

# Easergy MiCOM P746

**Numerical Busbar Protection Relay**

**P746/EN MC/L72**

Software Version	B3
Hardware Suffix	M
IEC61850	Edition 1

**Model Implementation Conformance Statement (MICS)**

**Note**

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MODEL IMPLEMENTATION  
CONFORMANCE STATEMENT  
(MICS)

Date (month/year):	10/2016
Products covered by this chapter:	This chapter covers the specific versions of the MiCOM products listed below. This includes <b>only</b> the following combinations of Software Version and Hardware Suffix.
Hardware suffix:	M
Software version:	B3
IEC61850 Edition:	1
Connection diagrams:	This includes a list of the Connection Diagrams for the Products covered by this document. 10P746xx (xx = 00 to 21)

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# *Notes:*



**1 INTRODUCTION**

This specification is the Model Implementation Conformance Statement (MICS) and presents the top-level IEC61850 data model that has been implemented. The definitions of all used Logical Nodes and their associated Common Data Classes, components and associated enumerated values are also included for completeness.

The reader is expected to be conversant with the terminology presented within the IEC61850 part 7 series of specifications.

## **2 OBJECTIVE**

This document is applicable for P746 with the firmware B3A. The MICS is conformant to the devices associated ICD (Substation Configuration Language) file: P746\_\_\_\_\_B3A.ICD, version V2.1, according to part 6 and part 7 of the IEC61850 standards.

The layouts of the presented tables within this document are conformant to the part 6 and 7 series of the IEC61850 standard specifications with the following exceptions:

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

**3 LOGICAL 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 Class)	Description	Name Space
GGIO_ALM_96	(GGIO)	Generic Process I/O (w.r.t 96 Alarm Elements)	IEC 61850-7-4:2003
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
GGIO_ALM_32	(GGIO)	Generic process I/O( with 32 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

LN Type	(LN Class)	Description	Name Space
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
RFLO_PRIV_P746	(RFLO)	Fault locator	IEC 61850-7-4:2003

**3.1**

**Logical Node: GGIO\_ALM\_32**

Description: Generic process I/O( with 32 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		
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		

Attribute	Attr. Type	Explanation	T	X
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		

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

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

LN Class: GGIO

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

Attribute	Attr. Type	Explanation	T	X
Alm31	SPS_D	General single alarm		
Alm32	SPS_D	General single alarm		
Alm33	SPS_D	General single alarm		
Alm34	SPS_D	General single alarm		
Alm35	SPS_D	General single alarm		
Alm36	SPS_D	General single alarm		
Alm37	SPS_D	General single alarm		
Alm38	SPS_D	General single alarm		
Alm39	SPS_D	General single alarm		
Alm40	SPS_D	General single alarm		
Alm41	SPS_D	General single alarm		
Alm42	SPS_D	General single alarm		
Alm43	SPS_D	General single alarm		
Alm44	SPS_D	General single alarm		
Alm45	SPS_D	General single alarm		
Alm46	SPS_D	General single alarm		
Alm47	SPS_D	General single alarm		
Alm48	SPS_D	General single alarm		
Alm49	SPS_D	General single alarm		
Alm50	SPS_D	General single alarm		
Alm51	SPS_D	General single alarm		
Alm52	SPS_D	General single alarm		
Alm53	SPS_D	General single alarm		
Alm54	SPS_D	General single alarm		
Alm55	SPS_D	General single alarm		
Alm56	SPS_D	General single alarm		
Alm57	SPS_D	General single alarm		
Alm58	SPS_D	General single alarm		
Alm59	SPS_D	General single alarm		
Alm60	SPS_D	General single alarm		
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		

Attribute	Attr. Type	Explanation	T	X
Alm75	SPS_D	General single alarm		
Alm76	SPS_D	General single alarm		
Alm77	SPS_D	General single alarm		
Alm78	SPS_D	General single alarm		
Alm79	SPS_D	General single alarm		
Alm80	SPS_D	General single alarm		
Alm81	SPS_D	General single alarm		
Alm82	SPS_D	General single alarm		
Alm83	SPS_D	General single alarm		
Alm84	SPS_D	General single alarm		
Alm85	SPS_D	General single alarm		
Alm86	SPS_D	General single alarm		
Alm87	SPS_D	General single alarm		
Alm88	SPS_D	General single alarm		
Alm89	SPS_D	General single alarm		
Alm90	SPS_D	General single alarm		
Alm91	SPS_D	General single alarm		
Alm92	SPS_D	General single alarm		
Alm93	SPS_D	General single alarm		
Alm94	SPS_D	General single alarm		
Alm95	SPS_D	General single alarm		
Alm96	SPS_D	General single alarm		

**3.3 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)		

### 3.4 Logical Node: GGIO\_IND\_18

Description: Generic Process I/O (w.r.t 18 Indication Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Ind1	SPS_D	General indication (binary input)		
Ind2	SPS_D	General indication (binary input)		
Ind3	SPS_D	General indication (binary input)		
Ind4	SPS_D	General indication (binary input)		
Ind5	SPS_D	General indication (binary input)		
Ind6	SPS_D	General indication (binary input)		
Ind7	SPS_D	General indication (binary input)		
Ind8	SPS_D	General indication (binary input)		
Ind9	SPS_D	General indication (binary input)		
Ind10	SPS_D	General indication (binary input)		
Ind11	SPS_D	General indication (binary input)		
Ind12	SPS_D	General indication (binary input)		
Ind13	SPS_D	General indication (binary input)		
Ind14	SPS_D	General indication (binary input)		
Ind15	SPS_D	General indication (binary input)		
Ind16	SPS_D	General indication (binary input)		
Ind17	SPS_D	General indication (binary input)		
Ind18	SPS_D	General indication (binary input)		

### 3.5 Logical Node: GGIO\_IND\_32

Description: Generic Process I/O (w.r.t 32 Indication Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Ind1	SPS_D	General indication (binary input)		
Ind2	SPS_D	General indication (binary input)		
Ind3	SPS_D	General indication (binary input)		
Ind4	SPS_D	General indication (binary input)		
Ind5	SPS_D	General indication (binary input)		
Ind6	SPS_D	General indication (binary input)		
Ind7	SPS_D	General indication (binary input)		
Ind8	SPS_D	General indication (binary input)		
Ind9	SPS_D	General indication (binary input)		



Attribute	Attr. Type	Explanation	T	X
Ind10	SPS_D	General indication (binary input)		
Ind11	SPS_D	General indication (binary input)		
Ind12	SPS_D	General indication (binary input)		
Ind13	SPS_D	General indication (binary input)		
Ind14	SPS_D	General indication (binary input)		
Ind15	SPS_D	General indication (binary input)		
Ind16	SPS_D	General indication (binary input)		
Ind17	SPS_D	General indication (binary input)		
Ind18	SPS_D	General indication (binary input)		
Ind19	SPS_D	General indication (binary input)		
Ind20	SPS_D	General indication (binary input)		
Ind21	SPS_D	General indication (binary input)		
Ind22	SPS_D	General indication (binary input)		
Ind23	SPS_D	General indication (binary input)		
Ind24	SPS_D	General indication (binary input)		
Ind25	SPS_D	General indication (binary input)		
Ind26	SPS_D	General indication (binary input)		
Ind27	SPS_D	General indication (binary input)		
Ind28	SPS_D	General indication (binary input)		
Ind29	SPS_D	General indication (binary input)		
Ind30	SPS_D	General indication (binary input)		
Ind31	SPS_D	General indication (binary input)		
Ind32	SPS_D	General indication (binary input)		

**3.6**

**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		

Attribute	Attr. Type	Explanation	T	X
SPCSO13	SPC_CONTROL	Single point controllable status output		
SPCSO14	SPC_CONTROL	Single point controllable status output		
SPCSO15	SPC_CONTROL	Single point controllable status output		
SPCSO16	SPC_CONTROL	Single point controllable status output		
SPCSO17	SPC_CONTROL	Single point controllable status output		
SPCSO18	SPC_CONTROL	Single point controllable status output		
SPCSO19	SPC_CONTROL	Single point controllable status output		
SPCSO20	SPC_CONTROL	Single point controllable status output		
SPCSO21	SPC_CONTROL	Single point controllable status output		
SPCSO22	SPC_CONTROL	Single point controllable status output		
SPCSO23	SPC_CONTROL	Single point controllable status output		
SPCSO24	SPC_CONTROL	Single point controllable status output		
SPCSO25	SPC_CONTROL	Single point controllable status output		
SPCSO26	SPC_CONTROL	Single point controllable status output		
SPCSO27	SPC_CONTROL	Single point controllable status output		
SPCSO28	SPC_CONTROL	Single point controllable status output		
SPCSO29	SPC_CONTROL	Single point controllable status output		
SPCSO30	SPC_CONTROL	Single point controllable status output		
SPCSO31	SPC_CONTROL	Single point controllable status output		
SPCSO32	SPC_CONTROL	Single point controllable status output		

### 3.7

#### 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)		

Attribute	Attr. Type	Explanation	T	X
Ind16	SPS_D	General indication (binary input)		
Ind17	SPS_D	General indication (binary input)		
Ind18	SPS_D	General indication (binary input)		
Ind19	SPS_D	General indication (binary input)		
Ind20	SPS_D	General indication (binary input)		
Ind21	SPS_D	General indication (binary input)		
Ind22	SPS_D	General indication (binary input)		
Ind23	SPS_D	General indication (binary input)		
Ind24	SPS_D	General indication (binary input)		
Ind25	SPS_D	General indication (binary input)		
Ind26	SPS_D	General indication (binary input)		
Ind27	SPS_D	General indication (binary input)		
Ind28	SPS_D	General indication (binary input)		
Ind29	SPS_D	General indication (binary input)		
Ind30	SPS_D	General indication (binary input)		
Ind31	SPS_D	General indication (binary input)		
Ind32	SPS_D	General indication (binary input)		
Ind33	SPS_D	General indication (binary input)		
Ind34	SPS_D	General indication (binary input)		
Ind35	SPS_D	General indication (binary input)		
Ind36	SPS_D	General indication (binary input)		
Ind37	SPS_D	General indication (binary input)		
Ind38	SPS_D	General indication (binary input)		
Ind39	SPS_D	General indication (binary input)		
Ind40	SPS_D	General indication (binary input)		

**3.8**

**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)		

Attribute	Attr. Type	Explanation	T	X
Ind11	SPS_D	General indication (binary input)		
Ind12	SPS_D	General indication (binary input)		
Ind13	SPS_D	General indication (binary input)		
Ind14	SPS_D	General indication (binary input)		
Ind15	SPS_D	General indication (binary input)		
Ind16	SPS_D	General indication (binary input)		
Ind17	SPS_D	General indication (binary input)		
Ind18	SPS_D	General indication (binary input)		
Ind19	SPS_D	General indication (binary input)		
Ind20	SPS_D	General indication (binary input)		
Ind21	SPS_D	General indication (binary input)		
Ind22	SPS_D	General indication (binary input)		
Ind23	SPS_D	General indication (binary input)		
Ind24	SPS_D	General indication (binary input)		
Ind25	SPS_D	General indication (binary input)		
Ind26	SPS_D	General indication (binary input)		
Ind27	SPS_D	General indication (binary input)		
Ind28	SPS_D	General indication (binary input)		
Ind29	SPS_D	General indication (binary input)		
Ind30	SPS_D	General indication (binary input)		
Ind31	SPS_D	General indication (binary input)		
Ind32	SPS_D	General indication (binary input)		
Ind33	SPS_D	General indication (binary input)		
Ind34	SPS_D	General indication (binary input)		
Ind35	SPS_D	General indication (binary input)		
Ind36	SPS_D	General indication (binary input)		
Ind37	SPS_D	General indication (binary input)		
Ind38	SPS_D	General indication (binary input)		
Ind39	SPS_D	General indication (binary input)		
Ind40	SPS_D	General indication (binary input)		
Ind41	SPS_D	General indication (binary input)		
Ind42	SPS_D	General indication (binary input)		
Ind43	SPS_D	General indication (binary input)		
Ind44	SPS_D	General indication (binary input)		
Ind45	SPS_D	General indication (binary input)		
Ind46	SPS_D	General indication (binary input)		
Ind47	SPS_D	General indication (binary input)		
Ind48	SPS_D	General indication (binary input)		
Ind49	SPS_D	General indication (binary input)		
Ind50	SPS_D	General indication (binary input)		
Ind51	SPS_D	General indication (binary input)		
Ind52	SPS_D	General indication (binary input)		
Ind53	SPS_D	General indication (binary input)		
Ind54	SPS_D	General indication (binary input)		

Attribute	Attr. Type	Explanation	T	X
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)		

### 3.9 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
SvnMod	INC_MOD_D_PRIV	System Backup Mode		X
SvnBeh	INS_BEH_D_PRIV	System backup Behaviour		X

### 3.10 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		

### 3.11 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
SyncSt	SPS_WD_NS	Time Synchronisation Indication(IEC 61850 phase 2.0 and 2.1)		X

### 3.12 Logical Node: LPHD\_STANDARD

Description: Px40 Physical Device Information

LN Class: LPHD

Attribute	Attr. Type	Explanation	T	X
PhyNam	DPL_STANDARD	Physical device name plate		
PhyHealth	INS_HEALTH	Physical device health		
Proxy	SPS_D	Indicates if this LN is a proxy		
PwrUp	SPS_D	Power up detected		

### 3.13 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 value		

### 3.14 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 value		

### 3.15 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		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Ase1	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 1		X
Ase2	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 2		X
Ase3	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 3		X
Ase4	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 4		X
Ase5	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 5		X
Ase6	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 6		X
Ase7	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 7		X
Ase8	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 8		X
Ase9	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 9		X
Ase10	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 10		X
Ase11	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 11		X
Ase12	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 12		X
Ase13	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 13		X
Ase14	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 14		X
Ase15	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 15		X
Ase16	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 16		X
Ase17	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 17		X
Ase18	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 18		X

**3.16 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		
Ase1	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 1		X
Ase2	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 2		X
Ase3	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 3		X
Ase4	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 4		X
Ase5	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 5		X
Ase6	WYE_SEG_ANONYMOUS	Single anonymous phase terminal 6		X

**3.17 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		
Ase1	WYE_SEG_ANG_NS	Phase currents, derived - T1		X
Ase2	WYE_SEG_ANG_NS	Phase currents, derived - T2		X
Ase3	WYE_SEG_ANG_NS	Phase currents, derived - T3		X
Ase4	WYE_SEG_ANG_NS	Phase currents, derived - T4		X
Ase5	WYE_SEG_ANG_NS	Phase currents, derived - T5		X
Ase6	WYE_SEG_ANG_NS	Phase currents, derived - T6		X

### 3.18 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

### 3.19 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		

### 3.20 Logical Node: MSQI\_SEQ\_6

Description: Sequence and imbalance

LN Class: MSQI

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		



Attribute	Attr. Type	Explanation	T	X
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
SeqA	SEQ_MAG_ND	Positive, Negative and Zero sequence current for T1		
SeqAse1	SEQ_MAG	Positive, Negative and Zero sequence current for T2		X
SeqAse2	SEQ_MAG	Positive, Negative and Zero sequence current for T3		X
SeqAse3	SEQ_MAG	Positive, Negative and Zero sequence current for T4		X
SeqAse4	SEQ_MAG	Positive, Negative and Zero sequence current for T5		X
SeqAse5	SEQ_MAG	Positive, Negative and Zero sequence current for T6		X

**3.21 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	

**3.22 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	

**3.23 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		

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Tr	ACT_NO_SEG	Trip		
Str	ACD_NO_SEG	Sum of all starts of all connected Logical Nodes		

### 3.24 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	

### 3.25 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		

### 3.26 Logical Node: RFLO\_PRIV\_P746

Description: Fault locator

LN Class: RFLO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
FltZ	CMV_MAG	Fault impedance		
FltDiskm	MV_FLOAT_ND	Fault distance in km		
FltPhs	INS_D_NS	Fault phase		X
FltSt1U	INS_D_NS	Fault start element 1 up		X
FltSt1L	INS_D_NS	Fault start element 1 low		X
FltSt2U	INS_D_NS	Fault start element 2 up		X
FltSt2L	INS_D_NS	Fault start element 2 low		X

Attribute	Attr. Type	Explanation	T	X
FltSt3U	INS_D_NS	Fault start element 3 up		X
FltSt3L	INS_D_NS	Fault start element 3 low		X
FltOp1U	INS_D_NS	Fault trip element 1 up		X
FltOp2U	INS_D_NS	Fault trip element 2 up		X
FltOp1L	INS_D_NS	Fault trip element 1 low		X
FltOp3U	INS_D_NS	Fault trip element 3 up		X
FltOp2L	INS_D_NS	Fault trip element 2 low		X
FltOp3L	INS_D_NS	Fault trip element 3 low		X
FltAlm1U	INS_D_NS	Fault alarm 1 up		X
FltAlm1L	INS_D_NS	Fault alarm 1 low		X
FltTU	INS_D_NS	Fault time up		X
FltTL	INS_D_NS	Fault time low		X
FltTms	INS_D_NS	Fault time ms		X
FltTye	INS_D_NS	Fault type		X
FltNum	INS_D	Fault record number		X
ActiveSG	INS_D_NS	Fault Record Active group		X
FltHz	MV_FLOAT_FAULT	Fault Record frequency		X
FltDur	MV_FLOAT_FAULT	Fault duration		X
CBOPtm	MV_FLOAT_FAULT	CB Operation time		X
RlyOpTm	MV_FLOAT_FAULT	Relay Operation time		X
TestMod	INS_D_NS	Test mode		X
FltA1	WYE_SEG_FAULT	Fault phase current--T1		X
FltA2	WYE_SEG_FAULT	Fault phase current--T2		X
FltA3	WYE_SEG_FAULT	Fault phase current--T3		X
FltA4	WYE_SEG_FAULT	Fault phase current--T4		X
FltA5	WYE_SEG_FAULT	Fault phase current--T5		X
FltA6	WYE_SEG_FAULT	Fault phase current--T6		X
AX1	MV_FLOAT_FAULT	Single anonymous phase terminal 1		X
AX2	MV_FLOAT_FAULT	Single anonymous phase terminal 2		X
AX3	MV_FLOAT_FAULT	Single anonymous phase terminal 3		X
AX4	MV_FLOAT_FAULT	Single anonymous phase terminal 4		X
AX5	MV_FLOAT_FAULT	Single anonymous phase terminal 5		X
AX6	MV_FLOAT_FAULT	Single anonymous phase terminal 6		X
AX7	MV_FLOAT_FAULT	Single anonymous phase terminal 7		X
AX8	MV_FLOAT_FAULT	Single anonymous phase terminal 8		X
AX9	MV_FLOAT_FAULT	Single anonymous phase terminal 9		X
AX10	MV_FLOAT_FAULT	Single anonymous phase terminal 10		X
AX11	MV_FLOAT_FAULT	Single anonymous phase terminal 11		X
AX12	MV_FLOAT_FAULT	Single anonymous phase terminal 12		X
AX13	MV_FLOAT_FAULT	Single anonymous phase terminal 13		X
AX14	MV_FLOAT_FAULT	Single anonymous phase terminal 14		X
AX15	MV_FLOAT_FAULT	Single anonymous phase terminal 15		X
AX16	MV_FLOAT_FAULT	Single anonymous phase terminal 16		X
AX17	MV_FLOAT_FAULT	Single anonymous phase terminal 17		X

Attribute	Attr. Type	Explanation	T	X
AX18	MV_FLOAT_FAULT	Single anonymous phase terminal 18		X
FltPhV	WYE_SEG_FAULT	Fault record phase to ground voltage		X
FltV1	MV_FLOAT_FAULT	Fault record V1 voltage		X
FltV2	MV_FLOAT_FAULT	Fault record V2 voltage		X
FltVN	MV_FLOAT_FAULT	Fault record VN voltage		X
FltPPV	WYE_SEG_FAULT	Fault record phase to phase voltage		X
Z1IDiff	WYE_SEG_FAULT	Fault differential current--Z1		X
Z1IBias	WYE_SEG_FAULT	Fault bias current--Z1		X
Z2IDiff	WYE_SEG_FAULT	Fault differential current--Z2		X
Z2IBias	WYE_SEG_FAULT	Fault bias current--Z2		X
Z3IDiff	WYE_SEG_FAULT	Fault differential current--Z3		X
Z3IBias	WYE_SEG_FAULT	Fault bias current--Z3		X
Z4IDiff	WYE_SEG_FAULT	Fault differential current--Z4		X
Z4IBias	WYE_SEG_FAULT	Fault bias current--Z4		X
CZIDiff	WYE_SEG_FAULT	Fault differential current--CZ		X
CZIBias	WYE_SEG_FAULT	Fault bias current--CZ		X

## 4 COMMON DATA CLASS DEFINITIONS

The definition tables for each of the Common Data Classes used in the Logical Node definitions are presented in the following sub-sections.

From an application point-of-view the data attributes of a Common Data Class are classified according to their specific use. The characterization of data attributes, and the services that they support/provide, will be through the use of 'Functional Constraints'. The Functional Constraints are specified by the table below:

FC Name	Semantic	Source Definition
BR	Buffered reports	IEC61850-7-2
CF	Configuration	IEC61850-7-2
CO	Control	IEC61850-7-2
DC	Description	IEC61850-7-2
EX	Extended Definition	IEC61850-7-2
GO	GOOSE Control	IEC61850-7-2
GS	GSSE Control (UCA2 GOOSE)	IEC61850-7-2
LG	Logging	IEC61850-7-2
MS	Multicast sampled value control	IEC61850-7-2
MX	Measurands (Analogue values)	IEC61850-7-2
RP	Unbuffered reports	IEC61850-7-2
SE	Setting Group Editable	IEC61850-7-2
SG	Setting Group	IEC61850-7-2
SP	Set Point	IEC61850-7-2
ST	Status Information	IEC61850-7-2
SV	Substitution Values	IEC61850-7-2
US	Unicast sampled value control	IEC61850-7-2
XX	Data attribute service parameters	IEC61850-7-2

### 4.1 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	

### 4.2 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	

### 4.3 Common Data Class: CMV\_MAG

Description: Complex Measured value(without db and rangeC)

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	

### 4.4 Common Data Class: CMV\_MAG\_ANG\_FLOAT

Description: Complex Measured value (w.r.t Floating Point Magnitude and Angle)

CDC Class: CMV

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

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

**4.5****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	

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

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

CDC Class: DEL

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

**4.7****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	

Attribute	Type	FC	Enumeration	Comment	X
location	VISIBLE_STRING255	DC		Physical location of device	

#### 4.8 Common Data Class: INC\_MOD

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

CDC Class: INC

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

#### 4.9 Common Data Class: INC\_MOD\_D\_PRIV

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

CDC Class: INC

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

#### 4.10 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	



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

#### 4.11 Common Data Class: INS\_BEH

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

CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (MMS Type: INT8)	ST	Beh	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

#### 4.12 Common Data Class: INS\_BEH\_D\_PRIV

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

CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (MMS Type: INT8)	ST	Beh	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

#### 4.13 Common Data Class: INS\_D

Description: Integer Status

CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32	ST		The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	
d	VISIBLE_STRING255	DC		Description of the status element	

#### 4.14 Common Data Class: INS\_D\_NS

Description: Integer Status with description

CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32	ST		The element status	

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

**4.15 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	

**4.16 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	

**4.17 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	

**4.18 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	

**4.19****Common Data Class: MV\_FLOAT\_FAULT**

Description: Measured value(without db and rangC but NS)

CDC Class: MV

Attribute	Type	FC	Enumeration	Comment	X
mag	AnalogueValue_Float	MX		Deadbanded magnitude of the instantaneous value of a measured value or harmonic value. Updated to the current value of instMag when the value has changed according to the configuration parameter db.	
q	Quality	MX		Quality of the measurement value	
t	TimeStamp	MX		Time deadbanded magnitude last exceeded its db configuration parameter	
units	Unit	CF		Unit of the attribute representing the data	
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

**4.20****Common Data Class: MV\_FLOAT\_ND**

Description: Measured value (without d)

CDC Class: MV

Attribute	Type	FC	Enumeration	Comment	X
mag	AnalogueValue_Float	MX		Deadbanded magnitude of the instantaneous value of a measured value or harmonic value. Updated to the current value of instMag when the value has changed according to the configuration parameter db.	
q	Quality	MX		Quality of the measurement value	
t	TimeStamp	MX		Time deadbanded magnitude last exceeded its db configuration parameter	
units	Unit	CF		Unit of the attribute representing the data	

**4.21**

**Common Data Class: MV\_FLOAT\_NS**

Description: MV\_FLOAT with dataNs for extra Dos

CDC Class: MV

Attribute	Type	FC	Enumeration	Comment	X
mag	AnalogueValue_Float	MX		Deadbanded magnitude of the instantaneous value of a measured value or harmonic value. Updated to the current value of instMag when the value has changed according to the configuration parameter db.	
q	Quality	MX		Quality of the measurement value	
t	TimeStamp	MX		Time deadbanded magnitude last exceeded its db configuration parameter	
units	Unit_Multiplier	CF		Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
rangeC	RangeConfig_Deadband	CF		Measurement range configuration attributes	
dataNs	VISIBLE_STRING255	EX		Data name space	

**4.22**

**Common Data Class: SEQ\_MAG**

Description: Sequence components of a measurement value without dataNs

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)	
dataNs	VISIBLE_STRING255	EX		Data name space	

**4.23****Common Data Class: SEQ\_MAG\_ND**

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)	

**4.24****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)	

Attribute	Type	FC	Enumeration	Comment	X
sboTimeout	INT32U	CF		Select Before Operate timeout period (in milliseconds)	
cdcNs	VISIBLE_STRING255	EX		Common Data Class Name Space	
cdcName	VISIBLE_STRING255	EX		Name of the Common Data Class	
d	VISIBLE_STRING255	DC		Description of the status element	

**4.25 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	

**4.26 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	

**4.27 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	

**4.28 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	

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

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

CDC Class: WYE

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

**4.30 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	

**4.31 Common Data Class: WYE\_SEG\_ANG\_NS**

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

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	
dataNs	VISIBLE_STRING255	EX		Data name space	

**4.32 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	
dataNs	VISIBLE_STRING255	EX		Data name space	

**4.33 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	

**4.34 Common Data Class: WYE\_SEG\_FAULT**

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

CDC Class: WYE

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



## 5 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.

### 5.1 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	

### 5.2 Component: Originator

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

Parent Type:

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

### 5.3 Component: RangeConfig\_Deadband

Comment: Measurement range configuration

Parent Type: RangeConfig

Attribute	Type	Enumeration	Comment	X
min	AnalogueValue_Float		Minimum process measurement for which values of i and f are considered within limits	
hhLim	AnalogueValue_Float		High High range limit	
hLim	AnalogueValue_Float		High range limit	
lLim	AnalogueValue_Float		Low range limit	
max	AnalogueValue_Float		Maximum process measurement for which values of i and f are considered within limits	
llLim	AnalogueValue_Float		Low Low range limit	

### 5.4 Component: Unit

Comment: SI Unit definitions

Parent Type:

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

**5.5 Component: Unit\_Multiplier**

Comment: SI Unit definitions

Parent Type: Unit

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

**5.6 Component: Vector\_Magnitude\_Float**

Comment: Complex vector (w.r.t Floating Point Magnitude value)

Parent Type: Vector

Attribute	Type	Enumeration	Comment	X
mag	AnalogueValue_Float		The magnitude of the complex value	

**5.7 Component: Vector\_MagnitudeAngle\_Float**

Comment: Complex vector (w.r.t Floating Point Magnitude and Angle values)

Parent Type: Vector

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

## 6 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.

### 6.1 Enumerated Type: AddCause

Description: AddCause

Ordinal	Semantic
0	Unknown
1	Not-supported
2	Blocked-by-switching-hierarchy
3	Select-failed
4	Invalid-position
5	Position-reached
6	Parameter-change-in-execution
7	Step-limit
8	Blocked-by-Mode
9	Blocked-by-process
10	Blocked-by-interlocking
11	Blocked-by-synchrocheck
12	Command-already-in-execution
13	Blocked-by-health
14	1-of-n-control
15	Abortion-by-cancel
16	Time-limit-over
17	Abortion-by-trip
18	Object-not-selected

### 6.2 Enumerated Type: Beh

Description: Behaviour

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

### 6.3 Enumerated Type: Bypass

Description: Bypass

Ordinal	Semantic
0	locking-bypass
1	mode-bypass
2	automation-bypass

Ordinal	Semantic
3	uniqueness-bypass
4	select-bypass
5	status-bypass

#### 6.4 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

#### 6.5 Enumerated Type: **dir**

Description: Direction

Ordinal	Semantic
0	unknown
1	forward
2	backward
3	both

#### 6.6 Enumerated Type: **Health**

Description: Health

Ordinal	Semantic
1	Ok
2	Warning
3	Alarm

#### 6.7 Enumerated Type: **Mod**

Description: Mode

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

#### 6.8 Enumerated Type: **multiplier**

Description: Exponents of the multiplier value in base 10.

Ordinal	Semantic
-24	y
-21	z

Ordinal	Semantic
-18	a
-15	f
-12	p
-9	n
-6	μ
-3	m
-2	c
-1	d
0	
1	da
2	h
3	k
6	M
9	G
12	T
15	P
18	E
21	Z
24	Y

## 6.9 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

## 6.10 Enumerated Type: seqT

Description: Sequence Measurement Type

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

## 6.11 Enumerated Type: SIUnit

Description: SI Units derived from ISO/IEC 1000

Ordinal	Semantic
-16	years

Ordinal	Semantic
-15	months
-14	weeks
-13	V/s
-12	mins
-11	hours
-10	days
-9	°F
-8	ratio
-7	miles
-6	inches
-5	feet
-4	df/dt
-3	Hz/s
-2	%
-1	pu
1	none
2	m
3	kg
4	s
5	A
6	K
7	mol
8	cd
9	deg
10	rad
11	sr
21	Gy
22	q
23	°C
24	Sv
25	F
26	C
27	S
28	H
29	V
30	ohm
31	J
32	N
33	Hz
34	lx
35	Lm
36	Wb
37	T
38	W

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

## 7 MMS DATA-TYPE CONVERSIONS

The following table shows the relationships between the Part 7 and Part 8-1 data types. The definitions presented above use Part 7 data types, however these are subject to 'translation' when exposed over an MMS (Part 8-1) interface:

Part 7 Type	MMS Type	Part 7 Description
BOOLEAN	Bool	Logical TRUE/FALSE value
BSTR16	Bstring16	Bit string 16
BVstring13	BVstring13	Variable bit string (upto 13 bits)
Check	BVstring2	Control Object check flags
CODED_ENUM	Byte	Coded enumeration
CODED_ENUM2	Byte	Coded enumeration (2)
Dbpos	Bstring2	Switch positions
EntryTime	Btime6	8.1 Section 8.1.3.7
ENUMERATED16	Short	16 bit enumerated value
ENUMERATED8	Byte	8 bit enumerated value
FLOAT32	Float	32 bit floating point value
FLOAT64	Double	64 bit floating point value
INT16	Short	16 bit signed integer value
INT16U	Ushort	16 bit unsigned integer value
INT24U	Ulong	24 bit unsigned integer value
INT32	Long	32 bit signed integer value
INT32U	Ulong	32 bit unsigned integer value
INT64	Int64	64 bit signed integer value
INT8	Byte	8 bit signed integer value
INT8U	Ubyte	8 bit unsigned integer value
OCTET_STRING6	Ostring6	6 character string (8 bits per character)
OCTET_STRING64	OVstring64	64 character string (8 bits per character)
OCTET_STRING8	OVstring8	8 character string (8 bits per character)
Quality	BVstring13	IEC61850 Quality
TimeStamp	Uttime	IEC61850 Time stamp
UNICODE_STRING255	UTF8Vstring255	255 character string (16 bits per unicode character)
UTC_TM	Uttime	UTC Timestamp
VISIBLE_STRING255	Vstring255	255 character string
VISIBLE_STRING64	Vstring64	64 character string
VISIBLE_STRING65	Vstring65	65 character string
VISIBLE_STRING97	Vstring97	97 character string







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