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

Table 132 – Association ends of Core::RegularTimePoint with other classes

mult from	name	mult to	type	description
1..*	IntervalSchedule	1..1	RegularIntervalSchedule	Regular interval schedule containing this time point.

6.3.33 ReportingGroup

A reporting group is used for various ad-hoc groupings used for reporting.

Table 133 shows all attributes of ReportingGroup.

Table 133 – Attributes of Core::ReportingGroup

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

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

Table 134 – Association ends of Core::ReportingGroup with other classes

mult from	name	mult to	type	description
0..*	PowerSystemResource	0..*	PowerSystemResource	Power system resources which belong to this reporting group.
0..*	ReportingSuperGroup	0..1	ReportingSuperGroup	Reporting super group to which this reporting group belongs.
0..1	BusNameMarker	0..*	BusNameMarker	The bus name markers that belong to this reporting group.
0..1	TopologicalNode	0..*	TopologicalNode	The topological nodes that belong to the reporting group.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

6.3.34 ReportingSuperGroup

A reporting super group, groups reporting groups for a higher level report.

Table 135 shows all attributes of ReportingSuperGroup.

Table 135 – Attributes of Core::ReportingSuperGroup

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

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

Table 136 – Association ends of Core::ReportingSuperGroup with other classes

mult from	name	mult to	type	description
0..1	ReportingGroup	0..*	ReportingGroup	Reporting groups that are grouped under this super group.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

6.3.35   SubGeographicalRegion

A subset of a geographical region of a power system network model.

Table 137 shows all attributes of SubGeographicalRegion.

Table 137 – Attributes of Core::SubGeographicalRegion

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

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

Table 138 – Association ends of Core::SubGeographicalRegion with other classes

mult from	name	mult to	type	description
0..1	Lines	0..*	Line	The lines within the sub-geographical region.
0..1	Substations	0..*	Substation	The substations in this sub-geographical region.
0..*	Region	0..1	GeographicalRegion	The geographical region which this sub-geographical region is within.
0..1	DCLines	0..*	DCLine	The DC lines in this sub-geographical region.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

6.3.36 Substation

A collection of equipment for purposes other than generation or utilization, through which electric energy in bulk is passed for the purposes of switching or modifying its characteristics.

Table 139 shows all attributes of Substation.

Table 139 – Attributes of Core::Substation

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

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

Table 140 – Association ends of Core::Substation with other classes

mult from	name	mult to	type	description
1..1	VoltageLevels	0..*	VoltageLevel	The voltage levels within this substation.
0..1	Bays	0..*	Bay	Bays contained in the substation.
0..1	NormalEnergizedFeeder	0..*	Feeder	The normal energized feeders of the substation. Also used for naming purposes.
0..*	NamingFeeder	0..1	Feeder	The primary feeder that normally energizes the secondary substation. Used for naming purposes. Either this association or the substation to subgeographical region should be used for hierarchical containment specification.
0..*	NormalEnergizingFeeder	0..*	Feeder	The feeders that potentially energize the downstream substation. Should be consistent with the associations that describe the naming hierarchy.
0..*	Region	0..1	SubGeographicalRegion	The SubGeographicalRegion containing the substation.
0..1	DCConverterUnit	0..*	DCConverterUnit	The DC converter unit belonging of the substation.
0..1	Equipments	0..*	Equipment	inherited from: EquipmentContainer
0..*	AdditionalGroupedEquipment	0..*	Equipment	inherited from: EquipmentContainer
1..1	ConnectivityNodes	0..*	ConnectivityNode	inherited from: ConnectivityNodeContainer
0..1	TopologicalNode	0..*	TopologicalNode	inherited from: ConnectivityNodeContainer
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

6.3.37   Terminal

An AC electrical connection point to a piece of conducting equipment. Terminals are connected at physical connection points called connectivity nodes.

Table 141 shows all attributes of Terminal.

Table 141 – Attributes of Core::Terminal

name	mult	type	description
phases	0..1	PhaseCode	Represents the normal network phasing condition. If the attribute is missing, three phases (ABC) shall be assumed, except for terminals of grounding classes (specializations of EarthFaultCompensator, GroundDisconnector, GroundSwitch, and Ground) which will be assumed to be N. Therefore, phase code ABCN is explicitly declared when needed, e.g. for star point grounding equipment. The phase code on terminals connecting same ConnectivityNode or same TopologicalNode as well as for equipment between two terminals shall be consistent.
connected	0..1	Boolean	inherited from: ACDCTerminal
sequenceNumber	0..1	Integer	inherited from: ACDCTerminal
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject

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

Table 142 – Association ends of Core::Terminal with other classes

mult from	name	mult to	type	description
0..*	ConductingEquipment	1..1	ConductingEquipment	The conducting equipment of the terminal. Conducting equipment have terminals that may be connected to other conducting equipment terminals via connectivity nodes or topological nodes.
0..*	ConnectivityNode	0..1	ConnectivityNode	The connectivity node to which this terminal connects with zero impedance.
0..*	TopologicalNode	0..1	TopologicalNode	The topological node associated with the terminal. This can be used as an alternative to the connectivity node path to topological node, thus making it unnecessary to model connectivity nodes in some cases. Note that the if connectivity nodes are in the model, this association would probably not be used as an input specification.
0..1	RegulatingControl	0..*	RegulatingControl	The controls regulating this terminal.
1..*	NormalHeadFeeder	0..1	Feeder	The feeder that this terminal normally feeds. Only specified for the terminals at head of feeders.
1..1	HasFirstMutualCoupling	0..*	MutualCoupling	Mutual couplings associated with the branch as the first branch.
0..1	TransformerEnd	0..*	TransformerEnd	All transformer ends connected at this terminal.

mult from	name	mult to	type	description
1..1	BranchGroupTerminal	0..*	BranchGroupTerminal	The directed branch group terminals for which this terminal is monitored.
1..1	SvPowerFlow	0..*	SvPowerFlow	The power flow state variable associated with the terminal.
1..1	AuxiliaryEquipment	0..*	AuxiliaryEquipment	The auxiliary equipment connected to the terminal.
1..1	HasSecondMutualCoupling	0..*	MutualCoupling	Mutual couplings with the branch associated as the first branch.
1..1	TieFlow	0..2	TieFlow	The control area tie flows to which this terminal associates.
0..1	EquipmentFaults	0..*	EquipmentFault	The equipment faults at this terminal.
0..1	ConverterDCSides	0..*	ACDCConverter	All converters' DC sides linked to this point of common coupling terminal.
1..1	RemoteInputSignal	0..*	RemoteInputSignal	Input signal coming from this terminal.
1..*	BusNameMarker	0..1	BusNameMarker	inherited from: ACDCTerminal
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: ACDCTerminal
0..1	Measurements	0..*	Measurement	inherited from: ACDCTerminal
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

6.3.38   VoltageLevel

A collection of equipment at one common system voltage forming a switchgear. The equipment typically consists of breakers, busbars, instrumentation, control, regulation and protection devices as well as assemblies of all these.

Table 143 shows all attributes of VoltageLevel.

Table 143 – Attributes of Core::VoltageLevel

name	mult	type	description
highVoltageLimit	0..1	Voltage	The bus bar's high voltage limit. The limit applies to all equipment and nodes contained in a given VoltageLevel. It is not required that it is exchanged in pair with lowVoltageLimit. It is preferable to use operational VoltageLimit, which prevails, if present.
lowVoltageLimit	0..1	Voltage	The bus bar's low voltage limit. The limit applies to all equipment and nodes contained in a given VoltageLevel. It is not required that it is exchanged in pair with highVoltageLimit. It is preferable to use operational VoltageLimit, which prevails, if present.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject

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

Table 144 – Association ends of Core::VoltageLevel with other classes

mult from	name	mult to	type	description
0..*	BaseVoltage	1..1	BaseVoltage	The base voltage used for all equipment within the voltage level.
0..1	Bays	0..*	Bay	The bays within this voltage level.
0..*	Substation	1..1	Substation	The substation of the voltage level.
0..1	Equipments	0..*	Equipment	inherited from: EquipmentContainer
0..*	AdditionalGroupedEquipment	0..*	Equipment	inherited from: EquipmentContainer
1..1	ConnectivityNodes	0..*	ConnectivityNode	inherited from: ConnectivityNodeContainer
0..1	TopologicalNode	0..*	TopologicalNode	inherited from: ConnectivityNodeContainer
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

6.4   Package Wires

6.4.1   General

An extension to the Core and Topology package that models information on the electrical characteristics of Transmission and Distribution networks. This package is used by network applications such as State Estimation, Load Flow and Optimal Power Flow.
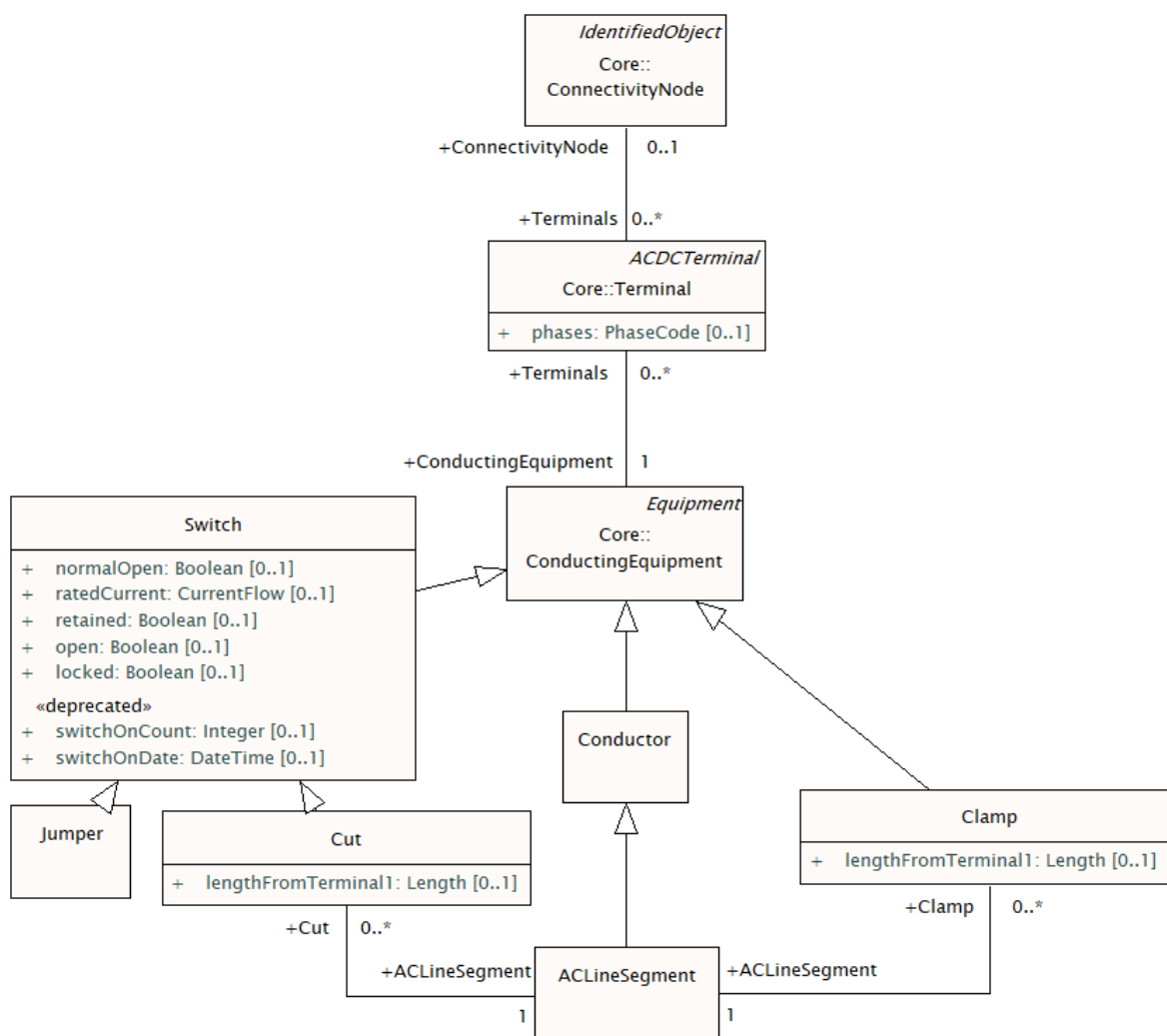
Figure 86 – Class diagram Wires::CutsAndJumpers

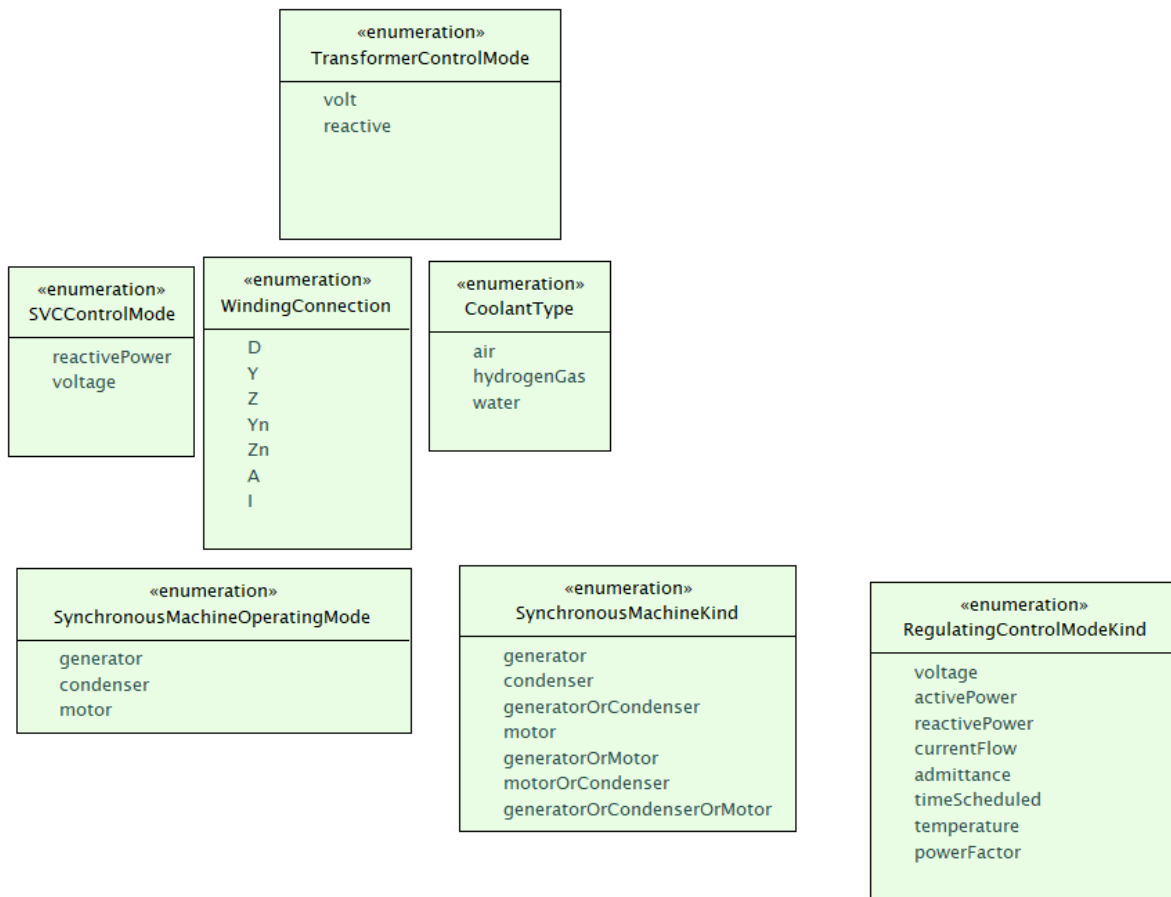Figure 86: The diagram show the cuts and jumpers data model.

«enumeration»
TransformerControlMode

volt
reactive

«enumeration»
SVCControlMode

reactivePower
voltage

«enumeration»
WindingConnection

D
Y
Z
Yn
Zn
A
I

«enumeration»
CoolantType

air
hydrogenGas
water

«enumeration»
SynchronousMachineOperatingMode

generator
condenser
motor

«enumeration»
SynchronousMachineKind

generator
condenser
generatorOrCondenser
motor
generatorOrMotor
motorOrCondenser
generatorOrCondenserOrMotor

«enumeration»
RegulatingControlModeKind

voltage
activePower
reactivePower
currentFlow
admittance
timeScheduled
temperature
powerFactor

Figure 87 – Class diagram Wires::Datatypes

Figure 87: This diagram shows the data types specific to the Wires package.
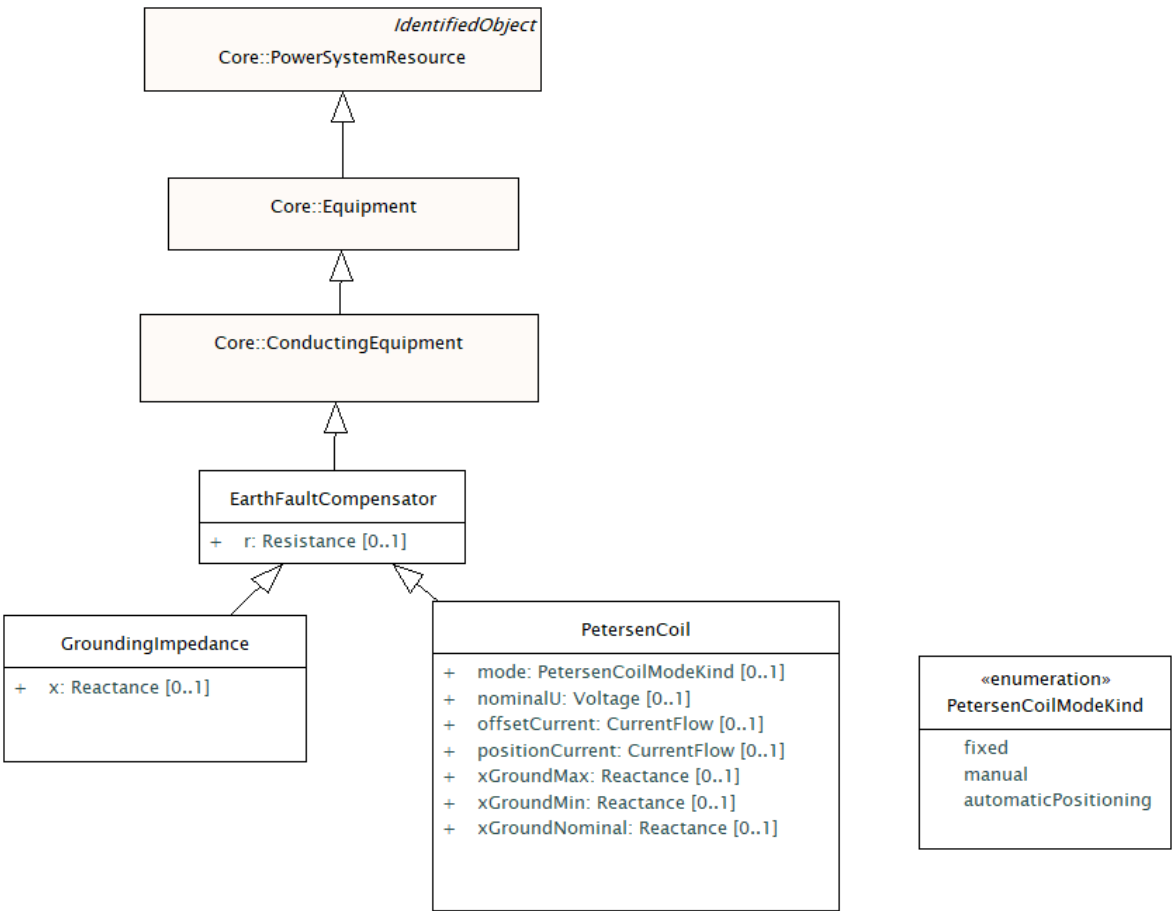
Figure 88 – Class diagram Wires::EarthFaultCompensator

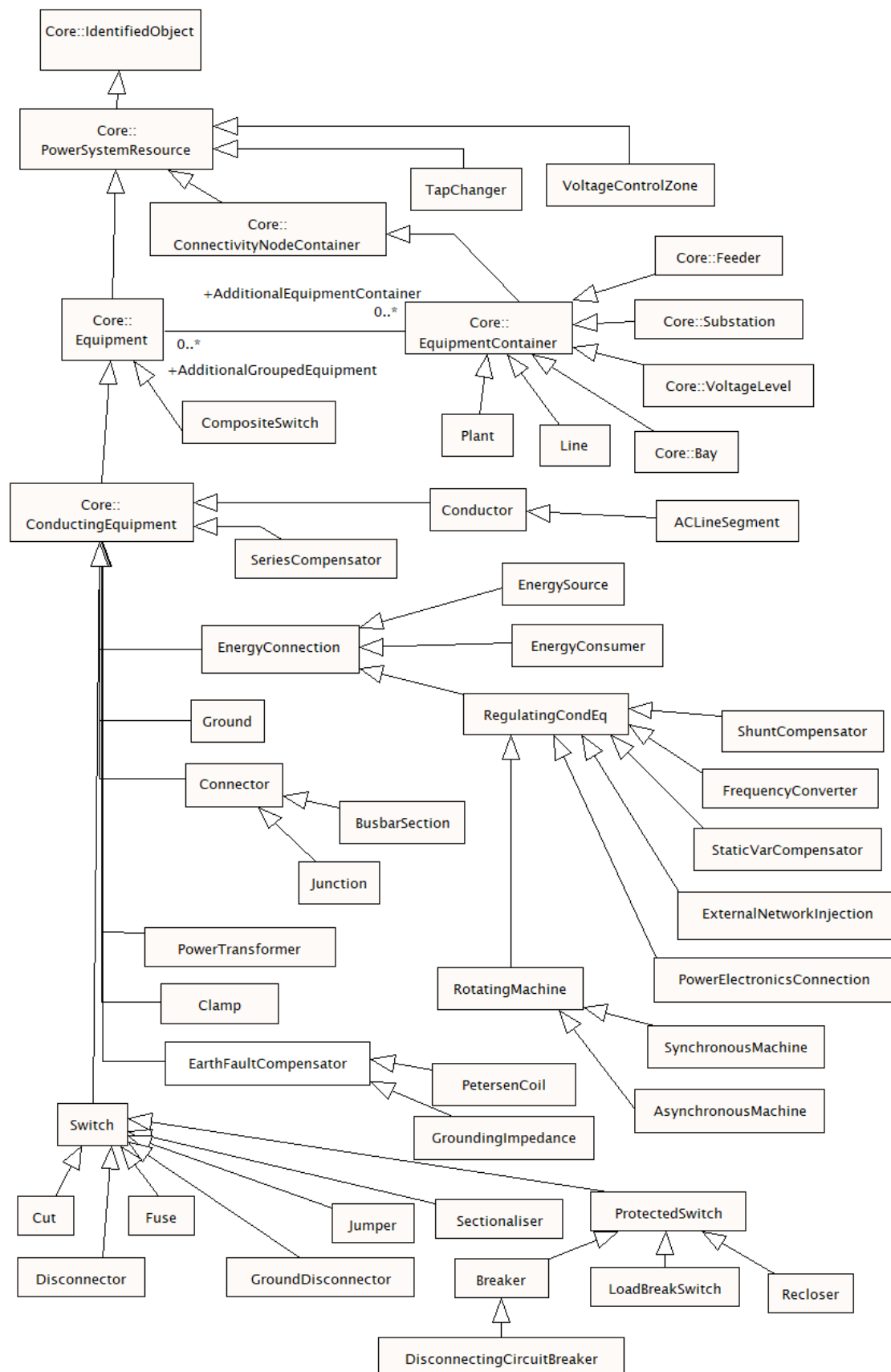Figure 88: Shows earth fault compensating devices.

Figure 89 – Class diagram Wires::InheritanceHierarchy

Figure 89: This diagram describes inheritance between classes in and related to the Wires package.
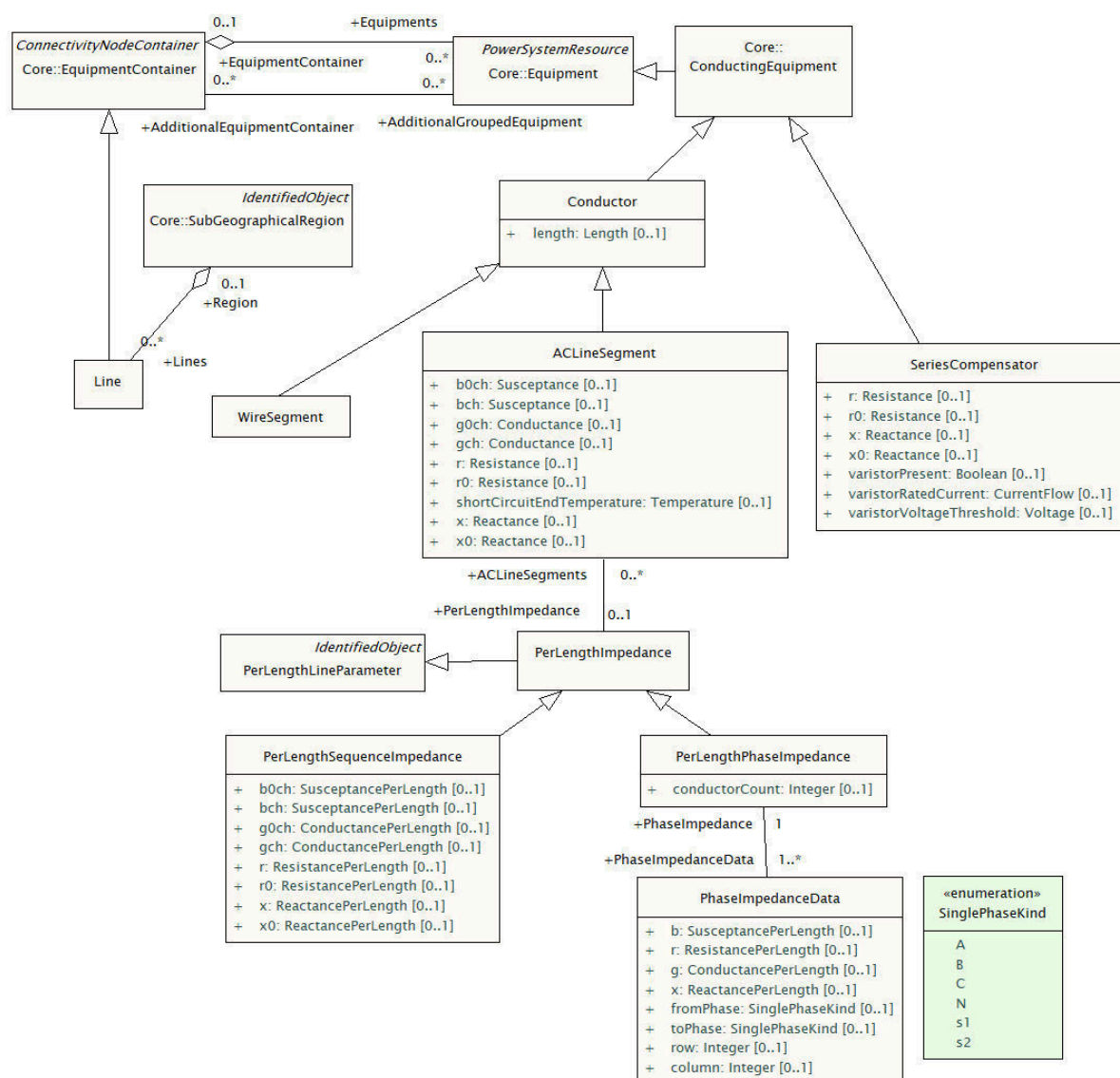

Figure 90 – Class diagram Wires::LineModel

Figure 90: This diagram shows all classes related to the transmission line model.