Easergy MiCOM P841B

Multifunctional Line Terminal IED

P841B/EN MC/Kc2 - Ed. 1

Software Version	K3
Hardware Suffix	M
IEC61850 Edition	1
Issue Date	03/2021

Model Implementation Conformance Statement (MICS)

Note The technical manual for this device gives instructions for its installation, commissioning, and operation. However, the manual cannot cover all conceivable circumstances or include detailed information on all topics. In the event of questions or specific problems, do not take any action without proper authorization. Contact the appropriate Schneider Electric technical sales office and request the necessary information.

Any agreements, commitments, and legal relationships and any obligations on the part of Schneider Electric including settlements of warranties, result solely from the applicable purchase contract, which is not affected by the contents of the technical manual.

This device MUST NOT be modified. If any modification is made without the express permission of Schneider Electric, it will invalidate the warranty, and may render the product unsafe.

MODEL IMPLEMENTATION CONFORMANCE STATEMENT (MICS)

Date (month/year):	03/2021
Products covered by this chapter:	This chapter covers the specific versions of the MiCOM products listed below. This includes ***only*** the following combinations of Software Version and Hardware Suffix.
Hardware suffix:	M
Software version:	K3
Connection diagrams:	This includes a list of the Connection Diagrams for the Products covered by this document. 10P84100 10P84101 (SH 1 to 2) 10P84102 (SH 1 to 2) 10P84103 (SH 1 to 2) 10P84104 (SH 1 to 2) 10P84105 (SH 1 to 2)

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1 Introduction

This specification is the Model Implementation Conformance Statement (MICS) and presents the top-level IEC61850 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 IEC61850 part 7 series of specifications.

2 Objective

This document is applicable for P84B with the firmware K3A. The MICS is conformant to the devices associated ICD (Substation Configuration Language) file: P84B_____K3A.ICD, version V2.1, according to part 6 and part 7 of the IEC61850 standards.

The layouts of the presented tables within this document are conformant to the part 6 and 7 series of the IEC61850 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 MiCOM custom attributes

3 Logical Device Definitions

The MiCOM relay implements an IEC61850 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 IEC61850 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
Control	Controls Domain
Measurements	Measurements Domain
Protection	Protection Domain
Records	Records Domain
System	System Domain

3.1 IEC61850 logical device data model

The IEC61850 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
Control			
	ArcRREC1	RREC_NO_SEG	Auto Reclose
	ArcRREC2	RREC_NO_SEG	Auto Reclose (CB 2)
	AscRSYN1	RSYN_DIFCLC_ENH	System Checks - Check Sync 1
	AscRSYN2	RSYN_DIFCLC_ENH	System Checks - Check Sync 2
	AscRSYN3	RSYN_DIFCLC_ENH	System Checks (CB 2) - Check Sync 1
	AscRSYN4	RSYN_DIFCLC_ENH	System Checks (CB 2) - Check Sync 2
	CILO1	CILO_INTERLOCK	Circuit Breaker Interlocking (Pole 1)
	CILO2	CILO_INTERLOCK	Circuit Breaker Interlocking (Pole 2)
	CILO3	CILO_INTERLOCK	Circuit Breaker Interlocking (Pole 3)
	CILO4	CILO_INTERLOCK	Circuit Breaker Interlocking (3 Pole)
	CILO5	CILO_INTERLOCK	Circuit Breaker (2) Interlocking (Pole 1)
	CILO6	CILO_INTERLOCK	Circuit Breaker (2) Interlocking (Pole 2)
	CILO7	CILO_INTERLOCK	Circuit Breaker (2) Interlocking (Pole 3)
	CILO8	CILO_INTERLOCK	Circuit Breaker (2) Interlocking (3 Pole)
	LLN0	LLN0_CONTROL_NO_DIST	LLN0 control for non-distance relays
	XCBR1	XCBR_BASIC	Circuit Breaker Monitoring (Pole 1)

LD	LN Instance	LN Type	Description
	XCBR2	XCBR_BASIC	Circuit Breaker Monitoring (Pole 2)
	XCBR3	XCBR_BASIC	Circuit Breaker Monitoring (Pole 3)
	XCBR4	XCBR_BASIC	Circuit Breaker Monitoring (3 Pole)
	XCBR5	XCBR_BASIC	Circuit Breaker (2) Monitoring (Pole 1)
	XCBR6	XCBR_BASIC	Circuit Breaker (2) Monitoring (Pole 2)
	XCBR7	XCBR_BASIC	Circuit Breaker (2) Monitoring (Pole 3)
	XCBR8	XCBR_BASIC	Circuit Breaker (2) Monitoring (3 Pole)
Measurements			
	LLN0	LLN0_STANDARD	Measurements Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	PriFouMMXU1	MMXU_FOURIER_CB2	Primary Fourier Measurements
	PriMMTR1	MMTR_PRIV	Primary based metering quantities
	PriMSQI1	MSQI_ALL	Primary Sequence Measurements
	PriMSTA1	MSTA_I_W_VAR	Primary Metering Statistics
	PriRmsMMXU1	MMXU_RMS	Primary RMS Measurements
	PriSpeMMXU1	MMXU_SPE_55	Primary Specific Measurements
	PriVcpMSQI1	MSQI_VOLTAGE	Primary Compensated Overvoltage Measurements
	SecFouMMXU1	MMXU_FOURIER_CB2	Secondary Fourier Measurements
	SecMMTR1	MMTR_PRIV	Secondary based metering quantities
	SecMSQI1	MSQI_ALL	Secondary Sequence Measurements
	SecMSTA1	MSTA_I_W_VAR	Secondary Metering Statistics
	SecRmsMMXU1	MMXU_RMS	Secondary RMS Measurements
	SecSpeMMXU1	MMXU_SPE_55	Secondary Specific Measurements
	SecVcpMSQI1	MSQI_VOLTAGE	Secondary Compensated Overvoltage Measurements
Protection			
	CbfRBRF1	RBRF_EXTTRIP_SEG	CB1 Fail 1
	CbfRBRF2	RBRF_EXTTRIP_SEG	CB1 Fail 2
	CbfRBRF3	RBRF_EXTTRIP_SEG	CB2 Fail 1
	CbfRBRF4	RBRF_EXTTRIP_SEG	CB2 Fail 2
	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
	EfdPTOC1	PTOC_NEU	IN1> 1 Earth Fault (Derived)
	EfdPTOC2	PTOC_NEU	IN1> 2 Earth Fault (Derived)
	EfdPTOC3	PTOC_NEU	IN1> 3 Earth Fault (Derived)
	EfdPTOC4	PTOC_NEU	IN1> 4 Earth Fault (Derived)
	FrqPTOF1	PTOF_NO_SEG	F> 1 Over Frequency
	FrqPTOF2	PTOF_NO_SEG	F> 2 Over Frequency

LD	LN Instance	LN Type	Description
	FrqPTUF1	PTUF_NO_SEG	F< 1 Under Frequency
	FrqPTUF2	PTUF_NO_SEG	F< 2 Under Frequency
	FrqPTUF3	PTUF_NO_SEG	F< 3 Under Frequency
	FrqPTUF4	PTUF_NO_SEG	F< 4 Under Frequency
	LLN0	LLN0_PROT_NO_DIFF_NO_DIST	Protection LLN0 No Dist No Diff
	LPHD1	LPHD_STANDARD	Physical Device Information
	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
	OcpPTOC1	PTOC_SEG	I> 1 Overcurrent
	OcpPTOC2	PTOC_SEG	I> 2 Overcurrent
	OcpPTOC3	PTOC_SEG	I> 3 Overcurrent
	OcpPTOC4	PTOC_SEG	I> 4 Overcurrent
	PTRC1	PTRC_NO_SEG	Protection Trip Conditioning
	PTRC2	PTRC_NO_SEG	Protection Trip Conditioning CB2
	SenEftPTOC1	PTOC_NEU	ISEF> 1 Sensitive Earth Fault
	SenEftPTOC2	PTOC_NEU	ISEF> 2 Sensitive Earth Fault
	SenEftPTOC3	PTOC_NEU	ISEF> 3 Sensitive Earth Fault
	SenEftPTOC4	PTOC_NEU	ISEF> 4 Sensitive Earth Fault
	SenRefPDIF1	PDIF_NEU	IREF> 1 Restricted Earth Fault
	ThmPTTR1	PTTR_NO_SEG	Thermal Overload
	VtpCmpPTOV1	PTOV_NO_SEG	Compensated V1> 1 Overvoltage
	VtpCmpPTOV2	PTOV_NO_SEG	Compensated V1> 2 Overvoltage
	VtpPhsPTOV1	PTOV_SEG	V> 1 Overvoltage
	VtpPhsPTOV2	PTOV_SEG	V> 2 Overvoltage
	VtpPhsPTUV1	PTUV_SEG	V< 1 Undervoltage
	VtpPhsPTUV2	PTUV_SEG	V< 2 Undervoltage
	VtpResPTOV1	PTOV_NEU	VN> 1 Residual Overvoltage
	VtpResPTOV2	PTOV_NEU	VN> 2 Residual Overvoltage
Records			
	LLN0	LLN0_STANDARD	Records Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	RDRE1	RDRE_BASIC	Disturbance Recorder
	RFLO1	RFLO_PRIV_8B	Fault Record
System			
	AlmGGIO1	GGIO_ALM_96	Alarms
	FnkGGIO1	GGIO_IND_10	Function Keys
	GosGGIO1	GGIO_IND_32	GOOSE Input Signals
	GosGGIO2	GGIO_IND_32	GOOSE Output Signals
	LedGGIO1	GGIO_IND_18	Red LED Signals
	LedGGIO2	GGIO_IND_18	Green LED Signals
	LinkGGIO1	GGIO_IND_6	Link Status
	LLN0	LLN0_SYSTEM	System Logical Device

LD	LN Instance	LN Type	Description
	LPHD1	LPHD_STANDARD	Physical Device Information
	OptGGIO1	GGIO_IND_24	Opto Inputs
	OrdRunGGIO1	GGIO_IND_32	Uniqueness of control "Order Running" indications for Control operations
	PloGGIO1	GGIO_IND_16_CTRL	Controllable Inputs
	PloGGIO2	GGIO_IND_16_CTRL	Controllable Inputs
	PloGGIO3	GGIO_IND_16	Control Input Status
	RlyGGIO1	GGIO_IND_32	Output Contacts
	UsrGGIO1	GGIO_IND_DPS_8	User Mapped (PSL) Double Point Status Indications
	UsrGGIO2	GGIO_IND_4	User Mapped (PSL) Single Point Status Indications

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 IEC61850 product data model:

LN Type	(LN	Description	Name Space
CILO_INTERLOCK	(CILO)	Control Interlocking	IEC 61850-7-4:2003
GGIO_IND_6	(GGIO)	Generic process I/O (w.r.t 6 Indication Elements)	IEC 61850-7-4:2003
GGIO_IND_DPS_8	(GGIO)	Generic process I/O (w.r.t 8 Dual Point Status Indication Elements)	IEC 61850-7-4:2003
GGIO_IND_4	(GGIO)	Generic process I/O (w.r.t 4 Indication Elements)	IEC 61850-7-4:2003
GGIO_IND_32	(GGIO)	Generic Process I/O (w.r.t 32 Indication Elements)	IEC 61850-7-4:2003
GGIO_IND_24	(GGIO)	Generic process I/O (w.r.t 24 Indication Elements)	IEC 61850-7-4:2003
GGIO_IND_18	(GGIO)	Generic Process I/O (w.r.t 18 Indication Elements)	IEC 61850-7-4:2003
GGIO_IND_16_CTRL	(GGIO)	Generic process I/O (w.r.t 16 Indications Ctrl i/p)	IEC 61850-7-4:2003
GGIO_IND_16	(GGIO)	Generic process I/O (w.r.t. 16 indications)	IEC 61850-7-4:2003
GGIO_IND_10	(GGIO)	Generic Process I/O (w.r.t 10 Indication Elements)	IEC 61850-7-4:2003
GGIO_ALM_96	(GGIO)	Generic Process I/O (w.r.t 96 Alarm Elements)	IEC 61850-7-4:2003
LLN0_PROT_NO_DIFF_	(LLN0)	Protection LLN0 for non_Differential non_Distance relays	IEC 61850-7-4:2003
NO_DISTLLN0_STANDARD	(LLN0)	General Logical Node 0	IEC 61850-7-4:2003
LLN0_SYSTEM	(LLN0)	System Logical Node 0	IEC 61850-7-4:2003
LLN0_CONTROL_NO_DI	(LLN0)	Control LLN0 for non-distance relays	IEC 61850-7-4:2003
STLPHD_STANDARD	(LPHD)	Px40 Physical Device Information	IEC 61850-7-4:2003
MMTR_PRIV	(MMTR)	Metering	IEC 61850-7-4:2003
MMXU_SPE_55	(MMXU)	Standard measurements	IEC 61850-7-4:2003
MMXU_FOURIER_CB2	(MMXU)	Standard measurements	IEC 61850-7-4:2003
MMXU_RMS	(MMXU)	Standard Measurements (w.r.t RMS Values)	IEC 61850-7-4:2003
MSQI_VOLTAGE	(MSQI)	Sequence and imbalance (w.r.t Pos, Neq, Zero Voltage Only)	IEC 61850-7-4:2003
MSQI_ALL	(MSQI)	Sequence and imbalance (w.r.t Pos, Neq, Zero)	IEC 61850-7-4:2003
MSTA_I_W_VAR	(MSTA)	Metering Statistics (w.r.t Current, Real + Reactive Power - Average + Max values)	IEC 61850-7-4:2003
PDIF_NEU	(PDIF)	Differential (w.r.t Neutral)	IEC 61850-7-4:2003
PFRC_NO_SEG	(PFRC)	Rate of change of frequency (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
PTOC_NEU	(PTOC)	Timed Overcurrent (w.r.t Neutral)	IEC 61850-7-4:2003
PTOC_NO_SEG	(PTOC)	Timed Overcurrent (w.r.t No Phase Segregation)	IEC 61850-7-4:2003

LN Type	(LN	Description	Name Space
PTOC_SEG	(PTOC)	Timed Overcurrent (w.r.t Phase Segregation)	IEC 61850-7-4:2003
PTOF_NO_SEG	(PTOF)	Over frequency (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
PTOV_NO_SEG	(PTOV)	Overvoltage (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
PTOV_SEG	(PTOV)	Overvoltage (w.r.t Phase Segregation)	IEC 61850-7-4:2003
PTOV_NEU	(PTOV)	Overvoltage (w.r.t Neutral)	IEC 61850-7-4:2003
PTRC_NO_SEG	(PTRC)	Protection trip conditioning (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
PTTR_NO_SEG	(PTTR)	Thermal overload (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
PTUF_NO_SEG	(PTUF)	Under frequency (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
PTUV_SEG	(PTUV)	Undervoltage (w.r.t Phase Segregation)	IEC 61850-7-4:2003
RBRF_EXTTRIP_SEG	(RBRF)	Breaker Failure (w.r.t External Tripping + Phase)	IEC 61850-7-4:2003
RDRE_BASIC	(RDRE)	Disturbance Recorder function (w.r.t Mandatory Attributes only)	IEC 61850-7-4:2003
RFLO_PRIV_8B	(RFLO)	Fault locator for P84B	IEC 61850-7-4:2003
RREC_NO_SEG	(RREC)	Autoreclosing (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
RSYN_DIFCLC_ENH	(RSYN)	Synchronism-check / Synchronising (w.r.t Calculated Differetial Measurements)	IEC 61850-7-4:2003
XCBR_BASIC	(XCBR)	Circuit Breaker (w.r.t Mandatory Attributes Only)	IEC 61850-7-4:2003

4.1 Logical Node: CILO_INTERLOCK

Description: Control Interlocking

LN Class: CILO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
EnaOpn	SPS_WD	Enable OPEN Commands		
EnaCls	SPS_WD	Enable CLOSE Commands		

4.2 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
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Alm1	SPS_D	General single alarm		
Alm2	SPS_D	General single alarm		
Alm3	SPS_D	General single alarm		

Attribute	Attr. Type	Explanation	T	X
Alm4	SPS_D	General single alarm		
Alm5	SPS_D	General single alarm		
Alm6	SPS_D	General single alarm		
Alm7	SPS_D	General single alarm		
Alm8	SPS_D	General single alarm		
Alm9	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		
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		

Attribute	Attr. Type	Explanation	T	X
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		
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		

Attribute	Attr. Type	Explanation	T	X
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		

4.3 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
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Ind1	SPS_D	General Indication		
Ind2	SPS_D	General Indication		
Ind3	SPS_D	General Indication		
Ind4	SPS_D	General Indication		
Ind5	SPS_D	General Indication		
Ind6	SPS_D	General Indication		
Ind7	SPS_D	General Indication		
Ind8	SPS_D	General Indication		
Ind9	SPS_D	General Indication		
Ind10	SPS_D	General Indication		

4.4 Logical Node: GGIO_IND_16

Description: Generic process I/O (w.r.t. 16 indications)
LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Ind1	SPS_D	General Indication		
Ind2	SPS_D	General Indication		
Ind3	SPS_D	General Indication		
Ind4	SPS_D	General Indication		
Ind5	SPS_D	General Indication		
Ind6	SPS_D	General Indication		
Ind7	SPS_D	General Indication		
Ind8	SPS_D	General Indication		
Ind9	SPS_D	General Indication		
Ind10	SPS_D	General Indication		
Ind11	SPS_D	General Indication		
Ind12	SPS_D	General Indication		

Attribute	Attr. Type	Explanation	T	X
Ind13	SPS_D	General Indication		
Ind14	SPS_D	General Indication		
Ind15	SPS_D	General Indication		
Ind16	SPS_D	General Indication		

4.5 Logical Node: GGIO_IND_16_CTRL

Description: Generic process I/O (w.r.t 16 Indications Ctrl i/p)
LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
SPCSO1	SPC_CONTROL	Single point controllable status output		
SPCSO2	SPC_CONTROL	Single point controllable status output		
SPCSO3	SPC_CONTROL	Single point controllable status output		
SPCSO4	SPC_CONTROL	Single point controllable status output		
SPCSO5	SPC_CONTROL	Single point controllable status output		
SPCSO6	SPC_CONTROL	Single point controllable status output		
SPCSO7	SPC_CONTROL	Single point controllable status output		
SPCSO8	SPC_CONTROL	Single point controllable status output		
SPCSO9	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		

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
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Ind1	SPS_D	General Indication		
Ind2	SPS_D	General Indication		
Ind3	SPS_D	General Indication		
Ind4	SPS_D	General Indication		
Ind5	SPS_D	General Indication		
Ind6	SPS_D	General Indication		
Ind7	SPS_D	General Indication		

Attribute	Attr. Type	Explanation	T	X
Ind8	SPS_D	General Indication		
Ind9	SPS_D	General Indication		
Ind10	SPS_D	General Indication		
Ind11	SPS_D	General Indication		
Ind12	SPS_D	General Indication		
Ind13	SPS_D	General Indication		
Ind14	SPS_D	General Indication		
Ind15	SPS_D	General Indication		
Ind16	SPS_D	General Indication		
Ind17	SPS_D	General Indication		
Ind18	SPS_D	General Indication		

4.7 Logical Node: GGIO_IND_24

Description: Generic process I/O (w.r.t 24 Indication Elements)
LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Ind1	SPS_D	General Indication		
Ind2	SPS_D	General Indication		
Ind3	SPS_D	General Indication		
Ind4	SPS_D	General Indication		
Ind5	SPS_D	General Indication		
Ind6	SPS_D	General Indication		
Ind7	SPS_D	General Indication		
Ind8	SPS_D	General Indication		
Ind9	SPS_D	General Indication		
Ind10	SPS_D	General Indication		
Ind11	SPS_D	General Indication		
Ind12	SPS_D	General Indication		
Ind13	SPS_D	General Indication		
Ind14	SPS_D	General Indication		
Ind15	SPS_D	General Indication		
Ind16	SPS_D	General Indication		
Ind17	SPS_D	General Indication		
Ind18	SPS_D	General Indication		
Ind19	SPS_D	General Indication		
Ind20	SPS_D	General Indication		
Ind21	SPS_D	General Indication		
Ind22	SPS_D	General Indication		
Ind23	SPS_D	General Indication		
Ind24	SPS_D	General Indication		

4.8 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
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Ind1	SPS_D	General Indication		
Ind2	SPS_D	General Indication		
Ind3	SPS_D	General Indication		
Ind4	SPS_D	General Indication		
Ind5	SPS_D	General Indication		
Ind6	SPS_D	General Indication		
Ind7	SPS_D	General Indication		
Ind8	SPS_D	General Indication		
Ind9	SPS_D	General Indication		
Ind10	SPS_D	General Indication		
Ind11	SPS_D	General Indication		
Ind12	SPS_D	General Indication		
Ind13	SPS_D	General Indication		
Ind14	SPS_D	General Indication		
Ind15	SPS_D	General Indication		
Ind16	SPS_D	General Indication		
Ind17	SPS_D	General Indication		
Ind18	SPS_D	General Indication		
Ind19	SPS_D	General Indication		
Ind20	SPS_D	General Indication		
Ind21	SPS_D	General Indication		
Ind22	SPS_D	General Indication		
Ind23	SPS_D	General Indication		
Ind24	SPS_D	General Indication		
Ind25	SPS_D	General Indication		
Ind26	SPS_D	General Indication		
Ind27	SPS_D	General Indication		
Ind28	SPS_D	General Indication		
Ind29	SPS_D	General Indication		
Ind30	SPS_D	General Indication		
Ind31	SPS_D	General Indication		
Ind32	SPS_D	General Indication		

4.9 Logical Node: GGIO_IND_4

Description: Generic process I/O (w.r.t 4 Indication Elements)
LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Ind1	SPS_D	General indication		
Ind2	SPS_D	General indication		
Ind3	SPS_D	General indication		
Ind4	SPS_D	General indication		

4.10 Logical Node: GGIO_IND_6

Description: Generic process I/O (w.r.t 6 Indication Elements)
LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Ind1	SPS_D	General indication (binary input)		
Ind2	SPS_D	General indication (binary input)		
Ind3	SPS_D	General indication (binary input)		
Ind4	SPS_D	General indication (binary input)		
Ind5	SPS_D	General indication (binary input)		
Ind6	SPS_D	General indication (binary input)		

4.11 Logical Node: GGIO_IND_DPS_8

Description: Generic process I/O (w.r.t 8 Dual Point Status Indication Elements)
LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
DPCSO1	DPC_STATUS_D	Double Point Status		
DPCSO2	DPC_STATUS_D	Double Point Status		
DPCSO3	DPC_STATUS_D	Double Point Status		
DPCSO4	DPC_STATUS_D	Double Point Status		
DPCSO5	DPC_STATUS_D	Double Point Status		
DPCSO6	DPC_STATUS_D	Double Point Status		
DPCSO7	DPC_STATUS_D	Double Point Status		
DPCSO8	DPC_STATUS_D	Double Point Status		

4.12 Logical Node: LLN0_CONTROL_NO_DIST

Description: Control LLN0 for non-distance relays
LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LLN0	Name Plate		
AscMod	INC_CTRL_D_PRIV	Check Synchronisation		X
AscBeh	INS_BEH_D_PRIV	Check Synchronisation		X
ArcMod	INC_CTRL_D_PRIV	Auto-Reclose		X
ArcBeh	INS_BEH_D_PRIV	Auto-Reclose		X

4.13 Logical Node: LLN0_PROT_NO_DIFF_NO_DIST

Description: Protection LLN0 for non_Differential non_Distance relays
LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LLN0	Name Plate		
OcpMod	INC_CTRL_D_PRIV	Overcurrent Mode		X
OcpBeh	INS_BEH_D_PRIV	Overcurrent Behaviour		X
NgcMod	INC_CTRL_D_PRIV	Negative Sequence Mode		X
NgcBeh	INS_BEH_D_PRIV	Negative Sequence Behaviour		X
EfdMod	INC_CTRL_D_PRIV	Earth Fault 1 (Derived) Mode		X
EfdBeh	INS_BEH_D_PRIV	Earth Fault 1 (Derived) Behaviour		X
SefMod	INC_CTRL_D_PRIV	SEF Mode		X
SefBeh	INS_BEH_D_PRIV	SEF Behaviour		X
VtpMod	INC_CTRL_D_PRIV	Overvoltage/Undervoltage Mode		X
VtpBeh	INS_BEH_D_PRIV	Overvoltage/Undervoltage Behaviour		X
NvdMod	INC_CTRL_D_PRIV	Residual Overvoltage NVD Mode		X
NvdBeh	INS_BEH_D_PRIV	Residual Overvoltage NVD Behaviour		X
FrqMod	INC_CTRL_D_PRIV	Overfrequency/Underfrequency Mode		X
FrqBeh	INS_BEH_D_PRIV	Overfrequency/Underfrequency Behaviour		X
DfpMod	INC_CTRL_D_PRIV	df/dt Mode		X
DfpBeh	INS_BEH_D_PRIV	df/dt Behaviour		X
ThmMod	INC_CTRL_D_PRIV	Thermal Overload Mode		X
ThmBeh	INS_BEH_D_PRIV	Thermal Overload Behaviour		X
CbfMod	INC_CTRL_D_PRIV	CB Fail Mode		X
CbfBeh	INS_BEH_D_PRIV	CB Fail Behaviour		X

4.14 Logical Node: LLN0_STANDARD

Description: General Logical Node 0
LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LLN0	Name Plate		

4.15 Logical Node: LLN0_SYSTEM

Description: System Logical Node 0
LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LLN0	Name Plate		
LEDRs	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

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	INS_HEALTH	Physical device health		
Proxy	SPS_D	Indicates if this LN is a proxy		
PwrUp	SPS_D	Power up detected		

4.17 Logical Node: MMTR_PRIV

Description: Metering
LN Class: MMTR

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
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	Reset Energy Meters		X

4.18 Logical Node: MMXU_FOURIER_CB2

Description: Standard measurements
LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		

Attribute	Attr. Type	Explanation	T	X
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_ANG_D	Phase to Ground voltages		
A1	WYE_SEG_RES_D	Phase currents (Fourier Magnitudes)		
A2	WYE_RES_ANG_D	Phase currents (ISEF Magnitude)		
A3	WYE_RES_ANG_D	Phase currents (Mutual Magnitude)		
A4	WYE_SEG_ANG_D	Phase Currents (CT1)		
A5	WYE_SEG_ANG_D	Phase Currents (CT2)		
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		
Vx1	WYE_RES_ANG_D_NS	CB1 C/S Voltage		X
Vx2	WYE_RES_ANG_D_NS	CB2 C/S Voltage		X

4.19 Logical Node: MMXU_RMS

Description: Standard Measurements (w.r.t RMS Values)
LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
PhV	WYE_SEG_D	Phase to Ground voltages		
A	WYE_SEG_D	Phase currents		

4.20 Logical Node: MMXU_SPE_55

Description: Standard measurements
LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
DfDt	MV_FLOAT_D_NS	df/dt		X

4.21 Logical Node: MSQI_ALL

Description: Sequence and imbalance (w.r.t Pos, Neq, Zero)
LN Class: MSQI

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		

Attribute	Attr. Type	Explanation	T	X
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
SeqA	SEQ_MAG_ANG	Positive, Negative and Zero sequence current		
SeqV	SEQ_MAG_ANG	Positive, Negative and Zero sequence voltage		

4.22 Logical Node: MSQI_VOLTAGE

Description: Sequence and imbalance (w.r.t Pos, Neq, Zero Voltage Only)

LN Class: MSQI

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
SeqV	SEQ_MAG_ANG	Positive, Negative and Zero sequence voltage		

4.23 Logical Node: MSTA_I_W_VAR

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

LN Class: MSTA

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
AvAmps1	MV_FLOAT_D	Average current		
AvAmps2	MV_FLOAT_D	Average current		
AvAmps3	MV_FLOAT_D	Average current		
AvAmps4	MV_FLOAT_D	Average current		
AvAmps5	MV_FLOAT_D	Average current		
AvAmps6	MV_FLOAT_D	Average current		
MaxAmps1	MV_FLOAT_D	Maximum current		
MaxAmps2	MV_FLOAT_D	Maximum current		
MaxAmps3	MV_FLOAT_D	Maximum current		
AvW1	MV_FLOAT_D	Average real power		
AvW2	MV_FLOAT_D	Average real power		
MaxW	MV_FLOAT_D	Maximum real power		
AvVAr1	MV_FLOAT_D	Average reactive power		
AvVAr2	MV_FLOAT_D	Average reactive power		
MaxVAr	MV_FLOAT_D	Maximum reactive power		

4.24 Logical Node: PDIF_NEU

Description: Differential (w.r.t Neutral)

LN Class: PDIF

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Op	ACT_NEU	Operate	T	

4.25 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
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

4.26 Logical Node: PTOC_NEU

Description: Timed Overcurrent (w.r.t Neutral)
LN Class: PTOC

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NEU	Start		
Op	ACT_NEU	Operate	T	

4.27 Logical Node: PTOC_NO_SEG

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

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

4.28 Logical Node: PTOC_SEG

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

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		

Attribute	Attr. Type	Explanation	T	X
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_SEG	Start		
Op	ACT_SEG	Operate	T	

4.29 Logical Node: PTOF_NO_SEG

Description: Over frequency (w.r.t No Phase Segregation)
LN Class: PTOF

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

4.30 Logical Node: PTOV_NEU

Description: Overvoltage (w.r.t Neutral)
LN Class: PTOV

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NEU	Start		
Op	ACT_NEU	Operate	T	

4.31 Logical Node: PTOV_NO_SEG

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

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

4.32 Logical Node: PTOV_SEG

Description: Overvoltage (w.r.t Phase Segregation)
LN Class: PTOV

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Str	ACD_SEG	Start		
Op	ACT_SEG	Operate	T	

4.33 Logical Node: PTRC_NO_SEG

Description: Protection trip conditioning (w.r.t No Phase Segregation)
LN Class: PTRC

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Tr	ACT_SEG	Trip		
Str	ACD_NO_SEG	Sum of all starts of all connected Logical Nodes		

4.34 Logical Node: PTTR_NO_SEG

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

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Amp	MV_FLOAT	Current for thermal load model		
TmpRl	MV_FLOAT	Relation between temperature and maximum temperature		
Op	ACT_NO_SEG	Operate	T	
MTRRs	SPC_CTRL_PRIV	Reset Thermal State		X
AlmThm	SPS_WD	Thermal alarm	T	

4.35 Logical Node: PTUF_NO_SEG

Description: Under frequency (w.r.t No Phase Segregation)
LN Class: PTUF

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

4.36 Logical Node: PTUV_SEG

Description: Undervoltage (w.r.t Phase Segregation)
LN Class: PTUV

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		

Attribute	Attr. Type	Explanation	T	X
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_SEG	Start		
Op	ACT_SEG	Operate	T	

4.37 Logical Node: RBRF_EXTTRIP_SEG

Description: Breaker Failure (w.r.t External Tripping + Phase)
LN Class: RBRF

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
OpEx	ACT_SEG	Breaker failure trip	T	

4.38 Logical Node: RDRE_BASIC

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

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
RcdMade	SPS_WD	Recording made		
FltNum	INS_BASIC	Fault number		

4.39 Logical Node: RFLO_PRIV_8B

Description: Fault locator for P84B
LN Class: RFLO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
FltZ	CMV_MAG_FLOAT_NDB	Fault Impedance		
FltDiskm	MV_FLOAT_NDB	Fault Distance in km		
FltDismi	MV_FLOAT_D_NS_NDB	Fault Distance in miles		X
FltLoc	MV_FLOAT_D_NS_NDB	Fault Location in Percentage		X
FltPhs	INS_D_NS	Fault Phase		X
FltSt1U	INS_D_NS	Fault Start Element 1 Upper Bits		X
FltSt1L	INS_D_NS	Fault Start Element 1 Lower Bits		X
FltSt2U	INS_D_NS	Fault Start Element 2 Upper Bits		X
FltSt2L	INS_D_NS	Fault Start Element 2 Lower Bits		X
FltSt3U	INS_D_NS	Fault Start Element 3 Upper Bits		X

Attribute	Attr. Type	Explanation	T	X
FltSt3L	INS_D_NS	Fault Start Element 3 Lower Bits		X
FltOp1U	INS_D_NS	Fault Trip Element 1 Upper Bits		X
FltOp1L	INS_D_NS	Fault Trip Element 1 Lower Bits		X
FltOp2U	INS_D_NS	Fault Trip Element 2 Upper Bits		X
FltOp2L	INS_D_NS	Fault Trip Element 2 Lower Bits		X
FltOp3U	INS_D_NS	Fault Trip Element 3 Upper Bits		X
FltOp3L	INS_D_NS	Fault Trip Element 3 Lower Bits		X
FltAlm1U	INS_D_NS	Fault Alarm 1 Upper Bits		X
FltAlm1L	INS_D_NS	Fault Alarm 1 Lower Bits		X
FltTU	INS_D_NS	Fault Time Upper Bits		X
FltTL	INS_D_NS	Fault Time Lower Bits		X
FltTms	INS_D_NS	Fault Time in ms		X
FltNum	INS_D	Number of Fault Records		X
ActiveSG	INS_D_NS	Fault Record Active Group		X
ARSeqCnt	INS_D_NS	AR Sequence Count		X
FltHz	MV_FLOAT_D_NS_NDB	Fault Record Frequency		X
FltDur	MV_FLOAT_D_NS_NDB	Fault Record Duration		X
CB1OpTm	MV_FLOAT_D_NS_NDB	Fault CB1 Operation Time		X
CB2OpTm	MV_FLOAT_D_NS_NDB	Fault CB2 Operation Time		X
RlyOpTm	MV_FLOAT_D_NS_NDB	Fault Relay Operation Time		X
PreFltA	WYE_SEG_ANG_D_NS	PreFault Phase Current		X
PreFltIN	WYE_RES_ANG_D_NS_	Prefault Current IN		X
NDBPreFltIM	WYE_RES_ANG_D_NS_	Prefault Current IM		X
NDBPreFltPhV	WYE_SEG_ANG_D_NS	Prefault Phase to Ground Voltage		X
PreFltVN	WYE_RES_ANG_D_NS_	Prefault Voltage VN		X
NDBFltA	WYE_SEG_ANG_D_NS	Fault Phase Current		X
FltIN	WYE_RES_ANG_D_NS_	Postfault Current IN		X
NDBFltIM	WYE_RES_ANG_D_NS_	PostFault Current IM		X
NDBFltPhV	WYE_SEG_ANG_D_NS	Postfault Phase to Ground Voltage		X
FltVN	WYE_RES_ANG_D_NS_	PostFault Voltage VN		X
NDBFltV1Rem	WYE_RES_ANG_D_NS_	Latest Fault Rem V1		X

NDBLogical Node: RREC_NO_SEG
Description: Autoreclosing (w.r.t No Phase Segregation)
LN Class: RREC

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Op	ACT_NO_SEG	Operate (used here to provide close to XCBR)	T	
AutoRecSt	INS_AR_STATE	Auto reclosing status		

4.40 Logical Node: RSYN_DIFCLC_ENH

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

LN Class: RSYN

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
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		

4.41 Logical Node: XCBR_BASIC

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

LN Class: XCBR

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Loc	SPS_WD	Local operation		
EEHealth	INS_HEALTH	External equipment health		
OpCnt	INS_BASIC	Operation counter		
Pos	DPC_CONTROL	Switch position		
BlkOpn	SPC_STATUS	Block opening		
BlkCls	SPC_STATUS	Block closing		
SumSwARs	BCR_PRIV	Sum of switched amperes, resetable		
CBOpCap	INS_CB_OPCAP	Circuit Breaker operating capability		
Lock	SPC_CTRL_PRIV	Prevention, i.e Lock, Trip/Close operations of the Circuit Breaker over IEC61850		X

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
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
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
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

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	dir	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	

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	

Attribute	Type	FC	Enumeration	Comment	X
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	

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	dir	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	dir	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	dir	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	

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	

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	

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	

5.7 Common Data Class: BCR_PRIV

Description: Binary Counter Reading

CDC Class: BCR

Attribute	Type	FC	Enumeration	Comment	X
actVal	INT32	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)	

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	

5.9 Common Data Class: CMV_MAG_ANG_NDB

Description: Complex Measured value without deadband

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	

5.10 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	

5.11 Common Data Class: CMV_MAG_FLOAT_NDB

Description: Complex Measured value

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	

5.12 Common Data Class: DEL_SEG_ANG

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

5.13 Common Data Class: DPC_CONTROL

Description: Controllable Double Point

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	Dbpos	ST		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	

Attribute	Type	FC	Enumeration	Comment	X
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)	
cdcNs	VISIBLE_STRING255	EX		Common Data Class name space	
cdcName	VISIBLE_STRING255	EX		Name of the Common Data Class	

5.14 Common Data Class: DPC_STATUS_D

Description: Controllable Double Point (with description)

CDC Class: DPC

Attribute	Type	FC	Enumeration	Comment	X
stVal	Dbpos	ST		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)	
d	VISIBLE_STRING255	DC		Description of the status element	

5.15 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	

5.16 Common Data Class: INC_CTRL_D_PRIV

Description: Controllable Integer Status (with NameSpace and description)

CDC Class: INC

Attribute	Type	FC	Enumeration	Comment	X
ctlVal	INT32	CO		Control value	
origin	Originator	ST		Originator of the last change of the controllable data	
stVal	ENUMERATED8 (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)	
d	VISIBLE_STRING255	DC		Description of the status element	
cdcNs	VISIBLE_STRING255	EX		Common Data Class name space	
cdcName	VISIBLE_STRING255	EX		Name of the Common Data Class	

Attribute	Type	FC	Enumeration	Comment	X
dataNs	VISIBLE_STRING255	EX		Data name space	

5.17 Common Data Class: INC_MOD

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

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (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)	

5.18 Common Data Class: INS_AR_STATE

Description: Integer Status (w.r.t Auto Reclose Status)
CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32 (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	

5.19 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	

5.20 Common Data Class: INS_BEH

Description: Integer Status (w.r.t Behaviour)
CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (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	

5.21 Common Data Class: INS_BEH_D_PRIV

Description: Integer Status (w.r.t Behaviour, with Description (Private DO))
CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (MMS Type: INT8)	ST	Beh	The element status	
q	Quality	ST		The quality of the status value	

Attribute	Type	FC	Enumeration	Comment	X
t	TimeStamp	ST		Timestamp of the last change in state	
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

5.22 Common Data Class: INS_CB_OPCAP

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

5.23 Common Data Class: INS_D

Description: Integer Status
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	
d	VISIBLE_STRING255	DC		Description of the status element	

5.24 Common Data Class: INS_D_NS

Description: Integer Status with d and dataNs
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	
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

5.25 Common Data Class: INS_HEALTH

Description: Integer Status (w.r.t health)
CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32 (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	

5.26 Common Data Class: LPL_LLN0

Description: Logical Node 0 Name Plate
CDC Class: LPL

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

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

5.27 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	

5.28 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	

5.29 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	

5.30 Common Data Class: MV_FLOAT_D_NS

Description: Measured value with d and dataNs

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	
dataNs	VISIBLE_STRING255	EX		Data name space	

5.31 Common Data Class: MV_FLOAT_D_NS_NDB

Description: Measured value with d, dataNs and without deadband

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	
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

5.32 Common Data Class: MV_FLOAT_NDB

Description: Measured value without Deadband

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	

5.33 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)	

5.34 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)	
d	VISIBLE_STRING255	DC		Description of the status element	
cdcNs	VISIBLE_STRING255	EX		Common Data Class name space	
cdcName	VISIBLE_STRING255	EX		Name of the Common Data Class	

5.35 Common Data Class: SPC_CTRL_PRIV

Description: Controllable Single Point (With Namespace)

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	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the 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	
sboTimeout	INT32U	CF		Select Before Operate timeout period (in milliseconds)	
cdcNs	VISIBLE_STRING255	EX		Common Data Class name space	
cdcName	VISIBLE_STRING255	EX		Name of the Common Data Class	
dataNs	VISIBLE_STRING255	EX		Data name space	

5.36 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)	

5.37 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	

5.38 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	

5.39 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	

5.40 Common Data Class: WYE_RES_ANG_D

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

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	

5.41 Common Data Class: WYE_RES_ANG_D_NS

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	

5.42 Common Data Class: WYE_RES_ANG_D_NS_NDB

Description: Phase to ground measurements for a 3-Phase system with d and dataNs

CDC Class: WYE

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

5.43 Common Data Class: WYE_SEG

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

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	

5.44 Common Data Class: WYE_SEG_ANG_D

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

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	
d	VISIBLE_STRING255	DC		Description of the status element	

5.45 Common Data Class: WYE_SEG_ANG_D_NS

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

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
phsA	CMV_MAG_ANG_NDB	--		Measurement values for Phase A	
phsB	CMV_MAG_ANG_NDB	--		Measurement values for Phase B	
phsC	CMV_MAG_ANG_NDB	--		Measurement values for Phase C	
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

5.46 Common Data Class: WYE_SEG_D

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

5.47 Common Data Class: WYE_SEG_RES_D

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

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.

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	

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
orIdent	OCTET_STRING64		Originator identification (Null value indicates unknown or not reported)	
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)	

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	
max	AnalogueValue_Float		Maximum process measurement for which values of i and f are considered within limits	
llLim	AnalogueValue_Float		Low Low range limit	
lLim	AnalogueValue_Float		Low range limit	
hLim	AnalogueValue_Float		High range limit	
hhLim	AnalogueValue_Float		High High range limit	

6.4 Component: Unit_Multiplier

Comment: SI Unit definitions

Parent Type: Unit

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

6.5 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	

6.6 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)	

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 IEC61850-7-3 and IEC61850-7-4 unless otherwise stated.

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

7.2 Enumerated type: AutoRecSt

Description: Auto-Reclose Status

Ordinal	Semantic
-1	Unsuccessful
1	Ready
2	InProgress
3	Successful

7.3 Enumerated type: Beh

Description: Behaviour

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

7.4 Enumerated type: Bypass

Description: Bypass

Ordinal	Semantic
0	locking-bypass
1	mode-bypass
2	automation-bypass
3	uniqueness-bypass
4	select-bypass
5	status-bypass

7.5 Enumerated type: CBOpCap

Description: Circuit Breaker Operating Capacity

Ordinal	Semantic
1	None
2	Open
3	Close-Open
4	Open-Close-Open
5	Close-Open-Close-Open

7.6 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

7.7 Enumerated type: dir

Description: Direction

Ordinal	Semantic
0	unknown
1	forward
2	backward
3	both

7.8 Enumerated type: Health

Description: Health

Ordinal	Semantic
1	Ok
2	Warning
3	Alarm

7.9 Enumerated type: Mod

Description: Mode

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

7.10 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

7.11 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

7.12 Enumerated type: seqT

Description: Sequence Measurement Type

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

7.13 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	none
2	m
3	kg
4	s
5	A
6	K
7	mol
8	cd
9	deg
10	rad
11	sr
21	Gy
22	q
23	°C
24	Sv
25	F
26	C
27	S
28	H
29	V

Ordinal	Semantic
30	ohm
31	J
32	N
33	Hz
34	lx
35	Lm
36	Wb
37	T
38	W
39	Pa
41	m^2
42	m^3
43	m/s
44	m/s^2
45	m^3/s
46	m/m^3
47	M
48	kg/m^3
49	m^2/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^2
68	As
69	A^2
70	A^2t
71	VAh
72	Wh
73	VArh
74	V/Hz

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 (upto 13 bits)
Check	BVstring2	Control Object check flags
CODED_ENUM	Byte	Coded enumeration
CODED_ENUM2	Byte	Coded enumeration (2)
Dbpos	Bstring2	Switch positions
EntryTime	Btime6	8.1 Section 8.1.3.7
ENUMERATED16	Short	16 bit enumerated value
ENUMERATED8	Byte	8 bit enumerated value
FLOAT32	Float	32 bit floating point value
FLOAT64	Double	64 bit floating point 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
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_STRING255	Vstring255	255 character string
VISIBLE_STRING64	Vstring64	64 character string
VISIBLE_STRING65	Vstring65	65 character string
VISIBLE_STRING97	Vstring97	97 character string

Customer Care Centre

http://www.schneider-electric.com/ccc

Schneider Electric

35 rue Joseph Monier
92506 Rueil-Malmaison
FRANCE

Phone: +33 (0) 1 41 29 70 00
Fax: +33 (0) 1 41 29 71 00

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