

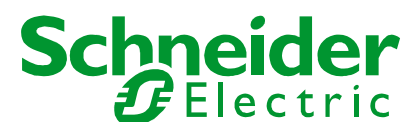
# MiCOM P438

## Rail Catenary Protection Devices

### PICS and MICS

This document does not replace the Technical Manual

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## 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

**Table 1 – Basic conformance statement**

		Client / Subscriber		Server / Publisher		Value / Comments
Client-Server roles						
B11	Server side (of TWO-PARTY-APPLICATION-ASSOCIATION)	—	—	c1	Y	
B12	Client side (of TWO-PARTY-APPLICATION-ASSOCIATION)	c1	N	—	—	
SCSMs supported						
B21	SCSM: IEC 61850-8-1 used		N		Y	
B22	SCSM: IEC 61850-9-1 used					
B23	SCSM: IEC 61850-9-2 used					
B24	SCSM: other					
Generic substation event model (GSE)						
B31	Publisher side	—	—	O	Y	
B32	Subscriber side	O	Y	—	—	
Transmission of sampled value model (SVC)						
B41	Publisher side	—	—	O	N	
B42	Subscriber side	O	N	—	—	

c1 – shall be 'M' if support for LOGICAL-DEVICE model has been declared.

O – Optional

M – Mandatory

Y – Yes (supported)

N – No (not supported)

## ACSI Models Conformance Statement

## 1.3 ACSI Models Conformance Statement

The ACSI models conformance statement shall be as defined in Table 2.

Table 2 – ACSI models conformance statement

		Client / Subscriber		Server / Publisher		Value / Comments
If Server side (B1) supported						
M1	Logical device	a	N	c2	Y	
M2	Logical node	c3	N	c3	Y	
M3	Data	c4	N	c4	Y	
M4	Data set	c5	N	c5	Y	
M5	Substitution	O	N	O	N	
M6	Setting group control	O	N	O	y	supp.Phase 2
Reporting						
M7	Buffered report control	O	N	O	y	supp.Phase 2
M7-1	sequence-number				y	supp.Phase 2
M7-2	report-time-stamp				y	supp.Phase 2
M7-3	reason-for-inclusion				y	supp.Phase 2
M7-4	data-set-name				y	supp.Phase 2
M7-5	data-reference				y	supp.Phase 2
M7-6	buffer-overflow				y	supp.Phase 2
M7-7	entryID				y	supp.Phase 2
M7-8	BufTim				y	supp.Phase 2
M7-9	IntgPd				y	supp.Phase 2
M7-10	GI				y	supp.Phase 2
M7-11	conf-revision				Y	supp.Phase 2
M8	Unbuffered report control	O	N	O	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	supp.Phase 2
Logging		O	N	O	N	
M9	Log control	O	N	O	N	
M9-1	IntgPd		N		N	
M10	Log	O	N	O	N	
M11	Control	M	N	M	Y	

		Client / Subscriber		Server / Publisher		Value / Comments
If GSE (B31/32) is supported						
	GOOSE	O	Y	O	Y	
M12-1	entryID		Y	O	Y	
M12-2	DataRefInc		Y	O	Y	
M13	GSSE	O	Y	O	Y	
If SVC (41/42) is supported						
M14	Multicast SVC	O	N	O	N	
M15	Unicast SVC	O	N	O	N	
M16	Time	M	Y	M	N	Time source with required accuracy shall be available
M17	File Transfer	O	N	O	Y	

c2 – shall be 'M' if support for LOGICAL-NODE model has been declared

c3 – shall be 'M' if support for DATA model has been declared

c4 – shall be 'M' if support for DATA-SET, Substitution, Report, Log Control, or Time model has been declared

c5 – shall be 'M' if support for Report, GSE, or SMV models has been declared

## 1.4 ACSI Service Conformance Statement

The ACSI service conformance statement shall be as defined in Table 3 – ACSI service Conformance statement (depending on the statements in Table 1 ).

**Table 3 – ACSI service Conformance statement**

	Services	AA: TP/MC	Client/ Subscriber		Server/ Publisher		Comments
<b>Server (clause 6)</b>							
S1	ServerDirectory	TP		N	M	Y	
<b>Application association (clause 7)</b>							
S2	Associate		M	N	M	Y	
S3	Abort		M	N	M	Y	
S4	Release		M	N	M	Y	
<b>Logical device (clause 8)</b>							
S5	LogicalDeviceDirectory	TP	M	N	M	Y	

## ACSI Service Conformance Statement

	Services	AA: TP/MC	Client/ Subscriber		Server/ Publisher		Comments
<b>Logical node (clause 9)</b>							
S6	LogicalNodeDirectory	TP	M	N	M	Y	
S7	GetAllDataValues	TP	O	N	M	Y	
<b>Data (clause 10)</b>							
S8	GetDataValues	TP	M	N	M	Y	
S9	SetDataValues	TP	O	N	O	Y	
S10	GetDataDirectory	TP	O	N	M	Y	
S11	GetDataDefinition	TP	O	N	M	Y	
<b>Data set (clause 11)</b>							
S12	GetDataSetValues	TP	O	N	M	Y	
S13	SetDataSetValues	TP	O	N	O	N	
S14	CreateDataSet	TP	O	N	O	N	
S15	DeleteDataSet	TP	O	N	O	N	
S16	GetDataSetDirectory	TP	O	N	O	Y	
<b>Substitution (clause 12)</b>							
S17	SetDataValues	TP	M	N	M	Y	
<b>Setting group control (clause 13)</b>							
S18	SelectActiveSG	TP	O	N	O	Y	supp.by Phase 2
S19	SelectEditSG	TP	O	N	O	N	
S20	SetSGValues	TP	O	N	O	N	
S21	ConfirmEditSGValues	TP	O	N	O	N	
S22	GetSGValues	TP	O	N	O	N	
S23	GetSGCBValues	TP	O	N	O	N	
<b>Reporting (clause 14)</b>							
<b>Buffered report control block (BRCB)</b>							
S24	Report	TP	c6	N	c6	Y	supp.by Phase 2
S24-1	data-change (dchg)					Y	supp.by Phase 2
S24-2	qchg-change (qchg)					Y	supp.by Phase 2
S24-3	data-update (dupd)					N	
S25	GetBRCBValues	TP	c6	N	c6	Y	supp.by Phase 2
S26	SetBRCBValues	TP	c6	N	c6	Y	supp.by Phase 2

	Services	AA: TP/MC	Client/ Subscriber		Server/ Publisher		Comments
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**Unbuffered report control block (URCB)**

S27	Report	TP	c6	N	c6	Y	
S27-1	data-change (dchg)			N		Y	
S27-2	qchg-change (qchg)			N		Y	
S27-3	data-update (dup)			N		N	
S28	GetURCBValues	TP	c6	N	c6	Y	
S29	SetURCBValues	TP	c6	N	c6	Y	supp.by Phase 2

c6 – shall declare support for at least one (BRCB or URCB)

**Logging (clause 14)****Log control block**

S30	GetLCBValues	TP	M	N	M	N	
S31	SetLCBValues	TP	O	N	M	N	

**Log**

S32	QueryLogByTime	TP	c7	N	M	N	
S33	QueryLogAfter	TP	c7	N	M	N	
S34	GetLogStatusValues	TP	M	N	M	N	

c7 – shall declare support for at least one (QueryLogByTime or QueryLogByEntry)

**Generic substation event model (GSE) (clause 15)****GOOSE-CONTROL-BLOCK**

S35	SendGOOSEMessage	MC	c8	N	c8	Y	
S36	GetGoReference	TP	O	N	c9	Y	
S37	GetGOOSEElementNumber	TP	O	N	c9	Y	
S38	GetGoCBValues	TP	O	N	O	Y	
S39	SetGoCBValues	TP	O	N	O	Y	

**GSSE-CONTROL-BLOCK**

S40	SendGSSEMessage	MC	c8	N	c8	N	
S41	GetGsReference	TP	O	N	c9	N	
S42	GetGSSEElementNumber	TP	O	N	c9	N	
S43	GetGsCBValues	TP	O	N	O	N	
S44	SetGsCBValues	TP	O	N	O	N	

c8 – shall declare support for at least one (SendGOOSEMessage or SendGSSEMessage)

c9 – shall declare support if TP association is available



ACSI Service Conformance Statement

Services	AA: TP/MC	Client/ Subscriber	Server/ Publisher	Comments
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**Transmission of sampled value model (SVC) (clause 16)**

**Multicast SVC**

S45	SendMSVMessage	MC	c10	N	c10	N	
S46	GetMSVCBValues	TP	O	N	O	N	
S47	SetMSVCBValues	TP	O	N	O	N	

**Unicast SVC**

S48	SendUSVMessage	TP	c10	N	c10	N	
S49	GetUSVCBValues	TP	O	N	O	N	
S50	SetUSVCBValues	TP	O	N	O	N	

c10 – shall declare support for at least one (SendMSVMessage or SendUSVMessage)

**Control (clause 17.5.1)**

S51	Select		M	N	O	Y	
S52	SelectWithValue	TP	M	N	O	Y	
S53	Cancel	TP	O	N	O	Y	
S54	Operate	TP	M	N	M	Y	
S55	Command-Termination	TP	M	N	O	Y	
S56	TimeActivated-Operate	TP	O	N	O	N	

**File transfer (clause 20)**

S57	GetFile	TP	O	N	M	Y	
S58	SetFile	TP	O	N	O	N	
S59	DeleteFile	TP	O	N	O	N	
S60	GetFileAttributeValues	TP	O	N	M	Y	

**Time (5.5)**

T1	Time resolution of internal clock		1ms	1ms	Nearest negative power of 2 in seconds
T2	Time accuracy of internal clock			1ms	T0
				N	T1
				N	T2
				N	T3
				N	T4
				N	T5
T3	Supported TimeStamp resolution	-		1ms	Nearest value of 2 <sup>**</sup> -n in seconds according to 5.5.3.7.3.3

## 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 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 LLN0 Logical Node (for addressing common issues across the Logical Device).

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

Logical Device	Comment / Usage
Control	PX438 Controls Domain
Measurements	PX438 Measurements Domain
Protection	PX438 Protection Domain
Records	PX438 Records Domain
System	PX438 System Domain

## Logical Device Definitions

### 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
Control	LLN0	tp30_LLNO_1	Logical node device
	LPHD1	tp30_LPHD_1	Physical device
	RREC1	tp30_RREC_1	Automatic reclosing
Measurements	LLN0	tp30_LLNO_1	Logical node device
	LPHD1	tp30_LPHD_1	Physical device
	MmuNorMMXN1	tp30_MMXN_1	Basic Measurements
	MmuPriMMXN1	tp30_MMXN_2	Primary Basic Measurements
	MmuPriMMXN2	tp30_MMXN_3	Primary Basic Measurements
	MmuPriMMXN3	tp30_MMXN_4	Primary Basic Measurements
	MmuSecMMXN1	tp30_MMXN_5	Basic Measurements
	MmuSecMMXN2	tp30_MMXN_4	Basic Measurements
	MmuSecMMXN3	tp30_MMXN_4	Basic Measurements
Protection	BocPhsPTOC1	tp30_PTOC_1	Phase Backup Protection
	BocPhsPTOC2	tp30_PTOC_1	Phase Backup Protection
	DisPDIS1	tp30_PDIS_1	Distance Protection
	DisPDIS10	tp30_PDIS_1	Distance Protection
	DisPDIS11	tp30_PDIS_1	Distance Protection
	DisPDIS12	tp30_PDIS_1	Distance Protection
	DisPDIS13	tp30_PDIS_1	Distance Protection
	DisPDIS14	tp30_PDIS_1	Distance Protection
	DisPDIS15	tp30_PDIS_1	Distance Protection
	DisPDIS16	tp30_PDIS_1	Distance Protection
	DisPDIS17	tp30_PDIS_1	Distance Protection
	DisPDIS2	tp30_PDIS_1	Distance Protection
	DisPDIS3	tp30_PDIS_1	Distance Protection
	DisPDIS4	tp30_PDIS_1	Distance Protection
	DisPDIS5	tp30_PDIS_1	Distance Protection
	DisPDIS6	tp30_PDIS_1	Distance Protection
	DisPDIS7	tp30_PDIS_1	Distance Protection
	DisPDIS8	tp30_PDIS_1	Distance Protection

LD	LN Instance	LN Type	Description
	DisPDIS9	tp30_PDIS_1	Distance Protection
	DtpPhAPTOC1	tp30_PTOC_1	Time over current
	DtpPhAPTOC2	tp30_PTOC_1	Time over current
	DtpPhBPTOC1	tp30_PTOC_1	Time over current
	DtpPhBPTOC2	tp30_PTOC_1	Time over current
	DtpPhsPTOC1	tp30_PTOC_1	Time over current
	DtpPhsPTOC2	tp30_PTOC_1	Time over current
	DtpPhsPTOC3	tp30_PTOC_1	Time over current
	DtpPhsRDIR1	tp30_RDIR_1	Direction
	DtpPhsRDIR2	tp30_RDIR_1	Direction
	ItpPhAPTOC1	tp30_PTOC_1	Time over current
	ItpPhBPTOC1	tp30_PTOC_1	Time over current
	ItpPhsPTOC1	tp30_PTOC_1	Time over current
	ItpPhsRDIR1	tp30_RDIR_1	Time over current
	LLN0	tp30_LLNO_2	Logical node device
	LPHD1	tp30_LPHD_1	Physical device
	PTRC1	tp30_PTRC_1	Trip conditioning
	PTRC2	tp30_PTRC_1	Trip conditioning
	PTRC3	tp30_PTRC_1	Trip conditioning
	RBRF1	tp30_RBRF_1	Breaker failure
	RBRF2	tp30_RBRF_2	Breaker failure
	RFLO1	tp30_RFLO_1	Fault locator
	RFLO2	tp30_RFLO_1	Fault locator
	RFLO3	tp30_RFLO_1	Fault locator
	SofPhsPSOF1	tp30_PSOF_1	Switch on to Fault
	ThmPTTR1	tp30_PTTR_1	Thermal overload
	ThmPTTR2	tp30_PTTR_1	Thermal overload
	ThmPTTR3	tp30_PTTR_1	Thermal overload
	VtpPhsPTOV1	tp30_PTOV_1	Time over voltage
	VtpPhsPTOV2	tp30_PTOV_1	Time over voltage
	VtpPhsPTUV1	tp30_PTUV_1	Time under voltage
	VtpPhsPTUV2	tp30_PTUV_1	Time under voltage
Records			
	LLN0	tp30_LLNO_1	Logical node device
	LPHD1	tp30_LPHD_1	Physical device
	RDRE1	tp30_RDRE_1	Disturbance recording
System			
	AlmGGIO1	tp30_GGIO_1	Generic process I/O
	GosGGIO1	tp30_GGIO_2	Generic process I/O
	GosGGIO2	tp30_GGIO_3	Generic process I/O
	IdcGGIO1	tp30_GGIO_4	Generic process I/O
	LLN0	tp30_LLNO_3	Logical node device

## Logical Node Definitions

LD	LN Instance	LN Type	Description
	LPHD1	tp30_LPHD_1	Physical device
	PloGGIO1	tp30_GGIO_5	Generic process I/O
	PloGGIO2	tp30_GGIO_6	Generic process I/O
	PloGGIO3	tp30_GGIO_6	Generic process I/O
	PloGGIO4	tp30_GGIO_5	Generic process I/O
	RtdGGIO1	tp30_GGIO_4	Generic process I/O
	ZAXN1	tp30_ZAXN_1	Auxiliary network

## 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
tp30_GGIO_1	(GGIO)	Generic process I/O	
tp30_GGIO_2	(GGIO)	Generic process I/O	
tp30_GGIO_3	(GGIO)	Generic process I/O	
tp30_GGIO_4	(GGIO)	Generic process I/O	
tp30_GGIO_5	(GGIO)	Generic process I/O	
tp30_GGIO_6	(GGIO)	Generic process I/O	
tp30_LLNO_1	(LLNO)	Logical node device	
tp30_LLNO_2	(LLNO)	Logical node device	
tp30_LLNO_3	(LLNO)	Logical node device	
tp30_LPHD_1	(LPHD)	Physical device	
tp30_MMXN_1	(MMXN)	Basic Measurements	
tp30_MMXN_2	(MMXN)	Primary Basic Measurements	
tp30_MMXN_3	(MMXN)	Primary Basic Measurements	
tp30_MMXN_4	(MMXN)	Primary Basic Measurements	
tp30_MMXN_5	(MMXN)	Basic Measurements	
tp30_PDIS_1	(PDIS)	Distance Protection	
tp30_PSOFF_1	(PSOF)	Switch on to Fault	
tp30_PTOC_1	(PTOC)	Time over current	
tp30_PTOV_1	(PTOV)	Time over voltage	
tp30_PTRC_1	(PTRC)	Trip conditioning	
tp30_PTTR_1	(PTTR)	Thermal overload	
tp30_PTUV_1	(PTUV)	Time under voltage	
tp30_RBRF_1	(RBRF)	Breaker failure	
tp30_RBRF_2	(RBRF)	Breaker failure	
tp30_RDIR_1	(RDIR)	Direction	

LN Type	(LN Class)	Description	Name Space
tp30_RDRE_1	(RDRE)	Disturbance recording	
tp30_RFLO_1	(RFLO)	Fault locator	
tp30_RREC_1	(RREC)	Automatic reclosing	
tp30_ZAXN_1	(ZAXN)	Auxiliary network	

### 2.4.1 LOGICAL NODE : tp30\_GGIO\_1

**Description** : Generic process I/O

**LN Class** : GGIO

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_1	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
Alm1	tp30_Alm10_1	Alarm	
Alm2	tp30_Alm10_1	Alarm	
Alm3	tp30_Alm10_1	Alarm	
Alm5	tp30_Alm10_1	Alarm	
Alm7	tp30_Alm10_1	Alarm	
Alm10	tp30_Alm10_1	Alarm	
Alm11	tp30_Alm10_1	Alarm	
Alm12	tp30_Alm10_1	Alarm	
Alm13	tp30_Alm10_1	Alarm	
Alm14	tp30_Alm10_1	Alarm	
urcbST	tp30_URCB	Unb. rep. control for status	

### 2.4.2 LOGICAL NODE : tp30\_GGIO\_2

**Description** : Generic process I/O

**LN Class** : GGIO

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_1	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
Ind1	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind2	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind3	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind4	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind5	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind6	tp30_Alm10_1	Gen. ind. (bin. input)	

## Logical Node Definitions

Attribute	Attr. Type	Explanation	X
Ind7	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind8	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind9	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind10	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind11	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind12	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind13	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind14	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind15	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind16	tp30_Alm10_1	Gen. ind. (bin. input)	

## 2.4.3 LOGICAL NODE : tp30\_GGIO\_3

**Description** : Generic process I/O

**LN Class** : GGIO

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_1	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
Ind1	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind2	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind3	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind4	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind5	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind6	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind7	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind8	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind9	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind10	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind11	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind12	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind13	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind14	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind15	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind16	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind17	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind18	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind19	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind20	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind21	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind22	tp30_Alm10_1	Gen. ind. (bin. input)	

Attribute	Attr. Type	Explanation	X
Ind23	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind24	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind25	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind26	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind27	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind28	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind29	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind30	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind31	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind32	tp30_Alm10_1	Gen. ind. (bin. input)	

#### 2.4.4 LOGICAL NODE : tp30\_GGIO\_4

**Description :** Generic process I/O

**LN Class :** GGIO

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_1	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_2	Name Plate	
urcbST	tp30_URCB	Unb. rep. control for status	
urcbMX	tp30_URCB	Unb. rep. control for measurement	
AnIn1	tp30_Amp_1	Analogue input	
AnIn2	tp30_Amp_1	Analogue input	

#### 2.4.5 LOGICAL NODE : tp30\_GGIO\_5

**Description :** Generic process I/O

**LN Class :** GGIO

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_1	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_2	Name Plate	
Ind1	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind2	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind3	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind4	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind5	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind6	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind7	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind8	tp30_Alm10_1	Gen. ind. (bin. input)	



## Logical Node Definitions

Attribute	Attr. Type	Explanation	X
Ind9	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind10	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind11	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind12	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind13	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind14	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind15	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind16	tp30_Alm10_1	Gen. ind. (bin. input)	
urcbST	tp30_URCB	Unb. rep. control for status	

## 2.4.6 LOGICAL NODE : tp30\_GGIO\_6

**Description** : Generic process I/O

**LN Class** : GGIO

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_1	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_2	Name Plate	
Ind1	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind2	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind3	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind4	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind5	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind6	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind7	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind8	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind9	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind10	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind11	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind12	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind13	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind14	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind15	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind16	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind17	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind18	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind19	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind20	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind21	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind22	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind23	tp30_Alm10_1	Gen. ind. (bin. input)	

Attribute	Attr. Type	Explanation	X
Ind24	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind25	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind26	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind27	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind28	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind29	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind30	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind31	tp30_Alm10_1	Gen. ind. (bin. input)	
Ind32	tp30_Alm10_1	Gen. ind. (bin. input)	
urcbST	tp30_URCB	Unb. rep. control for status	

### 2.4.7 LOGICAL NODE : tp30\_LLNO\_1

**Description :** Logical node device

**LN Class :** LLNO

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_1	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_2	Name Plate	
urcbST	tp30_URCB	Unb. rep. control for status	

### 2.4.8 LOGICAL NODE : tp30\_LLNO\_2

**Description :** Logical node device

**LN Class :** LLNO

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_2	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_2	Name Plate	
urcbST	tp30_URCB	Unb. rep. control for status	

## Logical Node Definitions

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### 2.4.9 LOGICAL NODE : tp30\_LLNO\_3

**Description** : Logical node device

**LN Class** : LLNO

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_1	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_2	Name Plate	
LEDRs	tp30_LEDRs_1	Led Reset	
urcbST	tp30_URCB	Unb. rep. control for status	
CurSG	tp30_CurSG_1	Current Setting Group	
SGCB	tp30_SGCB_1	Setting group control block	

### 2.4.10 LOGICAL NODE : tp30\_LPHD\_1

**Description** : Physical device

**LN Class** : LPHD

Attribute	Attr. Type	Explanation	X
PhyNam	tp30_PhyNam_1	Physical device name plate	
PhyHealth	tp30_PhyHealth_1	Physical device health	
Proxy	tp30_Proxy_1	Indicates if the LN is a proxy	
urcbST	tp30_URCB	Unb. rep. control for status	

### 2.4.11 LOGICAL NODE : tp30\_MMXN\_1

**Description** : Basic Measurements

**LN Class** : MMXN

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_1	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
Imp	tp30_Imp_1	Impedance	
urcbMX	tp30_URCB	Unb. rep. control for measurement	

### 2.4.12 LOGICAL NODE : tp30\_MMXN\_2

**Description** : Primary Basic Measurements

**LN Class** : MMXN

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_1	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
Amp	tp30_Amp_1	Current	
Vol	tp30_Amp_1	Voltage	
Watt	tp30_Amp_1	Active Power	
VolAmpr	tp30_Amp_1	Reactive power	
PwrFact	tp30_Amp_1	Active power factor	
Imp	tp30_Imp_1	Impedance	
Hz	tp30_Amp_1	Frequency	
LodAng	tp30_LodAng_1	angle	
urcbMX	tp30_URCB	Unb. rep. control for measurement	

### 2.4.13 LOGICAL NODE : tp30\_MMXN\_3

**Description** : Primary Basic Measurements

**LN Class** : MMXN

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_1	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
Amp	tp30_Amp_1	Current	
Vol	tp30_Amp_1	Voltage	
urcbMX	tp30_URCB	Unb. rep. control for measurement	

### 2.4.14 LOGICAL NODE : tp30\_MMXN\_4

**Description** : Primary Basic Measurements

**LN Class** : MMXN

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_1	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
Amp	tp30_Amp_1	Current	
Vol	tp30_Amp_1	Voltage	
urcbMX	tp30_URCB	Unb. rep. control for measurement	

## Logical Node Definitions

## 2.4.15 LOGICAL NODE : tp30\_MMXN\_5

**Description** : Basic Measurements**LN Class** : MMXN

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_1	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
Amp	tp30_Amp_1	Current	
Vol	tp30_Amp_1	Voltage	
Watt	tp30_Amp_1	Active Power	
VolAmpr	tp30_Amp_1	Reactive power	
Imp	tp30_Imp_1	Impedance	
Hz	tp30_Amp_1	Frequency	
LodAng	tp30_LodAng_1	angle	
urcbMX	tp30_URCB	Unb. rep. control for measurement	

## 2.4.16 LOGICAL NODE : tp30\_PDIS\_1

**Description** : Distance Protection**LN Class** : PDIS

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_2	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
Str	tp30_Dir_1	Start	
Op	tp30_AlmThm_1	Operate	
Blk	tp30_BlkJThm_1	Block	
urcbST	tp30_URCB	Unb. rep. control for status	

### 2.4.17 LOGICAL NODE : tp30\_PSOE\_1

**Description** : Switch on to Fault

**LN Class** : PSOF

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_2	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_3	Name Plate	
Str	tp30_Dir_1	Start	
Op	tp30_AlmThm_1	Operate	
Blk	tp30_BlkmThm_1	Block	
ParArcExt	tp30_ParArcExt_1	Parameter external autoreclose start	
urcbST	tp30_URCB	Unb. rep. control for status	

### 2.4.18 LOGICAL NODE : tp30\_PTOC\_1

**Description** : Time over current

**LN Class** : PTOC

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_2	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
Str	tp30_Dir_1	Start	
Op	tp30_AlmThm_1	Operate	
Blk	tp30_BlkmThm_1	Block	
urcbST	tp30_URCB	Unb. rep. control for status	

### 2.4.19 LOGICAL NODE : tp30\_PTOV\_1

**Description** : Time over voltage

**LN Class** : PTOV

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_2	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
Str	tp30_Dir_1	Start	
Op	tp30_AlmThm_1	Operate	
Blk	tp30_BlkmThm_1	Block	
urcbST	tp30_URCB	Unb. rep. control for status	

## Logical Node Definitions

## 2.4.20 LOGICAL NODE : tp30\_PTRC\_1

**Description** : Trip conditioning**LN Class** : PTRC

Attribute	Attr. Type	Explanation	X
TrBlk	tp30_ParArcExt_1	Trip blocked	
Mod	tp30_Mod_1	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
Str	tp30_Dir_1	Start	
Tr	tp30_AlmThm_1	Trip	
urcbST	tp30_URCB	Unb. rep. control for status	

## 2.4.21 LOGICAL NODE : tp30\_PTTR\_1

**Description** : Thermal overload**LN Class** : PTTR

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_2	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
Str	tp30_Dir_1	Start	
Op	tp30_AlmThm_1	Operate	
Blk	tp30_BlkThm_1	Block	
BlkThm	tp30_BlkThm_1	Block Thermal	
AlmThm	tp30_AlmThm_1	Thermal alarm	
urcbST	tp30_URCB	Unb. rep. control for status	

## 2.4.22 LOGICAL NODE : tp30\_PTUV\_1

**Description** : Time under voltage**LN Class** : PTUV

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_2	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
Str	tp30_Dir_1	Start	
Op	tp30_AlmThm_1	Operate	
Blk	tp30_BlkThm_1	Block	
urcbST	tp30_URCB	Unb. rep. control for status	

### 2.4.23 LOGICAL NODE : tp30\_RBRF\_1

**Description** : Breaker failure

**LN Class** : RBRF

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_2	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
Str	tp30_Dir_1	Start	
OpEx	tp30_AlmThm_1	Breaker failure trip	
OpIn	tp30_AlmThm_1	Operate retrip	
urcbST	tp30_URCB	Unb. rep. control for status	

### 2.4.24 LOGICAL NODE : tp30\_RBRF\_2

**Description** : Breaker failure

**LN Class** : RBRF

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_2	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
Str	tp30_Dir_1	Start	
OpEx	tp30_AlmThm_1	Breaker failure trip	
urcbST	tp30_URCB	Unb. rep. control for status	

### 2.4.25 LOGICAL NODE : tp30\_RDIR\_1

**Description** : Direction

**LN Class** : RDIR

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_2	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
Dir	tp30_Dir_1	Direction	
urcbST	tp30_URCB	Unb. rep. control for status	



## Logical Node Definitions

## 2.4.26 LOGICAL NODE : tp30\_RDRE\_1

**Description** : Disturbance recording**LN Class** : RDRE

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_1	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
RcdMade	tp30_Alm10_1	Disturbance recording complete	
FltNum	tp30_FltNum_1	Fault number	
GriFltNum	tp30_FltNum_1	Grid fault number	
RcdStr	tp30_Alm10_1	Disturbance recording process started	
urcbST	tp30_URCB	Unb. rep. control for status	

## 2.4.27 LOGICAL NODE : tp30\_RFLO\_1

**Description** : Fault locator**LN Class** : RFLO

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_1	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
FltZ	tp30_FltZ_1	Fault Impedance	
FltDiskm	tp30_Amp_1	Fault Distance in km	
urcbMX	tp30_URCB	Unb. rep. control for measurement	
urcbST	tp30_URCB	Unb. rep. control for status	

## 2.4.28 LOGICAL NODE : tp30\_RREC\_1

**Description** : Automatic reclosing**LN Class** : RREC

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_2	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_1	Name Plate	
Op	tp30_AlmThm_1	Operate	
AutoRecSt	tp30_AutoRecSt_1	Auto reclosing status	
Rechsr	tp30_ParArcExt_1	Recloser high speed	
RecTdr	tp30_ParArcExt_1	Recloser delayed	
urcbST	tp30_URCB	Unb. rep. control for status	

### 2.4.29 LOGICAL NODE : tp30\_ZAXN\_1

**Description** : Auxiliary network

**LN Class** : ZAXN

Attribute	Attr. Type	Explanation	X
Mod	tp30_Mod_1	Mode	
Beh	tp30_Beh_1	Behaviour	
Health	tp30_Health_1	Health	
NamPlt	tp30_NamPlt_2	Name Plate	
EEHealth	tp30_EEHealth_1	External equipment health	
urcbST	tp30_URCB	Unb. rep. control for status	

## 2.5 Extended Logical Nodes

### 2.5.1 LN: Switch-onto-Fault Protection Name: PSOF

Closing of a circuit breaker might inadvertently lead to a short-circuit fault due to a feeder grounding connection not yet removed, for example. The manual close command is monitored for a settable period of time. During this period, an undelayed trip command may be issued automatically on initialization of the general starting (depending on the chosen operating mode).

PSOF				
Attribute Name	Attr. Type	Explanation	T	M/O
LNName		Shall be inherited from Logical-Node Class (see IEC 61850-7-2)		
Data				
Common Logical Node Information				
		LN shall inherit all Mandatory Data from Common Logical Node Class		M
Status Information				
Str	ACD	Start	T	M
Op	ACT	Operate		M
ParArcExt	SPS	Parallel ARC Running	T	O
Settings				
StrVal	ASG	Start Value	T	O
OpTmms	ING	Operate Time	T	O

*Legend:*  
 T = TransientData  
 M – Mandatory  
 O – Optional

## 2.6 Data Objects

DO Name vendor specific	description
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## Data Objects

DO Name vendor specific	description
AngN	Angle Voltage/Current ground
Blk	Blocking Timer external
BlkThm1	Blocking external
BlkThm2	Blocking Timer external
CBTripped	Circuit breaker tripped
CIRej	Close rejection
CntGGIORS	Reset of counter
CurSG	Actual Parameter Subset
GenCntRs1	Actual value of counter 1
GenCntRs2	Actual value of counter 2
GenCntRs3	Actual value of counter 3
GenCntRs4	Actual value of counter 4
LaTrRs	Reporting reset of latched trip
Lock	Status of Interlocking
LodAngA	Angle Voltage/Current Phase A (Load Angle A)
LodAngB	Angle Voltage/Current Phase B (Load Angle B)
LodAngC	Angle Voltage/Current Phase C (Load Angle C)
MaxAmpsD1	Metering statistic maximum current delayed IA
MaxAmpsD2	Metering statistic maximum current delayed IB
MaxAmpsD3	Metering statistic maximum current delayed IC
MaxAmpsDI	Metering statistic maximum current delayed
MaxAmpsM1	Metering statistic maximum current stored IA
MaxAmpsM2	Metering statistic maximum current stored IB
MaxAmpsM3	Metering statistic maximum current stored IC
MaxAmpsMe	Metering statistic maximum current stored
MaxVpg	Metering statistic maximum phase to ground voltage
MaxVpp	Metering statistic maximum phase to phase voltage
MeasLoopV	Voltage of the measured loop
MeasRefV	Voltage of the reference voltage
MinVpg	Metering statistic minimum phase to ground voltage
MinVpp	Metering statistic minimum phase to phase voltage
MTRRs	Reset command for energy counters
OrdRun	Uniqueness of control
OverOpTmh	Motor running hours
Rechsr	(Re)close command High speed
RecTdr	(Re)close command Time delayed
StrEf	Starting ground fault
SumSwARsA	Sum of Switches Ameres Phase A
SumSwARsB	Sum of Switches Ameres Phase B
SumSwARsC	Sum of Switches Ameres Phase C
SyncSt	Time Synchronisation Status

DO Name vendor specific	description
TrBlk	Trip Command Blocked
TrPhIG	Trip Phase Overcurrent I>
TrResIG	Trip Ground Overcurrent I>
POSx (x=1-32)	position of switch (as DPS)

## 2.7 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 characterisation 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:

### Semantic

FC	Name Source Definition
BR	Buffered reports IEC 61850-7-2
CF	Configuration IEC 61850-7-2
CO	Control IEC 61850-7-2
DC	Description IEC 61850-7-2
EX	Extended Definition IEC 61850-7-2
GO	GOOSE Control IEC 61850-7-2
GS	GSSE Control (UCA2 GOOSE) IEC 61850-7-2
LG	Logging IEC 61850-7-2
MS	Multicast sampled value control IEC 61850-7-2
MX	Measurands (Analogue values) IEC 61850-7-2
RP	Unbuffered reports IEC 61850-7-2
SE	Setting Group Editable IEC 61850-7-2
SG	Setting Group IEC 61850-7-2
SP	Set Point IEC 61850-7-2
ST	Status Information IEC 61850-7-2
SV	Substitution Values IEC 61850-7-2
US	Unicast sampled value control IEC 61850-7-2
XX	Data attribute service parameters IEC 61850-7-2

## Common Data Class Definitions

## 2.7.1 COMMON DATA CLASS : tp30\_Alm10\_1

Description :

CDC Class : SPS

Attribute	Type	FC	Enumeration	Comment	X
stVal	BOOLEAN	ST		Status value of the data (Intermediate state, Off, On or Bad-state)	
q	Quality	ST		Quality of the protection,activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection, activation information	
d	Vstring255	DC		Description of the status element	

## 2.7.2 COMMON DATA CLASS : tp30\_AlmThm\_1

Description :

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	Vstring255	DC		Description of the status element	

## 2.7.3 COMMON DATA CLASS : tp30\_Amp\_1

Description :

CDC Class : MV

Attribute	Type	FC	Enumeration	Comment	X
mag	tp30_mag_1	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 protection,activation information	
t	TimeStamp	MX		Timestamp of the last change in state of protection, activation information	
units	tp30_units_1	CF	SIUnit	Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
d	Vstring255	DC		Description of the status element	

### 2.7.4 COMMON DATA CLASS : tp30\_AutoRecSt\_1

**Description :**

**CDC Class :** INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	Enum	ST	AutoRecSt	Status value of the data (Intermediate state, Off, On or Bad-state)	
q	Quality	ST		Quality of the protection,activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection, activation information	

### 2.7.5 COMMON DATA CLASS : tp30\_Beh\_1

**Description :**

**CDC Class :** INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	Enum	ST	Beh	Status value of the data (Intermediate state, Off, On or Bad-state)	
q	Quality	ST		Quality of the protection,activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection, activation information	

### 2.7.6 COMMON DATA CLASS : tp30\_BlKThm\_1

**Description :**

**CDC Class :** SPS

Attribute	Type	FC	Enumeration	Comment	X
stVal	BOOLEAN	ST		Status value of the data (Intermediate state, Off, On or Bad-state)	
q	Quality	ST		Quality of the protection,activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection, activation information	
d	Vstring255	DC		Description of the status element	
dataNs	Vstring255	EX		Data Name Space	

### 2.7.7 COMMON DATA CLASS : tp30\_CurSG\_1

**Description :**

**CDC Class :** INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32	ST		Status value of the data (Intermediate state, Off, On or Bad-state)	
q	Quality	ST		Quality of the protection,activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection, activation information	
ctlModel	Enumerated	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	
dataNs	Vstring255	EX		Data Name Space	

## Common Data Class Definitions

## 2.7.8 COMMON DATA CLASS : tp30\_Dir\_1

Description :

CDC Class : ACD

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
dirGeneral	Enumerated	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	Vstring255	DC		Description of the status element	

## 2.7.9 COMMON DATA CLASS : tp30\_EEHealth\_1

Description :

CDC Class : INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	Enum	ST	Health	Status value of the data (Intermediate state, Off, On or Bad-state)	
q	Quality	ST		Quality of the protection,activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection, activation information	

## 2.7.10 COMMON DATA CLASS : tp30\_FltNum\_1

Description :

CDC Class : INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32	ST		Status value of the data (Intermediate state, Off, On or Bad-state)	
q	Quality	ST		Quality of the protection,activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection, activation information	
d	Vstring255	DC		Description of the status element	

### 2.7.11 COMMON DATA CLASS : tp30\_FltZ\_1

**Description :**

**CDC Class :** CMV

Attribute	Type	FC	Enumeration	Comment	X
q	Quality	MX		Quality of the protection,activation information	
t	TimeStamp	MX		Timestamp of the last change in state of protection, activation information	
units	tp30_units_1	CF	SIUnit	Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
d	Vstring255	DC		Description of the status element	
cVal	tp30_cVal_1	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.	

### 2.7.12 COMMON DATA CLASS : tp30\_Health\_1

**Description :**

**CDC Class :** INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	Enum	ST	Health	Status value of the data (Intermediate state, Off, On or Bad-state)	
q	Quality	ST		Quality of the protection,activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection, activation information	

### 2.7.13 COMMON DATA CLASS : tp30\_Imp\_1

**Description :**

**CDC Class :** CMV

Attribute	Type	FC	Enumeration	Comment	X
q	Quality	MX		Quality of the protection,activation information	
t	TimeStamp	MX		Timestamp of the last change in state of protection, activation information	
units	tp30_units_1	CF	SIUnit	Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
dataNs	Vstring255	EX		Data Name Space	
cVal	tp30_cVal_1	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.	



## Common Data Class Definitions

## 2.7.14 COMMON DATA CLASS : tp30\_LEDRs\_1

Description :

CDC Class : SPC

Attribute	Type	FC	Enumeration	Comment	X
stVal	BOOLEAN	ST		Status value of the data (Intermediate state, Off, On or Bad-state)	
q	Quality	ST		Quality of the protection,activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection, activation information	
ctlModel	Enumerated	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	
dataNs	Vstring255	EX		Data Name Space	
Oper	tp30_Oper_1	CO		Determines the control activity	

## 2.7.15 COMMON DATA CLASS : tp30\_LodAng\_1

Description :

CDC Class : MV

Attribute	Type	FC	Enumeration	Comment	X
mag	tp30_mag_1	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 protection,activation information	
t	TimeStamp	MX		Timestamp of the last change in state of protection, activation information	
units	tp30_units_1	CF	SIUnit	Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
d	Vstring255	DC		Description of the status element	
dataNs	Vstring255	EX		Data Name Space	

## 2.7.16 COMMON DATA CLASS : tp30\_Mod\_1

Description :

CDC Class : INC

Attribute	Type	FC	Enumeration	Comment	X
stVal	Enum	ST	Mod	Status value of the data (Intermediate state, Off, On or Bad-state)	
q	Quality	ST		Quality of the protection,activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection, activation information	
ctlModel	Enum	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	

## 2.7.17 COMMON DATA CLASS : tp30\_Mod\_2

**Description :****CDC Class :** INC

Attribute	Type	FC	Enumeration	Comment	X
stVal	Enum	ST	Mod	Status value of the data (Intermediate state, Off, On or Bad-state)	
q	Quality	ST		Quality of the protection,activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection, activation information	
ctlModel	Enum	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	
Oper	tp30_Oper_2	CO		Determines the control activity	

## 2.7.18 COMMON DATA CLASS : tp30\_NamPlt\_1

**Description :****CDC Class :** LPL

Attribute	Type	FC	Enumeration	Comment	X
vendor	Vstring255	DC		Unit of the attribute representing the data	
swRev	Vstring255	DC		Software revision	
d	Vstring255	DC		Description of the status element	

## 2.7.19 COMMON DATA CLASS : tp30\_NamPlt\_2

**Description :****CDC Class :** LPL

Attribute	Type	FC	Enumeration	Comment	X
vendor	Vstring255	DC		Unit of the attribute representing the data	
swRev	Vstring255	DC		Software revision	
d	Vstring255	DC		Description of the status element	
configRev	Vstring255	DC		Uniquely identifies the configuration of a local device instance	

## 2.7.20 COMMON DATA CLASS : tp30\_NamPlt\_3

**Description :****CDC Class :** LPL

Attribute	Type	FC	Enumeration	Comment	X
vendor	Vstring255	DC		Unit of the attribute representing the data	
swRev	Vstring255	DC		Software revision	
d	Vstring255	DC		Description of the status element	
InNs	Vstring255	EX		Logical Node name space	

## Common Data Class Definitions

## 2.7.21 COMMON DATA CLASS : tp30\_Oper\_1

Description :

CDC Class : OPER

Attribute	Type	FC	Enumeration	Comment	X
ctlVal	BOOLEAN	CO		Determines the control activity	
origin	tp30_origin_1	CO	orCategory	Related to the originator of the last change of data	
ctlNum	INT8U	CO		Show the control sequence number of the control service	
T	TimeStamp	CO		Timestamp of the last change in state of protection, activation information	
Test	BOOLEAN	CO		Test	
Check	VBSTR2	CO		Check	

## 2.7.22 COMMON DATA CLASS : tp30\_Oper\_2

Description :

CDC Class : OPER

Attribute	Type	FC	Enumeration	Comment	X
ctlVal	INT32	CO		Determines the control activity	
origin	tp30_origin_1	CO	orCategory	Related to the originator of the last change of data	
ctlNum	INT8U	CO		Show the control sequence number of the control service	
T	TimeStamp	CO		Timestamp of the last change in state of protection, activation information	
Test	BOOLEAN	CO		Test	
Check	VBSTR2	CO		Check	

## 2.7.23 COMMON DATA CLASS : tp30\_ParArcExt\_1

Description :

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	Vstring255	DC		Description of the status element	
dataNs	Vstring255	EX		Data Name Space	

## 2.7.24 COMMON DATA CLASS : tp30\_PhyHealth\_1

Description :

CDC Class : INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	Enum	ST	Health	Status value of the data (Intermediate state, Off, On or Bad-state)	
q	Quality	ST		Quality of the protection,activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection, activation information	

## 2.7.25 COMMON DATA CLASS : tp30\_PhyNam\_1

Description :

CDC Class : DPL

Attribute	Type	FC	Enumeration	Comment	X
vendor	Vstring255	DC		Unit of the attribute representing the data	
hwRev	Vstring255	DC		Hardware revision	
swRev	Vstring255	DC		Software revision	
serNum	Vstring255	DC		Serial Number	

## 2.7.26 COMMON DATA CLASS : tp30\_Proxy\_1

Description :

CDC Class : SPS

Attribute	Type	FC	Enumeration	Comment	X
stVal	BOOLEAN	ST		Status value of the data (Intermediate state, Off, On or Bad-state)	
q	Quality	ST		Quality of the protection,activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection, activation information	

## 2.7.27 COMMON DATA CLASS : tp30\_SGCB\_1

Description :

CDC Class : SGC

Attribute	Type	FC	Enumeration	Comment	X
NumOfSG	INT8U	SP		Number of setting group	
ActSG	INT8U	SP		Actual setting group	
EditSG	INT8U	SP		Edit setting group)	
CnfEdit	BOOLEAN	SP		Confirm editing	
LActTm	TimeStamp	SP		Last activation time	

## Common Data Class Definitions

## 2.7.28 COMMON DATA CLASS : tp30\_URCB

Description :

CDC Class :

Attribute	Type	FC	Enumeration	Comment	X
	BASRCB	RP			

## 2.7.29 COMMON DATA CLASS : tp30\_cVal\_1

Description :

CDC Class : Vector

Attribute	Type	FC	Enumeration	Comment	X
mag	tp30_mag_1	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.	

## 2.7.30 COMMON DATA CLASS : tp30\_mag\_1

Description :

CDC Class : Vector

Attribute	Type	FC	Enumeration	Comment	X
f	FLOAT32	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.	

## 2.7.31 COMMON DATA CLASS : tp30\_origin\_1

Description :

CDC Class : OPER

Attribute	Type	FC	Enumeration	Comment	X
orCat	ENUM8	CO	orCategory	Related to the originator of the last change of data	
orIdent	VOSTR64	CO		Related to the originator of the last change of data	

## 2.7.32 COMMON DATA CLASS : tp30\_units\_1

Description :

CDC Class : CMV

Attribute	Type	FC	Enumeration	Comment	X
SIUnit	Enumerated	CF	SIUnit	Unit of the attribute representing the data	
multiplier	Enumerated	CF	multiplier	Unit of the attribute representing the data	

## 2.8 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.

## 2.9 Extra Defined Data attributes

additional DA for configured values	description
measCyc	update cycle for measurments in seconds
enCyc	update cycle for energy counters in seconds
comtrade	comtrade mode for file transfer (ASCII or binary)
distExtr	comtrade file transfer enabled

## 2.10 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.

### 2.10.1 Enumerated Type : AutoRecSt

**Description** : Auto reclosing status

Ordinal	Semantic
1	Ready
2	InProgress
3	Successful

### 2.10.2 Enumerated Type : Beh

**Description** : Behaviour

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

## Enumerated Type Definitions

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### 2.10.3 Enumerated Type : Health

**Description :** Health

Ordinal	Semantic
1	Ok
2	Warning
3	Alarm

### 2.10.4 Enumerated Type : Mod

**Description :** Mode

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

### 2.10.5 Enumerated Type : SIUnit

**Description :** Unit of the attribute representing the data

Ordinal	Semantic
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

Ordinal	Semantic
28	H
29	V
30	ohm
31	J
32	N
33	Hz
34	lx
35	Lm
36	Wb
37	T
38	W
39	Pa
41	m <sup>2</sup>
42	m <sup>3</sup>
43	m/s
44	m/s <sup>2</sup>
45	m <sup>3</sup> /s
46	m/m <sup>3</sup>
47	M
48	kg/m <sup>3</sup>
49	m <sup>2</sup> /s
50	W/m K
51	J/K
52	ppm
53	1/s
54	rad/s
61	VA
62	Watts
63	VAr
64	theta
65	cos(theta)
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



## Enumerated Type Definitions

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### 2.10.6 Enumerated Type : ctlModel

**Description** : Control model (Corresponding to the behaviour of the data)

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

### 2.10.7 Enumerated Type : dir

**Description** : General direction (unknown,forward,backward or both)

Ordinal	Semantic
0	unknown
1	forward
2	backward
3	both

### 2.10.8 Enumerated Type : multiplier

**Description** : Unit of the attribute representing the data

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

Ordinal	Semantic
9	G
12	T
15	P
18	E
21	Z
24	Y

### 2.10.9 Enumerated Type : orCategory

**Description** : Related to the originator of the last change of data

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

## MMS Data-Type Conversions

## 2.11 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
BVstring13	BVstring13	Variable bit string (upto 13 bits)
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	Long	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	Ostring64	64 character string (8 bits per character)
OCTET_STRING8	Ostring8	8 character string (8 bits per character)
Quality	BVstring13	IEC61850 Quality
RTYP_BOOL	Bool	Reporting type - BOOLEAN
RTYP_BSTR6	Bstring6	Reporting type - 6 bit string
RTYP_BSTR8	Bstring8	Reporting type - 8 bit string
RTYP_BSTR9	Bstring9	Reporting type - 9 bit string
RTYP_BTIME6	Btime6	Reporting type - 6 byte timestamp
RTYP_BVSTR10	BVstring10	Reporting type - Variable bit string (upto 10 bits)
RTYP_BVSTR6	BVstring6	Reporting type - Variable bit string (upto 6 bits)
RTYP_BVSTR8	Bvstring8	Reporting type - Variable bit string (upto 8 bits)
RTYP_INT16U	Ushort	Reporting type - 16 bit unsigned integer value
RTYP_INT32U	Ulong	Reporting type - 32 bit unsigned integer value
RTYP_INT8U	Ubyte	Reporting type - 8 bit unsigned integer value
RTYP_OSTR8	Ostring8	Reporting type - 8 character string (8 bits per character)
RTYP_VSTR32	Vstring32	Reporting type - 32 character string
RTYP_VSTR65	Vstring65	Reporting type - 65 character string
TimeStamp	Utctime	IEC61850 Time stamp
UNICODE_STRING255	UTF8Vstring255	255 character string (16 bits per unicode character)

Part 7 Type	MMS Type	Part 7 Description
UTC_TM	Utctime	UTC Timestamp
VISIBLE_STRING255	Vstring65	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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