GE
Grid Solutions

# MiCOM P40 Agile

## P345

**MICS**
**Model Implementation Conformance Statement - Edition 2**

Hardware version: M
Software version: 91
Publication reference: P345-MC2-EN-1.1

# 1. MODEL IMPLEMENTATION CONFORMANCE STATEMENT (MICS)

## 1.1 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.

## 1.2 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 GE custom attributes

## 1.3 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 |
|---|---|
| AutoControl | Commands and controls used for Automatic Control |
| AutoSynChk | Automatically Synchronism Check Control for CB |
| CBControl | Commands and controls for CB |
| CtlCB | Control CB |
| CtlCBFail | CB Fail Control Element |
| Measurements | Measurements |
| PloCnt | Programmable Logic Counters |
| ProtAng | Pole Slip (based on Internal phase angle) |
| ProtCli | CLI Protection |
| ProtDif | Differential Protection |
| ProtDmp | Dead machine |
| Protection | P345 Protection |
| ProtEft | Earth Fault Protection |
| ProtExc | Under Excitation |
| ProtFfc | Counter based Field Failure |
| ProtFrq | Frequency Protection |
| ProtNvd | Residual Voltage Protection |
| ProtOvCur | Overcurrent Protection |

| Logical Device | Comment/Usage |
|---|---|
| ProtOvThm | Thermal Overload Protection |
| ProtPow | Pole Slip (based on Sensitive Power) |
| ProtPsz | Pole slip / Out of Step |
| ProtPwr | Power Protection |
| ProtRtd | RTD Thermal Protection |
| ProtRteChgFrq | Frequency Change Ratio Protection |
| ProtRtrEf | Rotor Earth Fault Protection |
| ProtRtrThm | Rotor NPS Thermal Protection |
| ProtSbk | System Backup Protection |
| ProtSenEF | Sensitive Earth Fault Protection |
| ProtSenPwr | Sensitive Power Protection |
| ProtSta | Stator Earth Fault Protection |
| ProtSvn | VTS/CTS Supervision |
| ProtVhz | Overflux Protection |
| ProtVtp | Time-voltage Protection |
| Records | Records |
| System | System |

### 1.3.1 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 |
|---|---|---|---|
| AutoControl | | | |
| | LLN0 | LLN0_STANDARD | AutoControl Logical Device |
| | LPHD1 | LPHD_STANDARD | Px40 Physical Device Information |
| AutoSynChk | | | |
| | AscRSYN1 | RSYN_DIFCLC_ENH | System Checks - Check Sync 1 |
| | AscRSYN2 | RSYN_DIFCLC_ENH | System Checks - Check Sync 2 |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for Automatic Synchronism Check Control |
| CBControl | | | |
| | LLN0 | LLN0_STANDARD | CBControl Logical Device |
| | LPHD1 | LPHD_STANDARD | Px40 Physical Device Information |
| CtlCB | | | |
| | CBCILO1 | CILO_INTERLOCK | Circuit Breaker Interlocking for CB |
| | CBCSWI1 | CSWI_BASIC | Switch Controller for CB |
| | CBPTRC1 | PTRC_GLOBAL | Protection trip for CB Control |

| LD | LN Instance | LN Type | Description |
|---|---|---|---|
| | CBXCBR1 | XCBR_BASIC | Circuit Breaker Monitoring (Pole 1) |
| | CBXCBR2 | XCBR_BASIC | Circuit Breaker Monitoring (Pole 2) |
| | CBXCBR3 | XCBR_BASIC | Circuit Breaker Monitoring (Pole 3) |
| | CBXCBR4 | XCBR_BASIC | Circuit Breaker Monitoring for 3-pole |
| | LLN0 | LLN0_STANDARD | Logical Device for CB Control |
| CtlCBFail | | | |
| | CbfPTRC18 | PTRC_INDIVID_NO_SEG | Protection trip for CB Fail |
| | CbfRBRF1 | RBRF_EXTTRIP | CB Fail 1 |
| | CbfRBRF2 | RBRF_EXTTRIP | CB Fail 2 |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for CB Fail Control |
| Measurements | | | |
| | AfqMMTR1 | MMTR_AFQ | Abnormal Frequency Time measurements |
| | DfpMMXU1 | MMXU_DFDT | df/dt |
| | LLN0 | LLN0_STANDARD_MEA | Measurements Logical Device |
| | LolMMTR1 | MMTR_LOL | Loss of Life (Transformer) Meter values |
| | LolMMXU1 | MMXU_LOL | Loss of life (transformer) measurements |
| | LPHD1 | LPHD_STANDARD | Physical Device Information |
| | PriAvgMMXU1 | MMXU_METER_AV | Primary Average Value of Fixed Measurements |
| | PriAvgMMXU2 | MMXU_METER_AV | Primary Average Value of Rolled Measurements |
| | PriCsvMMXU1 | MMXU_CSV | Primary C/S Measurements |
| | PriFltMLFR1 | MLFR_FAULT_RECORD_1 | Measurements during the Latest Fault Record |
| | PriFltMLFR2 | MLFR_FAULT_RECORD_P345 | Measurements during the Latest Fault Record (P345) |
| | PriFouMMXU1 | MMXU_FOURIER | Primary Fourier Derived Measurands |
| | PriHa3MMXU1 | MMXU_THIRD_HARMONIC | Primary Third Harmonic Measurements |
| | PriImpMMXU1 | MMXU_Z | Primary impedance measurements |
| | PriLzdMMXU1 | MMXU_GEN_DIFF | Primary Generator Differential measurements |
| | PriMaxMMXU1 | MMXU_METER_MAX | Primary Maximum Value of Measurement |
| | PriMMTR1 | MMTR_PRIV | Primary based metering quantities |
| | PriMSQI1 | MSQI_ALL | Primary Sequence Measurements |
| | PriMSQI2 | MSQI_CT2 | Primary Sequence measurements for CT2 (only include seqA) |

| LD | LN Instance | LN Type | Description |
|---|---|---|---|
| | PriRmsMMXU1 | MMXU_RMS | Primary RMS Measurements |
| | PriSenMMXU1 | MMXU_SENSITIVE | Primary Sensitive power measurements |
| | PriStaMMXU1 | MMXU_STEFI_PRI | Primary Measurements for StEFI function |
| | PriStdMMXU1 | MMXU_BASIC_ALL | Primary Standard Measurements all except P341 |
| | PriStdMMXU2 | MMXU_BASIC2 | Primary Standard measurements - second CTs |
| | PriVhzMMXU1 | MMXU_VHZ | Primary Volts/Hz Measurements |
| | RtrLfiMMXU1 | MMXU_ROTOR_EF | Rotor EF Measurements |
| | SecAvgMMXU1 | MMXU_METER_AV | Secondary Average Value of Fixed Measurements |
| | SecAvgMMXU2 | MMXU_METER_AV | Secondary Average Value of Rolled Measurements |
| | SecCsvMMXU1 | MMXU_CSV | Secondary C/S Measurements |
| | SecFouMMXU1 | MMXU_FOURIER | Secondary Fourier Derived Measurands |
| | SecHa3MMXU1 | MMXU_THIRD_HARMONIC | Secondary Third Harmonic Measurements |
| | SecImpMMXU1 | MMXU_Z | Secondary impedance measurements |
| | SecLzdMMXU1 | MMXU_GEN_DIFF | Secondary Generator Differential measurements |
| | SecMaxMMXU1 | MMXU_METER_MAX | Secondary Maximum Value of Measurement |
| | SecMMTR1 | MMTR_PRIV | Secondary based metering quantities |
| | SecMSQI1 | MSQI_ALL | Secondary Sequence Measurements |
| | SecMSQI2 | MSQI_CT2 | Secondary Sequence measurements for CT2 (only include seqA) |
| | SecRmsMMXU1 | MMXU_RMS | Secondary RMS Measurements |
| | SecSenMMXU1 | MMXU_SENSITIVE | Secondary Sensitive power measurements |
| | SecStaMMXU1 | MMXU_STEFI_SEC | Secondary measurements for StEFI function |
| | SecStdMMXU1 | MMXU_BASIC_ALL | Secondary Standard Measurements all except P341 |
| | SecStdMMXU2 | MMXU_BASIC2 | Secondary Standard measurements - second CTs |
| | SecVhzMMXU1 | MMXU_VHZ | Secondary Volts/Hz Measurements |
| | ThmMMXU1 | MMXU_THM | Thermal Measurements |
| | XfrDifMMXU1 | MMXU_DIFF | Transformer Differential and Harmonic Values |
| PloCnt | | | |
| | CntFCNT1 | FCNT_COUNTER | PSL Settable Counter 1 |

| LD | LN Instance | LN Type | Description |
|---|---|---|---|
| | CntFCNT10 | FCNT_COUNTER | PSL Settable Counter 10 |
| | CntFCNT11 | FCNT_COUNTER | PSL Settable Counter 11 |
| | CntFCNT12 | FCNT_COUNTER | PSL Settable Counter 12 |
| | CntFCNT13 | FCNT_COUNTER | PSL Settable Counter 13 |
| | CntFCNT14 | FCNT_COUNTER | PSL Settable Counter 14 |
| | CntFCNT15 | FCNT_COUNTER | PSL Settable Counter 15 |
| | CntFCNT16 | FCNT_COUNTER | PSL Settable Counter 16 |
| | CntFCNT2 | FCNT_COUNTER | PSL Settable Counter 2 |
| | CntFCNT3 | FCNT_COUNTER | PSL Settable Counter 3 |
| | CntFCNT4 | FCNT_COUNTER | PSL Settable Counter 4 |
| | CntFCNT5 | FCNT_COUNTER | PSL Settable Counter 5 |
| | CntFCNT6 | FCNT_COUNTER | PSL Settable Counter 6 |
| | CntFCNT7 | FCNT_COUNTER | PSL Settable Counter 7 |
| | CntFCNT8 | FCNT_COUNTER | PSL Settable Counter 8 |
| | CntFCNT9 | FCNT_COUNTER | PSL Settable Counter 9 |
| | LLN0 | LLN0_STANDARD | Programmable Logic Counters Logical Device |
| ProtAng | | | |
| | AngPDUP1 | PDUP_DDB | Pole Slipping Trip (internal phase angle) |
| | LLN0 | LLN0_STANDARD | Logical Device for Pole Slip (based on Internal phase angle) |
| ProtCli | | | |
| | CliSCLI1 | SCLI_BASIC | Current Loop Input protection - channel 1 |
| | CliSCLI2 | SCLI_BASIC | Current Loop Input protection - channel 2 |
| | CliSCLI3 | SCLI_BASIC | Current Loop Input protection - channel 3 |
| | CliSCLI4 | SCLI_BASIC | Current Loop Input protection - channel 4 |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for CLI Protection |
| ProtDif | | | |
| | DifHzdPDIF1 | PDIF_NO_SEG | Differential - High Impedance |
| | DifIntPDIF1 | PDIF_NO_SEG | Differential - Interturn |
| | DifLzdPDIF1 | PDIF_NO_SEG | Differential - Low Impedance |
| | DifPTRC4 | PTRC_INDIVID_NO_SEG | Protection trip for Differential protection |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for Differential Protection |
| | XfrDifPDIF1 | PDIF_NO_SEG | Xformer Differential |
| ProtDmp | | | |
| | DmpPDMP1 | PDMP_NORMAL | Dead machine |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for Dead Machine Protection |
| Protection | | | |

| LD | LN Instance | LN Type | Description |
|---|---|---|---|
| | LLN0 | LLN0_STANDARD | Protection Logical Device with Standard Template |
| | LPHD1 | LPHD_STANDARD | Physical Device Information |
| ProtEft | | | |
| | EftPTOC1 | PTOC_NO_SEG | Earth fault - stage 1 |
| | EftPTOC2 | PTOC_NO_SEG | Earth fault - stage 2 |
| | EftPTRC3 | PTRC_INDIVID_NO_SEG | Protection trip for Earth Fault Protection |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for Earth Fault Protection |
| ProtExc | | | |
| | ExcPDUP1 | PDUP_NO_SEG | Under excitation - stage 1 |
| | ExcPDUP2 | PDUP_NO_SEG | Under excitation - stage 2 |
| | ExcPTRC5 | PTRC_INDIVID_NO_SEG | Protection trip for Under Excitation Protection |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for Under Excitation Protection |
| ProtFfc | | | |
| | FfcPDUP1 | PDUP_DDB | Counter based field failure 1 trip |
| | FfcPDUP2 | PDUP_DDB | Counter based field failure 2 trip |
| | LLN0 | LLN0_STANDARD | Logical Device for Counter based field failure protection |
| ProtFrq | | | |
| | FrqPTOF1 | PTOF_NO_SEG | F> 1 Overfrequency |
| | FrqPTOF2 | PTOF_NO_SEG | F> 2 Overfrequency |
| | FrqPTRC10 | PTRC_INDIVID_NO_SEG | Protection trip for Frequency Protection |
| | FrqPTUF1 | PTUF_NO_SEG | F< 1 Underfrequency |
| | FrqPTUF2 | PTUF_NO_SEG | F< 2 Underfrequency |
| | FrqPTUF3 | PTUF_NO_SEG | F< 3 Underfrequency |
| | FrqPTUF4 | PTUF_NO_SEG | F< 4 Underfrequency |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for Frequency Protection |
| | TafPTAF1 | PTAF_NO_SEG | Turbine Abnormal Frequency - Channel 1 |
| | TafPTAF2 | PTAF_NO_SEG | Turbine Abnormal Frequency - Channel 2 |
| | TafPTAF3 | PTAF_NO_SEG | Turbine Abnormal Frequency - Channel 3 |
| | TafPTAF4 | PTAF_NO_SEG | Turbine Abnormal Frequency - Channel 4 |
| | TafPTAF5 | PTAF_NO_SEG | Turbine Abnormal Frequency - Channel 5 |
| | TafPTAF6 | PTAF_NO_SEG | Turbine Abnormal Frequency - Channel 6 |
| ProtNvd | | | |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for NVD Protection |

| LD | LN Instance | LN Type | Description |
|---|---|---|---|
| | VtpResPTOV1 | PTOV_NO_SEG | VN> 1 Residual Overvoltage |
| | VtpResPTOV2 | PTOV_NO_SEG | VN> 2 Residual Overvoltage |
| | VtpResPTOV3 | PTOV_NO_SEG | VN> 3 Residual Overvoltage |
| | VtpResPTOV4 | PTOV_NO_SEG | VN> 4 Residual Overvoltage |
| | VtpResPTOV5 | PTOV_NO_SEG | VN> 5 Residual Overvoltage |
| | VtpResPTOV6 | PTOV_NO_SEG | VN> 6 Residual Overvoltage |
| | VtpResPTRC14 | PTRC_INDIVID_NO_SEG | Protection trip for NVD protection |
| ProtOvCur | | | |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for Overcurrent Protection |
| | NpsPTOC1 | PTOC_NO_SEG | NPS overcurrent - stage 1 |
| | NpsPTOC2 | PTOC_NO_SEG | NPS overcurrent - stage 2 |
| | NpsPTOC3 | PTOC_NO_SEG | NPS overcurrent - stage 3 |
| | NpsPTOC4 | PTOC_NO_SEG | NPS overcurrent - stage 4 |
| | OcpPTOC1 | PTOC_NO_SEG | I> 1 Overcurrent |
| | OcpPTOC2 | PTOC_NO_SEG | I> 2 Overcurrent |
| | OcpPTOC3 | PTOC_NO_SEG | I> 3 Overcurrent |
| | OcpPTOC4 | PTOC_NO_SEG | I> 4 Overcurrent |
| | OcpPTRC7 | PTRC_INDIVID_NO_SEG | Protection trip for Overcurrent Protection |
| ProtOvThm | | | |
| | HotPTTR1 | PTTR_HOT_TOP | Hot spot thermal protection - stage 1 |
| | HotPTTR2 | PTTR_HOT_TOP | Hot spot thermal protection - stage 2 |
| | HotPTTR3 | PTTR_HOT_TOP | Hot spot thermal protection - stage 3 |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for Thermal Overload Protection |
| | ThmPTRC20 | PTRC_INDIVID_NO_SEG | Protection trip for thermal Overload |
| | ThmPTTR1 | PTTR_NO_SEG | Thermal Overload |
| | TopPTTR1 | PTTR_HOT_TOP | Top Oil Thermal Overload - stage 1 |
| | TopPTTR2 | PTTR_HOT_TOP | Top Oil Thermal Overload - stage 2 |
| | TopPTTR3 | PTTR_HOT_TOP | Top Oil Thermal Overload - stage 3 |
| ProtPow | | | |
| | LLN0 | LLN0_STANDARD | Logical Device for Pole Slip (based on sensitive power) |
| | PowPDUP1 | PDUP_DDB | Pole Slipping Trip (sensitive power) |
| ProtPsz | | | |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for Pole Slip / Out of Step |

| LD | LN Instance | LN Type | Description |
|---|---|---|---|
| | | | Protection |
| | PszPPAM1 | PPAM_NO_SEG | Pole Slip / Out of Step - Zone 1 |
| | PszPPAM2 | PPAM_NO_SEG | Pole Slip / Out of Step - Zone 2 |
| | PszPTRC22 | PTRC_INDIVID_NO_SEG | Protection trip for Pole Slip / Out of Step Protection |
| ProtPwr | | | |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logic device for power protection |
| | NpsPDOP1 | PDOP_NO_SEG | Negative Phase Sequence Overpower protection stage 1 |
| | PdpPPWR1 | PPWR_NORMAL | Power protection (3-phase) stage 1 |
| | PdpPPWR2 | PPWR_NORMAL | Power protection (3-phase) stage 2 |
| | PdpPPWR3 | PPWR_NORMAL | Power protection (3-phase) stage 3 |
| | PdpPPWR4 | PPWR_NORMAL | Power protection (3-phase) stage 4 |
| | PdpPTRC6 | PTRC_INDIVID_NO_SEG | Protection trip for Power Protection |
| ProtRtd | | | |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for RTD Protection |
| | RtdSTMP1 | STMP_RTD | RTD channel 1 |
| | RtdSTMP10 | STMP_RTD | RTD channel 10 |
| | RtdSTMP2 | STMP_RTD | RTD channel 2 |
| | RtdSTMP3 | STMP_RTD | RTD channel 3 |
| | RtdSTMP4 | STMP_RTD | RTD channel 4 |
| | RtdSTMP5 | STMP_RTD | RTD channel 5 |
| | RtdSTMP6 | STMP_RTD | RTD channel 6 |
| | RtdSTMP7 | STMP_RTD | RTD channel 7 |
| | RtdSTMP8 | STMP_RTD | RTD channel 8 |
| | RtdSTMP9 | STMP_RTD | RTD channel 9 |
| ProtRteChgFrq | | | |
| | DfpPFRC1 | PFRC_NO_SEG | df/dt> 1 Frequency Rate of Change |
| | DfpPFRC2 | PFRC_NO_SEG | df/dt> 2 Frequency Rate of Change |
| | DfpPFRC3 | PFRC_NO_SEG | df/dt> 3 Frequency Rate of Change |
| | DfpPFRC4 | PFRC_NO_SEG | df/dt> 4 Frequency Rate of Change |
| | DfpPTRC8 | PTRC_INDIVID_NO_SEG | Protection trip for Frequency Rate Change Protection |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for Frequency Rate Change Protection |
| ProtRtrEf | | | |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for Rotor Earth Fault Protection |

| LD | LN Instance | LN Type | Description |
|---|---|---|---|
| | RtrLfiPEFI1 | PEFI_BASIC | Rotor Earth Fault Protection |
| ProtRtrThm | | | |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for Rotor NPS Thermal Protection |
| | RtpTrpPTTR1 | PTTR_NO_SEG | Rotor Thermal - NPS protection |
| ProtSbk | | | |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for System Backup Protection |
| | SbkOcpPTRC15 | PTRC_INDIVID_NO_SEG | Protection trip for System Backup Protection |
| | SbkOcpPVOC1 | PVOC_NO_SEG | System backup - voltage overcurrent |
| | SbkUzpPDIS1 | PDIS_SYSTEM | System backup - under impedance stage 1 |
| | SbkUzpPDIS2 | PDIS_SYSTEM | System backup - under impedance stage 2 |
| ProtSenEF | | | |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical device for Sensitive Earth Fault protection |
| | SenEftPTRC13 | PTRC_INDIVID_NO_SEG | Protection trip for Sensitive Earth Fault |
| | SenRefPDIF1 | PDIF_NO_SEG | IREF> 1 Restricted Earth Fault |
| | SenSefPSDE1 | PSDE_BASIC | ISEF>1 Sensitive Earth fault |
| ProtSenPwr | | | |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical device for Sensitive Power protection |
| | SenPdpPPWR1 | PPWR_NORMAL | Sensitive power (Single phase) stage 1 |
| | SenPdpPPWR2 | PPWR_NORMAL | Sensitive power (Single phase) stage 2 |
| | SenPdpPPWR3 | PPWR_NORMAL | Sensitive power (Single phase) stage 3 |
| | SenPdpPPWR4 | PPWR_NORMAL | Sensitive power (Single phase) stage 4 |
| | SenPdpPTRC16 | PTRC_INDIVID_NO_SEG | Protection trip for Sensitive Earth Fault |
| ProtSta | | | |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for Stator Earth Fault Protection |
| | StaHa3PTOV1 | PTOV_NO_SEG | 3rd Harmonic stator over voltage |
| | StaHa3PTUV1 | PTUV_NO_SEG | 3rd Harmonic stator under voltage |
| | StaLfiPEFI1 | PEFI_BASIC | STEFi protection - under resistance |
| | StaLfiPTOC1 | PTOC_NO_SEG | STEFi Protection - Overcurrent Stage |
| | StaPTRC17 | PTRC_INDIVID_NO_SEG | Protection trip for Stator Earth Fault Protection |
| ProtSvn | | | |

| LD | LN Instance | LN Type | Description |
|---|---|---|---|
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for VTS/CTS Supervision |
| | SvnRVCS1 | RVCS_VTS | VTS Supervision |
| | SvnRVCS2 | RVCS_CTS | CTS1 Supervision |
| | SvnRVCS3 | RVCS_CTS | CTS2 Supervision |
| ProtVhz | | | |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for Overflux Protection |
| | VhzPTRC19 | PTRC_INDIVID_NO_SEG | Protection trip for Overflux Protection |
| | VhzPVPH1 | PVPH_NO_SEG | Over fluxing - Stage 1 |
| | VhzPVPH2 | PVPH_NO_SEG | Over fluxing - Stage 2 |
| | VhzPVPH3 | PVPH_NO_SEG | Over fluxing - Stage 3 |
| | VhzPVPH4 | PVPH_NO_SEG | Over fluxing - Stage 4 |
| ProtVtp | | | |
| | LLN0 | LLN0_STANDARD_WITH_CTRLMOD | Logical Device for Vtp Protection |
| | NpsPTOV1 | PTOV_NO_SEG | NPS Overvoltage |
| | VtpPhsPTOV1 | PTOV_NO_SEG | V> 1 Overvoltage |
| | VtpPhsPTOV2 | PTOV_NO_SEG | V> 2 Overvoltage |
| | VtpPhsPTRC12 | PTRC_INDIVID_NO_SEG | Protection trip for Vtp Protection |
| | VtpPhsPTUV1 | PTUV_NO_SEG | V< 1 Undervoltage |
| | VtpPhsPTUV2 | PTUV_NO_SEG | V< 2 Undervoltage |
| | VtpPhsPTUV3 | PTUV_NO_SEG | V< 3 Undervoltage |
| Records | | | |
| | LLN0 | LLN0_STANDARD | Records Logical Device |
| | LPHD1 | LPHD_STANDARD | Physical Device Information |
| | RDRE1 | RDRE_BASIC | Disturbance Recorder |
| System | | | |
| | AlmGGIO1 | GGIO_ALM_96 | Alarms |
| | FnkGGIO1 | GGIO_IND_10 | Function Keys |
| | GosGGIO1 | GGIO_IND_64 | GOOSE Input Signals |
| | GosGGIO2 | GGIO_IND_64 | GOOSE Output Signals |
| | LedGGIO1 | GGIO_IND_18 | Red LED Signals |
| | LedGGIO2 | GGIO_IND_18 | Green LED Signals |
| | LGOS1 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 1 |
| | LGOS10 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 10 |
| | LGOS11 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 11 |
| | LGOS12 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 12 |
| | LGOS13 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 13 |

| LD | LN Instance | LN Type | Description |
|---|---|---|---|
| | LGOS14 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 14 |
| | LGOS15 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 15 |
| | LGOS16 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 16 |
| | LGOS17 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 17 |
| | LGOS18 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 18 |
| | LGOS19 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 19 |
| | LGOS2 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 2 |
| | LGOS20 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 20 |
| | LGOS21 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 21 |
| | LGOS22 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 22 |
| | LGOS23 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 23 |
| | LGOS24 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 24 |
| | LGOS25 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 25 |
| | LGOS26 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 26 |
| | LGOS27 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 27 |
| | LGOS28 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 28 |
| | LGOS29 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 29 |
| | LGOS3 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 3 |
| | LGOS30 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 30 |
| | LGOS31 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 31 |
| | LGOS32 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 32 |

| LD | LN Instance | LN Type | Description |
|---|---|---|---|
| | LGOS33 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 33 |
| | LGOS34 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 34 |
| | LGOS35 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 35 |
| | LGOS36 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 36 |
| | LGOS37 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 37 |
| | LGOS38 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 38 |
| | LGOS39 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 39 |
| | LGOS4 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 4 |
| | LGOS40 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 40 |
| | LGOS41 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 41 |
| | LGOS42 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 42 |
| | LGOS43 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 43 |
| | LGOS44 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 44 |
| | LGOS45 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 45 |
| | LGOS46 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 46 |
| | LGOS47 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 47 |
| | LGOS48 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 48 |
| | LGOS49 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 49 |
| | LGOS5 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 5 |
| | LGOS50 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 50 |
| | LGOS51 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 51 |

| LD | LN Instance | LN Type | Description |
|---|---|---|---|
| | LGOS52 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 52 |
| | LGOS53 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 53 |
| | LGOS54 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 54 |
| | LGOS55 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 55 |
| | LGOS56 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 56 |
| | LGOS57 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 57 |
| | LGOS58 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 58 |
| | LGOS59 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 59 |
| | LGOS6 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 6 |
| | LGOS60 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 60 |
| | LGOS61 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 61 |
| | LGOS62 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 62 |
| | LGOS63 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 63 |
| | LGOS64 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 64 |
| | LGOS7 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 7 |
| | LGOS8 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 8 |
| | LGOS9 | LGOS_SYSTEM | Monitoring of GOOSE Messages for External Publisher 9 |
| | LLN0 | LLN0_SYSTEM | System Logical Device |
| | LPHD1 | LPHD_SYSTEM | Physical Device Information for System Logical Device |
| | OptGGIO1 | GGIO_IND_32 | Opto (32) Inputs |
| | OrdRunGGIO1 | GGIO_IND_64 | Uniqueness of control "Order Running" indications for Control operations |

| LD | LN Instance | LN Type | Description |
|---|---|---|---|
| | PloGGIO1 | GGIO_IND_32_CTRL | Controllable Inputs |
| | RlyGGIO1 | GGIO_IND_32 | Output Contacts |

## 1.4 Logical Node definitions

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

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

| LN Type | (LN Class) | Description | Name Space |
|---|---|---|---|
| CILO_INTERLOCK | (CILO) | Control Interlocking | IEC 61850-7-4:2007B |
| CSWI_BASIC | (CSWI) | Switch controller | IEC 61850-7-4:2007B |
| FCNT_COUNTER | (FCNT) | Counter | IEC 61850-7-4:2007B |
| GGIO_IND_64 | (GGIO) | Generic Process I/O (w.r.t 64 Indication Elements) | IEC 61850-7-4:2007B |
| GGIO_ALM_96 | (GGIO) | Generic Process I/O (w.r.t 96 Alarm Elements) | IEC 61850-7-4:2007B |
| GGIO_IND_10 | (GGIO) | Generic Process I/O (w.r.t 10 Indication Elements) | IEC 61850-7-4:2007B |
| GGIO_IND_18 | (GGIO) | Generic Process I/O (w.r.t 18 Indication Elements) | IEC 61850-7-4:2007B |
| GGIO_IND_32 | (GGIO) | Generic Process I/O (w.r.t 32 Indication Elements) | IEC 61850-7-4:2007B |
| GGIO_IND_32_CTRL | (GGIO) | Generic process I/O (w.r.t 32 Indications Ctrl i/p) | IEC 61850-7-4:2007B |
| LGOS_SYSTEM | (LGOS) | Monitoring of GOOSE messages | IEC 61850-7-4:2007B |
| LLN0_STANDARD_MEA | (LLN0) | Measurements Logical Node 0 | IEC 61850-7-4:2007B |
| LLN0_STANDARD_WITH_CTRLMOD | (LLN0) | Logical Node 0 | IEC 61850-7-4:2007B |
| LLN0_SYSTEM | (LLN0) | System Logical Node 0 | IEC 61850-7-4:2007B |
| LLN0_STANDARD | (LLN0) | General Logical Node 0 | IEC 61850-7-4:2007B |
| LPHD_STANDARD | (LPHD) | Px40 Physical Device Information | IEC 61850-7-4:2007B |
| LPHD_SYSTEM | (LPHD) | Px40 Physical Device Information (used for Logical Device System only) | IEC 61850-7-4:2007B |
| MLFR_FAULT_RECORD_P345 | (MLFR) | Measurements of Fault Record | GE-SII:Px40:2013A |
| MLFR_FAULT_RECORD_1 | (MLFR) | Measurements of Fault Record | GE-SII:Px40:2013A |
| MMTR_PRIV | (MMTR) | Metering | IEC 61850-7-4:2007B |
| MMTR_AFQ | (MMTR) | Metering | IEC 61850-7-4:2007B |
| MMTR_LOL | (MMTR) | Metering | IEC 61850-7-4:2007B |
| MMXU_FOURIER | (MMXU) | Standard Measurements (w.r.t Fourier Values) | IEC 61850-7-4:2007B |

| LN Type | (LN Class) | Description | Name Space |
|---|---|---|---|
| MMXU_STEFI_PRI | (MMXU) | Measurements for Stator Earth Fault | IEC 61850-7-4:2007B |
| MMXU_SENSITIVE | (MMXU) | Standard measurements | IEC 61850-7-4:2007B |
| MMXU_ROTOR_EF | (MMXU) | Measurements for Rotor E/F | IEC 61850-7-4:2007B |
| MMXU_RMS | (MMXU) | Standard Measurements (w.r.t RMS Values) | IEC 61850-7-4:2007B |
| MMXU_METER_MAX | (MMXU) | Standard measurements (w.r.t Current, Real + Reactive Power - Max values) | IEC 61850-7-4:2007B |
| MMXU_METER_AV | (MMXU) | Metering Statistics (w.r.t Current, Real + Reactive Power - Average values) | IEC 61850-7-4:2007B |
| MMXU_GEN_DIFF | (MMXU) | Differential measurements | IEC 61850-7-4:2007B |
| MMXU_DIFF | (MMXU) | Standard measurements | IEC 61850-7-4:2007B |
| MMXU_DFDT | (MMXU) | Standard measurements (for dfdt only) | IEC 61850-7-4:2007B |
| MMXU_CSV | (MMXU) | Measurements for C/S | IEC 61850-7-4:2007B |
| MMXU_BASIC2 | (MMXU) | Standard measurements | IEC 61850-7-4:2007B |
| MMXU_BASIC_ALL | (MMXU) | Standard measurements | IEC 61850-7-4:2007B |
| MMXU_THM | (MMXU) | Standard measurements | IEC 61850-7-4:2007B |
| MMXU_LOL | (MMXU) | Loss-of-life (Transformer) measurements | IEC 61850-7-4:2007B |
| MMXU_STEFI_SEC | (MMXU) | Measurements for Stator Earth Fault | IEC 61850-7-4:2007B |
| MMXU_VHZ | (MMXU) | Measurements(w.r.t.Volts Per Hz) | IEC 61850-7-4:2007B |
| MMXU_Z | (MMXU) | Standard measurements | IEC 61850-7-4:2007B |
| MMXU_THIRD_HARMONIC | (MMXU) | Measurements (w.r.t 3rd Harmonic) | IEC 61850-7-4:2007B |
| MSQI_ALL | (MSQI) | Sequence and imbalance (w.r.t Pos, Neq, Zero) | IEC 61850-7-4:2007B |
| MSQI_CT2 | (MSQI) | Sequence and imbalance | IEC 61850-7-4:2007B |
| PDIF_NO_SEG | (PDIF) | Differential | IEC 61850-7-4:2007B |
| PDIS_SYSTEM | (PDIS) | Distance | IEC 61850-7-4:2007B |
| PDMP_NORMAL | (PDMP) | Combined Overcurrent/Undervoltage protection (Dead Machine) | GE-SII:Px40:2013A |
| PDOP_NO_SEG | (PDOP) | Over power protection | IEC 61850-7-4:2007B |
| PDUP_NO_SEG | (PDUP) | Under power protection | IEC 61850-7-4:2007B |
| PDUP_DDB | (PDUP) | Under power protection, for DDB | IEC 61850-7-4:2007B |
| PEFI_BASIC | (PEFI) | Earth Fault Injection protection | GE-SII:Px40:2013A |

| LN Type | (LN Class) | Description | Name Space |
|---|---|---|---|
| PFRC_NO_SEG | (PFRC) | Rate of change of frequency (w.r.t No Phase Segregation) | IEC 61850-7-4:2007B |
| PPAM_NO_SEG | (PPAM) | model "out-of-step" protection of generators | IEC 61850-7-4:2007B |
| PPWR_NORMAL | (PPWR) | Power Protection | GE-SII:Px40:2013A |
| PSDE_BASIC | (PSDE) | Sensitive directional earth fault | IEC 61850-7-4:2007B |
| PTAF_NO_SEG | (PTAF) | Turbine Abnormal Frequency Protection | GE-SII:Px40:2013A |
| PTOC_NO_SEG | (PTOC) | Timed Overcurrent (w.r.t No Phase Segregation) | IEC 61850-7-4:2007B |
| PTOF_NO_SEG | (PTOF) | Overfrequency (w.r.t No Phase Segregation) | IEC 61850-7-4:2007B |
| PTOV_NO_SEG | (PTOV) | Overvoltage (w.r.t No Phase Segregation) | IEC 61850-7-4:2007B |
| PTRC_GLOBAL | (PTRC) | Protection trip for global protection conditioning | IEC 61850-7-4:2007B |
| PTRC_INDIVID_NO_SEG | (PTRC) | Protection trip for individual protection conditioning | IEC 61850-7-4:2007B |
| PTTR_HOT_TOP | (PTTR) | Thermal overload | IEC 61850-7-4:2007B |
| PTTR_NO_SEG | (PTTR) | Thermal overload (w.r.t No Phase Segregation) | IEC 61850-7-4:2007B |
| PTUF_NO_SEG | (PTUF) | Underfrequency (w.r.t No Phase Segregation) | IEC 61850-7-4:2007B |
| PTUV_NO_SEG | (PTUV) | Undervoltage | IEC 61850-7-4:2007B |
| PVOC_NO_SEG | (PVOC) | Voltage controlled time overcurrent | IEC 61850-7-4:2007B |
| PVPH_NO_SEG | (PVPH) | Volts per Hz protection | IEC 61850-7-4:2007B |
| RBRF_EXTTRIP | (RBRF) | Breaker Failure (w.r.t External Tripping) | IEC 61850-7-4:2007B |
| RDRE_BASIC | (RDRE) | Disturbance Recorder function (w.r.t Mandatory Attributes only) | IEC 61850-7-4:2007B |
| RSYN_DIFCLC_ENH | (RSYN) | Synchronism-check / Synchronising (w.r.t Calculated Differential Measurements) | IEC 61850-7-4:2007B |
| RVCS_CTS | (RVCS) | CTS monitoring and report | GE-SII:Px40:2013A |
| RVCS_VTS | (RVCS) | VTS monitoring and report | GE-SII:Px40:2013A |
| SCLI_BASIC | (SCLI) | Current loop monitoring and reporting | GE-SII:Px40:2013A |
| STMP_RTD | (STMP) | Temperature supervision. | IEC 61850-7-4:2007B |
| XCBR_BASIC | (XCBR) | Circuit Breaker (w.r.t Mandatory Attributes Only) | IEC 61850-7-4:2007B |

1.4.1 Logical Node: CILO_INTERLOCK

Description: Control Interlocking

LN Class: CILO

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| EnaOpn | SPS_WD | Enable OPEN Commands | | |
| EnaCls | SPS_WD | Enable CLOSE Commands | | |

1.4.2 Logical Node: CSWI_BASIC

Description: Switch controller

LN Class: CSWI

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| Loc | SPS_WD | Local control behaviour | | |
| OpOpn | ACT_NO_SEG | Operation "open switch" | T | |
| OpCls | ACT_NO_SEG | Operation "close switch" | T | |
| OpCntRs | INC_MOD_STD | Resettable operation counter | | |
| Pos | DPC_CTRL | Switch, general | | |

1.4.3 Logical Node: FCNT_COUNTER

Description: Counter

LN Class: FCNT

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| CntVal | BCR_PRIV | Counter | | |
| RsCnt | SPC_CTRL_PRIV | Counter Reset | | X |

1.4.4 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 |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Alm01 | SPS_D | General single alarm | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| Alm02 | SPS_D | General single alarm | | |
| Alm03 | SPS_D | General single alarm | | |
| Alm04 | SPS_D | General single alarm | | |
| Alm05 | SPS_D | General single alarm | | |
| Alm06 | SPS_D | General single alarm | | |
| Alm07 | SPS_D | General single alarm | | |
| Alm08 | SPS_D | General single alarm | | |
| Alm09 | SPS_D | General single alarm | | |
| Alm10 | SPS_D | General single alarm | | |
| Alm11 | SPS_D | General single alarm | | |
| Alm12 | SPS_D | General single alarm | | |
| Alm13 | SPS_D | General single alarm | | |
| Alm14 | SPS_D | General single alarm | | |
| Alm15 | SPS_D | General single alarm | | |
| Alm16 | SPS_D | General single alarm | | |
| Alm17 | SPS_D | General single alarm | | |
| Alm18 | SPS_D | General single alarm | | |
| Alm19 | SPS_D | General single alarm | | |
| Alm20 | SPS_D | General single alarm | | |
| Alm21 | SPS_D | General single alarm | | |
| Alm22 | SPS_D | General single alarm | | |
| Alm23 | SPS_D | General single alarm | | |
| Alm24 | SPS_D | General single alarm | | |
| Alm25 | SPS_D | General single alarm | | |
| Alm26 | SPS_D | General single alarm | | |
| Alm27 | SPS_D | General single alarm | | |
| Alm28 | SPS_D | General single alarm | | |
| Alm29 | SPS_D | General single alarm | | |
| Alm30 | SPS_D | General single alarm | | |
| Alm31 | SPS_D | General single alarm | | |
| Alm32 | SPS_D | General single alarm | | |
| Alm33 | SPS_D | General single alarm | | |
| Alm34 | SPS_D | General single alarm | | |
| Alm35 | SPS_D | General single alarm | | |
| Alm36 | SPS_D | General single alarm | | |
| Alm37 | SPS_D | General single alarm | | |
| Alm38 | SPS_D | General single alarm | | |
| Alm39 | SPS_D | General single alarm | | |
| Alm40 | SPS_D | General single alarm | | |
| Alm41 | SPS_D | General single alarm | | |
| Alm42 | SPS_D | General single alarm | | |
| Alm43 | SPS_D | General single alarm | | |
| Alm44 | SPS_D | General single alarm | | |
| Alm45 | SPS_D | General single alarm | | |
| Alm46 | SPS_D | General single alarm | | |

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| Alm47 | SPS_D | General single alarm | | |
| Alm48 | SPS_D | General single alarm | | |
| Alm49 | SPS_D | General single alarm | | |
| Alm50 | SPS_D | General single alarm | | |
| Alm51 | SPS_D | General single alarm | | |
| Alm52 | SPS_D | General single alarm | | |
| Alm53 | SPS_D | General single alarm | | |
| Alm54 | SPS_D | General single alarm | | |
| Alm55 | SPS_D | General single alarm | | |
| Alm56 | SPS_D | General single alarm | | |
| Alm57 | SPS_D | General single alarm | | |
| Alm58 | SPS_D | General single alarm | | |
| Alm59 | SPS_D | General single alarm | | |
| Alm60 | SPS_D | General single alarm | | |
| Alm61 | SPS_D | General single alarm | | |
| Alm62 | SPS_D | General single alarm | | |
| Alm63 | SPS_D | General single alarm | | |
| Alm64 | SPS_D | General single alarm | | |
| Alm65 | SPS_D | General single alarm | | |
| Alm66 | SPS_D | General single alarm | | |
| Alm67 | SPS_D | General single alarm | | |
| Alm68 | SPS_D | General single alarm | | |
| Alm69 | SPS_D | General single alarm | | |
| Alm70 | SPS_D | General single alarm | | |
| Alm71 | SPS_D | General single alarm | | |
| Alm72 | SPS_D | General single alarm | | |
| Alm73 | SPS_D | General single alarm | | |
| Alm74 | SPS_D | General single alarm | | |
| Alm75 | SPS_D | General single alarm | | |
| Alm76 | SPS_D | General single alarm | | |
| Alm77 | SPS_D | General single alarm | | |
| Alm78 | SPS_D | General single alarm | | |
| Alm79 | SPS_D | General single alarm | | |
| Alm80 | SPS_D | General single alarm | | |
| Alm81 | SPS_D | General single alarm | | |
| Alm82 | SPS_D | General single alarm | | |
| Alm83 | SPS_D | General single alarm | | |
| Alm84 | SPS_D | General single alarm | | |
| Alm85 | SPS_D | General single alarm | | |
| Alm86 | SPS_D | General single alarm | | |
| Alm87 | SPS_D | General single alarm | | |
| Alm88 | SPS_D | General single alarm | | |
| Alm89 | SPS_D | General single alarm | | |
| Alm90 | SPS_D | General single alarm | | |
| Alm91 | SPS_D | General single alarm | | |

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

1.4.5 Logical Node: GGIO_IND_10

Description: Generic Process I/O (w.r.t 10 Indication Elements)

LN Class: GGIO

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Ind01 | SPS_D | General Indication | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| Ind02 | SPS_D | General Indication | | |
| Ind03 | SPS_D | General Indication | | |
| Ind04 | SPS_D | General Indication | | |
| Ind05 | SPS_D | General Indication | | |
| Ind06 | SPS_D | General Indication | | |
| Ind07 | SPS_D | General Indication | | |
| Ind08 | SPS_D | General Indication | | |
| Ind09 | SPS_D | General Indication | | |
| Ind10 | SPS_D | General Indication | | |

1.4.6 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 |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| Ind01 | SPS_D | General Indication | | |
| Ind02 | SPS_D | General Indication | | |
| Ind03 | SPS_D | General Indication | | |
| Ind04 | SPS_D | General Indication | | |
| Ind05 | SPS_D | General Indication | | |
| Ind06 | SPS_D | General Indication | | |
| Ind07 | SPS_D | General Indication | | |
| Ind08 | SPS_D | General Indication | | |
| Ind09 | SPS_D | General Indication | | |
| Ind10 | SPS_D | General Indication | | |
| Ind11 | SPS_D | General Indication | | |
| Ind12 | SPS_D | General Indication | | |

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| Ind13 | SPS_D | General Indication | | |
| Ind14 | SPS_D | General Indication | | |
| Ind15 | SPS_D | General Indication | | |
| Ind16 | SPS_D | General Indication | | |
| Ind17 | SPS_D | General Indication | | |
| Ind18 | SPS_D | General Indication | | |

1.4.7 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 |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Ind01 | SPS_D | General Indication | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| Ind02 | SPS_D | General Indication | | |
| Ind03 | SPS_D | General Indication | | |
| Ind04 | SPS_D | General Indication | | |
| Ind05 | SPS_D | General Indication | | |
| Ind06 | SPS_D | General Indication | | |
| Ind07 | SPS_D | General Indication | | |
| Ind08 | SPS_D | General Indication | | |
| Ind09 | SPS_D | General Indication | | |
| Ind10 | SPS_D | General Indication | | |
| Ind11 | SPS_D | General Indication | | |
| Ind12 | SPS_D | General Indication | | |
| Ind13 | SPS_D | General Indication | | |
| Ind14 | SPS_D | General Indication | | |
| Ind15 | SPS_D | General Indication | | |
| Ind16 | SPS_D | General Indication | | |
| Ind17 | SPS_D | General Indication | | |
| Ind18 | SPS_D | General Indication | | |
| Ind19 | SPS_D | General Indication | | |
| Ind20 | SPS_D | General Indication | | |
| Ind21 | SPS_D | General Indication | | |
| Ind22 | SPS_D | General Indication | | |
| Ind23 | SPS_D | General Indication | | |
| Ind24 | SPS_D | General Indication | | |
| Ind25 | SPS_D | General Indication | | |
| Ind26 | SPS_D | General Indication | | |
| Ind27 | SPS_D | General Indication | | |
| Ind28 | SPS_D | General Indication | | |
| Ind29 | SPS_D | General Indication | | |
| Ind30 | SPS_D | General Indication | | |

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| Ind31 | SPS_D | General Indication | | |
| Ind32 | SPS_D | General Indication | | |

1.4.8 Logical Node: GGIO_IND_32_CTRL

Description: Generic process I/O (w.r.t 32 Indications Ctrl i/p)

LN Class: GGIO

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| SPCSO01 | SPC_CONTROL | Single point controllable status output | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| SPCSO02 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO03 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO04 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO05 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO06 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO07 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO08 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO09 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO10 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO11 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO12 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO13 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO14 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO15 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO16 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO17 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO18 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO19 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO20 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO21 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO22 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO23 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO24 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO25 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO26 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO27 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO28 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO29 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO30 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO31 | SPC_CONTROL | Single point controllable status output | | |
| SPCSO32 | SPC_CONTROL | Single point controllable status output | | |

1.4.9 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 |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| Ind01 | SPS_D | General indication | | |
| Ind02 | SPS_D | General indication | | |
| Ind03 | SPS_D | General indication | | |
| Ind04 | SPS_D | General indication | | |
| Ind05 | SPS_D | General indication | | |
| Ind06 | SPS_D | General indication | | |
| Ind07 | SPS_D | General indication | | |
| Ind08 | SPS_D | General indication | | |
| Ind09 | SPS_D | General indication | | |
| Ind10 | SPS_D | General indication | | |
| Ind11 | SPS_D | General indication | | |
| Ind12 | SPS_D | General indication | | |
| Ind13 | SPS_D | General indication | | |
| Ind14 | SPS_D | General indication | | |
| Ind15 | SPS_D | General indication | | |
| Ind16 | SPS_D | General indication | | |
| Ind17 | SPS_D | General indication | | |
| Ind18 | SPS_D | General indication | | |
| Ind19 | SPS_D | General indication | | |
| Ind20 | SPS_D | General indication | | |
| Ind21 | SPS_D | General indication | | |
| Ind22 | SPS_D | General indication | | |
| Ind23 | SPS_D | General indication | | |
| Ind24 | SPS_D | General indication | | |
| Ind25 | SPS_D | General indication | | |
| Ind26 | SPS_D | General indication | | |
| Ind27 | SPS_D | General indication | | |
| Ind28 | SPS_D | General indication | | |
| Ind29 | SPS_D | General indication | | |
| Ind30 | SPS_D | General indication | | |
| Ind31 | SPS_D | General indication | | |
| Ind32 | SPS_D | General indication | | |
| Ind33 | SPS_D | General indication | | |
| Ind34 | SPS_D | General indication | | |
| Ind35 | SPS_D | General indication | | |
| Ind36 | SPS_D | General indication | | |
| Ind37 | SPS_D | General indication | | |

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| Ind38 | SPS_D | General indication | | |
| Ind39 | SPS_D | General indication | | |
| Ind40 | SPS_D | General indication | | |
| Ind41 | SPS_D | General indication | | |
| Ind42 | SPS_D | General indication | | |
| Ind43 | SPS_D | General indication | | |
| Ind44 | SPS_D | General indication | | |
| Ind45 | SPS_D | General indication | | |
| Ind46 | SPS_D | General indication | | |
| Ind47 | SPS_D | General indication | | |
| Ind48 | SPS_D | General indication | | |
| Ind49 | SPS_D | General indication | | |
| Ind50 | SPS_D | General indication | | |
| Ind51 | SPS_D | General indication | | |
| Ind52 | SPS_D | General indication | | |
| Ind53 | SPS_D | General indication | | |
| Ind54 | SPS_D | General indication | | |
| Ind55 | SPS_D | General indication | | |
| Ind56 | SPS_D | General indication | | |
| Ind57 | SPS_D | General indication | | |
| Ind58 | SPS_D | General indication | | |
| Ind59 | SPS_D | General indication | | |
| Ind60 | SPS_D | General indication | | |
| Ind61 | SPS_D | General indication | | |
| Ind62 | SPS_D | General indication | | |
| Ind63 | SPS_D | General indication | | |
| Ind64 | SPS_D | General indication | | |

1.4.10 Logical Node: LGOS_SYSTEM

Description: Monitoring of GOOSE messages

LN Class: LGOS

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| St | SPS_WD | Status of the subscription (True = active, False=not active) | | |
| SimSt | SPS_WD | Status showing that really Sim messages are received and accepted | | |
| GoCBRef | ORG_SRC_REF | Reference to the subscribed GOOSE control block | | |
| OoSeqGo | SPS_WD_PRIV | Out of order GOOSE indication | | X |

1.4.11 Logical Node: LLN0_STANDARD

Description: General Logical Node 0

LN Class: LLN0

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LLN0 | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| GrRef | ORG_SRC_REF | Reference to a higher level logical device | | |

1.4.12 Logical Node: LLN0_STANDARD_MEA

Description: Measurements Logical Node 0

LN Class: LLN0

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LLN0_MEA | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| GrRef | ORG_SRC_REF | Reference to a higher level logical device | | |

1.4.13 Logical Node: LLN0_STANDARD_WITH_CTRLMOD

Description: Logical Node 0

LN Class: LLN0

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LLN0 | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_CTRL_LD_MOD_2 | Mode | | |
| GrRef | ORG_SRC_REF | Reference to a higher level logical device | | |

1.4.14 Logical Node: LLN0_SYSTEM

Description: System Logical Node 0

LN Class: LLN0

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LLN0 | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_CTRL_LD_MOD | Mode | | |
| LEDRs | SPC_CONTROL | LED reset | T | |
| OrdRun | SPS_WD_PRIV | Indicate IED is operating a Control Object | | X |
| SyncSt | SPS_WD_PRIV | Indicate time synchronisation in the IED is active/inactive | | X |

1.4.15 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 | ENS_HEALTH | Physical device health | | |
| Proxy | SPS_D | Indicates if this LN is a proxy | | |
| PwrUp | SPS_D | Power up detected | | |

1.4.16 Logical Node: LPHD_SYSTEM

Description: Px40 Physical Device Information (used for Logical Device System only)

LN Class: LPHD

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| PhyNam | DPL_STANDARD | Physical device name plate | | |
| PhyHealth | ENS_HEALTH | Physical device health | | |
| Proxy | SPS_D | Indicates if this LN is a proxy | | |
| PwrUp | SPS_D | Power up detected | | |
| Sim | SPC_CONTROL | Receive simulated GOOSE or simulated SV | | |

1.4.17 Logical Node: MLFR_FAULT_RECORD_1

Description: Measurements of Fault Record

LN Class: MLFR

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN_PRIV | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS_DN | Behaviour | | |
| Health | ENS_HEALTH_DN | Health | | |
| Mod | ENC_MOD_THREE_STATUS_DN | Mode | | |
| Hz | MV_FLOAT_D_PRIV | Fault system frequency | | X |
| FltDur | MV_FLOAT_D_PRIV | Fault duration time | | X |
| CBOpTim | MV_FLOAT_D_PRIV | CB operate time | | X |
| RlyTrTim | MV_FLOAT_D_PRIV | Relay trip time | | X |
| A1Flt | WYE_SEG_D_PRIV | CT1 Fault Current | | X |
| PPVFlt | DEL_SEG_D_PRIV | Fault phase to phase voltage | | X |
| PhVFlt | WYE_SEG_D_PRIV | Fault Voltage | | X |
| VN1Flt | MV_FLOAT_D_PRIV | Fault Measured Neutral Voltage 1 | | X |
| VNFlt | MV_FLOAT_D_PRIV | Fault Derived Neutral Voltage | | X |
| NeutA1Flt | MV_FLOAT_D_PRIV | Fault Measured Neutral Current | | X |
| ISefFlt | MV_FLOAT_D_PRIV | Fault Sensitive Earth Fault Current | | X |
| SeqI2Flt | MV_FLOAT_D_PRIV | Fault Negative Sequence Current | | X |
| SeqV2Flt | MV_FLOAT_D_PRIV | Fault Negative Sequence Voltage | | X |
| TotWFlt | MV_FLOAT_D_PRIV | Fault Total Active Power | | X |
| TotVArFlt | MV_FLOAT_D_PRIV | Fault Total Reactive Power | | X |
| SenTotWFlt | MV_FLOAT_D_PRIV | Fault Total Active Sensitive Power | | X |
| SenTotVArFlt | MV_FLOAT_D_PRIV | Fault Total Reactive Sensitive Power | | X |
| DfDtFlt | MV_FLOAT_D_PRIV | Fault Df/dt | | X |

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| Cli1Flt | MV_FLOAT_D_PRIV | CL1 Input | | X |
| Cli2Flt | MV_FLOAT_D_PRIV | CL2 Input | | X |
| Cli3Flt | MV_FLOAT_D_PRIV | CL3 Input | | X |
| Cli4Flt | MV_FLOAT_D_PRIV | CL4 Input | | X |

1.4.18 Logical Node: MLFR_FAULT_RECORD_P345

Description: Measurements of Fault Record

LN Class: MLFR

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN_PRIV | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS_DN | Behaviour | | |
| Health | ENS_HEALTH_DN | Health | | |
| Mod | ENC_MOD_THREE_STATUS_DN | Mode | | |
| A2Flt | WYE_SEG_D_PRIV | CT2 Fault Current | | X |
| ADifFlt | WYE_SEG_D_PRIV | Fault Generator Differential Current | | X |
| ADifPUFlt | WYE_SEG_D_PRIV | Fault Transformer Differential Per Unit Differential Current | | X |
| VN2Flt | MV_FLOAT_D_PRIV | Fault Measured Neutral Voltage 2 | | X |
| IRefDiffFlt | MV_FLOAT_D_PRIV | Fault Restricted Earth Fault Differential Current | | X |
| IRefBiasFlt | MV_FLOAT_D_PRIV | Fault Restricted Earth Fault Bias Current | | X |
| Rtd01Flt | MV_FLOAT_D_PRIV | RTD 1 | | X |
| Rtd02Flt | MV_FLOAT_D_PRIV | RTD 2 | | X |
| Rtd03Flt | MV_FLOAT_D_PRIV | RTD 3 | | X |
| Rtd04Flt | MV_FLOAT_D_PRIV | RTD 4 | | X |
| Rtd05Flt | MV_FLOAT_D_PRIV | RTD 5 | | X |
| Rtd06Flt | MV_FLOAT_D_PRIV | RTD 6 | | X |
| Rtd07Flt | MV_FLOAT_D_PRIV | RTD 7 | | X |
| Rtd08Flt | MV_FLOAT_D_PRIV | RTD 8 | | X |
| Rtd09Flt | MV_FLOAT_D_PRIV | RTD 9 | | X |
| Rtd10Flt | MV_FLOAT_D_PRIV | RTD 10 | | X |
| AStaFlt | MV_FLOAT_D_PRIV | Fault Stator Earth Fault 20 Hz current. | | X |
| RPriFlt | MV_FLOAT_D_PRIV | Fault Stator Earth Fault Primary Resistance | | X |
| RtrRFlt | MV_FLOAT_D_PRIV | Fault Rotor Earth Fault Primary Resistance (from connected current loop input) | | X |

1.4.19 Logical Node: MMTR_AFQ

Description: Metering

LN Class: MMTR

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| FBnd1Tm | INS_BASIC_PRIV | Frequency Band 1 Time | | X |
| FBnd2Tm | INS_BASIC_PRIV | Frequency Band 2 Time | | X |

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| FBnd3Tm | INS_BASIC_PRIV | Frequency Band 3 Time | | X |
| FBnd4Tm | INS_BASIC_PRIV | Frequency Band 4 Time | | X |
| FBnd5Tm | INS_BASIC_PRIV | Frequency Band 5 Time | | X |
| FBnd6Tm | INS_BASIC_PRIV | Frequency Band 6 Time | | X |

1.4.20 Logical Node: MMTR_LOL

Description: Metering

LN Class: MMTR

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| LOLSts | MV_FLOAT_PRIV | Loss of Life Status | | X |
| LOLRate | MV_FLOAT_PRIV | Loss of Life Rate | | X |
| LOLLres | MV_FLOAT_PRIV | Loss of Life LRes | | X |
| FAALres | MV_FLOAT_PRIV | Loss of Life FAA LRes | | X |
| MTRRs | SPC_CTRL_PRIV | Reset LOL | | X |

1.4.21 Logical Node: MMTR_PRIV

Description: Metering

LN Class: MMTR

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| SupWh | BCR_PRIV | Real energy supply (Energy flow towards bus bar) | | |
| SupVArh | BCR_PRIV | Reactive energy supply (Energy flow towards bus bar) | | |
| DmdWh | BCR_PRIV | Real energy demand (Energy flow from bus bar) | | |
| DmdVArh | BCR_PRIV | Reactive energy demand (Energy flow from bus bar) | | |
| MTRRs | SPC_CTRL_PRIV | Reset Energy Meters | | X |

1.4.22 Logical Node: MMXU_BASIC_ALL

Description: Standard measurements

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| RelDifA | MV_FLOAT_PRIV | IREF Diff | | X |
| RelBiasA | MV_FLOAT_PRIV | IREF Bias | | X |
| VN | WYE_NEU_ANG_D_PRIV | VN Measured quantities | | X |

1.4.23 Logical Node: MMXU_BASIC2

Description: Standard measurements

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| Ct2A | WYE_SEG_ANG_PRIV | CT2 Current | | X |
| VN2 | WYE_NEU_ANG_D_PRIV | VN2 Measured quantities | | X |

1.4.24 Logical Node: MMXU_CSV

Description: Measurements for C/S

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| CSVolMag | MV_FLOAT_D_PRIV | Check Sync Voltage Magnitude | | X |
| CSVolAng | MV_FLOAT_D_PRIV_NO_DB | Check Sync Voltage Angle | | X |

1.4.25 Logical Node: MMXU_DFDT

Description: Standard measurements (for dfdt only)

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| Dfdt | MV_FLOAT_PRIV | df/dt | | X |

1.4.26 Logical Node: MMXU_DIFF

Description: Standard measurements

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| IDiff | WYE_SEG_D_PRIV | Current Diff | | X |
| IBias | WYE_SEG_D_PRIV | Current Bias | | X |
| IDiff2nd | WYE_SEG_D_PRIV | Second Harmonic Diff | | X |
| IDiff5th | WYE_SEG_D_PRIV | Fifth Harmonic Diff | | X |

1.4.27 Logical Node: MMXU_FOURIER

Description: Standard Measurements (w.r.t Fourier Values)

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| TotW | MV_FLOAT | Total active power (Total P) | | |
| TotVAr | MV_FLOAT | Total reactive power (Total Q) | | |
| TotVA | MV_FLOAT | Total apparent power (Total S) | | |
| TotPF | MV_FLOAT | Average power factor (Total PF) | | |
| Hz | MV_FLOAT | Frequency | | |
| PPV | DEL_SEG_ANG | Phase to Phase voltages | | |
| PhV | WYE_SEG_ANG | Phase to Ground voltages | | |
| A | WYE_SEG_ANG | Phase currents | | |
| NeutA1 | WYE_NEU_ANG_D_PRIV | IN Measured | | |
| NeutA2 | WYE_RES_MAG_D_PRIV | In-1 derived | | |
| NeutA3 | WYE_RES_MAG_D_PRIV | In-2 derived | | |
| W | WYE_SEG | Phase active power (P) | | |
| VAr | WYE_SEG | Phase reactive power (Q) | | |
| VA | WYE_SEG | Phase apparent power (S) | | |
| PF | WYE_SEG | Phase power factor | | |
| NPSPwr | MV_FLOAT_PRIV | NPS Power S2 | | X |
| VN | WYE_RES_ANG_D_PRIV | VN Derived Magnitude Angle | | |

1.4.28 Logical Node: MMXU_GEN_DIFF

Description: Differential measurements

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| OpARem | WYE_SEG_PRIV | Remote current | | X |
| OpBiasRem | WYE_SEG_PRIV | Remote Bias | | X |
| IREFDif | MV_FLOAT_PRIV | IREF Diff | | X |
| IREFBias | MV_FLOAT_PRIV | IREF Bias | | X |

1.4.29 Logical Node: MMXU_LOL

Description: Loss-of-life (Transformer) measurements

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| LOL | MV_FLOAT_PRIV | Loss of Life Aging Factor | | X |

1.4.30 Logical Node: MMXU_METER_AV

Description: Metering Statistics (w.r.t Current, Real + Reactive Power - Average values)

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| ClcExp | SPS_WD | Calculation period expired | T | |
| ClcMth | ENG_SET_WD_CLCMTH | Calculation method of statistical data objects | | |
| ClcMod | ENG_SET_WD_CLCMOD | Calculation mode | | |
| ClcIntvTyp | ENG_SET_WD_CLCINTVTYP | Calculation interval type | | |
| ClcIntvPer | ING_SET_WD | number of units to consider to calculate the calculation interval duration | | |
| AvWPhs | MV_FLOAT_D | Arithmetic average of the magnitude of active power of the 3 phases | | |
| AvVArPhs | MV_FLOAT_D | Arithmetic average of the magnitude of reactive power of the 3 phases | | |
| AvAPhsA | MV_FLOAT_D_PRIV | Arithmetic average of the magnitude of Ia current | | X |
| AvAPhsB | MV_FLOAT_D_PRIV | Arithmetic average of the magnitude of Ib current | | X |
| AvAPhsC | MV_FLOAT_D_PRIV | Arithmetic average of the magnitude of Ic current | | X |

1.4.31 Logical Node: MMXU_METER_MAX

Description: Standard measurements (w.r.t Current, Real + Reactive Power - Max values)

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| ClcExp | SPS_WD | Calculation period expired | T | |
| ClcMth | ENG_SET_WD_CLCMTH | Calculation method of statistical data objects | | |
| ClcMod | ENG_SET_WD_CLCMOD | Calculation mode | | |
| MaxWPhs | MV_FLOAT_D | Maximum magnitude of active power of the 3 phases | | |
| MaxVArPhs | MV_FLOAT_D | Maximum magnitude of reactive power of the 3 phases | | |
| MaxAPhsA | MV_FLOAT_D_PRIV | Maximum magnitude of Ia current | | X |
| MaxAPhsB | MV_FLOAT_D_PRIV | Maximum magnitude of Ib current | | X |
| MaxAPhsC | MV_FLOAT_D_PRIV | Maximum magnitude of Ic current | | X |

1.4.32 Logical Node: MMXU_RMS

Description: Standard Measurements (w.r.t RMS Values)

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| PhV | WYE_SEG_D | Phase to Ground voltages | | |
| A | WYE_SEG_D | Phase currents | | |

1.4.33 Logical Node: MMXU_ROTOR_EF

Description: Measurements for Rotor E/F

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| R | MV_FLOAT_PRIV | 64R Fault Resistance | | X |
| CLI | MV_FLOAT_PRIV | Current Loop Input Current | | X |

1.4.34 Logical Node: MMXU_SENSITIVE

Description: Standard measurements

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| TotW | MV_FLOAT | Total active power (Total P) | | |
| TotVAr | MV_FLOAT | Total reactive power (Total Q) | | |
| TotPF | MV_FLOAT | Average power factor (Total PF) | | |
| Asen1 | CMV_MAG_ANG_FLOAT_PRIV | Sensitive current 1 | | X |
| Asen2 | CMV_MAG_ANG_FLOAT_PRIV | Sensitive current 2 | | X |

1.4.35 Logical Node: MMXU_STEFI_PRI

Description: Measurements for Stator Earth Fault

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| V | MV_FLOAT_PRIV | V Magnitude | | X |

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| Rpri | MV_FLOAT_PRIV | Primary R | | X |
| I | MV_FLOAT_PRIV | I Magnitude | | X |
| IAng | MV_FLOAT_PRIV_NO_DB | I Angle | | X |

1.4.36 Logical Node: MMXU_STEFI_SEC

Description: Measurements for Stator Earth Fault

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| V | MV_FLOAT_PRIV | V Magnitude | | X |
| Rsec | MV_FLOAT_PRIV | Secondary R | | X |
| I | MV_FLOAT_PRIV | I Magnitude | | X |
| IAng | MV_FLOAT_PRIV_NO_DB | I Angle | | X |

1.4.37 Logical Node: MMXU_THIRD_HARMONIC

Description: Measurements (w.r.t 3rd Harmonic)

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| VN | MV_FLOAT_PRIV | VN 3rd Harmonic | | X |

1.4.38 Logical Node: MMXU_THM

Description: Standard measurements

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| HotT | MV_FLOAT_PRIV | Hot Spot Temperature | | X |
| TopT | MV_FLOAT_PRIV | Top Oil Temperature | | X |
| AmbT | MV_FLOAT_PRIV | Ambient Temperature | | X |
| TopPreleft | MV_FLOAT_PRIV | Top Oil Pretrip Left | | X |

1.4.39 Logical Node: MMXU_VHZ

Description: Measurements(w.r.t.Volts Per Hz)

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| VHz | MV_FLOAT_PRIV | Volts/Hz | | X |

1.4.40 Logical Node: MMXU_Z

Description: Standard measurements

LN Class: MMXU

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| Z | WYE_Z_D | Phase impedance | | |

1.4.41 Logical Node: MSQI_ALL

Description: Sequence and imbalance (w.r.t Pos, Neq, Zero)

LN Class: MSQI

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| SeqA | SEQ_MAG_ANG | Positive, Negative and Zero sequence current | | |
| SeqV | SEQ_MAG_ANG | Positive, Negative and Zero sequence voltage | | |

1.4.42 Logical Node: MSQI_CT2

Description: Sequence and imbalance

LN Class: MSQI

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| SeqA | SEQ_MAG_ANG | Positive, Negative and Zero sequence current | | |

1.4.43 Logical Node: PDIF_NO_SEG

Description: Differential

LN Class: PDIF

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_TWO_STATUS | Mode | | |
| Op | ACT_NO_SEG | Operate | T | |

1.4.44 Logical Node: PDIS_SYSTEM

Description: Distance

LN Class: PDIS

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_TWO_STATUS | Mode | | |
| Str | ACD_NO_SEG | Start | | |
| Op | ACT_NO_SEG | Operate | T | |

1.4.45 Logical Node: PDMP_NORMAL

Description: Combined Overcurrent/Undervoltage protection (Dead Machine)

LN Class: PDMP

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN_PRIV | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS_DN | Behaviour | | |
| Health | ENS_HEALTH_DN | Health | | |
| Mod | ENC_MOD_TWO_STATUS_DN | Mode | | |
| Op | ACT_NO_SEG_DN | Operate | T | |

1.4.46 Logical Node: PDOP_NO_SEG

Description: Over power protection

LN Class: PDOP

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_TWO_STATUS | Mode | | |
| Str | ACD_NO_SEG | Start | | |
| Op | ACT_NO_SEG | Operate | T | |

1.4.47 Logical Node: PDUP_DDB

Description: Under power protection, for DDB

LN Class: PDUP

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| Str | ACD_NO_SEG | Start | | |
| Op | ACT_NO_SEG | Operate | T | |

1.4.48 Logical Node: PDUP_NO_SEG

Description: Under power protection

LN Class: PDUP

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_TWO_STATUS | Mode | | |
| Str | ACD_NO_SEG | Start | | |
| Op | ACT_NO_SEG | Operate | T | |

1.4.49 Logical Node: PEFI_BASIC

Description: Earth Fault Injection protection

LN Class: PEFI

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN_PRIV | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS_DN | Behaviour | | |
| Health | ENS_HEALTH_DN | Health | | |
| Mod | ENC_MOD_TWO_STATUS_DN | Mode | | |
| StrAlm1 | SPS_D_PRIV | Alarm Start | | |
| Alm1 | SPS_D_PRIV | Alarm | | |
| StrTrip1 | SPS_D_PRIV | Trip Start | | |
| Trip1 | SPS_D_PRIV | Trip | | |

1.4.50 Logical Node: PFRC_NO_SEG

Description: Rate of change of frequency (w.r.t No Phase Segregation)

LN Class: PFRC

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_TWO_STATUS | Mode | | |
| Str | ACD_NO_SEG | Start | | |
| Op | ACT_NO_SEG | Operate | T | |

1.4.51 Logical Node: PPAM_NO_SEG

Description: model "out-of-step" protection of generators

LN Class: PPAM

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_TWO_STATUS | Mode | | |
| Str | ACD_NO_SEG | Start | | |
| Op | ACT_NO_SEG | Operate | T | |

1.4.52 Logical Node: PPWR_NORMAL

Description: Power Protection

LN Class: PPWR

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN_PRIV | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS_DN | Behaviour | | |
| Health | ENS_HEALTH_DN | Health | | |
| Mod | ENC_MOD_TWO_STATUS_DN | Mode | | |
| Str | ACD_NO_SEG_DN | Start | | |
| Op | ACT_NO_SEG_DN | Operate | T | |
| PwrFunSel | ENS_PWR_FN_MOD_PRIV | Power Function Mode status | | |

1.4.53 Logical Node: PSDE_BASIC

Description: Sensitive directional earth fault

LN Class: PSDE

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_TWO_STATUS | Mode | | |
| Str | ACD_NO_SEG | Start | | |
| Op | ACT_NO_SEG | Operate | T | |

1.4.54 Logical Node: PTAF_NO_SEG

Description: Turbine Abnormal Frequency Protection

LN Class: PTAF

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN_PRIV | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS_DN | Behaviour | | |
| Health | ENS_HEALTH_DN | Health | | |
| Mod | ENC_MOD_TWO_STATUS_DN | Mode | | |
| Str | ACD_NO_SEG_DN | Start | | |
| Op | ACT_NO_SEG_DN | Trip | T | |

1.4.55 Logical Node: PTOC_NO_SEG

Description: Timed Overcurrent (w.r.t No Phase Segregation)

LN Class: PTOC

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_TWO_STATUS | Mode | | |
| Str | ACD_NO_SEG | Start | | |
| Op | ACT_NO_SEG | Operate | T | |

1.4.56 Logical Node: PTOF_NO_SEG

Description: Overfrequency (w.r.t No Phase Segregation)

LN Class: PTOF

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_TWO_STATUS | Mode | | |
| Str | ACD_NO_SEG | Start | | |
| Op | ACT_NO_SEG | Operate | T | |

1.4.57 Logical Node: PTOV_NO_SEG

Description: Overvoltage (w.r.t No Phase Segregation)

LN Class: PTOV

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_TWO_STATUS | Mode | | |
| Str | ACD_NO_SEG | Start | | |
| Op | ACT_NO_SEG | Operate | T | |

1.4.58 Logical Node: PTRC_GLOBAL

Description: Protection trip for global protection conditioning

LN Class: PTRC

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| Tr | ACT_NO_SEG | Trip | | |
| Op | ACT_NO_SEG | Operate (combination of subscribed Op from protection functions) | | |
| Str | ACD_NO_SEG | Sum of all starts of all connected Logical Nodes | | |

1.4.59 Logical Node: PTRC_INDIVID_NO_SEG

Description: Protection trip for individual protection conditioning

LN Class: PTRC

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| Op | ACT_NO_SEG | Operate (combination of subscribed Op from protection functions) | | |
| Str | ACD_NO_SEG | Sum of all starts of all connected Logical Nodes | | |

1.4.60 Logical Node: PTTR_HOT_TOP

Description: Thermal overload

LN Class: PTTR

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_TWO_STATUS | Mode | | |
| Str | ACD_NO_SEG | Start | | |
| Op | ACT_NO_SEG | Operate | T | |
| MTRRs | SPC_CTRL_PRIV | Reset thermal state | | X |

1.4.61 Logical Node: PTTR_NO_SEG

Description: Thermal overload (w.r.t No Phase Segregation)

LN Class: PTTR

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_TWO_STATUS | Mode | | |
| Op | ACT_NO_SEG | Operate | T | |
| AlmThm | SPS_WD | Thermal alarm | | |
| TmpRl | MV_FLOAT | Relation between temperature and maximum temperature | | |
| MTRRs | SPC_CTRL_PRIV | Reset Thermal State | | X |

1.4.62 Logical Node: PTUF_NO_SEG

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

LN Class: PTUF

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_TWO_STATUS | Mode | | |

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| Str | ACD_NO_SEG | Start | | |
| Op | ACT_NO_SEG | Operate | T | |

1.4.63 Logical Node: PTUV_NO_SEG

Description: Undervoltage

LN Class: PTUV

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_TWO_STATUS | Mode | | |
| Str | ACD_NO_SEG | Start | | |
| Op | ACT_NO_SEG | Operate | T | |

1.4.64 Logical Node: PVOC_NO_SEG

Description: Voltage controlled time overcurrent

LN Class: PVOC

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_TWO_STATUS | Mode | | |
| Str | ACD_NO_SEG | Start | | |
| Op | ACT_NO_SEG | Operate | T | |

1.4.65 Logical Node: PVPH_NO_SEG

Description: Volts per Hz protection

LN Class: PVPH

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_TWO_STATUS | Mode | | |
| Str | ACD_NO_SEG | Start | | |
| Op | ACT_NO_SEG | Operate | T | |

1.4.66 Logical Node: RBRF_EXTTRIP

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

LN Class: RBRF

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_TWO_STATUS | Mode | | |
| OpEx | ACT_NO_SEG | Breaker failure trip ("External trip") | T | |

1.4.67 Logical Node: RDRE_BASIC

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

LN Class: RDRE

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| RcdMade | SPS_WD | Recording made | | |
| FltNum | INS_BASIC | Fault number | | |

1.4.68 Logical Node: RSYN_DIFCLC_ENH

Description: Synchronism-check / Synchronising (w.r.t Calculated Differential Measurements)

LN Class: RSYN

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| Rel | SPS_WD | Release | | |
| VInd | SPS_WD | Voltage difference indicator | | |
| AngInd | SPS_WD | Angle difference indicator | | |
| HzInd | SPS_WD | Frequency difference indicator | | |
| DifVClc | MV_FLOAT | Calculated difference in voltage | | |
| DifHzClc | MV_FLOAT | Calculated difference in frequency | | |
| DifAngClc | MV_FLOAT | Calculated difference of phase angle | | |

1.4.69 Logical Node: RVCS_CTS

Description: CTS monitoring and report

LN Class: RVCS

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN_PRIV | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS_DN | Behaviour | | |
| Health | ENS_HEALTH_DN | Health | | |
| Mod | ENC_MOD_TWO_STATUS_DN | Mode | | |
| CTSBlk | SPS_D_PRIV | CTS block status | | X |

1.4.70 Logical Node: RVCS_VTS

Description: VTS monitoring and report

LN Class: RVCS

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN_PRIV | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS_DN | Behaviour | | |
| Health | ENS_HEALTH_DN | Health | | |
| Mod | ENC_MOD_TWO_STATUS_DN | Mode | | |

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| SlwVTSBlk | SPS_D_PRIV | slow VTS block status | | X |
| FstVTSBlk | SPS_D_PRIV | fast VTS block status | | X |

1.4.71 Logical Node: SCLI_BASIC

Description: Current loop monitoring and reporting

LN Class: SCLI

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN_PRIV | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS_DN | Behaviour | | |
| Health | ENS_HEALTH_DN | Health | | |
| Mod | ENC_MOD_TWO_STATUS_DN | Mode | | |
| CliAlmSel | ENS_FN_STA_CLI_PRIV | Current Loop Alarm function current mode | | X |
| StrAlm1 | SPS_D_PRIV | Current Loop Input Alarm start | | X |
| Alm1 | SPS_D_PRIV | Current Loop Input Alarm | | |
| CliTripSel | ENS_FN_STA_CLI_PRIV | Current Loop Trip function current mode | | X |
| StrTrip1 | SPS_D_PRIV | Current loop input trip start | | X |
| Trip1 | SPS_D_PRIV | Current loop input trip | | X |
| Ind1 | SPS_D_PRIV | Current loop supervision undercurrent fail alarm | | |
| BlkInd1 | SPS_D_PRIV | Block Current Loop input protection | | X |
| AnIn1 | MV_FLOAT_D_PRIV | Current loop input measured value | | |

1.4.72 Logical Node: STMP_RTD

Description: Temperature supervision.

LN Class: STMP

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_FOUR_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |
| Mod | ENC_MOD_TWO_STATUS | Mode | | |
| Tmp | MV_FLOAT_D | Temperature | | |
| DataErr | SPS_D_PRIV | Data Error | | |
| OcErr | SPS_D_PRIV | Open circuit | | |
| ScErr | SPS_D_PRIV | Short circuit | | |
| HWErr | SPS_D_PRIV | Hardware Error | | |
| Alm | SPS_D | Temperature Alarm | | |
| Trip | SPS_D | Temperature Trip | | |
| RsRtd | SPC_CTRL_PRIV | Reset RTD Flags | | |

1.4.73 Logical Node: XCBR_BASIC

Description: Circuit Breaker (w.r.t Mandatory Attributes Only)

LN Class: XCBR

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| NamPlt | LPL_LN | Name Plate | | |
| Beh | ENS_BEH_THREE_STATUS | Behaviour | | |
| Health | ENS_HEALTH | Health | | |

| Attribute | Attr. Type | Explanation | T | X |
|---|---|---|---|---|
| Mod | ENC_MOD_THREE_STATUS | Mode | | |
| EEHealth | ENS_HEALTH | External equipment health | | |
| Loc | SPS_WD | Local operation | | |
| OpCnt | INS_BASIC | Operation counter | | |
| CBOpCap | ENS_CBCAP | Circuit Breaker operating capability | | |
| SumSwARs | BCR_PRIV | Sum of switched amperes, resettable | | |
| Pos | DPC_STATUS | Switch position | | |
| BlkOpn | SPC_STATUS | Block opening | | |
| BlkCls | SPC_STATUS | Block closing | | |

## 1.5 Common Data Class definitions

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

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

| FC Name | Semantic | Source Definition |
|---|---|---|
| BL | Blocking | IEC61850-7-2-2010 |
| 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 |
| OR | Operate received | IEC61850-7-2-2010 |
| 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 |
| SR | Service response | IEC61850-7-2-2010 |
| 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 |

### 1.5.1 Common Data Class: ACD_NO_SEG

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

CDC Class: ACD

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| general | BOOLEAN | ST | | Trip or start has happened | |
| dirGeneral | ENUMERATED8 (MMS Type: INT8) | ST | dir | General direction (unknown, forward, backward or both) | |

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

1.5.2 Common Data Class: ACD_NO_SEG_DN

Description: Directional Protection Activation Information (w.r.t No Phase Segregation, with dataNs used for the standard DO in the extended LN)

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 | |
| dataNs | VISIBLE_STRING255 | EX | | Data name space | |

1.5.3 Common Data Class: ACT_NO_SEG

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

CDC Class: ACT

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| general | BOOLEAN | ST | | Trip or start has happened | |
| q | Quality | ST | | Quality of the protection activation information | |
| t | TimeStamp | ST | | Timestamp of the last change in state of protection activation information | |

1.5.4 Common Data Class: ACT_NO_SEG_DN

Description: Protection Activation Information (w.r.t No Phase Segregation, with dataNs used for the standard DO in the extended LN)

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 | |
| dataNs | VISIBLE_STRING255 | EX | | Data name space | |

1.5.5 Common Data Class: BCR_PRIV

Description: Binary Counter Reading

CDC Class: BCR

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| actVal | INT64 | ST | | Binary counter status represented as an integer | |
| q | Quality | ST | | Quality of counter value | |
| t | TimeStamp | ST | | Time of last counter change | |
| pulsQty | FLOAT32 | CF | | Magnitude of the counted value 'per count' (value = actVal x pulsQty) | |

1.5.6 Common Data Class: CMV_MAG_ANG_FLOAT

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

CDC Class: CMV

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

1.5.7 Common Data Class: CMV_MAG_ANG_FLOAT_PRIV

Description: Complex Measured value (used for extended DO)

CDC Class: CMV

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| cVal | Vector_MagnitudeAngle_Float | MX | | Deadbanded complex measured vector. Updated to the current value of instCVal when the value has changed according to the configuration parameter db. | |
| q | Quality | MX | | Quality of the measurement value | |
| t | TimeStamp | MX | | Time deadbanded magnitude last exceeded its db configuration parameter | |
| units | Unit_Multiplier | CF | | Unit of the attribute representing the data | |
| db | INT32U | CF | | Measurement deadband | |
| rangeC | RangeConfig_DeadBand | CF | | Measurement range configuration attributes | |
| dataNs | VISIBLE_STRING255 | EX | | Data name space | |

1.5.8 Common Data Class: CMV_MAG_FLOAT

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

CDC Class: CMV

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| cVal | Vector_Magnitude_Float | MX | | Deadbanded complex measured vector. Updated to the current value of instCVal when the value has changed according to the configuration parameter db. | |
| q | Quality | MX | | Quality of the measurement value | |
| t | TimeStamp | MX | | Time deadbanded magnitude last exceeded its db configuration parameter | |

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

1.5.9 Common Data Class: DEL_SEG_ANG

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

CDC Class: DEL

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

1.5.10 Common Data Class: DEL_SEG_D_PRIV

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

CDC Class: DEL

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

1.5.11 Common Data Class: DPC_CTRL

Description: Controllable Double Point (for CSWI.pos)

CDC Class: DPC

| 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 | CODED_ENUM (MMS Type: _BSTR2) | ST | Dbpos | Status value of the data (Intermediate state, Off, On or Bad-state) | |
| q | Quality | ST | | Quality of the status value | |
| t | TimeStamp | ST | | Timestamp of the last change in state of status value | |
| ctlModel | ENUMERATED8 (MMS Type: INT8) | CF | ctlModel | Control model (Corresponding to the behaviour of the data) | |
| sboTimeout | INT32U | CF | | Select Before Operate timeout period (in milliseconds) | |

1.5.12 Common Data Class: DPC_STATUS

Description: Controllable Double Point (w.r.t Status Only)

CDC Class: DPC

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| stVal | CODED_ENUM (MMS Type: _BSTR2) | ST | Dbpos | Status value of the data (Intermediate state, Off, On or Bad-state) | |
| q | Quality | ST | | Quality of the status value | |
| t | TimeStamp | ST | | Timestamp of the last change in state of status value | |
| ctlModel | ENUMERATED8 (MMS Type: INT8) | CF | ctlModel | Control model (Corresponding to the behaviour of the data) | |

1.5.13 Common Data Class: DPL_STANDARD

Description: Standard Device Name Plate

CDC Class: DPL

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| vendor | VISIBLE_STRING255 | DC | | Name of the vendor | |
| hwRev | VISIBLE_STRING255 | DC | | Hardware revision | |
| swRev | VISIBLE_STRING255 | DC | | Software revision | |
| serNum | VISIBLE_STRING255 | DC | | Serial Number | |
| model | VISIBLE_STRING255 | DC | | Model Number | |
| location | VISIBLE_STRING255 | DC | | Physical location of device | |

1.5.14 Common Data Class: ENC_CTRL_LD_MOD

Description: Controllable enumerated status

CDC Class: ENC

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| ctlVal | ENUMERATED32 (MMS Type: INT8) | CO | Mod_3 | Control value | |
| origin | Originator | ST | | Originator of the last change of the controllable data | |
| stVal | ENUMERATED32 (MMS Type: INT8) | ST | Mod_3 | Status value of the data | |
| q | Quality | ST | | Quality of the status value | |
| t | TimeStamp | ST | | Timestamp of the last change in state of status value | |
| ctlModel | ENUMERATED8 (MMS Type: INT8) | CF | ctlModel | Control model (Corresponding to the behaviour of the data) | |
| sboTimeout | INT32U | CF | | Select Before Operate timeout period (in milliseconds) | |
| d | VISIBLE_STRING255 | DC | | Description of the status element | |

1.5.15 Common Data Class: ENC_CTRL_LD_MOD_2

Description: Controllable enumerated status (includes three status, used for child LD.LLN0)

CDC Class: ENC

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| ctlVal | ENUMERATED32 (MMS Type: INT8) | CO | Mod_2 | Control value | |
| origin | Originator | ST | | Originator of the last change of the controllable data | |

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| stVal | ENUMERATED32 (MMS Type: INT8) | ST | Mod_2 | Status value of the data | |
| q | Quality | ST | | Quality of the status value | |
| t | TimeStamp | ST | | Timestamp of the last change in state of status value | |
| ctlModel | ENUMERATED8 (MMS Type: INT8) | CF | ctlModel | Control model (Corresponding to the behaviour of the data) | |
| sboTimeout | INT32U | CF | | Select Before Operate timeout period (in milliseconds) | |
| d | VISIBLE_STRING255 | DC | | Description of the status element | |

1.5.16 Common Data Class: ENC_MOD_THREE_STATUS

Description: Controllable enumerated mode status (with 3 status)

CDC Class: ENC

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| stVal | ENUMERATED32 (MMS Type: INT8) | ST | Mod_3 | 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) | |

1.5.17 Common Data Class: ENC_MOD_THREE_STATUS_DN

Description: Controllable enumerated status (with 3 status and dataNs used for the Mod in the extended LN)

CDC Class: ENC

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| stVal | ENUMERATED32 (MMS Type: INT8) | ST | Beh_3 | 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) | |
| dataNs | VISIBLE_STRING255 | EX | | Data name space | |

1.5.18 Common Data Class: ENC_MOD_TWO_STATUS

Description: Controllable enumerated status

CDC Class: ENC

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| stVal | ENUMERATED32 (MMS Type: INT8) | ST | Mod_2 | Status value of the mode used for LN which have two status | |
| 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) | |

1.5.19 Common Data Class: ENC_MOD_TWO_STATUS_DN

Description: Controllable enumerated status (with 2 status and dataNs used for the Mod in the extended LN)

CDC Class: ENC

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| stVal | ENUMERATED32 (MMS Type: INT8) | ST | Mod_2 | 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) | |
| dataNs | VISIBLE_STRING255 | EX | | Data name space | |

1.5.20 Common Data Class: ENG_SET_WD_CLCINTVTYP

Description: Enumerated status setting (for ClcIntvTyp)

CDC Class: ENG

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| setVal | ENUMERATED8 (MMS Type: INT8) | SP | ClcIntvTyp | Setting value | |

1.5.21 Common Data Class: ENG_SET_WD_CLCMOD

Description: Enumerated status setting (for ClcMod)

CDC Class: ENG

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| setVal | ENUMERATED8 (MMS Type: INT8) | SP | ClcMod | Setting value | |

1.5.22 Common Data Class: ENG_SET_WD_CLCMTH

Description: Enumerated status setting (for ClcMth)

CDC Class: ENG

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| setVal | ENUMERATED8 (MMS Type: INT8) | SP | ClcMth | Setting value | |

1.5.23 Common Data Class: ENS_BEH_FOUR_STATUS

Description: Enumerated behaviour status (with 4 status )

CDC Class: ENS

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| stVal | ENUMERATED8 (MMS Type: INT8) | ST | Beh_4 | The element status | |
| q | Quality | ST | | The quality of the status value | |
| t | TimeStamp | ST | | Timestamp of the last change in state | |

1.5.24 Common Data Class: ENS_BEH_FOUR_STATUS_DN

Description: Enumerated status

CDC Class: ENS

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| stVal | ENUMERATED8 | ST | Beh_4 | The element status | |

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| | (MMS Type: INT8) | | | | |
| 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 | |

1.5.25 Common Data Class: ENS_BEH_THREE_STATUS

Description: Enumerated behaviour status (with 3 status)

CDC Class: ENS

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| stVal | ENUMERATED8 (MMS Type: INT8) | ST | Beh_3 | The element status | |
| q | Quality | ST | | The quality of the status value | |
| t | TimeStamp | ST | | Timestamp of the last change in state | |

1.5.26 Common Data Class: ENS_BEH_THREE_STATUS_DN

Description: Enumerated status (with 3 status and dataNs used for the Beh in the extended LN)

CDC Class: ENS

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| stVal | ENUMERATED8 (MMS Type: INT8) | ST | Beh_3 | The element status | |
| q | Quality | ST | | The quality of the status value | |
| t | TimeStamp | ST | | Timestamp of the last change in state | |
| dataNs | VISIBLE_STRING255 | EX | | Data name space | |

1.5.27 Common Data Class: ENS_CBCAP

Description: Enumerated status (w.r.t. CB operating capability)

CDC Class: ENS

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

1.5.28 Common Data Class: ENS_FN_STA_CLI_PRIV

Description: Enumerated status (w.r.t Current Loop Input functionality status)

CDC Class: ENS

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| stVal | ENUMERATED8 (MMS Type: INT8) | ST | FnStatCLI | 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 | |

1.5.29 Common Data Class: ENS_HEALTH

Description: Enumerated status

CDC Class: ENS

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| stVal | ENUMERATED8 (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 | |

1.5.30 Common Data Class: ENS_HEALTH_DN

Description: Enumerated status (with dataNs used for the Health in the extended LN)

CDC Class: ENS

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| stVal | ENUMERATED8 (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 | |
| dataNs | VISIBLE_STRING255 | EX | | Data name space | |

1.5.31 Common Data Class: ENS_PWR_FN_MOD_PRIV

Description: Enumerated status (wrt to Power Stage Mode Function Status)

CDC Class: ENS

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| stVal | ENUMERATED8 (MMS Type: INT8) | ST | PwrFnMode | 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 | |

1.5.32 Common Data Class: INC_MOD_STD

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

CDC Class: INC

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| stVal | INT32 | 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) | |

1.5.33 Common Data Class: ING_SET_WD

Description: Integer Status Setting

CDC Class: ING

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| setVal | INT32 | SP | | Setting value | |

1.5.34 Common Data Class: INS_BASIC

Description: Integer Status (w.r.t Mandatory Options Only)

CDC Class: INS

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

1.5.35 Common Data Class: INS_BASIC_PRIV

Description: Integer Status (w.r.t Mandatory Options Only) but with dataNs

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 | |
| dataNs | VISIBLE_STRING255 | EX | | Data name space | |

1.5.36 Common Data Class: LPL_LLN0

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 | |

1.5.37 Common Data Class: LPL_LLN0_MEA

Description: Measurements 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 | |
| configRev | VISIBLE_STRING255 | DC | | Uniquely identifies the configuration of a local device instance | |
| ldNs | VISIBLE_STRING255 | EX | | Logical Device name space | |

1.5.38 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 | |

1.5.39 Common Data Class: LPL_LN_PRIV

Description: Logical Node Name Plate (w.r.t GE Grid Solutions Extended)

CDC Class: LPL

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| vendor | VISIBLE_STRING255 | DC | | Name of the vendor | |
| swRev | VISIBLE_STRING255 | DC | | Software revision | |
| d | VISIBLE_STRING255 | DC | | Description | |
| lnNs | VISIBLE_STRING255 | EX | | Logical Node name space | |
| dataNs | VISIBLE_STRING255 | EX | | Data name space | |

1.5.40 Common Data Class: MV_FLOAT

Description: Measured value (w.r.t. Floating Point value)

CDC Class: MV

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

1.5.41 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 | |

1.5.42 Common Data Class: MV_FLOAT_D_PRIV

Description: Measured value

CDC Class: MV

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

1.5.43 Common Data Class: MV_FLOAT_D_PRIV_NO_DB

Description: Measured value

CDC Class: MV

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

1.5.44 Common Data Class: MV_FLOAT_PRIV

Description: Measured value (used for extended DO)

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 | |

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| db | INT32U | CF | | Measurement deadband | |
| rangeC | RangeConfig_DeadBand | CF | | Measurement range configuration attributes | |
| dataNs | VISIBLE_STRING255 | EX | | Data name space | |

1.5.45 Common Data Class: MV_FLOAT_PRIV_NO_DB

Description: Measured value

CDC Class: MV

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| mag | AnalogueValue_Float | MX | | Deadbanded magnitude of the instantaneous value of a measured value or harmonic value. Updated to the current value of instMag when the value has changed according to the configuration parameter db. | |
| q | Quality | MX | | Quality of the measurement value | |
| t | TimeStamp | MX | | Time deadbanded magnitude last exceeded its db configuration parameter | |
| dataNs | VISIBLE_STRING255 | EX | | Data name space | |

1.5.46 Common Data Class: ORG_SRC_REF

Description: Object reference settings

CDC Class: ORG

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| setSrcRef | ObjectReference | SP | | The value of the object reference setting | |

1.5.47 Common Data Class: SEQ_MAG_ANG

Description: Sequence components of a measurement value (w.r.t Magnitudes + Angles)

CDC Class: SEQ

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

1.5.48 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 | |

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| | | | | status value | |
| ctlModel | ENUMERATED8 (MMS Type: INT8) | CF | ctlModel | Control model (Corresponding to the behaviour of the data) | |
| sboTimeout | INT32U | CF | | Select Before Operate timeout period (in milliseconds) | |

1.5.49 Common Data Class: SPC_CTRL_PRIV

Description: Controllable Single Point (With Namespace)

CDC Class: SPC

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| ctlVal | BOOLEAN | CO | | Control value (Off - FALSE, On - TRUE) | |
| origin | Originator | ST | | Originator of the last change of the controllable data | |
| stVal | BOOLEAN | ST | | Status value of the data | |
| q | Quality | ST | | Quality of the status value | |
| t | TimeStamp | ST | | Timestamp of the last change in state of status value | |
| ctlModel | ENUMERATED8 (MMS Type: INT8) | CF | ctlModel | Control model (Corresponding to the behaviour of the data) | |
| sboTimeout | INT32U | CF | | Select Before Operate timeout period (in milliseconds) | |
| dataNs | VISIBLE_STRING255 | EX | | Data name space | |

1.5.50 Common Data Class: SPC_STATUS

Description: Controllable Single Point (w.r.t Status Only)

CDC Class: SPC

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

1.5.51 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 | |

1.5.52 Common Data Class: SPS_D_PRIV

Description: Single Point Status(with Description, with Name Space)

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 | |
| dataNs | VISIBLE_STRING255 | EX | | Data name space | |

1.5.53 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 | |

1.5.54 Common Data Class: SPS_WD_PRIV

Description: Single Point Status(without Description with Name Space)

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 | |

1.5.55 Common Data Class: WYE_NEU_ANG_D_PRIV

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

CDC Class: WYE

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| neut | CMV_MAG_ANG_FLOAT | -- | | Measurement values for neutral input | |
| d | VISIBLE_STRING255 | DC | | Description of the status element | |
| dataNs | VISIBLE_STRING255 | EX | | Data name space | |

1.5.56 Common Data Class: WYE_RES_ANG_D_PRIV

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

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 | |

1.5.57 Common Data Class: WYE_RES_MAG_D_PRIV

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

CDC Class: WYE

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| res | CMV_MAG_FLOAT | -- | | Measurement values for the residual system current | |
| d | VISIBLE_STRING255 | DC | | Description of the status element | |
| dataNs | VISIBLE_STRING255 | EX | | Data name space | |

1.5.58 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 | |

1.5.59 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 | |

1.5.60 Common Data Class: WYE_SEG_ANG_PRIV

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 | |
| dataNs | VISIBLE_STRING255 | EX | | Data name space | |

1.5.61 Common Data Class: WYE_SEG_D

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

1.5.62 Common Data Class: WYE_SEG_D_PRIV

Description: Phase to ground measurements for a 3-Phase system (w.r.t Phase Segregation + Description, use for private data)

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 | |
| dataNs | VISIBLE_STRING255 | EX | | Data name space | |

1.5.63 Common Data Class: WYE_SEG_PRIV

Description: Phase to ground measurements for a 3-Phase system (used for extended DO)

CDC Class: WYE

| Attribute | Type | FC | Enumeration | Comment | X |
|---|---|---|---|---|---|
| phsA | CMV_MAG_FLOAT | -- | | Measurement values for Phase A | |
| phsB | CMV_MAG_FLOAT | -- | | Measurement values for Phase B | |
| phsC | CMV_MAG_FLOAT | -- | | Measurement values for Phase C | |
| dataNs | VISIBLE_STRING255 | EX | | Data name space | |

1.5.64 Common Data Class: WYE_Z_D

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

CDC Class: WYE

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

## 1.6 Common data attribute type definitions

Common data attribute types, known herein as components, are defined for use in the Common Data Classes defined in the sections above.

1.6.1 Component: AnalogueValue_Float

Comment: General analogue value (w.r.t Floating Point value)

Parent Type: AnalogueValue

| Attribute | Type | Enumeration | Comment | X |
|---|---|---|---|---|
| f | FLOAT32 | | Floating point value | |

1.6.2 Component: Originator

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

Parent Type:

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

1.6.3 Component: RangeConfig_DeadBand

Comment: Measurement range configuration

Parent Type: RangeConfig

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

1.6.4 Component: Unit

Comment: SI Unit definitions

Parent Type:

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

1.6.5 Component: Unit_Multiplier

Comment: SI Unit definitions

Parent Type: Unit

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

1.6.6 Component: Vector_Magnitude_Float

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

Parent Type: Vector

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

1.6.7 Component: Vector_MagnitudeAngle_Float

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

Parent Type: Vector

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

## 1.7 Enumerated type definitions

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

1.7.1 Enumerated type: AddCause

Description: AddCause

| Ordinal | Semantic |
|---|---|
| 0 | Unknown |
| 1 | Not-supported |
| 2 | Blocked-by-switching-hierarchy |
| 3 | Select-failed |
| 4 | Invalid-position |
| 5 | Position-reached |
| 6 | Parameter-change-in-execution |
| 7 | Step-limit |
| 8 | Blocked-by-Mode |
| 9 | Blocked-by-process |
| 10 | Blocked-by-interlocking |
| 11 | Blocked-by-synchrocheck |
| 12 | Command-already-in-execution |
| 13 | Blocked-by-health |
| 14 | 1-of-n-control |
| 15 | Abortion-by-cancel |
| 16 | Time-limit-over |
| 17 | Abortion-by-trip |
| 18 | Object-not-selected |
| 19 | Object-already-selected |
| 20 | No-access-authority |
| 21 | Ended-with-overshoot |
| 22 | Abortion-due-to-deviation |
| 23 | Abortion-by-communication-loss |
| 24 | Blocked-by-command |
| 25 | None |
| 26 | Inconsistent-parameters |
| 27 | Locked-by-other-client |

1.7.2 Enumerated type: Beh_3

Description: Behaviour including 3 states

| Ordinal | Semantic |
|---|---|
| 1 | on |
| 3 | test |
| 4 | test/blocked |

1.7.3 Enumerated type: Beh_4

Description: Behaviour including 4 states

| Ordinal | Semantic |
|---|---|
| 1 | on |
| 3 | test |
| 4 | test/blocked |
| 5 | off |

1.7.4 Enumerated type: CBOpCap

Description: CB Operating Capability

| Ordinal | Semantic |
|---|---|
| 1 | None |
| 2 | Open |
| 4 | Open-Close-Open |
| 5 | Close-Open-Close-Open |
| 6 | Open-Close-Open-Close-Open |
| 7 | more |

1.7.5 Enumerated type: ClcIntvTyp

Description: Calculation interval type

| Ordinal | Semantic |
|---|---|
| 1 | MS |
| 2 | PER_CYCLE |
| 3 | CYCLE |
| 4 | DAY |
| 5 | WEEK |
| 6 | MONTH |
| 7 | YEAR |
| 8 | EXTERNAL |

1.7.6 Enumerated type: ClcMod

Description: Calculation mode

| Ordinal | Semantic |
|---|---|
| 1 | TOTAL |
| 2 | PERIOD |
| 3 | SLIDING |

1.7.7 Enumerated type: ClcMth

Description: Calculation method of statistical data objects

| Ordinal | Semantic |
|---|---|
| 1 | UNSPECIFIED |
| 2 | TRUE_RMS |
| 3 | PEAK_FUNDAMENTAL |
| 4 | RMS_FUNDAMENTAL |
| 5 | MIN |
| 6 | MAX |

| Ordinal | Semantic |
|---|---|
| 7 | AVG |
| 8 | SDV |
| 9 | PREDICTION |
| 10 | RATE |

1.7.8 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 |

1.7.9 Enumerated type: Dbpos

Description: Switch positions

| Ordinal | Semantic |
|---|---|
| 0 | intermediate |
| 1 | off |
| 2 | on |
| 3 | bad |

1.7.10 Enumerated type: dir

Description: Direction

| Ordinal | Semantic |
|---|---|
| 0 | unknown |
| 1 | forward |
| 2 | backward |
| 3 | both |

1.7.11 Enumerated type: FnStatCLI

Description: The status of Current Loop input protection functionality

| Ordinal | Semantic |
|---|---|
| 0 | Under |
| 1 | Over |

1.7.12 Enumerated type: Health

Description: Health

| Ordinal | Semantic |
|---|---|
| 1 | Ok |
| 2 | Warning |
| 3 | Alarm |

1.7.13 Enumerated type: Mod_2

Description: Mode including 2 states

| Ordinal | Semantic |
|---|---|
| 1 | on |
| 5 | off |

1.7.14 Enumerated type: Mod_3

Description: Mode including 3 states

| Ordinal | Semantic |
|---|---|
| 1 | on |
| 3 | test |
| 4 | test/blocked |

1.7.15 Enumerated type: multiplier

Description: Exponents of the multiplier value in base 10.

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

1.7.16 Enumerated type: orCategory

Description: orCategory

| Ordinal | Semantic |
|---|---|
| 0 | not-supported |
| 1 | bay-control |
| 2 | station-control |
| 3 | remote-control |
| 4 | automatic-bay |

| Ordinal | Semantic |
|---|---|
| 5 | automatic-station |
| 6 | automatic-remote |
| 7 | maintenance |
| 8 | process |

1.7.17 Enumerated type: PwrFnMode

Description: The status of power protection stage mode functionality

| Ordinal | Semantic |
|---|---|
| 0 | Disabled |
| 1 | Under |
| 2 | Over |

1.7.18 Enumerated type: seqT

Description: Sequence Measurement Type

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

1.7.19 Enumerated type: SIUnit

Description: SI Units derived from ISO/IEC 1000

| Ordinal | Semantic |
|---|---|
| -16 | years |
| -15 | months |
| -14 | weeks |
| -13 | V/s |
| -12 | mins |
| -11 | hours |
| -10 | days |
| -9 | °F |
| -8 | ratio |
| -7 | miles |
| -6 | inches |
| -5 | feet |
| -4 | df/dt |
| -3 | hz/s |
| -2 | % |
| -1 | pu |
| 1 | |
| 2 | m |
| 3 | kg |
| 4 | s |
| 5 | A |
| 6 | K |
| 7 | mol |
| 8 | cd |
| 9 | deg |

| Ordinal | Semantic |
|---|---|
| 10 | rad |
| 11 | sr |
| 21 | Gy |
| 22 | Bq |
| 23 | °C |
| 24 | Sv |
| 25 | F |
| 26 | C |
| 27 | S |
| 28 | H |
| 29 | V |
| 30 | ohm |
| 31 | J |
| 32 | N |
| 33 | Hz |
| 34 | lx |
| 35 | Lm |
| 36 | Wb |
| 37 | T |
| 38 | W |
| 39 | Pa |
| 41 | $m^2$ |
| 42 | $m^3$ |
| 43 | m/s |
| 44 | $m/s^2$ |
| 45 | $m^3/s$ |
| 46 | $m/m^3$ |
| 47 | M |
| 48 | $kg/m^3$ |
| 49 | $m^2/s$ |
| 50 | W/m K |
| 51 | J/K |
| 52 | ppm |
| 53 | 1/s |
| 54 | rad/s |
| 55 | $W/m^2$ |
| 56 | $J/m^2$ |
| 57 | S/m |
| 58 | K/s |
| 59 | Pa/s |
| 60 | J/kg K |
| 61 | VA |
| 62 | Watts |
| 63 | VAr |
| 64 | phi |

| Ordinal | Semantic |
|---|---|
| 65 | cos(phi) |
| 66 | Vs |
| 67 | V² |
| 68 | As |
| 69 | A² |
| 70 | A²t |
| 71 | VAh |
| 72 | Wh |
| 73 | VArh |
| 74 | V/Hz |
| 75 | Hz/s |
| 76 | char |
| 77 | char/s |
| 78 | kgm² |
| 79 | dB |
| 80 | J/Wh |
| 81 | W/s |
| 82 | l/s |
| 83 | dBm |
| 84 | h |
| 85 | min |

## 1.8 MMS data-type conversions

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

| Part 7 Type | MMS Type | Part 7 Description |
|---|---|---|
| BOOLEAN | Bool | Logical TRUE/FALSE value |
| BSTR16 | Bstring16 | Bit-string -16 bits |
| BVstring13 | BVstring13 | Variable bit string (upto 13 bits) |
| Check | BVstring2 | Control Object check flags |
| CODED_ENUM | Byte | Coded enumeration |
| CODED_ENUM2 | Byte | Coded enumeration (2) |
| EntryTime | Btime6 | 8.1 Section 8.1.3.7 |
| ENUMERATED16 | Short | 16 bit enumerated value |
| ENUMERATED32 | Long | 32 bit enumerated value |
| ENUMERATED8 | Byte | 8 bit enumerated value |
| FLOAT32 | Float | 32 bit floating point value |
| FLOAT64 | Double | 64 bit floating point value |
| INT128 | Int64 | 128 bit signed integer value |
| INT16 | Short | 16 bit signed integer value |
| INT16U | Ushort | 16 bit unsigned integer value |
| INT24U | Ulong | 24 bit unsigned integer value |
| INT32 | Long | 32 bit signed integer value |
| INT32U | Ulong | 32 bit unsigned integer value |
| INT64 | Int64 | 64 bit signed integer value |

| Part 7 Type | MMS Type | Part 7 Description |
|---|---|---|
| INT8 | Byte | 8 bit signed integer value |
| INT8U | Ubyte | 8 bit unsigned integer value |
| ObjectReference | Vstring129 | Object Reference (129 character string) |
| OCTET_STRING6 | Ostring6 | 6 character string (8 bits per character) |
| OCTET_STRING64 | OVstring64 | 64 character string (8 bits per character) |
| OCTET_STRING8 | OVstring8 | 8 character string (8 bits per character) |
| Quality | BVstring13 | IEC61850 Quality |
| TimeStamp | Utctime | IEC61850 Time stamp |
| UNICODE_STRING255 | UTF8Vstring255 | 255 character string (16 bits per unicode character) |
| UTC_TM | Utctime | UTC Timestamp |
| VISIBLE_STRING129 | Vstring129 | 129 character string |
| VISIBLE_STRING255 | Vstring255 | 255 character string |
| VISIBLE_STRING64 | Vstring64 | 64 character string |
| VISIBLE_STRING65 | Vstring65 | 65 character string |
| VISIBLE_STRING97 | Vstring97 | 97 character string |

## Imagination at work

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