 (NC) GridStateAlterationTimePoint root class

Grid state alteration at a given point in time.
Table 652 shows all attributes of GridStateAlterationTimePoint.

**Table 652 – 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.<br>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).<br>In the case of priority strategy, the item with the lowest number gets allocated energy first.<br>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%. |

Table 653 shows all association ends of GridStateAlterationTimePoint with other classes.

**Table 653 – Association ends of ExtSchedule::GridStateAlterationTimePoint with other classes**

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

### 3.19.41 (NC) HourPattern

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Pattern of hourly period in a day with the same kind of intensity.
Table 654 shows all attributes of HourPattern.

**Table 654 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 655 shows all association ends of HourPattern with other classes.

**Table 655 – Association ends of ExtSchedule::HourPattern with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | BaseRegularIntervalSchedule | 0..* | BaseRegularIntervalSchedule | (NC) Base regulat 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 |

### 3.19.42 (NC) PeakKind enumeration

Kind of time period with similar intensity.
Table 656 shows all literals of PeakKind.

**Table 656 – 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. |

### 3.19.43 (NC) EnergyScenarioKind enumeration

Kind of energy scenario.
Table 657 shows all literals of EnergyScenarioKind.

**Table 657 – 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. |

### 3.19.44 (NC) HourPeriod root class

Period of hours in a day.
Table 658 shows all attributes of HourPeriod.

**Table 658 – 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.<br>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 659 shows all association ends of HourPeriod with other classes.

**Table 659 – 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. |

### 3.19.45 (NC) AssessedElementRegularSchedule

Inheritance path = BaseRegularIntervalSchedule : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
Regular schedule for assessed element.
Table 660 shows all attributes of AssessedElementRegularSchedule.

**Table 660 – Attributes of ExtSchedule::AssessedElementRegularSchedule**

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

Table 661 shows all association ends of AssessedElementRegularSchedule with other classes.

**Table 661 – Association ends of ExtSchedule::AssessedElementRegularSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | AssessedElement | 0..1 | AssessedElement | (NC) Assessed Element that has regular schedules. |
| 0..1 | AssessedElementRegularTimePoint | 0..* | AssessedElementRegularTimePoint | (NC) Assessed element regular time point which belong to an assessed element regular schedule. |
| 0..* | Season | 0..1 | Season | (NC) inherited from: BaseRegularIntervalSchedule |
| 0..* | HourPattern | 0..1 | HourPattern | (NC) inherited from: BaseRegularIntervalSchedule |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.46 (NC) AssessedElementRegularTimePoint root class

Assessed element instruction value at a given point in time.
Table 662 shows all attributes of AssessedElementRegularTimePoint.

**Table 662 – 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. |

| name | mult | type | description |
|---|---|---|---|
| | | | It is only used when an assessed element is considered conservative for a region.<br>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. |
| virtualPositiveMargin | 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.<br>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.<br>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).<br>The allowed value range is [0,100]. |

Table 663 shows all association ends of AssessedElementRegularTimePoint with other classes.

**Table 663 – Association ends of ExtSchedule::AssessedElementRegularTimePoint with other classes**

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

### 3.19.47 (NC) VoltageAngleSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

The schedule for a voltage angle.

Table 664 shows all attributes of VoltageAngleSchedule.

**Table 664 – Attributes of ExtSchedule::VoltageAngleSchedule**

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

Table 665 shows all association ends of VoltageAngleSchedule with other classes.

**Table 665 – Association ends of ExtSchedule::VoltageAngleSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | VoltageAngleLimit | 0..1 | VoltageAngleLimit | (NC) Voltage angle limit which has voltage angle schedules. |
| 1..1 | VoltageAngletimePoint | 1..* | VoltageAngleTimePoint | (NC) The voltage angle time point that relates to this voltage angle schedule. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.48 (NC) VoltageAngleTimePoint root class

Voltage angle at a given point in time.
Table 666 shows all attributes of VoltageAngleTimePoint.

**Table 666 – 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. |

Table 667 shows all association ends of VoltageAngleTimePoint with other classes.

**Table 667 – 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. |

### 3.19.49 (NC) PowerScheduleKind enumeration

Kind of power schedule.
Table 668 shows all literals of PowerScheduleKind.

**Table 668 – 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. |

### 3.19.50 (NC) InfeedLimitSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
The schedule for an infeed limit.
Table 669 shows all attributes of InfeedLimitSchedule.

**Table 669 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 670 shows all association ends of InfeedLimitSchedule with other classes.

**Table 670 – 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 schedules. |
| 1..1 | InfeedLimitTimePoint | 1..* | InfeedLimitTimePoint | (NC) Infeed limit time point that relates to this voltage angle schedule. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |

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

### 3.19.51 (NC) InfeedLimitTimePoint root class

Infeed limit at a given point in time.
Table 671 shows all attributes of InfeedLimitTimePoint.

**Table 671 – 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. |

Table 672 shows all association ends of InfeedLimitTimePoint with other classes.

**Table 672 – 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. |

### 3.19.52 (NC) RemedialActionSchemeSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
The schedule for a remedial action scheme.
Table 673 shows all attributes of RemedialActionSchemeSchedule.

**Table 673 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 674 shows all association ends of RemedialActionSchemeSchedule with other classes.

**Table 674 – Association ends of ExtSchedule::RemedialActionSchemeSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | ArmedRemedialAction | 0..1 | RemedialActionScheme | (NC) Armed remedial action for a remedial action scheme. |
| 0..* | SchemeRemedialAction | 0..1 | SchemeRemedialAction | (NC) Remedial action scheme which has remedial action scheme schedules. |
| 1..1 | RemedialActionScheme TimePoint | 1..* | RemedialActionScheme TimePoint | (NC) Remedial action scheme time point that relates to this remedial action scheme schedule. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.53 (NC) RemedialActionSchemeTimePoint root class

Remedial action scheme at a given point in time.
Table 675 shows all attributes of RemedialActionSchemeTimePoint.

**Table 675 – 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 676 shows all association ends of RemedialActionSchemeTimePoint with other classes.

**Table 676 – Association ends of ExtSchedule::RemedialActionSchemeTimePoint with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | RemedialActionScheme Schedule | 1..1 | RemedialActionScheme Schedule | (NC) Remedial action scheme schedule that has time point. |

### 3.19.54 (NC) RemedialActionGroupSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
The schedule for a remedial action group.
Table 677 shows all attributes of RemedialActionGroupSchedule.

**Table 677 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 678 shows all association ends of RemedialActionGroupSchedule with other classes.

**Table 678 – Association ends of ExtSchedule::RemedialActionGroupSchedule with 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 |

### 3.19.55 (NC) RemedialActionGroupTimePoint root class

Remedial action group at a given point in time.
Table 679 shows all attributes of RemedialActionGroupTimePoint.

**Table 679 – 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. |

Table 680 shows all association ends of RemedialActionGroupTimePoint with other classes.

**Table 680 – 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. |

### 3.19.56 (NC) GridStateAlterationSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Schedule for a grid state alteration.

Table 681 shows all attributes of GridStateAlterationSchedule.

**Table 681 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 682 shows all association ends of GridStateAlterationSchedule with other classes.

**Table 682 – 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 |

### 3.19.57 (NC) RegulatingControlRegularSchedule

Inheritance path = BaseRegularIntervalSchedule : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Regular schedule for regulating control.

Table 683 shows all attributes of RegulatingControlRegularSchedule.

**Table 683 – Attributes of ExtSchedule::RegulatingControlRegularSchedule**

| name | mult | type | description |
|---|---|---|---|
| discrete | 1..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 | 1..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 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.<br>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 | 1..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 | 1..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 684 shows all association ends of RegulatingControlRegularSchedule with other classes.

**Table 684 – 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 |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.58 (NC) TapChangerControlRegularSchedule

Inheritance path = RegulatingControlRegularSchedule : BaseRegularIntervalSchedule : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Regular schedule for tap changer control.

Table 685 shows all attributes of TapChangerControlRegularSchedule.

**Table 685 – Attributes of ExtSchedule::TapChangerControlRegularSchedule**

| name | mult | type | description |
|---|---|---|---|
| discrete | 1..1 | NullCIM | (NC) inherited from: RegulatingControlRegularSchedule |
| enabled | 1..1 | NullCIM | (NC) inherited from: RegulatingControlRegularSchedule |
| targetDeadband | 0..1 | NullCIM | (NC) inherited from: RegulatingControlRegularSchedule |
| targetValue | 1..1 | NullCIM | (NC) inherited from: RegulatingControlRegularSchedule |
| targetValueUnitMultiplier | 1..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 |

| name | mult | type | description |
|---|---|---|---|
| actionMethod | 0..1 | String | (NC) inherited from: BaseTimeSeries |
| percentile | 0..1 | Integer | (NC) inherited from: BaseTimeSeries |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 686 shows all association ends of TapChangerControlRegularSchedule with other classes.

**Table 686 – Association ends of ExtSchedule::TapChangerControlRegularSchedule with 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 |

### 3.19.59 (NC) TapRegularSchedule

Inheritance path = BaseRegularIntervalSchedule : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Regular schedule for tap.

Table 687 shows all attributes of TapRegularSchedule.

**Table 687 – Attributes of ExtSchedule::TapRegularSchedule**

| name | mult | type | description |
|---|---|---|---|
| controlEnabled | 1..1 | NullCIM | (NC) Specifies the regulation status of the equipment. True is regulating, false is not regulating. |
| step | 1..1 | NullCIM | (NC) Tap changer position.<br>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 |

| name | mult | type | description |
|---|---|---|---|
| | | | oscillate or to accommodate for a continuous solution as input.<br>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 |
| 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 688 shows all association ends of TapRegularSchedule with other classes.

**Table 688 – Association ends of ExtSchedule::TapRegularSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | TapChanger | 0..1 | TapChanger | (NC) Tap changer which has TapRegularSchedule. |
| 0..* | Season | 0..1 | Season | (NC) inherited from: BaseRegularIntervalSchedule |
| 0..* | HourPattern | 0..1 | HourPattern | (NC) inherited from: BaseRegularIntervalSchedule |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.60 (NC) SwitchRegularSchedule

Inheritance path = BaseRegularIntervalSchedule : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Regular schedule for switch.

Table 689 shows all attributes of SwitchRegularSchedule.

**Table 689 – Attributes of ExtSchedule::SwitchRegularSchedule**

| name | mult | type | description |
|---|---|---|---|
| open | 1..1 | NullCIM | (NC) The attribute tells if the switch is considered open when used as input to topology processing. |
| locked | 1..1 | NullCIM | (NC) If true, the switch is locked. The resulting switch state is a combination of locked and Switch.open attributes as follows:<br>- locked=true and Switch.open=true. The resulting state is open and locked;<br>- locked=false and Switch.open=true. The resulting state is open;<br>- 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 |
| 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 690 shows all association ends of SwitchRegularSchedule with other classes.

**Table 690 – 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 |

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

### 3.19.61 (NC) EnergyConnectionRegularSchedule

Inheritance path = BaseRegularIntervalSchedule : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Regular schedule for energy connection.

Table 691 shows all attributes of EnergyConnectionRegularSchedule.

**Table 691 – Attributes of ExtSchedule::EnergyConnectionRegularSchedule**

| name | mult | type | description |
|---|---|---|---|
| p | 1..1 | NullCIM | (NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node.<br>Starting value for a steady state solution. |
| q | 1..1 | NullCIM | (NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node.<br>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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 692 shows all association ends of EnergyConnectionRegularSchedule with other classes.

**Table 692 – 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 |

| 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 |

### 3.19.62 (NC) InServiceRegularSchedule

Inheritance path = BaseRegularIntervalSchedule : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Regular schedule for elements having in service.

Table 693 shows all attributes of InServiceRegularSchedule.

**Table 693 – Attributes of ExtSchedule::InServiceRegularSchedule**

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

Table 694 shows all association ends of InServiceRegularSchedule with other classes.

**Table 694 – 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 |

### 3.19.63 (NC) ControlAreaRegularSchedule

Inheritance path = BaseRegularIntervalSchedule : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Regular schedule for control area.

Table 695 shows all attributes of ControlAreaRegularSchedule.

**Table 695 – Attributes of ExtSchedule::ControlAreaRegularSchedule**

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

Table 696 shows all association ends of ControlAreaRegularSchedule with other classes.

**Table 696 – Association ends of ExtSchedule::ControlAreaRegularSchedule with other 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 |

### 3.19.64 (NC) SynchronousMachineRegularSchedule

Inheritance path = BaseRegularIntervalSchedule : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Regular schedule for synchronous machine.

Table 697 shows all attributes of SynchronousMachineRegularSchedule.

**Table 697 – Attributes of ExtSchedule::SynchronousMachineRegularSchedule**

| name | mult | type | description |
|---|---|---|---|
| operatingMode | 1..1 | NullCIM | (NC) Current mode of operation. |
| referencePriority | 1..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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 698 shows all association ends of SynchronousMachineRegularSchedule with other classes.

**Table 698 – Association ends of ExtSchedule::SynchronousMachineRegularSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | SynchronousMachine | 0..1 | SynchronousMachine | (NC) SynchronousMachine which has SynchronousMachineRegularSchedule. |
| 0..* | Season | 0..1 | Season | (NC) inherited from: BaseRegularIntervalSchedule |
| 0..* | HourPattern | 0..1 | HourPattern | (NC) inherited from: BaseRegularIntervalSchedule |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.65 (NC) AsynchronousMachineRegularSchedule

Inheritance path = BaseRegularIntervalSchedule : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Regular schedule for asynchronous machine.

Table 699 shows all attributes of AsynchronousMachineRegularSchedule.

**Table 699 – Attributes of ExtSchedule::AsynchronousMachineRegularSchedule**

| name | mult | type | description |
|---|---|---|---|
| asynchronousMachineType | 1..1 | NullCIM | (NC) Indicates the type of Asynchronous Machine (motor or generator). |
| dayOfWeek | 0..1 | DayOfWeekKind | (NC) inherited from: BaseRegularIntervalSchedule |
| intervalStartTime | 0..1 | DateTime | (NC) inherited from: BaseRegularIntervalSchedule |
| intervalEndTime | 0..1 | DateTime | (NC) inherited from: BaseRegularIntervalSchedule |
| generatedAtTime | 0..1 | DateTime | (NC) inherited from: BaseTimeSeries |
| interpolationKind | 0..1 | TimeSeriesInterpolationKind | (NC) inherited from: BaseTimeSeries |
| timeSeriesKind | 0..1 | BaseTimeSeriesKind | (NC) inherited from: BaseTimeSeries |
| actionMethod | 0..1 | String | (NC) inherited from: BaseTimeSeries |
| percentile | 0..1 | Integer | (NC) inherited from: BaseTimeSeries |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 700 shows all association ends of AsynchronousMachineRegularSchedule with other classes.

**Table 700 – Association ends of ExtSchedule::AsynchronousMachineRegularSchedule 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 |

### 3.19.66 (NC) ExternalNetworkInjectionRegularSchedule

Inheritance path = BaseRegularIntervalSchedule : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Regular schedule for external network injection.

Table 701 shows all attributes of ExternalNetworkInjectionRegularSchedule.

**Table 701 – Attributes of ExtSchedule::ExternalNetworkInjectionRegularSchedule**

| name | mult | type | description |
|---|---|---|---|
| referencePriority | 1..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 | 1..1 | NullCIM | (NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node.<br>Starting value for steady state solutions. |
| q | 1..1 | NullCIM | (NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node.<br>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 |

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

Table 702 shows all association ends of ExternalNetworkInjectionRegularSchedule with other classes.

**Table 702 – Association ends of ExtSchedule::ExternalNetworkInjectionRegularSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | ExternalNetworkinjection | 0..1 | ExternalNetworkInjection | (NC) External network injection which has ExternalNetworkinjectionRegularSchedule |
| 0..* | Season | 0..1 | Season | (NC) inherited from: BaseRegularIntervalSchedule |
| 0..* | HourPattern | 0..1 | HourPattern | (NC) inherited from: BaseRegularIntervalSchedule |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.67 (NC) EquivalentInjectionRegularSchedule

Inheritance path = BaseRegularIntervalSchedule : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Regular schedule for equivalent injection.

Table 703 shows all attributes of EquivalentInjectionRegularSchedule.

**Table 703 – 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 | 1..1 | NullCIM | (NC) Equivalent active power injection. Load sign convention is used, i.e. positive sign means flow out from a node.<br>Starting value for steady state solutions. |
| q | 1..1 | NullCIM | (NC) Equivalent 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 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 704 shows all association ends of EquivalentInjectionRegularSchedule with other classes.

**Table 704 – Association ends of ExtSchedule::EquivalentInjectionRegularSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | EquivalentInjection | 0..1 | EquivalentInjection | (NC) EquivalentInjection which has EquivalentInjectionRegularSchedule. |
| 0..* | Season | 0..1 | Season | (NC) inherited from: BaseRegularIntervalSchedule |
| 0..* | HourPattern | 0..1 | HourPattern | (NC) inherited from: BaseRegularIntervalSchedule |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.68 (NC) ACDCConverterRegularSchedule

Inheritance path = BaseRegularIntervalSchedule : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Regular schedule for ACDC converter.

Table 705 shows all attributes of ACDCConverterRegularSchedule.

**Table 705 – Attributes of ExtSchedule::ACDCConverterRegularSchedule**

| name | mult | type | description |
|---|---|---|---|
| p | 1..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.<br>Starting value for a steady state solution in the case a simplified power flow model is used. |
| q | 1..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.<br>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 |
| 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 706 shows all association ends of ACDCConverterRegularSchedule with other classes.

**Table 706 – Association ends of ExtSchedule::ACDCConverterRegularSchedule 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 |

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

### 3.19.69 (NC) CsConverterRegularSchedule

Inheritance path = ACDCConverterRegularSchedule : BaseRegularIntervalSchedule : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
Regular schedule for CS converter.
Table 707 shows all attributes of CsConverterRegularSchedule.

**Table 707 – Attributes of ExtSchedule::CsConverterRegularSchedule**

| name | mult | type | description |
|---|---|---|---|
| operatingMode | 1..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 | 1..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 minAlpha<=targetAlpha<=maxAlpha. The attribute shall be a positive value. |
| targetGamma | 0..1 | NullCIM | (NC) Target extinction angle. It is converter's control variable used in power flow. It is only applicable for inverter if continuous tap changer control is used. Allowed values are within the range minGamma<=targetGamma<=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 | 1..1 | NullCIM | (NC) inherited from: ACDCConverterRegularSchedule |
| q | 1..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 |

| 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 708 shows all association ends of CsConverterRegularSchedule with other classes.

**Table 708 – Association ends of ExtSchedule::CsConverterRegularSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | CsConverter | 0..1 | CsConverter | (NC) CsConverter which has CsConverterRegularSchedule. |
| 0..* | Season | 0..1 | Season | (NC) inherited from: BaseRegularIntervalSchedule |
| 0..* | HourPattern | 0..1 | HourPattern | (NC) inherited from: BaseRegularIntervalSchedule |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.70 (NC) VsConverterRegularSchedule

Inheritance path = ACDCConverterRegularSchedule : BaseRegularIntervalSchedule : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Regular schedule for VS converter.

Table 709 shows all attributes of VsConverterRegularSchedule.

**Table 709 – Attributes of ExtSchedule::VsConverterRegularSchedule**

| name | mult | type | description |
|---|---|---|---|
| droop | 0..1 | NullCIM | (NC) Droop constant. The pu value is obtained as D [kV/MW] x Sb / Ubdc. 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 | 1..1 | NullCIM | (NC) Kind of control of real power and/or DC voltage. |
| qPccControl | 1..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. |

| name | mult | type | description |
|---|---|---|---|
| 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 | 1..1 | NullCIM | (NC) inherited from: ACDCConverterRegularSchedule |
| q | 1..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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 710 shows all association ends of VsConverterRegularSchedule with other classes.

**Table 710 – 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 |

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

### 3.19.71 (NC) EquivalentInjectionSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Regular schedule for equivalent injection.

Table 711 shows all attributes of EquivalentInjectionSchedule.

**Table 711 – Attributes of ExtSchedule::EquivalentInjectionSchedule**

| name | mult | type | description |
|---|---|---|---|
| generatedAtTime | 0..1 | DateTime | (NC) inherited from: BaseTimeSeries |
| interpolationKind | 0..1 | TimeSeriesInterpolationKind | (NC) inherited from: BaseTimeSeries |
| timeSeriesKind | 0..1 | BaseTimeSeriesKind | (NC) inherited from: BaseTimeSeries |
| actionMethod | 0..1 | String | (NC) inherited from: BaseTimeSeries |
| percentile | 0..1 | Integer | (NC) inherited from: BaseTimeSeries |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 712 shows all association ends of EquivalentInjectionSchedule with other classes.

**Table 712 – Association ends of ExtSchedule::EquivalentInjectionSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..1 | EquivalentInjectionTimePoint | 1..* | EquivalentInjectionTimePoint | (NC) The time point that relates to this equivalent injection schedule. |
| 0..* | EquivalentInjection | 0..1 | EquivalentInjection | (NC) Equivalent injection which has equivalent injection schedules. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.72 (NC) EnergyConnectionSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
Schedule for energy connection.
Table 713 shows all attributes of EnergyConnectionSchedule.

**Table 713 – Attributes of ExtSchedule::EnergyConnectionSchedule**

| name | mult | type | description |
|---|---|---|---|
| generatedAtTime | 0..1 | DateTime | (NC) inherited from: BaseTimeSeries |
| interpolationKind | 0..1 | TimeSeriesInterpolationKind | (NC) inherited from: BaseTimeSeries |
| timeSeriesKind | 0..1 | BaseTimeSeriesKind | (NC) inherited from: BaseTimeSeries |
| actionMethod | 0..1 | String | (NC) inherited from: BaseTimeSeries |
| percentile | 0..1 | Integer | (NC) inherited from: BaseTimeSeries |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 714 shows all association ends of EnergyConnectionSchedule with other classes.

**Table 714 – 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 |

### 3.19.73 (NC) TapSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
Schedule for tap.
Table 715 shows all attributes of TapSchedule.

**Table 715 – Attributes of ExtSchedule::TapSchedule**

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

Table 716 shows all association ends of TapSchedule with other classes.

**Table 716 – Association ends of ExtSchedule::TapSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | TapChanger | 0..1 | TapChanger | (NC) Tap changer which has tap schedules. |
| 1..1 | TapScheduleTimePoint | 1..* | TapScheduleTimePoint | (NC) The time point that relates to this tap schedule. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.74 (NC) EquivalentInjectionTimePoint root class

Equivalent injection values for a given point in time.
Table 717 shows all attributes of EquivalentInjectionTimePoint.

**Table 717 – 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 | 1..1 | NullCIM | (NC) Equivalent active power injection. Load sign convention is used, i.e. positive sign means flow out from a node.<br>Starting value for steady state solutions. |
| q | 1..1 | NullCIM | (NC) Equivalent reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node.<br>Starting value for steady state solutions. |

Table 718 shows all association ends of EquivalentInjectionTimePoint with other classes.

**Table 718 – Association ends of ExtSchedule::EquivalentInjectionTimePoint with other classes**

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

### 3.19.75 (NC) RegulatingControlSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Schedule for regulating control.

Table 719 shows all attributes of RegulatingControlSchedule.

**Table 719 – Attributes of ExtSchedule::RegulatingControlSchedule**

| name | mult | type | description |
|---|---|---|---|
| generatedAtTime | 0..1 | DateTime | (NC) inherited from: BaseTimeSeries |
| interpolationKind | 0..1 | TimeSeriesInterpolationKind | (NC) inherited from: BaseTimeSeries |
| timeSeriesKind | 0..1 | BaseTimeSeriesKind | (NC) inherited from: BaseTimeSeries |
| actionMethod | 0..1 | String | (NC) inherited from: BaseTimeSeries |
| percentile | 0..1 | Integer | (NC) inherited from: BaseTimeSeries |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 720 shows all association ends of RegulatingControlSchedule with other classes.

**Table 720 – Association ends of ExtSchedule::RegulatingControlSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..1 | RegulatingControlTimePoint | 1..* | RegulatingControlTimePoint | (NC) The time point that relates to this regulating control schedule. |
| 0..* | RegulatingControl | 0..1 | RegulatingControl | (NC) Regulating control which has regulating control schedules. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.76 (NC) TapChangerControlSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Schedule for tap changer control.
Table 721 shows all attributes of TapChangerControlSchedule.

**Table 721 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 722 shows all association ends of TapChangerControlSchedule with other classes.

**Table 722 – Association ends of ExtSchedule::TapChangerControlSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..1 | RegulatingControlTimePoint | 1..* | RegulatingControlTimePoint | (NC) The time point that relates to this stap changer control schedule. |
| 0..* | TapChangerControl | 0..1 | TapChangerControl | (NC) Tap changer control which has TapChangerControlSchedule. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.77 (NC) RegulatingControlTimePoint root class

Regulating control values for a given point in time.
Table 723 shows all attributes of RegulatingControlTimePoint.

**Table 723 – Attributes of ExtSchedule::RegulatingControlTimePoint**

| name | mult | type | description |
|---|---|---|---|
| atTime | 0..1 | DateTime | (NC) The time the data is valid for. |
| targetValue | 1..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 | 1..1 | NullCIM | (NC) Specify the multiplier for used for the targetValue. |

| name | mult | type | description |
|---|---|---|---|
| maxAllowedTargetValue | 0..1 | NullCIM | (NC) Maximum allowed target value (RegulatingControl.targetValue). |
| minAllowedTargetValue | 0..1 | NullCIM | (NC) Minimum allowed target value (RegulatingControl.targetValue). |

Table 724 shows all association ends of RegulatingControlTimePoint with other classes.

**Table 724 – 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. |

### 3.19.78 (NC) SwitchSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Schedule for switch.

Table 725 shows all attributes of SwitchSchedule.

**Table 725 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 726 shows all association ends of SwitchSchedule with other classes.

**Table 726 – 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 |

| 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 |

### 3.19.79 (NC) InServiceSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Schedule for elements having in service.

Table 727 shows all attributes of InServiceSchedule.

**Table 727 – Attributes of ExtSchedule::InServiceSchedule**

| name | mult | type | description |
|---|---|---|---|
| generatedAtTime | 0..1 | DateTime | (NC) inherited from: BaseTimeSeries |
| interpolationKind | 0..1 | TimeSeriesInterpolationKind | (NC) inherited from: BaseTimeSeries |
| timeSeriesKind | 0..1 | BaseTimeSeriesKind | (NC) inherited from: BaseTimeSeries |
| actionMethod | 0..1 | String | (NC) inherited from: BaseTimeSeries |
| percentile | 0..1 | Integer | (NC) inherited from: BaseTimeSeries |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 728 shows all association ends of InServiceSchedule with other classes.

**Table 728 – 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 |

### 3.19.80 (NC) ControlAreaSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Schedule for control area.

Table 729 shows all attributes of ControlAreaSchedule.

**Table 729 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 730 shows all association ends of ControlAreaSchedule with other classes.

**Table 730 – 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 |

### 3.19.81 (NC) SynchronousMachineSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Schedule for synchronous machine.

Table 731 shows all attributes of SynchronousMachineSchedule.

**Table 731 – 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 |

| 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 732 shows all association ends of SynchronousMachineSchedule with other classes.

**Table 732 – Association ends of ExtSchedule::SynchronousMachineSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | SynchronousMachine | 0..1 | SynchronousMachine | (NC) Synchronous machine which has synchronous machine schedules. |
| 1..1 | SynchronousMachineTimePoint | 1..* | SynchronousMachineTimePoint | (NC) The time point that relates to this synchronous machine schedule. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.82 (NC) AsynchronousMachineSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Schedule for asynchronous machine.

Table 733 shows all attributes of AsynchronousMachineSchedule.

**Table 733 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 734 shows all association ends of AsynchronousMachineSchedule with other classes.

**Table 734 – Association ends of ExtSchedule::AsynchronousMachineSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | AsynchronousMachine | 0..1 | AsynchronousMachine | (NC) Asynchronous machine which has asynchronous machine schedules. |
| 1..1 | AsynchronousMachineTimePoint | 1..* | AsynchronousMachineTimePoint | (NC) The time point that relates to this asynchronous machine schedule. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.83 (NC) ExternalNetworkInjectionSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Schedule for external network injection.

Table 735 shows all attributes of ExternalNetworkInjectionSchedule.

**Table 735 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 736 shows all association ends of ExternalNetworkInjectionSchedule with other classes.

**Table 736 – 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 |

| 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 |

### 3.19.84 (NC) VsConverterSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Schedule for VS converter.

Table 737 shows all attributes of VsConverterSchedule.

**Table 737 – Attributes of ExtSchedule::VsConverterSchedule**

| name | mult | type | description |
|---|---|---|---|
| generatedAtTime | 0..1 | DateTime | (NC) inherited from: BaseTimeSeries |
| interpolationKind | 0..1 | TimeSeriesInterpolationKind | (NC) inherited from: BaseTimeSeries |
| timeSeriesKind | 0..1 | BaseTimeSeriesKind | (NC) inherited from: BaseTimeSeries |
| actionMethod | 0..1 | String | (NC) inherited from: BaseTimeSeries |
| percentile | 0..1 | Integer | (NC) inherited from: BaseTimeSeries |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 738 shows all association ends of VsConverterSchedule with other classes.

**Table 738 – Association ends of ExtSchedule::VsConverterSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..1 | VsConverterTimePoint | 1..* | VsConverterTimePoint | (NC) The time point that relates to this VS converter schedule. |
| 0..* | VsConverter | 0..1 | VsConverter | (NC) Vs converter which has Vs converter schedules. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.85 (NC) CsConverterSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Schedule for CS converter.

Table 739 shows all attributes of CsConverterSchedule.

**Table 739 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 740 shows all association ends of CsConverterSchedule with other classes.

**Table 740 – Association ends of ExtSchedule::CsConverterSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..1 | CsConverterTimePoint | 0..* | CsConverterTimePoint | (NC) The time point that relates to this CS converter schedule. |
| 0..* | CsConverter | 0..1 | CsConverter | (NC) Cs converter which has Cs converter schedules. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.86 (NC) ACDCTimePoint root class

ACDC values for a given point in time.
Table 741 shows all attributes of ACDCTimePoint.

**Table 741 – Attributes of ExtSchedule::ACDCTimePoint**

| name | mult | type | description |
|---|---|---|---|
| atTime | 0..1 | DateTime | (NC) The time the data is valid for. |
| p | 1..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.<br>Starting value for a steady state solution in the case a simplified power flow model is used. |
| q | 1..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.<br>Starting value for a steady state solution in the case a simplified power flow model is used. |

| name | mult | type | description |
|---|---|---|---|
| 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. |

### 3.19.87 (NC) VsConverterTimePoint

Inheritance path = ACDCTimePoint
VS converter values for a given point in time.
Table 742 shows all attributes of VsConverterTimePoint.

**Table 742 – Attributes of ExtSchedule::VsConverterTimePoint**

| name | mult | type | description |
|---|---|---|---|
| droop | 0..1 | NullCIM | (NC) Droop constant. The pu value is obtained as D [kV/MW] x Sb / Ubdc. 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 | 1..1 | NullCIM | (NC) Kind of control of real power and/or DC voltage. |
| qPccControl | 1..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 | 1..1 | NullCIM | (NC) inherited from: ACDCTimePoint |
| q | 1..1 | NullCIM | (NC) inherited from: ACDCTimePoint |
| targetPpcc | 0..1 | NullCIM | (NC) inherited from: ACDCTimePoint |
| targetUdc | 0..1 | NullCIM | (NC) inherited from: ACDCTimePoint |

Table 743 shows all association ends of VsConverterTimePoint with other classes.

**Table 743 – 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. |

### 3.19.88 (NC) CsConverterTimePoint

Inheritance path = ACDCTimePoint
CSConverter values for a given point in time.
Table 744 shows all attributes of CsConverterTimePoint.

**Table 744 – Attributes of ExtSchedule::CsConverterTimePoint**

| name | mult | type | description |
|---|---|---|---|
| operatingMode | 1..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 | 1..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 minAlpha<=targetAlpha<=maxAlpha. The attribute shall be a positive value. |
| targetGamma | 0..1 | NullCIM | (NC) Target extinction angle. It is converter's control variable used in power flow. It is only applicable for inverter if continuous tap changer control is used. Allowed values are within the range minGamma<=targetGamma<=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 | 1..1 | NullCIM | (NC) inherited from: ACDCTimePoint |
| q | 1..1 | NullCIM | (NC) inherited from: ACDCTimePoint |
| targetPpcc | 0..1 | NullCIM | (NC) inherited from: ACDCTimePoint |
| targetUdc | 0..1 | NullCIM | (NC) inherited from: ACDCTimePoint |

Table 745 shows all association ends of CsConverterTimePoint with other classes.

**Table 745 – 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. |

### 3.19.89 (NC) TapScheduleTimePoint root class

Tap schedule values for a given point in time.
Table 746 shows all attributes of TapScheduleTimePoint.

**Table 746 – Attributes of ExtSchedule::TapScheduleTimePoint**

| name | mult | type | description |
|---|---|---|---|
| atTime | 0..1 | DateTime | (NC) The time the data is valid for. |
| controlEnabled | 1..1 | NullCIM | (NC) Specifies the regulation status of the equipment. True is regulating, false is not regulating. |
| step | 1..1 | NullCIM | (NC) Tap changer position.<br>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.<br>The attribute shall be equal to or greater than lowStep and equal to or less than highStep. |

Table 747 shows all association ends of TapScheduleTimePoint with other classes.

**Table 747 – 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. |

### 3.19.90 (NC) EnergyConnectionTimePoint root class

Energy connection values for a given point in time.
Table 748 shows all attributes of EnergyConnectionTimePoint.

**Table 748 – Attributes of ExtSchedule::EnergyConnectionTimePoint**

| name | mult | type | description |
|---|---|---|---|
| atTime | 0..1 | DateTime | (NC) The time the data is valid for. |
| p | 1..1 | NullCIM | (NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node.<br>Starting value for a steady state solution. |
| q | 1..1 | NullCIM | (NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node.<br>Starting value for a steady state solution. |

Table 749 shows all association ends of EnergyConnectionTimePoint with other classes.

**Table 749 – Association ends of ExtSchedule::EnergyConnectionTimePoint with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | EnergyConnectionSchedule | 1..1 | EnergyConnectionSchedule | (NC) The energy connection schedule that has this time point. |

### 3.19.91 (NC) SwitchTimePoint root class

Switch values for a given point in time.
Table 750 shows all attributes of SwitchTimePoint.

**Table 750 – Attributes of ExtSchedule::SwitchTimePoint**

| name | mult | type | description |
|---|---|---|---|
| atTime | 0..1 | DateTime | (NC) The time the data is valid for. |
| open | 1..1 | NullCIM | (NC) The attribute tells if the switch is considered open when used as input to topology processing. |
| locked | 1..1 | NullCIM | (NC) If true, the switch is locked. The resulting switch state is a combination of locked and Switch.open attributes as follows:<br>- locked=true and Switch.open=true. The resulting state is open and locked;<br>- locked=false and Switch.open=true. The resulting state is open;<br>- locked=false and Switch.open=false. The resulting state is closed. |

Table 751 shows all association ends of SwitchTimePoint with other classes.

**Table 751 – 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. |

### 3.19.92 (NC) InServiceTimePoint root class

In service values for a given point in time.
Table 752 shows all attributes of InServiceTimePoint.

**Table 752 – Attributes of ExtSchedule::InServiceTimePoint**

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

Table 753 shows all association ends of InServiceTimePoint with other classes.

**Table 753 – 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. |

### 3.19.93 (NC) ControlAreaTimePoint root class

Participation factor for a given point in time.
Table 754 shows all attributes of ControlAreaTimePoint.

**Table 754 – 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 | 1..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. |

Table 755 shows all association ends of ControlAreaTimePoint with other classes.

**Table 755 – 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. |

### 3.19.94 (NC) SynchronousMachineTimePoint root class

Synchronous machine values for a given point in time.
Table 756 shows all attributes of SynchronousMachineTimePoint.

**Table 756 – Attributes of ExtSchedule::SynchronousMachineTimePoint**

| name | mult | type | description |
|---|---|---|---|
| atTime | 0..1 | DateTime | (NC) The time the data is valid for. |
| operatingMode | 1..1 | NullCIM | (NC) Current mode of operation. |
| referencePriority | 1..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 757 shows all association ends of SynchronousMachineTimePoint with other classes.

**Table 757 – Association ends of ExtSchedule::SynchronousMachineTimePoint with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | SynchronousMachineSchedule | 1..1 | SynchronousMachineSchedule | (NC) The synchronous machine schedule that has this time point. |

### 3.19.95 (NC) AsynchronousMachineTimePoint root class

Asynchronous machine values for a given point in time.
Table 758 shows all attributes of AsynchronousMachineTimePoint.

**Table 758 – Attributes of ExtSchedule::AsynchronousMachineTimePoint**

| name | mult | type | description |
|---|---|---|---|
| atTime | 0..1 | DateTime | (NC) The time the data is valid for. |
| asynchronousMachineType | 1..1 | NullCIM | (NC) Indicates the type of Asynchronous Machine (motor or generator). |

Table 759 shows all association ends of AsynchronousMachineTimePoint with other classes.

**Table 759 – Association ends of ExtSchedule::AsynchronousMachineTimePoint with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | AsynchronousMachineSchedule | 1..1 | AsynchronousMachineSchedule | (NC) The asynchronous machine schedule that has this time point. |

### 3.19.96 (NC) ExternalNetworkInjectionTimePoint root class

External network injection values for a given point in time.
Table 760 shows all attributes of ExternalNetworkInjectionTimePoint.

**Table 760 – Attributes of ExtSchedule::ExternalNetworkInjectionTimePoint**

| name | mult | type | description |
|---|---|---|---|
| atTime | 0..1 | DateTime | (NC) The time the data is valid for. |
| referencePriority | 1..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 | 1..1 | NullCIM | (NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node.<br>Starting value for steady state solutions. |
| q | 1..1 | NullCIM | (NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node.<br>Starting value for steady state solutions. |

Table 761 shows all association ends of ExternalNetworkInjectionTimePoint with other classes.

**Table 761 – Association ends of ExtSchedule::ExternalNetworkInjectionTimePoint with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | ExternalNetworkInjectionSchedule | 1..1 | ExternalNetworkInjectionSchedule | (NC) The external network injection schedule that has this time point. |

### 3.19.97 (NC) BatteryUnitSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
Schedule for battery unit.
Table 762 shows all attributes of BatteryUnitSchedule.

**Table 762 – 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 |

| 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 763 shows all association ends of BatteryUnitSchedule with other classes.

**Table 763 – Association ends of ExtSchedule::BatteryUnitSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..1 | BatteryUnitTimePoint | 1..* | BatteryUnitTimePoint | (NC) The time point that relates to this battery unit schedule. |
| 0..* | BatteryUnit | 0..1 | BatteryUnit | (NC) Battery unit which has battery unit schedules. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.98 (NC) BatteryUnitTimePoint root class

Battery unit values for a given point in time.
Table 764 shows all attributes of BatteryUnitTimePoint.

**Table 764 – Attributes of ExtSchedule::BatteryUnitTimePoint**

| name | mult | type | description |
|---|---|---|---|
| batteryState | 1..1 | NullCIM | (NC) The current state of the battery (charging, full, etc.). |
| storedE | 1..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. |

Table 765 shows all association ends of BatteryUnitTimePoint with other classes.

**Table 765 – 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. |

### 3.19.99 (NC) VoltageLimitSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
Schedule for voltage limit.

Table 766 shows all attributes of VoltageLimitSchedule.

**Table 766 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 767 shows all association ends of VoltageLimitSchedule with other classes.

**Table 767 – 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 |

### 3.19.100 (NC) ActivePowerLimitSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Schedule for active power limit.

Table 768 shows all attributes of ActivePowerLimitSchedule.

**Table 768 – 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 |

| 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 769 shows all association ends of ActivePowerLimitSchedule with other classes.

**Table 769 – Association ends of ExtSchedule::ActivePowerLimitSchedule with other 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 pwoer limit schedule. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.101 (NC) ApparentPowerLimitSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Schedule for apparent power limit.

Table 770 shows all attributes of ApparentPowerLimitSchedule.

**Table 770 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 771 shows all association ends of ApparentPowerLimitSchedule with other classes.

**Table 771 – Association ends of ExtSchedule::ApparentPowerLimitSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | ApparentPowerLimit | 0..1 | ApparentPowerLimit | (NC) Apparent power limit which has apparent power limit schedules. |
| 1..1 | ApparentPowerLimitTimePoint | 1..* | ApparentPowerLimitTimePoint | (NC) The time point that relates to this apparent power limit schedule. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.102 (NC) CurrentLimitSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Schedule for current limit.

Table 772 shows all attributes of CurrentLimitSchedule.

**Table 772 – 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 |

Table 773 shows all association ends of CurrentLimitSchedule with other classes.

**Table 773 – 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 |

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

### 3.19.103 (NC) CurrentLimitTimePoint root class

Current limit values for a given point in time.
Table 774 shows all attributes of CurrentLimitTimePoint.

**Table 774 – Attributes of ExtSchedule::CurrentLimitTimePoint**

| name | mult | type | description |
|---|---|---|---|
| atTime | 0..1 | DateTime | (NC) The time the data is valid for. |
| value | 1..1 | NullCIM | (NC) Limit on current flow. The attribute shall be a positive value or zero. |

Table 775 shows all association ends of CurrentLimitTimePoint with other classes.

**Table 775 – Association ends of ExtSchedule::CurrentLimitTimePoint with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | CurrentLimitSchedule | 1..1 | CurrentLimitSchedule | (NC) The current limit schedule that has this time point. |

### 3.19.104 (NC) ApparentPowerLimitTimePoint root class

Apparent power limit for a given point in time.
Table 776 shows all attributes of ApparentPowerLimitTimePoint.

**Table 776 – Attributes of ExtSchedule::ApparentPowerLimitTimePoint**

| name | mult | type | description |
|---|---|---|---|
| atTime | 0..1 | DateTime | (NC) The time the data is valid for. |
| value | 1..1 | NullCIM | (NC) The apparent power limit. The attribute shall be a positive value or zero. |

Table 777 shows all association ends of ApparentPowerLimitTimePoint with other classes.

**Table 777 – Association ends of ExtSchedule::ApparentPowerLimitTimePoint with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | ApparentPowerLimitSchedule | 1..1 | ApparentPowerLimitSchedule | (NC) The apparent power limit schedule that has this time point. |

### 3.19.105 (NC) ActivePowerLimitTimePoint root class

Active power limit for a given point in time.
Table 778 shows all attributes of ActivePowerLimitTimePoint.

**Table 778 – Attributes of ExtSchedule::ActivePowerLimitTimePoint**

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

| name | mult | type | description |
|---|---|---|---|
| value | 1..1 | NullCIM | (NC) Value of active power limit. The attribute shall be a positive value or zero. |

Table 779 shows all association ends of ActivePowerLimitTimePoint with other classes.

**Table 779 – Association ends of ExtSchedule::ActivePowerLimitTimePoint with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | ActivePowerLimitSchedule | 1..1 | ActivePowerLimitSchedule | (NC) The active power limit schedule that has this time point. |

### 3.19.106 (NC) VoltageLimitTimePoint root class

Voltage limit values for a given point in time.
Table 780 shows all attributes of VoltageLimitTimePoint.

**Table 780 – Attributes of ExtSchedule::VoltageLimitTimePoint**

| name | mult | type | description |
|---|---|---|---|
| atTime | 0..1 | DateTime | (NC) The time the data is valid for. |
| value | 1..1 | NullCIM | (NC) Limit on voltage. High or low limit nature of the limit depends upon the properties of the operational limit type. The attribute shall be a positive value or zero. |

Table 781 shows all association ends of VoltageLimitTimePoint with other classes.

**Table 781 – 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. |

### 3.19.107 (NC) ShuntCompensatorSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
Schedule for shunt compensator.
Table 782 shows all attributes of ShuntCompensatorSchedule.

**Table 782 – 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 |

| 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 783 shows all association ends of ShuntCompensatorSchedule with other classes.

**Table 783 – Association ends of ExtSchedule::ShuntCompensatorSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | ShuntCompensator | 0..1 | ShuntCompensator | (NC) Shunt compensator which has shunt compensator schedules. |
| 1..1 | ShuntCompensatorTime Point | 1..* | ShuntCompensatorTime Point | (NC) The time point that relates to this shunt compensator schedule. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.108 (NC) ShuntCompensatorTimePoint root class

Shunt compensator values for a given point in time.
Table 784 shows all attributes of ShuntCompensatorTimePoint.

**Table 784 – Attributes of ExtSchedule::ShuntCompensatorTimePoint**

| name | mult | type | description |
|---|---|---|---|
| atTime | 0..1 | DateTime | (NC) The time the data is valid for. |
| sections | 1..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.<br>For LinearShuntConpensator 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.<br>For NonlinearShuntCompensator-s shall only be set to one of the NonlinearShuntCompenstorPoint.sectionNumber. There is no interpolation between NonlinearShuntCompenstorPoint-s. |

Table 785 shows all association ends of ShuntCompensatorTimePoint with other classes.

**Table 785 – Association ends of ExtSchedule::ShuntCompensatorTimePoint with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | ShuntCompensatorSchedule | 1..1 | ShuntCompensatorSchedule | (NC) The shunt compensator schedule that has this time point. |

### 3.19.109 (NC) GeneratingUnitSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
Schedule for generating unit.
Table 786 shows all attributes of GeneratingUnitSchedule.

**Table 786 – Attributes of ExtSchedule::GeneratingUnitSchedule**

| name | mult | type | description |
|---|---|---|---|
| generatedAtTime | 0..1 | DateTime | (NC) inherited from: BaseTimeSeries |
| interpolationKind | 0..1 | TimeSeriesInterpolationKind | (NC) inherited from: BaseTimeSeries |
| timeSeriesKind | 0..1 | BaseTimeSeriesKind | (NC) inherited from: BaseTimeSeries |
| actionMethod | 0..1 | String | (NC) inherited from: BaseTimeSeries |
| percentile | 0..1 | Integer | (NC) inherited from: BaseTimeSeries |
| aliasName | 0..1 | String | inherited from: IdentifiedObject |
| description | 0..1 | String | inherited from: IdentifiedObject |
| mRID | 0..1 | String | inherited from: IdentifiedObject |
| name | 0..1 | String | inherited from: IdentifiedObject |
| energyIdentCodeEic | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 787 shows all association ends of GeneratingUnitSchedule with other classes.

**Table 787 – Association ends of ExtSchedule::GeneratingUnitSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | GeneratingUnit | 0..1 | GeneratingUnit | (NC) Generating unit which has generating unit schedules. |
| 1..1 | GeneratingUnitTimePoint | 1..* | GeneratingUnitTimePoint | The time point that relates to this generating unit schedule. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.110 (NC) GeneratingUnitTimePoint root class

Generating unit values for a given point in time.
Table 788 shows all attributes of GeneratingUnitTimePoint.

**Table 788 – Attributes of ExtSchedule::GeneratingUnitTimePoint**

| name | mult | type | description |
|---|---|---|---|
| atTime | 0..1 | DateTime | (NC) The time the data is valid for. |
| normalPF | 1..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 789 shows all association ends of GeneratingUnitTimePoint with other classes.

**Table 789 – Association ends of ExtSchedule::GeneratingUnitTimePoint with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | GeneratingUnitSchedule | 1..1 | GeneratingUnitSchedule | The generating unit schedule that has this time point. |

### 3.19.111 (NC) StaticVarCompensatorSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Schedule for static var compensator.

Table 790 shows all attributes of StaticVarCompensatorSchedule.

**Table 790 – 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 |

Table 791 shows all association ends of StaticVarCompensatorSchedule with other classes.

**Table 791 – Association ends of ExtSchedule::StaticVarCompensatorSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..1 | StaticVarCompensatorTimePoint | 1..* | StaticVarCompensatorTimePoint | (NC) The time point that relates to this static var compensator schedule. |

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | StaticVarCompensator | 0..1 | StaticVarCompensator | (NC) Static var compensator which has static var compensator schedules. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.112 (NC) StaticVarCompensatorTimePoint root class

Static var compensator values for a given point in time.
Table 792 shows all attributes of StaticVarCompensatorTimePoint.

**Table 792 – Attributes of ExtSchedule::StaticVarCompensatorTimePoint**

| name | mult | type | description |
|---|---|---|---|
| atTime | 0..1 | DateTime | (NC) The time the data is valid for. |
| q | 1..1 | NullCIM | (NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node.<br>Starting value for a steady state solution. |

Table 793 shows all association ends of StaticVarCompensatorTimePoint with other classes.

**Table 793 – Association ends of ExtSchedule::StaticVarCompensatorTimePoint with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | StaticVarCompensatorSchedule | 1..1 | StaticVarCompensatorSchedule | (NC) The StaticVarCompensator schedule that has this time point. |

### 3.19.113 (NC) StageTriggerSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
Schedule for a stage trigger.
Table 794 shows all attributes of StageTriggerSchedule.

**Table 794 – 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 | 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 795 shows all association ends of StageTriggerSchedule with other classes.

**Table 795 – Association ends of ExtSchedule::StageTriggerSchedule with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 0..* | StageTrigger | 1..1 | StageTrigger | (NC) Stage trigger which has stage trigger schedules. |
| 1..1 | StageTriggerTimePoint | 1..* | StageTriggerTimePoint | (NC) Stage trigger time point that relates to this remedial action scheme schedule. |
| 0..1 | DiagramObjects | 0..* | DiagramObject | inherited from: IdentifiedObject |
| 1..1 | Names | 0..* | Name | inherited from: IdentifiedObject |
| 0..1 | AlternativeIdentifier | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | Name | 0..* | Name | (NC) inherited from: IdentifiedObject |
| 0..1 | ParameterEvent | 0..* | ParameterEvent | inherited from: IdentifiedObject |

### 3.19.114 (NC) StageTriggerTimePoint root class

Stage trigger values at a given point in time.
Table 796 shows all attributes of StageTriggerTimePoint.

**Table 796 – 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. |

Table 797 shows all association ends of StageTriggerTimePoint with other classes.

**Table 797 – Association ends of ExtSchedule::StageTriggerTimePoint with other classes**

| mult from | name | mult to | type | description |
|---|---|---|---|---|
| 1..* | StageTriggerSchedule | 1..1 | StageTriggerSchedule | (NC) Stage trigger schedule that has time point. |

### 3.19.115 (NC) GenericSequenceSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
Schedule for sequence.
Table 798 shows all attributes of GenericSequenceSchedule.

**Table 798 – 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: ExtEuIdentifiedObject |
| shortName | 0..1 | String | (European) inherited from: ExtEuIdentifiedObject |

Table 799 shows all association ends of GenericSequenceSchedule with other classes.

**Table 799 – 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 |

### 3.19.116 (NC) SequenceTimePoint root class

Sequence at a given point in time.
Table 800 shows all attributes of SequenceTimePoint.

**Table 800 – 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 801 shows all association ends of SequenceTimePoint with other classes.

**Table 801 – 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. |