

INTERNATIONAL STANDARD

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**Energy management system application program interface (EMS-API) –
Part 301: Common information model (CIM) base**

**Interface de programmation d'application pour système de gestion d'énergie
(EMS-API) –
Partie 301: Base de modèle d'information commun (CIM)**



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CONTENTS

FOREWORD.....	32
INTRODUCTION.....	34
1 Scope.....	36
2 Normative references	36
3 Terms and definitions	37
4 CIM specification	37
4.1 Overview.....	37
4.2 CIM modeling notation	38
4.3 CIM packages.....	38
4.4 CIM classes and relationships.....	40
4.4.1 Classes	40
4.4.2 Generalization	41
4.4.3 Simple association.....	42
4.4.4 Aggregation.....	43
4.5 CIM model concepts and examples.....	43
4.5.1 Concepts	43
4.5.2 Containment, equipment hierarchies and naming.....	44
4.5.3 Names model	45
4.5.4 Connectivity model	46
4.5.5 Inheritance hierarchy.....	49
4.5.6 Transformer model	51
4.5.7 Transformer tap modeling.....	53
4.5.8 Phase wire modeling	66
4.5.9 Grounding devices modeling.....	68
4.5.10 Cuts, clamps and jumpers model	71
4.5.11 Measurements and controls.....	75
4.5.12 Regulating control models	80
4.5.13 DC model for CIM.....	81
4.5.14 Static Var Compensator voltage regulation	100
4.6 Modeling guidelines	102
4.6.1 Modeling for change	102
4.6.2 Process for amendments to the CIM	102
4.6.3 Changes to the CIM UML model	102
4.6.4 Changes to the CIM standards documents.....	103
4.6.5 Deprecations	103
4.6.6 CIM profiles	103
4.7 Modeling tools	103
4.8 User implementation conventions.....	104
4.8.1 Conventions beyond UML.....	104
4.8.2 Number of terminals for ConductingEquipment objects	104
4.9 CIM modeling examples.....	104
5 Detailed model	105
5.1 Overview.....	105
5.2 Context.....	105
6 Package Base	107
6.1 General.....	107

6.2	Package Faults	107
6.2.1	General	107
6.2.2	EquipmentFault	107
6.2.3	Fault	108
6.2.4	FaultCauseType	109
6.2.5	FaultImpedance compound	109
6.2.6	LineFault	109
6.2.7	PhaseConnectedFaultKind enumeration	110
6.3	Package DocIEC 61970	111
6.4	Package Domain	112
6.4.1	General	112
6.4.2	ActivePower datatype	118
6.4.3	ActivePowerChangeRate datatype	118
6.4.4	ActivePowerPerCurrentFlow datatype	119
6.4.5	ActivePowerPerFrequency datatype	119
6.4.6	Admittance datatype	119
6.4.7	AngleDegrees datatype	120
6.4.8	AngleRadians datatype	120
6.4.9	ApparentPower datatype	120
6.4.10	Area datatype	120
6.4.11	Boolean primitive	121
6.4.12	Capacitance datatype	121
6.4.13	CapacitancePerLength datatype	121
6.4.14	Conductance datatype	121
6.4.15	ConductancePerLength datatype	121
6.4.16	CostPerEnergyUnit datatype	122
6.4.17	CostPerVolume datatype	122
6.4.18	CostRate datatype	122
6.4.19	Currency enumeration	123
6.4.20	CurrentFlow datatype	123
6.4.21	Damping datatype	123
6.4.22	Date primitive	124
6.4.23	DateInterval compound	124
6.4.24	DateTime primitive	124
6.4.25	DateTimeInterval compound	124
6.4.26	Decimal primitive	124
6.4.27	DecimalQuantity compound	124
6.4.28	Displacement datatype	125
6.4.29	Duration primitive	125
6.4.30	Float primitive	125
6.4.31	FloatQuantity compound	125
6.4.32	Frequency datatype	125
6.4.33	Hours datatype	126
6.4.34	Impedance datatype	126
6.4.35	Inductance datatype	126
6.4.36	InductancePerLength datatype	126
6.4.37	Integer primitive	127
6.4.38	IntegerQuantity compound	127
6.4.39	KiloActivePower datatype	127

6.4.40	Length datatype	127
6.4.41	Minutes datatype	128
6.4.42	Money datatype	128
6.4.43	MonthDay primitive	128
6.4.44	MonthDayInterval compound	128
6.4.45	PU datatype	128
6.4.46	PerCent datatype	129
6.4.47	Pressure datatype	129
6.4.48	Reactance datatype	129
6.4.49	ReactancePerLength datatype	129
6.4.50	ReactivePower datatype	130
6.4.51	RealEnergy datatype	130
6.4.52	Resistance datatype	130
6.4.53	ResistancePerLength datatype	130
6.4.54	RotationSpeed datatype	131
6.4.55	Seconds datatype	131
6.4.56	Speed datatype	131
6.4.57	String primitive	132
6.4.58	StringQuantity compound	132
6.4.59	Susceptance datatype	132
6.4.60	SusceptancePerLength datatype	132
6.4.61	Temperature datatype	133
6.4.62	Time primitive	133
6.4.63	TimeInterval compound	133
6.4.64	UnitMultiplier enumeration	133
6.4.65	UnitSymbol enumeration	134
6.4.66	Voltage datatype	135
6.4.67	VoltagePerReactivePower datatype	135
6.4.68	Volume datatype	135
6.4.69	VolumeFlowRate datatype	136
6.4.70	WaterLevel datatype	136
6.4.71	Weight datatype	136
6.5	Package Core	136
6.5.1	General	136
6.5.2	ACDC Terminal	140
6.5.3	BaseFrequency	141
6.5.4	BasePower	141
6.5.5	BaseVoltage	142
6.5.6	BasicIntervalSchedule	143
6.5.7	Bay	143
6.5.8	BreakerConfiguration enumeration	144
6.5.9	BusbarConfiguration enumeration	144
6.5.10	ConductingEquipment	144
6.5.11	ConnectivityNode	145
6.5.12	ConnectivityNodeContainer	146
6.5.13	Curve	147
6.5.14	CurveData root class	147
6.5.15	CurveStyle enumeration	148
6.5.16	Equipment	148

6.5.17	EquipmentContainer	149
6.5.18	GeographicalRegion	150
6.5.19	IdentifiedObject root class	150
6.5.20	IrregularIntervalSchedule	151
6.5.21	IrregularTimePoint root class	152
6.5.22	Name root class	152
6.5.23	NameType root class	153
6.5.24	NameTypeAuthority root class	153
6.5.25	OperatingParticipant	154
6.5.26	OperatingShare root class	154
6.5.27	PSRType	155
6.5.28	PhaseCode enumeration	155
6.5.29	PowerSystemResource	156
6.5.30	RegularIntervalSchedule	157
6.5.31	RegularTimePoint root class	158
6.5.32	ReportingSuperGroup	158
6.5.33	SubGeographicalRegion	159
6.5.34	Substation	159
6.5.35	Terminal	160
6.5.36	VoltageLevel	161
6.6	Package DiagramLayout	162
6.6.1	General	162
6.6.2	DiagramStyle	163
6.6.3	Diagram	164
6.6.4	DiagramObject	164
6.6.5	DiagramObjectGluePoint root class	166
6.6.6	DiagramObjectPoint root class	166
6.6.7	DiagramObjectStyle	166
6.6.8	OrientationKind enumeration	167
6.6.9	TextDiagramObject	167
6.6.10	VisibilityLayer	168
6.7	Package OperationalLimits	169
6.7.1	General	169
6.7.2	ActivePowerLimit	170
6.7.3	ApparentPowerLimit	171
6.7.4	BranchGroup	171
6.7.5	BranchGroupTerminal root class	172
6.7.6	CurrentLimit	172
6.7.7	OperationalLimit	173
6.7.8	OperationalLimitDirectionKind enumeration	174
6.7.9	OperationalLimitSet	174
6.7.10	OperationalLimitType	175
6.7.11	VoltageLimit	175
6.8	Package Topology	176
6.8.1	General	176
6.8.2	BusNameMarker	178
6.8.3	DCTopologicalNode	179
6.8.4	TopologicalIsland	179
6.8.5	TopologicalNode	180

6.9	Package Wires.....	181
6.9.1	General	181
6.9.2	PerLengthSequenceImpedance	197
6.9.3	PerLengthPhaseImpedance	198
6.9.4	ShuntCompensatorPhase	199
6.9.5	RatioTapChanger	200
6.9.6	BusbarSection	201
6.9.7	SinglePhaseKind enumeration	202
6.9.8	TransformerTank	202
6.9.9	Disconnecter	203
6.9.10	Jumper	204
6.9.11	TapSchedule	205
6.9.12	TransformerCoreAdmittance	205
6.9.13	SVCControlMode enumeration.....	206
6.9.14	EnergyConsumerPhase	206
6.9.15	SynchronousMachineOperatingMode enumeration	207
6.9.16	TapChangerControl	208
6.9.17	PhaseTapChangerTable	209
6.9.18	TransformerStarImpedance	209
6.9.19	Breaker.....	210
6.9.20	GroundDisconnecter	211
6.9.21	SwitchSchedule	212
6.9.22	PowerTransformer	213
6.9.23	PhaseTapChangerAsymmetrical	216
6.9.24	Ground	217
6.9.25	Line	218
6.9.26	PhaseTapChangerSymmetrical	218
6.9.27	RegulationSchedule.....	219
6.9.28	Fuse	220
6.9.29	TransformerMeshImpedance	221
6.9.30	SwitchPhase	222
6.9.31	PowerTransformerEnd.....	223
6.9.32	PetersenCoil.....	225
6.9.33	RegulatingCondEq.....	226
6.9.34	PhaseTapChangerNonLinear.....	227
6.9.35	SeriesCompensator	228
6.9.36	PhaseShuntConnectionKind enumeration	229
6.9.37	GroundingImpedance	229
6.9.38	TransformerControlMode enumeration.....	230
6.9.39	RatioTapChangerTablePoint.....	230
6.9.40	ACLineSegment.....	231
6.9.41	Recloser	232
6.9.42	CompositeSwitch.....	234
6.9.43	TransformerEnd.....	234
6.9.44	Sectionalizer.....	236
6.9.45	VoltageControlZone	237
6.9.46	EnergySource.....	237
6.9.47	SynchronousMachine.....	239
6.9.48	RegulatingControlModeKind enumeration	241

6.9.49	Clamp	242
6.9.50	TransformerTankEnd	243
6.9.51	PhaseTapChanger	244
6.9.52	ACLineSegmentPhase	244
6.9.53	RatioTapChangerTable	245
6.9.54	RotatingMachine	246
6.9.55	RegulatingControl	247
6.9.56	PhaseImpedanceData root class	248
6.9.57	ShuntCompensator	249
6.9.58	EarthFaultCompensator	250
6.9.59	MutualCoupling	251
6.9.60	Cut	252
6.9.61	ReactiveCapabilityCurve	253
6.9.62	Switch	254
6.9.63	StaticVarCompensator	256
6.9.64	CoolantType enumeration	257
6.9.65	ProtectedSwitch	257
6.9.66	EnergyConsumer	258
6.9.67	Junction	260
6.9.68	PhaseTapChangerLinear	261
6.9.69	Conductor	262
6.9.70	PerLengthImpedance	263
6.9.71	FrequencyConverter	263
6.9.72	Plant	264
6.9.73	PhaseTapChangerTablePoint	265
6.9.74	LoadBreakSwitch	266
6.9.75	PetersenCoilModeKind enumeration	267
6.9.76	SynchronousMachineKind enumeration	267
6.9.77	Connector	267
6.9.78	AsynchronousMachine	268
6.9.79	TapChanger	270
6.9.80	ShortCircuitTypeKind enumeration	271
6.9.81	WindingConnection enumeration	272
6.9.82	ExternalNetworkInjection	272
6.9.83	AsynchronousMachineKind enumeration	274
6.9.84	LinearShuntCompensator	274
6.9.85	NonlinearShuntCompensator	276
6.9.86	NonlinearShuntCompensatorPoint root class	277
6.9.87	LinearShuntCompensatorPhase	277
6.9.88	NonlinearShuntCompensatorPhase	278
6.9.89	NonlinearShuntCompensatorPhasePoint root class	279
6.9.90	PerLengthLineParameter	279
6.9.91	TapChangerTablePoint root class	280
6.9.92	PhaseTapChangerTabular	281
6.9.93	PowerElectronicsConnection	282
6.10	Package Generation	283
6.10.1	General	283
6.10.2	Package GenerationTrainingSimulation	284
6.10.3	Package Production	299

6.11	Package DC	346
6.11.1	General	346
6.11.2	ACDCConverter	351
6.11.3	ACDCConverterDCTerminal	353
6.11.4	DCBaseTerminal	354
6.11.5	DCConverterUnit	355
6.11.6	DCLine	356
6.11.7	DCSeriesDevice	356
6.11.8	VsQpccControlKind enumeration	357
6.11.9	CsPpccControlKind enumeration	357
6.11.10	CsOperatingModeKind enumeration	358
6.11.11	CsConverter	358
6.11.12	DCBreaker	360
6.11.13	DCEquipmentContainer	360
6.11.14	DCBusbar	361
6.11.15	DCConverterOperatingModeKind enumeration	362
6.11.16	DCChopper	362
6.11.17	DCDisconnect	363
6.11.18	DCGround	364
6.11.19	DCLineSegment	364
6.11.20	DCShunt	365
6.11.21	DCConductingEquipment	366
6.11.22	DCSwitch	367
6.11.23	DCNode	368
6.11.24	DCTopologicalIsland	368
6.11.25	DCPolarityKind enumeration	369
6.11.26	PerLengthDCLineParameter	369
6.11.27	DCTerminal	370
6.11.28	VsPpccControlKind enumeration	370
6.11.29	VsCapabilityCurve	371
6.11.30	VsConverter	372
6.12	Package LoadModel	373
6.12.1	General	373
6.12.2	ConformLoad	375
6.12.3	ConformLoadGroup	376
6.12.4	ConformLoadSchedule	376
6.12.5	DayType	377
6.12.6	EnergyArea	378
6.12.7	LoadArea	378
6.12.8	LoadGroup	379
6.12.9	LoadResponseCharacteristic	379
6.12.10	NonConformLoad	381
6.12.11	NonConformLoadGroup	382
6.12.12	NonConformLoadSchedule	382
6.12.13	PowerCutZone	383
6.12.14	Season	384
6.12.15	SeasonDayTypeSchedule	384
6.12.16	StationSupply	385
6.12.17	SubLoadArea	386

6.13	Package AuxiliaryEquipment.....	387
6.13.1	General	387
6.13.2	AuxiliaryEquipment	388
6.13.3	CurrentTransformer	389
6.13.4	FaultIndicator	390
6.13.5	PostLineSensor	391
6.13.6	PotentialTransformer	392
6.13.7	PotentialTransformerKind enumeration	393
6.13.8	Sensor.....	393
6.13.9	SurgeArrester	394
6.13.10	WaveTrap.....	394
6.14	Package Protection.....	395
6.14.1	General	395
6.14.2	CurrentRelay	396
6.14.3	ProtectionEquipment	397
6.14.4	RecloseSequence.....	398
6.14.5	SynchrocheckRelay	399
6.15	Package Equivalents.....	400
6.15.1	General	400
6.15.2	EquivalentBranch	401
6.15.3	EquivalentEquipment	404
6.15.4	EquivalentInjection	405
6.15.5	EquivalentNetwork.....	406
6.15.6	EquivalentShunt	407
6.16	Package Meas	408
6.16.1	General	408
6.16.2	Accumulator	412
6.16.3	AccumulatorLimit	412
6.16.4	AccumulatorLimitSet.....	413
6.16.5	AccumulatorReset	413
6.16.6	AccumulatorValue.....	414
6.16.7	Analog.....	415
6.16.8	AnalogControl.....	416
6.16.9	AnalogLimit	417
6.16.10	AnalogLimitSet	417
6.16.11	AnalogValue	418
6.16.12	Command	418
6.16.13	Control	419
6.16.14	Discrete	420
6.16.15	DiscreteCommand	421
6.16.16	DiscreteValue	421
6.16.17	Limit	422
6.16.18	LimitSet	422
6.16.19	Measurement.....	423
6.16.20	MeasurementValue.....	424
6.16.21	MeasurementValueQuality	425
6.16.22	MeasurementValueSource	426
6.16.23	Quality61850 root class	426
6.16.24	RaiseLowerCommand.....	427

6.16.25	SetPoint	428
6.16.26	StringMeasurement	429
6.16.27	StringMeasurementValue.....	429
6.16.28	Validity enumeration	430
6.16.29	ValueAliasSet	431
6.16.30	ValueToAlias	431
6.17	Package SCADA.....	432
6.17.1	General	432
6.17.2	CommunicationLink	433
6.17.3	RemoteControl	434
6.17.4	RemotePoint.....	434
6.17.5	RemoteSource.....	435
6.17.6	RemoteUnit	436
6.17.7	RemoteUnitType enumeration.....	436
6.17.8	Source enumeration	437
6.18	Package ControlArea	437
6.18.1	General	437
6.18.2	AltGeneratingUnitMeas root class.....	440
6.18.3	AltTieMeas root class	440
6.18.4	ControlArea	440
6.18.5	ControlAreaGeneratingUnit.....	441
6.18.6	ControlAreaTypeKind enumeration	442
6.18.7	TieFlow root class	442
6.19	Package Contingency	443
6.19.1	General	443
6.19.2	Contingency	443
6.19.3	ContingencyElement.....	444
6.19.4	ContingencyEquipment.....	444
6.19.5	ContingencyEquipmentStatusKind enumeration	445
6.20	Package StateVariables	445
6.20.1	General	445
6.20.2	StateVariable root class.....	446
6.20.3	SvInjection.....	446
6.20.4	SvPowerFlow.....	447
6.20.5	SvShuntCompensatorSections.....	447
6.20.6	SvStatus.....	448
6.20.7	SvTapStep.....	448
6.20.8	SvVoltage.....	449
Annex A (informative)	Custom extensions.....	450
A.1	Overview.....	450
A.2	European extensions	450
A.2.1	Overview	450
A.2.2	OperationalLimitType.....	450
A.2.3	LimitTypeKind enumeration	450
A.2.4	IdentifiedObject	451
A.2.5	EnergySchedulingType	452
A.2.6	ConnectivityNode	452
A.2.7	TopologicalNode.....	453
Bibliography	455

Figure 1 – Example working group package dependencies	39
Figure 2 – CIM IEC 61970-301 package diagram	40
Figure 3 – Example of generalization	42
Figure 4 – Example of simple association	43
Figure 5 – Example of aggregation	43
Figure 6 – Equipment containers.....	45
Figure 7 – Names	46
Figure 8 – Connectivity model.....	47
Figure 9 – Simple network example	48
Figure 10 – Simple network connectivity modeled with CIM Topology	49
Figure 11 – Equipment inheritance hierarchy	50
Figure 12 – Transformer and Tank model.....	51
Figure 13 – Transformer model.....	53
Figure 14 – Transformer tap model	54
Figure 15 – Phasor diagram and equations	57
Figure 16 – Symmetrical phase shifter impedance variation	58
Figure 17 – Core organization.....	59
Figure 18 – Phasor diagram and equations	59
Figure 19 – Core organization.....	60
Figure 20 – Phasor diagram and equations	61
Figure 21 – Core organization.....	62
Figure 22 – Phasor diagram and equations	62
Figure 23 – Phasor diagrams and equations	64
Figure 24 – Core organization.....	65
Figure 25 – Phase wire data model.....	67
Figure 26 – Phase connectivity	68
Figure 27 – Station including Petersen coils drawing example	69
Figure 28 – Grounding device data model.....	70
Figure 29 – Instance diagram objects with one terminal coil.....	71
Figure 30 – Cuts, clamps, and jumpers UML model	72
Figure 31 – Example before cuts and jumpers are applied	73
Figure 32 – Example after cuts and jumpers are applied	74
Figure 33 – Example of jumper without cut or clamp	75
Figure 34 – Navigating from PSR to MeasurementValue	77
Figure 35 – Measurement placement	80
Figure 36 – Regulating control models	81
Figure 37 – HVDC bipolar link from IEC 60633	82
Figure 38 – A point-to-point VSC transmission scheme.....	83
Figure 39 – HVDC power flow model.....	83
Figure 40 – Current Source Converter power flow	84
Figure 41 – Voltage Source Converter power flow.....	85
Figure 42 – Power flow cases	86

Figure 43 – VSC transmission with a symmetrical monopole illustrated with capacitive earthing on the DC side (IEC 62747)	87
Figure 44 – VSC <i>P-Q</i> capability curve	87
Figure 45 – Bipolar VSC transmission with earth return (IEC 62747).....	88
Figure 46 – Object instances for a bipolar current source HVDC line	89
Figure 47 – Object instances for symmetric monopole VSC HVDC data model.....	90
Figure 48 – Containment structure for a bipolar HVDC line	91
Figure 49 – Containment structure for a bipolar back-to-back HVDC station	92
Figure 50 – The Basic topology in package Core	93
Figure 51 – DC and AC topology.....	94
Figure 52 – HVDC Containment	95
Figure 53 – Equipment model	96
Figure 54 – HVDC line model.....	97
Figure 55 – Key for Figure 56, Figure 57 and Figure 58	98
Figure 56 – Simple monopole with measurements	98
Figure 57 – Simple bipolar	99
Figure 58 – Monopole one side with detailed model	99
Figure 59 – <i>V-I</i> characteristic of SVC	100
Figure 60 – CIM top level packages	105
Figure 61 – Class diagram Faults::Faults	107
Figure 62 – Class diagram DocIEC 61970::DocumentationExampleInheritance	111
Figure 63 – Class diagram DocIEC 61970::DocumentationExampleAggregation	112
Figure 64 – Class diagram DocIEC 61970::DocumentationExampleAssociation	112
Figure 65 – Class diagram Domain::CombinedElectricalDatatypes.....	113
Figure 66 – Class diagram Domain::BasicDatatypes	113
Figure 67 – Class diagram Domain::ElectricityDatatypes	114
Figure 68 – Class diagram Domain::EnumeratedUnitDatatypes.....	115
Figure 69 – Class diagram Domain::GeneralDatatypes	116
Figure 70 – Class diagram Domain::MonetaryDatatypes	117
Figure 71 – Class diagram Domain::TimeDatatypes	118
Figure 72 – Class diagram Core::Main	137
Figure 73 – Class diagram Core::Names.....	138
Figure 74 – Class diagram Core::CurveSchedule	138
Figure 75 – Class diagram Core::Datatypes	139
Figure 76 – Class diagram Core::Reporting	139
Figure 77 – Class diagram Core::OperatingShare	140
Figure 78 – Class diagram DiagramLayout::DiagramLayout	163
Figure 79 – Class diagram OperationalLimits::OperationalLimits.....	169
Figure 80 – Class diagram OperationalLimits::BranchGroup	170
Figure 81 – Class diagram Topology::Main	177
Figure 82 – Class diagram Topology::TopologyReporting.....	178
Figure 83 – Class diagram Wires::CutsAndJumpers.....	182
Figure 84 – Class diagram Wires::Datatypes.....	183

Figure 85 – Class diagram Wires::EarthFaultCompensator	184
Figure 86 – Class diagram Wires::InheritanceHierarchy	185
Figure 87 – Class diagram Wires::LineModel	186
Figure 88 – Class diagram Wires::MutualCoupling	187
Figure 89 – Class diagram Wires::NamingHierarchyPart1	188
Figure 90 – Class diagram Wires::NamingHierarchyPart2	189
Figure 91 – Class diagram Wires::RegulatingEquipment	190
Figure 92 – Class diagram Wires::Schedules	191
Figure 93 – Class diagram Wires::ShuntCompensator	192
Figure 94 – Class diagram Wires::SwitchingEquipment.....	193
Figure 95 – Class diagram Wires::TapChanger	194
Figure 96 – Class diagram Wires::VoltageControl	195
Figure 97 – Class diagram Wires::WiresPhaseModel	196
Figure 98 – Class diagram Wires::Transformer	197
Figure 99 – Class diagram Generation::Main	283
Figure 100 – Class diagram GenerationTrainingSimulation::Main.....	284
Figure 101 – Class diagram GenerationTrainingSimulation::Datatypes	284
Figure 102 – Class diagram Production::PowerElectronics.....	300
Figure 103 – Class diagram Production::Nuclear.....	300
Figure 104 – Class diagram Production::Main	301
Figure 105 – Class diagram Production::Datatypes	302
Figure 106 – Class diagram Production::Hydro	303
Figure 107 – Class diagram Production::Thermal.....	304
Figure 108 – Class diagram DC::DCContainment.....	347
Figure 109 – Class diagram DC::DCEquipment.....	348
Figure 110 – Class diagram DC::DCLineModel	349
Figure 111 – Class diagram DC::ACDCCConverter	350
Figure 112 – Class diagram DC::ACDCCConnectivityModel	351
Figure 113 – Class diagram LoadModel::Main.....	374
Figure 114 – Class diagram LoadModel::Datatypes	374
Figure 115 – Class diagram AuxiliaryEquipment::AuxiliaryEquipment.....	388
Figure 116 – Class diagram Protection::Main	396
Figure 117 – Class diagram Equivalentents::Main.....	401
Figure 118 – Class diagram Meas::Control	409
Figure 119 – Class diagram Meas::Datatypes	409
Figure 120 – Class diagram Meas::Measurement.....	410
Figure 121 – Class diagram Meas::MeasurementInheritance	411
Figure 122 – Class diagram Meas::Quality	411
Figure 123 – Class diagram SCADA::Datatypes.....	432
Figure 124 – Class diagram SCADA::Main.....	433
Figure 125 – Class diagram ControlArea::ControlArea	438
Figure 126 – Class diagram ControlArea::ControlAreaInheritance.....	439
Figure 127 – Class diagram ControlArea::Datatypes	439

Figure 128 – Class diagram Contingency::Contingency.....	443
Figure 129 – Class diagram StateVariables::StateVariables.....	446
Table 1 – NameType class naming conventions.....	46
Table 2 – Mapping of phase shift transformers to CIM classes.....	55
Table 3 – Mapping of symbols used in formulas to CIM attributes.....	56
Table 4 – Impedance variations in a phase shift transformer.....	56
Table 5 – Description of variables.....	57
Table 6 – Tap changer control options.....	66
Table 7 – measurementType naming conventions.....	78
Table 8 – MeasurementValueSource naming conventions.....	79
Table 9 – Attributes of Package1::Class1.....	106
Table 10 – Association ends of Package1::Class1 with other classes.....	106
Table 11 – Literals of Package1::Enumeration1.....	107
Table 12 – Attributes of Faults::EquipmentFault.....	108
Table 13 – Association ends of Faults::EquipmentFault with other classes.....	108
Table 14 – Attributes of Faults::Fault.....	108
Table 15 – Association ends of Faults::Fault with other classes.....	109
Table 16 – Attributes of Faults::FaultCauseType.....	109
Table 17 – Association ends of Faults::FaultCauseType with other classes.....	109
Table 18 – Attributes of Faults::FaultImpedance.....	109
Table 19 – Attributes of Faults::LineFault.....	110
Table 20 – Association ends of Faults::LineFault with other classes.....	110
Table 21 – Literals of Faults::PhaseConnectedFaultKind.....	110
Table 22 – Attributes of Domain::ActivePower.....	118
Table 23 – Attributes of Domain::ActivePowerChangeRate.....	119
Table 24 – Attributes of Domain::ActivePowerPerCurrentFlow.....	119
Table 25 – Attributes of Domain::ActivePowerPerFrequency.....	119
Table 26 – Attributes of Domain::Admittance.....	119
Table 27 – Attributes of Domain::AngleDegrees.....	120
Table 28 – Attributes of Domain::AngleRadians.....	120
Table 29 – Attributes of Domain::ApparentPower.....	120
Table 30 – Attributes of Domain::Area.....	120
Table 31 – Attributes of Domain::Capacitance.....	121
Table 32 – Attributes of Domain::CapacitancePerLength.....	121
Table 33 – Attributes of Domain::Conductance.....	121
Table 34 – Attributes of Domain::ConductancePerLength.....	122
Table 35 – Attributes of Domain::CostPerEnergyUnit.....	122
Table 36 – Attributes of Domain::CostPerVolume.....	122
Table 37 – Attributes of Domain::CostRate.....	123
Table 38 – Literals of Domain::Currency.....	123
Table 39 – Attributes of Domain::CurrentFlow.....	123
Table 40 – Attributes of Domain::Damping.....	124

Table 41 – Attributes of Domain::DateInterval	124
Table 42 – Attributes of Domain::DateTimeInterval	124
Table 43 – Attributes of Domain::DecimalQuantity	125
Table 44 – Attributes of Domain::Displacement	125
Table 45 – Attributes of Domain::FloatQuantity	125
Table 46 – Attributes of Domain::Frequency	126
Table 47 – Attributes of Domain::Hours	126
Table 48 – Attributes of Domain::Impedance	126
Table 49 – Attributes of Domain::Inductance	126
Table 50 – Attributes of Domain::InductancePerLength	127
Table 51 – Attributes of Domain::IntegerQuantity	127
Table 52 – Attributes of Domain::KiloActivePower	127
Table 53 – Attributes of Domain::Length	127
Table 54 – Attributes of Domain::Minutes	128
Table 55 – Attributes of Domain::Money	128
Table 56 – Attributes of Domain::MonthDayInterval	128
Table 57 – Attributes of Domain::PU	129
Table 58 – Attributes of Domain::PerCent	129
Table 59 – Attributes of Domain::Pressure	129
Table 60 – Attributes of Domain::Reactance	129
Table 61 – Attributes of Domain::ReactancePerLength	130
Table 62 – Attributes of Domain::ReactivePower	130
Table 63 – Attributes of Domain::RealEnergy	130
Table 64 – Attributes of Domain::Resistance	130
Table 65 – Attributes of Domain::ResistancePerLength	131
Table 66 – Attributes of Domain::RotationSpeed	131
Table 67 – Attributes of Domain::Seconds	131
Table 68 – Attributes of Domain::Speed	132
Table 69 – Attributes of Domain::StringQuantity	132
Table 70 – Attributes of Domain::Susceptance	132
Table 71 – Attributes of Domain::SusceptancePerLength	133
Table 72 – Attributes of Domain::Temperature	133
Table 73 – Attributes of Domain::TimeInterval	133
Table 74 – Literals of Domain::UnitMultiplier	134
Table 75 – Literals of Domain::UnitSymbol	134
Table 76 – Attributes of Domain::Voltage	135
Table 77 – Attributes of Domain::VoltagePerReactivePower	135
Table 78 – Attributes of Domain::Volume	135
Table 79 – Attributes of Domain::VolumeFlowRate	136
Table 80 – Attributes of Domain::WaterLevel	136
Table 81 – Attributes of Domain::Weight	136
Table 82 – Attributes of Core::ACDCTerminal	140
Table 83 – Association ends of Core::ACDCTerminal with other classes	141

Table 84 – Attributes of Core::BaseFrequency	141
Table 85 – Association ends of Core::BaseFrequency with other classes	141
Table 86 – Attributes of Core::BasePower	142
Table 87 – Association ends of Core::BasePower with other classes	142
Table 88 – Attributes of Core::BaseVoltage	142
Table 89 – Association ends of Core::BaseVoltage with other classes	142
Table 90 – Attributes of Core::BasicIntervalSchedule	143
Table 91 – Association ends of Core::BasicIntervalSchedule with other classes	143
Table 92 – Attributes of Core::Bay	143
Table 93 – Association ends of Core::Bay with other classes	144
Table 94 – Literals of Core::BreakerConfiguration	144
Table 95 – Literals of Core::BusbarConfiguration	144
Table 96 – Attributes of Core::ConductingEquipment	145
Table 97 – Association ends of Core::ConductingEquipment with other classes	145
Table 98 – Attributes of Core::ConnectivityNode	146
Table 99 – Association ends of Core::ConnectivityNode with other classes	146
Table 100 – Attributes of Core::ConnectivityNodeContainer	146
Table 101 – Association ends of Core::ConnectivityNodeContainer with other classes	146
Table 102 – Attributes of Core::Curve	147
Table 103 – Association ends of Core::Curve with other classes	147
Table 104 – Attributes of Core::CurveData	148
Table 105 – Association ends of Core::CurveData with other classes	148
Table 106 – Literals of Core::CurveStyle	148
Table 107 – Attributes of Core::Equipment	149
Table 108 – Association ends of Core::Equipment with other classes	149
Table 109 – Attributes of Core::EquipmentContainer	149
Table 110 – Association ends of Core::EquipmentContainer with other classes	150
Table 111 – Attributes of Core::GeographicalRegion	150
Table 112 – Association ends of Core::GeographicalRegion with other classes	150
Table 113 – Attributes of Core::IdentifiedObject	151
Table 114 – Association ends of Core::IdentifiedObject with other classes	151
Table 115 – Attributes of Core::IrregularIntervalSchedule	151
Table 116 – Association ends of Core::IrregularIntervalSchedule with other classes	152
Table 117 – Attributes of Core::IrregularTimePoint	152
Table 118 – Association ends of Core::IrregularTimePoint with other classes	152
Table 119 – Attributes of Core::Name	152
Table 120 – Association ends of Core::Name with other classes	153
Table 121 – Attributes of Core::NameType	153
Table 122 – Association ends of Core::NameType with other classes	153
Table 123 – Attributes of Core::NameTypeAuthority	153
Table 124 – Association ends of Core::NameTypeAuthority with other classes	154
Table 125 – Attributes of Core::OperatingParticipant	154
Table 126 – Association ends of Core::OperatingParticipant with other classes	154

Table 127 – Attributes of Core::OperatingShare	154
Table 128 – Association ends of Core::OperatingShare with other classes	155
Table 129 – Attributes of Core::PSRType.....	155
Table 130 – Association ends of Core::PSRType with other classes	155
Table 131 – Literals of Core::PhaseCode.....	156
Table 132 – Attributes of Core::PowerSystemResource	156
Table 133 – Association ends of Core::PowerSystemResource with other classes	157
Table 134 – Attributes of Core::RegularIntervalSchedule	157
Table 135 – Association ends of Core::RegularIntervalSchedule with other classes	157
Table 136 – Attributes of Core::RegularTimePoint	158
Table 137 – Association ends of Core::RegularTimePoint with other classes	158
Table 138 – Attributes of Core::ReportingSuperGroup	158
Table 139 – Association ends of Core::ReportingSuperGroup with other classes	158
Table 140 – Attributes of Core::SubGeographicalRegion.....	159
Table 141 – Association ends of Core::SubGeographicalRegion with other classes	159
Table 142 – Attributes of Core::Substation.....	159
Table 143 – Association ends of Core::Substation with other classes	160
Table 144 – Attributes of Core::Terminal.....	160
Table 145 – Association ends of Core::Terminal with other classes	161
Table 146 – Attributes of Core::VoltageLevel	162
Table 147 – Association ends of Core::VoltageLevel with other classes	162
Table 148 – Attributes of DiagramLayout::DiagramStyle	163
Table 149 – Association ends of DiagramLayout::DiagramStyle with other classes	164
Table 150 – Attributes of DiagramLayout::Diagram	164
Table 151 – Association ends of DiagramLayout::Diagram with other classes	164
Table 152 – Attributes of DiagramLayout::DiagramObject	165
Table 153 – Association ends of DiagramLayout::DiagramObject with other classes	165
Table 154 – Association ends of DiagramLayout::DiagramObjectGluePoint with other classes	166
Table 155 – Attributes of DiagramLayout::DiagramObjectPoint	166
Table 156 – Association ends of DiagramLayout::DiagramObjectPoint with other classes	166
Table 157 – Attributes of DiagramLayout::DiagramObjectStyle	167
Table 158 – Association ends of DiagramLayout::DiagramObjectStyle with other classes	167
Table 159 – Literals of DiagramLayout::OrientationKind.....	167
Table 160 – Attributes of DiagramLayout::TextDiagramObject	167
Table 161 – Association ends of DiagramLayout::TextDiagramObject with other classes	168
Table 162 – Attributes of DiagramLayout::VisibilityLayer.....	168
Table 163 – Association ends of DiagramLayout::VisibilityLayer with other classes	169
Table 164 – Attributes of OperationalLimits::ActivePowerLimit	170
Table 165 – Association ends of OperationalLimits::ActivePowerLimit with other classes	171
Table 166 – Attributes of OperationalLimits::ApparentPowerLimit	171

Table 167 – Association ends of OperationalLimits::ApparentPowerLimit with other classes	171
Table 168 – Attributes of OperationalLimits::BranchGroup	171
Table 169 – Association ends of OperationalLimits::BranchGroup with other classes	172
Table 170 – Attributes of OperationalLimits::BranchGroupTerminal.....	172
Table 171 – Association ends of OperationalLimits::BranchGroupTerminal with other classes	172
Table 172 – Attributes of OperationalLimits::CurrentLimit.....	173
Table 173 – Association ends of OperationalLimits::CurrentLimit with other classes	173
Table 174 – Attributes of OperationalLimits::OperationalLimit	173
Table 175 – Association ends of OperationalLimits::OperationalLimit with other classes	174
Table 176 – Literals of OperationalLimits::OperationalLimitDirectionKind	174
Table 177 – Attributes of OperationalLimits::OperationalLimitSet	174
Table 178 – Association ends of OperationalLimits::OperationalLimitSet with other classes	175
Table 179 – Attributes of OperationalLimits::OperationalLimitType.....	175
Table 180 – Association ends of OperationalLimits::OperationalLimitType with other classes	175
Table 181 – Attributes of OperationalLimits::VoltageLimit	176
Table 182 – Association ends of OperationalLimits::VoltageLimit with other classes	176
Table 183 – Attributes of Topology::BusNameMarker.....	178
Table 184 – Association ends of Topology::BusNameMarker with other classes	179
Table 185 – Attributes of Topology::DCTopologicalNode.....	179
Table 186 – Association ends of Topology::DCTopologicalNode with other classes	179
Table 187 – Attributes of Topology::TopologicalIsland	180
Table 188 – Association ends of Topology::TopologicalIsland with other classes	180
Table 189 – Attributes of Topology::TopologicalNode	180
Table 190 – Association ends of Topology::TopologicalNode with other classes	181
Table 191 – Attributes of Wires::PerLengthSequenceImpedance	198
Table 192 – Association ends of Wires::PerLengthSequenceImpedance with other classes	198
Table 193 – Attributes of Wires::PerLengthPhaseImpedance	198
Table 194 – Association ends of Wires::PerLengthPhaseImpedance with other classes	199
Table 195 – Attributes of Wires::ShuntCompensatorPhase	199
Table 196 – Association ends of Wires::ShuntCompensatorPhase with other classes	199
Table 197 – Attributes of Wires::RatioTapChanger.....	200
Table 198 – Association ends of Wires::RatioTapChanger with other classes	200
Table 199 – Attributes of Wires::BusbarSection	201
Table 200 – Association ends of Wires::BusbarSection with other classes	201
Table 201 – Literals of Wires::SinglePhaseKind	202
Table 202 – Attributes of Wires::TransformerTank	202
Table 203 – Association ends of Wires::TransformerTank with other classes	202
Table 204 – Attributes of Wires::Disconnecter.....	203
Table 205 – Association ends of Wires::Disconnecter with other classes	203
Table 206 – Attributes of Wires::Jumper	204

Table 207 – Association ends of Wires::Jumper with other classes	204
Table 208 – Attributes of Wires::TapSchedule.....	205
Table 209 – Association ends of Wires::TapSchedule with other classes	205
Table 210 – Attributes of Wires::TransformerCoreAdmittance	206
Table 211 – Association ends of Wires::TransformerCoreAdmittance with other classes	206
Table 212 – Literals of Wires::SVCControlMode.....	206
Table 213 – Attributes of Wires::EnergyConsumerPhase	207
Table 214 – Association ends of Wires::EnergyConsumerPhase with other classes	207
Table 215 – Literals of Wires::SynchronousMachineOperatingMode	208
Table 216 – Attributes of Wires::TapChangerControl	208
Table 217 – Association ends of Wires::TapChangerControl with other classes	209
Table 218 – Attributes of Wires::PhaseTapChangerTable	209
Table 219 – Association ends of Wires::PhaseTapChangerTable with other classes	209
Table 220 – Attributes of Wires::TransformerStarImpedance.....	210
Table 221 – Association ends of Wires::TransformerStarImpedance with other classes	210
Table 222 – Attributes of Wires::Breaker.....	210
Table 223 – Association ends of Wires::Breaker with other classes	211
Table 224 – Attributes of Wires::GroundDisconnecter	211
Table 225 – Association ends of Wires::GroundDisconnecter with other classes	212
Table 226 – Attributes of Wires::SwitchSchedule	212
Table 227 – Association ends of Wires::SwitchSchedule with other classes	213
Table 228 – Attributes of Wires::PowerTransformer	214
Table 229 – Association ends of Wires::PowerTransformer with other classes	215
Table 230 – Attributes of Wires::PhaseTapChangerAsymmetrical	216
Table 231 – Association ends of Wires::PhaseTapChangerAsymmetrical with other classes	217
Table 232 – Attributes of Wires::Ground	217
Table 233 – Association ends of Wires::Ground with other classes	217
Table 234 – Attributes of Wires::Line	218
Table 235 – Association ends of Wires::Line with other classes	218
Table 236 – Attributes of Wires::PhaseTapChangerSymmetrical	219
Table 237 – Association ends of Wires::PhaseTapChangerSymmetrical with other classes	219
Table 238 – Attributes of Wires::RegulationSchedule.....	220
Table 239 – Association ends of Wires::RegulationSchedule with other classes.....	220
Table 240 – Attributes of Wires::Fuse	220
Table 241 – Association ends of Wires::Fuse with other classes	221
Table 242 – Attributes of Wires::TransformerMeshImpedance.....	222
Table 243 – Association ends of Wires::TransformerMeshImpedance with other classes	222
Table 244 – Attributes of Wires::SwitchPhase	222
Table 245 – Association ends of Wires::SwitchPhase with other classes.....	223
Table 246 – Attributes of Wires::PowerTransformerEnd	224
Table 247 – Association ends of Wires::PowerTransformerEnd with other classes	225
Table 248 – Attributes of Wires::PetersenCoil.....	225

Table 249 – Association ends of Wires::PetersenCoil with other classes.....	226
Table 250 – Attributes of Wires::RegulatingCondEq.....	226
Table 251 – Association ends of Wires::RegulatingCondEq with other classes.....	227
Table 252 – Attributes of Wires::PhaseTapChangerNonLinear	227
Table 253 – Association ends of Wires::PhaseTapChangerNonLinear with other classes	228
Table 254 – Attributes of Wires::SeriesCompensator	228
Table 255 – Association ends of Wires::SeriesCompensator with other classes	229
Table 256 – Literals of Wires::PhaseShuntConnectionKind	229
Table 257 – Attributes of Wires::GroundingImpedance.....	230
Table 258 – Association ends of Wires::GroundingImpedance with other classes	230
Table 259 – Literals of Wires::TransformerControlMode.....	230
Table 260 – Attributes of Wires::RatioTapChangerTablePoint	231
Table 261 – Association ends of Wires::RatioTapChangerTablePoint with other classes.....	231
Table 262 – Attributes of Wires::ACLineSegment.....	231
Table 263 – Association ends of Wires::ACLineSegment with other classes.....	232
Table 264 – Attributes of Wires::Recloser	233
Table 265 – Association ends of Wires::Recloser with other classes	233
Table 266 – Attributes of Wires::CompositeSwitch	234
Table 267 – Association ends of Wires::CompositeSwitch with other classes	234
Table 268 – Attributes of Wires::TransformerEnd.....	235
Table 269 – Association ends of Wires::TransformerEnd with other classes.....	235
Table 270 – Attributes of Wires::Sectionalizer.....	236
Table 271 – Association ends of Wires::Sectionalizer with other classes.....	236
Table 272 – Attributes of Wires::VoltageControlZone	237
Table 273 – Association ends of Wires::VoltageControlZone with other classes.....	237
Table 274 – Attributes of Wires::EnergySource	238
Table 275 – Association ends of Wires::EnergySource with other classes.....	238
Table 276 – Attributes of Wires::SynchronousMachine.....	239
Table 277 – Association ends of Wires::SynchronousMachine with other classes	241
Table 278 – Literals of Wires::RegulatingControlModeKind	241
Table 279 – Attributes of Wires::Clamp	242
Table 280 – Association ends of Wires::Clamp with other classes.....	242
Table 281 – Attributes of Wires::TransformerTankEnd	243
Table 282 – Association ends of Wires::TransformerTankEnd with other classes	243
Table 283 – Attributes of Wires::PhaseTapChanger	244
Table 284 – Association ends of Wires::PhaseTapChanger with other classes.....	244
Table 285 – Attributes of Wires::ACLineSegmentPhase	245
Table 286 – Association ends of Wires::ACLineSegmentPhase with other classes.....	245
Table 287 – Attributes of Wires::RatioTapChangerTable	245
Table 288 – Association ends of Wires::RatioTapChangerTable with other classes.....	245
Table 289 – Attributes of Wires::RotatingMachine	246
Table 290 – Association ends of Wires::RotatingMachine with other classes.....	246

Table 291 – Attributes of Wires::RegulatingControl	247
Table 292 – Association ends of Wires::RegulatingControl with other classes	248
Table 293 – Attributes of Wires::PhaseImpedanceData	248
Table 294 – Association ends of Wires::PhaseImpedanceData with other classes	249
Table 295 – Attributes of Wires::ShuntCompensator	249
Table 296 – Association ends of Wires::ShuntCompensator with other classes	250
Table 297 – Attributes of Wires::EarthFaultCompensator	250
Table 298 – Association ends of Wires::EarthFaultCompensator with other classes	251
Table 299 – Attributes of Wires::MutualCoupling	251
Table 300 – Association ends of Wires::MutualCoupling with other classes	252
Table 301 – Attributes of Wires::Cut	252
Table 302 – Association ends of Wires::Cut with other classes	253
Table 303 – Attributes of Wires::ReactiveCapabilityCurve	254
Table 304 – Association ends of Wires::ReactiveCapabilityCurve with other classes	254
Table 305 – Attributes of Wires::Switch	255
Table 306 – Association ends of Wires::Switch with other classes	255
Table 307 – Attributes of Wires::StaticVarCompensator	256
Table 308 – Association ends of Wires::StaticVarCompensator with other classes	257
Table 309 – Literals of Wires::CoolantType	257
Table 310 – Attributes of Wires::ProtectedSwitch	257
Table 311 – Association ends of Wires::ProtectedSwitch with other classes	258
Table 312 – Attributes of Wires::EnergyConsumer	259
Table 313 – Association ends of Wires::EnergyConsumer with other classes	259
Table 314 – Attributes of Wires::Junction	260
Table 315 – Association ends of Wires::Junction with other classes	260
Table 316 – Attributes of Wires::PhaseTapChangerLinear	261
Table 317 – Association ends of Wires::PhaseTapChangerLinear with other classes	262
Table 318 – Attributes of Wires::Conductor	262
Table 319 – Association ends of Wires::Conductor with other classes	263
Table 320 – Attributes of Wires::PerLengthImpedance	263
Table 321 – Association ends of Wires::PerLengthImpedance with other classes	263
Table 322 – Attributes of Wires::FrequencyConverter	264
Table 323 – Association ends of Wires::FrequencyConverter with other classes	264
Table 324 – Attributes of Wires::Plant	265
Table 325 – Association ends of Wires::Plant with other classes	265
Table 326 – Attributes of Wires::PhaseTapChangerTablePoint	265
Table 327 – Association ends of Wires::PhaseTapChangerTablePoint with other classes	266
Table 328 – Attributes of Wires::LoadBreakSwitch	266
Table 329 – Association ends of Wires::LoadBreakSwitch with other classes	266
Table 330 – Literals of Wires::PetersenCoilModeKind	267
Table 331 – Literals of Wires::SynchronousMachineKind	267
Table 332 – Attributes of Wires::Connector	268

Table 333 – Association ends of Wires::Connector with other classes.....	268
Table 334 – Attributes of Wires::AsynchronousMachine	269
Table 335 – Association ends of Wires::AsynchronousMachine with other classes.....	270
Table 336 – Attributes of Wires::TapChanger.....	270
Table 337 – Association ends of Wires::TapChanger with other classes	271
Table 338 – Literals of Wires::ShortCircuitRotorKind.....	272
Table 339 – Literals of Wires::WindingConnection	272
Table 340 – Attributes of Wires::ExternalNetworkInjection	272
Table 341 – Association ends of Wires::ExternalNetworkInjection with other classes	274
Table 342 – Literals of Wires::AsynchronousMachineKind	274
Table 343 – Attributes of Wires::LinearShuntCompensator	274
Table 344 – Association ends of Wires::LinearShuntCompensator with other classes	275
Table 345 – Attributes of Wires::NonlinearShuntCompensator	276
Table 346 – Association ends of Wires::NonlinearShuntCompensator with other classes	276
Table 347 – Attributes of Wires::NonlinearShuntCompensatorPoint	277
Table 348 – Association ends of Wires::NonlinearShuntCompensatorPoint with other classes	277
Table 349 – Attributes of Wires::LinearShuntCompensatorPhase.....	278
Table 350 – Association ends of Wires::LinearShuntCompensatorPhase with other classes	278
Table 351 – Attributes of Wires::NonlinearShuntCompensatorPhase.....	278
Table 352 – Association ends of Wires::NonlinearShuntCompensatorPhase with other classes	279
Table 353 – Attributes of Wires::NonlinearShuntCompensatorPhasePoint.....	279
Table 354 – Association ends of Wires::NonlinearShuntCompensatorPhasePoint with other classes	279
Table 355 – Attributes of Wires::PerLengthLineParameter	280
Table 356 – Association ends of Wires::PerLengthLineParameter with other classes	280
Table 357 – Attributes of Wires::TapChangerTablePoint	280
Table 358 – Attributes of Wires::PhaseTapChangerTabular	281
Table 359 – Association ends of Wires::PhaseTapChangerTabular with other classes	281
Table 360 – Attributes of Wires::PowerElectronicsConnection	282
Table 361 – Association ends of Wires::PowerElectronicsConnection with other classes	283
Table 362 – Attributes of GenerationTrainingSimulation::BWRSteamSupply	285
Table 363 – Association ends of GenerationTrainingSimulation::BWRSteamSupply with other classes	286
Table 364 – Literals of GenerationTrainingSimulation::BoilerControlMode	286
Table 365 – Attributes of GenerationTrainingSimulation::CTTempActivePowerCurve	286
Table 366 – Association ends of GenerationTrainingSimulation::CTTempActivePowerCurve with other classes	287
Table 367 – Attributes of GenerationTrainingSimulation::CombustionTurbine	287
Table 368 – Association ends of GenerationTrainingSimulation::CombustionTurbine with other classes	288
Table 369 – Attributes of GenerationTrainingSimulation::DrumBoiler	288

Table 370 – Association ends of GenerationTrainingSimulation::DrumBoiler with other classes	289
Table 371 – Attributes of GenerationTrainingSimulation::FossilSteamSupply	289
Table 372 – Association ends of GenerationTrainingSimulation::FossilSteamSupply with other classes	290
Table 373 – Attributes of GenerationTrainingSimulation::HeatRecoveryBoiler	291
Table 374 – Association ends of GenerationTrainingSimulation::HeatRecoveryBoiler with other classes	292
Table 375 – Attributes of GenerationTrainingSimulation::HydroTurbine	292
Table 376 – Association ends of GenerationTrainingSimulation::HydroTurbine with other classes	293
Table 377 – Attributes of GenerationTrainingSimulation::PWRSteamSupply	293
Table 378 – Association ends of GenerationTrainingSimulation::PWRSteamSupply with other classes	294
Table 379 – Attributes of GenerationTrainingSimulation::PrimeMover	294
Table 380 – Association ends of GenerationTrainingSimulation::PrimeMover with other classes	294
Table 381 – Attributes of GenerationTrainingSimulation::SteamSupply	295
Table 382 – Association ends of GenerationTrainingSimulation::SteamSupply with other classes	295
Table 383 – Attributes of GenerationTrainingSimulation::SteamTurbine	295
Table 384 – Association ends of GenerationTrainingSimulation::SteamTurbine with other classes	296
Table 385 – Attributes of GenerationTrainingSimulation::Subcritical	296
Table 386 – Association ends of GenerationTrainingSimulation::Subcritical with other classes	297
Table 387 – Attributes of GenerationTrainingSimulation::Supercritical	298
Table 388 – Association ends of GenerationTrainingSimulation::Supercritical with other classes	299
Table 389 – Literals of GenerationTrainingSimulation::TurbineType	299
Table 390 – Attributes of Production::TargetLevelSchedule	304
Table 391 – Association ends of Production::TargetLevelSchedule with other classes	305
Table 392 – Attributes of Production::PenstockLossCurve	305
Table 393 – Association ends of Production::PenstockLossCurve with other classes	306
Table 394 – Attributes of Production::HydroGeneratingUnit	306
Table 395 – Association ends of Production::HydroGeneratingUnit with other classes	307
Table 396 – Attributes of Production::AirCompressor	308
Table 397 – Association ends of Production::AirCompressor with other classes	308
Table 398 – Attributes of Production::HydroPowerPlant	309
Table 399 – Association ends of Production::HydroPowerPlant with other classes	309
Table 400 – Literals of Production::GeneratorControlSource	310
Table 401 – Attributes of Production::InflowForecast	310
Table 402 – Association ends of Production::InflowForecast with other classes	310
Table 403 – Attributes of Production::SteamSendoutSchedule	311
Table 404 – Association ends of Production::SteamSendoutSchedule with other classes	311

Table 405 – Attributes of Production::HydroPump	311
Table 406 – Association ends of Production::HydroPump with other classes	312
Table 407 – Literals of Production::HydroEnergyConversionKind	312
Table 408 – Attributes of Production::Classification	313
Table 409 – Attributes of Production::HeatInputCurve	313
Table 410 – Association ends of Production::HeatInputCurve with other classes	314
Table 411 – Attributes of Production::GenUnitOpCostCurve	314
Table 412 – Association ends of Production::GenUnitOpCostCurve with other classes	314
Table 413 – Literals of Production::EmissionType	315
Table 414 – Attributes of Production::ThermalGeneratingUnit	315
Table 415 – Association ends of Production::ThermalGeneratingUnit with other classes	316
Table 416 – Attributes of Production::NuclearGeneratingUnit	317
Table 417 – Association ends of Production::NuclearGeneratingUnit with other classes	318
Table 418 – Attributes of Production::Reservoir	319
Table 419 – Association ends of Production::Reservoir with other classes	320
Table 420 – Attributes of Production::WindGeneratingUnit	320
Table 421 – Association ends of Production::WindGeneratingUnit with other classes	321
Table 422 – Attributes of Production::StartMainFuelCurve	322
Table 423 – Association ends of Production::StartMainFuelCurve with other classes	322
Table 424 – Attributes of Production::GrossToNetActivePowerCurve	323
Table 425 – Association ends of Production::GrossToNetActivePowerCurve with other classes	323
Table 426 – Attributes of Production::EmissionAccount	324
Table 427 – Association ends of Production::EmissionAccount with other classes	324
Table 428 – Attributes of Production::HeatRateCurve	324
Table 429 – Association ends of Production::HeatRateCurve with other classes	325
Table 430 – Attributes of Production::HeatRate	325
Table 431 – Attributes of Production::CAESPlant	326
Table 432 – Association ends of Production::CAESPlant with other classes	326
Table 433 – Literals of Production::HydroPlantStorageKind	326
Table 434 – Attributes of Production::GeneratingUnit	327
Table 435 – Association ends of Production::GeneratingUnit with other classes	329
Table 436 – Attributes of Production::EmissionCurve	329
Table 437 – Association ends of Production::EmissionCurve with other classes	330
Table 438 – Attributes of Production::ShutdownCurve	330
Table 439 – Association ends of Production::ShutdownCurve with other classes	331
Table 440 – Literals of Production::FuelType	331
Table 441 – Attributes of Production::FuelAllocationSchedule	331
Table 442 – Association ends of Production::FuelAllocationSchedule with other classes	332
Table 443 – Attributes of Production::CombinedCyclePlant	332
Table 444 – Association ends of Production::CombinedCyclePlant with other classes	333
Table 445 – Attributes of Production::TailbayLossCurve	333
Table 446 – Association ends of Production::TailbayLossCurve with other classes	333

Table 447 – Attributes of Production::IncrementalHeatRateCurve	334
Table 448 – Association ends of Production::IncrementalHeatRateCurve with other classes	334
Table 449 – Attributes of Production::FossilFuel	335
Table 450 – Association ends of Production::FossilFuel with other classes	335
Table 451 – Literals of Production::EmissionValueSource	336
Table 452 – Attributes of Production::StartIgnFuelCurve	336
Table 453 – Association ends of Production::StartIgnFuelCurve with other classes	336
Table 454 – Attributes of Production::HydroPumpOpSchedule	337
Table 455 – Association ends of Production::HydroPumpOpSchedule with other classes	337
Table 456 – Attributes of Production::HydroGeneratingEfficiencyCurve	337
Table 457 – Association ends of Production::HydroGeneratingEfficiencyCurve with other classes	338
Table 458 – Attributes of Production::Emission	338
Table 459 – Attributes of Production::CostPerHeatUnit	338
Table 460 – Attributes of Production::CogenerationPlant	339
Table 461 – Association ends of Production::CogenerationPlant with other classes	339
Table 462 – Attributes of Production::StartRampCurve	340
Table 463 – Association ends of Production::StartRampCurve with other classes	340
Table 464 – Literals of Production::GeneratorControlMode	340
Table 465 – Attributes of Production::LevelVsVolumeCurve	341
Table 466 – Association ends of Production::LevelVsVolumeCurve with other classes	341
Table 467 – Attributes of Production::StartupModel	341
Table 468 – Association ends of Production::StartupModel with other classes	342
Table 469 – Attributes of Production::GenUnitOpSchedule	342
Table 470 – Association ends of Production::GenUnitOpSchedule with other classes	343
Table 471 – Literals of Production::WindGenUnitKind	343
Table 472 – Attributes of Production::SolarGeneratingUnit	343
Table 473 – Association ends of Production::SolarGeneratingUnit with other classes	344
Table 474 – Attributes of Production::PowerElectronicsUnit	345
Table 475 – Association ends of Production::PowerElectronicsUnit with other classes	345
Table 476 – Attributes of Production::PowerElectronicsWindUnit	346
Table 477 – Association ends of Production::PowerElectronicsWindUnit with other classes	346
Table 478 – Attributes of DC::ACDCCConverter	352
Table 479 – Association ends of DC::ACDCCConverter with other classes	353
Table 480 – Attributes of DC::ACDCCConverterDCTerminal	354
Table 481 – Association ends of DC::ACDCCConverterDCTerminal with other classes	354
Table 482 – Attributes of DC::DCBaseTerminal	354
Table 483 – Association ends of DC::DCBaseTerminal with other classes	355
Table 484 – Attributes of DC::DCConverterUnit	355
Table 485 – Association ends of DC::DCConverterUnit with other classes	355
Table 486 – Attributes of DC::DCLine	356

Table 487 – Association ends of DC::DCLine with other classes	356
Table 488 – Attributes of DC::DCSeriesDevice	357
Table 489 – Association ends of DC::DCSeriesDevice with other classes	357
Table 490 – Literals of DC::VsQpccControlKind	357
Table 491 – Literals of DC::CsPpccControlKind	358
Table 492 – Literals of DC::CsOperatingModeKind	358
Table 493 – Attributes of DC::CsConverter	358
Table 494 – Association ends of DC::CsConverter with other classes	359
Table 495 – Attributes of DC::DCBreaker.....	360
Table 496 – Association ends of DC::DCBreaker with other classes	360
Table 497 – Attributes of DC::DCEquipmentContainer	361
Table 498 – Association ends of DC::DCEquipmentContainer with other classes	361
Table 499 – Attributes of DC::DCBusbar	361
Table 500 – Association ends of DC::DCBusbar with other classes.....	362
Table 501 – Literals of DC::DCConverterOperatingModeKind	362
Table 502 – Attributes of DC::DCChopper.....	362
Table 503 – Association ends of DC::DCChopper with other classes	363
Table 504 – Attributes of DC::DCDisconnecter.....	363
Table 505 – Association ends of DC::DCDisconnecter with other classes	363
Table 506 – Attributes of DC::DCGround	364
Table 507 – Association ends of DC::DCGround with other classes	364
Table 508 – Attributes of DC::DCLineSegment.....	365
Table 509 – Association ends of DC::DCLineSegment with other classes	365
Table 510 – Attributes of DC::DCShunt.....	366
Table 511 – Association ends of DC::DCShunt with other classes.....	366
Table 512 – Attributes of DC::DCConductingEquipment.....	366
Table 513 – Association ends of DC::DCConductingEquipment with other classes.....	367
Table 514 – Attributes of DC::DCSwitch.....	367
Table 515 – Association ends of DC::DCSwitch with other classes	367
Table 516 – Attributes of DC::DCNode.....	368
Table 517 – Association ends of DC::DCNode with other classes	368
Table 518 – Attributes of DC::DCTopologicalIsland.....	369
Table 519 – Association ends of DC::DCTopologicalIsland with other classes	369
Table 520 – Literals of DC::DCPolarityKind.....	369
Table 521 – Attributes of DC::PerLengthDCLineParameter	369
Table 522 – Association ends of DC::PerLengthDCLineParameter with other classes.....	370
Table 523 – Attributes of DC::DCTerminal	370
Table 524 – Association ends of DC::DCTerminal with other classes	370
Table 525 – Literals of DC::VsPpccControlKind	371
Table 526 – Attributes of DC::VsCapabilityCurve	371
Table 527 – Association ends of DC::VsCapabilityCurve with other classes	371
Table 528 – Attributes of DC::VsConverter.....	372
Table 529 – Association ends of DC::VsConverter with other classes	373

Table 530 – Attributes of LoadModel::ConformLoad	375
Table 531 – Association ends of LoadModel::ConformLoad with other classes.....	375
Table 532 – Attributes of LoadModel::ConformLoadGroup	376
Table 533 – Association ends of LoadModel::ConformLoadGroup with other classes	376
Table 534 – Attributes of LoadModel::ConformLoadSchedule	377
Table 535 – Association ends of LoadModel::ConformLoadSchedule with other classes	377
Table 536 – Attributes of LoadModel::DayType	377
Table 537 – Association ends of LoadModel::DayType with other classes.....	378
Table 538 – Attributes of LoadModel::EnergyArea	378
Table 539 – Association ends of LoadModel::EnergyArea with other classes	378
Table 540 – Attributes of LoadModel::LoadArea.....	378
Table 541 – Association ends of LoadModel::LoadArea with other classes	379
Table 542 – Attributes of LoadModel::LoadGroup	379
Table 543 – Association ends of LoadModel::LoadGroup with other classes	379
Table 544 – Attributes of LoadModel::LoadResponseCharacteristic	380
Table 545 – Association ends of LoadModel::LoadResponseCharacteristic with other classes	381
Table 546 – Attributes of LoadModel::NonConformLoad.....	381
Table 547 – Association ends of LoadModel::NonConformLoad with other classes	381
Table 548 – Attributes of LoadModel::NonConformLoadGroup	382
Table 549 – Association ends of LoadModel::NonConformLoadGroup with other classes	382
Table 550 – Attributes of LoadModel::NonConformLoadSchedule	383
Table 551 – Association ends of LoadModel::NonConformLoadSchedule with other classes	383
Table 552 – Attributes of LoadModel::PowerCutZone.....	383
Table 553 – Association ends of LoadModel::PowerCutZone with other classes	384
Table 554 – Attributes of LoadModel::Season	384
Table 555 – Association ends of LoadModel::Season with other classes.....	384
Table 556 – Attributes of LoadModel::SeasonDayTypeSchedule	385
Table 557 – Association ends of LoadModel::SeasonDayTypeSchedule with other classes	385
Table 558 – Attributes of LoadModel::StationSupply	385
Table 559 – Association ends of LoadModel::StationSupply with other classes	386
Table 560 – Attributes of LoadModel::SubLoadArea.....	386
Table 561 – Association ends of LoadModel::SubLoadArea with other classes	387
Table 562 – Attributes of AuxiliaryEquipment::AuxiliaryEquipment	389
Table 563 – Association ends of AuxiliaryEquipment::AuxiliaryEquipment with other classes	389
Table 564 – Attributes of AuxiliaryEquipment::CurrentTransformer	389
Table 565 – Association ends of AuxiliaryEquipment::CurrentTransformer with other classes	390
Table 566 – Attributes of AuxiliaryEquipment::FaultIndicator.....	390
Table 567 – Association ends of AuxiliaryEquipment::FaultIndicator with other classes	391
Table 568 – Attributes of AuxiliaryEquipment::PostLineSensor	391

Table 569 – Association ends of AuxiliaryEquipment::PostLineSensor with other classes	391
Table 570 – Attributes of AuxiliaryEquipment::PotentialTransformer	392
Table 571 – Association ends of AuxiliaryEquipment::PotentialTransformer with other classes	392
Table 572 – Literals of AuxiliaryEquipment::PotentialTransformerKind	393
Table 573 – Attributes of AuxiliaryEquipment::Sensor	393
Table 574 – Association ends of AuxiliaryEquipment::Sensor with other classes	393
Table 575 – Attributes of AuxiliaryEquipment::SurgeArrester	394
Table 576 – Association ends of AuxiliaryEquipment::SurgeArrester with other classes	394
Table 577 – Attributes of AuxiliaryEquipment::WaveTrap	395
Table 578 – Association ends of AuxiliaryEquipment::WaveTrap with other classes	395
Table 579 – Attributes of Protection::CurrentRelay	396
Table 580 – Association ends of Protection::CurrentRelay with other classes	397
Table 581 – Attributes of Protection::ProtectionEquipment	397
Table 582 – Association ends of Protection::ProtectionEquipment with other classes	398
Table 583 – Attributes of Protection::RecloseSequence	398
Table 584 – Association ends of Protection::RecloseSequence with other classes	399
Table 585 – Attributes of Protection::SynchrocheckRelay	399
Table 586 – Association ends of Protection::SynchrocheckRelay with other classes	400
Table 587 – Attributes of Equivalents::EquivalentBranch	402
Table 588 – Association ends of Equivalents::EquivalentBranch with other classes	403
Table 589 – Attributes of Equivalents::EquivalentEquipment	404
Table 590 – Association ends of Equivalents::EquivalentEquipment with other classes	404
Table 591 – Attributes of Equivalents::EquivalentInjection	405
Table 592 – Association ends of Equivalents::EquivalentInjection with other classes	406
Table 593 – Attributes of Equivalents::EquivalentNetwork	407
Table 594 – Association ends of Equivalents::EquivalentNetwork with other classes	407
Table 595 – Attributes of Equivalents::EquivalentShunt	407
Table 596 – Association ends of Equivalents::EquivalentShunt with other classes	408
Table 597 – Attributes of Meas::Accumulator	412
Table 598 – Association ends of Meas::Accumulator with other classes	412
Table 599 – Attributes of Meas::AccumulatorLimit	412
Table 600 – Association ends of Meas::AccumulatorLimit with other classes	413
Table 601 – Attributes of Meas::AccumulatorLimitSet	413
Table 602 – Association ends of Meas::AccumulatorLimitSet with other classes	413
Table 603 – Attributes of Meas::AccumulatorReset	414
Table 604 – Association ends of Meas::AccumulatorReset with other classes	414
Table 605 – Attributes of Meas::AccumulatorValue	414
Table 606 – Association ends of Meas::AccumulatorValue with other classes	415
Table 607 – Attributes of Meas::Analog	415
Table 608 – Association ends of Meas::Analog with other classes	416
Table 609 – Attributes of Meas::AnalogControl	416
Table 610 – Association ends of Meas::AnalogControl with other classes	416

Table 611 – Attributes of Meas::AnalogLimit	417
Table 612 – Association ends of Meas::AnalogLimit with other classes	417
Table 613 – Attributes of Meas::AnalogLimitSet	417
Table 614 – Association ends of Meas::AnalogLimitSet with other classes	417
Table 615 – Attributes of Meas::AnalogValue	418
Table 616 – Association ends of Meas::AnalogValue with other classes	418
Table 617 – Attributes of Meas::Command	418
Table 618 – Association ends of Meas::Command with other classes	419
Table 619 – Attributes of Meas::Control	419
Table 620 – Association ends of Meas::Control with other classes	420
Table 621 – Attributes of Meas::Discrete	420
Table 622 – Association ends of Meas::Discrete with other classes	420
Table 623 – Attributes of Meas::DiscreteCommand	421
Table 624 – Association ends of Meas::DiscreteCommand with other classes	421
Table 625 – Attributes of Meas::DiscreteValue	421
Table 626 – Association ends of Meas::DiscreteValue with other classes	422
Table 627 – Attributes of Meas::Limit	422
Table 628 – Association ends of Meas::Limit with other classes	422
Table 629 – Attributes of Meas::LimitSet	423
Table 630 – Association ends of Meas::LimitSet with other classes	423
Table 631 – Attributes of Meas::Measurement	424
Table 632 – Association ends of Meas::Measurement with other classes	424
Table 633 – Attributes of Meas::MeasurementValue	425
Table 634 – Association ends of Meas::MeasurementValue with other classes	425
Table 635 – Attributes of Meas::MeasurementValueQuality	425
Table 636 – Association ends of Meas::MeasurementValueQuality with other classes	426
Table 637 – Attributes of Meas::MeasurementValueSource	426
Table 638 – Association ends of Meas::MeasurementValueSource with other classes	426
Table 639 – Attributes of Meas::Quality61850	427
Table 640 – Attributes of Meas::RaiseLowerCommand	428
Table 641 – Association ends of Meas::RaiseLowerCommand with other classes	428
Table 642 – Attributes of Meas::SetPoint	428
Table 643 – Association ends of Meas::SetPoint with other classes	429
Table 644 – Attributes of Meas::StringMeasurement	429
Table 645 – Association ends of Meas::StringMeasurement with other classes	429
Table 646 – Attributes of Meas::StringMeasurementValue	430
Table 647 – Association ends of Meas::StringMeasurementValue with other classes	430
Table 648 – Literals of Meas::Validity	430
Table 649 – Attributes of Meas::ValueAliasSet	431
Table 650 – Association ends of Meas::ValueAliasSet with other classes	431
Table 651 – Attributes of Meas::ValueToAlias	431
Table 652 – Association ends of Meas::ValueToAlias with other classes	432
Table 653 – Attributes of SCADA::CommunicationLink	433

Table 654 – Association ends of SCADA::CommunicationLink with other classes	434
Table 655 – Attributes of SCADA::RemoteControl	434
Table 656 – Association ends of SCADA::RemoteControl with other classes	434
Table 657 – Attributes of SCADA::RemotePoint	435
Table 658 – Association ends of SCADA::RemotePoint with other classes	435
Table 659 – Attributes of SCADA::RemoteSource	435
Table 660 – Association ends of SCADA::RemoteSource with other classes	435
Table 661 – Attributes of SCADA::RemoteUnit	436
Table 662 – Association ends of SCADA::RemoteUnit with other classes	436
Table 663 – Literals of SCADA::RemoteUnitType	436
Table 664 – Literals of SCADA::Source	437
Table 665 – Attributes of ControlArea::AltGeneratingUnitMeas	440
Table 666 – Association ends of ControlArea::AltGeneratingUnitMeas with other classes	440
Table 667 – Attributes of ControlArea::AltTieMeas	440
Table 668 – Association ends of ControlArea::AltTieMeas with other classes	440
Table 669 – Attributes of ControlArea::ControlArea	441
Table 670 – Association ends of ControlArea::ControlArea with other classes	441
Table 671 – Attributes of ControlArea::ControlAreaGeneratingUnit	442
Table 672 – Association ends of ControlArea::ControlAreaGeneratingUnit with other classes	442
Table 673 – Literals of ControlArea::ControlAreaTypeKind	442
Table 674 – Attributes of ControlArea::TieFlow	442
Table 675 – Association ends of ControlArea::TieFlow with other classes	443
Table 676 – Attributes of Contingency::Contingency	444
Table 677 – Association ends of Contingency::Contingency with other classes	444
Table 678 – Attributes of Contingency::ContingencyElement	444
Table 679 – Association ends of Contingency::ContingencyElement with other classes	444
Table 680 – Attributes of Contingency::ContingencyEquipment	445
Table 681 – Association ends of Contingency::ContingencyEquipment with other classes	445
Table 682 – Literals of Contingency::ContingencyEquipmentStatusKind	445
Table 683 – Attributes of StateVariables::SvInjection	447
Table 684 – Association ends of StateVariables::SvInjection with other classes	447
Table 685 – Attributes of StateVariables::SvPowerFlow	447
Table 686 – Association ends of StateVariables::SvPowerFlow with other classes	447
Table 687 – Attributes of StateVariables::SvShuntCompensatorSections	448
Table 688 – Association ends of StateVariables::SvShuntCompensatorSections with other classes	448
Table 689 – Attributes of StateVariables::SvStatus	448
Table 690 – Association ends of StateVariables::SvStatus with other classes	448
Table 691 – Attributes of StateVariables::SvTapStep	448
Table 692 – Association ends of StateVariables::SvTapStep with other classes	449
Table 693 – Attributes of StateVariables::SvVoltage	449

Table 694 – Association ends of StateVariables::SvVoltage with other classes	449
Table A.1 – Attributes of OperationalLimitType	450
Table A.2 – Literals of LimitTypeKind	450
Table A.3 – Attributes of IdentifiedObject	451
Table A.4 – Association ends of EnergySchedulingType	452
Table A.5 – Attributes of ConnectivityNode	452
Table A.6 – Attributes of TopologicalNode	453

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENERGY MANAGEMENT SYSTEM APPLICATION PROGRAM INTERFACE (EMS-API) –

Part 301: Common information model (CIM) base

FOREWORD

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International Standard IEC 61970-301 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

This sixth edition cancels and replaces the fifth edition, published in 2013. This sixth edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) new model for grounding including Petersen coils;
- b) models for HVDC;
- c) addition of Static Var Compensation models;
- d) phase shift transformer updates - the section has been added;
- e) short circuit calculations based on IEC 60909;
- f) addition of non-linear shunt compensator;

- g) addition of model for steady state calculation inputs, Steady State Hypothesis;
- h) addition of base frequency model;
- i) corrections of several smaller issues, e.g. issues found at ENTSO-E interoperability tests;
- j) UML clean up;
- k) new model for PowerElectronicUnits and their connection to the AC network added;
- l) new section on relation between TapChanger.ItcFlag and TapChanger.TapChangerControl;
- m) Annex A with custom extensions added.

The text of this standard is based on the following documents:

FDIS	Report on voting
57/1779/FDIS	57/1788/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 61970 series, under the general title: *Energy management system application program interface (EMS-API)*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This document is one of the IEC 61970 series which defines an application program interface (API) for an energy management system (EMS). IEC 61970 was originally based upon the work of the EPRI Control Center API (CCAPI) research project (RP-3654-1). The principle objectives of the EPRI CCAPI project were to:

- reduce the cost and time needed to add new applications to an EMS;
- protect the investment of existing applications or systems that are working effectively with an EMS.

The principal objective of the IEC 61970 series is to produce standards which facilitate the integration of EMS applications developed independently by different vendors, between entire EMS systems developed independently, or between an EMS system and other systems concerned with different aspects of power system operations, such as generation or distribution management systems (DMS). This is accomplished by defining application program interfaces to enable these applications or systems access to public data and exchange information independent of how such information is represented internally.

The Common Information Model (CIM) specifies the semantics for this API. The Component Interface Specifications (CIS), which are contained in other parts of the IEC 61970 series, specify the content of the messages exchanged.

The CIM is an abstract model that represents all the major objects in an electric utility enterprise typically needed to model the operational aspects of a utility. This model includes public classes and attributes for these objects, as well as the relationships between them.

This document defines the CIM Base set of packages which provide a logical view of the functional aspects of an Energy Management System including Supervisory Control and Data Acquisition (SCADA). Other functional areas are standardized in separate IEC documents that augment and reference this document. For example, IEC 61968-11 addresses distribution models and references this document. While there are multiple IEC standards dealing with different parts of the CIM, there is a single, unified information model comprising the CIM behind all these individual standards documents.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning a computer-based implementation of an object-oriented power system model in a relational database. As such, it does not conflict with the development of any logical power system model including the Common Information Model (CIM), where implementation of the model is not defined.

The IEC takes no position concerning the evidence, validity and scope of this patent right.

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ENERGY MANAGEMENT SYSTEM APPLICATION PROGRAM INTERFACE (EMS-API) –

Part 301: Common information model (CIM) base

1 Scope

The common information model (CIM) is an abstract model that represents all the major objects in an electric utility enterprise typically involved in utility operations. By providing a standard way of representing power system resources as object classes and attributes, along with their relationships, the CIM facilitates the integration of network applications developed independently by different vendors, between entire systems running network applications developed independently, or between a system running network applications and other systems concerned with different aspects of power system operations, such as generation or distribution management. SCADA is modeled to the extent necessary to support power system simulation and inter-control centre communication. The CIM facilitates integration by defining a common language (i.e. semantics) based on the CIM to enable these applications or systems to access public data and exchange information independent of how such information is represented internally.

The object classes represented in the CIM are abstract in nature and may be used in a wide variety of applications. The use of the CIM goes far beyond its application in an EMS. This document should be understood as a tool to enable integration in any domain where a common power system model is needed to facilitate interoperability and plug compatibility between applications and systems independent of any particular implementation.

Due to the size of the complete CIM, the object classes contained in the CIM are grouped into a number of logical Packages, each of which represents a certain part of the overall power system being modeled. Collections of these Packages are progressed as separate International Standards. This document specifies a Base set of packages which provide a logical view of the functional aspects of Energy Management System (EMS) information within the electric utility enterprise that is shared between all applications. Other standards specify more specific parts of the model that are needed by only certain applications. Subclause 4.3 of this document provides the current grouping of packages into standards documents.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050 (all parts), *International Electrotechnical Vocabulary (IEV)* (available at www.electropedia.org)

IEC 61850 (all parts), *Communication networks and systems for power utility automation*

IEC 61850-7-4:2010, *Communication networks and systems for power utility automation – Part 7-4: Basic communication structure – Compatible logical node classes and data object classes*

IEC 61968 (all parts), *Application integration at electric utilities – System interfaces for distribution management*