

# MiCOM P746

Numerical Busbar Protection

P746/EN PM/B31

Version    Software Version A0B  
              Hardware Suffix K

PICS & MICS

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# 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 shall be as 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)	Y	–	
<b>SCSMs supported</b>				
B21	SCSM: IEC 6185-8-1 used	N	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	–	N	
B42	<b>Subscriber</b> side	N	–	
<div style="border: 1px solid black; padding: 5px;"> <p><i>Notes</i></p> <p>– Y = supported N or empty = not supported</p> </div>				

**Table 1 - Basic conformance statement**

### 1.3 ACSI Models Conformance Statement

The ACSI models conformance statement shall be as 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>	N	Y	
M2	<b>Logical Node</b>	N	Y	
M3	<b>Data</b>	N	Y	
M4	<b>Data set</b>	N	Y	
M5	<b>Substitution</b>	N	N	
M6	<b>Setting group control</b>	N	Y	
	<b>Reporting</b>			
M7	<b>Buffered report control</b>	N	Y	
M7-1	sequence-number	N	Y	
M7-2	report-time-stamp	N	Y	
M7-3	reason-for-inclusion	N	Y	
M7-4	data-set-name	N	Y	
M7-5	data-reference	N	Y	
M7-6	buffer-overflow	N	Y	
M7-7	entryID	N	Y	
M7-8	BufTim	N	Y	
M7-9	IntgPd	N	Y	
M7-10	GI	N	Y	
M7-11	conf-revision	N	Y	
M8	<b>Unbuffered report control</b>	N	Y	
M8-1	sequence-number	N	Y	
M8-2	report-time-stamp	N	Y	
M8-3	reason-for-inclusion	N	Y	
M8-4	data-set-name	N	Y	
M8-5	data-reference	N	Y	
M8-6	BufTim	N	Y	
M8-7	IntgPd	N	Y	
M8-8	GI	N	Y	
M8-9	conf-revision	N	Y	
	<b>Logging</b>			
M9	<b>Log control</b>	N	N	
M9-1	IntgPd	N	N	
M10	<b>Log</b>			
M11	<b>Control</b>	N	Y	
If <b>GSE</b> (B31/32) is supported				
M12	<b>GOOSE</b>	Y	Y	
M13	<b>GSSE</b>	N	N	
If <b>SVC</b> (41/42) is supported				
M14	Multicast SVC	N	N	

		Client/ subscriber	Server/ publisher	Value/ comments
M15	Unicast SVC	N	N	
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>	N	Y	
<div style="border: 1px solid black; padding: 5px;"> <i>Notes</i>      <i>Y = service is supported</i>                                    <i>N or empty = service is not supported</i> </div>				

**Table 2 - Models conformance statement**

### 1.4 ACSI Service Conformance Statement

The ACSI service conformance statement shall be as 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		N	
<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		N	
S14	CreateDataSet	TP		N	
S15	DeleteDataSet	TP		N	

	Services	AA: TP/MC	Client (C)	Server (S)	Comments
S16	GetDataSetDirectory	TP		Y	
<b>Substitution</b>					
S17	SetDataValues	TP		N	
<b>Setting group control</b>					
S18	SelectActiveSG	TP		Y	
S19	SelectEditSG	TP		N	
S20	SetSGValues	TP		N	
S21	ConfirmEditSGValues	TP		N	
S22	GetSGValues	TP		N	
S23	GetSGCBValues	TP		Y	
<b>Reporting</b>					
Buffered report control block (BRCB)					
S24	Report	TP		Y	
S24-1	data-change (dchg)			Y	
S24-2	qchg-change (qchg)			N	
S24-3	data-update (dupd)			N	
S25	GetBRCBValues	TP		Y	
S26	SetBRCBValues	TP		Y	
Unbuffered report control block (URCB)					
S27	Report	TP		Y	
S27-1	data-change (dchg)			Y	
S27-2	qchg-change (qchg)			N	
S27-3	data-update (dup)			N	
S28	GetURCBValues	TP		Y	
S29	SetURCBValues	TP		Y	
<b>Logging</b>					
Log control block					
S30	GetLCBValues	TP		N	
S31	SetLCBValues	TP		N	
Log					
S32	QueryLogByTime	TP		N	
S33	QueryLogByEntry	TP		N	
S34	GetLogStatusValues	TP		N	
<b>Generic substation event model (GSE)</b>					
GOOSE-CONTROL-BLOCK					
S35	SendGOOSEMessage	MC		Y	IED supports GOOSE publish & subscription.

	Services	AA: TP/MC	Client (C)	Server (S)	Comments
S36	GetReference	TP		N	
S37	GetGOOSEElementNumber	TP		N	
S38	GetGoCBValues	TP		Y	
S39	SetGoCBValues	TP		Y	
<b>GSSE-CONTROL-BLOCK</b>					
S40	SendGSSEMessage	MC		N	
S41	GetReference	TP		N	
S42	GetGSSEElementNumber	TP		N	
S43	GetGsCBValues	TP		N	
S44	SetGsCBValues	TP		N	
<b>Transmission of sampled value model (SVC)</b>					
Multicast SVC					
S45	SendMSVMessage	MC		N	
S46	GetMSVCBValues	TP		N	
S47	SetMSVCBValues	TP		N	
Unicast SVC					
S48	SendUSVMessage	TP		N	
S49	GetUSVCBValues	TP		N	
S50	SetUSVCBValues	TP		N	
<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		N	
<b>File transfer</b>					
S57	GetFile	TP		Y	
S58	SetFile	TP		N	
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				T0
				1 ms	T1

	Services	AA: TP/MC	Client (C)	Server (S)	Comments		
					T2		
					T3		
					T4		
					T5		
T3	Supported TimeStamp resolution	-		10	Nearest value of 2 ** - n in seconds.		
<table border="1"><tr><td>Notes</td><td>AA: Application association type TP: Two part (for MMS) MC: Multicast (for GOOSE and SMV)</td></tr></table>						Notes	AA: Application association type TP: Two part (for MMS) MC: Multicast (for GOOSE and SMV)
Notes	AA: Application association type TP: Two part (for MMS) MC: Multicast (for GOOSE and SMV)						

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 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.

### 2.2 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 IEC61850 standards. The layout of the presented tables within this document are conformant to the part 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

### 2.3 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
Measurements	P746 Measurements
Protection	P746 Protection
Records	P746 Records
System	P746 System

#### 2.3.1 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
Measurements			
	LLN0	LLN0_STANDARD	Measurements Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	PriBbpMDIF1	MDIF_BBP	Primary Busbar Differential measurements for base values - zone 1
	PriBbpMDIF2	MDIF_BBP	Primary Busbar differential measurements for bias values - zone 1
	PriBbpMDIF3	MDIF_BBP	Primary Busbar Differential measurements for base values - zone 2
	PriBbpMDIF4	MDIF_BBP	Primary Busbar differential measurements for bias values - zone 2
	PriCznMDIF1	MDIF_CZ	Primary Check zone differential measurements for base values - fundamentals
	PriCznMDIF2	MDIF_CZ	Primary Check zone differential measurements for bias values - fundamentals
	PriDvdMMXU1	MMXU_A_6	Primary Derived one-box measurements
	PriFouMMXU1	MMXU_FOURIER	Primary Fourier based measurements
	PriMsiMMXU1	MMXU_DERIVED_A_6	Primary measured values for One-box measurements
	PriMsiMMXU2	MMXU_A_18	Primary measured values for Three-box measurements
	PriRmsMMXU1	MMXU_RMS	Primary RMS measurements
	PriSeqMSQI1	MSQI_SEQ_6	Primary one-box sequence measurements
	SecBbpMDIF1	MDIF_BBP	Secondary Busbar Differential measurements for base values - zone 1
	SecBbpMDIF2	MDIF_BBP	Secondary Busbar differential measurements for bias values - zone 1
	SecBbpMDIF3	MDIF_BBP	Secondary Busbar Differential measurements for base values - zone 2



LD	LN Instance	LN Type	Description
	SecBbpMDIF4	MDIF_BBP	Secondary Busbar differential measurements for bias values - zone 2
	SecCznMDIF1	MDIF_CZ	Secondary Check zone differential measurements for base values - fundamentals
	SecCznMDIF2	MDIF_CZ	Secondary Check zone differential measurements for bias values - fundamentals
	SecDvdMMXU1	MMXU_A_6	Secondary Derived one-box measurements
	SecFouMMXU1	MMXU_FOURIER	Secondary Fourier based measurments
	SecMsiMMXU1	MMXU_DERIVED_A_6	Secondary measured values for One-box measurements
	SecMsiMMXU2	MMXU_A_18	Secondary measured values for Three-box measurements
	SecRmsMMXU1	MMXU_RMS	Secondary RMS measuerments
	SecSeqMSQI1	MSQI_SEQ_6	Secondary one-box sequence measurements
Protection			
	BbpT01PDIF1	PDIF_NEU	Busbar Differential - T1
	BbpT02PDIF1	PDIF_NEU	Busbar Differential - T2
	BbpT03PDIF1	PDIF_NEU	Busbar Differential - T3
	BbpT04PDIF1	PDIF_NEU	Busbar Differential - T4
	BbpT05PDIF1	PDIF_NEU	Busbar Differential - T5
	BbpT06PDIF1	PDIF_NEU	Busbar Differential - T6
	BbpT07PDIF1	PDIF_NEU	Busbar Differential - T7
	BbpT08PDIF1	PDIF_NEU	Busbar Differential - T8
	BbpT09PDIF1	PDIF_NEU	Busbar Differential - T9
	BbpT10PDIF1	PDIF_NEU	Busbar Differential - T10
	BbpT11PDIF1	PDIF_NEU	Busbar Differential - T11
	BbpT12PDIF1	PDIF_NEU	Busbar Differential - T12
	BbpT13PDIF1	PDIF_NEU	Busbar Differential - T13
	BbpT14PDIF1	PDIF_NEU	Busbar Differential - T14
	BbpT15PDIF1	PDIF_NEU	Busbar Differential - T15
	BbpT16PDIF1	PDIF_NEU	Busbar Differential - T16
	BbpT17PDIF1	PDIF_NEU	Busbar Differential - T17
	BbpT18PDIF1	PDIF_NEU	Busbar Differential - T18
	BbpZonPDIF1	PDIF_NEU	Dead zone differential protections - zone 1
	BbpZonPDIF2	PDIF_NEU	Dead zone differential protections - zone 2

LD	LN Instance	LN Type	Description
	CbfT01RBRF1	RBRF_STANDARD	CB Fail - T1
	CbfT02RBRF1	RBRF_STANDARD	CB Fail - T2
	CbfT03RBRF1	RBRF_STANDARD	CB Fail - T3
	CbfT04RBRF1	RBRF_STANDARD	CB Fail - T4
	CbfT05RBRF1	RBRF_STANDARD	CB Fail - T5
	CbfT06RBRF1	RBRF_STANDARD	CB Fail - T6
	CbfT07RBRF1	RBRF_STANDARD	CB Fail - T7
	CbfT08RBRF1	RBRF_STANDARD	CB Fail - T8
	CbfT09RBRF1	RBRF_STANDARD	CB Fail - T9
	CbfT10RBRF1	RBRF_STANDARD	CB Fail - T10
	CbfT11RBRF1	RBRF_STANDARD	CB Fail - T11
	CbfT12RBRF1	RBRF_STANDARD	CB Fail - T12
	CbfT13RBRF1	RBRF_STANDARD	CB Fail - T13
	CbfT14RBRF1	RBRF_STANDARD	CB Fail - T14
	CbfT15RBRF1	RBRF_STANDARD	CB Fail - T15
	CbfT16RBRF1	RBRF_STANDARD	CB Fail - T16
	CbfT17RBRF1	RBRF_STANDARD	CB Fail - T17
	CbfT18RBRF1	RBRF_STANDARD	CB Fail - T18
	CznPDIF1	PDIF_NEU	Check zone differential protection
	DznT01PTOC1	PTOC_NEU	Deadzone Overcurrent - T1 - Stage 1
	DznT02PTOC1	PTOC_NEU	Deadzone Overcurrent - T2 - Stage 1
	DznT03PTOC1	PTOC_NEU	Deadzone Overcurrent - T3 - Stage 1
	DznT04PTOC1	PTOC_NEU	Deadzone Overcurrent - T4 - Stage 1
	DznT05PTOC1	PTOC_NEU	Deadzone Overcurrent - T5 - Stage 1
	DznT06PTOC1	PTOC_NEU	Deadzone Overcurrent - T6 - Stage 1
	DznT07PTOC1	PTOC_NEU	Deadzone Overcurrent - T7 - Stage 1
	DznT08PTOC1	PTOC_NEU	Deadzone Overcurrent - T8 - Stage 1
	DznT09PTOC1	PTOC_NEU	Deadzone Overcurrent - T9 - Stage 1
	DznT10PTOC1	PTOC_NEU	Deadzone Overcurrent - T10 - Stage 1
	DznT11PTOC1	PTOC_NEU	Deadzone Overcurrent - T11 - Stage 1
	DznT12PTOC1	PTOC_NEU	Deadzone Overcurrent - T12 - Stage 1
	DznT13PTOC1	PTOC_NEU	Deadzone Overcurrent - T13 - Stage 1
	DznT14PTOC1	PTOC_NEU	Deadzone Overcurrent - T14 - Stage 1

LD	LN Instance	LN Type	Description
	DznT15PTOC1	PTOC_NEU	Deadzone Overcurrent - T15 - Stage 1
	DznT16PTOC1	PTOC_NEU	Deadzone Overcurrent - T16 - Stage 1
	DznT17PTOC1	PTOC_NEU	Deadzone Overcurrent - T17 - Stage 1
	DznT18PTOC1	PTOC_NEU	Deadzone Overcurrent - T18 - Stage 1
	EfdT01PTOC1	PTOC_NEU	Earth Fault Protection - T1 - Stage 1
	EfdT01PTOC2	PTOC_NEU	Earth Fault Protection - T1- Stage 2
	EfdT02PTOC1	PTOC_NEU	Earth Fault Protection - T2 - Stage 1
	EfdT02PTOC2	PTOC_NEU	Earth Fault Protection - T2- Stage 2
	EfdT03PTOC1	PTOC_NEU	Earth Fault Protection - T3 - Stage 1
	EfdT03PTOC2	PTOC_NEU	Earth Fault Protection - T3- Stage 2
	EfdT04PTOC1	PTOC_NEU	Earth Fault Protection - T4 - Stage 1
	EfdT04PTOC2	PTOC_NEU	Earth Fault Protection - T4- Stage 2
	EfdT05PTOC1	PTOC_NEU	Earth Fault Protection - T5 - Stage 1
	EfdT05PTOC2	PTOC_NEU	Earth Fault Protection - T5- Stage 2
	EfdT06PTOC1	PTOC_NEU	Earth Fault Protection - T6 - Stage 1
	EfdT06PTOC2	PTOC_NEU	Earth Fault Protection - T6- Stage 2
	LLN0	LLN0_PROT	Protection LLN0
	LPHD1	LPHD_STANDARD	Physical Device Information
	OcpT01PTOC1	PTOC_NEU	Overcurrent Protection - T1 - Stage 1
	OcpT01PTOC2	PTOC_NEU	Overcurrent Protection - T1 - Stage 2
	OcpT02PTOC1	PTOC_NEU	Overcurrent Protection - T2 - Stage 1
	OcpT02PTOC2	PTOC_NEU	Overcurrent Protection - T2 - Stage 2
	OcpT03PTOC1	PTOC_NEU	Overcurrent Protection - T3 - Stage 1
	OcpT03PTOC2	PTOC_NEU	Overcurrent Protection - T3 - Stage 2
	OcpT04PTOC1	PTOC_NEU	Overcurrent Protection - T4 - Stage 1
	OcpT04PTOC2	PTOC_NEU	Overcurrent Protection - T4 - Stage 2

LD	LN Instance	LN Type	Description
	OcpT05PTOC1	PTOC_NEU	Overcurrent Protection - T5 - Stage 1
	OcpT05PTOC2	PTOC_NEU	Overcurrent Protection - T5 - Stage 2
	OcpT06PTOC1	PTOC_NEU	Overcurrent Protection - T6 - Stage 1
	OcpT06PTOC2	PTOC_NEU	Overcurrent Protection - T6 - Stage 2
	OcpT07PTOC1	PTOC_NEU	Overcurrent Protection - T7 - Stage 1
	OcpT07PTOC2	PTOC_NEU	Overcurrent Protection - T7 - Stage 2
	OcpT08PTOC1	PTOC_NEU	Overcurrent Protection - T8 - Stage 1
	OcpT08PTOC2	PTOC_NEU	Overcurrent Protection - T8 - Stage 2
	OcpT09PTOC1	PTOC_NEU	Overcurrent Protection - T9 - Stage 1
	OcpT09PTOC2	PTOC_NEU	Overcurrent Protection - T9 - Stage 2
	OcpT10PTOC1	PTOC_NEU	Overcurrent Protection - T10 - Stage 1
	OcpT10PTOC2	PTOC_NEU	Overcurrent Protection - T10 - Stage 2
	OcpT11PTOC1	PTOC_NEU	Overcurrent Protection - T11 - Stage 1
	OcpT11PTOC2	PTOC_NEU	Overcurrent Protection - T11 - Stage 2
	OcpT12PTOC1	PTOC_NEU	Overcurrent Protection - T12 - Stage 1
	OcpT12PTOC2	PTOC_NEU	Overcurrent Protection - T12 - Stage 2
	OcpT13PTOC1	PTOC_NEU	Overcurrent Protection - T13 - Stage 1
	OcpT13PTOC2	PTOC_NEU	Overcurrent Protection - T13 - Stage 2
	OcpT14PTOC1	PTOC_NEU	Overcurrent Protection - T14 - Stage 1
	OcpT14PTOC2	PTOC_NEU	Overcurrent Protection - T14 - Stage 2
	OcpT15PTOC1	PTOC_NEU	Overcurrent Protection - T15 - Stage 1
	OcpT15PTOC2	PTOC_NEU	Overcurrent Protection - T15 - Stage 2
	OcpT16PTOC1	PTOC_NEU	Overcurrent Protection - T16 - Stage 1
	OcpT16PTOC2	PTOC_NEU	Overcurrent Protection - T16 - Stage 2
	OcpT17PTOC1	PTOC_NEU	Overcurrent Protection - T17 - Stage 1
	OcpT17PTOC2	PTOC_NEU	Overcurrent Protection - T17 - Stage 2

LD	LN Instance	LN Type	Description
	OcpT18PTOC1	PTOC_NEU	Overcurrent Protection - T18 - Stage 1
	OcpT18PTOC2	PTOC_NEU	Overcurrent Protection - T18 - Stage 2
	PTRC1	PTRC_NO_SEG	Trip Conditioning
Records			
	LLN0	LLN0_STANDARD	Records Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	RDRE1	RDRE_BASIC	Disturbance Recorder
System			
	AlmGGIO1	GGIO_ALM_96	Alarms
	FnkGGIO1	GGIO_IND_10	Function Key Indications
	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
	LLN0	LLN0_SYSTEM	System Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	OptGGIO1	GGIO_IND_40	Opto Inputs
	OrdRunGGIO1	GGIO_IND_64	Uniqueness of control "Order Running" indications for Control operations
	PloGGIO1	GGIO_IND_32_CTRL	PSL Control Inputs
	RlyGGIO1	GGIO_IND_32	Relay outputs

## 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 IEC61850 product data model:

LN Type	(LN)	Description	Name Space
GGIO_IND_10	(GGIO)	Generic process I/O	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_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 Indication Elements)	IEC 61850-7-4:2003
GGIO_IND_40	(GGIO)	Generic Process I/O (w.r.t 40 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

LN Type	(LN)	Description	Name Space
GGIO_ALM_96	(GGIO)	Generic Process I/O (w.r.t 96 Alarm Elements)	IEC 61850-7-4:2003
LLN0_PROT	(LLN0)	Protection Domain Logical Node 0	IEC 61850-7-4:2003
LLN0_STANDARD	(LLN0)	General Logical Node 0	IEC 61850-7-4:2003
LLN0_SYSTEM	(LLN0)	System Domain Logical Node 0	IEC 61850-7-4:2003
LPHD_STANDARD	(LPHD)	Px40 Physical Device Information	IEC 61850-7-4:2003
MDIF_CZ	(MDIF)	Differential measurements for checkzone	IEC 61850-7-4:2003
MDIF_BBP	(MDIF)	Differential measurements for buspar	IEC 61850-7-4:2003
MMXU_A_18	(MMXU)	Standard measurements for P746 three-box mode	IEC 61850-7-4:2003
MMXU_A_6	(MMXU)	Standard measurements for P746 one-box mode	IEC 61850-7-4:2003
MMXU_DERIVED_A_6	(MMXU)	Standard measurements	IEC 61850-7-4:2003
MMXU_FOURIER	(MMXU)	Fourier standard measurements	IEC 61850-7-4:2003
MMXU_RMS	(MMXU)	Standard measurements	IEC 61850-7-4:2003
MSQI_SEQ_6	(MSQI)	Sequence and imbalance	IEC 61850-7-4:2003
PDIF_NEU	(PDIF)	Differential (w.r.t Neutral)	IEC 61850-7-4:2003
PTOC_NEU	(PTOC)	Timed Overcurrent (w.r.t Neutral)	IEC 61850-7-4:2003
PTRC_NO_SEG	(PTRC)	Protection trip conditioning (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
RBRF_STANDARD	(RBRF)	Breaker Failure	IEC 61850-7-4:2003
RDRE_BASIC	(RDRE)	Disturbance Recorder function (w.r.t Mandatory Attributes only)	IEC 61850-7-4:2003

## 2.4.1

**Logical Node: GGIO\_ALM\_96**

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

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Alm1	SPS_D	General single alarm		
Alm2	SPS_D	General single alarm		
Alm3	SPS_D	General single alarm		

Attribute	Attr. Type	Explanation	T	X
Alm4	SPS_D	General single alarm		
Alm5	SPS_D	General single alarm		
Alm6	SPS_D	General single alarm		
Alm7	SPS_D	General single alarm		
Alm8	SPS_D	General single alarm		
Alm9	SPS_D	General single alarm		
Alm10	SPS_D	General single alarm		
Alm11	SPS_D	General single alarm		
Alm12	SPS_D	General single alarm		
Alm13	SPS_D	General single alarm		
Alm14	SPS_D	General single alarm		
Alm15	SPS_D	General single alarm		
Alm16	SPS_D	General single alarm		
Alm17	SPS_D	General single alarm		
Alm18	SPS_D	General single alarm		
Alm19	SPS_D	General single alarm		
Alm20	SPS_D	General single alarm		
Alm21	SPS_D	General single alarm		
Alm22	SPS_D	General single alarm		
Alm23	SPS_D	General single alarm		
Alm24	SPS_D	General single alarm		
Alm25	SPS_D	General single alarm		
Alm26	SPS_D	General single alarm		
Alm27	SPS_D	General single alarm		
Alm28	SPS_D	General single alarm		
Alm29	SPS_D	General single alarm		
Alm30	SPS_D	General single alarm		
Alm31	SPS_D	General single alarm		
Alm32	SPS_D	General single alarm		
Alm33	SPS_D	General single alarm		
Alm34	SPS_D	General single alarm		
Alm35	SPS_D	General single alarm		
Alm36	SPS_D	General single alarm		
Alm37	SPS_D	General single alarm		
Alm38	SPS_D	General single alarm		
Alm39	SPS_D	General single alarm		
Alm40	SPS_D	General single alarm		
Alm41	SPS_D	General single alarm		
Alm42	SPS_D	General single alarm		
Alm43	SPS_D	General single alarm		
Alm44	SPS_D	General single alarm		
Alm45	SPS_D	General single alarm		
Alm46	SPS_D	General single alarm		
Alm47	SPS_D	General single alarm		

Attribute	Attr. Type	Explanation	T	X
Alm48	SPS_D	General single alarm		
Alm49	SPS_D	General single alarm		
Alm50	SPS_D	General single alarm		
Alm51	SPS_D	General single alarm		
Alm52	SPS_D	General single alarm		
Alm53	SPS_D	General single alarm		
Alm54	SPS_D	General single alarm		
Alm55	SPS_D	General single alarm		
Alm56	SPS_D	General single alarm		
Alm57	SPS_D	General single alarm		
Alm58	SPS_D	General single alarm		
Alm59	SPS_D	General single alarm		
Alm60	SPS_D	General single alarm		
Alm61	SPS_D	General single alarm		
Alm62	SPS_D	General single alarm		
Alm63	SPS_D	General single alarm		
Alm64	SPS_D	General single alarm		
Alm65	SPS_D	General single alarm		
Alm66	SPS_D	General single alarm		
Alm67	SPS_D	General single alarm		
Alm68	SPS_D	General single alarm		
Alm69	SPS_D	General single alarm		
Alm70	SPS_D	General single alarm		
Alm71	SPS_D	General single alarm		
Alm72	SPS_D	General single alarm		
Alm73	SPS_D	General single alarm		
Alm74	SPS_D	General single alarm		
Alm75	SPS_D	General single alarm		
Alm76	SPS_D	General single alarm		
Alm77	SPS_D	General single alarm		
Alm78	SPS_D	General single alarm		
Alm79	SPS_D	General single alarm		
Alm80	SPS_D	General single alarm		
Alm81	SPS_D	General single alarm		
Alm82	SPS_D	General single alarm		
Alm83	SPS_D	General single alarm		
Alm84	SPS_D	General single alarm		
Alm85	SPS_D	General single alarm		
Alm86	SPS_D	General single alarm		
Alm87	SPS_D	General single alarm		
Alm88	SPS_D	General single alarm		
Alm89	SPS_D	General single alarm		
Alm90	SPS_D	General single alarm		
Alm91	SPS_D	General single alarm		



Attribute	Attr. Type	Explanation	T	X
Alm92	SPS_D	General single alarm		
Alm93	SPS_D	General single alarm		
Alm94	SPS_D	General single alarm		
Alm95	SPS_D	General single alarm		
Alm96	SPS_D	General single alarm		

2.4.2

**Logical Node: GGIO\_IND\_10**

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)		
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)		

2.4.3

**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)		

Attribute	Attr. Type	Explanation	T	X
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)		

## 2.4.4

**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)		
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)		

Attribute	Attr. Type	Explanation	T	X
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)		

2.4.5

**Logical Node: GGIO\_IND\_32\_CTRL**

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		
SPCSO1	SPC_CONTROL	Single point controllable status output		
SPCSO2	SPC_CONTROL	Single point controllable status output		
SPCSO3	SPC_CONTROL	Single point controllable status output		
SPCSO4	SPC_CONTROL	Single point controllable status output		
SPCSO5	SPC_CONTROL	Single point controllable status output		
SPCSO6	SPC_CONTROL	Single point controllable status output		
SPCSO7	SPC_CONTROL	Single point controllable status output		
SPCSO8	SPC_CONTROL	Single point controllable status output		
SPCSO9	SPC_CONTROL	Single point controllable status output		
SPCSO10	SPC_CONTROL	Single point controllable status output		
SPCSO11	SPC_CONTROL	Single point controllable status output		
SPCSO12	SPC_CONTROL	Single point controllable status output		
SPCSO13	SPC_CONTROL	Single point controllable status output		
SPCSO14	SPC_CONTROL	Single point controllable status output		
SPCSO15	SPC_CONTROL	Single point controllable status output		
SPCSO16	SPC_CONTROL	Single point controllable status output		
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		

Attribute	Attr. Type	Explanation	T	X
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		

## 2.4.6

**Logical Node: GGIO\_IND\_40**

Description: Generic Process I/O (w.r.t 40 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)		

Attribute	Attr. Type	Explanation	T	X
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)		

2.4.7

**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)		

Attribute	Attr. Type	Explanation	T	X
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)		
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)		

**2.4.8****Logical Node: LLN0\_PROT**

Description: Protection Domain 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		
DifMod	INC_MOD_D_PRIV	Differential Mode		X
DifBeh	INS_BEH_D_PRIV	Differential Behaviour		X
DznMod	INC_MOD_D_PRIV	Deadzone Overcurrent Mode		X
DznBeh	INS_BEH_D_PRIV	Deadzone Overcurrent Behaviour		X
OcpMod	INC_MOD_D_PRIV	Overcurrent Mode		X
OcpBeh	INS_BEH_D_PRIV	Overcurrent Behaviour		X
EfmMod	INC_MOD_D_PRIV	Earth Fault 1 (Measured) Mode		X
EfmBeh	INS_BEH_D_PRIV	Earth Fault 1 (Measured) Behaviour		X
CbfMod	INC_MOD_D_PRIV	CB Fail Mode		X
CbfBeh	INS_BEH_D_PRIV	Circuit Breaker Fail Behaviour		X
SvnBeh	INS_BEH_D_PRIV	System backup Behaviour		X
SvnMod	INC_MOD_D_PRIV	System Backup Mode		X

**2.4.9****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		

**2.4.10****Logical Node: LLN0\_SYSTEM**

Description: System Domain 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( IEC 61850 phase 2.0 and 2.1 )		X

Attribute	Attr. Type	Explanation	T	X
SyncSt	SPS_WD_NS	Time Synchronisation Indication(IEC 61850 phase 2.0 and 2.1)		X

## 2.4.11

**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		

## 2.4.12

**Logical Node: MDIF\_BBP**

Description: Differential measurements for buspar

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		
OpARem	WYE_SEG_D	Remote current measurement - base values		

## 2.4.13

**Logical Node: MDIF\_CZ**

Description: Differential measurements for checkzone

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		
OpARem	WYE_SEG_D	Remote current measurement - base values		

## 2.4.14

**Logical Node: MMXU\_A\_18**

Description: Standard measurements for P746 three-box mode

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		
A1	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 1		
A2	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 2		
A3	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 3		
A4	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 4		
A5	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 5		
A6	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 6		
A7	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 7		
A8	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 8		
A9	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 9		
A10	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 10		
A11	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 11		
A12	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 12		
A13	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 13		
A14	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 14		
A15	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 15		
A16	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 16		
A17	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 17		
A18	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 18		

**2.4.15****Logical Node: MMXU\_A\_6**

Description: Standard measurements for P746 one-box mode

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		
A1	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 1		
A2	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 2		
A3	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 3		
A4	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 4		
A5	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 5		
A6	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 6		

**2.4.16****Logical Node: MMXU\_DERIVED\_A\_6**

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		
A1	WYE_SEG_ANG	Phase currents, derived - T1		
A2	WYE_SEG_ANG	Phase currents, derived - T2		
A3	WYE_SEG_ANG	Phase currents, derived - T3		
A4	WYE_SEG_ANG	Phase currents, derived - T4		
A5	WYE_SEG_ANG	Phase currents, derived - T5		
A6	WYE_SEG_ANG	Phase currents, derived - T6		

## 2.4.17

**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		X
V1	MV_FLOAT_NS	V1 Magnitude		X
V2	MV_FLOAT_NS	V2 Magnitude		X
VNd	WYE_RES_ANG_D_NS	VNd		X

## 2.4.18

**Logical Node: MMXU\_RMS**

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		
PhV	WYE_SEG	Phase to Ground voltages		

## 2.4.19

**Logical Node: MSQI\_SEQ\_6**

Description: Sequence and imbalance

LN Class: MSQI

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
SeqA1	SEQ_MAG	Positive, Negative and Zero sequence current for T1		
SeqA2	SEQ_MAG	Positive, Negative and Zero sequence current for T2		
SeqA3	SEQ_MAG	Positive, Negative and Zero sequence current for T3		
SeqA4	SEQ_MAG	Positive, Negative and Zero sequence current for T4		
SeqA5	SEQ_MAG	Positive, Negative and Zero sequence current for T5		
SeqA6	SEQ_MAG	Positive, Negative and Zero sequence current for T6		

2.4.20

**Logical Node: PDIF\_NEU**

Description: Differential (w.r.t Neutral)

LN Class: PDIF

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

2.4.21

**Logical Node: PTOC\_NEU**

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

LN Class: PTOC

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

2.4.22

**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_NO_SEG	Trip		
Str	ACD_NO_SEG	Sum of all starts of all connected Logical Nodes		

## 2.4.23

**Logical Node: RBRF\_STANDARD**

Description: Breaker Failure

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

## 2.4.24

**Logical Node: RDRE\_BASIC**

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

LN Class: RDRE

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

## 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

FC Name	Semantic	Source Definition
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\_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	

2.5.2

**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	

## 2.5.3

**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	

## 2.5.4

**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	

**2.5.5 Common Data Class: DEL\_SEG\_ANG**

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

CDC Class: DEL

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

**2.5.6 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	

**2.5.7 Common Data Class: INC\_MOD**

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

CDC Class: INC

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

**2.5.8 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	

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32 (MMS Type: INT8)	ST	Mod	Status value of the data	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	
d	VISIBLE_STRING255	DC		Description of the status element	
cdcNs	VISIBLE_STRING255	EX		Common data class name space	
cdcName	VISIBLE_STRING255	EX		Common data class name	
dataNs	VISIBLE_STRING255	EX		Data name space	
Bypass	ENUMERATED8 (MMS Type: INT16U)	CO	Bypass	Bypass	

**2.5.9****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	

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

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

CDC Class: INS

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

**2.5.11****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	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	
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

**2.5.12 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	

**2.5.13 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	

**2.5.14 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	

## 2.5.15

**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	

## 2.5.16

**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	

Attribute	Type	FC	Enumeration	Comment	X
rangeC	RangeConfig_Deadband	CF		Measurement range configuration attributes	
dataNs	VISIBLE_STRING255	EX		Data name space	

2.5.17

**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)	

2.5.18

**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	
cdcName	VISIBLE_STRING255	EX		Common data class name	

Attribute	Type	FC	Enumeration	Comment	X
Bypass	ENUMERATED8 (MMS Type: INT16U)	CO	Bypass	Bypass	

### 2.5.19 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	

### 2.5.20 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	

### 2.5.21 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	

### 2.5.22 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	

2.5.23

**Common Data Class: WYE\_SEG**

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

CDC Class: WYE

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

2.5.24

**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	

2.5.25

**Common Data Class: WYE\_SEG\_ANONYMOUS**

Description: Phase to ground measurements for anonymous phase of a 3-Phase system

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
neut	CMV_MAG_ANG_FLOAT	--		Measurement values for neutral input	

2.5.26

**Common Data Class: WYE\_SEG\_D**

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

CDC Class: WYE

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

## 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

Parent Type:

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

### 2.6.3 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	

Attribute	Type	Enumeration	Comment	X
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	ENUMERATED16 (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	
ang	AnalogueValue_Float		The angle of the complex value (the unit is degrees)	

**2.6.7 Component: INC\_MOD\_D\_PRIV\_SelectWithValue**

Comment: Control object

Parent Type:

Attribute	Type	Enumeration	Comment	X
ctlVal	INT32		Control element	
origin	Struct		Control element	
ctlNum	INT8U		Control element	

Attribute	Type	Enumeration	Comment	X
T	Timestamp		Control element	
Test	BOOLEAN		Control element	
Check	Check		Control element	

### 2.6.8 Component: INC\_MOD\_D\_PRIV\_Operate

Comment: Control object

Parent Type:

Attribute	Type	Enumeration	Comment	X
ctlVal	INT32		Control element	
origin	Struct		Control element	
ctlNum	INT8U		Control element	
T	Timestamp		Control element	
Test	BOOLEAN		Control element	
Check	Check		Control element	

### 2.6.9 Component: INC\_MOD\_D\_PRIV\_Cancel

Comment: Control object

Parent Type:

Attribute	Type	Enumeration	Comment	X
ctlVal	INT32		Control element	
origin	Struct		Control element	
ctlNum	INT8U		Control element	
T	Timestamp		Control element	
Test	BOOLEAN		Control element	

### 2.6.10 Component: SPC\_CONTROL\_SelectWithValue

Comment: Control object

Parent Type:

Attribute	Type	Enumeration	Comment	X
ctlVal	BOOLEAN		Control element	
origin	Struct		Control element	
ctlNum	INT8U		Control element	
T	Timestamp		Control element	
Test	BOOLEAN		Control element	
Check	Check		Control element	

### 2.6.11 Component: SPC\_CONTROL\_Operate

Comment: Control object



Parent Type:

Attribute	Type	Enumeration	Comment	X
ctlVal	BOOLEAN		Control element	
origin	Struct		Control element	
ctlNum	INT8U		Control element	
T	Timestamp		Control element	
Test	BOOLEAN		Control element	
Check	Check		Control element	

2.6.12

**Component: SPC\_CONTROL\_Cancel**

Comment: Control object

Parent Type:

Attribute	Type	Enumeration	Comment	X
ctlVal	BOOLEAN		Control element	
origin	Struct		Control element	
ctlNum	INT8U		Control element	
T	Timestamp		Control element	
Test	BOOLEAN		Control element	

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

2.7.1

**Enumerated type: AddCause**

Description: AddCause

Ordinal	Semantic
0	Unknown
1	Not-supported
2	Blocked-by-switching-hierarchy
3	Select-failed
4	Invalid-position
5	Position-reached
6	Parameter-change-in-execution
7	Step-limit
8	Blocked-by-Mode
9	Blocked-by-process
10	Blocked-by-interlocking
11	Blocked-by-synchrocheck
12	Command-already-in-execution
13	Blocked-by-health
14	1-of-n-control

Ordinal	Semantic
15	Abortion-by-cancel
16	Time-limit-over
17	Abortion-by-trip
18	Object-not-selected

**2.7.2****Enumerated type: Beh**

Description: Behaviour

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

**2.7.3****Enumerated type: Bypass**

Description: Bypass

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

**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: dir**

Description: Direction

Ordinal	Semantic
0	unknown
1	forward

Ordinal	Semantic
2	backward
3	both

### 2.7.6 Enumerated type: Health

Description: Health

Ordinal	Semantic
1	Ok
2	Warning
3	Alarm

### 2.7.7 Enumerated type: Mod

Description: Mode

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

### 2.7.8 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	$\mu$
-3	m
-2	c
-1	d
0	
1	da
2	h
3	k
6	M
9	G
12	T
15	P

Ordinal	Semantic
18	E
21	Z
24	Y

**2.7.9****Enumerated type: orCategory**

Description: orCategory

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

**2.7.10****Enumerated type: seqT**

Description: Sequence Measurement Type

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

**2.7.11****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

Ordinal	Semantic
-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 <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

Ordinal	Semantic
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

## 2.7.12

**Enumerated type: Error**

Description: Error

Ordinal	Semantic
0	No Error
1	Unknown
2	Timeout Test Not OK
3	Operator Test Not OK

## 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
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

Part 7 Type	MMS Type	Part 7 Description
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	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

# *Notes:*







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