

Easergy MiCOM P643

Transformer Protection Relay

P643/EN MC/Gb3 - Ed. 1

Software Version	B6
Hardware Suffix	M
IEC61850 Edition	1
Issue Date	09/2020

Model Implementation Conformance Statement (MICS)

Note

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**MODEL IMPLEMENTATION
CONFORMANCE STATEMENT
(MICS)**

Date (month/year):	09/2020
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:	B6
Connection diagrams:	This includes a list of the Connection Diagrams for the Products covered by this document. 10P642xx (xx = 01 to 10) 10P643xx (xx = 01 to 06) 10P645xx (xx = 01 to 09)

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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 P643 with the firmware B6A. The MICS is conformant to the devices associated ICD (Substation Configuration Language) file: P643_____B6A.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	P643 Measurements
Protection	P643 Protection
Records	P643 Records
System	P643 System

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			
	CILO1	CILO_INTERLOCK	Circuit Breaker(1) Interlocking
	CILO2	CILO_INTERLOCK	Circuit Breaker(2) Interlocking
	CILO3	CILO_INTERLOCK	Circuit Breaker(3) Interlocking
	LLN0	LLN0_STANDARD	LLN0 General logical Node
	LPHD1	LPHD_STANDARD	Physical Device Information
	XCBR1	XCBR_BASIC	Circuit Breaker(1) Monitoring
	XCBR2	XCBR_BASIC	Circuit Breaker(2) Monitoring
	XCBR3	XCBR_BASIC	Circuit Breaker(3) Monitoring
	Measurements		
ClIMsiGGIO1		GGIO_ANAL_4	CLIO measurements
LLN0		LLN0_STANDARD	Measurements Logical Device
LoIMMTR1		MMTR_LOL	Loss of Life (Transformer) Meter values
LoIMMXU1		MMXU_LOL	Loss of life (transformer) measurements
LPHD1		LPHD_STANDARD	Physical Device Information
PriEfIMMTR1		MMTR_EFL	Primary Energy Flow Metering
PriFouMMXU1		MMXU_FOURIER	Primary fourier derived measurements
PriFouMMXU2		MMXU_FOURIER_WINDING	Primary HV Winding Fourier Measurements

LD	LN Instance	LN Type	Description
	PriFouMMXU3	MMXU_FOURIER_WINDING	Primary LV Winding Fourier Measurements
	PriFouMMXU4	MMXU_FOURIER_WINDING	Primary TV Winding Fourier Measurements
	PriFxdMSTA1	MSTA_DEMAND	Primary Fixed Demand Values
	PriHzdMMXU1	MMXU_HZD	HV winding high impedance primary values
	PriHzdMMXU2	MMXU_HZD	LV winding high impedance primary values
	PriHzdMMXU3	MMXU_HZD	TV winding high impedance primary values
	PriHzdMMXU4	MMXU_HZD	Auto transformer high impedance primary values
	PriLzdMDIF1	MDIF_LZD	HV winding low impedance primary differential values
	PriLzdMDIF2	MDIF_LZD	LV winding low impedance primary differential values
	PriLzdMDIF3	MDIF_LZD	TV winding low impedance primary differential values
	PriLzdMDIF4	MDIF_LZD	Auto transformer low impedance primary differential values
	PriMsiMMXU1	MMXU_MSI	Primary measured input values for CT1
	PriMsiMMXU2	MMXU_MSI	Primary measured input values for CT2
	PriMsiMMXU3	MMXU_MSI	Primary measured input values for CT3
	PriPkdMSTA1	MSTA_DEMAND	Primary Peak Demand Values
	PriPwrMMXU1	MMXU_POWER_WINDING	Primary power measurements for HV
	PriPwrMMXU2	MMXU_POWER_WINDING	Primary power measurements for LV
	PriPwrMMXU3	MMXU_POWER_WINDING	Primary power measurements for TV
	PriRmsMMXU1	MMXU_RMS_PHV	Primary phase to ground voltage measurements
	PriRmsMMXU2	MMXU_RMS	Primary RMS measurements for HV
	PriRmsMMXU3	MMXU_RMS	Primary RMS measurements for LV
	PriRmsMMXU4	MMXU_RMS	Primary RMS measurements for TV
	PriRodMSTA1	MSTA_DEMAND	Primary Rolling Demand Values
	PriVhzMMXU1	MMXU_VHZ	Primary volts-per-hertz measurements - winding 1
	PriVhzMMXU2	MMXU_VHZ	Primary volts-per-hertz measurements - winding 2
	PwrFctMMXU1	MMXU_POWER_FACTOR	Power factor measurements
	RtdGGIO1	GGIO_ANAL_10	RTD Analogue values
	SecEfIMMTR1	MMTR_EFL	Secondary Energy Flow Metering
	SecFouMMXU1	MMXU_FOURIER	Secondary fourier derived measurements
	SecFouMMXU2	MMXU_FOURIER_WINDING	Secondary HV Winding Fourier Measurements

LD	LN Instance	LN Type	Description
	SecFouMMXU3	MMXU_FOURIER_WINDING	Secondary LV Winding Fourier Measurements
	SecFouMMXU4	MMXU_FOURIER_WINDING	Secondary TV Winding Fourier Measurements
	SecFxdMSTA1	MSTA_DEMAND	Secondary Fixed Demand Values
	SecHzdMMXU1	MMXU_HZD	HV winding high impedance secondary values
	SecHzdMMXU2	MMXU_HZD	LV winding high impedance secondary values
	SecHzdMMXU3	MMXU_HZD	TV winding high impedance secondary values
	SecHzdMMXU4	MMXU_HZD	Auto transformer high impedance secondary values
	SecLzdMDIF1	MDIF_LZD	HV winding low impedance secondary differential values
	SecLzdMDIF2	MDIF_LZD	LV winding low impedance secondary differential values
	SecLzdMDIF3	MDIF_LZD	TV winding low impedance secondary differential values
	SecLzdMDIF4	MDIF_LZD	Auto transformer low impedance secondary differential values
	SecMsiMMXU1	MMXU_MSI	Secondary measured input values for CT1
	SecMsiMMXU2	MMXU_MSI	Secondary measured input values for CT2
	SecMsiMMXU3	MMXU_MSI	Secondary measured input values for CT3
	SecPkdMSTA1	MSTA_DEMAND	Secondary Peak Demand Values
	SecPwrMMXU1	MMXU_POWER_WINDING	Secondary power measurements for HV
	SecPwrMMXU2	MMXU_POWER_WINDING	Secondary power measurements for LV
	SecPwrMMXU3	MMXU_POWER_WINDING	Secondary power measurements for TV
	SecRmsMMXU1	MMXU_RMS_PHV	Secondary phase to ground voltage measurements
	SecRmsMMXU2	MMXU_RMS	Secondary RMS measurements for HV
	SecRmsMMXU3	MMXU_RMS	Secondary RMS measurements for LV
	SecRmsMMXU4	MMXU_RMS	Secondary RMS measurements for TV
	SecRodMSTA1	MSTA_DEMAND	Secondary Rolling Demand Values
	SecVhzMMXU1	MMXU_VHZ	Secondary volts-per-hertz measurements - winding 1
	SecVhzMMXU2	MMXU_VHZ	Secondary volts-per-hertz measurements - winding 2
	ThmMMXU1	MMXU_THM	Thermal Measurements
	XfrDifMDIF1	MDIF_XFR_1	Transformer Differential Values
	XfrDifMDIF2	MDIF_XFR_2_3	Transformer Differential values - 2nd Harmonic

LD	LN Instance	LN Type	Description
	XfrDifMDIF3	MDIF_XFR_2_3	Transformer Differential values -5th Harmonic
Protection			
	Cbf1RBRF1	RBRF_INTTRIP	CT1 CB Fail 1
	Cbf1RBRF2	RBRF_EXTTRIP	CT1 CB Fail 2
	Cbf2RBRF1	RBRF_INTTRIP	CT2 CB Fail 1
	Cbf2RBRF2	RBRF_EXTTRIP	CT2 CB Fail 2
	Cbf3RBRF1	RBRF_INTTRIP	CT3 CB Fail 1 - P643/P645
	Cbf3RBRF2	RBRF_EXTTRIP	CT3 CB Fail 2 - P643/P645
	CliAlmPTUC1	PTUC_NEU	CLIO Input 1 Alarm
	CliAlmPTUC2	PTUC_NEU	CLIO Input 2 Alarm
	CliAlmPTUC3	PTUC_NEU	CLIO Input 3 Alarm
	CliAlmPTUC4	PTUC_NEU	CLIO Input 4 Alarm
	CliBlkGGIO1	GGIO_IND_4	Current Loop blocked signals
	CliTrpPTUC1	PTUC_NEU	Current Loop Input 1 Trip
	CliTrpPTUC2	PTUC_NEU	Current Loop Input 2 Trip
	CliTrpPTUC3	PTUC_NEU	Current Loop Input 3 Trip
	CliTrpPTUC4	PTUC_NEU	Current Loop Input 4 Trip
	DifPDIF1	PDIF_NEU_NO_STR	differential protection
	EfmEI1PTOC1	PTOC_NO_SEG	Earth fault element 1 - stage 1
	EfmEI1PTOC2	PTOC_NO_SEG	Earth fault element 1 - stage 2
	EfmEI1PTOC3	PTOC_NO_SEG	Earth fault element 1 - stage 3
	EfmEI1PTOC4	PTOC_NO_SEG	Earth fault element 1 - stage 4
	EfmEI2PTOC1	PTOC_NO_SEG	Earth fault element 2 - stage 1
	EfmEI2PTOC2	PTOC_NO_SEG	Earth fault element 2 - stage 2
	EfmEI2PTOC3	PTOC_NO_SEG	Earth fault element 2 - stage 3
	EfmEI2PTOC4	PTOC_NO_SEG	Earth fault element 2 - stage 4
	EfmEI3PTOC1	PTOC_NO_SEG	Earth fault element 3 - stage 1
	EfmEI3PTOC2	PTOC_NO_SEG	Earth fault element 3 - stage 2
	EfmEI3PTOC3	PTOC_NO_SEG	Earth fault element 3 - stage 3
	EfmEI3PTOC4	PTOC_NO_SEG	Earth fault element 3 - stage 4
	FrqPTOF1	PTOF_NO_SEG	F> 1 Over Frequency
	FrqPTOF2	PTOF_NO_SEG	F> 2 Over Frequency
	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
	HotPTTR1	PTTR_NO_SEG	Hot Oil Thermal Overload stage 1
	HotPTTR2	PTTR_NO_SEG	Hot Oil Thermal Overload stage 2
	HotPTTR3	PTTR_NO_SEG	Hot Oil Thermal Overload stage 3
	LLN0	LLN0_P643_P645	LLN0
	LPHD1	LPHD_STANDARD	Physical Device Information
	NgcEI1PTOC1	PTOC_NO_SEG	I>1 element 1 NPS Overcurrent
	NgcEI1PTOC2	PTOC_NO_SEG	I>2 element 1 NPS Overcurrent
	NgcEI1PTOC3	PTOC_NO_SEG	I>3 element 1 NPS Overcurrent

LD	LN Instance	LN Type	Description
	NgcEI1PTOC4	PTOC_NO_SEG	I>4 element 1 NPS Overcurrent
	NgcEI2PTOC1	PTOC_NO_SEG	I>1 element 2 NPS Overcurrent
	NgcEI2PTOC2	PTOC_NO_SEG	I>2 element 2 NPS Overcurrent
	NgcEI2PTOC3	PTOC_NO_SEG	I>3 element 2 NPS Overcurrent
	NgcEI2PTOC4	PTOC_NO_SEG	I>4 element 2 NPS Overcurrent
	NgcEI3PTOC1	PTOC_NO_SEG	I>1 element 3 NPS Overcurrent
	NgcEI3PTOC2	PTOC_NO_SEG	I>2 element 3 NPS Overcurrent
	NgcEI3PTOC3	PTOC_NO_SEG	I>3 element 3 NPS Overcurrent
	NgcEI3PTOC4	PTOC_NO_SEG	I>4 element 3 NPS Overcurrent
	NgvPTOV1	PTOV_NO_SEG	Negative Sequence Overvoltage
	OcpEI1PTOC1	PTOC_NO_SEG	I>1 element 1 Protection
	OcpEI1PTOC2	PTOC_NO_SEG	I>2 element 1 Protection
	OcpEI1PTOC3	PTOC_NO_SEG	I>3 element 1 Protection
	OcpEI1PTOC4	PTOC_NO_SEG	I>4 element 1 Protection
	OcpEI2PTOC1	PTOC_NO_SEG	I>1 element 2 Protection
	OcpEI2PTOC2	PTOC_NO_SEG	I>2 element 2 Protection
	OcpEI2PTOC3	PTOC_NO_SEG	I>3 element 2 Protection
	OcpEI2PTOC4	PTOC_NO_SEG	I>4 element 2 Protection
	OcpEI3PTOC1	PTOC_NO_SEG	I>1 element 3 Protection
	OcpEI3PTOC2	PTOC_NO_SEG	I>2 element 3 Protection
	OcpEI3PTOC3	PTOC_NO_SEG	I>3 element 3 Protection
	OcpEI3PTOC4	PTOC_NO_SEG	I>4 element 3 Protection
	OcpPVOC1	PVOC_NO_SEG	Voltage Controlled Overcurrent - stage 1
	OcpPVOC2	PVOC_NO_SEG	Voltage Controlled Overcurrent - stage 2
	PTRC1	PTRC_NO_SEG	Trip Conditioning
	RefAtrPDIF1	PDIF_NEU	Auto Transformer Restricted Earth Fault
	RefHvwPDIF1	PDIF_NEU	HV Winding Restricted Earth Fault
	RefLvwPDIF1	PDIF_NEU	LV Winding Restricted Earth Fault
	RefTvwPDIF1	PDIF_NEU	TV Winding Restricted Earth Fault
	RtdDerGGIO1	GGIO_IND_10	RTD Data Error indications
	RtdOpcGGIO1	GGIO_IND_10	RTD Open Cct indications
	RtdPTTR1	PTTR_NEU	RTD channel 1
	RtdPTTR10	PTTR_NEU	RTD channel 10
	RtdPTTR2	PTTR_NEU	RTD channel 2
	RtdPTTR3	PTTR_NEU	RTD channel 3
	RtdPTTR4	PTTR_NEU	RTD channel 4
	RtdPTTR5	PTTR_NEU	RTD channel 5
	RtdPTTR6	PTTR_NEU	RTD channel 6
	RtdPTTR7	PTTR_NEU	RTD channel 7
	RtdPTTR8	PTTR_NEU	RTD channel 8
	RtdPTTR9	PTTR_NEU	RTD channel 9
	RtdShcGGIO1	GGIO_IND_10	RTD Short Cct indications

LD	LN Instance	LN Type	Description
	TopPTTR1	PTTR_NO_SEG	Top Oil Thermal Overload stage 1
	TopPTTR2	PTTR_NO_SEG	Top Oil Thermal Overload stage 2
	TopPTTR3	PTTR_NO_SEG	Top Oil Thermal Overload stage 3
	VhzWg1PVPH1	PVPH_STANDARD	Over fluxing - winding 1
	VhzWg1PVPH2	PVPH_STANDARD	Over fluxing winding 1
	VhzWg1PVPH3	PVPH_STANDARD	Over fluxing winding 1
	VhzWg1PVPH4	PVPH_STANDARD	Over fluxing winding 1
	VhzWg2PVPH1	PVPH_STANDARD	Over fluxing - winding 2
	VhzWg2PVPH2	PVPH_STANDARD	Over fluxing - winding 2
	VhzWg2PVPH3	PVPH_STANDARD	Over fluxing - winding 2
	VhzWg2PVPH4	PVPH_STANDARD	Over fluxing - winding 2
	VtpPhsPTOV1	PTOV_NO_SEG	Phase Overvoltage - stage 1
	VtpPhsPTOV2	PTOV_NO_SEG	Phase Overvoltage - stage 2
	VtpPhsPTUV1	PTUV_NO_SEG	Phase Undervoltage -stage 1
	VtpPhsPTUV2	PTUV_NO_SEG	Phase Undervoltage -stage 2
	VtpResPTOV1	PTOV_NO_SEG	Residual Overvoltage - stage 1
	VtpResPTOV2	PTOV_NO_SEG	Residual Overvoltage - stage 2
	XfrDifPDIF1	PDIF_NEU_SEG	Xformer Differential
	XfrDifPHAR1	PHAR_BASIC	XFormer Harmonic Restraint - 2nd harmonic
	XfrDifPHAR2	PHAR_BASIC	XFormer Harmonic Restraint - 5th harmonic
Records			
	LLN0	LLN0_STANDARD	Records Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	RDRE1	RDRE_BASIC	Disturbance Recorder
	RFLO1	RFLO_P643	Rault Record
System			
	AlmGGIO1	GGIO_ALM_96	Alarms
	AlmGGIO2	GGIO_ALM_32	User Alarms
	FnkGGIO1	GGIO_IND_10	Function Keys
	GosGGIO1	GGIO_IND_64	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
	LPHD1	LPHD_STANDARD	Physical Device Information
	OptGGIO1	GGIO_IND_24	Opto Inputs (24 off)
	OrdRunGGIO1	GGIO_IND_64	Uniqueness of control "Order Running" indications for control operations
	PloGGIO1	GGIO_IND_32_CTRL	Controllable Inputs
	RlyGGIO1	GGIO_IND_24	Output Contacts (24 off)

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_64	(GGIO)	Generic Process I/O(w.r.t 64 Indication Elements)	IEC 61850-7-4:2003
GGIO_ALM_32	(GGIO)	Generic process I/O	IEC 61850-7-4:2003
GGIO_ALM_96	(GGIO)	Generic Process I/O (w.r.t 96 Alarm Elements)	IEC 61850-7-4:2003
GGIO_ANAL_10	(GGIO)	Generic process I/O w.r.t. 10 analogue inputs	IEC 61850-7-4:2003
GGIO_ANAL_4	(GGIO)	Generic process I/O	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_IND_18	(GGIO)	Generic Process I/O (w.r.t 18 Indication Elements)	IEC 61850-7-4:2003
GGIO_IND_24	(GGIO)	Generic process I/O	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_32_CTRL	(GGIO)	Generic process I/O (w.r.t 32 Indications Ctrl i/p)	IEC 61850-7-4:2003
GGIO_IND_4	(GGIO)	Generic process I/O	IEC 61850-7-4:2003
GGIO_IND_6	(GGIO)	Generic process I/O	IEC 61850-7-4:2003
LLN0_SYSTEM	(LLN0)	Logical Node 0	IEC 61850-7-4:2003
LLN0_P643_P645	(LLN0)	Logical Node 0	IEC 61850-7-4:2003
LLN0_STANDARD	(LLN0)	General Logical Node 0	IEC 61850-7-4:2003
LPHD_STANDARD	(LPHD)	Px40 Physical Device Information	IEC 61850-7-4:2003
MDIF_LZD	(MDIF)	Differential measurements	IEC 61850-7-4:2003
MDIF_XFR_1	(MDIF)	Differential measurements	IEC 61850-7-4:2003
MDIF_XFR_2_3	(MDIF)	Differential measurements	IEC 61850-7-4:2003
MMTR_EFL	(MMTR)	Metering	IEC 61850-7-4:2003
MMTR_LOL	(MMTR)	Metering	IEC 61850-7-4:2003
MMXU_MSI	(MMXU)	Standard measurements	IEC 61850-7-4:2003
MMXU_FOURIER	(MMXU)	Fourier standard measurements	IEC 61850-7-4:2003
MMXU_FOURIER_WINDI	(MMXU)	Fourier winding measurements	IEC 61850-7-4:2003
NGMMXU_HZD	(MMXU)	Standard measurements	IEC 61850-7-4:2003
MMXU_POWER_FACTO	(MMXU)	Power factor measurements	IEC 61850-7-4:2003
RMMXU_POWER_WINDING	(MMXU)	Power measurements	IEC 61850-7-4:2003
MMXU_RMS	(MMXU)	RMSmeasurements	IEC 61850-7-4:2003
MMXU_RMS_PHV	(MMXU)	RMS Voltage measurements	IEC 61850-7-4:2003
MMXU_THM	(MMXU)	Thermal measurements	IEC 61850-7-4:2003
MMXU_VHZ	(MMXU)	Volts per Herz measurements	IEC 61850-7-4:2003
MMXU_LOL	(MMXU)	Loss-of-Life (Transformer) measurements	IEC 61850-7-4:2003
MSTA_DEMAND	(MSTA)	Metering Statistics	IEC 61850-7-4:2003

LN Type	(LN)	Description	Name Space
PDIF_NEU	(PDIF)	Differential (w.r.t Neutral)	IEC 61850-7-4:2003
PDIF_NEU_NO_STR	(PDIF)	Differential	IEC 61850-7-4:2003
PDIF_NEU_SEG	(PDIF)	Differential (w.r.t Neutral)	IEC 61850-7-4:2003
PHAR_BASIC	(PHAR)	Harmonic Restraint	IEC 61850-7-4:2003
PTOC_NO_SEG	(PTOC)	Timed Overcurrent (w.r.t No 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 Phase Segregation)	IEC 61850-7-4:2003
PTRC_NO_SEG	(PTRC)	Protection trip conditioning (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
PTTR_NEU	(PTTR)	Thermal overload (Including Alarm)	IEC 61850-7-4:2003
PTTR_NO_SEG	(PTTR)	Thermal overload (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
PTUC_NEU	(PTUC)	Models timed under-current protection	IEC 61850-7-2:2003
PTUF_NO_SEG	(PTUF)	Under frequency (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
PTUV_NO_SEG	(PTUV)	Undervoltage (w.r.t No Phase Segregation)	SCHNEIDER-ELECTRIC-MiCOM
PVOC_NO_SEG	(PVOC)	Voltage controlled time overcurrent (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
PVPH_STANDARD	(PVPH)	Volts per Hz protection	IEC 61850-7-4:2003
RBRF_EXTTRIP	(RBRF)	Breaker Failure (w.r.t External Trip)	IEC 61850-7-4:2003
RBRF_INTTRIP	(RBRF)	Breaker Failure (w.r.t Internal Trip)	IEC 61850-7-4:2003
RDRE_BASIC	(RDRE)	Disturbance Recorder function (w.r.t Mandatory Attributes only)	IEC 61850-7-4:2003
RFLO_P643	(RFLO)	Fault record value	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_32

Description: Generic process I/O
LN Class: GGIO

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		
Alm1	SPS_D	General single alarm		
Alm2	SPS_D	General single alarm		
Alm3	SPS_D	General single alarm		
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		

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
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		

Attribute	Attr. Type	Explanation	T	X
Alm3	SPS_D	General single alarm		
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		

Attribute	Attr. Type	Explanation	T	X
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		
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		

Attribute	Attr. Type	Explanation	T	X
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		

4.4 Logical Node: GGIO_ANAL_10

Description: Generic process I/O w.r.t. 10 analogue inputs
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		
AnIn1	MV_FLOAT_D	Analogue input point 1		
AnIn2	MV_FLOAT_D	Analogue input point 2		
AnIn3	MV_FLOAT_D	Analogue input point 3		
AnIn4	MV_FLOAT_D	Analogue input point 4		
AnIn5	MV_FLOAT_D	Analogue input point 5		
AnIn6	MV_FLOAT_D	Analogue input point 6		
AnIn7	MV_FLOAT_D	Analogue input point 7		
AnIn8	MV_FLOAT_D	Analogue input point 8		
AnIn9	MV_FLOAT_D	Analogue input point 9		
AnIn10	MV_FLOAT_D	Analogue input point 10		

4.5 Logical Node: GGIO_ANAL_4

Description: Generic process I/O
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		
AnIn1	MV_FLOAT_D	Analogue Input		
AnIn2	MV_FLOAT_D	Analogue Input		
AnIn3	MV_FLOAT_D	Analogue Input		
AnIn4	MV_FLOAT_D	Analogue Input		

4.6 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		

Attribute	Attr. Type	Explanation	T	X
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)		
Ind7	SPS_D	General indication (binary input)		
Ind8	SPS_D	General indication (binary input)		
Ind9	SPS_D	General indication (binary input)		
Ind10	SPS_D	General indication (binary input)		

4.7 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 (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)		
Ind7	SPS_D	General indication (binary input)		
Ind8	SPS_D	General indication (binary input)		
Ind9	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)		

4.8 Logical Node: GGIO_IND_24

Description: Generic process I/O

LN Class: GGIO

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		
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		

4.9 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 (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)		
Ind7	SPS_D	General indication (binary input)		
Ind8	SPS_D	General indication (binary input)		
Ind9	SPS_D	General indication (binary input)		

Attribute	Attr. Type	Explanation	T	X
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)		

4.10 Logical Node: GGIO_IND_32_CTRL

Description: Generic process I/O (w.r.t 32 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		

Attribute	Attr. Type	Explanation	T	X
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		

4.11 Logical Node: GGIO_IND_4

Description: Generic process I/O
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)		

4.12 Logical Node: GGIO_IND_6

Description: Generic process I/O
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)		

Attribute	Attr. Type	Explanation	T	X
Ind5	SPS_D	General indication (binary input)		
Ind6	SPS_D	General indication (binary input)		

4.13 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
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)		
Ind7	SPS_D	General indication (binary input)		
Ind8	SPS_D	General indication (binary input)		
Ind9	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)		

Attribute	Attr. Type	Explanation	T	X
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)		
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)		

4.14 Logical Node: LLN0_P643_P645

Description: 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_LLNO	Name Plate		
VhzMod	INC_MOD_D_PRIV	Volts/Hz Mode		
VhzBeh	INS_BEH_D_PRIV	Volts per Hz Behaviour		
RefMod	INC_MOD_D_PRIV	REF Mode		
RefBeh	INS_BEH_D_PRIV	REF Behaviour		
FrqMod	INC_MOD_D_PRIV	Overfrequency/Underfrequency Mode		
FrqBeh	INS_BEH_D_PRIV	Overfrequency/Underfrequency Behaviour		

Attribute	Attr. Type	Explanation	T	X
ThmMod	INC_MOD_D_PRIV	Thermal Overload Mode		
ThmBeh	INS_BEH_D_PRIV	Thermal Overload Behaviour		
CbfMod	INC_MOD_D_PRIV	CB Fail Mode		
CbfBeh	INS_BEH_D_PRIV	Circuit Breaker Fail Behaviour		
EfmMod	INC_MOD_D_PRIV	Earth Fault 1 (Measured) Mode		
EfmBeh	INS_BEH_D_PRIV	Earth Fault 1 (Measured) Behaviour		
OcpMod	INC_MOD_D_PRIV	Overcurrent Mode		
OcpBeh	INS_BEH_D_PRIV	Overcurrent Behaviour		
DifMod	INC_MOD_D_PRIV	Differential Mode		
DifBeh	INS_BEH_D_PRIV	Differential Behaviour		
NpsMod	INC_MOD_D_PRIV	NPS Overcurrent Mode		
NpsBeh	INS_BEH_D_PRIV	NPS Overcurrent Behaviour		
RtdMod	INC_MOD_D_PRIV	RTD Mode		
RtdBeh	INS_BEH_D_PRIV	RTD Behaviour		
NvdMod	INC_MOD_D_PRIV	NVD Overvoltage Mode		
NvdBeh	INS_BEH_D_PRIV	NVD Overvoltage Behaviour		
VtpMod	INC_MOD_D_PRIV	Voltage Protection Mode		
VtpBeh	INS_BEH_D_PRIV	Voltage Protection Behaviour		
CliMod	INC_MOD_D_PRIV	Clio Inputs Protection Mode		
CliBeh	INS_BEH_D_PRIV	Clio Inputs Behaviour		

4.15 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		
NamPlt	LPL_LLNO	Name Plate		

4.16 Logical Node: LLN0_SYSTEM

Description: 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_LLNO	Name Plate		
LEDRs	SPC_CONTROL	LED reset	T	
OrdRun	SPS_WD_NS	Order Running(IEC61850 phase 2.0 and 2.1)		X
SyncSt	SPS_WD_NS	Time Synchronisation Indication(IEC61850 phase 2.0 and 2.1)		X

4.17 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		

4.18 Logical Node: MDIF_LZD

Description: Differential measurements

LN Class: MDIF

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
IDiff	MV_FLOAT_NS	IREF low impedance Diff		X
IBias	MV_FLOAT_NS	IREF low impedance Bias		X

4.19 Logical Node: MDIF_XFR_1

Description: Differential measurements

LN Class: MDIF

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
IDiff	WYE_SEG_NS	Current Diff - 3 phase		X
IBias	WYE_SEG_NS	Current Bias - 3 phase		X

4.20 Logical Node: MDIF_XFR_2_3

Description: Differential measurements

LN Class: MDIF

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

4.21 Logical Node: MMTR_EFL

Description: Metering

LN Class: MMTR

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		
SupWh	BCR_MMTR	Real energy supply (Energy flow towards bus bar)		
SupVARh	BCR_MMTR	Reactive energy supply (Energy flow towards bus bar)		
DmdWh	BCR_MMTR	Real energy demand (Energy flow from bus bar)		
DmdVARh	BCR_MMTR	Reactive energy demand (Energy flow from bus bar)		
MMTRs	SPC_CTRL_PRIV	Reset thermal state		X

4.22 Logical Node: MMTR_LOL

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		
FAALres	MV_FLOAT_NS	Loss of Life FAA LRes		X
LOLLres	MV_FLOAT_NS	Loss of Life LRes		X
LOLSts	MV_FLOAT_NS	Loss of Life Status		X
LOLRate	MV_FLOAT_NS	Loss of Life Rate		X

4.23 Logical Node: MMXU_FOURIER

Description: Fourier 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		
Hz	MV_FLOAT_D	Frequency		
PPV	DEL_SEG_ANG	Phase to Phase voltages		
PhV	WYE_SEG_ANG	Phase to Ground voltages		
V0	MV_FLOAT_NS	V0 Magnitude		
V1	MV_FLOAT_NS	V1 Magnitude		
V2	MV_FLOAT_NS	V2 Magnitude		
Vx	WYE_RES_ANG_D_NS	Vx		
VNd	WYE_RES_ANG_D_NS	VNd		

4.24 Logical Node: MMXU_FOURIER_WINDING

Description: Fourier winding 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
A	WYE_SEG_ANG	Phase currents		
IN	WYE_RES_ANG_D_NS	IN measured		
INd	WYE_RES_ANG_D_NS	IN derived		
INTN	WYE_RES_ANG_D_NS	IN TN measured		

4.25 Logical Node: MMXU_HZD

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		
IN	WYE_RES_MAG_NS	IN measured		

4.26 Logical Node: MMXU_LOL

Description: Loss-of-Life (Transformer) 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		
FAA	MV_FLOAT_NS	Loss of Life FAA		
LOL	MV_FLOAT_NS	Loss of Life Aging Factor		

4.27 Logical Node: MMXU_MSI

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		
A	WYE_SEG_ANG	Phase currents		
I0	MV_FLOAT_NS	I0 Magnitude		
I1	MV_FLOAT_NS	I1 Magnitude		
I2	MV_FLOAT_NS	I2 Magnitude		
INd	WYE_RES_ANG_D_NS	IN derived		

4.28 Logical Node: MMXU_POWER_FACTOR

Description: Power factor measurements

LN Class: MMXU

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		
TotPF	MV_FLOAT	Average power factor (Total PF)		
PF	WYE_SEG	Phase power factor		

4.29 Logical Node: MMXU_POWER_WINDING

Description: Power 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		
TotW	MV_FLOAT	Total active power (Total P)		
TotVAr	MV_FLOAT	Total reactive power (Total Q)		
TotVA	MV_FLOAT	Total apparent power (Total S)		
W	WYE_SEG	Phase active power (P)		
VAr	WYE_SEG	Phase reactive power (Q)		
VA	WYE_SEG	Phase apparent power (S)		

4.30 Logical Node: MMXU_RMS

Description: RMSmeasurements
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		
A	WYE_SEG	Phase currents		

4.31 Logical Node: MMXU_RMS_PHV

Description: RMS Voltage 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		
PhV	WYE_SEG	Phase to Ground voltages		

4.32 Logical Node: MMXU_THM

Description: Thermal 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		
HotT	MV_FLOAT_NS	Hot Spot Temperature		
TopT	MV_FLOAT_NS	Top Oil Temperature		
AmbT	MV_FLOAT_NS	Ambient Temperature		
TopPreLft	MV_FLOAT_NS	Top Oil Pretrip Left		

4.33 Logical Node: MMXU_VHZ

Description: Volts per Herz 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		
VHz	MV_FLOAT_NS	Volts/Hz		X
VHzt	MV_FLOAT_NS	Volts/Hz t Pretrip		X
VHzThrm	MV_FLOAT_NS	Volts/Hz Thermal		X

4.34 Logical Node: MSTA_DEMAND

Description: Metering Statistics

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		
MaxW	MV_FLOAT	Maximum real power		
MaxVAr	MV_FLOAT	Maximum reactive power		

4.35 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		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

4.36 Logical Node: PDIF_NEU_NO_STR

Description: Differential

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_SEG	Operate	T	

4.37 Logical Node: PDIF_NEU_SEG

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		
Str	ACD_SEG	Start		
Op	ACT_SEG	Operate	T	

4.38 Logical Node: PHAR_BASIC

Description: Harmonic Restraint

LN Class: PHAR

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_SEG	Start		

4.39 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	

4.40 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		

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

4.41 Logical Node: PTOV_NO_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		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

4.42 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		

4.43 Logical Node: PTTR_NEU

Description: Thermal overload (Including Alarm)

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		
Op	ACT_NO_SEG	Operate	T	
AlmThm	SPS_WD	Thermal alarm	T	
MTRRs	SPC_CTRL_PRIV	Reset thermal state		X

4.44 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		

Attribute	Attr. Type	Explanation	T	X
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Op	ACT_NO_SEG	Operate	T	
MTRRs	SPC_CTRL_PRIV	Reset thermal state		X

4.45 Logical Node: PTUC_NEU

Description: Models timed under-current protection
LN Class: PTUC

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	Started		
Op	ACT_NO_SEG	Operate	T	
ModOvA	SPS_WD_NS	Overcurrent Mode Indication		

4.46 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	

4.47 Logical Node: PTUV_NO_SEG

Description: Undervoltage (w.r.t No Phase Segregation)
LN Class: PTUV

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	

4.48 Logical Node: PVOC_NO_SEG

Description: Voltage controlled time overcurrent (w.r.t No Phase Segregation)
LN Class: PVOC

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_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

4.49 Logical Node: PVPH_STANDARD

Description: Volts per Hz protection

LN Class: PVPH

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	

4.50 Logical Node: RBRF_EXTTRIP

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

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_NO_SEG	Breaker failure trip ("External trip")	T	

4.51 Logical Node: RBRF_INTTRIP

Description: Breaker Failure (w.r.t Internal Trip)

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		
OpIn	ACT_NO_SEG	Operate, retrip ("Internal trip")	T	

4.52 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		

Attribute	Attr. Type	Explanation	T	X
FltNum	INS_BASIC	Fault number		

4.53 Logical Node: RFLO_P643

Description: Fault record value

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_FLOAT_FAULT	Fault impedance		
FltDiskm	MV_FLOAT_FAULT_ND	Fault distance in km		
FltNum	INS_D	Fault record number		X
FltPhs	INS_D_NS	Fault Phases		X
FltSt1U	INS_D_NS	Fault start element 1 up		X
FltSt1L	INS_D_NS	Fault start element 1 low		X
FltSt2U	INS_D_NS	Fault start element 2 up		X
FltSt2L	INS_D_NS	Fault start element 2 low		X
FltSt3U	INS_D_NS	Fault start element 3 up		X
FltSt3L	INS_D_NS	Fault start element 3 low		X
FltOp1U	INS_D_NS	Fault trip element 1 up		X
FltOp1L	INS_D_NS	Fault trip element 1 low		X
FltOp2U	INS_D_NS	Fault trip element 2 up		X
FltOp2L	INS_D_NS	Fault trip element 2 low		X
FltOp3U	INS_D_NS	Fault trip element 3 up		X
FltOp3L	INS_D_NS	Fault trip element 3 low		X
FltAlmU	INS_D_NS	Fault alarm up		X
FltAlmL	INS_D_NS	Fault alarm low		X
FltTU	INS_D_NS	Fault time up		X
FltTL	INS_D_NS	Fault time low		X
FltTms	INS_D_NS	Fault time ms		X
FltType	INS_D_NS	Fault Type		X
ActGp	INS_D_NS	Fault Active group		X
Freq	MV_FLOAT_FAULT	Fault frequency		X
FltDur	MV_FLOAT_FAULT	Fault duration		X
CBOpTm	MV_FLOAT_FAULT	Fault CB Operation time		X
RlyOpTm	MV_FLOAT_FAULT	Fault Rly Operation time		X
FltA1	WYE_SEG_FAULT	Fault phase current of CT1		X
FltA2	WYE_SEG_FAULT	Fault phase current of CT2		X
FltA3	WYE_SEG_FAULT	Fault phase current of CT3		X
AHV	WYE_SEG_FAULT	Fault phase current for HV Winding		X
ALV	WYE_SEG_FAULT	Fault phase current for LV Winding		X
ATV	WYE_SEG_FAULT	Fault phase current for TV Winding		X
I2HV	MV_FLOAT_FAULT	Fault current I2 for HV Winding		X
I2LV	MV_FLOAT_FAULT	Fault current I2 for LV Winding		X

Attribute	Attr. Type	Explanation	T	X
I2TV	MV_FLOAT_FAULT	Fault current I2 for TV Winding		X
INHV	MV_FLOAT_FAULT	Fault current IN for HV Winding		X
INLV	MV_FLOAT_FAULT	Fault current IN for LV Winding		X
INTV	MV_FLOAT_FAULT	Fault current IN for TV Winding		X
FltPhV	WYE_SEG_FAULT	Fault record phase voltage		X
FltVx	MV_FLOAT_FAULT	Fault voltage Vx measured		X
FltV1	MV_FLOAT_FAULT	Fault voltage V1 measured		X
FltV2	MV_FLOAT_FAULT	Fault voltage V2 measured		X
FltVN	MV_FLOAT_FAULT	Fault voltage VN measured		X
FltPPV	DEL_SEG_FAULT	Fault record phase-phase voltage		X
IDiff	WYE_SEG_FAULT	Fault current Idiff		X
IBias	WYE_SEG_FAULT	Fault current Ibias		X
IDiffLZHV	MV_FLOAT_FAULT	Fault IREF HV LoZ Diff		X
IBiasLZHV	MV_FLOAT_FAULT	Fault IREF HV LoZ Bias		X
IDiffLZLV	MV_FLOAT_FAULT	Fault IREF LV LoZ Diff		X
IBiasLZLV	MV_FLOAT_FAULT	Fault IREF LV LoZ Bias		X
IDiffLZTV	MV_FLOAT_FAULT	Fault IREF TV LoZ Diff		X
IBiasLZTV	MV_FLOAT_FAULT	Fault IREF TV LoZ Bias		X
IDiffLZAt	MV_FLOAT_FAULT	Fault IREF Auto LoZ Diff		X
IBiasLZAt	MV_FLOAT_FAULT	Fault IREF Auto LoZ Bias		X
IOpHZHV	MV_FLOAT_FAULT	Fault IREF HV HighZ Op		X
IOpHZLV	MV_FLOAT_FAULT	Fault IREF LV HighZ Op		X
IOpHZTV	MV_FLOAT_FAULT	Fault IREF TV HighZ Op		X
IOpHZAt	MV_FLOAT_FAULT	Fault IREF Auto HighZ Op		X
Ipeak	WYE_SEG_FAULT	Fault phase current Ipeak		X
I2t	WYE_SEG_FAULT	Fault phase I2t		X
RTD1	MV_FLOAT_FAULT	Fault RTD1		X
RTD2	MV_FLOAT_FAULT	Fault RTD2		X
RTD3	MV_FLOAT_FAULT	Fault RTD3		X
RTD4	MV_FLOAT_FAULT	Fault RTD4		X
RTD5	MV_FLOAT_FAULT	Fault RTD5		X
RTD6	MV_FLOAT_FAULT	Fault RTD6		X
RTD7	MV_FLOAT_FAULT	Fault RTD7		X
RTD8	MV_FLOAT_FAULT	Fault RTD8		X
RTD9	MV_FLOAT_FAULT	Fault RTD9		X
RTD10	MV_FLOAT_FAULT	Fault RTD10		X
CLIO1	MV_FLOAT_FAULT	Fault CLIO1		X
CLIO2	MV_FLOAT_FAULT	Fault CLIO2		X
CLIO3	MV_FLOAT_FAULT	Fault CLIO3		X
CLIO4	MV_FLOAT_FAULT	Fault CLIO4		X
INTN1	MV_FLOAT_FAULT	Fault current IN for TN1		X
INTN2	MV_FLOAT_FAULT	Fault current IN for TN2		X
INTN3	MV_FLOAT_FAULT	Fault current IN for TN3		X

4.54 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		
Lock	SPC_CTRL_PRIV	Prevention, i.e Lock, Trip/Close operations of the Circuit Breaker over IEC61850		X
BlkCls	SPC_STATUS	Block closing		
CBOpCap	INS_CB_OPCAP	Circuit Breaker operating capability		

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_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	

5.2 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	

Attribute	Type	FC	Enumeration	Comment	X
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	

5.3 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	

5.4 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	

5.5 Common Data Class: BCR_MMTR

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)	

5.6 Common Data Class: CMV_FLOAT_FAULT

Description: Complex Measured value in fault record
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	

5.7 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	

5.8 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	

5.9 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	

5.10 Common Data Class: DEL_SEG_FAULT

Description: Phase to phase measurements for a 3-Phase system
CDC Class: DEL

Attribute	Type	FC	Enumeration	Comment	X
phsAB	CMV_FLOAT_FAULT	--		Measurement values for Phase A to Phase B	
phsBC	CMV_FLOAT_FAULT	--		Measurement values for Phase B to Phase C	
phsCA	CMV_FLOAT_FAULT	--		Measurement values for Phase C to Phase A	
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

5.11 Common Data Class: DPC_CONTROL

Description: Controllable Double Point
CDC Class: DPC

Attribute	Type	FC	Enumeration	Comment	X
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	
stSeld	BOOLEAN	ST		The controllable data is in the status "Selected"	
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	
ctlVal	BOOLEAN	CO		Control value (Off - FALSE, On - TRUE)	
cdcName	VISIBLE_STRING255	EX		Name of the Common Data Class	

5.12 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	

5.13 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	

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)	

5.14 Common Data Class: INC_MOD_D_PRIV

Description: Controllable Integer Status (w.r.t Mode, with description (Private DO))
 CDC Class: INC

Attribute	Type	FC	Enumeration	Comment	X
ctlVal	INT32	CO		Control value	
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	
dataNs	VISIBLE_STRING255	EX		Data name space	

5.15 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	

5.16 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	

5.17 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	
t	TimeStamp	ST		Timestamp of the last change in state	

Attribute	Type	FC	Enumeration	Comment	X
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

5.18 Common Data Class: INS_CB_OPCAP

Description: Integer Status
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	

5.19 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	

5.20 Common Data Class: INS_D_NS

Description: Integer Status with description
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	

5.21 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	

5.22 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	

Attribute	Type	FC	Enumeration	Comment	X
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	

5.23 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	

5.24 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	

5.25 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	

5.26 Common Data Class: MV_FLOAT_FAULT

Description: Measured value in fault record
 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	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	

5.27 Common Data Class: MV_FLOAT_FAULT_ND

Description: Measured value in fault record

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	

5.28 Common Data Class: MV_FLOAT_NS

Description: MV_FLOAT with dataNs for extra Dos

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	

5.29 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)	
cdcNs	VISIBLE_STRING255	EX		Common Data Class name space	
d	VISIBLE_STRING255	DC		Description of the status element	
cdcName	VISIBLE_STRING255	EX		Name of the Common Data Class	

5.30 Common Data Class: SPC_CTRL_PRIV

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)	
stSeld	BOOLEAN	ST		The controllable data is in the status "Selected"	
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	

5.31 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)	

5.32 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	

5.33 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	

5.34 Common Data Class: SPS_WD_NS

Description: Single Point Status (without Description, with namespace)

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	

5.35 Common Data Class: WYE_RES_ANG_D_NS

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	
dataNs	VISIBLE_STRING255	EX		Data name space	

5.36 Common Data Class: WYE_RES_MAG_NS

Description: Phase to ground measurements for a 1-Phase system, magnitude only

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
res	CMV_MAG_FLOAT	--		Measurement values for the residual system current	
dataNs	VISIBLE_STRING255	EX		Data name space	

5.37 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	

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

5.38 Common Data Class: WYE_SEG_ANG

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	

5.39 Common Data Class: WYE_SEG_FAULT

Description: Phase to ground measurements for a 3-Phase system
 CDC Class: WYE

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

5.40 Common Data Class: WYE_SEG_NS

Description: WYE_SEG with dataNs DO
 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	

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
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)	

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	

6.4 Component: Unit

Comment: SI Unit definitions

Parent Type:

Attribute	Type	Enumeration	Comment	X
multiplier	ENUMERATED16 (MMS Type: INT8)	multiplier	Multiplier value, the default of which is 0 (i.e. multiplier = 1)	
SIUnit	ENUMERATED16 (MMS Type: INT8)	SIUnit	SI Unit	

6.5 Component: Unit_Multiplier

Comment: SI Unit definitions

Parent Type: Unit

Attribute	Type	Enumeration	Comment	X
multiplier	ENUMERATED16 (MMS Type: INT8)	multiplier	Multiplier value, the default of which is 0 (i.e. multiplier = 1)	
SIUnit	ENUMERATED16 (MMS Type: INT8)	SIUnit	SI Unit	

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	

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)	

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: IEC61850 phase 2.0 and 2.1

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: Beh

Description: Behaviour

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

7.3 Enumerated type: Bypass

Description: IEC61850 phase 2.0 and 2.1

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

Ordinal	Semantic
5	status-bypass

7.4 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

7.5 Enumerated type: ctIModel

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

7.6 Enumerated type: dir

Description: Direction

Ordinal	Semantic
0	unknown
1	forward
2	backward
3	both

7.7 Enumerated type: Health

Description: Health

Ordinal	Semantic
1	Ok
2	Warning
3	Alarm

7.8 Enumerated type: Mod

Description: Mode

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

7.9 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

7.10 Enumerated type: orCategory

Description: IEC61850 phase 2.0 and 2.1

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

7.11 Enumerated type: SIUnit

Description: SI Units derived from ISO/IEC 1000

Ordinal	Semantic
-16	years
-15	months
-14	weeks
-13	V/s

Ordinal	Semantic
-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
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

Ordinal	Semantic
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 ² t
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
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/cc>

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

www.schneider-electric.com

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