



GE VERNOVA

# MiCOM P40 Agile

## P145

### MICS

Model Implementation Conformance Statement - IEC 61850 Edition 2

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# 1 MODEL IMPLEMENTATION CONFORMANCE STATEMENT (MICS)

## 1.1 INTRODUCTION

This specification is the Model Implementation Conformance Statement (MICS) and presents the top-level IEC 61850 data model that has been implemented. The definitions of all used Logical Nodes and their associated Common Data Classes, components and associated enumerated values are also included for completeness.

The reader is expected to be conversant with the terminology presented within the IEC 61850 part 7 series of specifications.

## 1.2 OBJECTIVE

To provide comprehensive details of the standard data object model elements supported by the device. The MICS is conformant to the devices associated ICD (Substation Configuration Language) file, according to part 6 of the IEC 61850 standards. The layout of the presented tables within this document are conformant to the part 7 series of the IEC 61850 standard specifications with the following exceptions:

- The "Trigger Options" field is not presented
- The "M/O" field is not present as the definitions are as deployed within the model
- An additional column "X" is used to signify GE Vernova custom attributes

## 1.3 LOGICAL DEVICE DEFINITIONS

The MiCOM relay implements an IEC 61850 server that can contain one or more Logical Devices. Each Logical Device contains a data model built from instances of specific Logical Nodes and must consist of at least an instance of the LPHD Logical Node (which is responsible for providing physical device information) and an instance of the LLN0 Logical Node (for addressing common issues across the Logical Device).

The IEC 61850 data model is contained within the Logical Devices detailed in the table below. All MiCOM devices will name the supported Logical Devices consistently to ensure that data model variables with the same purpose will have the same name within each MiCOM server.

Logical Device	Comment/Usage
AutoControl	Commands and controls used for Automatic Control
AutoRec	Auto Reclose Control Domain for CB
AutoSynChk	Automatically Synchronism Check Control Domain for CB
CtlCB	CB Control
CtlCBFail	CB Fail Control Domain for CB
CtlSw	Switch Control
Measurements	P145 Measurements Domain
Protection	P145 Protection Domain
ProtEfd	Derived Earth Fault Protection
ProtEfm	Measured Earth Fault Protection
ProtFrq	Frequency Protection Domain
ProtNegSeq	Negative Sequence Protection Domain
ProtNgv	Negative Sequence Overvoltage Protection
ProtNvd	Residual Voltage Protection Domain
ProtOvCur	Overcurrent Protection Domain
ProtOvThm	Over Thermal Protection Domain
ProtPwr	Directional Power Protection Domain
ProtRteChgFrq	Frequency Change Ratio Protection Domain
ProtSef	Sensitive Earth Fault Protection Domain
ProtVtp	Time-voltage Protection Domain

Logical Device	Comment/Usage
Records	P145 Records Domain
SwControl	Commands and controls for Switch
System	P145 System Domain

### 1.3.1 IEC 61850 LOGICAL DEVICE DATA MODEL

The IEC 61850 Logical Device top-level data model consists of instances of Logical Nodes. The data model name for a Logical Node instance is constructed from an optional prefix (known as the wrapper), the Logical Node name, and an instance ID (or suffix).

The presented data model is in an alphabetically sorted order, rather than a logical order, because this is the natural order of the data when presented by a native MMS browser. (Higher level browsers can of course impart any ordering that they desire).

LD	LN Instance	LN Type	Description
AutoControl			
	LLN0	LLN0_STANDARD	AutoControl Logical Device
	LPHD1	LPHD_STANDARD	Px40 Physical Device Information
AutoRec			
	ArcRREC1	RREC_NO_SEG	Auto Reclose Control Domain for CB
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for Auto Reclose Control in CB
AutoSynChk			
	AscRSYN1	RSYN_DIFCLC	System Checks (CB) - Check Sync 1
	AscRSYN2	RSYN_DIFCLC	System Checks (CB) - Check Sync 2
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for CB Automatic Synchronism Check Control
CtiCB			
	CBCILO1	CILO_INTERLOCK	Circuit Breaker Interlocking for CB
	CBCSWI1	CSWI_BASIC	Switch Controller for CB
	CBPTRC1	PTRC_GLOBAL	Protection trip for CB Control
	CBXCBR1	XCBR_BASIC	Circuit Breaker Monitoring (Pole 1)
	LLN0	LLN0_STANDARD	Logical Device for CB Control
CtiCBFail			
	CbfPTRC13	PTRC_INDIVID_NO_SEG	Protection trip for CB Fail
	CbfRBRF1	RBRF_EXTTRIP	CB Fail 1
	CbfRBRF2	RBRF_EXTTRIP	CB Fail 2
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for CB Fail Control
CtiSw			
	LLN0	LLN0_STANDARD	Switch Control Logical Device
	SwCILO1	CILO_INTERLOCK	XSWI1 Interlocking
	SwCILO2	CILO_INTERLOCK	XSWI2 Interlocking
	SwCILO3	CILO_INTERLOCK	XSWI3 Interlocking
	SwCILO4	CILO_INTERLOCK	XSWI4 Interlocking
	SwCILO5	CILO_INTERLOCK	XSWI5 Interlocking
	SwCILO6	CILO_INTERLOCK	XSWI6 Interlocking
	SwCILO7	CILO_INTERLOCK	XSWI7 Interlocking
	SwCILO8	CILO_INTERLOCK	XSWI8 Interlocking
	SwCSWI1	CSWI_BASIC	Control Switch 1
	SwCSWI2	CSWI_BASIC	Control Switch 2
	SwCSWI3	CSWI_BASIC	Control Switch 3
	SwCSWI4	CSWI_BASIC	Control Switch 4
	SwCSWI5	CSWI_BASIC	Control Switch 5

LD	LN Instance	LN Type	Description
	SwCSWI6	CSWI_BASIC	Control Switch 6
	SwCSWI7	CSWI_BASIC	Control Switch 7
	SwCSWI8	CSWI_BASIC	Control Switch 8
	SwXSWI1	XSWI_BASIC	Switch Monitoring and Control
	SwXSWI2	XSWI_BASIC	Switch Monitoring and Control
	SwXSWI3	XSWI_BASIC	Switch Monitoring and Control
	SwXSWI4	XSWI_BASIC	Switch Monitoring and Control
	SwXSWI5	XSWI_BASIC	Switch Monitoring and Control
	SwXSWI6	XSWI_BASIC	Switch Monitoring and Control
	SwXSWI7	XSWI_BASIC	Switch Monitoring and Control
	SwXSWI8	XSWI_BASIC	Switch Monitoring and Control
Measurements			
	LLN0	LLN0_STANDARD_MEA	Measurements Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	PriAvgMMXU1	MMXU_METER_AV	Primary Average Value of Fixed Measurements
	PriAvgMMXU2	MMXU_METER_AV	Primary Average Value of Rolled Measurements
	PriFitMLFR1	MLFR_FAULT	Measurements during the Latest Fault Record
	PriFouMMXU1	MMXU_FOURIER_P140_EXT	Primary Fourier Measurements
	PriMaxMMXU1	MMXU_METER_MAX	Primary Maximum Value of Measurement
	PriMMTR1	MMTR_PRIV	Primary based metering quantities
	PriMSQI1	MSQI_ALL	Primary Sequence Measurements
	PriRmsMMXU1	MMXU_RMS_P140	Primary RMS Measurements
	SecAvgMMXU1	MMXU_METER_AV	Secondary Average Value of Fixed Measurements
	SecAvgMMXU2	MMXU_METER_AV	Secondary Average Value of Rolled Measurements
	SecFouMMXU1	MMXU_FOURIER_P140	Secondary Fourier Measurements
	SecMaxMMXU1	MMXU_METER_MAX	Secondary Maximum Value of Measurement
	SecMMTR1	MMTR_PRIV	Secondary based metering quantities
	SecMSQI1	MSQI_ALL	Secondary Sequence Measurements
	SecRmsMMXU1	MMXU_RMS_P140	Secondary RMS Measurements
Protection			
	LLN0	LLN0_STANDARD	Protection Logical Device with Standard Template
	LPHD1	LPHD_STANDARD	Physical Device Information
ProtEfd			
	EfdPTOC1	PTOC_NEU	IN2> 1 Earth Fault (Derived)
	EfdPTOC2	PTOC_NEU	IN2> 2 Earth Fault (Derived)
	EfdPTOC3	PTOC_NEU	IN2> 3 Earth Fault (Derived)
	EfdPTOC4	PTOC_NEU	IN2> 4 Earth Fault (Derived)
	EfdPTRC3	PTRC_INDIVID_NO_SEG	Protection trip for Earth Fault (Derived) protection
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for Efd Protection
ProtEfm			
	EfmPTOC1	PTOC_NEU	IN1> 1 Earth Fault (Measured)
	EfmPTOC2	PTOC_NEU	IN1> 2 Earth Fault (Measured)
	EfmPTOC3	PTOC_NEU	IN1> 3 Earth Fault (Measured)

LD	LN Instance	LN Type	Description
	EfmPTOC4	PTOC_NEU	IN1> 4 Earth Fault (Measured)
	EfmPTRC4	PTRC_INDIVID_NO_SEG	Protection trip for Earth Fault (Measured) protection
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for Efm Protection
ProtFrq			
	FrqPTOF1	PTOF_NO_SEG	F> 1 Overfrequency
	FrqPTOF2	PTOF_NO_SEG	F> 2 Overfrequency
	FrqPTRC10	PTRC_INDIVID_NO_SEG	Protection trip for Frequency Protection
	FrqPTUF1	PTUF_NO_SEG	F< 1 Underfrequency
	FrqPTUF2	PTUF_NO_SEG	F< 2 Underfrequency
	FrqPTUF3	PTUF_NO_SEG	F< 3 Underfrequency
	FrqPTUF4	PTUF_NO_SEG	F< 4 Underfrequency
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for Frequency Protection
ProtNegSeq			
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for Negative Sequence Protection
	NgcPTOC1	PTOC_NO_SEG	I2> 1 Negative Sequence
	NgcPTOC2	PTOC_NO_SEG	I2> 2 Negative Sequence
	NgcPTOC3	PTOC_NO_SEG	I2> 3 Negative Sequence
	NgcPTOC4	PTOC_NO_SEG	I2> 4 Negative Sequence
	NgcPTRC5	PTRC_INDIVID_NO_SEG	Protection trip for Negative Sequence Protection
ProtNgv			
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for Ngv Protection
	NgvPTOV1	PTOV_NO_SEG	V2> 1 Negative Sequence
	VtpNgvPTRC9	PTRC_INDIVID_NO_SEG	Protection trip for Ngv protection
ProtNvd			
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for Nvd Protection
	VtpResPTOV1	PTOV_NEU	VN> 1 Residual Overvoltage
	VtpResPTOV2	PTOV_NEU	VN> 2 Residual Overvoltage
	VtpResPTOV3	PTOV_NEU	VN> 3 Residual Overvoltage
	VtpResPTOV4	PTOV_NEU	VN> 4 Residual Overvoltage
	VtpResPTRC8	PTRC_INDIVID_NO_SEG	Protection trip for Nvd protection
ProtOvCur			
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for Overcurrent Protection
	OcpPTOC1	PTOC_SEG	I> 1 Overcurrent
	OcpPTOC2	PTOC_SEG	I> 2 Overcurrent
	OcpPTOC3	PTOC_SEG	I> 3 Overcurrent
	OcpPTOC4	PTOC_SEG	I> 4 Overcurrent
	OcpPTOC5	PTOC_SEG	I> 5 Overcurrent
	OcpPTOC6	PTOC_SEG	I> 6 Overcurrent
	OcpPTRC2	PTRC_INDIVID_NO_SEG	Protection trip for Overcurrent Protection
ProtOvThm			
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for Thermal Overload Protection
	ThmPTRC12	PTRC_INDIVID_NO_SEG	Thermal Overload
	ThmPTTR1	PTTR_NO_SEG	Thermal Overload
ProtPwr			
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logic device for directional power protection
	PdpPDOP1	PDOP_BASIC	Directional overpower stage 1

LD	LN Instance	LN Type	Description
	PdpPDOP2	PDOP_BASIC	Directional overpower stage 2
	PdpPDUP1	PDUP_BASIC	Directional underpower stage 1
	PdpPDUP2	PDUP_BASIC	Directional underpower stage 2
	PdpPTRC15	PTRC_INDIVID_NO_SEG	Protection trip for directional power
ProtRteChgFrq			
	DfpPFRC1	PFRC_NO_SEG	df/dt> 1 Frequency Rate of Change
	DfpPFRC2	PFRC_NO_SEG	df/dt> 2 Frequency Rate of Change
	DfpPFRC3	PFRC_NO_SEG	df/dt> 3 Frequency Rate of Change
	DfpPFRC4	PFRC_NO_SEG	df/dt> 4 Frequency Rate of Change
	DfpPFRC5	PFRC_NO_SEG	df/dt> 5 Frequency Rate of Change
	DfpPFRC6	PFRC_NO_SEG	df/dt> 6 Frequency Rate of Change
	DfpPFRC7	PFRC_NO_SEG	df/dt> 7 Frequency Rate of Change
	DfpPFRC8	PFRC_NO_SEG	df/dt> 8 Frequency Rate of Change
	DfpPFRC9	PFRC_NO_SEG	df/dt> 9 Frequency Rate of Change
	DfpPTRC11	PTRC_INDIVID_NO_SEG	Protection trip for Frequency Rate Change Protection
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for Frequency Rate Change Protection
ProtSef			
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for SEF Protection
	SenEftPSDE1	PSDE_NEU	ISEF> 1 Sensitive Earth Fault
	SenEftPSDE2	PSDE_NEU	ISEF> 2 Sensitive Earth Fault
	SenEftPSDE3	PSDE_NEU	ISEF> 3 Sensitive Earth Fault
	SenEftPSDE4	PSDE_NEU	ISEF> 4 Sensitive Earth Fault
	SenEftPTRC6	PTRC_INDIVID_NO_SEG	Protection trip for Sensitive Earth Fault Protection
	SenRefPDIF1	PDIF_NEU	IREF> 1 Restricted Earth Fault
ProtVtp			
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for Vtp Protection
	VtpPhsPTOV1	PTOV_SEG	V> 1 Overvoltage
	VtpPhsPTOV2	PTOV_SEG	V> 2 Overvoltage
	VtpPhsPTOV3	PTOV_SEG	V> 3 Overvoltage
	VtpPhsPTOV4	PTOV_SEG	V> 4 Overvoltage
	VtpPhsPTOV5	PTOV_SEG	V> 5 Overvoltage
	VtpPhsPTOV6	PTOV_SEG	V> 6 Overvoltage
	VtpPhsPTRC7	PTRC_INDIVID_NO_SEG	Protection trip for Vtp Protection
	VtpPhsPTUV1	PTUV_SEG	V< 1 Undervoltage
	VtpPhsPTUV2	PTUV_SEG	V< 1 Undervoltage
	VtpPhsPTUV3	PTUV_SEG	V< 1 Undervoltage
	VtpPhsPTUV4	PTUV_SEG	V< 1 Undervoltage
Records			
	LLN0	LLN0_STANDARD	Records Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	RDRE1	RDRE_BASIC	Disturbance Recorder
	RFLO1	RFLO_BASIC	Fault Locator
SwControl			
	LLN0	LLN0_STANDARD	Switch Control Logical Device
	LPHD1	LPHD_STANDARD	Px40 Physical Device Information
System			
	AlmGGIO1	GGIO_ALM_96	Alarms
	FnkGGIO1	GGIO_IND_10	Function Keys

LD	LN Instance	LN Type	Description
	GosGGIO1	GGIO_IND_128	GOOSE Input Signals
	GosGGIO2	GGIO_IND_32	GOOSE Output Signals
	LedGGIO1	GGIO_IND_18	Red LED Signals
	LedGGIO2	GGIO_IND_18	Green LED Signals
	LGOS1	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 1
	LGOS10	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 10
	LGOS100	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 100
	LGOS101	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 101
	LGOS102	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 102
	LGOS103	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 103
	LGOS104	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 104
	LGOS105	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 105
	LGOS106	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 106
	LGOS107	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 107
	LGOS108	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 108
	LGOS109	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 109
	LGOS11	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 11
	LGOS110	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 110
	LGOS111	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 111
	LGOS112	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 112
	LGOS113	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 113
	LGOS114	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 114
	LGOS115	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 115
	LGOS116	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 116
	LGOS117	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 117
	LGOS118	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 118
	LGOS119	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 119
	LGOS12	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 12
	LGOS120	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 120
	LGOS121	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 121

LD	LN Instance	LN Type	Description
	LGOS122	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 122
	LGOS123	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 123
	LGOS124	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 124
	LGOS125	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 125
	LGOS126	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 126
	LGOS127	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 127
	LGOS128	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 128
	LGOS13	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 13
	LGOS14	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 14
	LGOS15	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 15
	LGOS16	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 16
	LGOS17	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 17
	LGOS18	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 18
	LGOS19	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 19
	LGOS2	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 2
	LGOS20	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 20
	LGOS21	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 21
	LGOS22	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 22
	LGOS23	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 23
	LGOS24	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 24
	LGOS25	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 25
	LGOS26	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 26
	LGOS27	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 27
	LGOS28	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 28
	LGOS29	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 29
	LGOS3	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 3
	LGOS30	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 30
	LGOS31	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 31

LD	LN Instance	LN Type	Description
	LGOS32	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 32
	LGOS33	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 33
	LGOS34	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 34
	LGOS35	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 35
	LGOS36	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 36
	LGOS37	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 37
	LGOS38	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 38
	LGOS39	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 39
	LGOS4	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 4
	LGOS40	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 40
	LGOS41	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 41
	LGOS42	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 42
	LGOS43	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 43
	LGOS44	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 44
	LGOS45	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 45
	LGOS46	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 46
	LGOS47	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 47
	LGOS48	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 48
	LGOS49	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 49
	LGOS5	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 5
	LGOS50	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 50
	LGOS51	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 51
	LGOS52	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 52
	LGOS53	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 53
	LGOS54	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 54
	LGOS55	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 55
	LGOS56	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 56
	LGOS57	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 57

LD	LN Instance	LN Type	Description
	LGOS58	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 58
	LGOS59	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 59
	LGOS6	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 6
	LGOS60	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 60
	LGOS61	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 61
	LGOS62	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 62
	LGOS63	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 63
	LGOS64	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 64
	LGOS65	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 65
	LGOS66	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 66
	LGOS67	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 67
	LGOS68	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 68
	LGOS69	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 69
	LGOS7	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 7
	LGOS70	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 70
	LGOS71	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 71
	LGOS72	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 72
	LGOS73	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 73
	LGOS74	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 74
	LGOS75	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 75
	LGOS76	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 76
	LGOS77	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 77
	LGOS78	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 78
	LGOS79	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 79
	LGOS8	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 8
	LGOS80	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 80
	LGOS81	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 81
	LGOS82	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 82

LD	LN Instance	LN Type	Description
	LGOS83	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 83
	LGOS84	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 84
	LGOS85	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 85
	LGOS86	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 86
	LGOS87	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 87
	LGOS88	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 88
	LGOS89	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 89
	LGOS9	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 9
	LGOS90	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 90
	LGOS91	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 91
	LGOS92	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 92
	LGOS93	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 93
	LGOS94	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 94
	LGOS95	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 95
	LGOS96	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 96
	LGOS97	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 97
	LGOS98	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 98
	LGOS99	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 99
	LLN0	LLN0_SYSTEM	System Logical Device
	LPHD1	LPHD_SYSTEM	Physical Device Information
	NP2LCCH1	LCCH_SYSTEM	Physical communication channel supervision for NP2 (stationbus port and its redundant port).
	OptGGIO1	GGIO_IND_32	Opto Inputs
	OrdRunGGIO1	GGIO_IND_64	Uniqueness of control "Order Running" indications for Control operations
	PloGGIO1	GGIO_IND_32_CTRL	Controllable Inputs
	RlyGGIO1	GGIO_IND_32	Output Contacts
	TVTR1	TVTR_SYSTEM	Voltage transformer monitor

## 1.4 LOGICAL NODE DEFINITIONS

The definition tables for each of the Logical Nodes in the top-level data model are presented in the following sub-sections.

The following table presents a summary of the Logical Node templates used across the Logical Devices within the overall IEC 61850 product data model:

LN Type	(LN Class)	Description	Name Space
CILO_INTERLOCK	(CILO)	Control Interlocking	IEC 61850-7-4:2007A
CSWI_BASIC	(CSWI)	Switch controller	IEC 61850-7-4:2007A
GGIO_ALM_96	(GGIO)	Generic Process I/O (w.r.t 96 Alarm Elements)	IEC 61850-7-4:2007A
GGIO_IND_10	(GGIO)	Generic Process I/O (w.r.t 10 Indication Elements)	IEC 61850-7-4:2007A
GGIO_IND_128	(GGIO)	Generic process I/O (w.r.t 128 Indication Elements)	IEC 61850-7-4:2007A
GGIO_IND_18	(GGIO)	Generic Process I/O (w.r.t 18 Indication Elements)	IEC 61850-7-4:2007A
GGIO_IND_32	(GGIO)	Generic Process I/O (w.r.t 32 Indication Elements)	IEC 61850-7-4:2007A
GGIO_IND_32_CTRL	(GGIO)	Generic process I/O (w.r.t 32 Indications Ctrl i/p)	IEC 61850-7-4:2007A
GGIO_IND_64	(GGIO)	Generic Process I/O (w.r.t 64 Indication Elements)	IEC 61850-7-4:2007A
LCCH_SYSTEM	(LCCH)	Physical communication channel supervision	IEC 61850-7-4:2007A
LGOS_SYSTEM	(LGOS)	Monitoring of GOOSE messages	IEC 61850-7-4:2007A
LLN0_STANDARD	(LLN0)	General Logical Node 0	IEC 61850-7-4:2007A
LLN0_SYSTEM	(LLN0)	System Logical Node 0	IEC 61850-7-4:2007A
LLN0_STANDARD_MEA	(LLN0)	Measurements Logical Node 0	IEC 61850-7-4:2007A
LLN0_STANDARD_WITH_CTRLMOD	(LLN0)	Logical Node 0	IEC 61850-7-4:2007A
LPHD_STANDARD	(LPHD)	Px40 Physical Device Information	IEC 61850-7-4:2007A
LPHD_SYSTEM	(LPHD)	Physical device information	IEC 61850-7-4:2007A
MLFR_FAULT	(MLFR)	Measurements of Fault Record	MiCOM-Px40:2013A
MMTR_PRIV	(MMTR)	Metering	IEC 61850-7-4:2007A
MMXU_FOURIER_P140	(MMXU)	Standard measurements	IEC 61850-7-4:2007A
MMXU_FOURIER_P140_EXT	(MMXU)	Standard measurements including df/dt	IEC 61850-7-4:2007A
MMXU_METER_AV	(MMXU)	Metering Statistics (w.r.t Current, Real + Reactive Power - Average values)	IEC 61850-7-4:2007A
MMXU_METER_MAX	(MMXU)	Standard measurements (w.r.t Current, Real + Reactive Power - Max values)	IEC 61850-7-4:2007A
MMXU_RMS_P140	(MMXU)	Standard measurements (w.r.t RMS Values - P140)	IEC 61850-7-4:2007A

LN Type	(LN Class)	Description	Name Space
MSQI_ALL	(MSQI)	Sequence and imbalance (w.r.t Pos, Neg, Zero)	IEC 61850-7-4:2007A
PDIF_NEU	(PDIF)	Differential (w.r.t Neutral)	IEC 61850-7-4:2007A
PDOP_BASIC	(PDOP)	Overpower protection	IEC 61850-7-4:2007A
PDUP_BASIC	(PDUP)	Underpower protection	IEC 61850-7-4:2007A
PFRC_NO_SEG	(PFRC)	Rate of change of frequency (w.r.t No Phase Segregation)	IEC 61850-7-4:2007A
PSDE_NEU	(PSDE)	Sensitive directional earth fault	IEC 61850-7-4:2007A
PTOC_NEU	(PTOC)	Timed Overcurrent (w.r.t Neutral)	IEC 61850-7-4:2007A
PTOC_NO_SEG	(PTOC)	Timed Overcurrent (w.r.t No Phase Segregation)	IEC 61850-7-4:2007A
PTOC_SEG	(PTOC)	Timed Overcurrent (w.r.t Phase Segregation)	IEC 61850-7-4:2007A
PTOF_NO_SEG	(PTOF)	Overfrequency (w.r.t No Phase Segregation)	IEC 61850-7-4:2007A
PTOV_SEG	(PTOV)	Overvoltage (w.r.t Phase Segregation)	IEC 61850-7-4:2007A
PTOV_NEU	(PTOV)	Overvoltage (w.r.t Neutral)	IEC 61850-7-4:2007A
PTOV_NO_SEG	(PTOV)	Overvoltage (w.r.t Phase Segregation)	IEC 61850-7-4:2007A
PTRC_GLOBAL	(PTRC)	Protection trip conditioning	IEC 61850-7-4:2007A
PTRC_INDIVID_NO_SEG	(PTRC)	Protection trip conditioning	IEC 61850-7-4:2007A
PTTR_NO_SEG	(PTTR)	Thermal overload (w.r.t No Phase Segregation)	IEC 61850-7-4:2007A
PTUF_NO_SEG	(PTUF)	Underfrequency (w.r.t No Phase Segregation)	IEC 61850-7-4:2007A
PTUV_SEG	(PTUV)	Undervoltage (w.r.t Phase Segregation)	IEC 61850-7-4:2007A
RBRF_EXTTRIP	(RBRF)	Breaker Failure (w.r.t External Tripping)	IEC 61850-7-4:2007A
RDRE_BASIC	(RDRE)	Disturbance Recorder function (w.r.t Mandatory Attributes only)	IEC 61850-7-4:2007A
RFLO_BASIC	(RFLO)	Fault Locator (w.r.t Mandatory Attributes only)	IEC 61850-7-4:2007A
RREC_NO_SEG	(RREC)	Autoreclosing (w.r.t No Phase Segregation)	IEC 61850-7-4:2007A
RSYN_DIFCLC	(RSYN)	Synchronism-check/Synchronising (w.r.t Calculated Differential Measurements)	IEC 61850-7-4:2007A
TVTR_SYSTEM	(TVTR)	Voltage transformer	IEC 61850-7-4:2007A
XCBR_BASIC	(XCBR)	Circuit Breaker (w.r.t Mandatory Attributes Only)	IEC 61850-7-4:2007A
XSWI_BASIC	(XSWI)	Circuit Switch (w.r.t Switch Status and Control)	IEC 61850-7-4:2007A

### 1.4.1 LOGICAL NODE: CILO\_INTERLOCK

Description: Control Interlocking

LN Class: CILO

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
EnaOpn	SPS_WD	Enable OPEN Commands		
EnaCls	SPS_WD	Enable CLOSE Commands		

### 1.4.2 LOGICAL NODE: CSWI\_BASIC

Description: Switch controller

LN Class: CSWI

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Loc	SPS_WD	Local control behaviour		
OpOpn	ACT_NO_SEG	Operation "open switch"	T	
OpCls	ACT_NO_SEG	Operation "close switch"	T	
OpCntRs	INC_MOD_STD	Resettable operation counter		
Pos	DPC_CONTROL	Switch, general		

### 1.4.3 LOGICAL NODE: GGIO\_ALM\_96

Description: Generic process I/O (w.r.t 96 Alarm Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Alm01	SPS_D	General single alarm		
Alm02	SPS_D	General single alarm		
Alm03	SPS_D	General single alarm		
Alm04	SPS_D	General single alarm		
Alm05	SPS_D	General single alarm		
Alm06	SPS_D	General single alarm		
Alm07	SPS_D	General single alarm		
Alm08	SPS_D	General single alarm		
Alm09	SPS_D	General single alarm		
Alm10	SPS_D	General single alarm		
Alm11	SPS_D	General single alarm		
Alm12	SPS_D	General single alarm		
Alm13	SPS_D	General single alarm		
Alm14	SPS_D	General single alarm		
Alm15	SPS_D	General single alarm		

Attribute	Attr. Type	Explanation	T	X
Alm16	SPS_D	General single alarm		
Alm17	SPS_D	General single alarm		
Alm18	SPS_D	General single alarm		
Alm19	SPS_D	General single alarm		
Alm20	SPS_D	General single alarm		
Alm21	SPS_D	General single alarm		
Alm22	SPS_D	General single alarm		
Alm23	SPS_D	General single alarm		
Alm24	SPS_D	General single alarm		
Alm25	SPS_D	General single alarm		
Alm26	SPS_D	General single alarm		
Alm27	SPS_D	General single alarm		
Alm28	SPS_D	General single alarm		
Alm29	SPS_D	General single alarm		
Alm30	SPS_D	General single alarm		
Alm31	SPS_D	General single alarm		
Alm32	SPS_D	General single alarm		
Alm33	SPS_D	General single alarm		
Alm34	SPS_D	General single alarm		
Alm35	SPS_D	General single alarm		
Alm36	SPS_D	General single alarm		
Alm37	SPS_D	General single alarm		
Alm38	SPS_D	General single alarm		
Alm39	SPS_D	General single alarm		
Alm40	SPS_D	General single alarm		
Alm41	SPS_D	General single alarm		
Alm42	SPS_D	General single alarm		
Alm43	SPS_D	General single alarm		
Alm44	SPS_D	General single alarm		
Alm45	SPS_D	General single alarm		
Alm46	SPS_D	General single alarm		
Alm47	SPS_D	General single alarm		
Alm48	SPS_D	General single alarm		
Alm49	SPS_D	General single alarm		
Alm50	SPS_D	General single alarm		
Alm51	SPS_D	General single alarm		
Alm52	SPS_D	General single alarm		
Alm53	SPS_D	General single alarm		
Alm54	SPS_D	General single alarm		
Alm55	SPS_D	General single alarm		
Alm56	SPS_D	General single alarm		
Alm57	SPS_D	General single alarm		
Alm58	SPS_D	General single alarm		
Alm59	SPS_D	General single alarm		
Alm60	SPS_D	General single alarm		
Alm61	SPS_D	General single alarm		
Alm62	SPS_D	General single alarm		
Alm63	SPS_D	General single alarm		
Alm64	SPS_D	General single alarm		
Alm65	SPS_D	General single alarm		
Alm66	SPS_D	General single alarm		

Attribute	Attr. Type	Explanation	T	X
Alm67	SPS_D	General single alarm		
Alm68	SPS_D	General single alarm		
Alm69	SPS_D	General single alarm		
Alm70	SPS_D	General single alarm		
Alm71	SPS_D	General single alarm		
Alm72	SPS_D	General single alarm		
Alm73	SPS_D	General single alarm		
Alm74	SPS_D	General single alarm		
Alm75	SPS_D	General single alarm		
Alm76	SPS_D	General single alarm		
Alm77	SPS_D	General single alarm		
Alm78	SPS_D	General single alarm		
Alm79	SPS_D	General single alarm		
Alm80	SPS_D	General single alarm		
Alm81	SPS_D	General single alarm		
Alm82	SPS_D	General single alarm		
Alm83	SPS_D	General single alarm		
Alm84	SPS_D	General single alarm		
Alm85	SPS_D	General single alarm		
Alm86	SPS_D	General single alarm		
Alm87	SPS_D	General single alarm		
Alm88	SPS_D	General single alarm		
Alm89	SPS_D	General single alarm		
Alm90	SPS_D	General single alarm		
Alm91	SPS_D	General single alarm		
Alm92	SPS_D	General single alarm		
Alm93	SPS_D	General single alarm		
Alm94	SPS_D	General single alarm		
Alm95	SPS_D	General single alarm		
Alm96	SPS_D	General single alarm		

#### 1.4.4 LOGICAL NODE: GGIO\_IND\_10

Description: Generic Process I/O (w.r.t 10 Indication Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
NamPit	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Ind01	SPS_D	General indication (binary input)		
Mod	ENC_MOD_THREE_STATUS	Mode		
Ind02	SPS_D	General indication (binary input)		
Ind03	SPS_D	General indication (binary input)		
Ind04	SPS_D	General indication (binary input)		
Ind05	SPS_D	General indication (binary input)		
Ind06	SPS_D	General indication (binary input)		
Ind07	SPS_D	General indication (binary input)		
Ind08	SPS_D	General indication (binary input)		
Ind09	SPS_D	General indication (binary input)		
Ind10	SPS_D	General indication (binary input)		

### 1.4.5 LOGICAL NODE: GGIO\_IND\_128

Description: Generic Process I/O (w.r.t 128 indications)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Ind001	SPS_D	General indication (binary input)		
Mod	ENC_MOD_THREE_STATUS	Mode		
Ind002	SPS_D	General indication (binary input)		
Ind003	SPS_D	General indication (binary input)		
Ind004	SPS_D	General indication (binary input)		
Ind005	SPS_D	General indication (binary input)		
Ind006	SPS_D	General indication (binary input)		
Ind007	SPS_D	General indication (binary input)		
Ind008	SPS_D	General indication (binary input)		
Ind009	SPS_D	General indication (binary input)		
Ind010	SPS_D	General indication (binary input)		
Ind011	SPS_D	General indication (binary input)		
Ind012	SPS_D	General indication (binary input)		
Ind013	SPS_D	General indication (binary input)		
Ind014	SPS_D	General indication (binary input)		
Ind015	SPS_D	General indication (binary input)		
Ind016	SPS_D	General indication (binary input)		
Ind017	SPS_D	General indication (binary input)		
Ind018	SPS_D	General indication (binary input)		
Ind019	SPS_D	General indication (binary input)		
Ind020	SPS_D	General indication (binary input)		
Ind021	SPS_D	General indication (binary input)		
Ind022	SPS_D	General indication (binary input)		
Ind023	SPS_D	General indication (binary input)		
Ind024	SPS_D	General indication (binary input)		
Ind025	SPS_D	General indication (binary input)		
Ind026	SPS_D	General indication (binary input)		
Ind027	SPS_D	General indication (binary input)		
Ind028	SPS_D	General indication (binary input)		
Ind029	SPS_D	General indication (binary input)		
Ind030	SPS_D	General indication (binary input)		
Ind031	SPS_D	General indication (binary input)		
Ind032	SPS_D	General indication (binary input)		
Ind033	SPS_D	General indication (binary input)		
Ind034	SPS_D	General indication (binary input)		
Ind035	SPS_D	General indication (binary input)		
Ind036	SPS_D	General indication (binary input)		
Ind037	SPS_D	General indication (binary input)		
Ind038	SPS_D	General indication (binary input)		
Ind039	SPS_D	General indication (binary input)		
Ind040	SPS_D	General indication (binary input)		
Ind041	SPS_D	General indication (binary input)		
Ind042	SPS_D	General indication (binary input)		

Attribute	Attr. Type	Explanation	T	X
Ind043	SPS_D	General indication (binary input)		
Ind044	SPS_D	General indication (binary input)		
Ind045	SPS_D	General indication (binary input)		
Ind046	SPS_D	General indication (binary input)		
Ind047	SPS_D	General indication (binary input)		
Ind048	SPS_D	General indication (binary input)		
Ind049	SPS_D	General indication (binary input)		
Ind050	SPS_D	General indication (binary input)		
Ind051	SPS_D	General indication (binary input)		
Ind052	SPS_D	General indication (binary input)		
Ind053	SPS_D	General indication (binary input)		
Ind054	SPS_D	General indication (binary input)		
Ind055	SPS_D	General indication (binary input)		
Ind056	SPS_D	General indication (binary input)		
Ind057	SPS_D	General indication (binary input)		
Ind058	SPS_D	General indication (binary input)		
Ind059	SPS_D	General indication (binary input)		
Ind060	SPS_D	General indication (binary input)		
Ind061	SPS_D	General indication (binary input)		
Ind062	SPS_D	General indication (binary input)		
Ind063	SPS_D	General indication (binary input)		
Ind064	SPS_D	General indication (binary input)		
Ind065	SPS_D	General indication (binary input)		
Ind066	SPS_D	General indication (binary input)		
Ind067	SPS_D	General indication (binary input)		
Ind068	SPS_D	General indication (binary input)		
Ind069	SPS_D	General indication (binary input)		
Ind070	SPS_D	General indication (binary input)		
Ind071	SPS_D	General indication (binary input)		
Ind072	SPS_D	General indication (binary input)		
Ind073	SPS_D	General indication (binary input)		
Ind074	SPS_D	General indication (binary input)		
Ind075	SPS_D	General indication (binary input)		
Ind076	SPS_D	General indication (binary input)		
Ind077	SPS_D	General indication (binary input)		
Ind078	SPS_D	General indication (binary input)		
Ind079	SPS_D	General indication (binary input)		
Ind080	SPS_D	General indication (binary input)		
Ind081	SPS_D	General indication (binary input)		
Ind082	SPS_D	General indication (binary input)		
Ind083	SPS_D	General indication (binary input)		
Ind084	SPS_D	General indication (binary input)		
Ind085	SPS_D	General indication (binary input)		
Ind086	SPS_D	General indication (binary input)		
Ind087	SPS_D	General indication (binary input)		
Ind088	SPS_D	General indication (binary input)		
Ind089	SPS_D	General indication (binary input)		
Ind090	SPS_D	General indication (binary input)		
Ind091	SPS_D	General indication (binary input)		
Ind092	SPS_D	General indication (binary input)		
Ind093	SPS_D	General indication (binary input)		

Attribute	Attr. Type	Explanation	T	X
Ind094	SPS_D	General indication (binary input)		
Ind095	SPS_D	General indication (binary input)		
Ind096	SPS_D	General indication (binary input)		
Ind097	SPS_D	General indication (binary input)		
Ind098	SPS_D	General indication (binary input)		
Ind099	SPS_D	General indication (binary input)		
Ind100	SPS_D	General indication (binary input)		
Ind101	SPS_D	General indication (binary input)		
Ind102	SPS_D	General indication (binary input)		
Ind103	SPS_D	General indication (binary input)		
Ind104	SPS_D	General indication (binary input)		
Ind105	SPS_D	General indication (binary input)		
Ind106	SPS_D	General indication (binary input)		
Ind107	SPS_D	General indication (binary input)		
Ind108	SPS_D	General indication (binary input)		
Ind109	SPS_D	General indication (binary input)		
Ind110	SPS_D	General indication (binary input)		
Ind111	SPS_D	General indication (binary input)		
Ind112	SPS_D	General indication (binary input)		
Ind113	SPS_D	General indication (binary input)		
Ind114	SPS_D	General indication (binary input)		
Ind115	SPS_D	General indication (binary input)		
Ind116	SPS_D	General indication (binary input)		
Ind117	SPS_D	General indication (binary input)		
Ind118	SPS_D	General indication (binary input)		
Ind119	SPS_D	General indication (binary input)		
Ind120	SPS_D	General indication (binary input)		
Ind121	SPS_D	General indication (binary input)		
Ind122	SPS_D	General indication (binary input)		
Ind123	SPS_D	General indication (binary input)		
Ind124	SPS_D	General indication (binary input)		
Ind125	SPS_D	General indication (binary input)		
Ind126	SPS_D	General indication (binary input)		
Ind127	SPS_D	General indication (binary input)		
Ind128	SPS_D	General indication (binary input)		

#### 1.4.6 LOGICAL NODE: GGIO\_IND\_18

Description: Generic Process I/O (w.r.t 18 Indication Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Ind01	SPS_D	General indication (binary input)		
Ind02	SPS_D	General indication (binary input)		
Ind03	SPS_D	General indication (binary input)		
Ind04	SPS_D	General indication (binary input)		
Ind05	SPS_D	General indication (binary input)		

Attribute	Attr. Type	Explanation	T	X
Ind06	SPS_D	General indication (binary input)		
Ind07	SPS_D	General indication (binary input)		
Ind08	SPS_D	General indication (binary input)		
Ind09	SPS_D	General indication (binary input)		
Ind10	SPS_D	General indication (binary input)		
Ind11	SPS_D	General indication (binary input)		
Ind12	SPS_D	General indication (binary input)		
Ind13	SPS_D	General indication (binary input)		
Ind14	SPS_D	General indication (binary input)		
Ind15	SPS_D	General indication (binary input)		
Ind16	SPS_D	General indication (binary input)		
Ind17	SPS_D	General indication (binary input)		
Ind18	SPS_D	General indication (binary input)		

#### 1.4.7 LOGICAL NODE: GGIO\_IND\_32

Description: Generic Process I/O (w.r.t 32 Indication Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Ind01	SPS_D	General indication (binary input)		
Mod	ENC_MOD_THREE_STATUS	Mode		
Ind02	SPS_D	General indication (binary input)		
Ind03	SPS_D	General indication (binary input)		
Ind04	SPS_D	General indication (binary input)		
Ind05	SPS_D	General indication (binary input)		
Ind06	SPS_D	General indication (binary input)		
Ind07	SPS_D	General indication (binary input)		
Ind08	SPS_D	General indication (binary input)		
Ind09	SPS_D	General indication (binary input)		
Ind10	SPS_D	General indication (binary input)		
Ind11	SPS_D	General indication (binary input)		
Ind12	SPS_D	General indication (binary input)		
Ind13	SPS_D	General indication (binary input)		
Ind14	SPS_D	General indication (binary input)		
Ind15	SPS_D	General indication (binary input)		
Ind16	SPS_D	General indication (binary input)		
Ind17	SPS_D	General indication (binary input)		
Ind18	SPS_D	General indication (binary input)		
Ind19	SPS_D	General indication (binary input)		
Ind20	SPS_D	General indication (binary input)		
Ind21	SPS_D	General indication (binary input)		
Ind22	SPS_D	General indication (binary input)		
Ind23	SPS_D	General indication (binary input)		
Ind24	SPS_D	General indication (binary input)		
Ind25	SPS_D	General indication (binary input)		
Ind26	SPS_D	General indication (binary input)		
Ind27	SPS_D	General indication (binary input)		

Attribute	Attr. Type	Explanation	T	X
Ind28	SPS_D	General indication (binary input)		
Ind29	SPS_D	General indication (binary input)		
Ind30	SPS_D	General indication (binary input)		
Ind31	SPS_D	General indication (binary input)		
Ind32	SPS_D	General indication (binary input)		

#### 1.4.8 LOGICAL NODE: GGIO\_IND\_32\_CTRL

Description: Generic Process I/O (w.r.t 16 Indications Ctrl i/p)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
SPCSO01	SPC_CONTROL	Single point controllable status output		
Mod	ENC_MOD_THREE_STATUS	Mode		
SPCSO02	SPC_CONTROL	Single point controllable status output		
SPCSO03	SPC_CONTROL	Single point controllable status output		
SPCSO04	SPC_CONTROL	Single point controllable status output		
SPCSO05	SPC_CONTROL	Single point controllable status output		
SPCSO06	SPC_CONTROL	Single point controllable status output		
SPCSO07	SPC_CONTROL	Single point controllable status output		
SPCSO08	SPC_CONTROL	Single point controllable status output		
SPCSO09	SPC_CONTROL	Single point controllable status output		
SPCSO10	SPC_CONTROL	Single point controllable status output		
SPCSO11	SPC_CONTROL	Single point controllable status output		
SPCSO12	SPC_CONTROL	Single point controllable status output		
SPCSO13	SPC_CONTROL	Single point controllable status output		
SPCSO14	SPC_CONTROL	Single point controllable status output		
SPCSO15	SPC_CONTROL	Single point controllable status output		
SPCSO16	SPC_CONTROL	Single point controllable status output		
SPCSO17	SPC_CONTROL	Single point controllable status output		
SPCSO18	SPC_CONTROL	Single point controllable status output		
SPCSO19	SPC_CONTROL	Single point controllable status output		
SPCSO20	SPC_CONTROL	Single point controllable status output		
SPCSO21	SPC_CONTROL	Single point controllable status output		
SPCSO22	SPC_CONTROL	Single point controllable status output		
SPCSO23	SPC_CONTROL	Single point controllable status output		
SPCSO24	SPC_CONTROL	Single point controllable status output		
SPCSO25	SPC_CONTROL	Single point controllable status output		
SPCSO26	SPC_CONTROL	Single point controllable status output		
SPCSO27	SPC_CONTROL	Single point controllable status output		
SPCSO28	SPC_CONTROL	Single point controllable status output		
SPCSO29	SPC_CONTROL	Single point controllable status output		
SPCSO30	SPC_CONTROL	Single point controllable status output		
SPCSO31	SPC_CONTROL	Single point controllable status output		
SPCSO32	SPC_CONTROL	Single point controllable status output		

### 1.4.9 LOGICAL NODE: GGIO\_IND\_64

Description: Generic Process I/O (w.r.t 64 Indication Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Ind01	SPS_D	General indication (binary input)		
Ind02	SPS_D	General indication (binary input)		
Ind03	SPS_D	General indication (binary input)		
Ind04	SPS_D	General indication (binary input)		
Ind05	SPS_D	General indication (binary input)		
Ind06	SPS_D	General indication (binary input)		
Ind07	SPS_D	General indication (binary input)		
Ind08	SPS_D	General indication (binary input)		
Ind09	SPS_D	General indication (binary input)		
Ind10	SPS_D	General indication (binary input)		
Ind11	SPS_D	General indication (binary input)		
Ind12	SPS_D	General indication (binary input)		
Ind13	SPS_D	General indication (binary input)		
Ind14	SPS_D	General indication (binary input)		
Ind15	SPS_D	General indication (binary input)		
Ind16	SPS_D	General indication (binary input)		
Ind17	SPS_D	General indication (binary input)		
Ind18	SPS_D	General indication (binary input)		
Ind19	SPS_D	General indication (binary input)		
Ind20	SPS_D	General indication (binary input)		
Ind21	SPS_D	General indication (binary input)		
Ind22	SPS_D	General indication (binary input)		
Ind23	SPS_D	General indication (binary input)		
Ind24	SPS_D	General indication (binary input)		
Ind25	SPS_D	General indication (binary input)		
Ind26	SPS_D	General indication (binary input)		
Ind27	SPS_D	General indication (binary input)		
Ind28	SPS_D	General indication (binary input)		
Ind29	SPS_D	General indication (binary input)		
Ind30	SPS_D	General indication (binary input)		
Ind31	SPS_D	General indication (binary input)		
Ind32	SPS_D	General indication (binary input)		
Ind33	SPS_D	General indication (binary input)		
Ind34	SPS_D	General indication (binary input)		
Ind35	SPS_D	General indication (binary input)		
Ind36	SPS_D	General indication (binary input)		
Ind37	SPS_D	General indication (binary input)		
Ind38	SPS_D	General indication (binary input)		
Ind39	SPS_D	General indication (binary input)		
Ind40	SPS_D	General indication (binary input)		
Ind41	SPS_D	General indication (binary input)		
Ind42	SPS_D	General indication (binary input)		

Attribute	Attr. Type	Explanation	T	X
Ind43	SPS_D	General indication (binary input)		
Ind44	SPS_D	General indication (binary input)		
Ind45	SPS_D	General indication (binary input)		
Ind46	SPS_D	General indication (binary input)		
Ind47	SPS_D	General indication (binary input)		
Ind48	SPS_D	General indication (binary input)		
Ind49	SPS_D	General indication (binary input)		
Ind50	SPS_D	General indication (binary input)		
Ind51	SPS_D	General indication (binary input)		
Ind52	SPS_D	General indication (binary input)		
Ind53	SPS_D	General indication (binary input)		
Ind54	SPS_D	General indication (binary input)		
Ind55	SPS_D	General indication (binary input)		
Ind56	SPS_D	General indication (binary input)		
Ind57	SPS_D	General indication (binary input)		
Ind58	SPS_D	General indication (binary input)		
Ind59	SPS_D	General indication (binary input)		
Ind60	SPS_D	General indication (binary input)		
Ind61	SPS_D	General indication (binary input)		
Ind62	SPS_D	General indication (binary input)		
Ind63	SPS_D	General indication (binary input)		
Ind64	SPS_D	General indication (binary input)		

#### 1.4.10 LOGICAL NODE: LCCH\_SYSTEM

Description: Physical communication channel supervision

LN Class: LCCH

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
ChLiv	SPS_D	Physical channel status: true, if channel receives telegrams within a specified time interval.		
RedChLiv	SPS_D	Physical channel status of redundant channel.		

#### 1.4.11 LOGICAL NODE: LGOS\_SYSTEM

Description: Monitoring of GOOSE messages

LN Class: LGOS

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
SimSt	SPS_WD	Status showing that really Sim messages are received and accepted		
St	SPS_WD	Status of the subscription (True = active, False = not active)		

Attribute	Attr. Type	Explanation	T	X
GoCRef	ORG_SRC_REF	Reference to the subscribed GOOSE control block		
OoSEqGo	SPS_WD_PRIV	Out of Order GOOSE indication		X

#### 1.4.12 LOGICAL NODE: LLN0\_STANDARD

Description: General Logical Node 0

LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LLNO	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
GrRef	ORG_SRC_REF	Reference to a higher level logical device		

#### 1.4.13 LOGICAL NODE: LLN0\_STANDARD\_MEA

Description: Measurements Logical Node 0

LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LLNO_MEA	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
GrRef	ORG_SRC_REF	Reference to a higher level logical device		

#### 1.4.14 LOGICAL NODE: LLN0\_STANDARD\_WITH\_CTRLMOD

Description: Logical Node 0

LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LLNO	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_CTRL_LD_MOD_2	Mode		
GrRef	ORG_SRC_REF	Reference to a higher level logical device		

#### 1.4.15 LOGICAL NODE: LLN0\_SYSTEM

Description: System Logical Node 0

LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LLNO	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_CTRL_LD_MOD	Mode		
LEDs	SPC_CONTROL	LED reset	T	
OrdRun	SPS_WD_PRIV	Indicate IED is operating a Control Object		X
SyncSt	SPS_WD_PRIV	Indicate time synchronisation in the IED is active/inactive		X

**1.4.16 LOGICAL NODE: LPHD\_STANDARD**

Description: Px40 Physical Device Information

LN Class: LPHD

Attribute	Attr. Type	Explanation	T	X
PhyNam	DPL_STANDARD	Physical device name plate		
PhyHealth	ENS_HEALTH	Physical device health		
Proxy	SPS_D	Indicates if this LN is a proxy		
PwrUp	SPS_D	Power up detected		

**1.4.17 LOGICAL NODE: LPHD\_SYSTEM**

Description: Physical Device Information

LN Class: LPHD

Attribute	Attr. Type	Explanation	T	X
PhyNam	DPL_STANDARD	Physical device name plate		
PhyHealth	ENS_HEALTH	Physical device health		
Proxy	SPS_D	Indicates if this LN is a proxy		
PwrUp	SPS_D	Power up detected		
Sim	SPC_CONTROL	Receive simulated GOOSE or simulated SV		

**1.4.18 LOGICAL NODE: MLFR\_FAULT**

Description: Measurements of Fault Record

LN Class: MLFR

Attribute	Attr. Type	Explanation	T	X
NamPit	LPL_LN_PRIV	Name Plate		
Beh	ENS_BEH_THREE_STATUS_DN	Behaviour		
Health	ENS_HEALTH_DN	Health		
Mod	ENC_MOD_THREE_STATUS_DN	Mode		
AFit	WYE_SEG_PRIV	Fault current		X
CBOPtim	MV_FLOAT_PRIV	CB operate Time		X
FitDur	MV_FLOAT_PRIV	Fault duration		X
PhVFit	WYE_SEG_PRIV	Fault voltage		X
RlyTrTim	MV_FLOAT_PRIV	Relay trip time		X
IrefDiff	MV_FLOAT_PRIV	Iref differential current during fault		X
IrefBias	MV_FLOAT_PRIV	Iref bias current during fault		X
Hz	MV_FLOAT_PRIV	System Frequency		X
Vn	MV_FLOAT_PRIV	VN Derived VN Measure		X
Imax	WYE_SEG_PRIV	Ia,Ib,Ic max		X

**1.4.19 LOGICAL NODE: MMTR\_PRIV**

Description: Metering

LN Class: MMTR

Attribute	Attr. Type	Explanation	T	X
NamPit	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		

Attribute	Attr. Type	Explanation	T	X
TotWh	BCR_PRIV	Net real energy since last reset		
TotVArh	BCR_PRIV	Net reactive energy since last reset		
SupWh	BCR_PRIV	Real energy supply (Energy flow towards bus bar)		
SupVArh	BCR_PRIV	Reactive energy supply (Energy flow towards bus bar)		
DmdWh	BCR_PRIV	Real energy demand (Energy flow from bus bar)		
DmdVArh	BCR_PRIV	Reactive energy demand (Energy flow from bus bar)		
MTRRs	SPC_CTRL_PRIV_NS	Reset Energy Meters		X

#### 1.4.20 LOGICAL NODE: MMXU\_FOURIER\_P140

Description: Standard measurements

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
TotW	MV_FLOAT	Total active power (Total P)		
TotVAr	MV_FLOAT	Total reactive power (Total Q)		
TotVA	MV_FLOAT	Total apparent power (Total S)		
TotPF	MV_FLOAT	Average power factor (Total PF)		
Hz	MV_FLOAT	Frequency		
PPV	DEL_SEG_ANG	Phase to Phase voltages		
PhV	WYE_SEG_RES_D	Phase to Ground voltages		
A	WYE_SEG_RES_D	Phase currents (Fourier Magnitudes)		
NeutA1	WYE_RES_ANG_D_PRIV	Phase currents (IN Measured)		X
NeutA2	WYE_RES_ANG_D_PRIV	Phase currents (IN Measured)		X
W	WYE_SEG	Phase active power (P)		
VAr	WYE_SEG	Phase reactive power (Q)		
VA	WYE_SEG	Phase apparent power (S)		
PF	WYE_SEG	Phase power factor		

#### 1.4.21 LOGICAL NODE: MMXU\_FOURIER\_P140\_EXT

Description: Standard measurements including df/dt

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
TotW	MV_FLOAT	Total active power (Total P)		
TotVAr	MV_FLOAT	Total reactive power (Total Q)		
TotVA	MV_FLOAT	Total apparent power (Total S)		
TotPF	MV_FLOAT	Average power factor (Total PF)		
Hz	MV_FLOAT	Frequency		
PPV	DEL_SEG_ANG	Phase to Phase voltages		

Attribute	Attr. Type	Explanation	T	X
PhV	WYE_SEG_RES_D	Phase to Ground voltages		
A	WYE_SEG_RES_D	Phase currents (Fourier Magnitudes)		
NeutA1	WYE_RES_ANG_D_PRIV	Phase currents (IN Measured)		X
NeutA2	WYE_RES_ANG_D_PRIV	Phase currents (ISEF Magnitude)		X
W	WYE_SEG	Phase active power (P)		
VAr	WYE_SEG	Phase reactive power (Q)		
VA	WYE_SEG	Phase apparent power (S)		
PF	WYE_SEG	Phase power factor		
DfDt	MV_FLOAT_PRIV	The measurement for Df/Dt		X

#### 1.4.22 LOGICAL NODE: MMXU\_METER\_AV

Description: Metering Statistics (w.r.t Current, Real + Reactive Power - Average values)

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
NamPit	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
CicExp	SPS_WD	Calculation period expired	T	
CicMth	ENG_SET_WD_CLCMTH	Calculation method of statistical data objects		
CicMod	ENG_SET_WD_CLCMOD	Calculation mode		
CicIntvTyp	ENG_SET_WD_CLCINTVTYP	Calculation interval type		
CicIntvPer	ING_SET_WD	number of units to consider,to calculate the calculation interval duration		
AvWPhs	MV_FLOAT_D	Arithmetic average of the magnitude of active power of the 3 phases		
AvVArPhs	MV_FLOAT_D	Arithmetic average of the magnitude of reactive power of the 3 phases		
AvAPhsA	MV_FLOAT_D_PRIV	Arithmetic average of the magnitude of Ia current		X
AvAPhsB	MV_FLOAT_D_PRIV	Arithmetic average of the magnitude of Ib current		X
AvAPhsC	MV_FLOAT_D_PRIV	Arithmetic average of the magnitude of Ic current		X

#### 1.4.23 LOGICAL NODE: MMXU\_METER\_MAX

Description: Standard measurements (w.r.t Current, Real + Reactive Power - Max values)

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
NamPit	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
CicExp	SPS_WD	Calculation period expired	T	
CicMth	ENG_SET_WD_CLCMTH	Calculation method of statistical data objects		
CicMod	ENG_SET_WD_CLCMOD	Calculation mode		
MaxWPhs	MV_FLOAT_D	Maximum magnitude of active power of the 3 phases		

Attribute	Attr. Type	Explanation	T	X
MaxVArPhs	MV_FLOAT_D	Maximum magnitude of reactive power of the 3 phases		
MaxAPhsA	MV_FLOAT_D_PRIV	Maximum magnitude of Ia current		X
MaxAPhsB	MV_FLOAT_D_PRIV	Maximum magnitude of Ib current		X
MaxAPhsC	MV_FLOAT_D_PRIV	Maximum magnitude of Ic current		X

#### 1.4.24 LOGICAL NODE: MMXU\_RMS\_P140

Description: Standard Measurements (w.r.t RMS Values - P140)

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
NamPIt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
PhV	WYE_SEG_D	Phase to Ground voltages		
A	WYE_SEG_D	Phase currents		

#### 1.4.25 LOGICAL NODE: MSQI\_ALL

Description: Sequence and imbalance (w.r.t Pos, Neg, Zero)

LN Class: MSQI

Attribute	Attr. Type	Explanation	T	X
NamPIt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
SeqA	SEQ_MAG_ANG	Positive, Negative and Zero sequence current		
SeqV	SEQ_MAG_ANG	Positive, Negative and Zero sequence voltage		
ImbNgA	MV_FLOAT	Imbalance negative sequence current		

#### 1.4.26 LOGICAL NODE: PDIF\_NEU

Description: Differential (w.r.t Neutral)

LN Class: PDIF

Attribute	Attr. Type	Explanation	T	X
NamPIt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Op	ACT_NEU	Operate	T	
DifACIc	WYE_INET	Differential current		
RstA	WYE_INET	Restraint current		

**1.4.27 LOGICAL NODE: PDOP\_BASIC**

Description: Overpower protection

LN Class: PDOP

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		
Str	ACD_SEG	Start		
Op	ACT_SEG	Operate	T	

**1.4.28 LOGICAL NODE: PDUP\_BASIC**

Description: Underpower protection

LN Class: PDUP

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		
Str	ACD_SEG	Start		
Op	ACT_SEG	Operate	T	

**1.4.29 LOGICAL NODE: PFRC\_NO\_SEG**

Description: Rate of change of frequency (w.r.t No Phase Segregation)

LN Class: PFRC

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

**1.4.30 LOGICAL NODE: PSDE\_NEU**

Description: Sensitive directional earth fault

LN Class: PSDE

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		
Str	ACD_NEU	Start		
Op	ACT_NEU	Operate	T	

**1.4.31 LOGICAL NODE: PTOC\_NEU**

Description: Timed Overcurrent (w.r.t Neutral)

LN Class: PTOC

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Str	ACD_NEU	Start		
Op	ACT_NEU	Operate	T	

**1.4.32 LOGICAL NODE: PTOC\_NO\_SEG**

Description: Timed Overcurrent (w.r.t No Phase Segregation)

LN Class: PTOC

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

**1.4.33 LOGICAL NODE: PTOC\_SEG**

Description: Timed Overcurrent (w.r.t Phase Segregation)

LN Class: PTOC

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Str	ACD_SEG	Start		
Op	ACT_SEG	Operate	T	

**1.4.34 LOGICAL NODE: PTOF\_NO\_SEG**

Description: Overfrequency (w.r.t No Phase Segregation)

LN Class: PTOF

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

**1.4.35 LOGICAL NODE: PTOV\_NEU**

Description: Overvoltage (w.r.t Neutral)

LN Class: PTOV

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Str	ACD_NEU	Start		
Op	ACT_NEU	Operate	T	

**1.4.36 LOGICAL NODE: PTOV\_NO\_SEG**

Description: Overvoltage (w.r.t No Phase Segregation)

LN Class: PTOV

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

**1.4.37 LOGICAL NODE: PTOV\_SEG**

Description: Overvoltage (w.r.t Phase Segregation)

LN Class: PTOV

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Str	ACD_SEG	Start		
Op	ACT_SEG	Operate	T	

**1.4.38 LOGICAL NODE: PTRC\_GLOBAL**

Description: Protection trip conditioning

LN Class: PTRC

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Tr	ACT_NO_SEG	Trip		
Op	ACT_NO_SEG	Operate (combination of subscribed Op from protection functions)		
Str	ACD_NO_SEG	Sum of all starts of all connected Logical Nodes		

**1.4.39 LOGICAL NODE: PTRC\_INDIVID\_NO\_SEG**

Description: Protection trip conditioning

LN Class: PTRC

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Op	ACT_NO_SEG	Operate (combination of subscribed Op from protection functions)		
Str	ACD_NO_SEG	Sum of all starts of all connected Logical Nodes		

**1.4.40 LOGICAL NODE: PTTR\_NO\_SEG**

Description: Thermal overload (w.r.t No Phase Segregation)

LN Class: PTTR

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Amp	MV_FLOAT	Current for thermal load model		
TmpRI	MV_FLOAT	Relation between temperature and maximum temperature		
Op	ACT_NO_SEG	Operate	T	
MTRRs	SPC_CTRL_PRV_NS	Reset Thermal State		X
AlmThm	SPS_WD	Thermal alarm		

**1.4.41 LOGICAL NODE: PTUF\_NO\_SEG**

Description: Underfrequency (w.r.t No Phase Segregation)

LN Class: PTUF

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

**1.4.42 LOGICAL NODE: PTUV\_SEG**

Description: Undervoltage (w.r.t Phase Segregation)

LN Class: PTUV

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		

Attribute	Attr. Type	Explanation	T	X
Str	ACD_SEG	Start		
Op	ACT_SEG	Operate	T	

#### 1.4.43 LOGICAL NODE: RBRF\_EXTTRIP

Description: Breaker Failure (w.r.t External Tripping)

LN Class: RBRF

Attribute	Attr. Type	Explanation	T	X
NamPit	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
OpEx	ACT_NO_SEG	Breaker failure trip ("External trip")	T	

#### 1.4.44 LOGICAL NODE: RDRE\_BASIC

Description: Disturbance Recorder function (w.r.t Mandatory Attributes only)

LN Class: RDRE

Attribute	Attr. Type	Explanation	T	X
NamPit	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
RcdMade	SPS_WD	Recording made		
FitNum	INS_BASIC	Fault number		

#### 1.4.45 LOGICAL NODE: RFLO\_BASIC

Description: Fault Locator (w.r.t Mandatory Attributes only)

LN Class: RFLO

Attribute	Attr. Type	Explanation	T	X
NamPit	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
FitZ	CMV_MAG_FLOAT	Fault impedance		
FitDiskm	MV_FLOAT	Fault distance in km		

#### 1.4.46 LOGICAL NODE: RREC\_NO\_SEG

Description: Autoreclosing (w.r.t No Phase Segregation)

LN Class: RREC

Attribute	Attr. Type	Explanation	T	X
NamPit	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
OpCls	ACT_NO_SEG	Operation "Close Switch" issued to close circuit breaker		
AutoRecSt	ENS_AUTORECST	Auto reclosing status		

**1.4.47 LOGICAL NODE: RSYN\_DIFCLC**

Description: Synchronism-check/Synchronising (w.r.t Calculated Differential Measurements)

LN Class: RSYN

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Rel	SPS_WD	Release		
VInd	SPS_WD	Voltage difference indicator		
AngInd	SPS_WD	Angle difference indicator		
HzInd	SPS_WD	Frequency difference indicator		
DifVClc	MV_FLOAT	Calculated difference in voltage		
DifHzClc	MV_FLOAT	Calculated difference in frequency		
DifAngClc	MV_FLOAT	Calculated difference of phase angle		

**1.4.48 LOGICAL NODE: TVTR\_SYSTEM**

Description: Voltage transformer

LN Class: TVTR

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
EEHealth	ENS_HEALTH	External equipment health		
EEName	DPL_PRIV	External equipment name plate		
FuFail	SPS_WD	TVTR fuse failure		

**1.4.49 LOGICAL NODE: XCBR\_BASIC**

Description: Circuit Breaker (w.r.t Mandatory Attributes Only)

LN Class: XCBR

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
EEHealth	ENS_HEALTH	External equipment health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Loc	SPS_WD	Local operation		
OpCnt	INS_BASIC	Operation counter		
CBOpCap	ENS_CBCAP	Circuit Breaker operating capacity		
SumSwARs	BCR_PRIV	Sum of switched amperes, resettable		
Pos	DPC_STATUS	Switch position		
BlkOpn	SPC_STATUS	Block opening		
BlkCls	SPC_STATUS	Block closing		

### 1.4.50 LOGICAL NODE: XSWI\_BASIC

Description: Circuit Switch (w.r.t Switch Status and Control)

LN Class: XSWI

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Loc	SPS_WD	Local operation		
EEHealth	ENS_HEALTH	External equipment health		
OpCnt	INS_BASIC	Operation counter		
Pos	DPC_STATUS	Switch position		
BlkOpn	SPC_STATUS	Block opening		
BlkCls	SPC_STATUS	Block closing		
SwTyp	ENS_SWI_TYPE	Switch type		
SwOpCap	ENS_CBCAP	Switch operating capability		

## 1.5 COMMON DATA CLASS DEFINITIONS

The definition tables for each of the Common Data Classes used in the Logical Node definitions are presented in the following sub-sections.

From an application point-of-view the data attributes of a Common Data Class are classified according to their specific use. The characterization of data attributes, and the services that they support/provide, will be through the use of 'Functional Constraints'. The Functional Constraints are specified by the table below:

FC Name	Semantic	Source Definition
BL	Blocking	IEC61850-7-2-2010
BR	Buffered reports	IEC61850-7-2
CF	Configuration	IEC61850-7-2
CO	Control	IEC61850-7-2
DC	Description	IEC61850-7-2
EX	Extended Definition	IEC61850-7-2
GO	GOOSE Control	IEC61850-7-2
GS	GSSE Control (UCA2 GOOSE)	IEC61850-7-2
LG	Logging	IEC61850-7-2
MS	Multicast sampled value control	IEC61850-7-2
MX	Measurands (Analogue values)	IEC61850-7-2
OR	Operate received	IEC61850-7-2-2010
RP	Unbuffered reports	IEC61850-7-2
SE	Setting Group Editable	IEC61850-7-2
SG	Setting Group	IEC61850-7-2
SP	Set Point	IEC61850-7-2
SR	Service response	IEC61850-7-2-2010
ST	Status Information	IEC61850-7-2
SV	Substitution Values	IEC61850-7-2
US	Unicast sampled value control	IEC61850-7-2
XX	Data attribute service parameters	IEC61850-7-2

### 1.5.1 COMMON DATA CLASS: ACD\_NEU

Description: Directional Protection Activation Information (w.r.t Neutral)

CDC Class: ACD

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
dirGeneral	ENUMERATED8 (MMS Type: INT8)	ST	dir	General direction (unknown, forward, backward or both)	
neut	BOOLEAN	ST		Trip or start event with earth current has happened	
dirNeut	ENUMERATED8 (MMS Type: INT8)	ST	PhaseFaultDirectionKind	Earth current direction (unknown, forward or backward)	
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

### 1.5.2 COMMON DATA CLASS: ACD\_NO\_SEG

Description: Directional Protection Activation Information (w.r.t No Phase Segregation)

CDC Class: ACD

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
dirGeneral	ENUMERATED8 (MMS Type: INT8)	ST	dir	General direction (unknown, forward, backward or both)	
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

### 1.5.3 COMMON DATA CLASS: ACD\_SEG

Description: Directional Protection Activation Information (w.r.t Phase Segregation)

CDC Class: ACD

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
dirGeneral	ENUMERATED8 (MMS Type: INT8)	ST	dir	General direction (unknown, forward, backward or both)	
phsA	BOOLEAN	ST		Trip or start event of Phase A has happened	
dirPhsA	ENUMERATED8 (MMS Type: INT8)	ST	PhaseFaultDirectionKind	Phase A direction (unknown, forward or backward)	
phsB	BOOLEAN	ST		Trip or start event of Phase B has happened	
dirPhsB	ENUMERATED8 (MMS Type: INT8)	ST	PhaseFaultDirectionKind	Phase B direction (unknown, forward or backward)	
phsC	BOOLEAN	ST		Trip or start event of Phase C has happened	
dirPhsC	ENUMERATED8 (MMS Type: INT8)	ST	PhaseFaultDirectionKind	Phase C direction (unknown, forward or backward)	
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

#### 1.5.4 COMMON DATA CLASS: ACT\_NEU

Description: Protection Activation Information (w.r.t Neutral)

CDC Class: ACT

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
neut	BOOLEAN	ST		Trip or start event with earth current has happened	
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

#### 1.5.5 COMMON DATA CLASS: ACT\_NO\_SEG

Description: Protection Activation Information (w.r.t No Phase Segregation)

CDC Class: ACT

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

#### 1.5.6 COMMON DATA CLASS: ACT\_SEG

Description: Protection Activation Information (w.r.t Phase Segregation)

CDC Class: ACT

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
phsA	BOOLEAN	ST		Trip or start event of Phase A has happened	
phsB	BOOLEAN	ST		Trip or start event of Phase B has happened	
phsC	BOOLEAN	ST		Trip or start event of Phase C has happened	
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

#### 1.5.7 COMMON DATA CLASS: BCR\_PRIV

Description: Binary Counter Reading

CDC Class: BCR

Attribute	Type	FC	Enumeration	Comment	X
actVal	INT64	ST		Binary counter status represented as an integer	
q	Quality	ST		Quality of counter value	
t	TimeStamp	ST		Time of last counter change	
pulsQty	FLOAT32	CF		Magnitude of the counted value 'per count' (value = actVal x pulsQty)	

### 1.5.8 COMMON DATA CLASS: CMV\_MAG\_ANG\_FLOAT

Description: Complex Measured value (w.r.t Floating Point Magnitude and Angle)

CDC Class: CMV

Attribute	Type	FC	Enumeration	Comment	X
cVal	Vector_MagnitudeAngle_Float	MX		Deadbanded complex measured vector. Updated to the current value of instCVal when the value has changed according to the configuration parameter db.	
q	Quality	MX		Quality of the measurement value	
t	TimeStamp	MX		Time deadbanded magnitude last exceeded its db configuration parameter	
units	Unit_Multiplier	CF		Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
rangeC	RangeConfig_Deadband	CF		Measurement range configuration attributes	

### 1.5.9 COMMON DATA CLASS: CMV\_MAG\_FLOAT

Description: Complex Measured value (w.r.t Floating Point Magnitude)

CDC Class: CMV

Attribute	Type	FC	Enumeration	Comment	X
cVal	Vector_Magnitude_Float	MX		Deadbanded complex measured vector. Updated to the current value of instCVal when the value has changed according to the configuration parameter db.	
q	Quality	MX		Quality of the measurement value	
t	TimeStamp	MX		Time deadbanded magnitude last exceeded its db configuration parameter	
units	Unit_Multiplier	CF		Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
rangeC	RangeConfig_Deadband	CF		Measurement range configuration attributes	

### 1.5.10 COMMON DATA CLASS: DEL\_SEG\_ANG

Description: Phase to phase measurements for a 3-Phase system (w.r.t Phase Segregation + Angle)

CDC Class: DEL

Attribute	Type	FC	Enumeration	Comment	X
phsAB	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase A to Phase B	
phsBC	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase B to Phase C	
phsCA	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase C to Phase A	

### 1.5.11 COMMON DATA CLASS: DPC\_CTRL

Description: Controllable Double Point (for CSWI.pos)

CDC Class: DPC

Attribute	Type	FC	Enumeration	Comment	X
ctlVal	BOOLEAN	CO		Control value (Off - FALSE, On - TRUE)	
origin	Originator	ST		Originator of the last change of the controllable data	
stVal	CODED_ENUM (MMS Type: _BSTR2)	ST	Dbpos	Status value of the data (Intermediate state, Off, On or Bad-state)	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	

Attribute	Type	FC	Enumeration	Comment	X
sboTimeout	INT32U	CF		Select Before Operate timeout period (in milliseconds)	

### 1.5.12 COMMON DATA CLASS: DPC\_STATUS

Description: Controllable Double Point (w.r.t Status Only)

CDC Class: DPC

Attribute	Type	FC	Enumeration	Comment	X
stVal	CODED_ENUM (MMS Type: _BSTR2)	ST	Dbpos	Status value of the data (Intermediate state, Off, On or Bad-state)	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	

### 1.5.13 COMMON DATA CLASS: DPL\_PRIV

Description: Device name plate

CDC Class: DPL

Attribute	Type	FC	Enumeration	Comment	X
vendor	VISIBLE_STRING255	DC		Name of the vendor	

### 1.5.14 COMMON DATA CLASS: DPL\_STANDARD

Description: Standard Device Name Plate

CDC Class: DPL

Attribute	Type	FC	Enumeration	Comment	X
vendor	VISIBLE_STRING255	DC		Name of the vendor	
hwRev	VISIBLE_STRING255	DC		Hardware revision	
swRev	VISIBLE_STRING255	DC		Software revision	
serNum	VISIBLE_STRING255	DC		Serial Number	
model	VISIBLE_STRING255	DC		Model Number	
location	VISIBLE_STRING255	DC		Physical location of device	

### 1.5.15 COMMON DATA CLASS: ENC\_CTRL\_LD\_MOD

Description: Controllable enumerated status

CDC Class: ENC

Attribute	Type	FC	Enumeration	Comment	X
ctlVal	ENUMERATED32 (MMS Type: INT8)	CO	Mod_3	Control value	
origin	Originator	ST		Originator of the last change of the controllable data	
stVal	ENUMERATED32 (MMS Type: INT8)	ST	Mod_3	Status value of the data	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	
sboTimeout	INT32U	CF		Select Before Operate timeout period (in milliseconds)	
d	VISIBLE_STRING255	DC		Description of the status element	

### 1.5.16 COMMON DATA CLASS: ENC\_CTRL\_LD\_MOD\_2

Description: Controllable enumerated status (includes three status, used for child LD.LLN0)

CDC Class: ENC

Attribute	Type	FC	Enumeration	Comment	X
ctlVal	ENUMERATED32 (MMS Type: INT8)	CO	Mod_2	Control value	
origin	Originator	ST		Originator of the last change of the controllable data	
stVal	ENUMERATED32 (MMS Type: INT8)	ST	Mod_2	Status value of the data	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	
sboTimeout	INT32U	CF		Select Before Operate timeout period (in milliseconds)	
d	VISIBLE_STRING255	DC		Description of the status element	

### 1.5.17 COMMON DATA CLASS: ENC\_MOD\_THREE\_STATUS

Description: Controllable enumerated mode status (with 3 status)

CDC Class: ENC

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED32 (MMS Type: INT8)	ST	Mod_3	Status value of the data	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	

### 1.5.18 COMMON DATA CLASS: ENC\_MOD\_THREE\_STATUS\_DN

Description: Controllable enumerated status (with 3 status and dataNs used for the Mod in the extended LN)

CDC Class: ENC

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED32 (MMS Type: INT8)	ST	Mod_3	Status value of the data	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	
dataNs	VISIBLE_STRING255	EX		Data name space	

### 1.5.19 COMMON DATA CLASS: ENC\_MOD\_TWO\_STATUS

Description: Controllable enumerated status

CDC Class: ENC

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED32 (MMS Type: INT8)	ST	Mod_2	Status value of the mode used for LN which have two status	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
stVal	ENUMERATED32 (MMS Type: INT8)	ST	Mod_2	Status value of the mode used for LN which have two status	
q	Quality	ST		Quality of the status value	

Attribute	Type	FC	Enumeration	Comment	X
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	

### 1.5.20 COMMON DATA CLASS: ENG\_SET\_WD\_CLCINTVTYP

Description: Enumerated status setting (for ClcIntvTyp)

CDC Class: ENG

Attribute	Type	FC	Enumeration	Comment	X
setVal	ENUMERATED8 (MMS Type: INT8)	SP	ClcIntvTyp	Setting value	

### 1.5.21 COMMON DATA CLASS: ENG\_SET\_WD\_CLCMOD

Description: Enumerated status setting (for ClcMod)

CDC Class: ENG

Attribute	Type	FC	Enumeration	Comment	X
setVal	ENUMERATED8 (MMS Type: INT8)	SP	ClcMod	Setting value	

### 1.5.22 COMMON DATA CLASS: ENG\_SET\_WD\_CLCMTH

Description: Enumerated status setting (for ClcMth)

CDC Class: ENG

Attribute	Type	FC	Enumeration	Comment	X
setVal	ENUMERATED8 (MMS Type: INT8)	SP	ClcMth	Setting value	

### 1.5.23 COMMON DATA CLASS: ENS\_AUTORECST

Description: Enumerated status

CDC Class: ENS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (MMS Type: INT8)	ST	AutoRecSt	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

### 1.5.24 COMMON DATA CLASS: ENS\_BEH\_FOUR\_STATUS

Description: Enumerated behaviour status (with 4 status)

CDC Class: ENS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (MMS Type: INT8)	ST	Beh_4	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

**1.5.25 COMMON DATA CLASS: ENS\_BEH\_THREE\_STATUS**

Description: Enumerated behaviour status (with 3 status)

CDC Class: ENS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (MMS Type: INT8)	ST	Beh_3	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

**1.5.26 COMMON DATA CLASS: ENS\_BEH\_THREE\_STATUS\_DN**

Description: Enumerated status (with 3 status and dataNs)

CDC Class: ENS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (MMS Type: INT8)	ST	Beh_3	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	
dataNs	VISIBLE_STRING255	EX		Data name space	

**1.5.27 COMMON DATA CLASS: ENS\_CBCAP**

Description: Enumerated status (w.r.t CB operating capability)

CDC Class: ENS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (MMS Type: INT8)	ST	CBOpCap	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

**1.5.28 COMMON DATA CLASS: ENS\_HEALTH**

Description: Enumerated status

CDC Class: ENS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (MMS Type: INT8)	ST	Health	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

**1.5.29 COMMON DATA CLASS: ENS\_HEALTH\_DN**

Description: Enumerated status (with dataNs)

CDC Class: ENS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (MMS Type: INT8)	ST	Health	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	
dataNs	VISIBLE_STRING255	EX		Data name space	

**1.5.30 COMMON DATA CLASS: ENS\_SWI\_TYPE**

Description: Enumerated status

CDC Class: ENS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (MMS Type: INT8)	ST	SwType	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

**1.5.31 COMMON DATA CLASS: INC\_MOD**

Description: Controllable Integer Status (w.r.t Mode)

CDC Class: INC

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32 (MMS Type: INT8)	ST	Mod	Status value of the data	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	

**1.5.32 COMMON DATA CLASS: INC\_MOD\_STD**

Description: Controllable Integer Status

CDC Class: INC

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32	ST		Status value of the data	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	

**1.5.33 COMMON DATA CLASS: ING\_SET\_WD**

Description: Integer Status Setting

CDC Class: ING

Attribute	Type	FC	Enumeration	Comment	X
setVal	INT32	SP		Setting value	

**1.5.34 COMMON DATA CLASS: INS\_BASIC**

Description: Integer Status (w.r.t Mandatory Options Only)

CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32	ST		The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

**1.5.35 COMMON DATA CLASS: INS\_BEH**

Description: Integer Status (w.r.t Behaviour)

CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32 (MMS Type: INT8)	ST	Beh	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

**1.5.36 COMMON DATA CLASS: INS\_CBCAP**

Description: Integer Status (w.r.t Circuit Breaker Operating)

CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32 (MMS Type: INT8)	ST	CBOpCap	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

**1.5.37 COMMON DATA CLASS: LPL\_LLNO**

Description: Logical Node 0 Name Plate

CDC Class: LPL

Attribute	Type	FC	Enumeration	Comment	X
vendor	VISIBLE_STRING255	DC		Name of the vendor	
swRev	VISIBLE_STRING255	DC		Software revision	
d	VISIBLE_STRING255	DC		Description	
configRev	VISIBLE_STRING255	DC		Uniquely identifies the configuration of a local device instance	
IdNs	VISIBLE_STRING255	EX		Logical Device name space	

**1.5.38 COMMON DATA CLASS: LPL\_LLNO\_MEA**

Description: Measurements Logical Node 0 name plate

CDC Class: LPL

Attribute	Type	FC	Enumeration	Comment	X
vendor	VISIBLE_STRING255	DC		Name of the vendor	
swRev	VISIBLE_STRING255	DC		Software revision	
configRev	VISIBLE_STRING255	DC		Uniquely identifies the configuration of a local device instance	
IdNs	VISIBLE_STRING255	EX		Logical Device name space	

**1.5.39 COMMON DATA CLASS: LPL\_LN**

Description: Standard Logical Node Name Plate

CDC Class: LPL

Attribute	Type	FC	Enumeration	Comment	X
vendor	VISIBLE_STRING255	DC		Name of the vendor	
swRev	VISIBLE_STRING255	DC		Software revision	
d	VISIBLE_STRING255	DC		Description	

**1.5.40 COMMON DATA CLASS: LPL\_LN\_PRIV**

Description: Logical Node Name Plate

CDC Class: LPL

Attribute	Type	FC	Enumeration	Comment	X
vendor	VISIBLE_STRING255	DC		Name of the vendor	
swRev	VISIBLE_STRING255	DC		Software revision	
d	VISIBLE_STRING255	DC		Description	
InNs	VISIBLE_STRING255	EX		Logical Node name space	
dataNs	VISIBLE_STRING255	EX		Data name space	

**1.5.41 COMMON DATA CLASS: MV\_FLOAT**

Description: Measured value (w.r.t Floating Point value)

CDC Class: MV

Attribute	Type	FC	Enumeration	Comment	X
mag	AnalogueValue_Float	MX		Deadbanded magnitude of the instantaneous value of a measured value or harmonic value. Updated to the current value of instMag when the value has changed according to the configuration parameter db.	
q	Quality	MX		Quality of the measurement value	
t	TimeStamp	MX		Time deadbanded magnitude last exceeded its db configuration parameter	
units	Unit_Multiplier	CF		Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
rangeC	RangeConfig_Deadband	CF		Measurement range configuration attributes	

**1.5.42 COMMON DATA CLASS: MV\_FLOAT\_D**

Description: Measured value (w.r.t Floating Point Value with Description)

CDC Class: MV

Attribute	Type	FC	Enumeration	Comment	X
mag	AnalogueValue_Float	MX		Deadbanded magnitude of the instantaneous value of a measured value or harmonic value. Updated to the current value of instMag when the value has changed according to the configuration parameter db.	
q	Quality	MX		Quality of the measurement value	
t	TimeStamp	MX		Time deadbanded magnitude last exceeded its db configuration parameter	
units	Unit_Multiplier	CF		Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
rangeC	RangeConfig_Deadband	CF		Measurement range configuration attributes	
d	VISIBLE_STRING255	DC		Description of the status element	

**1.5.43 COMMON DATA CLASS: MV\_FLOAT\_D\_PRIV**

Description: Measured value

CDC Class: MV

Attribute	Type	FC	Enumeration	Comment	X
mag	AnalogueValue_Float	MX		Deadbanded magnitude of the instantaneous value of a measured value or harmonic value. Updated to the current value of instMag when the value has changed according to the configuration parameter db.	

Attribute	Type	FC	Enumeration	Comment	X
q	Quality	MX		Quality of the measurement value	
t	TimeStamp	MX		Time deadbanded magnitude last exceeded its db configuration parameter	
units	Unit	CF		Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
rangeC	RangeConfig_Deadband	CF		Measurement range configuration attributes	
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

#### 1.5.44 COMMON DATA CLASS: MV\_FLOAT\_PRIV

Description: Measured value (used for extended DO)

CDC Class: MV

Attribute	Type	FC	Enumeration	Comment	X
mag	AnalogueValue_Float	MX		Deadbanded magnitude of the instantaneous value of a measured value or harmonic value. Updated to the current value of instMag when the value has changed according to the configuration parameter db.	
q	Quality	MX		Quality of the measurement value	
t	TimeStamp	MX		Time deadbanded magnitude last exceeded its db configuration parameter	
units	Unit_Multiplier	CF		Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
rangeC	RangeConfig_Deadband	CF		Measurement range configuration attributes	
dataNs	VISIBLE_STRING255	EX		Data name space	

#### 1.5.45 COMMON DATA CLASS: ORG\_SRC\_REF

Description: Object reference settings

CDC Class: ORG

Attribute	Type	FC	Enumeration	Comment	X
setSrcRef	ObjectReference	SP		The value of the object reference setting	

#### 1.5.46 COMMON DATA CLASS: SEQ\_MAG\_ANG

Description: Sequence components of a measurement value (w.r.t Magnitudes + Angles)

CDC Class: SEQ

Attribute	Type	FC	Enumeration	Comment	X
c1	CMV_MAG_ANG_FLOAT	--		Sequence component 1 (For semantic meaning see seqT)	
c2	CMV_MAG_ANG_FLOAT	--		Sequence component 2 (For semantic meaning see seqT)	
c3	CMV_MAG_ANG_FLOAT	--		Sequence component 3 (For semantic meaning see seqT)	
seqT	ENUMERATED8 (MMS Type: INT8)	MX	seqT	Sequence quantity measurement type (Pos-Neg-Zero or Dir-Quad-Zero)	

**1.5.47 COMMON DATA CLASS: SPC\_CONTROL**

Description: Controllable Single Point

CDC Class: SPC

Attribute	Type	FC	Enumeration	Comment	X
ctlVal	BOOLEAN	CO		Control value (Off - FALSE, On - TRUE)	
origin	Originator	ST		Originator of the last change of the controllable data	
stVal	BOOLEAN	ST		Status value of the data	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	
sboTimeout	INT32U	CF		Select Before Operate timeout period (in milliseconds)	

**1.5.48 COMMON DATA CLASS: SPC\_CTRL\_PRIV\_NS**

Description: Controllable Single Point (Name Space)

CDC Class: SPC

Attribute	Type	FC	Enumeration	Comment	X
ctlVal	BOOLEAN	CO		Control value (Off - FALSE, On - TRUE)	
origin	Originator	ST		Originator of the last change of the controllable data	
stVal	BOOLEAN	ST		Status value of the data	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	
sboTimeout	INT32U	CF		Select Before Operate timeout period (in milliseconds)	
dataNs	VISIBLE_STRING255	EX		Data name space	

**1.5.49 COMMON DATA CLASS: SPC\_STATUS**

Description: Controllable Single Point (w.r.t Status Only)

CDC Class: SPC

Attribute	Type	FC	Enumeration	Comment	X
stVal	BOOLEAN	ST		Status value of the data	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	

**1.5.50 COMMON DATA CLASS: SPS\_D**

Description: Standard Single Point Status (with Description)

CDC Class: SPS

Attribute	Type	FC	Enumeration	Comment	X
stVal	BOOLEAN	ST		The element status (TRUE or FALSE)	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	
d	VISIBLE_STRING255	DC		Description of the status element	

**1.5.51 COMMON DATA CLASS: SPS\_WD**

Description: Single Point Status (without Description)

CDC Class: SPS

Attribute	Type	FC	Enumeration	Comment	X
stVal	BOOLEAN	ST		The element status (TRUE or FALSE)	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

**1.5.52 COMMON DATA CLASS: SPS\_WD\_PRIV**

Description: Single Point Status (without Description with Name Space)

CDC Class: SPS

Attribute	Type	FC	Enumeration	Comment	X
stVal	BOOLEAN	ST		The element status (TRUE or FALSE)	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	
dataNs	VISIBLE_STRING255	EX		Data name space	

**1.5.53 COMMON DATA CLASS: WYE\_INET**

Description: Phase to ground measurements for a 3-Phase system (w.r.t Net Current)

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
net	CMV_MAG_FLOAT	--		Measurement values for the net (sum of all phases) system current	

**1.5.54 COMMON DATA CLASS: WYE\_RES\_ANG\_D\_PRIV**

Description: Phase to ground measurements for a 3-Phase system

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
res	CMV_MAG_ANG_FLOAT	--		Measurement values for the residual system current	
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

**1.5.55 COMMON DATA CLASS: WYE\_SEG**

Description: Phase to ground measurements for a 3-Phase system (w.r.t Phase Segregation)

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
phsA	CMV_MAG_FLOAT	--		Measurement values for Phase A	
phsB	CMV_MAG_FLOAT	--		Measurement values for Phase B	
phsC	CMV_MAG_FLOAT	--		Measurement values for Phase C	

**1.5.56 COMMON DATA CLASS: WYE\_SEG\_D**

Description: Phase to ground measurements for a 3-Phase system (w.r.t Phase Segregation + Description)

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
phsA	CMV_MAG_FLOAT	--		Measurement values for Phase A	
phsB	CMV_MAG_FLOAT	--		Measurement values for Phase B	
phsC	CMV_MAG_FLOAT	--		Measurement values for Phase C	
d	VISIBLE_STRING255	DC		Description of the status element	

**1.5.57 COMMON DATA CLASS: WYE\_SEG\_PRIV**

Description: Phase to ground measurements for a 3-Phase system

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
phsA	CMV_MAG_FLOAT	--		Measurement values for Phase A	
phsB	CMV_MAG_FLOAT	--		Measurement values for Phase B	
phsC	CMV_MAG_FLOAT	--		Measurement values for Phase C	
dataNs	VISIBLE_STRING255	EX		Data name space	

**1.5.58 COMMON DATA CLASS: WYE\_SEG\_RES\_D**

Description: Phase to ground measurements for a 3-Phase system (w.r.t Phase Segregation + Residual + Description)

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
phsA	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase A	
phsB	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase B	
phsC	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase C	
neut	CMV_MAG_ANG_FLOAT	--		Measurement values for neutral input	
d	VISIBLE_STRING255	DC		Description of the status element	

**1.6 COMMON DATA ATTRIBUTE TYPE DEFINITIONS**

Common data attribute types, known herein as components, are defined for use in the Common Data Classes defined in the sections above.

**1.6.1 COMPONENT: ANALOGUEVALUE\_FLOAT**

Comment: General analogue value (w.r.t Floating Point value)

Parent Type: AnalogueValue

Attribute	Type	Enumeration	Comment	X
f	FLOAT32		Floating point value	

### 1.6.2 COMPONENT: ORIGINATOR

Comment: Originator of the last change of data attribute representing the value of a controllable data object

Parent Type:

Attribute	Type	Enumeration	Comment	X
orCat	ENUMERATED8 (MMS Type: INT8)	orCategory	Originator category (Not-supported, bay-control, station-control, remote-control, automatic-bay, automatic-station, automatic-remote, maintenance or process)	
orIdent	OCTET_STRING64		Originator identification (Null value indicates unknown or not reported)	

### 1.6.3 COMPONENT: RANGECONFIG\_DEADBAND

Comment: Measurement range configuration

Parent Type: RangeConfig

Attribute	Type	Enumeration	Comment	X
min	AnalogueValue_Float		Minimum process measurement for which values of i and f are considered within limits	
hhLim	AnalogueValue_Float		High High range limit	
hLim	AnalogueValue_Float		High range limit	
lLim	AnalogueValue_Float		Low range limit	
max	AnalogueValue_Float		Maximum process measurement for which values of i and f are considered within limits	
llLim	AnalogueValue_Float		Low Low range limit	

### 1.6.4 COMPONENT: UNIT

Comment: SI Unit definitions

Parent Type:

Attribute	Type	Enumeration	Comment	X
multiplier	ENUMERATED8 (MMS Type: INT8)	multiplier	Multiplier value, the default of which is 0 (i.e. multiplier = 1)	
SIUnit	ENUMERATED8 (MMS Type: INT8)	SIUnit	SI Unit	

### 1.6.5 COMPONENT: UNIT\_MULTIPLIER

Comment: SI Unit definitions

Parent Type: Unit

Attribute	Type	Enumeration	Comment	X
multiplier	ENUMERATED8 (MMS Type: INT8)	multiplier	Multiplier value, the default of which is 0 (i.e. multiplier = 1)	
SIUnit	ENUMERATED8 (MMS Type: INT8)	SIUnit	SI Unit	

### 1.6.6 COMPONENT: VECTOR\_MAGNITUDE\_FLOAT

Comment: Complex vector (w.r.t Floating Point Magnitude value)

Parent Type: Vector

Attribute	Type	Enumeration	Comment	X
mag	AnalogueValue_Float		The magnitude of the complex value	

### 1.6.7 COMPONENT: VECTOR\_MAGNITUDEANGLE\_FLOAT

Comment: Complex vector (w.r.t Floating Point Magnitude and Angle values)

Parent Type: Vector

Attribute	Type	Enumeration	Comment	X
mag	AnalogueValue_Float		The magnitude of the complex value	
ang	AnalogueValue_Float		The angle of the complex value (the unit is degrees)	

## 1.7 ENUMERATED TYPE DEFINITIONS

The following sub-sections specify the enumerations that are associated to some Common Data Class attributes. The definition of the enumerations are according to IEC 61850-7-3 and IEC 61850-7-4 unless otherwise stated.

### 1.7.1 ENUMERATED TYPE: ADDCAUSE

Description: AddCause

Ordinal	Semantic
0	Unknown
1	Not-supported
2	Blocked-by-switching-hierarchy
3	Select-failed
4	Invalid-position
5	Position-reached
6	Parameter-change-in-execution
7	Step-limit
8	Blocked-by-Mode
9	Blocked-by-process
10	Blocked-by-interlocking
11	Blocked-by-synchrocheck
12	Command-already-in-execution
13	Blocked-by-health
14	1-of-n-control
15	Abortion-by-cancel
16	Time-limit-over
17	Abortion-by-trip
18	Object-not-selected
19	Object-already-selected
20	No-access-authority
21	Ended-with-overshoot
22	Abortion-due-to-deviation
23	Abortion-by-communication-loss

Ordinal	Semantic
24	Blocked-by-command
25	None
26	Inconsistent-parameters
27	Locked-by-other-client

### 1.7.2 ENUMERATED TYPE: AUTORECST

Description: Auto-Reclose Status

Ordinal	Semantic
1	Ready
2	InProgress
3	Successful
4	WaitingForTrip
5	TripFromProtection
6	FaultDisappeared
7	WaitToComplete
8	CBclosed
9	CycleUnsuccessful
10	Unsuccessful
11	Aborted

### 1.7.3 ENUMERATED TYPE: BEH

Description: Behaviour

Ordinal	Semantic
1	on
2	blocked
3	test
4	test/blocked
5	off
10	Unsuccessful
11	Aborted

### 1.7.4 ENUMERATED TYPE: BEH\_3

Description: Behaviour including 3 states

Ordinal	Semantic
1	on
3	test
4	test/blocked

### 1.7.5 ENUMERATED TYPE: BEH\_4

Description: Behaviour including 4 states

Ordinal	Semantic
1	on
3	test
4	test/blocked
5	off

### 1.7.6 ENUMERATED TYPE: CBOPCAP

Description: Enumeration for CB operation

Ordinal	Semantic
1	None
2	Open
3	Close-Open
4	Open-Close-Open
5	Close-Open-Close-Open
6	Open-Close-Open-Close-Open
7	more

### 1.7.7 ENUMERATED TYPE: CLCINTVTYP

Description: Calculation interval type

Ordinal	Semantic
1	MS
2	PER_CYCLE
3	CYCLE
4	DAY
5	WEEK
6	MONTH
7	YEAR
8	EXTERNAL

### 1.7.8 ENUMERATED TYPE: CLCMOD

Description: Calculation mode

Ordinal	Semantic
1	TOTAL
2	PERIOD
3	SLIDING

### 1.7.9 ENUMERATED TYPE: CLCMTH

Description: Calculation method of statistical data objects

Ordinal	Semantic
1	UNSPECIFIED
2	TRUE_RMS
3	PEAK_FUNDAMENTAL
4	RMS_FUNDAMENTAL
5	MIN
6	MAX
7	AVG
8	SDV
9	PREDICTION
10	RATE

**1.7.10 ENUMERATED TYPE: CTLMODEL**

Description: Control Model

Ordinal	Semantic
0	status-only
1	direct-with-normal-security
2	sbo-with-normal-security
3	direct-with-enhanced-security
4	sbo-with-enhanced-security

**1.7.11 ENUMERATED TYPE: DBPOS**

Description: Circuit Breaker position

Ordinal	Semantic
0	intermediate
1	off
2	on
3	bad

**1.7.12 ENUMERATED TYPE: DIR**

Description: Direction

Ordinal	Semantic
0	unknown
1	forward
2	backward
3	both

**1.7.13 ENUMERATED TYPE: HEALTH**

Description: Health

Ordinal	Semantic
1	Ok
2	Warning
3	Alarm

**1.7.14 ENUMERATED TYPE: MOD**

Description: Mode

Ordinal	Semantic
1	on
2	blocked
3	test
4	test/blocked
5	off

**1.7.15 ENUMERATED TYPE: MOD\_2**

Description: Mode including 2 states

Ordinal	Semantic
1	on
5	off

**1.7.16 ENUMERATED TYPE: MOD\_3**

Description: Mode including 3 states

Ordinal	Semantic
1	on
3	test
4	test/blocked

**1.7.17 ENUMERATED TYPE: MULTIPLIER**

Description: Exponents of the multiplier value in base 10

Ordinal	Semantic
-24	y
-21	z
-18	a
-15	f
-12	p
-9	n
-6	μ
-3	m
-2	c
-1	d
0	
1	da
2	h
3	k
6	M
9	G
12	T
15	P
18	E
21	Z
24	Y

**1.7.18 ENUMERATED TYPE: ORCATEGORY**

Description: orCategory

Ordinal	Semantic
0	not-supported
1	bay-control
2	station-control
3	remote-control
4	automatic-bay
5	automatic-station
6	automatic-remote
7	maintenance
8	process

**1.7.19 ENUMERATED TYPE: PHASEFAULTDIRECTIONKIND**

Description: Phase Fault Direction kind without 'both'

Ordinal	Semantic
0	unknown
1	forward
2	backward

**1.7.20 ENUMERATED TYPE: SEQT**

Description: Sequence Measurement Type

Ordinal	Semantic
0	pos-neg-zero
1	dir-quad-zero

**1.7.21 ENUMERATED TYPE: SIUNIT**

Description: SI Units derived from ISO/IEC 1000

Ordinal	Semantic
-16	years
-15	months
-14	weeks
-13	V/s
-12	mins
-11	hours
-10	days
-9	°F
-8	ratio
-7	miles
-6	inches
-5	feet
-4	df/dt
-3	hz/s
-2	%
-1	pu
1	
2	m
3	kg
4	s
5	A
6	K
7	mol
8	cd
9	deg
10	rad
11	sr
21	Gy
22	Bq
23	°C
24	Sv
25	F
26	C

Ordinal	Semantic
27	S
28	H
29	V
30	ohm
31	J
32	N
33	Hz
34	lx
35	Lm
36	Wb
37	T
38	W
39	Pa
41	m <sup>2</sup>
42	m <sup>3</sup>
43	m/s
44	m/s <sup>2</sup>
45	m <sup>3</sup> /s
46	m/m <sup>3</sup>
47	M
48	kg/m <sup>3</sup>
49	m <sup>2</sup> /s
50	W/m K
51	J/K
52	ppm
53	1/s
54	rad/s
61	VA
62	Watts
63	VAr
64	phi
65	cos(phi)
66	Vs
67	V <sup>2</sup>
68	As
69	A <sup>2</sup>
70	A <sup>2</sup> t
71	VAh
72	Wh
73	VArh
74	V/Hz
75	Hz/s
76	char
77	char/s
78	kgm <sup>2</sup>
79	dB
80	J/Wh
81	W/s
82	l/s
83	dBm
84	h

Ordinal	Semantic
85	min

### 1.7.22 ENUMERATED TYPE: SWTYPE

Description: Switch Type

Ordinal	Semantic
1	Load Break
2	Disconnecter
3	Earthing Switch
4	High Speed Earthing Switch

## 1.8 MMS DATA-TYPE CONVERSIONS

The following table shows the relationships between the Part 7 and Part 8-1 data types. The definitions presented above use Part 7 data types, however these are subject to 'translation' when exposed over an MMS (Part 8-1) interface:

Part 7 Type	MMS Type	Part 7 Description
BOOLEAN	Bool	Logical TRUE/FALSE value
BSTR16	Bstring16	Bit-string -16 bits
BVstring13	BVstring13	Variable bit string (up to 13 bits)
Check	BVstring2	Control Object check flags
CODED_ENUM	Byte	Coded enumeration
CODED_ENUM2	Byte	Coded enumeration (2)
EntryTime	Btime6	8.1 Section 8.1.3.7
ENUMERATED16	Short	16 bit enumerated value
ENUMERATED32	Long	32 bit enumerated value
ENUMERATED8	Byte	8 bit enumerated value
FLOAT32	Float	32 bit floating point value
FLOAT64	Double	64 bit floating point value
INT128	Int64	128 bit signed integer value
INT16	Short	16 bit signed integer value
INT16U	Ushort	16 bit unsigned integer value
INT24U	Ulong	24 bit unsigned integer value
INT32	Long	32 bit signed integer value
INT32U	Ulong	32 bit unsigned integer value
INT64	Int64	64 bit signed integer value
INT8	Byte	8 bit signed integer value
INT8U	Ubyte	8 bit unsigned integer value
ObjectReference	Vstring129	Object Reference(129 character string)
OCTET_STRING6	Ostring6	6 character string (8 bits per character)
OCTET_STRING64	OVstring64	64 character string (8 bits per character)
OCTET_STRING8	OVstring8	8 character string (8 bits per character)
Quality	BVstring13	IEC61850 Quality
TimeStamp	Utctime	IEC61850 Time stamp
UNICODE_STRING255	UTF8Vstring255	255 character string (16 bits per unicode character)
UTC_TM	Utctime	UTC Timestamp
VISIBLE_STRING129	Vstring129	129 character string
VISIBLE_STRING255	Vstring255	255 character string
VISIBLE_STRING64	Vstring64	64 character string
VISIBLE_STRING65	Vstring65	65 character string
VISIBLE_STRING97	Vstring97	97 character string



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