

# MiCOM P241

Rotating Machine Protection Relay

P241/EN PM/Ja5

Version 57

PICS & MICS

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# Notes:

# 1 PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (PICS)

## 1.1 Introduction

This specification is the Protocol Implementation Conformance Statement (PICS) and presents the ACSI conformance statements as defined in Annex A of Part 7-2 of the IEC 61850 standard specifications.

## 1.2 ACSI Basic Conformance Statement

The basic conformance statement is defined in Table 1.

Client-Server roles		Client/ subscriber	Server/ publisher	Value/ comments
B11	Server side (of Two-Party-Application-Association)		Y	
B12	Client side of (Two-Party-Application-Association)			
<b>SCSMs supported</b>				
B21	SCSM: IEC 6185-8-1 used		Y	
B22	SCSM: IEC 6185-9-1 used			
B23	SCSM: IEC 6185-9-2 used			
B24	SCSM: other			
<b>Generic substation event model (GSE)</b>				
B31	<b>Publisher</b> side		Y	
B32	<b>Subscriber</b> side	Y		
<b>Transmission of sampled value model (SVC)</b>				
B41	<b>Publisher</b> side			
B42	<b>Subscriber</b> side			
<i>Notes: Y = supported N or empty = not supported</i>				

Table 1: Basic conformance statement

## 1.3 ACSI Models Conformance Statement

The ACSI models conformance statement is defined in Table 2.

		Client/ subscriber	Server/ publisher	Value/ comments
If <b>Server or Client</b> side (B11/12) is supported				
M1	<b>Logical Device</b>		Y	
M2	<b>Logical Node</b>		Y	
M3	<b>Data</b>		Y	
M4	<b>Data set</b>		Y	
M5	<b>Substitution</b>			
M6	<b>Setting group control</b>		Y	
	<b>Reporting</b>			
M7	<b>Buffered report control</b>		Y	

		Client/ subscriber	Server/ publisher	Value/ comments
M7-1	sequence-number		Y	
M7-2	report-time-stamp		Y	
M7-3	reason-for-inclusion		Y	
M7-4	data-set-name		Y	
M7-5	data-reference		Y	
M7-6	buffer-overflow		Y	
M7-7	entryID		Y	
M7-8	BufTim		Y	
M7-9	IntgPd		Y	
M7-10	GI		Y	
M7-11	conf-revision		Y	
M8	<b>Unbuffered report control</b>		Y	
M8-1	sequence-number		Y	
M8-2	report-time-stamp		Y	
M8-3	reason-for-inclusion		Y	
M8-4	data-set-name		Y	
M8-5	data-reference		Y	
M8-6	BufTim		Y	
M8-7	IntgPd		Y	
M8-8	GI		Y	
M8-9	conf-revision		Y	
	<b>Logging</b>			
M9	<b>Log control</b>			
M9-1	IntgPd			
M10	<b>Log</b>			
M11	<b>Control</b>		Y	
If <b>GSE</b> (B31/32) is supported				
M12	<b>GOOSE</b>	Y	Y	
M13	<b>GSSE</b>			
If <b>SVC</b> (41/42) is supported				
M14	Multicast SVC			
M15	Unicast SVC			
If <b>Server or Client</b> side (B11/12) is supported				
M16	<b>Time</b>	Y	Y	Time source with required accuracy shall be available.
M17	<b>File Transfer</b>		Y	
Notes: Y = service is supported N or empty = service is not supported				

Table 2: Models conformance statement



## 1.4 ACSI Service Conformance Statement

The ACSI service conformance statement is defined in Table 3 (depending on the statements in Table 1).

	Services	AA: TP/MC	Client (C)	Server (S)	Comments
<b>Server</b>					
S1	ServerDirectory	TP		Y	
<b>Application association</b>					
S2	Associate			Y	
S3	Abort			Y	
S4	Release			Y	
<b>Logical Device</b>					
S5	LogicalDeviceDirectory	TP		Y	
<b>Logical Node</b>					
S6	LogicalNodeDirectory	TP		Y	
S7	GetAllDataValues	TP		Y	
<b>Data</b>					
S8	GetDataValues	TP		Y	
S9	SetDataValues	TP		Y	
S10	GetDataDirectory	TP		Y	
S11	GetDataDefinition	TP		Y	
<b>Data set</b>					
S12	GetDataSetValues	TP		Y	
S13	SetDataSetValues	TP			
S14	CreateDataSet	TP			
S15	DeleteDataSet	TP			
S16	GetDataSetDirectory	TP		Y	
<b>Substitution</b>					
S17	SetDataValues	TP			
<b>Setting group control</b>					
S18	SelectActiveSG	TP		Y	
S19	SelectEditSG	TP			
S20	SetSGValues	TP			
S21	ConfirmEditSGValues	TP			
S22	GetSGValues	TP		Y	
S23	GetSGCBValues	TP		Y	
<b>Reporting</b>					
Buffered report control block (BRCB)					
S24	Report	TP		Y	
S24-1	data-change (dchg)			Y	

	Services	AA: TP/MC	Client (C)	Server (S)	Comments
S24-2	qchg-change (qchg)				
S24-3	data-update (dupd)				
S25	GetBRCBValues	TP		Y	
S26	SetBRCBValues	TP		Y	
<b>Unbuffered report control block (URCB)</b>					
S27	Report	TP		Y	
S27-1	data-change (dchg)			Y	
S27-2	qchg-change (qchg)				
S27-3	data-update (dup)				
S28	GetURCBValues	TP		Y	
S29	SetURCBValues	TP		Y	
<b>Logging</b>					
Log control block					
S30	GetLCBValues	TP			
S31	SetLCBValues	TP			
Log					
S32	QueryLogByTime	TP			
S33	QueryLogByEntry	TP			
S34	GetLogStatusValues	TP			
<b>Generic substation event model (GSE)</b>					
GOOSE-CONTROL-BLOCK					
S35	SendGOOSEMessage	MC		Y	IED supports GOOSE publish & subscription.
S36	GetReference	TP			
S37	GetGOOSEElementNumber	TP			
S38	GetGoCBValues	TP		Y	
S39	SetGoCBValues	TP		Y	
GSSE-CONTROL-BLOCK					
S40	SendGSSEMessage	MC			
S41	GetReference	TP			
S42	GetGSSEElementNumber	TP			
S43	GetGsCBValues	TP			
S44	SetGsCBValues	TP			
<b>Transmission of sampled value model (SVC)</b>					
Multicast SVC					
S45	SendMSVMessage	MC			
S46	GetMSVCBValues	TP			
S47	SetMSVCBValues	TP			
Unicast SVC					
S48	SendUSVMessage	TP			

	Services	AA: TP/MC	Client (C)	Server (S)	Comments
S49	GetUSVCBValues	TP			
S50	SetUSVCBValues	TP			
<b>Control</b>					
S51	Select			Y	
S52	SelectWithValue	TP		Y	
S53	Cancel	TP		Y	
S54	Operate	TP		Y	
S55	Command-Termination	TP		Y	
S56	TimeActivated-Operate	TP			
<b>File transfer</b>					
S57	GetFile	TP		Y	
S58	SetFile	TP			
S59	DeleteFile	TP		Y	Only from /dr_unextracted/ Operation may only be performed on .cfg files.
S60	GetFileAttributeValues	TP		Y	
<b>Time</b>					
T1	Time resolution of internal clock			1 ms	Nearest negative power of 2 in seconds.
T2	Time accuracy of internal clock			1 ms	T0
					T1
					T2
					T3
					T4
					T5
T3	Supported TimeStamp resolution	-		1 ms	Nearest negative power of 2 in seconds.
<p><i>Notes:</i>      <i>AA: Application association type</i>  <i>TP: Two part (for MMS)</i>  <i>MC: Multicast (for GOOSE and SMV)</i></p>					

**Table 3: Service conformance statement**

## 2 MODEL IMPLEMENTATION CONFORMANCE STATEMENT (MICS)

### 2.1 Introduction

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

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

### 2.2 Objective

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

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

### 2.3 Logical Device Definitions

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

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

Logical Device	Comment/Usage
Control	P241 Control
Measurements	P241 Measurements
Protection	P241 Protection
Records	P241 Records
System	P241 System

#### 2.3.1 IEC 61850 Logical Device Data Model

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

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

LD	LN instance	LN type	Description
<b>Control</b>			
	CILO1	CILO_BASIC	Interlocking Circuit Breaker
	LLN0	LLN0_STANDARD	LLNO standard for Control
	LPHD1	LPHD_STANDARD	Physical Device Information
	XCBR1	XCBR_BASIC	Circuit Breaker Monitoring
<b>Measurements</b>			
	LLN0	LLN0_STANDARD	Measurements Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	MotRunMSTA1	MSTA_P240	Motor Running measurement
	MsiCliGGIO1	GGIO_ANALOG_4	Current Loop Input measurements
	PriDemMSTA1	MSTA_W_VAR	Fixed & Peak Demand (primary) measurements
	PriFouMMXU1	MMXU_FOURIER_P240	Fourier Primary measurands
	PriMMTR1	MMTR_ALL	Primary based metering quantities
	PriRmsMMXU1	MMXU_RMS_P240	RMS (primary) measurements
	PriStdMSQI1	MSQI_P243	Standard (primary) Sequence measurements
	SecDemMSTA1	MSTA_W_VAR	Fixed & Peak Demand (secondary) measurements
	SecFouMMXU1	MMXU_FOURIER_P240	Fourier Secondary measurands
	SecMMTR1	MMTR_ALL	Secondary based metering quantities
	SecRmsMMXU1	MMXU_RMS_P240	RMS (secondary) measurements
	SecStdMSQI1	MSQI_P243	Standard (secondary) Sequence measurements
<b>Protection</b>			
	AbsPTUV1	PTUV_NO_SEG_P240	Antibackspin function
	CbfRBRF1	RBRF_EXTTRIP	CBFail 1
	CbfRBRF2	RBRF_EXTTRIP	CBFail 2
	EfdPTOC1	PTOC_NEU	Earth Fault Derived - Stage 1
	EfdPTOC2	PTOC_NEU	Earth Fault Derived - Stage 2
	LLN0	LLN0_PROTP243	LLNO for P243 (Max configuration for P240)
	LosLodPDUP1	PDUP_STANDARD	Loss of Load protection - Stage 1
	LosLodPDUP2	PDUP_STANDARD	Loss of Load protection - Stage 2
	LPHD1	LPHD_STANDARD	Physical Device Information
	MotPMRI1	PMRI_P240	Motor restart inhibition - Warm Start
	MotPMRI2	PMRI_P240	Motor restart inhibition - Cold Start
	MotPMSS1	PMSS_P240	Motor start-up supervision - Locked Rotor during running
	MotPMSS2	PMSS_P240	Motor start-up supervision - Locked Rotor during start-up
	MotPMSS3	PMSS_P240	Motor start-up supervision - Stage Reacceleration
	MotPMSS4	PMSS_P240	Motor start-up supervision - Prolonged Start
	NgcPTOC1	PTOC_NO_SEG	Negative Sequence Overcurrent - Stage 1
	NgcPTOC2	PTOC_NO_SEG	Negative Sequence Overcurrent - Stage 2
	OcpCliPTOC1	PTOC_NO_SEG	CLIO Input 1
	OcpCliPTOC2	PTOC_NO_SEG	CLIO Input 2
	OcpCliPTOC3	PTOC_NO_SEG	CLIO Input 3
	OcpCliPTOC4	PTOC_NO_SEG	CLIO Input 4
	OcpPTOC1	PTOC_NO_SEG	Short Circuit - Stage 1
	OcpPTOC2	PTOC_NO_SEG	Short Circuit - Stage 2

LD	LN instance	LN type	Description
	OcpPTOC3	PTOC_NO_SEG	Short Circuit - Stage 3
	OcpPTOC4	PTOC_NO_SEG	Short Circuit - Stage 4
	PfrPPAM1	PPAM_P240	Out of Step
	PwrRevPDOP1	PDOP_DIR_NO_SEG	Reverse Overpower.
	RtdPTTR1	PTTR_RTD_P240	RTD Channel 1
	RtdPTTR10	PTTR_RTD_P240	RTD Channel 10
	RtdPTTR2	PTTR_RTD_P240	RTD Channel 2
	RtdPTTR3	PTTR_RTD_P240	RTD Channel 3
	RtdPTTR4	PTTR_RTD_P240	RTD Channel 4
	RtdPTTR5	PTTR_RTD_P240	RTD Channel 5
	RtdPTTR6	PTTR_RTD_P240	RTD Channel 6
	RtdPTTR7	PTTR_RTD_P240	RTD Channel 7
	RtdPTTR8	PTTR_RTD_P240	RTD Channel 8
	RtdPTTR9	PTTR_RTD_P240	RTD Channel 9
	SenEftPDOP1	PDOP_NO_SEG	Zero Sequence Overpower (Sensitive E/F)
	SenEftPTOC1	PTOC_NEU	Earth Fault Sensitive - Stage 1
	SenEftPTOC2	PTOC_NEU	Earth Fault Sensitive - Stage 2
	SvnRVCS1	RVCS_P240	CTS/VTs Supervision
	ThmPTTR1	PTTR_NO_SEG_P240	Thermal Overload
	UfpPTUF1	PTUF_NO_SEG	Underfrequency - Stage 1
	UfpPTUF2	PTUF_NO_SEG	Underfrequency - Stage 2
	UxpPDUP1	PDUP_STANDARD	Loss of Field / Underexcitation - Stage 1
	UxpPDUP2	PDUP_STANDARD	Loss of Field / Underexcitation - Stage 2
	VptPhsPTUV1	PTUV_NO_SEG	Phase Undervoltage - Stage 1
	VtpPhsPTOV1	PTOV_NO_SEG	Phase Overvoltage - Stage 1
	VtpPhsPTOV2	PTOV_NO_SEG	Phase Overvoltage - Stage 2
	VtpPhsPTUV2	PTUV_NO_SEG	Phase Undervoltage - Stage 2
	VtpResPTOV1	PTOV_NEU	Residual Overvoltage - Stage 1
	VtpResPTOV2	PTOV_NEU	Residual Overvoltage - Stage 2
<b>Records</b>			
	LLN0	LLN0_STANDARD	Records Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	RDRE1	RDRE_BASIC	Disturbance Recorder
<b>System</b>			
	AlmGGIO1	GGIO_ALM_96	Alarms
	GosGGIO1	GGIO_IND_64	GOOSE Input Signals
	GosGGIO2	GGIO_IND_32	GOOSE Output Signals
	LedStdGGIO1	GGIO_IND_8	8 Standards programmable LEDs
	LLN0	LLNO_SYSTEM	System Logical Device (with OrdRun, SyncSt)
	LPHD1	LPHD_STANDARD	Physical Device Information
	OptGGIO1	GGIO_IND_16	Opto Inputs (16 off)
	OrdRunGGIO1	GGIO_IND_64	Uniqueness of control "Order Running" indications for Control operations
	PloGGIO1	GGIO_IND32_PLO	PSL Control Input (32 set/reset)

LD	LN instance	LN type	Description
	RlyGGIO1	GGIO_IND_16	Output Contacts (16 off)

## 2.4 Logical Node Definitions

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

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

LN type	(LN class)	Description	Name space
CILO_BASIC	(CILO)	Interlocking	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_ANALOG_4	(GGIO)	Generic process I/O (w.r.t. 4 analogues inputs)	IEC 61850-7-4:2003
GGIO_IND_16	(GGIO)	Generic Process I/O (w.r.t 16 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_64	(GGIO)	Generic Process I/O (w.r.t 64 Indication Elements)	IEC 61850-7-4:2003
GGIO_IND_8	(GGIO)	Generic Process I/O (w.r.t 8 Indication Elements)	IEC 61850-7-4:2003
GGIO_IND32_PLO	(GGIO)	Generic Process I/O (32 Indications controllable)	IEC 61850-7-4:2003
LLN0_PROTP243	(LLN0)	Logical Node 0	IEC 61850-7-4:2003
LLN0_STANDARD	(LLN0)	General Logical Node 0	IEC 61850-7-4:2003
LLNO_SYSTEM	(LLN0)	Logical Node 0 (with OrdRun & SyncSt)	IEC 61850-7-4:2003
LPHD_STANDARD	(LPHD)	Px40 Physical Device Information	IEC 61850-7-4:2003
MMTR_ALL	(MMTR)	Metering	IEC 61850-7-4:2003
MMXU_FOURIER_P240	(MMXU)	Standard measurements	IEC 61850-7-4:2003
MMXU_RMS_P240	(MMXU)	Measurements (RMS values)	IEC 61850-7-4:2003
MSQI_P243	(MSQI)	Sequence and imbalance for P243	IEC 61850-7-4:2003
MSTA_W_VAR	(MSTA)	Metering Statistics Standard (Real + Reactive Power)	IEC 61850-7-4:2003
MSTA_P240	(MSTA)	Metering Statistics	IEC 61850-7-4:2003
PDOP_DIR_NO_SEG	(PDOP)	Directional Overpower (w.r.t no phase segregation)	IEC 61850-7-4:2003
PDOP_NO_SEG	(PDOP)	Overpower protection (w.r.t no phase segregation)	IEC 61850-7-4:2003
PDUP_STANDARD	(PDUP)	Underpower protection	IEC 61850-7-4:2003
PMRI_P240	(PMRI)	Motor Restart Inhibition	IEC 61850-7-4:2003
PMSS_P240	(PMSS)	Motor Starting Time supervision (Locked Rotor/Prolonged start)	IEC 61850-7-4:2003
PPAM_P240	(PPAM)	Out of Step protection for Motors	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
PTOV_NEU	(PTOV)	Overvoltage (w.r.t Neutral)	IEC 61850-7-4:2003
PTOV_NO_SEG	(PTOV)	Overvoltage (w.r.t Phase Segregation)	IEC 61850-7-4:2003
PTTR_RTD_P240	(PTTR)	Thermal Overload (no phase segregation)	IEC 61850-7-4:2003
PTTR_NO_SEG_P240	(PTTR)	Thermal Overload for P240 (w.r.t. no Phase Segregation)	IEC 61850-7-4:2003
PTUF_NO_SEG	(PTUF)	Underfrequency (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
PTUV_NO_SEG	(PTUV)	Undervoltage (w.r.t No Phase Segregation)	IEC 61850-7-4:2003

LN type	(LN class)	Description	Name space
PTUV_NO_SEG_P240	(PTUV)	Undervoltage (w.r.t no phase segregation and with Voltage measure)	IEC 61850-7-4:2003
RBRF_EXTTRIP	(RBRF)	Breaker Failure (w.r.t External Tripping)	IEC 61850-7-4:2003
RDRE_BASIC	(RDRE)	Disturbance Recorder function (w.r.t Mandatory Attributes only)	IEC 61850-7-4:2003
RVCS_P240	(RVCS)	VTS/CTS monitoring and report	Schneider Electric-SII:PCS-Px40
XCBR_BASIC	(XCBR)	Circuit Breaker (w.r.t Mandatory Attributes only)	IEC 61850-7-4:2003

#### 2.4.1 Logical Node: CILO\_BASIC

**Description:** Interlocking

**LN class:** CILO

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
EnaOpn	SPS_WD	Enable Open		
EnaCls	SPS_WD	Enable Close		

#### 2.4.2 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	Behavior		
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		



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

Attribute	Attr. type	Explanation	T	X
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		
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		

### 2.4.3

**Logical Node:** GGIO\_ANALOG\_4

**Description:** Generic Process I/O (w.r.t. 4 analogues inputs)

**LN class:** GGIO

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		

Attribute	Attr. type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
AnIn1	MV_FLOAT_D	Analogue Input 1		
AnIn2	MV_FLOAT_D	Analogue Input 2		
AnIn3	MV_FLOAT_D	Analogue Input 3		
AnIn4	MV_FLOAT_D	Analogue Input 4		

**2.4.4****Logical Node: GGIO\_IND\_16****Description:** Generic Process I/O (w.r.t 16 Indication Elements)**LN class:** GGIO

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
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)		

**2.4.5****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	Behavior		
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)		
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)		

## 2.4.6

**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	Behavior		
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)		

Attribute	Attr. type	Explanation	T	X
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)		
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)		

Attribute	Attr. type	Explanation	T	X
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)		

## 2.4.7

**Logical Node:** GGIO\_IND\_8**Description:** Generic Process I/O (w.r.t 8 Indication Elements)**LN class:** GGIO

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
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)		

## 2.4.8

**Logical Node:** GGIO\_IND32\_PLO**Description:** Generic Process I/O (32 Indications controllable)**LN class:** GGIO

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
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		

Attribute	Attr. type	Explanation	T	X
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		
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		

**2.4.9**

**Logical Node:** LLN0\_PROTP243

**Description:** Logical Node 0

**LN class:** LLN0

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LLNO	Name Plate		

**2.4.10**

**Logical Node:** LLN0\_STANDARD

**Description:** General Logical Node 0

**LN class:** LLN0

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		

Attribute	Attr. type	Explanation	T	X
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LLNO	Name Plate		

#### 2.4.11 Logical Node: LLNO\_SYSTEM

**Description:** Logical Node 0 (with OrdRun & SyncSt)

**LN class:** LLNO

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LLNO	Name Plate		
LEDRs	SPC_CONTROL	LED reset	T	
OrdRun	SPS_WD_NS	Order Running		X
SyncSt	SPS_WD_NS	IED time synchronization state		X

#### 2.4.12 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		

#### 2.4.13 Logical Node: MMTR\_ALL

**Description:** Metering

**LN class:** MMTR

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
SupWh	BCR_BASIC	Real energy supply		
SupVArh	BCR_BASIC	Reactive energy supply		
DmdWh	BCR_BASIC	Real energy demand		
DmdVArh	BCR_BASIC	Reactive energy demand		
MTRRs	SPC_CTL_NS	Reset Energies		X

#### 2.4.14 Logical Node: MMXU\_FOURIER\_P240

**Description:** Standard measurements

**LN class:** MMXU



Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
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)		
TotPF	MV_FLOAT	Average power factor (Total PF)		
Hz	MV_FLOAT	Frequency		
PPV	DEL_SEG_ANG	Phase to Phase voltages		
PhV	WYE_SEG_RES_ANG	Phase to Ground voltages		
W	WYE_RES_MAG_D	Phase active power (P)		
A1	WYE_SEG_RES_ANG	Phase currents (as standard)		
A2	WYE_SEG_RES_NEUT_D	Phase currents (for Sensitive E/F)		

**2.4.15****Logical Node:** MMXU\_RMS\_P240**Description:** Measurements (RMS values)**LN class:** MMXU

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
PPV	DEL_SEG	Phase to Phase voltages		
PhV	WYE_SEG	Phase to Ground voltages		
A	WYE_SEG_RES	Phase currents		

**2.4.16****Logical Node:** MSQI\_P243**Description:** Sequence and imbalance for P243**LN class:** MSQI

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
SeqA	SEQ_MAG	Positive, Negative and Zero sequence current		
SeqV	SEQ_MAG	Positive, Negative and Zero sequence voltage		

**2.4.17****Logical Node:** MSTA\_P240**Description:** Metering Statistics**LN class:** MSTA

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		

Attribute	Attr. type	Explanation	T	X
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
MotRunHr	MV_FLOAT_NS	Motor Running Hour		X

## 2.4.18

**Logical Node: MSTA\_W\_VAR****Description:** Metering Statistics Standard (Real + Reactive Power)**LN class:** MSTA

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
MaxAmps	MV_FLOAT_D	Maximum current		
MaxVolts	MV_FLOAT_D	Maximum voltage		
AvW	MV_FLOAT_D	Average real power		
MaxW	MV_FLOAT_D	Maximum real power		
AvVAr	MV_FLOAT_D	Average reactive power		
MaxVAr	MV_FLOAT_D	Maximum reactive power		

## 2.4.19

**Logical Node: PDOP\_DIR\_NO\_SEG****Description:** Directional Overpower (w.r.t no phase segregation)**LN class:** PDOP

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	
DirGeneralRev	INS_DIR_NS	Reverse Directional		X

## 2.4.20

**Logical Node: PDOP\_NO\_SEG****Description:** Overpower protection (w.r.t no phase segregation)**LN class:** PDOP

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		

Attribute	Attr. type	Explanation	T	X
Op	ACT_NO_SEG	Operate	T	

**2.4.21****Logical Node: PDUP\_STANDARD****Description:** Underpower protection**LN class:** PDUP

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

**2.4.22****Logical Node: PMRI\_P240****Description:** Motor Restart Inhibition**LN class:** PMRI

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Op	ACT_NO_SEG	Operate		
StrInh	SPS_WD	Restart Inhibited		
OpCnt	INS_BASIC	Counter Number of starts		X
StrPrg	SPS_D_NS	Start In Progress		X
OpCntEmy	INS_D_NS	Counter Number of Emergency Starts		X
StrTmmNx	MV_FLOAT_D_NS	Time to Next Start		X

**2.4.23****Logical Node: PMSS\_P240****Description:** Motor Starting Time supervision (Locked Rotor/Prolonged start)**LN class:** PMSS

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Op	ACT_NO_SEG	Operate		
OpCnt	INS_BASIC	Operation counter		X
StrInh	SPS_WD	Restart Inhibited		X
StrPrg	SPS_D_NS	Start in progress		X

**2.4.24****Logical Node: PPAM\_P240****Description:** Out of Step protection for Motors

**LN class:** PPAM

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start Lag		
Op	ACT_NO_SEG	Operate Lag	T	
OpLd	ACT_NO_SEG_D_NS	Operate Lead	T	X
StrLd	ACD_NO_SEG_D_NS	Start Lead		X

#### 2.4.25

**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	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NEU	Start		
Op	ACT_NEU	Operate	T	

#### 2.4.26

**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	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

#### 2.4.27

**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	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NEU	Start		

Attribute	Attr. type	Explanation	T	X
Op	ACT_NEU	Operate	T	

**2.4.28****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	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

**2.4.29****Logical Node:** PTTR\_NO\_SEG\_P240**Description:** Thermal Overload for P240 (w.r.t. no Phase Segregation)**LN class:** PTTR

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Amp	MV_FLOAT_D	Current for thermal load model		
TmpRI	MV_FLOAT_D	Relation between temperature and maximum temperature		
Op	ACT_NO_SEG	Operate	T	
AlmThm	ACT_NO_SEG	Thermal alarm	T	
MTRRs	SPC_CTL_NS	Reset thermal state		X

**2.4.30****Logical Node:** PTTR\_RTD\_P240**Description:** Thermal Overload (no phase segregation)**LN class:** PTTR

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Tmp	MV_FLOAT	Temperature for thermal load		
Op	ACT_NO_SEG	Operate	T	
AlmThm	ACT_NO_SEG	Thermal alarm	T	
OpnCct	ACT_NO_SEG_D_NS	Open Circuit alarm		X
DataErr	ACT_NO_SEG_D_NS	Data Error alarm		X

Attribute	Attr. type	Explanation	T	X
ShrtCct	ACT_NO_SEG_D_NS	Short Circuit alarm		X

## 2.4.31

**Logical Node:** PTUF\_NO\_SEG

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

**LN class:** PTUF

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

## 2.4.32

**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	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

## 2.4.33

**Logical Node:** PTUV\_NO\_SEG\_P240

**Description:** Undervoltage (w.r.t no phase segregation and with Voltage measure)

**LN class:** PTUV

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	
PPVRem	MV_FLOAT_D_NS	Remanent phase to phase voltage		X

## 2.4.34

**Logical Node:** RBRF\_EXTTRIP

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

**LN class:** RBRF

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		

Attribute	Attr. type	Explanation	T	X
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
OpEx	ACT_NO_SEG	Breaker failure trip ("External trip")	T	

#### 2.4.35 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	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
RcdMade	SPS_WD	Recording made		
FltNum	INS_BASIC	Fault number		

#### 2.4.36 Logical Node: RVCS\_P240

**Description:** VTS/CTS monitoring and report

**LN class:** RVCS

Attribute	Attr. type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behavior		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN_P	Name Plate		
SlwVTSBik	SPS_D	slow VTS block status		
FstVTSBik	SPS_D	fast VTS block status		
SlwCTSBik	SPS_D	slow CTS block status		
FstCTSBik	SPS_D	fast CTS block status		

#### 2.4.37 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	Behavior		
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		
BlkOpn	SPC_STATUS	Block opening		
Pos	DPC_CONTROL	Switch position		
BlkCls	SPC_STATUS	Block closing		
CBOpCap	INS_BASIC	Circuit Breaker operating capability		

Attribute	Attr. type	Explanation	T	X
Lock	SPC_CTL_NS	Handle Circuit Breaker locks		X

## 2.5

### 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

### 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	



Attribute	Type	FC	Enumeration	Comment	X
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

2.5.2

**Common Data Class: ACD\_NO\_SEG**

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

**CDC class:** ACD

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

2.5.3

**Common Data Class: ACD\_NO\_SEG\_D\_NS**

**Description:** ACD\_NO\_SEG with description and dataNS

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

2.5.4

**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	

2.5.5

**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	

Attribute	Type	FC	Enumeration	Comment	X
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

### 2.5.6 Common Data Class: ACT\_NO\_SEG\_D\_NS

**Description:** ACT\_NO\_SEG with Description and namespace DO dataNs

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

### 2.5.7 Common Data Class: BCR\_BASIC

**Description:** Binary Counter Reading

**CDC class:** BCR

Attribute	Type	FC	Enumeration	Comment	X
actVal	INT128	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)	
d	VISIBLE_STRING255	DC		Description of the status element	

### 2.5.8 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	

Attribute	Type	FC	Enumeration	Comment	X
rangeC	RangeConf	CF		Measurement range configuration attributes	

**2.5.9****Common Data Class: CMV\_MAG\_FLOAT****Description:** Complex Measured value (w.r.t Floating Point Magnitude)**CDC class:** CMV

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

**2.5.10****Common Data Class: DEL\_SEG****Description:** Phase to phase measurements for a 3-Phase system (w.r.t Phase Segregation)**CDC class:** DEL

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

**2.5.11****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	

**2.5.12****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)	
stVal	CODED_ENUM (MMS Type: _BSTR2)	ST	Dbpos	Status value of the data (Intermediate state, Off, On or Bad-state)	
origin	Originator	ST		Originator of the last change of the controllable 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 behavior of the data)	
sboTimeout	INT32U	CF		Select Before Operate timeout period (in milliseconds)	

**2.5.13****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	

**2.5.14****Common Data Class:** INC\_MOD**Description:** Controllable Integer Status (w.r.t Mode)**CDC class:** INC

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

**2.5.15****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	

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

**2.5.16 Common Data Class: INS\_BEH**

**Description:** Integer Status (w.r.t Behavior)

**CDC class:** INS

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

**2.5.17 Common Data Class: INS\_D\_NS**

**Description:** Integer Status (w.r.t Counters (Private and 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	

**2.5.18 Common Data Class: INS\_DIR\_NS**

**Description:** Integer Status (w.r.t Directional (Private DO))

**CDC class:** INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32 (MMS Type: INT8)	ST	dir	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	
dataNs	VISIBLE_STRING255	EX		Data name space	

**2.5.19 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	

Attribute	Type	FC	Enumeration	Comment	X
t	TimeStamp	ST		Timestamp of the last change in state	

## 2.5.20

**Common Data Class: LPL\_LLNO****Description:** Logical Node 0 Name Plate**CDC class:** LPL

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

## 2.5.21

**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	

## 2.5.22

**Common Data Class: LPL\_LN\_P****Description:** Logical Node Name Plate for Propriety LN**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	
lnNs	VISIBLE_STRING255	EX		Logical Node name space	

## 2.5.23

**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	

Attribute	Type	FC	Enumeration	Comment	X
units	Unit_Multiplier	CF		Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
rangeC	RangeConf	CF		Measurement range configuration attributes	

**2.5.24****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	RangeConf	CF		Measurement range configuration attributes	
d	VISIBLE_STRING255	DC		Description of the status element	

**2.5.25****Common Data Class: MV\_FLOAT\_D\_NS****Description:** MV\_FLAT with Description 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	RangeConf	CF		Measurement range configuration attributes	
dataNs	VISIBLE_STRING255	EX		Data name space	
d	VISIBLE_STRING255	DC		Description of the status element	

**2.5.26****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	RangeConf	CF		Measurement range configuration attributes	
dataNs	VISIBLE_STRING255	EX		Data name space	

## 2.5.27

**Common Data Class: SEQ\_MAG****Description:** Sequence components of a measurement value**CDC class:** SEQ

Attribute	Type	FC	Enumeration	Comment	X
c1	CMV_MAG_FLOAT	--		Sequence component 1 (For semantic meaning see seqT)	
c2	CMV_MAG_FLOAT	--		Sequence component 2 (For semantic meaning see seqT)	
c3	CMV_MAG_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)	

## 2.5.28

**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 behavior of the data)	
sboTimeout	INT32U	CF		Select Before Operate timeout period (in milliseconds)	

## 2.5.29

**Common Data Class: SPC\_CTL\_NS****Description:** Controllable Single Point (with DataNS)**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 behavior of the data)	
sboTimeout	INT32U	CF		Select Before Operate timeout period (in milliseconds)	
dataNs	VISIBLE_STRING255	EX		Data name space	

**2.5.30****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 behavior of the data)	

**2.5.31****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	

**2.5.32****Common Data Class: SPS\_D\_NS****Description:** Single Point Status with Description and DataNS**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	

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

## 2.5.33

**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	

## 2.5.34

**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	

## 2.5.35

**Common Data Class: WYE\_RES\_MAG\_D****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	
d	VISIBLE_STRING255	DC		Description of the status element	

## 2.5.36

**Common Data Class: WYE\_SEG****Description:** Phase to ground measurements for a 3-Phase system (w.r.t Phase Segregation)**CDC class:** WYE

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

## 2.5.37

**Common Data Class: WYE\_SEG\_RES****Description:** Phase to ground measurements for a 3-Phase system (w.r.t Phase Segregation + Residual)**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	
res	CMV_MAG_FLOAT	--		Measurement values for the residual system current	

**2.5.38****Common Data Class: WYE\_SEG\_RES\_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	
res	CMV_MAG_ANG_FLOAT	--		Measurement values for the residual system current	

**2.5.39****Common Data Class: WYE\_SEG\_RES\_NEUT\_D**

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

**CDC class:** WYE

Attribute	Type	FC	Enumeration	Comment	X
neut	CMV_MAG_ANG_FLOAT	--		Measurement values for neutral input	
d	VISIBLE_STRING255	DC		Description of the status element	

**2.6****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.

**2.6.1****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	

**2.6.2****Component: Originator**

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

Attribute	Type	Enumeration	Comment	X
orIdent	OCTET_STRING64		Originator identification (Null value indicates unknown or not reported)	

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)	

### 2.6.3 Component: RangeConf

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	
lLim	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	

### 2.6.4 Component: Unit\_Multiplier

Comment: SI Unit definitions

Parent type: Unit

Attribute	Type	Enumeration	Comment	X
SIUnit	ENUMERATED8 (MMS Type: INT8)	SIUnit	SI Unit	
multiplier	ENUMERATED16 (MMS Type: INT8)	multiplier	Multiplier value, the default of which is 0 (i.e. multiplier = 1)	

### 2.6.5 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	

### 2.6.6 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	

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

## 2.7 Enumerated Type Definitions

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

### 2.7.1 Enumerated type: AddCause

**Description:** Additional cause

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

### 2.7.2 Enumerated type: Beh

**Description:** Behavior

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

### 2.7.3 Enumerated type: Bypass

**Description:** Cause of Bypass

Ordinal	Semantic
0	locking-bypass

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

**2.7.4****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

**2.7.5****Enumerated type: Dbpos****Description:** Circuit Breaker position

Ordinal	Semantic
0	intermediate
1	off
2	on
3	bad

**2.7.6****Enumerated type: dir****Description:** Direction

Ordinal	Semantic
0	unknown
1	forward
2	backward
3	both

**2.7.7****Enumerated type: Health****Description:** Health

Ordinal	Semantic
1	Ok
2	Warning
3	Alarm

**2.7.8****Enumerated type: Mod****Description:** Mode

Ordinal	Semantic
1	on
2	blocked

Ordinal	Semantic
3	test
4	test/blocked
5	off

**2.7.9****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

**2.7.10****Enumerated type: orCategory**

**Description:** Control mode and Place mode

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

**2.7.11****Enumerated type: seqT**

**Description:** Sequence Measurement Type

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

## 2.7.12

**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
30	ohm
31	J



Ordinal	Semantic
32	N
33	Hz
34	Ix
35	Lm
36	Wb
37	T
38	W
39	Pa
41	m <sup>2</sup>
42	m <sup>3</sup>
43	m/s
44	m/s <sup>2</sup>
45	m <sup>3</sup> /s
46	m/m <sup>3</sup>
47	M
48	kg/m <sup>3</sup>
49	m <sup>2</sup> /s
50	W/m K
51	J/K
52	ppm
53	1/s
54	rad/s
61	VA
62	Watts
63	VAr
64	phi
65	cos(phi)
66	Vs
67	V <sup>2</sup>
68	As
69	A <sup>2</sup>
70	A <sup>2</sup> t
71	VAh
72	Wh
73	VArh
74	V/Hz

## 2.8

### 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

Part 7 type	MMS type	Part 7 description
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)
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
INT128	Int64	128 bit signed integer value
INT16	Short	16 bit signed integer value
INT16U	Ushort	16 bit unsigned integer value
INT24U	Ulong	24 bit unsigned integer value
INT32	Long	32 bit signed integer value
INT32U	Ulong	32 bit unsigned integer value
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	IEC 61850 Quality
TimeStamp	Utctime	IEC 61850 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





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