RELION® PRODUCT FAMILY

Grid Automation REC615 and RER615

DNP3 Point List Manual

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Section 1 Introduction

1.1 This manual

The point list manual describes the outlook and properties of the data points specific to the protection relay. The manual should be used in conjunction with the corresponding communication protocol manual.

1.2 Intended audience

This manual addresses the communication system engineer or system integrator responsible for pre-engineering and engineering for communication setup in a substation from an protection relay perspective.

The system engineer or system integrator must have a basic knowledge of communication in protection and control systems and thorough knowledge of the specific communication protocol.

1.3 Product documentation

1.3.1 Product documentation set

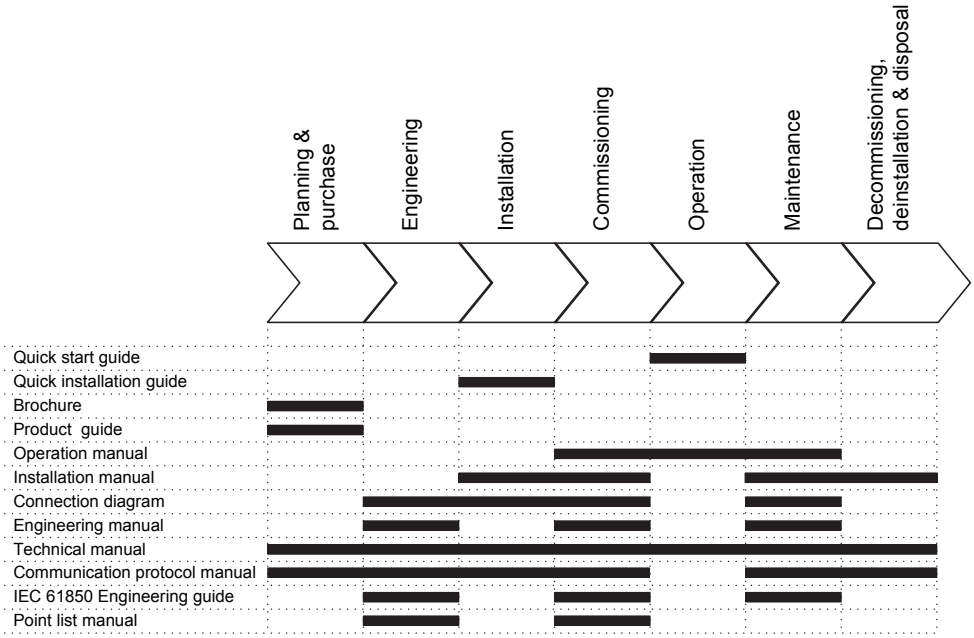

Figure 1: The intended use of documents during the product life cycle

Product series- and product-specific manuals can be downloaded from the ABB Web site http://www.abb.com/relion.

1.3.2 Document revision history

Document revision/date	Product version	History
A/2018-08-31	2.0	First release
B/2019-05-31	2.0.3	Content updated to correspond to the product series version

Download the latest documents from the ABB Web site http://www.abb.com/substationautomation.

1.3.3 Related documentation

Name of the document	Document ID
DNP3 Communication Protocol Manual	1MRS758757

1.4 Symbols and conventions

1.4.1 Symbols

The caution icon indicates important information or warning related to the concept discussed in the text. It might indicate the presence of a hazard which could result in corruption of software or damage to equipment or property.

The information icon alerts the reader of important facts and conditions.

The tip icon indicates advice on, for example, how to design your project or how to use a certain function.

Although warning hazards are related to personal injury, it is necessary to understand that under certain operational conditions, operation of damaged equipment may result in degraded process performance leading to personal injury or death. Therefore, comply fully with all warning and caution notices.

1.4.2 Document conventions

A particular convention may not be used in this manual.

- Abbreviations and acronyms are spelled out in the glossary. The glossary also contains definitions of important terms.
- The example figures illustrate the IEC display variant.
- Menu paths are presented in bold.
  Select **Main menu/Settings**.
- LHMI messages are shown in Courier font.
  To save the changes in nonvolatile memory, select `Yes` and press ↵.
- Parameter names are shown in italics.
  The function can be enabled and disabled with the *Operation* setting.
- Parameter values are indicated with quotation marks.
  The corresponding parameter values are "On" and "Off".
- Input/output messages and monitored data names are shown in Courier font.
  When the function starts, the `START` output is set to TRUE.

1.4.3 Functions, codes and symbols

All available functions are listed in the table. All of them may not be applicable to all products.

Table 1: Functions included in the relays

Function	IEC 61850	IEC 60617	IEC-ANSI
Protection			
Three-phase non-directional overcurrent protection, low stage, instance 1	PHLPTOC1	3I> (1)	51P-1 (1)
	FPHLPTOC1	F3I> (1)	F51P-1 (1)
Three-phase non-directional overcurrent protection, high stage, instance 1	PHHPTOC1	3I>> (1)	51P-2 (1)
Three-phase non-directional overcurrent protection, instantaneous stage, instance 1	PHIPTOC1	3I>>> (1)	50P/51P (1)
Three-phase non-directional overcurrent protection, instantaneous stage, instance 2	PHIPTOC2	3I>>> (2)	50P/51P (2)
Three-phase directional overcurrent protection, low stage, instance 1	DPHLPDOC1	3I> -> (1)	67-1 (1)
	FDPHLPDOC1	F3I> -> (1)	F67-1 (1)
Three-phase directional overcurrent protection, low stage, instance 2	DPHLPDOC2	3I> -> (2)	67-1 (2)
	FDPHLPDOC2	F3I> -> (2)	F67-1 (2)
Three-phase directional overcurrent protection, low stage, instance 3	DPHLPDOC3	3I> -> (3)	67-1 (3)
Three-phase directional overcurrent protection, low stage, instance 4	DPHLPDOC4	3I> -> (4)	67-1 (4)
Three-phase directional overcurrent protection, high stage, instance 1	DPHHPDOC1	3I>> -> (1)	67-2 (1)
Three-phase directional overcurrent protection, high stage, instance 2	DPHHPDOC2	3I>> -> (2)	67-2 (2)
Three-phase directional overcurrent protection, high stage, instance 3	DPHHPDOC3	3I>> -> (3)	67-2 (3)
Three-phase directional overcurrent protection, high stage, instance 4	DPHHPDOC4	3I>> -> (4)	67-2 (4)
Non-directional earth-fault protection, low stage, instance 1	EFLPTOC1	Io> (1)	51N-1 (1)
	FEFLPTOC1	FIo> (1)	F51N-1 (1)
Non-directional earth-fault protection, high stage, instance 1	EFHPTOC1	Io>> (1)	51N-2 (1)
Non-directional earth-fault protection, instantaneous stage, instance 1	EFIPTOC1	Io>>> (1)	50N/51N (1)
Directional earth-fault protection, low stage, instance 1	DEFLPDEF1	Io> -> (1)	67N-1 (1)
	FDEFLPDEF1	FIo> -> (1)	F67N-1 (1)
Directional earth-fault protection, low stage, instance 2	DEFLPDEF2	Io> -> (2)	67N-1 (2)
	FDEFLPDEF2	FIo> -> (2)	F67N-1 (2)
Directional earth-fault protection, low stage, instance 3	DEFLPDEF3	Io> -> (3)	67N-1 (3)

Table continues on next page

Function	IEC 61850	IEC 60617	IEC-ANSI
Directional earth-fault protection, low stage, instance 4	DEFLPDEF4	Io> -> (4)	67N-1 (4)
Directional earth-fault protection, high stage, instance 1	DEFHPDEF1	Io>> -> (1)	67N-2 (1)
Directional earth-fault protection, high stage, instance 2	DEFHPDEF2	Io>> -> (2)	67N-2 (2)
Directional earth-fault protection, high stage, instance 3	DEFHPDEF3	Io>> -> (3)	67N-2 (3)
Directional earth-fault protection, high stage, instance 4	DEFHPDEF4	Io>> -> (4)	67N-2 (4)
Transient / intermittent earth-fault protection, instance 1	INTRPTEF1	Io> -> IEF (1)	67NIEF (1)
Admittance-based earth-fault protection, instance 1	EFPADM1	Yo> -> (1)	21YN (1)
Admittance-based earth-fault protection, instance 2	EFPADM2	Yo> -> (2)	21YN (2)
Admittance-based earth-fault protection, instance 3	EFPADM3	Yo> -> (3)	21YN (3)
Wattmetric-based earth-fault protection, instance 1	WPWDE1	Po> -> (1)	32N (1)
Wattmetric-based earth-fault protection, instance 2	WPWDE2	Po> -> (2)	32N (2)
Wattmetric-based earth-fault protection, instance 3	WPWDE3	Po> -> (3)	32N (3)
Harmonics-based earth-fault protection, instance 1	HAEFPTOC1	Io>HA (1)	51NHA (1)
Multifrequency admittance-based earth-fault protection, instance 1	MFADPSDE1	Io> -> Y (1)	67YN (1)
Multifrequency admittance-based earth-fault protection, instance 2	MFADPSDE2	Io> -> Y (2)	67YN (2)
Negative-sequence overcurrent protection, instance 1	NSPTOC1	I2> (1)	46 (1)
Negative-sequence overcurrent protection, instance 2	NSPTOC2	I2> (2)	46 (2)
Phase discontinuity protection, instance 1	PDNSPTOC1	I2/I1> (1)	46PD (1)
Residual overvoltage protection, instance 1	ROVPTOV1	Uo> (1)	59G (1)
Residual overvoltage protection, instance 2	ROVPTOV2	Uo> (2)	59G (2)
Three-phase undervoltage protection, instance 1	PHPTUV1	3U< (1)	27 (1)
Three-phase undervoltage protection, instance 2	PHPTUV2	3U< (2)	27 (2)
Three-phase undervoltage protection, instance 3	PHPTUV3	3U< (3)	27 (3)
Three-phase overvoltage protection, instance 1	PHPTOV1	3U> (1)	59 (1)

Table continues on next page

Function	IEC 61850	IEC 60617	IEC-ANSI
Three-phase overvoltage protection, instance 2	PHPTOV2	3U> (2)	59 (2)
Three-phase overvoltage protection, instance 3	PHPTOV3	3U> (3)	59 (3)
Positive-sequence undervoltage protection, instance 1	PSPTUV1	U1< (1)	47U+ (1)
Negative-sequence overvoltage protection, instance 1	NSPTOV1	U2> (1)	47O- (1)
Loss of phase (undercurrent), instance 1	PHPTUC1	3I< (1)	37 (1)
Loss of phase (undercurrent), instance 2	PHPTUC2	3I< (2)	37 (2)
Frequency protection, instance 1	FRPFRQ1	f>/f<,df/dt (1)	81 (1)
Frequency protection, instance 2	FRPFRQ2	f>/f<,df/dt (2)	81 (2)
Three-phase thermal protection for feeders, cables and distribution transformers, instance 1	T1PTTR1	3Ith>F (1)	49F (1)
Circuit breaker failure protection, instance 1	CCBRBRF1	3I>/Io>BF (1)	51BF/51NBF (1)
Circuit breaker failure protection, instance 2	CCBRBRF2	3I>/Io>BF (2)	51BF/51NBF (2)
Three-phase inrush detector, instance 1	INRPHAR1	3I2f> (1)	68 (1)
Master trip, instance 1	TRPPTRC1	Master Trip (1)	94/86 (1)
Master trip, instance 2	TRPPTRC2	Master Trip (2)	94/86 (2)
Multipurpose protection, instance 1	MAPGAPC1	MAP (1)	MAP (1)
Multipurpose protection, instance 2	MAPGAPC2	MAP (2)	MAP (2)
Multipurpose protection, instance 3	MAPGAPC3	MAP (3)	MAP (3)
Multipurpose protection, instance 4	MAPGAPC4	MAP (4)	MAP (4)
Multipurpose protection, instance 5	MAPGAPC5	MAP (5)	MAP (5)
Multipurpose protection, instance 6	MAPGAPC6	MAP (6)	MAP (6)
Load-shedding and restoration, instance 1	LSHDPFRQ1	UFLS/R (1)	81LSH (1)
Load-shedding and restoration, instance 2	LSHDPFRQ2	UFLS/R (2)	81LSH (2)
Fault locator, instance 1	SCEFRFLO1	FLOC (1)	21FL (1)
Three-phase power directional element, instance 1	DPSRDIR1	I1-> (1)	32P (1)
Three-phase power directional element, instance 2	DPSRDIR2	I1-> (2)	32P (2)
Power quality			
Current total demand distortion, instance 1	CMHAI1	PQM3I (1)	PQM3I (1)
Voltage total harmonic distortion, instance 1	VMHAI1	PQM3U (1)	PQM3V (1)
Voltage variation, instance 1	PHQVVR1	PQMU (1)	PQMV (1)

Table continues on next page

Function	IEC 61850	IEC 60617	IEC-ANSI
Voltage unbalance, instance 1	VSQVUB1	PQUUB (1)	PQVUB (1)
Control			
Circuit-breaker control, instance 1	CBXCBR1	I <-> O CB (1)	I <-> O CB (1)
Circuit-breaker control, instance 2	CBXCBR2	I <-> O CB (2)	I <-> O CB (2)
Disconnector control, instance 1	DCXSWI1	I <-> O DCC (1)	I <-> O DCC (1)
Disconnector control, instance 2	DCXSWI2	I <-> O DCC (2)	I <-> O DCC (2)
Disconnector control, instance 3	DCXSWI3	I <-> O DCC (3)	I <-> O DCC (3)
Disconnector control, instance 4	DCXSWI4	I <-> O DCC (4)	I <-> O DCC (4)
Disconnector control, instance 5	DCXSWI5	I <-> O DCC (5)	I <-> O DCC (5)
Disconnector control, instance 6	DCXSWI6	I <-> O DCC (6)	I <-> O DCC (6)
Disconnector control, instance 7	DCXSWI7	I <-> O DCC (7)	I <-> O DCC (7)
Disconnector control, instance 8	DCXSWI8	I <-> O DCC (8)	I <-> O DCC (8)
Disconnector position indication, instance 1	DCSXSWI1	I <-> O DC (1)	I <-> O DC (1)
Disconnector position indication, instance 2	DCSXSWI2	I <-> O DC (2)	I <-> O DC (2)
Earthing switch indication, instance 1	ESSXSWI1	I <-> O ES (1)	I <-> O ES (1)
Earthing switch indication, instance 2	ESSXSWI2	I <-> O ES (2)	I <-> O ES (2)
Earthing switch indication, instance 3	ESSXSWI3	I <-> O ES (3)	I <-> O ES (3)
Earthing switch indication, instance 4	ESSXSWI4	I <-> O ES (4)	I <-> O ES (4)
Earthing switch indication, instance 5	ESSXSWI5	I <-> O ES (5)	I <-> O ES (5)
Earthing switch indication, instance 6	ESSXSWI6	I <-> O ES (6)	I <-> O ES (6)
Earthing switch indication, instance 7	ESSXSWI7	I <-> O ES (7)	I <-> O ES (7)
Earthing switch indication, instance 8	ESSXSWI8	I <-> O ES (8)	I <-> O ES (8)
Autoreclosing, instance 1	DARREC1	O -> I (1)	79 (1)
Autoreclosing, instance 2	DARREC2	O -> I (2)	79 (2)
Synchronism and energizing check, instance 1	SECRSYN1	SYNC (1)	25 (1)
Automatic transfer switch, instance 1	ATSABTC1	ATSABTC1	ATSABTC1
Condition monitoring			
Circuit-breaker condition monitoring, instance 1	SSCBR1	CBCM (1)	CBCM (1)
Circuit-breaker condition monitoring, instance 2	SSCBR2	CBCM (2)	CBCM (2)
Trip circuit supervision, instance 1	TCSSCBR1	TCS (1)	TCM (1)
Trip circuit supervision, instance 2	TCSSCBR2	TCS (2)	TCM (2)
Fuse failure supervision, instance 1	SEQSPVC1	FUSEF (1)	60 (1)
Fuse failure supervision, instance 2	SEQSPVC2	FUSEF (1)	60 (1)
Runtime counter for machines and devices, instance 1	MDSOPT1	OPTS (1)	OPTM (1)
Voltage presence, instance 1	PHSVPR1	PHSVPR(1)	PHSVPR(1)
Voltage presence, instance 2	PHSVPR2	PHSVPR(2)	PHSVPR(2)

Table continues on next page

Function	IEC 61850	IEC 60617	IEC-ANSI
Measurement			
Three-phase current measurement, instance 1	CMMXU1	3I (1)	3I (1)
Three-phase current measurement, instance 2	CMMXU2	3I (2)	3I (2)
Sequence current measurement, instance 1	CSMSQI1	I1, I2, I0 (1)	I1, I2, I0 (1)
Sequence current measurement, instance 2	CSMSQI2	I1, I2, I0 (2)	I1, I2, I0 (2)
Residual current measurement, instance 1	RESCMMXU1	Io (1)	In (1)
Three-phase voltage measurement, instance 1	VMMXU1	3U (1)	3V (1)
Three-phase voltage measurement, instance 2	VMMXU2	3U (2)	3V (2)
Residual voltage measurement, instance 1	RESVMMXU1	Uo (1)	Vn (1)
Sequence voltage measurement, instance 1	VSMSQI1	U1, U2, U0 (1)	V1, V2, V0 (1)
Sequence voltage measurement, instance 2	VSMSQI2	U1, U2, U0 (2)	V1, V2, V0 (2)
Three-phase power and energy measurement, instance 1	PEMMXU1	P, E (1)	P, E (1)
Three-phase power and energy measurement, instance 2	PEMMXU2	P, E (2)	P, E (2)
Single-phase power and energy measurement, instance 1	SPEMMXU1	SP, SE (1)	SP, SE (1)
Single-phase power and energy measurement, instance 2	SPEMMXU2	SP, SE (2)	SP, SE (2)
Frequency measurement, instance 1	FMMXU1	f (1)	f (1)
Frequency measurement, instance 2	FMMXU2	f (2)	f (2)
Load profile record, instance 1	LDPRLRC1	LOADPROF (1)	LOADPROF (1)
Other			
Minimum pulse timer (2 pcs), instance 1	TPGAPC1	TP (1)	TP (1)
Minimum pulse timer (2 pcs), instance 2	TPGAPC2	TP (2)	TP (2)
Minimum pulse timer (2 pcs, second resolution), instance 1	TPSGAPC1	TPS (1)	TPS (1)
Minimum pulse timer (2 pcs, minute resolution), instance 1	TPMGAPC1	TPM (1)	TPM (1)
Pulse timer (8 pcs), instance 1	PTGAPC1	PT (1)	PT (1)
Pulse timer (8 pcs), instance 2	PTGAPC2	PT (2)	PT (2)
Time delay off (8 pcs), instance 1	TOFGAPC1	TOF (1)	TOF (1)
Time delay off (8 pcs), instance 2	TOFGAPC2	TOF (2)	TOF (2)
Time delay on (8 pcs), instance 1	TONGAPC1	TON (1)	TON (1)

Table continues on next page

Function	IEC 61850	IEC 60617	IEC-ANSI
Time delay on (8 pcs), instance 2	TONGAPC2	TON (2)	TON (2)
Set-reset (8 pcs), instance 1	SRGAPC1	SR (1)	SR (1)
Set-reset (8 pcs), instance 2	SRGAPC2	SR (2)	SR (2)
Move (8 pcs), instance 1	MVGAPC1	MV (1)	MV (1)
Move (8 pcs), instance 2	MVGAPC2	MV (2)	MV (2)
Move (8 pcs), instance 3	MVGAPC3	MV (3)	MV (3)
Move (8 pcs), instance 4	MVGAPC4	MV (4)	MV (4)
Move (8 pcs), instance 5	MVGAPC5	MV (5)	MV (5)
Move (8 pcs), instance 6	MVGAPC6	MV (6)	MV (6)
Move (8 pcs), instance 7	MVGAPC7	MV (7)	MV (7)
Move (8 pcs), instance 8	MVGAPC8	MV (8)	MV (8)
Generic control point (16 pcs), instance 1	SPCGAPC1	SPC (1)	SPC (1)
Generic control point (16 pcs), instance 2	SPCGAPC2	SPC (2)	SPC (2)
Remote generic control points, instance 1	SPCRGAPC1	SPCR (1)	SPCR (1)
Local generic control points, instance 1	SPCLGAPC1	SPCL (1)	SPCL (1)
Generic up-down counters, instance 1	UDFCNT1	UDCNT (1)	UDCNT (1)
Generic up-down counters, instance 2	UDFCNT2	UDCNT (2)	UDCNT (2)
Generic up-down counters, instance 3	UDFCNT3	UDCNT (3)	UDCNT (3)
Analog value scaling, instance 1	SCA4GAPC1	SCA4 (1)	SCA4 (1)
Analog value scaling, instance 2	SCA4GAPC2	SCA4 (2)	SCA4 (2)
Analog value scaling, instance 3	SCA4GAPC3	SCA4 (3)	SCA4 (3)
Analog value scaling, instance 4	SCA4GAPC4	SCA4 (4)	SCA4 (4)
Analog value scaling, instance 5	SCA4GAPC5	SCA4 (5)	SCA4 (5)
Analog value scaling, instance 6	SCA4GAPC6	SCA4 (6)	SCA4 (6)
Analog value scaling, instance 7	SCA4GAPC7	SCA4 (7)	SCA4 (7)
Analog value scaling, instance 8	SCA4GAPC8	SCA4 (8)	SCA4 (8)
Analog value scaling, instance 9	SCA4GAPC9	SCA4 (9)	SCA4 (9)
Analog value scaling, instance 10	SCA4GAPC10	SCA4 (10)	SCA4 (10)
Analog value scaling, instance 11	SCA4GAPC11	SCA4 (11)	SCA4 (11)
Analog value scaling, instance 12	SCA4GAPC12	SCA4 (12)	SCA4 (12)
Integer value move, instance 1	MVI4GAPC1	MVI4 (1)	MVI4 (1)
Integer value move, instance 2	MVI4GAPC2	MVI4 (2)	MVI4 (2)
Daily timer function, instance 1	DTMGAPC1	DTMGAPC1	DTMGAPC1
Daily timer function, instance 2	DTMGAPC2	DTMGAPC2	DTMGAPC2
Programmable buttons (4 buttons)	FKEY4GGIO1	FKEY4GGIO1	FKEY4GGIO1

Table continues on next page

Function	IEC 61850	IEC 60617	IEC-ANSI
Logging functions			
Disturbance recorder	RDRE1	DR (1)	DFR (1)
Fault record	FLTRFRC1	FAULTREC (1)	FAULTREC (1)

Section 2 DNP3 data mappings

2.1 Overview

This document describes the DNP3 data points and structures available in the protection relay. The data points are unmapped as a default on the DNP3 level. The point lists describe a superset of all DNP3 data available through the standard configuration/s including the optional functionalities.

The point tables show all the available DNP3 data points in the protection relays. The data objects in the point tables are listed based on the AFL and data object IEC 61850 names.

As a default, the class assignments are Class 0 and Class 1 for binary inputs and Class 0 and Class 2 for analog inputs. These assignments can be modified later. Analog values are provided with default scalings. The scalings can be freely modified by the user.

This list represents the superset of DNP3 points. The actual set of available points, meaning the actual set of available applications, is determined by the protection relay's order code.

2.2 Supported functions

2.2.1 Supported functions in REC615

Table 2: Supported functions

Function	IEC 61850	A	B	C	E	F	G	H
		CE01	CE02	CE03	CE04	CE05	CE06	CE07
Protection								
Three-phase non-directional overcurrent protection, low stage	PHLPTOC	(1)	(1)	(1)	(1)			
	FPHLPTOC	(1)	(1)	(1)	(1)			
Three-phase non-directional overcurrent protection, high stage	PHHPTOC	(1)	(1)	(1)	(1)			
Three-phase non-directional overcurrent protection, instantaneous stage	PHIPTOC	1	1	1	1	1	2[14)]	2[14)]
Three-phase directional overcurrent protection, low stage	DPHLPDOC	(2)	(2)	(2)	(2)	2[1)]	4[1)2)3)]	4[1)2)3)]
	FDPHLPDOC	(2)	(2)	(2)	(2)			
Three-phase directional overcurrent protection, high stage	DPHHPDOC	(1)	(1)	(1)	(1)	2[1)]	4[1)2)3)]	4[1)2)3)]

Table continues on next page

Function	IEC 61850	A	B	C	E	F	G	H
		CE01	CE02	CE03	CE04	CE05	CE06	CE07
Non-directional earth-fault protection, low stage	EFLPTOC	(1)	(1)	(1)	(1)[4]			
	FEFLPTOC	(1)	(1)	(1)	(1)[4]			
Non-directional earth-fault protection, high stage	EFHPTOC	(1)	(1)	(1)	(1)[4]			
Non-directional earth-fault protection, instantaneous stage	EFIPTOC	1	1	1	1[4]	1	1	1
Directional earth-fault protection, low stage	DEFLPDEF	(2)[5]	(2)[5]	(2)[5]	(2)[4][5]	2[1]	4[1][2][3][6][7][8]	4[1][2][3][6][7][8]
	FDEFLPDEF	(2)[5]	(2)[5]	(2)[5]	(2)[4][5]			
Directional earth-fault protection, high stage	DEFHPDEF	(1)[5]	(1)[5]	(1)[5]	(1)[4][5]	2[1]	4[1][2][3][6][7][8]	4[1][2][3][6][7][8]
Transient / intermittent earth-fault protection	INTRPTEF	(1)[5]	(1)[5]	(1)[5]	(1)[4][5]			
Admittance-based earth-fault protection[5]	EFPADM	(3)[5]	(3)[5]	(3)[5]	(3)[4][5]			
Wattmetric-based earth-fault protection[5]	WPWDE	(3)[5]	(3)[5]	(3)[5]	(3)[4][5]			
Harmonics-based earth-fault protection[5]	HAEFPTOC	(1)	(1)	(1)	(1)[4]			
Multifrequency admittance-based earth-fault protection	MFADPSDE	(1)[5]	(1)[5]	(1)[5]	(1)[4][5]	1[1]	2[1][9][10][11]	2[1][9][10][11]
Negative-sequence overcurrent protection	NSPTOC	2	2	2	2			
Phase discontinuity protection	PDNSPTOC	1	1	1	1	1	1	1
Residual overvoltage protection	ROVPTOV	(1)[5]	(2)[9][10]	(1)[5]	(2)[9][10]	1[1]	2[1][9][10]	2[1][9][10]
Three-phase undervoltage protection	PHPTUV	(3)	(3)[12]	(3)	(3)[12]	1[1]	2[1][13]	2[1][13]
Three-phase overvoltage protection	PHPTOV	(3)	(3)[12]	(3)	(3)[12]	1[1]	2[1][13]	2[1][13]
Positive-sequence undervoltage protection	PSPTUV	(1)	(1)	(1)	(1)			
Negative-sequence overvoltage protection	NSPTOV	(1)	(1)	(1)	(1)			
Loss of phase (undercurrent)	PHPTUC						2[14]	2[14]
Frequency protection	FRPFRQ	(2)	(2)	(2)	(2)	1[1]	2[1][13]	2[1][13]
Three-phase thermal protection for feeders, cables and distribution transformers	T1PTTR	1	1	1	1	1	1	1
Circuit breaker failure protection	CCBRBRF	2	2	2	2[4]	1	2[11][14]	2[11][14]
Three-phase inrush detector	INRPHAR	1	1	1	1	1	1	1
Master trip	TRPPTRC	2	2	2	2	2	2	2
Multipurpose protection[15]	MAPGAPC	6	6	6	6	2	2	2
Load-shedding and restoration	LSHDPFRQ	(1)	(1)	(1)	(1)	1[1]	2[1][13]	2[1][13]
Fault locator	SCEFRFLO	(1)	(1)	(1)	(1)	1[1]	1[1]	1[1]
Three-phase power directional element	DPSRDIR	1	1	1	1	1	2	2
Power quality								
Current total demand distortion	CMHAI	(1)	(1)	(1)	(1)			
Voltage total harmonic distortion	VMHAI	(1)	(1)	(1)	(1)			
Voltage variation	PHQVVR	(1)	(1)	(1)	(1)			

Table continues on next page

Function	IEC 61850	A	B	C	E	F	G	H
		CE01	CE02	CE03	CE04	CE05	CE06	CE07
Voltage unbalance	VSQVUB	(1)	(1)	(1)	(1)			
Control								
Circuit-breaker control	CBXCBR	2	2	2	2	1	2	2
Disconnector control	DCXSWI	8	8	8	8	4	8	8
Disconnector position indication	DCSXSWI	2	2	2	2	1	2	2
Earthing switch indication	ESSXSWI	8	8	8	8	4	8	8
Autoreclosing	DARREC	(1)	(1)	(1)	(1)	1[1)]	2[1)]	2[1)]
Synchronism and energizing check	SECRSYN		1		1	1		
Automatic transfer switch	ATSABTC	(1)	(1)	(1)	(1)	1[1)]	1[1)]	1[1)]
Condition monitoring								
Circuit-breaker condition monitoring	SSCBR	2	2	2	2	1	2[14)]	2[14)]
Trip circuit supervision	TCSSCBR	2	2	2	2	2	2	2
Fuse failure supervision	SEQSPVC	1	1	1	1	1	2[13)14)]	2[13)14)]
Runtime counter for machines and devices	MDSOPT	1	1	1	1			
Voltage presence	PHSVPR	1	2[13)]	1	2[13)]	1	2[13)]	2[13)]
Measurement								
Three-phase current measurement	CMMXU	1	1	1	1	1	2[14)]	2[14)]
Sequence current measurement	CSMSQI	1	1	1	1	1	2[14)]	2[14)]
Residual current measurement	RESCMMXU	1	1	1		1	1	1
Three-phase voltage measurement	VMMXU	1	2[13)]	1	2[13)]	2[13)]	2[13)]	2[13)]
Residual voltage measurement	RESVMMXU					1		
Sequence voltage measurement	VSMSQI	1	2[13)]	1	2[13)]		2[13)]	2[13)]
Three-phase power and energy measurement	PEMMXU	1	1	1	1	1	2[13)14)]	2[13)14)]
Single-phase power and energy measurement	SPEMMXU	1	1	1	1	1	2[13)14)]	2[13)14)]
Frequency measurement	FMMXU	1	2[13)]	1	2[13)]	1	2[13)]	2[13)]
Load profile record	LDPRLRC	1	1	1	1	1	1	1
Other								
Minimum pulse timer (2 pcs)	TPGAPC	2	2	2	2	2	2	2
Minimum pulse timer (2 pcs, second resolution)	TPSGAPC	1	1	1	1	1	1	1
Minimum pulse timer (2 pcs, minute resolution)	TPMGAPC	1	1	1	1	1	1	1
Pulse timer (8 pcs)	PTGAPC	2	2	2	2	2	2	2
Time delay off (8 pcs)	TOFGAPC	2	2	2	2	2	2	2
Time delay on (8 pcs)	TONGAPC	2	2	2	2	2	2	2
Set-reset (8 pcs)	SRGAPC	2	2	2	2	2	2	2
Move (8 pcs)	MVGAPC	8	8	8	8	8	8	8
Generic control point (16 pcs)	SPCGAPC	2	2	2	2	2	2	2
Remote generic control points	SPCRGAPC	1	1	1	1	1	1	1
Local generic control points	SPCLGAPC	1	1	1	1	1	1	1

Table continues on next page

Function	IEC 61850	A	B	C	E	F	G	H
		CE01	CE02	CE03	CE04	CE05	CE06	CE07
Generic up-down counters	UDFCNT	3	3	3	3	3	3	3
Analog value scaling	SCA4GAPC	12	12	12	12	12	12	12
Integer value move	MVI4GAPC	2	2	2	2	2	2	2
Daily timer function	DTMGAPC	2	2	2	2	2	2	2
Programmable buttons (4 buttons)	FKEY4GGIO	1	1	1	1	1	1	1
Logging functions								
Disturbance recorder	RDRE	1	1	1	1	1	1	1
Fault record	FLTRFRC	1	1	1	1	1	1	1
1, 2, ... = number of included instances () = optional								

1) Specific functional package to be selected for functional package 1 (G,H), 2 (C,D) and 3 (D)
2) Voltage group B always used with the third and fourth instances
3) Current group B always used with the third and fourth instances
4) Io calculated is always used
5) Uo calculated is always used
6) Uo calculated is always used with the first and second instances
7) UoB calculated is always used with the third and fourth instances
8) IoB calculated is always used with the third and fourth instances
9) Uo calculated is always used with the first instance
10) UoB calculated is always used with the second instance
11) IoB calculated is always used with the second instance
12) Voltage group B always used with the third instance
13) Voltage group B always used with the second instance
14) Current group B always used with the second instance
15) UoB calculated is always used

2.2.2 Supported functions in RER615

Table 3: Supported functions

Function	IEC 61850	IEC 60617	IEC-ANSI	A	D	E
				RE01	RE02	RE03
Protection						
Three-phase non-directional overcurrent protection, low stage	PHLPTOC	3I>	51P-1	(1)	(1)	(1)
	FPHLPTOC	F3I>	F51P-1	(1)	(1)	(1)
Three-phase non-directional overcurrent protection, high stage	PHHPTOC	3I>>	51P-2	(1)	(1)	(1)
Three-phase non-directional overcurrent protection, instantaneous stage	PHIPTOC	3I>>>	50P/51P	1	1	1
Three-phase directional overcurrent protection, low stage	DPHLPDOC	3I> ->	67-1	(2)	(2)	(2)
	FDPHLPDOC	F3I> ->	F67-1	(2)	(2)	(2)
Three-phase directional overcurrent protection, high stage	DPHHPDOC	3I>> ->	67-2	(1)	(1)	(1)
Non-directional earth-fault protection, low stage	EFLPTOC	Io>	51N-1	(1)	(1)	(1)[1)]
	FEFLPTOC	FIo>	F51N-1	(1)	(1)	(1)[1)]
Non-directional earth-fault protection, high stage	EFHPTOC	Io>>	51N-2	(1)	(1)	(1)[1)]

Table continues on next page

Function	IEC 61850	IEC 60617	IEC-ANSI	A	D	E
				RE01	RE02	RE03
Non-directional earth-fault protection, instantaneous stage	EFIPTOC	Io>>>	50N/51N	1	1	1[1)]
Directional earth-fault protection, low stage	DEFLPDEF	Io> ->	67N-1	(2)[2)]	(2)[2)]	(2)[1)2)]
	FDEFLPDEF	FIo> ->	F67N-1	(2)[2)]	(2)[2)]	(2)[1)2)]
Directional earth-fault protection, high stage	DEFHPDEF	Io>> ->	67N-2	(1)[2)]	(1)[2)]	(1)[1)2)]
Transient / intermittent earth-fault protection	INTRPTEF	Io> -> IEF	67NIEF	(1)[2)]	(1)[2)]	(1)[1)2)]
Admittance-based earth-fault protection	EFPADM	Yo> ->	21YN	(3)[2)]	(3)[2)]	(3)[1)2)]
Wattmetric-based earth-fault protection	WPWDE	Po> ->	32N	(3)[2)]	(3)[2)]	(3)[1)2)]
Harmonics-based earth-fault protection	HAEFPTOC	Io>HA	51NHA	(1)	(1)	(1)[1)]
Multifrequency admittance-based earth-fault protection	MFADPSDE	Io> -> Y	67YN	(1)[2)]	(1)[2)]	(1)[1)2)]
Negative-sequence overcurrent protection	NSPTOC	I2>	46	2	2	2
Phase discontinuity protection	PDNSPTOC	I2/I1>	46PD	1	1	1
Residual overvoltage protection	ROVPTOV	Uo>	59G	(1)[2)]	(2)[3)4)]	(2)[3)4)]
Three-phase undervoltage protection	PHPTUV	3U<	27	(3)	(3)[5)]	(3)[5)]
Three-phase overvoltage protection	PHPTOV	3U>	59	(3)	(3)[5)]	(3)[5)]
Positive-sequence undervoltage protection	PSPTUV	U1<	47U+	(1)	(1)	(1)
Negative-sequence overvoltage protection	NSPTOV	U2>	47O-	(1)	(1)	(1)
Frequency protection	FRPFRQ	f>/f<,df/dt	81	(2)	(2)	(2)
Three-phase thermal protection for feeders, cables and distribution transformers	T1PTTR	3Ith>F	49F	1	1	1
Circuit breaker failure protection	CCBRBRF	3I>/Io>BF	51BF/51NBF	2	2	2[1)]
Three-phase inrush detector	INRPHAR	3I2f>	68	1	1	1
Master trip	TRPPTRC	Master Trip	94/86	2	2	2
Multipurpose protection	MAPGAPC	MAP	MAP	6	6	6
Load-shedding and restoration	LSHDPFRQ	UFLS/R	81LSH	(1)	(1)	(1)
Fault locator	SCEFRFLO	FLOC	21FL	(1)	(1)	(1)
Three-phase power directional element	DPSRDIR	I1->	32P	1	1	1
Power quality						
Current total demand distortion	CMHAI	PQM3I	PQM3I	(1)	(1)	(1)
Voltage total harmonic distortion	VMHAI	PQM3U	PQM3V	(1)	(1)	(1)
Voltage variation	PHQVVR	PQMU	PQMV	(1)	(1)	(1)
Voltage unbalance	VSQVUB	PQUUB	PQVUB	(1)	(1)	(1)
Control						
Circuit-breaker control	CBXCBR	I <-> O CB	I <-> O CB	2	2	2
Disconnector control	DCXSWI	I <-> O DCC	I <-> O DCC	8	8	8
Disconnector position indication	DCSXSWI	I <-> O DC	I <-> O DC	2	2	2
Earthing switch indication	ESSXSWI	I <-> O ES	I <-> O ES	8	8	8
Autoreclosing	DARREC	O -> I	79	1	1	1

Table continues on next page

Function	IEC 61850	IEC 60617	IEC-ANSI	A	D	E
				RE01	RE02	RE03
Synchronism and energizing check	SECRSYN	SYNC	25		1	1
Automatic transfer switch	ATSABTC	ATSABTC1	ATSABTC1	(1)	(1)	(1)
Condition monitoring						
Circuit-breaker condition monitoring	SSCBR	CBCM	CBCM	2	2	2
Trip circuit supervision	TCSSCBR	TCS	TCM	2	2	2
Fuse failure supervision	SEQSPVC	FUSEF	60	1	1	1
Runtime counter for machines and devices	MDSOPT	OPTS	OPTM	1	1	1
Voltage presence	PHSVPR	PHSVPR	PHSVPR	1	2[6)]	2[6)]
Measurement						
Three-phase current measurement	CMMXU	3I	3I	1	1	1
Sequence current measurement	CSMSQI	I1, I2, I0	I1, I2, I0	1	1	1
Residual current measurement	RESCMMXU	Io	In	1	1	
Three-phase voltage measurement	VMMXU	3U	3V	1	2[6)]	2[6)]
Sequence voltage measurement	VSMSQI	U1, U2, U0	V1, V2, V0	1	2[6)]	2[6)]
Three-phase power and energy measurement	PEMMXU	P, E	P, E	1	1	1
Single-phase power and energy measurement	SPEMMXU	SP, SE	SP, SE	1	1	1
Frequency measurement	FMMXU	f	f	1	2[6)]	2[6)]
Load profile record	LDPRLRC	LOADPROF	LOADPROF	1	1	1
Other						
Minimum pulse timer (2 pcs)	TPGAPC	TP	TP	2	2	2
Minimum pulse timer (2 pcs, second resolution)	TPSGAPC	TPS	TPS	1	1	1
Minimum pulse timer (2 pcs, minute resolution)	TPMGAPC	TPM	TPM	1	1	1
Pulse timer (8 pcs)	PTGAPC	PT	PT	2	2	2
Time delay off (8 pcs)	TOFGAPC	TOF	TOF	2	2	2
Time delay on (8 pcs)	TONGAPC	TON	TON	2	2	2
Set-reset (8 pcs)	SRGAPC	SR	SR	2	2	2
Move (8 pcs)	MVGAPC	MV	MV	8	8	8
Generic control point (16 pcs)	SPCGAPC	SPC	SPC	2	2	2
Remote generic control points	SPCRGAPC	SPCR	SPCR	1	1	1
Local generic control points	SPCLGAPC	SPCL	SPCL	1	1	1
Generic up-down counters	UDFCNT	UDCNT	UDCNT	3	3	3
Analog value scaling	SCA4GAPC	SCA4	SCA4	12	12	12
Integer value move	MVI4GAPC	MVI4	MVI4	2	2	2
Daily timer function	DTMGAPC	DTMGAPC1	DTMGAPC1	2	2	2
Programmable buttons (4 buttons)	FKEY4GGIO	FKEY4GGIO 1	FKEY4GGIO 1	1	1	1
Logging functions						

Table continues on next page

Function	IEC 61850	IEC 60617	IEC-ANSI	A	D	E
				RE01	RE02	RE03
Disturbance recorder	RDRE	DR	DFR	1	1	1
Fault record	FLTRFRC	FAULTREC	FAULTREC	1	1	1
1, 2, ... = number of included instances () = optional						

1) Io calculated is always used
2) Uo calculated is always used
3) Uo calculated is always used with the first instance
4) UoB calculated is always used with the second instance
5) Voltage group B is always used with the third instance
6) Voltage group B is always used with the second instance

2.3 Binary inputs

Table 4: Explanations of the binary input table columns

Column name	Description
IEC 61850 name	Original IED data object identification. Described in the IEC 61850 format as Logical Device.Logical Node and thereafter .Data Object.Data Attribute. Logical Node is the same as the application function block name.
SA name	The signal may have a defined label that is visible, for example, in the Application Configuration tool in PCM600.
Description	Short description of the signal. See the technical manual for more information.
Value	Meaning of the input states.

2.3.1 System functions

2.3.1.1 CTRL.LLN0 Local/remote state (also present in DNP IIN-bits)

Boolean object CTRL.LLN0.Loc is True (“1”) in states Local and Off. In all other states, including multistates, the object is False (“0”). DNP3 control should be possible when the object is “0”.

Table 5: CTRL.LLN0 Local/remote state (also present in DNP IIN-bits)

IEC 61850 name	SA name	Description	Values
CTRL.LLN0			
.Loc.stVal		Remote/Local state	0/1=Rem/Loc
.LocKeyHMI.stVal		Station state	1=Station

2.3.1.2 LD0.GNRLLTMS1 Time synchronization (1)

Table 6: LD0.GNRLLTMS1 Time synchronization (1)

IEC 61850 name	SA name	Description	Value
LD0.GNRLLTMS1			
.TmChSt1.stVal		Time channel status	0=Up; 1=Down

2.3.1.3 LD0.GSELPRT1 Goose supervision (1)

Table 7: LD0.GSELPRT1 Goose supervision (1)

IEC 61850 name	SA name	Description	Value
LD0.GSELPRT1			
.Alm.stVal	ALARM	Goose alarm	1=Alarm

2.3.1.4 LD0.LDEV1 System values (1)

Table 8: LD0.LDEV1 System values (1)

IEC 61850 name	SA name	Description	Value
LD0.LDEV1			
.StLstOv.stVal		Internal status overflow	1=Overflow
.MeasLstOv.stVal		Internal meas overflow	1=Overflow
.ChgFlg.stVal		Composition changed	1=Changed
.DevFail.stVal		Internal Fault	1=Fault

2.3.1.5 LD0.LEDGGIO1 Indication LED states OFF/ColorX

These LED indication points interpret the case when an indication signal is wired to either the OK or ALARM input of the LED function block. The default color for ALARM is red and for OK green. Colors can, however, be reconfigured with a setting parameter.

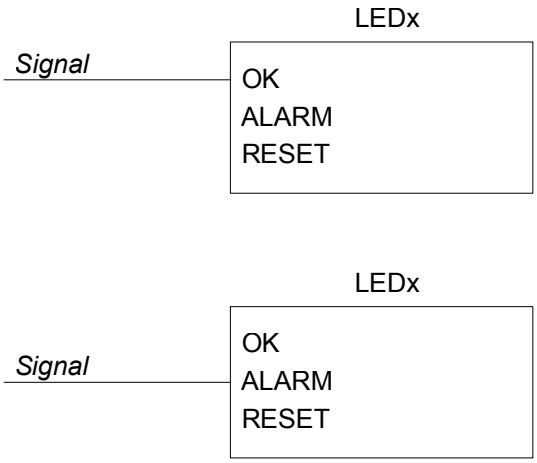

Figure 2: Signal wired to either OK or Alarm input

Table 9: LD0.LEDGGIO1 LHMI LED indications OFF/ColorX

IEC 61850 name	SA name	Description	Values
LD0.LEDGGIO1			
.LEDSt1.stVal		LED State 1 - Off/Color	0/1=Off/Color
.LEDSt2.stVal		LED State 2 - Off/Color	0/1=Off/Color
.LEDSt3.stVal		LED State 3 - Off/Color	0/1=Off/Color
.LEDSt4.stVal		LED State 4 - Off/Color	0/1=Off/Color
.LEDSt5.stVal		LED State 5 - Off/Color	0/1=Off/Color
.LEDSt6.stVal		LED State 6 - Off/Color	0/1=Off/Color
.LEDSt7.stVal		LED State 7 - Off/Color	0/1=Off/Color
.LEDSt8.stVal		LED State 8 - Off/Color	0/1=Off/Color
.LEDSt9.stVal		LED State 9 - Off/Color	0/1=Off/Color
.LEDSt10.stVal		LED State 10 - Off/Color	0/1=Off/Color
.LEDSt11.stVal		LED State 11 - Off/Color	0/1=Off/Color

2.3.1.6 LD0.LEDGGIO1 Indication LED states Color1/Color2

These LED indication points interpret the case when a signal is wired to both the OK and ALARM inputs, but inverted to the other. This means that the LED toggles between red and green colors. The default color for ALARM is red and for OK green. Colors can, however, be reconfigured with a setting parameter.

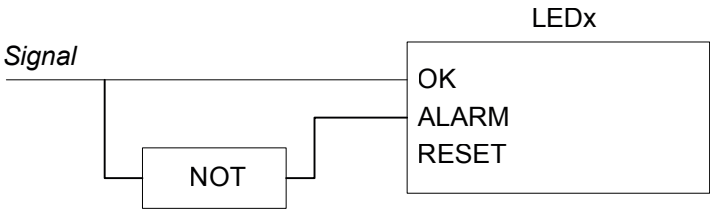

Figure 3: Signal wired to both OK and ALARM inputs – inverted to the other

If the OK and ALARM inputs are wired to separate indication signals, the LED will have three legal states and cannot be expressed with one bit only. In this case, it is possible to combine this LED bit interpretation with the corresponding value from the other LED state interpretation.

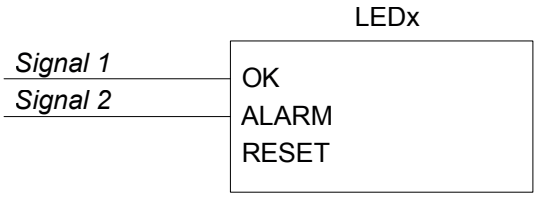

Figure 4: Separate signals wired to OK and ALARM inputs

Table 10: LD0.LEDGGIO1 LHMI LED indications - two state cases (1)

IEC 61850 name	SA name	Description	Values
LD0.LEDGGIO1			
.LEDSt1.stVal		LED State 1 - Color 1/Color 2	0/1=Color 1/Color 2
.LEDSt2.stVal		LED State 2 - Color 1/Color 2	0/1=Color 1/Color 2
.LEDSt3.stVal		LED State 3 - Color 1/Color 2	0/1=Color 1/Color 2
.LEDSt4.stVal		LED State 4 - Color 1/Color 2	0/1=Color 1/Color 2
.LEDSt5.stVal		LED State 5 - Color 1/Color 2	0/1=Color 1/Color 2
.LEDSt6.stVal		LED State 6 - Color 1/Color 2	0/1=Color 1/Color 2
.LEDSt7.stVal		LED State 7 - Color 1/Color 2	0/1=Color 1/Color 2
.LEDSt8.stVal		LED State 8 - Color 1/Color 2	0/1=Color 1/Color 2
.LEDSt9.stVal		LED State 9 - Color 1/Color 2	0/1=Color 1/Color 2
.LEDSt10.stVal		LED State 10 - Color 1/Color 2	0/1=Color 1/Color 2
.LEDSt11.stVal		LED State 11 - Color 1/Color 2	0/1=Color 1/Color 2

2.3.1.7 LD0.RCHLCCH1 Redundant Ethernet supervision (1)

Table 11: LD0.RCHLCCH1 Redundant Ethernet supervision (1)

IEC 61850 name	SA name	Description	Value
LD0.RCHLCCH1			
.ChLiv.stVal	CHLIV	Ethernet channel live	1=Live
.RedChLiv.stVal	REDCHLIV	Redundant Ethernet channel live	1=Live

2.3.1.8 LD0.SCHLCCHx Ethernet channel supervision (1...3)

Table 12: LD0.SCHLCCHx Ethernet channel supervision (1...3)

IEC 61850 name	SA name	Description	Value
LD0.SCHLCCH1			
.ChLiv.stVal	CH1LIV	Ethernet channel 1 live	1=Live
LD0.SCHLCCH2			
.ChLiv.stVal	CH2LIV	Ethernet channel 2 live	1=Live
LD0.SCHLCCH3			
.ChLiv.stVal	CH3LIV	Ethernet channel 2 live	1=Live

2.3.2 Switchgear functions

2.3.2.1 CTRL.CBXCBR1 Circuit-breaker control (1)

Table 13: CTRL.CBXCBR1 Circuit-breaker control (1)

IEC 61850 name	SA name	Description	Values
CTRL.CBCILO1			
.EnaCls.stVal	ENA_CLOSE	Close enabled	1=Enabled
.EnaOpn.stVal	ENA_OPEN	Open enabled	1=Enabled
CTRL.CBCSWI1			
.SynItlByps.stVal	ITL_BYPASS	Interlocking bypass	1=Bypassed
.Pos.stSeld	SELECTED	CB selected	1=Selected
CTRL.CBXCBR1			
.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked
LD0.CCBRBRF1			
.OpEx.general	TRBU	Failure ext.trip	1=Failure
.OpIn.general	TRRET	Operate, re-trip	1=Operate
.Str.general	CB_FAULT_AL	Start, timer running	1=Start

2.3.2.2 CTRL.CBXCBR2 Circuit-breaker control (2)

Table 14: CTRL.CBXCBR2 Circuit-breaker control (2)

IEC 61850 name	SA name	Description	Values
CTRL.CBCILO2			
.EnaCls.stVal	ENA_CLOSE	Close enabled	1=Enabled
.EnaOpn.stVal	ENA_OPEN	Open enabled	1=Enabled
CTRL.CBCSWI1			
.SynItlByps.stVal	ITL_BYPASS	Interlocking bypass	1=Bypassed
.Pos.stSeld	SELECTED	CB selected	1=Selected
CTRL.CBXCBR2			
.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked
LD0.CCBRBRF2			
.OpEx.general	TRBU	Failure ext.trip	1=Failure
.OpIn.general	TRRET	Operate, re-trip	1=Operate
.Str.general	CB_FAULT_AL	Start, timer running	1=Start

2.3.2.3 CTRL.DCXSWI1 Disconnector control (1)

Table 15: CTRL.DCXSWI1 Disconnector control (1)

IEC 61850 name	SA name	Description	Values
CTRL.DCCILO1			
.EnaCls.stVal	ENA_CLOSE	Close enabled	1=Enabled
.EnaOpn.stVal	ENA_OPEN	Open enabled	1=Enabled
.ItlByps.stVal	ITL_BYPASS	Interlocking bypass	1=Bypassed
CTRL.DCCSWI1			
.Pos.stSeld	SELECTED	CB selected	1=Selected
CTRL.DCXSWI1			
.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked

2.3.2.4 CTRL.DCXSWI2 Disconnector control (2)

Table 16: CTRL.DCXSWI2 Disconnector control (2)

IEC 61850 name	SA name	Description	Values
CTRL.DCCILO2			
.EnaCls.stVal	ENA_CLOSE	Close enabled	1=Enabled
.EnaOpn.stVal	ENA_OPEN	Open enabled	1=Enabled
.ItlByps.stVal	ITL_BYPASS	Interlocking bypass	1=Bypassed
Table continues on next page			

IEC 61850 name	SA name	Description	Values
CTRL.DCCSWI2			
.Pos.stSeld	SELECTED	CB selected	1=Selected
CTRL.DCXSWI2			
.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked

2.3.2.5 CTRL.DCXSWI3 Disconnector control (3)

Table 17: CTRL.DCXSWI3 Disconnector control (3)

IEC 61850 name	SA name	Description	Values
CTRL.DCCILO3			
.EnaCls.stVal	ENA_CLOSE	Close enabled	1=Enabled
.EnaOpn.stVal	ENA_OPEN	Open enabled	1=Enabled
.ItlByPss.stVal	ITL_BYPASS	Interlocking bypass	1=Bypassed
CTRL.DCCSWI3			
.Pos.stSeld	SELECTED	CB selected	1=Selected
CTRL.DCXSWI3			
.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked

2.3.2.6 CTRL.DCXSWI4 Disconnector control (4)

Table 18: CTRL.DCXSWI4 Disconnector control (4)

IEC 61850 name	SA name	Description	Values
CTRL.DCCILO4			
.EnaCls.stVal	ENA_CLOSE	Close enabled	1=Enabled
.EnaOpn.stVal	ENA_OPEN	Open enabled	1=Enabled
.ItlByPss.stVal	ITL_BYPASS	Interlocking bypass	1=Bypassed
CTRL.DCCSWI4			
.Pos.stSeld	SELECTED	CB selected	1=Selected
CTRL.DCXSWI4			
.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked

2.3.2.7 CTRL.DCXSWI5 Disconnector control (5)

Table 19: CTRL.DCXSWI5 Disconnector control (5)

IEC 61850 name	SA name	Description	Values
CTRL.DCCILO5			
.EnaCls.stVal	ENA_CLOSE	Close enabled	1=Enabled
.EnaOpn.stVal	ENA_OPEN	Open enabled	1=Enabled
.ItlByPss.stVal	ITL_BYPASS	Interlocking bypass	1=Bypassed
CTRL.DCCSWI5			
.Pos.stSeld	SELECTED	CB selected	1=Selected
CTRL.DCXSWI5			
.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked

2.3.2.8 CTRL.DCXSWI6 Disconnector control (6)

Table 20: CTRL.DCXSWI6 Disconnector control (6)

IEC 61850 name	SA name	Description	Values
CTRL.DCCILO6			
.EnaCls.stVal	ENA_CLOSE	Close enabled	1=Enabled
.EnaOpn.stVal	ENA_OPEN	Open enabled	1=Enabled
.ItlByPss.stVal	ITL_BYPASS	Interlocking bypass	1=Bypassed
CTRL.DCCSWI6			
.Pos.stSeld	SELECTED	CB selected	1=Selected
CTRL.DCXSWI6			
.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked

2.3.2.9 CTRL.DCXSWI7 Disconnector control (7)

Table 21: CTRL.DCXSWI7 Disconnector control (7)

IEC 61850 name	SA name	Description	Values
CTRL.DCCILO7			
.EnaCls.stVal	ENA_CLOSE	Close enabled	1=Enabled
.EnaOpn.stVal	ENA_OPEN	Open enabled	1=Enabled
.ItlByPss.stVal	ITL_BYPASS	Interlocking bypass	1=Bypassed
CTRL.DCCSWI7			
.Pos.stSeld	SELECTED	CB selected	1=Selected
CTRL.DCXSWI7			
.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked

2.3.2.10 CTRL.DCXSWI8 Disconnector control (8)

Table 22: CTRL.DCXSWI8 Disconnector control (8)

IEC 61850 name	SA name	Description	Values
CTRL.DCCILO8			
.EnaCls.stVal	ENA_CLOSE	Close enabled	1=Enabled
.EnaOpn.stVal	ENA_OPEN	Open enabled	1=Enabled
.ItlByPss.stVal	ITL_BYPASS	Interlocking bypass	1=Bypassed
CTRL.DCCSWI8			
.Pos.stSeld	SELECTED	CB selected	1=Selected
CTRL.DCXSWI8			
.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked

2.3.3 Sensors and monitoring functions

2.3.3.1 LD0.IL1TCTR1 Three-phase CT supervision (1)

Table 23: LD0.IL1TCTR1 Three-phase CT supervision (1)

IEC 61850 name	SA name	Description	Values
LD0.IL1TCTR1			
.Alm.stVal	ALARM	Alarm	1=Alarm
.Wrn.stVal	WARNING	Warning	1=Warning

2.3.3.2 LD0.IL1TCTR2 Three-phase CT supervision (2)

Table 24: LD0.IL1TCTR2 Three-phase CT supervision (2)

IEC 61850 name	SA name	Description	Values
LD0.IL1TCTR2			
.Alm.stVal	ALARM	Alarm	1=Alarm
.Wrn.stVal	WARNING	Warning	1=Warning

2.3.3.3 LD0.MDSOPT1 Runtime counter for machines and devices (1)

Table 25: LD0.MDSOPT1 Runtime counter for machines and devices (1)

IEC 61850 name	SA name	Description	Values
LD0.MDSOPT1			
.OpTmAlm.stVal	ALARM	Accum. op. time alarm	1=Alarm
.OpTmWrn.stVal	WARNING	Accum. op. time warning	1=Warning

2.3.3.4 LD0.PHSVPR1 Voltage presence (1)

Table 26: LD0.PHSVPR1 Voltage presence (1)

IEC 61850 name	SA name	Description	Values
LD0.PHSVRP1			
.VLiv.stVal	U_LIVE	High voltage presence	1=High voltage
.VLivPhsA.stVal	U_A_AB_LIVE	High phsA or phsAB voltage	1=High voltage
.VLivPhsB.stVal	U_B_BC_LIVE	High phsB or phsBA voltage	1=High voltage
.VLivPhsB.stVal	U_C_CA_LIVE	High phsC or phsCA voltage	1=High voltage
.VDea.stVal	U_DEAD	Low voltage presence	1=Low voltage
.VDeaPhsA.stVal	U_A_AB_DEAD	Low phsA or phsAB voltage	1=Low voltage
.VDeaPhsB.stVal	U_B_BC_DEAD	Low phsB or phsBA voltage	1=Low voltage
.VDeaPhsC.stVal	U_C_CA_DEAD	Low phsC or phsCA voltage	1=Low voltage

2.3.3.5 LD0.PHSVPR2 Voltage presence (2)

Table 27: LD0.PHSVPR2 Voltage presence (2)

IEC 61850 name	SA name	Description	Values
LD0.PHSVRP2			
.VLiv.stVal	U_LIVE	High voltage presence	1=High voltage
.VLivPhsA.stVal	U_A_AB_LIVE	High phsA or phsAB voltage	1=High voltage
.VLivPhsB.stVal	U_B_BC_LIVE	High phsB or phsBA voltage	1=High voltage
.VLivPhsB.stVal	U_C_CA_LIVE	High phsC or phsCA voltage	1=High voltage
.VDea.stVal	U_DEAD	Low voltage presence	1=Low voltage
.VDeaPhsA.stVal	U_A_AB_DEAD	Low phsA or phsAB voltage	1=Low voltage
.VDeaPhsB.stVal	U_B_BC_DEAD	Low phsB or phsBA voltage	1=Low voltage
.VDeaPhsC.stVal	U_C_CA_DEAD	Low phsC or phsCA voltage	1=Low voltage

2.3.3.6 LD0.RESTCTR1 Io CT supervision (1)

Table 28: LD0.RESTCTR1 Io CT supervision (1)

IEC 61850 name	SA name	Description	Values
LD0.RESTCTR1			
.Alm.stVal	ALARM	Alarm	1=Alarm
.Wrn.stVal	WARNING	Warning	1=Warning

2.3.3.7 LD0.RESTVTR1 Uo VT supervision (1)

Table 29: LD0.RESTVTR1 Uo VT supervision (1)

IEC 61850 name	SA name	Description	Values
LD0.RESTVTR1			
.Alm.stVal	ALARM	Alarm	1=Alarm
.Wrn.stVal	WARNING	Warning	1=Warning

2.3.3.8 LD0.SSCBR1 Circuit-breaker condition monitoring (1)

Table 30: LD0.SSCBR1 Circuit-breaker condition monitoring (1)

IEC 61850 name	SA name	Description	Values
LD0.SSCBR1			
.OpCntAlm.stVal	OPR_ALM	CB operations alarm	1=Alarm
.OpnAlm.stVal	TRV_T_OP_ALM	Cls travel time alarm	1=Alarm
.ClsAlm.stVal	TRV_T_CL_ALM	Cls travel time alarm	1=Alarm
.OpCntLO.stVal	OPR_LO	CB operations lockout	1=Lockout
.LonTmAlm.stVal	MON_ALM	CB inactive alarm	1=Alarm
.APwrAlm.stVal	IPOW_ALM	Iyt alarm	1=Alarm
.APwrLO.stVal	IPOW_LO	Iyt lockout	1=Lockout
.RmnNumOpAlm.stVal	CB_LIFE_ALM	CB lifetime alarm	1=Alarm
LD0.SSIMG1			
.InsAlm.stVal	PRES_ALM	Low pressure alarm	1=Alarm
.InsBlk.stVal	PRES_LO	Low pressure lockout	1=Lockout
LD0.SSOPM1			
.SprChaAlm.stVal	SPR_CHR_ALM	Spring charge time alarm	1=Alarm

2.3.3.9 LD0.SSCBR2 Circuit-breaker condition monitoring (2)

Table 31: LD0.SSCBR2 Circuit-breaker condition monitoring (2)

IEC 61850 name	SA name	Description	Values
LD0.SSCBR2			
.OpCntAlm.stVal	OPR_ALM	CB operations alarm	1=Alarm
.OpnAlm.stVal	TRV_T_OP_ALM	Cls travel time alarm	1=Alarm
.ClsAlm.stVal	TRV_T_CL_ALM	Cls travel time alarm	1=Alarm
.OpCntLO.stVal	OPR_LO	CB operations lockout	1=Lockout
.LonTmAlm.stVal	MON_ALM	CB inactive alarm	1=Alarm
.APwrAlm.stVal	IPOW_ALM	Iyt alarm	1=Alarm
.APwrLO.stVal	IPOW_LO	Iyt lockout	1=Lockout
.RmnNumOpAlm.stVal	CB_LIFE_ALM	CB lifetime alarm	1=Alarm
Table continues on next page			

IEC 61850 name	SA name	Description	Values
LD0.SSIMG2			
.InsAlm.stVal	PRES_ALM	Low pressure alarm	1=Alarm
.InsBlk.stVal	PRES_LO	Low pressure lockout	1=Lockout
LD0.SSOPM2			
.SprChaAlm.stVal	SPR_CHR_ALM	Spring charge time alarm	1=Alarm

2.3.3.10 LD0.TCSSCBR1 Trip circuit supervision (1)

Table 32: LD0.TCSSCBR1 Trip circuit supervision (1)

IEC 61850 name	SA name	Description	Values
LD0.TCSSCBR1			
.CircAlm.stVal	ALARM	Supervision alarm	1=Alarm

2.3.3.11 LD0.TCSSCBR2 Trip circuit supervision (2)

Table 33: LD0.TCSSCBR2 Trip circuit supervision (2)

IEC 61850 name	SA name	Description	Values
LD0.TCSSCBR2			
.CircAlm.stVal	ALARM	Supervision alarm	1=Alarm

2.3.3.12 LD0.UL1TVTR1 Three-phase VT supervision (1)

Table 34: LD0.UL1TVTR1 Three-phase VT supervision (1)

IEC 61850 name	SA name	Description	Values
LD0.UL1TVTR1			
.Alm.stVal	ALARM	Alarm	1=Alarm
.Wrn.stVal	WARNING	Warning	1=Warning

2.3.3.13 LD0.UL1TVTR2 Three-phase VT supervision (2)

Table 35: LD0.UL1TVTR2 Three-phase VT supervision (2)

IEC 61850 name	SA name	Description	Values
LD0.UL1TVTR2			
.Alm.stVal	ALARM	Alarm	1=Alarm
.Wrn.stVal	WARNING	Warning	1=Warning

2.3.3.14 LD0.XARGGI0130 Alarm/warning

Table 36: LD0.XARGGI0130 Alarm/warning

IEC 61850 name	SA name	Description	Values
LD0.XARGGIO130			
.Alm.stVal		XARGGIO130 Alarm	1=Alarm
.Wrn.stVal		XARGGIO130 Warning	1=Warning

2.3.4 Metering and measurand functions

2.3.4.1 LD0.CMMXU1 Three-phase current measurement (1)

Table 37: LD0.CMMXU1 Three-phase current measurement (1)

IEC 61850 name	SA name	Description	Values
LD0.CMMXU1			
.HiAlm.stVal	HIGH_ALARM	High alarm	1=Alarm
.HiWrn.stVal	HIGH_WARN	High warning	1=Warning
.LoAlm.stVal	LOW_ALARM	Low alarm	1=Alarm
.LoWrn.stVal	LOW_WARN	Low warning	1=Warning

2.3.4.2 LD0.CMMXU2 Three-phase current measurement (2)

Table 38: LD0.CMMXU2 Three-phase current measurement (2)

IEC 61850 name	SA name	Description	Values
LD0.CMMXU2			
.HiAlm.stVal	HIGH_ALARM	High alarm	1=Alarm
.HiWrn.stVal	HIGH_WARN	High warning	1=Warning
.LoAlm.stVal	LOW_ALARM	Low alarm	1=Alarm
.LoWrn.stVal	LOW_WARN	Low warning	1=Warning

2.3.4.3 LD0.RESCMMXU1 Residual current measurement (1)

Table 39: LD0.RESCMMXU1 Residual current measurement (1)

IEC 61850 name	SA name	Description	Values
LD0.RESCMMXU1			
.HiAlm.stVal	HIGH_ALARM	High alarm	1=Alarm
.HiWrn.stVal	HIGH_WARN	High warning	1=Warning

2.3.4.4 LD0.RESVMMXU1 Residual voltage measurement (1)

Table 40: LD0.RESVMMXU1 Residual voltage measurement (1)

IEC 61850 name	SA name	Description	Values
LD0.RESVMMXU1			
.HiAlm.stVal	HIGH_ALARM	High alarm	1=Alarm
.HiWrn.stVal	HIGH_WARN	High warning	1=Warning

2.3.4.5 LD0.VMMXU1 Three-phase voltage measurement (1)

Table 41: LD0.VMMXU1 Three-phase voltage measurement (1)

IEC 61850 name	SA name	Description	Values
LD0.VMMXU1			
.HiAlm.stVal	HIGH_ALARM	High alarm	1=Alarm
.HiWrn.stVal	HIGH_WARN	High warning	1=Warning
.LoAlm.stVal	LOW_ALARM	Low alarm	1=Alarm
.LoWrn.stVal	LOW_WARN	Low warning	1=Warning

2.3.4.6 LD0.VMMXU2 Three-phase voltage measurement (2)

Table 42: LD0.VMMXU2 Three-phase voltage measurement (2)

IEC 61850 name	SA name	Description	Values
LD0.VMMXU2			
.HiAlm.stVal	HIGH_ALARM	High alarm	1=Alarm
.HiWrn.stVal	HIGH_WARN	High warning	1=Warning
.LoAlm.stVal	LOW_ALARM	Low alarm	1=Alarm
.LoWrn.stVal	LOW_WARN	Low warning	1=Warning

2.3.5 Power quality functions

2.3.5.1 LD0.CMHAI1 Current total demand distortion (1)

Table 43: LD0.CMHAI1 Current total demand distortion (1)

IEC 61850 name	SA name	Description	Values
LD0.CMHAI1			
.Alm.stVal	ALARM	Distortion alarm	10=Alarm

2.3.5.2 LD0.PHQVVR1 Voltage variation (1)

Table 44: LD0.PHQVVR1 Voltage variation (1)

IEC 61850 name	SA name	Description	Values
LD0.PH1QVVR1			
.VarStrGen.stVal	-	Variation event detected	1=Detected
.VarEnd.stVal	-	Variation event ended	1=Ended
.SwlOp.stVal	-	Swell event detected	1=Detected
.DipOp.stVal	-	Dip event detected	1=Detected
.IntrOp.stVal	-	Interruption event detected	1=Detected

2.3.5.3 LD0.VMHAI1 Voltage total harmonic distortion (1)

Table 45: LD0.VMHAI1 Voltage total harmonic distortion (1)

IEC 61850 name	SA name	Description	Values
LD0.VMHAI1			
.Alm.stVal	-	Distortion alarm	1=Alarm

2.3.5.4 LD0.VSQVUB1 Voltage unbalance (1)

Table 46: LD0.VSQVUB1 Voltage unbalance (1)

IEC 61850 name	SA name	Description	Value
LD0.VSQVUB1			
.VarStr.stVal	MN_UNB_AL	Unbalance alarm	1=Alarm
.HiPctVUnb.stVal	PCT_UNB_AL	Percentile unbalance alarm	1=Alarm

2.3.6 Protection functions

2.3.6.1 LD0.DEFHPDEF1 Directional earth-fault protection, high stage (1)

Table 47: LD0.DEFHPDEF1 Directional earth-fault protection, high stage (1)

IEC 61850 name	SA name	Description	Values
LD0.DEFHPTOC1		High stage (1)	
.Op.general	OPERATE	-Operate	1=Operate
.Str.general	START	-Start	1=Start

2.3.6.2 LD0.DEFHPDEF2 Directional earth-fault protection, high stage (2)

Table 48: LD0.DEFHPDEF2 Directional earth-fault protection, high stage (2)

IEC 61850 name	SA name	Description	Values
LD0.DEFHPTOC2		High stage (2)	
.Op.general	OPERATE	-Operate	1=Operate
.Str.general	START	-Start	1=Start

2.3.6.3 LD0.DEFHPDEF3 Directional earth-fault protection, high stage (3)

Table 49: LD0.DEFHPDEF3 Directional earth-fault protection, high stage (3)

IEC 61850 name	SA name	Description	Values
LD0.DEFHPTOC3		High stage (3)	
.Op.general	OPERATE	-Operate	1=Operate
.Str.general	START	-Start	1=Start

2.3.6.4 LD0.DEFHPDEF4 Directional earth-fault protection, high stage (4)

Table 50: LD0.DEFHPDEF4 Directional earth-fault protection, high stage (4)

IEC 61850 name	SA name	Description	Values
LD0.DEFHPTOC4		High stage (4)	
.Op.general	OPERATE	-Operate	1=Operate
.Str.general	START	-Start	1=Start

2.3.6.5 LD0.DEFLPDEF1 Directional earth-fault protection, low stage (1)

Table 51: LD0.DEFLPDEF1 Directional earth-fault protection, low stage (1)

IEC 61850 name	SA name	Description	Values
LD0.DEFLPTOC1		Low stage (1)	
.Op.general	OPERATE	-Operate	1=Operate
.Str.general	START	-Start	1=Start

2.3.6.6 LD0.DEFLPDEF2 Directional earth-fault protection, low stage (2)

Table 52: LD0.DEFLPDEF2 Directional earth-fault protection, low stage (2)

IEC 61850 name	SA name	Description	Values
LD0.DEFLPTOC2		Low stage (2)	
.Op.general	OPERATE	-Operate	1=Operate
.Str.general	START	-Start	1=Start

2.3.6.7 LD0.DEFLPDEF3 Directional earth-fault protection, low stage (3)

Table 53: LD0.DEFLPDEF3 Directional earth-fault protection, low stage (3)

IEC 61850 name	SA name	Description	Values
LD0.DEFLPTOC3		Low stage (3)	
.Op.general	OPERATE	-Operate	1=Operate
.Str.general	START	-Start	1=Start

2.3.6.8 LD0.DEFLPDEF4 Directional earth-fault protection, low stage (4)

Table 54: LD0.DEFLPDEF4 Directional earth-fault protection, low stage (4)

IEC 61850 name	SA name	Description	Values
LD0.DEFLPTOC4		Low stage (4)	
.Op.general	OPERATE	-Operate	1=Operate
.Str.general	START	-Start	1=Start

2.3.6.9 LD0.DPHHPDOC1 Three-phase directional overcurrent protection, high stage (1)

Table 55: LD0.DPHHPDOC1 Three-phase directional overcurrent protection, high stage (1)

IEC 61850 name	SA name	Description	Values
LD0.DPHHPTOC1		High stage (1)	
.Op.general	OPERATE	-Operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate
.Str.general	START	-Start	1=Start
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start

2.3.6.10 LD0.DPHHPDOC2 Three-phase directional overcurrent protection, high stage (2)

Table 56: LD0.DPHHPDOC2 Three-phase directional overcurrent protection, high stage (2)

IEC 61850 name	SA name	Description	Values
LD0.DPHHPTOC2		High stage (2)	
.Op.general	OPERATE	-Operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate

Table continues on next page

IEC 61850 name	SA name	Description	Values
.Op.phsC		phase C operate	1=Operate
.Str.general	START	-Start	1=Start
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start

2.3.6.11 LD0.DPHHPDOC3 Three-phase directional overcurrent protection, high stage (3)

Table 57: LD0.DPHHPDOC3 Three-phase directional overcurrent protection, high stage (3)

IEC 61850 name	SA name	Description	Values
LD0.DPHHPTOC3		High stage (3)	
.Op.general	OPERATE	-Operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate
.Str.general	START	-Start	1=Start
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start

2.3.6.12 LD0.DPHHPDOC4 Three-phase directional overcurrent protection, high stage (4)

Table 58: LD0.DPHHPDOC4 Three-phase directional overcurrent protection, high stage (4)

IEC 61850 name	SA name	Description	Values
LD0.DPHHPTOC4		High stage (4)	
.Op.general	OPERATE	-Operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate
.Str.general	START	-Start	1=Start
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start

2.3.6.13 LD0.DPHLPDOC1 Three-phase directional overcurrent protection, low stage (1)

Table 59: LD0.DPHLPDOC1 Three-phase directional overcurrent protection, low stage (1)

IEC 61850 name	SA name	Description	Values
LD0.DPHLPTOC1		Low stage (1)	
.Op.general	OPERATE	-Operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate
.Str.general	START	-Start	1=Start
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start

2.3.6.14 LD0.DPHLPDOC2 Three-phase directional overcurrent protection, low stage (2)

Table 60: LD0.DPHLPDOC2 Three-phase directional overcurrent protection, low stage (2)

IEC 61850 name	SA name	Description	Values
LD0.DPHLPTOC2		Low stage (2)	
.Op.general	OPERATE	-Operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate
.Str.general	START	-Start	1=Start
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start

2.3.6.15 LD0.DPHLPDOC3 Three-phase directional overcurrent protection, low stage (3)

Table 61: LD0.DPHLPDOC3 Three-phase directional overcurrent protection, low stage (3)

IEC 61850 name	SA name	Description	Values
LD0.DPHLPTOC3		Low stage (3)	
.Op.general	OPERATE	-Operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate
.Str.general	START	-Start	1=Start

Table continues on next page

IEC 61850 name	SA name	Description	Values
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start

2.3.6.16 LD0.DPHLPDOC4 Three-phase directional overcurrent protection, low stage (4)

Table 62: LD0.DPHLPDOC4 Three-phase directional overcurrent protection, low stage (4)

IEC 61850 name	SA name	Description	Values
LD0.DPHLPTOC4		Low stage (4)	
.Op.general	OPERATE	-Operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate
.Str.general	START	-Start	1=Start
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start

2.3.6.17 LD0.EFHPTOC1 Non-directional earth-fault protection, high stage (1)

Table 63: LD0.EFHPTOC1 Non-directional earth-fault protection, high stage (1)

IEC 61850 name	SA name	Description	Values
LD0.EFHPTOC1		High stage (1)	
.Op.general	OPERATE	Operate	1=Operate
.Str.general	START	Start	1=Start

2.3.6.18 LD0.EFIPTOC1 Non-directional earth-fault protection, instantaneous stage (1)

Table 64: LD0.EFIPTOC1 Non-directional earth-fault protection, instantaneous stage (1)

IEC 61850 name	SA name	Description	Values
LD0.EFIPTOC1		Instant. stage (1)	
.Op.general	OPERATE	Operate	1=Operate
.Str.general	START	Start	1=Start

2.3.6.19 LD0.EFLPTOC1 Non-directional earth-fault protection, low stage (1)

Table 65: LD0.EFLPTOC1 Non-directional earth-fault protection, low stage (1)

IEC 61850 name	SA name	Description	Values
LD0.EFLPTOC1		Low stage (1)	
.Op.general	OPERATE	Operate	1=Operate
.Str.general	START	Start	1=Start

2.3.6.20 LD0.EFPADM1 Admittance-based earth-fault protection (1)

Table 66: LD0.EFPADM1 Admittance-based earth-fault protection (1)

IEC 61850 name	SA name	Description	Values
LD0.EFPADM1			
.Str.general	START	Stage1 start	1=Start
.Op.general	OPERATE	Stage1 operate	1=Operate

2.3.6.21 LD0.EFPADM2 Admittance-based earth-fault protection (2)

Table 67: LD0.EFPADM2 Admittance-based earth-fault protection (2)

IEC 61850 name	SA name	Description	Values
LD0.EFPADM2			
.Str.general	START	Stage2 start	1=Start
.Op.general	OPERATE	Stage2 operate	1=Operate

2.3.6.22 LD0.EFPADM3 Admittance-based earth-fault protection (3)

Table 68: LD0.EFPADM3 Admittance-based earth-fault protection (3)

IEC 61850 name	SA name	Description	Values
LD0.EFPADM3			
.Str.general	START	Stage3 start	1=Start
.Op.general	OPERATE	Stage3 operate	1=Operate

2.3.6.23 LD0.FDEFLPDEF1 FA - Directional earth-fault protection, low stage (1)

Table 69: LD0.FDEFLPDEF1 FA - Directional earth-fault protection, low stage (1)

IEC 61850 name	SA name	Description	Values
LD0.FDEFLPTOC1			
.Str.general	START	General start	1=Start
.Op.general	OPERATE	General operate	1=Operate

2.3.6.24 LD0.FDEFLPDEF2 FA - Directional earth-fault protection, low stage (2)

Table 70: LD0.FDEFLPDEF2 FA - Directional earth-fault protection, low stage (2)

IEC 61850 name	SA name	Description	Values
LD0.FDEFLPTOC2			
.Str.general	START	General start	1=Start
.Op.general	OPERATE	General operate	1=Operate

2.3.6.25 LD0.FDPHLPDOC1 FA - Three-phase directional overcurrent protection, low stage (1)

Table 71: LD0.FDPHLPDOC1 FA - Three-phase directional overcurrent protection, low stage (1)

IEC 61850 name	SA name	Description	Values
LD0.FDPHLPTOC1			
.Str.general	START	General start	1=Start
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start
.Op.general	OPERATE	General operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate

2.3.6.26 LD0.FDPHLPDOC2 FA - Three-phase directional overcurrent protection, low stage (2)

Table 72: LD0.FDPHLPDOC2 FA - Three-phase directional overcurrent protection, low stage (2)

IEC 61850 name	SA name	Description	Values
LD0.FDPHLPTOC2			
.Str.general	START	General start	1=Start
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start
.Op.general	OPERATE	General operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate

2.3.6.27 LD0.FEFLPTOC1 FA - Non-directional earth-fault protection, low stage (1)

Table 73: LD0.FEFLPTOC1 FA - Non-directional earth-fault protection, low stage (1)

IEC 61850 name	SA name	Description	Values
LD0.FEFLPTOC1			
.Str.general	START	General start	1=Start
.Op.general	OPERATE	General operate	1=Operate

2.3.6.28 LD0.FPHLPTOC1 FA - Three-phase non-directional overcurrent protection, low stage (1)

Table 74: LD0.FPHLPTOC1 FA - Three-phase non-directional overcurrent protection, low stage (1)

IEC 61850 name	SA name	Description	Values
LD0.FPHLPTOC1			
.Str.general	START	General start	1=Start
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start
.Op.general	OPERATE	General operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate

2.3.6.29 LD0.FRPFRQ1 Frequency protection (1)

Table 75: LD0.FRPFRQ1 Frequency protection (1)

IEC 61850 name	SA name	Description	Values
LD0.FRPTRC1			
.Str.general	START	Stage start	1=Start
LD0.FRPTOF1		Overfrequency	
.Op.general	OPR_OFRQ	-Operate	1=Operate
LD0.FRPTUF1		Underfrequency	
.Op.general	OPR_UFRQ	-Operate	1=Operate
LD0.FRPFRC1		Frequency gradient	
.Op.general	OPR_FRG	-Operate	1=Operate

2.3.6.30 LD0.FRPFRQ2 Frequency protection (2)

Table 76: LD0.FRPFRQ2 Frequency protection (2)

IEC 61850 name	SA name	Description	Values
LD0.FRPTRC2			
.Str.general	START	Stage start	1=Start
LD0.FRPTOF2		Overfrequency	
.Op.general	OPR_OFRQ	-Operate	1=Operate
LD0.FRPTUF2		Underfrequency	
.Op.general	OPR_UFRQ	-Operate	1=Operate
LD0.FRPFRC2		Frequency gradient	
.Op.general	OPR_FRG	-Operate	1=Operate

2.3.6.31 LD0.HAEFPTOC1 Harmonics-based earth-fault protection (1)

Table 77: LD0.HAEFPTOC1 Harmonics-based earth-fault protection (1)

IEC 61850 name	SA name	Description	Values
LD0.HAEFPTOC1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.6.32 LD0.INRPHAR1 Three-phase inrush detector (1)

Table 78: LD0.INRPHAR1 Three-phase inrush detector (1)

IEC 61850 name	SA name	Description	Values
LD0.INRPHAR1			
.Str.general	-	General start	1=Start
.Str.phsA		Phs A start	1=Start
.Str.phsB		Phs B start	1=Start
.Str.phsC		Phs C start	1=Start

2.3.6.33 LD0.INTRPTEF1 Transient/intermittent earth-fault protection (1)

Table 79: LD0.INTRPTEF1 Transient/intermittent earth-fault protection (1)

IEC 61850 name	SA name	Description	Values
LD0.INTRPTEF1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.6.34 LD0.LEDPTRC1 Global protection signals (1)

Table 80: LD0.LEDPTRC1 Global protection signals (1)

IEC 61850 name	SA name	Description	Values
LD0.LEDPTRC1		Global protection signals	
.Op.general	-	-General Operate	1=Operate
.Op.phsA	-	-phsA Operate	1=Operate
.Op.phsB	-	-phsB Operate	1=Operate
.Op.phsC	-	-phsC Operate	1=Operate
.Str.general	-	-General Start	1=Start
.Str.phsA	-	-phsA Start	1=Start
.Str.phsB	-	-phsB Start	1=Start
.Str.phsC	-	-phsC Start	1=Start

2.3.6.35 LD0.LSHDPFRQ1 Load-shedding and restoration (1)

Table 81: LD0.LSHDPFRQ1 Load-shedding and restoration (1)

IEC 61850 name	SA name	Description	Values
LD0.LSHDPTRC1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start
LD0.LSHDPTOF1			
.Str.general	ST_REST	Start restore	1=Start
.Op.general	RESTORE	Restored	1=Restored

2.3.6.36 LD0.LSHDPFRQ2 Load-shedding and restoration (2)

Table 82: LD0.LSHDPFRQ2 Load-shedding and restoration (2)

IEC 61850 name	SA name	Description	Values
LD0.LSHDPTRC2			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start
LD0.LSHDPTOF2			
.Str.general	ST_REST	Start restore	1=Start
.Op.general	RESTORE	Restored	1=Restored

2.3.6.37 LD0.MFADPSDE1 Multifrequency admittance-based earth-fault protection (1)

Table 83: LD0.MFADPSDE1 Multifrequency admittance-based earth-fault protection (1)

IEC 61850 name	SA name	Description	Value
LD0.MFADPSDE1			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.6.38 LD0.MFADPSDE2 Multifrequency admittance-based earth-fault protection (2)

Table 84: LD0.MFADPSDE2 Multifrequency admittance-based earth-fault protection (2)

IEC 61850 name	SA name	Description	Value
LD0.MFADPSDE2			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.6.39 LD0.NSPTOC1 Negative-sequence overcurrent protection (1)

Table 85: LD0.NSPTOC1 Negative-sequence overcurrent protection (1)

IEC 61850 name	SA name	Description	Values
LD0.NSPTOC1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.6.40 LD0.NSPTOC2 Negative-sequence overcurrent protection (2)

Table 86: LD0.NSPTOC2 Negative-sequence overcurrent protection (2)

IEC 61850 name	SA name	Description	Values
LD0.NSPTOC2			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.6.41 LD0.NSPTOV1 Negative-sequence overvoltage protection (1)

Table 87: LD0.NSPTOV1 Negative-sequence overvoltage protection (1)

IEC 61850 name	SA name	Description	Values
LD0.NSPTOV1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.6.42 LD0.PDNSPTOC1 Phase discontinuity protection (1)

Table 88: LD0.PDNSPTOC1 Phase discontinuity protection (1)

IEC 61850 name	SA name	Description	Values
LD0.PDNSPTOC1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.6.43 LD0.PHHPTOC1 Three-phase non-directional overcurrent protection, high stage (1)

Table 89: LD0.PHHPTOC1 Three-phase non-directional overcurrent protection, high stage (1)

IEC 61850 name	SA name	Description	Values
LD0.PHHPTOC1			
.Op.general	OPERATE	Stage operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate
.Str.general	START	Stage start	1=Start
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start

2.3.6.44 LD0.PHIPTOC1 Three-phase non-directional overcurrent protection, instantaneous stage (1)

Table 90: LD0.PHIPTOC1 Three-phase non-directional overcurrent protection, instantaneous stage (1)

IEC 61850 name	SA name	Description	Values
LD0.PHIPTOC1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.6.45 LD0.PHIPTOC2 Three-phase non-directional overcurrent protection, instantaneous stage (2)

Table 91: LD0.PHIPTOC2 Three-phase non-directional overcurrent protection, instantaneous stage (2)

IEC 61850 name	SA name	Description	Values
LD0.PHIPTOC2			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.6.46 LD0.PHLPTOC1 Three-phase non-directional overcurrent protection, low stage (1)

Table 92: LD0.PHLPTOC1 Three-phase non-directional overcurrent protection, low stage (1)

IEC 61850 name	SA name	Description	Values
LD0.PHLPTOC1			
.Op.general	OPERATE	Stage operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate
.Str.general	START	Stage start	1=Start
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start

2.3.6.47 LD0.PHPTOV1 Three-phase overvoltage protection (1)

Table 93: LD0.PHPTOV1 Three-phase overvoltage protection (1)

IEC 61850 name	SA name	Description	Values
LD0.PHPTOV1			
.Op.general	OPERATE	Stage operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate
.Str.general	START	Stage start	1=Start
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start

2.3.6.48 LD0.PHPTOV2 Three-phase overvoltage protection (2)

Table 94: LD0.PHPTOV2 Three-phase overvoltage protection (2)

IEC 61850 name	SA name	Description	Values
LD0.PHPTOV2			
.Op.general	OPERATE	Stage operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate
.Str.general	START	Stage start	1=Start

Table continues on next page

IEC 61850 name	SA name	Description	Values
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start

2.3.6.49 LD0.PHPTOV3 Three-phase overvoltage protection (3)

Table 95: LD0.PHPTOV3 Three-phase overvoltage protection (3)

IEC 61850 name	SA name	Description	Values
LD0.PHPTOV3			
.Op.general	OPERATE	Stage operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate
.Str.general	START	Stage start	1=Start
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start

2.3.6.50 LD0.PHPTUC1 Loss of phase, undercurrent (1)

Table 96: LD0.PHPTUC1 Loss of phase, undercurrent (1)

IEC 61850 name	SA name	Description	Values
LD0.PHPTUC1			
.Str.general	START	General start	1=Start
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start
.Op.general	OPERATE	General operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate

2.3.6.51 LD0.PHPTUC2 Loss of phase, undercurrent (2)

Table 97: LD0.PHPTUC2 Loss of phase, undercurrent (2)

IEC 61850 name	SA name	Description	Values
LD0.PHPTUC2			
.Str.general	START	General start	1=Start
.Str.phsA		phase A start	1=Start
Table continues on next page			

IEC 61850 name	SA name	Description	Values
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start
.Op.general	OPERATE	General operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate

2.3.6.52 LD0.PHPTUV1 Three-phase undervoltage protection (1)

Table 98: LD0.PHPTUV1 Three-phase undervoltage protection (1)

IEC 61850 name	SA name	Description	Values
LD0.PHPTUV1			
.Op.general	OPERATE	Stage operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate
.Str.general	START	Stage start	1=Start
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start

2.3.6.53 LD0.PHPTUV2 Three-phase undervoltage protection (2)

Table 99: LD0.PHPTUV2 Three-phase undervoltage protection (2)

IEC 61850 name	SA name	Description	Values
LD0.PHPTUV2			
.Op.general	OPERATE	Stage operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate
.Str.general	START	Stage start	1=Start
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start

2.3.6.54 LD0.PHPTUV3 Three-phase undervoltage protection (3)

Table 100: LD0.PHPTUV3 Three-phase undervoltage protection (3)

IEC 61850 name	SA name	Description	Values
LD0.PHPTUV3			
.Op.general	OPERATE	Stage operate	1=Operate
.Op.phsA		phase A operate	1=Operate
.Op.phsB		phase B operate	1=Operate
.Op.phsC		phase C operate	1=Operate
.Str.general	START	Stage start	1=Start
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start

2.3.6.55 LD0.PSPTUV1 Positive-sequence undervoltage protection (1)

Table 101: LD0.PSPTUV1 Positive-sequence undervoltage protection (1)

IEC 61850 name	SA name	Description	Values
LD0.PSPTUV1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.6.56 LD0.ROVPTOV1 Residual overvoltage protection (1)

Table 102: LD0.ROVPTOV1 Residual overvoltage protection (1)

IEC 61850 name	SA name	Description	Values
LD0.ROVPTOV1			
.Op.general	OPERATE	Stage 1 operate	1=Operate
.Str.general	START	Stage 1 start	1=Start

2.3.6.57 LD0.ROVPTOV2 Residual overvoltage protection (2)

Table 103: LD0.ROVPTOV2 Residual overvoltage protection (2)

IEC 61850 name	SA name	Description	Values
LD0.ROVPTOV2			
.Op.general	OPERATE	Stage 2 operate	1=Operate
.Str.general	START	Stage 2 start	1=Start

2.3.6.58 LD0.T1PTTR1 Three-phase thermal protection for feeders, cables and distribution transformers (1)

Table 104: LD0.T1PTTR1 Three-phase thermal protection for feeders, cables and distribution transformers (1)

IEC 61850 name	SA name	Description	Values
LD0.T1PTTR1			
.AlmThm.general	ALARM	Thermal alarm	1=Alarm
.Op.general	OPERATE	General operate	1=Operate
.Str.general	START	General start	1=Start

2.3.6.59 LD0.TRPPTRC1 Master trip (1)

Table 105: LD0.TRPPTRC1 Master trip (1)

IEC 61850 name	SA name	Description	Values
LD0.TRPPTRC1			
.Op.general	-	Operate input signal	1=Operate
.Tr.general	-	Trip output signal	1=Trip

2.3.6.60 LD0.TRPPTRC2 Master trip (2)

Table 106: LD0.TRPPTRC2 Master trip (2)

IEC 61850 name	SA name	Description	Values
LD0.TRPPTRC2			
.Op.general	-	Operate input signal	1=Operate
.Tr.general	-	Trip output signal	1=Trip

2.3.6.61 LD0.WPWDE1 Wattmetric-based earth-fault protection (1)

Table 107: LD0.WPWDE1 Wattmetric-based earth-fault protection (1)

IEC 61850 name	SA name	Description	Values
LD0.WPDSE1			
.Str.general	START	Stage 1 start	1=Start
.Op.general	OPERATE	Stage 1 operate	1=Operate

2.3.6.62 LD0.WPWDE2 Wattmetric-based earth-fault protection (2)

Table 108: LD0.WPWDE2 Wattmetric-based earth-fault protection (2)

IEC 61850 name	SA name	Description	Values
LD0.WPDSE2			
.Str.general	START	Stage 2 start	1=Start
.Op.general	OPERATE	Stage 2 operate	1=Operate

2.3.6.63 LD0.WPWDE3 Wattmetric-based earth-fault protection (3)

Table 109: LD0.WPWDE3 Wattmetric-based earth-fault protection (3)

IEC 61850 name	SA name	Description	Values
LD0.WPDSE3			
.Str.general	START	Stage 3 start	1=Start
.Op.general	OPERATE	Stage 3 operate	1=Operate

2.3.7 Protection-related functions

2.3.7.1 LD0.DARREC1 Autoreclosing (1)

Table 110: LD0.DARREC1 Autoreclosing (1)

IEC 61850 name	SA name	Description	Values
LD0.DARREC1			
.PrgRec1.stVal	INPRO_1	AR 1st reclose	1=In progress
.PrgRec2.stVal	INPRO_2	AR 2nd reclose	1=In progress
.PrgRec3.stVal	INPRO_3	AR 3rd reclose	1=In progress
.PrgRec4.stVal	INPRO_4	AR 4th reclose	1=In progress
.PrgRec5.stVal	INPRO_5	AR 5th reclose	1=In progress
.PrgRec.stVal	INPRO	AR in progress	1=In progress
.CBManCls.stVal	MAN_CB_CL	CB manually closed	1=CB closed
.AutoRecOn.stVal	AR_ON	Autoreclose ON/OFF	1=ON
.LO.stVal	LOCKED	Lockout status	1=Lockout
.UnsRec.stVal	UNSUC_RECL	Reclose fail status	1=Failed
.InInhRec.stVal	INHIBIT_RECL	Inhibit reclose	1=Inhibit
.InBlkThm.stVal	-	Thermal block (status)	1=Block
.RdyRec.stVal	READY	Ready reclose status	1=Ready
.ActRec.stVal	ACTIVE	Active reclose status	1=Active
.SucRec.stVal	SUC_RECL	Successful reclose	1=Successful
.PrgDsr.stVal	DISCR_INPRO	Discrimination time in p.	1=In progress
.PrgCutOut.stVal	CUTOUT_INPRO	Cutout time in progress	1=In progress
.FrqOpAlm.stVal	FRQ_OP_ALM	Frequent operation alarm	1=Alarm
.RclTmStr.stVal	-	Reclaim time started	1=Started
.ProCrd.stVal	-	Protection coordination	1=In progress
.OpCls.general	CLOSE_CB	Operate (close XCBR)	1=Close CB
.OpOpn.general	OPEN_CB	Operate (open XCBR)	1=Open CB
.UnsCBCls.stVal	UNSUC_CB	CB closing failed	1=Failed
.WtMstr.stVal	CMD_WAIT	Master signal to follower	1=Signal

2.3.7.2 LD0.DARREC2 Autoreclosing (2)

Table 111: LD0.DARREC2 Autoreclosing (2)

IEC 61850 name	SA name	Description	Values
LD0.DARREC2			
.PrgRec1.stVal	INPRO_1	AR 1st reclose	1=In progress
.PrgRec2.stVal	INPRO_2	AR 2nd reclose	1=In progress
.PrgRec3.stVal	INPRO_3	AR 3rd reclose	1=In progress
.PrgRec4.stVal	INPRO_4	AR 4th reclose	1=In progress
.PrgRec5.stVal	INPRO_5	AR 5th reclose	1=In progress
.PrgRec.stVal	INPRO	AR in progress	1=In progress
.CBManCls.stVal	MAN_CB_CL	CB manually closed	1=CB closed
.AutoRecOn.stVal	AR_ON	Autoreclose ON/OFF	1=ON
.LO.stVal	LOCKED	Lockout status	1=Lockout
.UnsRec.stVal	UNSUC_RECL	Reclose fail status	1=Failed
.InInhRec.stVal	INHIBIT_RECL	Inhibit reclose	1=Inhibit
.InBlkThm.stVal	-	Thermal block (status)	1=Block
.RdyRec.stVal	READY	Ready reclose status	1=Ready
.ActRec.stVal	ACTIVE	Active reclose status	1=Active
.SucRec.stVal	SUC_RECL	Successful reclose	1=Successful
.PrgDsr.stVal	DISCR_INPRO	Discrimination time in p.	1=In progress
.PrgCutOut.stVal	CUTOUT_INPRO	Cutout time in progress	1=In progress
.FrqOpAlm.stVal	FRQ_OP_ALM	Frequent operation alarm	1=Alarm
.RclTmStr.stVal	-	Reclaim time started	1=Started
.ProCrd.stVal	-	Protection coordination	1=In progress
.OpCls.general	CLOSE_CB	Operate (close XCBR)	1=Close CB
.OpOpn.general	OPEN_CB	Operate (open XCBR)	1=Open CB
.UnsCBCls.stVal	UNSUC_CB	CB closing failed	1=Failed
.WtMstr.stVal	CMD_WAIT	Master signal to follower	1=Signal

2.3.7.3 LD0.DPSRDIR1 Three-phase power directional element (1)

Table 112: LD0.DPSRDIR1 Three-phase power directional element (1)

IEC 61850 name	SA name	Description	Values
LD0.DPSRDIR1			
.Dir.general	RELEASE	Dir criteria satisified	1=Release

2.3.7.4 LD0.DPSRDIR2 Three-phase power directional element (2)

Table 113: LD0.DPSRDIR2 Three-phase power directional element (2)

IEC 61850 name	SA name	Description	Values
LD0.DPSRDIR2			
.Dir.general	RELEASE	Dir criteria satisified	1=Release

2.3.7.5 LD0.LDPRLRC1 Load profile record (1)

Table 114: LD0.LDPRLRC1 Load profile record (1)

IEC 61850 name	SA name	Description	Value
LD0.LDPRLRC1			
.MemWrn.stVal		Recording memory warning	1=Warning
.MemAlm.stVal		Recording memory alarm	1=Alarm

2.3.7.6 DR.RDRE1 Disturbance recorder (1)

Table 115: DR.RDRE1 Disturbance recorder (1)

IEC 61850 name	SA name	Description	Values
DR.RDRE1			
.RcdMade.stVal		DR recording made	1=Made
.RcdStr.stVal		Recording started	1=Started
.RcdDltInd.stVal		Recording deleted	1=Deleted
.MemFullSt.stVal		Memory full	1=Full
.OvWrRcdInd.stVal		Recording overwritten	1=Overwritten
.PerTrgInd.stVal		Periodic triggering	1=Periodic
.ManTrgInd.stVal		Manual triggering	1=Manual

2.3.7.7 LD0.SCEFRFLO1 Fault locator (1)

Table 116: LD0.SCEFRFLO1 Fault locator (1)

IEC 61850 name	SA name	Description	Values
LD0.SCEFRFLO1			
.Alm.stVal	ALARM	Alarm signal	1=Alarm
.TrgSt.stVal	TRIGG	Calculation triggered	1=Triggered

2.3.7.8 LD0.SECRSYN1 Synchronism and energizing check (1)

Table 117: LD0.SECRSYN1 Synchronism and energizing check (1)

IEC 61850 name	SA name	Description	Values
LD0.SECRSYN1			
.SynPrg.stVal	SYNC_INPRO	Synch in progress	1=In progress
.FailCmd.stVal	CMD_FAIL_AL	CB close request failed	1=Failed
.FailSyn.stVal	CL_FAIL_AL	CB close command failed	1=Failed

2.3.7.9 LD0.SEQSPVC1 Fuse failure supervision (1)

Table 118: LD0.SEQSPVC1 Fuse failure supervision (1)

IEC 61850 name	SA name	Description	Values
LD0.SEQSPVC1			
.Str.general	FUSEF_U	General start	1=Start
.Str3Ph.general	FUSEF_3PH	Three-phase start	1=Start

2.3.7.10 LD0.SEQSPVC2 Fuse failure supervision (2)

Table 119: LD0.SEQSPVC2 Fuse failure supervision (2)

IEC 61850 name	SA name	Description	Values
LD0.SEQSPVC2			
.Str.general	FUSEF_U	General start	1=Start
.Str3Ph.general	FUSEF_3PH	Three-phase start	1=Start

2.3.8 Generic functions

2.3.8.1 LD0.DTMGAPC1 Daily timer function (1)

Table 120: LD0.DTMGAPC1 Daily timer function (1)

IEC 61850 name	SA name	Description	Values
LD0.DTMGAPC1			
.Op.general	-	Output status	1=On

2.3.8.2 LD0.DTMGAPC2 Daily timer function (2)

Table 121: LD0.DTMGAPC2 Daily timer function (2)

IEC 61850 name	SA name	Description	Values
LD0.DTMGAPC2			
.Op.general	-	Output status	1=On

2.3.8.3 LD0.FKEY4GGIO1 Programmable buttons (4 buttons) (1)

Table 122: LD0.FKEY4GGIO1 Programmable buttons (4 buttons) (1)

IEC 61850 name	SA name	Description	Values
LD0.FKEY4GGIO1			
.SPCSO1.stVal	LED 1	Output state 1	1=On
.SPCSO2.stVal	LED 2	Output state 2	1=On
.SPCSO3.stVal	LED 3	Output state 3	1=On
.SPCSO4.stVal	LED 4	Output state 4	1=On

2.3.8.4 LD0.MAPGAPC1 Multipurpose protection (1)

Table 123: LD0.MAPGAPC1 Multipurpose protection (1)

IEC 61850 name	SA name	Description	Values
LD0.MAPGAPC1			
.Op.general	OPERATE	Stage operate	1 = Operate
.Str.general	START	Stage start	1 = Start

2.3.8.5 LD0.MAPGAPC2 Multipurpose protection (2)

Table 124: LD0.MAPGAPC2 Multipurpose protection (2)

IEC 61850 name	SA name	Description	Values
LD0.MAPGAPC2			
.Op.general	OPERATE	Stage operate	1 = Operate
.Str.general	START	Stage start	1 = Start

2.3.8.6 LD0.MAPGAPC3 Multipurpose protection (3)

Table 125: LD0.MAPGAPC3 Multipurpose protection (3)

IEC 61850 name	SA name	Description	Values
LD0.MAPGAPC3			
.Op.general	OPERATE	Stage operate	1 = Operate
.Str.general	START	Stage start	1 = Start

2.3.8.7 LD0.MAPGAPC4 Multipurpose protection (4)

Table 126: LD0.MAPGAPC4 Multipurpose protection (4)

IEC 61850 name	SA name	Description	Values
LD0.MAPGAPC4			
.Op.general	OPERATE	Stage operate	1 = Operate
.Str.general	START	Stage start	1 = Start

2.3.8.8 LD0.MAPGAPC5 Multipurpose protection (5)

Table 127: LD0.MAPGAPC5 Multipurpose protection (5)

IEC 61850 name	SA name	Description	Values
LD0.MAPGAPC5			
.Op.general	OPERATE	Stage operate	1 = Operate
.Str.general	START	Stage start	1 = Start

2.3.8.9 LD0.MAPGAPC6 Multipurpose protection (6)

Table 128: LD0.MAPGAPC6 Multipurpose protection (6)

IEC 61850 name	SA name	Description	Values
LD0.MAPGAPC6			
.Op.general	OPERATE	Stage operate	1 = Operate
.Str.general	START	Stage start	1 = Start

2.3.8.10 LD0.MVGAPC1 Move (8 pcs) (1)

Table 129: LD0.MVGAPC1 Move (8 pcs) (1)

IEC 61850 name	SA name	Description	Values
LD0.MVGAPC1			
.SPCSO1.stVal	-	Input 1 signal	0/1=Off/On
.SPCSO2.stVal	-	Input 2 signal	0/1=Off/On
.SPCSO3.stVal	-	Input 3 signal	0/1=Off/On
.SPCSO4.stVal	-	Input 4 signal	0/1=Off/On
.SPCSO5.stVal	-	Input 5 signal	0/1=Off/On
.SPCSO6.stVal	-	Input 6 signal	0/1=Off/On
.SPCSO7.stVal	-	Input 7 signal	0/1=Off/On
.SPCSO8.stVal	-	Input 8 signal	0/1=Off/On

2.3.8.11 LD0.MVGAPC2 Move (8 pcs) (2)

Table 130: LD0.MVGAPC2 Move (8 pcs) (2)

IEC 61850 name	SA name	Description	Values
LD0.MVGAPC2			
.SPCSO1.stVal	-	Input 1 signal	0/1=Off/On
.SPCSO2.stVal	-	Input 2 signal	0/1=Off/On
.SPCSO3.stVal	-	Input 3 signal	0/1=Off/On
.SPCSO4.stVal	-	Input 4 signal	0/1=Off/On
.SPCSO5.stVal	-	Input 5 signal	0/1=Off/On
Table continues on next page			

IEC 61850 name	SA name	Description	Values
.SPCSO6.stVal	-	Input 6 signal	0/1=Off/On
.SPCSO7.stVal	-	Input 7 signal	0/1=Off/On
.SPCSO8.stVal	-	Input 8 signal	0/1=Off/On

2.3.8.12 LD0.MVGAPC3 Move (8 pcs) (3)

Table 131: LD0.MVGAPC3 Move (8 pcs) (3)

IEC 61850 name	SA name	Description	Values
LD0.MVGAPC3			
.SPCSO1.stVal	-	Input 1 signal	0/1=Off/On
.SPCSO2.stVal	-	Input 2 signal	0/1=Off/On
.SPCSO3.stVal	-	Input 3 signal	0/1=Off/On
.SPCSO4.stVal	-	Input 4 signal	0/1=Off/On
.SPCSO5.stVal	-	Input 5 signal	0/1=Off/On
.SPCSO6.stVal	-	Input 6 signal	0/1=Off/On
.SPCSO7.stVal	-	Input 7 signal	0/1=Off/On
.SPCSO8.stVal	-	Input 8 signal	0/1=Off/On

2.3.8.13 LD0.MVGAPC4 Move (8 pcs) (4)

Table 132: LD0.MVGAPC4 Move (8 pcs) (4)

IEC 61850 name	SA name	Description	Values
LD0.MVGAPC4			
.SPCSO1.stVal	-	Input 1 signal	0/1=Off/On
.SPCSO2.stVal	-	Input 2 signal	0/1=Off/On
.SPCSO3.stVal	-	Input 3 signal	0/1=Off/On
.SPCSO4.stVal	-	Input 4 signal	0/1=Off/On
.SPCSO5.stVal	-	Input 5 signal	0/1=Off/On
.SPCSO6.stVal	-	Input 6 signal	0/1=Off/On
.SPCSO7.stVal	-	Input 7 signal	0/1=Off/On
.SPCSO8.stVal	-	Input 8 signal	0/1=Off/On

2.3.8.14 LD0.MVGAPC5 Move (8 pcs) (5)

Table 133: LD0.MVGAPC5 Move (8 pcs) (5)

IEC 61850 name	SA name	Description	Values
LD0.MVGAPC5			
.SPCSO1.stVal	-	Input 1 signal	0/1=Off/On
.SPCSO2.stVal	-	Input 2 signal	0/1=Off/On
Table continues on next page			

IEC 61850 name	SA name	Description	Values
.SPCSO3.stVal	-	Input 3 signal	0/1=Off/On
.SPCSO4.stVal	-	Input 4 signal	0/1=Off/On
.SPCSO5.stVal	-	Input 5 signal	0/1=Off/On
.SPCSO6.stVal	-	Input 6 signal	0/1=Off/On
.SPCSO7.stVal	-	Input 7 signal	0/1=Off/On
.SPCSO8.stVal	-	Input 8 signal	0/1=Off/On

2.3.8.15 LD0.MVGAPC6 Move (8 pcs) (6)

Table 134: LD0.MVGAPC6 Move (8 pcs) (6)

IEC 61850 name	SA name	Description	Values
LD0.MVGAPC6			
.SPCSO1.stVal	-	Input 1 signal	0/1=Off/On
.SPCSO2.stVal	-	Input 2 signal	0/1=Off/On
.SPCSO3.stVal	-	Input 3 signal	0/1=Off/On
.SPCSO4.stVal	-	Input 4 signal	0/1=Off/On
.SPCSO5.stVal	-	Input 5 signal	0/1=Off/On
.SPCSO6.stVal	-	Input 6 signal	0/1=Off/On
.SPCSO7.stVal	-	Input 7 signal	0/1=Off/On
.SPCSO8.stVal	-	Input 8 signal	0/1=Off/On

2.3.8.16 LD0.MVGAPC7 Move (8 pcs) (7)

Table 135: LD0.MVGAPC7 Move (8 pcs) (7)

IEC 61850 name	SA name	Description	Values
LD0.MVGAPC7			
.SPCSO1.stVal	-	Input 1 signal	0/1=Off/On
.SPCSO2.stVal	-	Input 2 signal	0/1=Off/On
.SPCSO3.stVal	-	Input 3 signal	0/1=Off/On
.SPCSO4.stVal	-	Input 4 signal	0/1=Off/On
.SPCSO5.stVal	-	Input 5 signal	0/1=Off/On
.SPCSO6.stVal	-	Input 6 signal	0/1=Off/On
.SPCSO7.stVal	-	Input 7 signal	0/1=Off/On
.SPCSO8.stVal	-	Input 8 signal	0/1=Off/On

2.3.8.17 LD0.MVGAPC8 Move (8 pcs) (8)

Table 136: LD0.MVGAPC8 Move (8 pcs) (8)

IEC 61850 name	SA name	Description	Values
LD0.MVGAPC8			
.SPCSO1.stVal	-	Input 1 signal	0/1=Off/On
.SPCSO2.stVal	-	Input 2 signal	0/1=Off/On
.SPCSO3.stVal	-	Input 3 signal	0/1=Off/On
.SPCSO4.stVal	-	Input 4 signal	0/1=Off/On
.SPCSO5.stVal	-	Input 5 signal	0/1=Off/On
.SPCSO6.stVal	-	Input 6 signal	0/1=Off/On
.SPCSO7.stVal	-	Input 7 signal	0/1=Off/On
.SPCSO8.stVal	-	Input 8 signal	0/1=Off/On

2.3.8.18 LD0.SPCGAPC1 Generic control point (16 pcs) (1)

Table 137: LD0.SPCGAPC1 Generic control point (16 pcs) (1)

IEC 61850 name	SA name	Description	Values
LD0.SPCGAPC1			
.SPCS01.stVal	-	Output 1 state	0/1=Off/On
.SPCS02.stVal	-	Output 2 state	0/1=Off/On
.SPCS03.stVal	-	Output 3 state	0/1=Off/On
.SPCS04.stVal	-	Output 4 state	0/1=Off/On
.SPCS05.stVal	-	Output 5 state	0/1=Off/On
.SPCS06.stVal	-	Output 6 state	0/1=Off/On
.SPCS07.stVal	-	Output 7 state	0/1=Off/On
.SPCS08.stVal	-	Output 8 state	0/1=Off/On
.SPCS09.stVal	-	Output 9 state	0/1=Off/On
.SPCS10.stVal	-	Output 10 state	0/1=Off/On
.SPCS11.stVal	-	Output 11 state	0/1=Off/On
.SPCS12.stVal	-	Output 12 state	0/1=Off/On
.SPCS13.stVal	-	Output 13 state	0/1=Off/On
.SPCS14.stVal	-	Output 14 state	0/1=Off/On
.SPCS15.stVal	-	Output 15 state	0/1=Off/On
.SPCS16.stVal	-	Output 16 state	0/1=Off/On

2.3.8.19 LD0.SPCGAPC2 Generic control point (16 pcs) (2)

Table 138: LD0.SPCGAPC2 Generic control point (16 pcs) (2)

IEC 61850 name	SA name	Description	Values
LD0.SPCGAPC2			
.SPCS01.stVal	-	Output 1 state	0/1=Off/On
.SPCS02.stVal	-	Output 2 state	0/1=Off/On
.SPCS03.stVal	-	Output 3 state	0/1=Off/On
.SPCS04.stVal	-	Output 4 state	0/1=Off/On
.SPCS05.stVal	-	Output 5 state	0/1=Off/On
.SPCS06.stVal	-	Output 6 state	0/1=Off/On
.SPCS07.stVal	-	Output 7 state	0/1=Off/On
.SPCS08.stVal	-	Output 8 state	0/1=Off/On
.SPCS09.stVal	-	Output 9 state	0/1=Off/On
.SPCS10.stVal	-	Output 10 state	0/1=Off/On
.SPCS11.stVal	-	Output 11 state	0/1=Off/On
.SPCS12.stVal	-	Output 12 state	0/1=Off/On
.SPCS13.stVal	-	Output 13 state	0/1=Off/On
.SPCS14.stVal	-	Output 14 state	0/1=Off/On
.SPCS15.stVal	-	Output 15 state	0/1=Off/On
.SPCS16.stVal	-	Output 16 state	0/1=Off/On

2.3.8.20 LD0.SPCLGAPC1 Local generic control points (1)

Table 139: LD0.SPCLGAPC1 Local generic control points (1)

IEC 61850 name	SA name	Description	Values
LD0.SPCLGAPC1			
.SPCSO1.stVal		Output 1 state	1=On; 0=Off
.SPCSO2.stVal		Output 2 state	1=On; 0=Off
.SPCSO3.stVal		Output 3 state	1=On; 0=Off
.SPCSO4.stVal		Output 4 state	1=On; 0=Off
.SPCSO5.stVal		Output 5 state	1=On; 0=Off
.SPCSO6.stVal		Output 6 state	1=On; 0=Off
.SPCSO7.stVal		Output 7 state	1=On; 0=Off
.SPCSO8.stVal		Output 8 state	1=On; 0=Off
.SPCSO9.stVal		Output 9 state	1=On; 0=Off
.SPCSO10.stVal		Output 10 state	1=On; 0=Off
.SPCSO11.stVal		Output 11 state	1=On; 0=Off
.SPCSO12.stVal		Output 12 state	1=On; 0=Off
.SPCSO13.stVal		Output 13 state	1=On; 0=Off

Table continues on next page

IEC 61850 name	SA name	Description	Values
.SPCSO14.stVal		Output 14 state	1=On; 0=Off
.SPCSO15.stVal		Output 15 state	1=On; 0=Off
.SPCSO16.stVal		Output 16 state	1=On; 0=Off

2.3.8.21 LD0.SPCRGAPC1 Remote generic control points (1)

Table 140: LD0.SPCRGAPC1 Remote generic control points (1)

IEC 61850 name	SA name	Description	Values
LD0.SPCRGAPC1			
.SPCSO1.stVal		Output 1 state	1=On; 0=Off
.SPCSO2.stVal		Output 2 state	1=On; 0=Off
.SPCSO3.stVal		Output 3 state	1=On; 0=Off
.SPCSO4.stVal		Output 4 state	1=On; 0=Off
.SPCSO5.stVal		Output 5 state	1=On; 0=Off
.SPCSO6.stVal		Output 6 state	1=On; 0=Off
.SPCSO7.stVal		Output 7 state	1=On; 0=Off
.SPCSO8.stVal		Output 8 state	1=On; 0=Off
.SPCSO9.stVal		Output 9 state	1=On; 0=Off
.SPCSO10.stVal		Output 10 state	1=On; 0=Off
.SPCSO11.stVal		Output 11 state	1=On; 0=Off
.SPCSO12.stVal		Output 12 state	1=On; 0=Off
.SPCSO13.stVal		Output 13 state	1=On; 0=Off
.SPCSO14.stVal		Output 14 state	1=On; 0=Off
.SPCSO15.stVal		Output 15 state	1=On; 0=Off
.SPCSO16.stVal		Output 16 state	1=On; 0=Off

2.3.9 Physical and raw I/O data

2.3.9.1 LD0.XAGGIO130 Physical I/O

Table 141: LD0.XAGGIO130 Physical I/O

IEC 61850 name	SA name	Description	Values
LD0.XAGGIO130			
.Ind1.stVal	-	X130-Input 1	1/0=ON/OFF
.Ind2.stVal	-	X130-Input 2	1/0=ON/OFF
.Ind3.stVal	-	X130-Input 3	1/0=ON/OFF
.Ind4.stVal	-	X130-Input 4	1/0=ON/OFF

2.3.9.2 LD0.XGGIO100 Physical I/O

Table 142: LD0.XGGIO100 Physical I/O

IEC 61850 name	SA name	Description	Values
LD0.XGGIO100			
.SPCSO1.stVal	-	X100-Output 1	1/0=ON/OFF
.SPCSO2.stVal	-	X100-Output 2	1/0=ON/OFF
.SPCSO3.stVal	-	X100-Output 3	1/0=ON/OFF
.SPCSO4.stVal	-	X100-Output 4	1/0=ON/OFF
.SPCSO5.stVal	-	X100-Output 5	1/0=ON/OFF
.SPCSO6.stVal	-	X100-Output 6	1/0=ON/OFF

2.3.9.3 LD0.XGGIO110 Physical I/O

Table 143: LD0.XGGIO110 Physical I/O

IEC 61850 name	SA name	Description	Values
LD0.XGGIO110			
.Ind1.stVal	-	X110-Input 1	1/0=ON/OFF
.Ind2.stVal	-	X110-Input 2	1/0=ON/OFF
.Ind3.stVal	-	X110-Input 3	1/0=ON/OFF
.Ind4.stVal	-	X110-Input 4	1/0=ON/OFF
.Ind5.stVal	-	X110-Input 5	1/0=ON/OFF
.Ind6.stVal	-	X110-Input 6	1/0=ON/OFF
.Ind7.stVal	-	X110-Input 7	1/0=ON/OFF
.Ind8.stVal	-	X110-Input 8	1/0=ON/OFF
.SPCSO1.stVal	-	X110-Output 1	1/0=ON/OFF
.SPCSO2.stVal	-	X110-Output 2	1/0=ON/OFF
.SPCSO3.stVal	-	X110-Output 3	1/0=ON/OFF
.SPCSO4.stVal	-	X110-Output 4	1/0=ON/OFF

2.3.9.4 LD0.XGGIO120 Physical I/O

Table 144: LD0.XGGIO120 Physical I/O

IEC 61850 name	SA name	Description	Values
LD0.XGGIO120			
.Ind1.stVal	-	X120-Input 1	1/0=ON/OFF
.Ind2.stVal	-	X120-Input 2	1/0=ON/OFF
.Ind3.stVal	-	X120-Input 3	1/0=ON/OFF
.Ind4.stVal	-	X120-Input 4	1/0=ON/OFF

2.3.9.5 LD0.XGGIO130 Physical I/O

Table 145: LD0.XGGIO130 Physical I/O

IEC 61850 name	SA name	Description	Values
LD0.XGGIO130			
.Ind1.stVal	-	X130-Input 1	1/0=ON/OFF
.Ind2.stVal	-	X130-Input 2	1/0=ON/OFF
.Ind3.stVal	-	X130-Input 3	1/0=ON/OFF
.Ind4.stVal	-	X130-Input 4	1/0=ON/OFF
.Ind5.stVal	-	X130-Input 5	1/0=ON/OFF
.Ind6.stVal	-	X130-Input 6	1/0=ON/OFF
.SPCSO1.stVal	-	X130-Output 1	1/0=ON/OFF
.SPCSO2.stVal	-	X130-Output 2	1/0=ON/OFF
.SPCSO3.stVal	-	X130-Output 3	1/0=ON/OFF

2.3.10 Automatic control functions

2.3.10.1 LD0.ATSABTC1 Automatic transfer switch (1)

Table 146: LD0.ATSABTC1 Automatic transfer switch (1)

IEC 61850 name	SA name	Description	Values
LD0.ATSABTC1			
.OpOpn1.general	OPEN_CB1	CB open Bus 1	1=Open
.OpCls1.general	CLOSE_CB1	CB close Bus 1	1=Close
.OpOpn2.general	OPEN_CB2	CB open Bus 2	1=Open
.OpCls2.general	CLOSE_CB2	CB close Bus 2	1=Close
.TrnBlkAlm.stVal	BLKD_AL	ATS blocked alarm	1=Alarm
.PrgAuto.stVal	INPRO	Automatic operation in progress	1=Auto

2.4 Binary outputs

Table 147: Explanations of the binary output table columns

Column name	Description
IEC 61850 name	Original IED data object identification. Described in the IEC 61850 format as Logical Device.Logical Node and thereafter .Data Object.Data Attribute. Logical Node is the same as the application function block name.
SA name	The signal may have a defined label that is visible, for example, in the Application Configuration tool in PCM600.
Description	Short description of the signal. See the technical manual for more information.
Type	Output type. Some outputs can only be controlled with value “On”. Writing “Off” to these points does not affect the function of the output. See the DNP3 control relay output block parameters.

2.4.1 System functions

2.4.1.1 LD0.LLN0/LDEV1 Reset indications and LEDs, reset device (1)

Table 148: LD0.LLN0/LDEV1 Reset indications and LEDs, reset device (1)

IEC 61850 name	SA name	Description	Type
LD0.LLN0			
.IndLEDRs.Oper.ctlVal		Reset indications and LEDs	On
.ProgLEDRs.Oper.ctlVal		Reset programmable LEDs	On
.MeasStatRs.Oper.ctlVal		Reset metering records	On
.PQRs.Oper.ctlVal		Reset power quality data	On
LD0.LDEV1			
.WrmStrCmd.Oper.ctlVal		Reset device (warm start)	On

2.4.2 Switchgear functions

2.4.2.1 CTRL.CBXCBR1 Circuit-breaker control (1)

Table 149: CTRL.CBXCBR1 Circuit-breaker control (1)

IEC 61850 name	SA name	Description	Type
CTRL.CBCSWI1			
.Pos.Oper.ctlVal	-	Circuit breaker control	On/Off

2.4.2.2 CTRL.CBXCBR2 Circuit-breaker control (2)

Table 150: CTRL.CBXCBR2 Circuit-breaker control (2)

IEC 61850 name	SA name	Description	Type
CTRL.CBCSWI2			
.Pos.Oper.ctlVal	-	Circuit breaker control	On/Off

2.4.2.3 CTRL.DCXSWI1 Disconnector control (1)

Table 151: CTRL.DCXSWI1 Disconnector control (1)

IEC 61850 name	SA name	Description	Type
CTRL.DCCSWI1			
.Pos.Oper.ctlVal	-	Disconnector control	On/Off

2.4.2.4 CTRL.DCXSWI2 Disconnector control (2)

Table 152: CTRL.DCXSWI2 Disconnector control (2)

IEC 61850 name	SA name	Description	Type
CTRL.DCCSWI2			
.Pos.Oper.ctlVal	-	Disconnector control	On/Off

2.4.2.5 CTRL.DCXSWI3 Disconnector control (3)

Table 153: CTRL.DCXSWI3 Disconnector control (3)

IEC 61850 name	SA name	Description	Type
CTRL.DCCSWI3			
.Pos.Oper.ctlVal	-	Disconnector control	On/Off

2.4.2.6 CTRL.DCXSWI4 Disconnector control (4)

Table 154: CTRL.DCXSWI4 Disconnector control (4)

IEC 61850 name	SA name	Description	Type
CTRL.DCCSWI4			
.Pos.Oper.ctlVal	-	Disconnector control	On/Off

2.4.2.7 CTRL.DCXSWI5 Disconnector control (5)

Table 155: CTRL.DCXSWI5 Disconnector control (5)

IEC 61850 name	SA name	Description	Type
CTRL.DCCSWI5			
.Pos.Oper.ctlVal	-	Disconnector control	On/Off

2.4.2.8 CTRL.DCXSWI6 Disconnector control (6)

Table 156: CTRL.DCXSWI6 Disconnector control (6)

IEC 61850 name	SA name	Description	Type
CTRL.DCCSWI6			
.Pos.Oper.ctlVal	-	Disconnector control	On/Off

2.4.2.9 CTRL.DCXSWI7 Disconnector control (7)

Table 157: CTRL.DCXSWI7 Disconnector control (7)

IEC 61850 name	SA name	Description	Type
CTRL.DCCSWI7			
.Pos.Oper.ctlVal	-	Disconnector control	On/Off

2.4.2.10 CTRL.DCXSWI8 Disconnector control (8)

Table 158: CTRL.DCXSWI8 Disconnector control (8)

IEC 61850 name	SA name	Description	Type
CTRL.DCCSWI8			
.Pos.Oper.ctlVal	-	Disconnector control	On/Off

2.4.3 Sensors and monitoring functions

2.4.3.1 LD0.SSCBR1 Circuit-breaker condition monitoring (1)

Table 159: LD0.SSCBR1 Circuit-breaker condition monitoring (1)

IEC 61850 name	SA name	Description	Type
LD0.SSCBR1			
.RsAccmAPwr.Oper.ctlVal	RST_IPOW	Reset accum. energy	On
.RsCBWear.Oper.ctlVal	RST_CB_WEAR	Reset CB life and op. counter	On
.RsTrvTm.Oper.ctlVal	RST_TRV_T	Reset travel time alarm	On
LD0.SSOPM1			
.RsSprChaTm.Oper.ctlVal	RST_SPR_T	Reset spring charge alarm	On

2.4.3.2 LD0.SSCBR2 Circuit-breaker condition monitoring (2)

Table 160: LD0.SSCBR2 Circuit-breaker condition monitoring (2)

IEC 61850 name	SA name	Description	Type
LD0.SSCBR2			
.RsAccmAPwr.Oper.ctlVal	RST_IPOW	Reset accum. energy	On
.RsCBWear.Oper.ctlVal	RST_CB_WEAR	Reset CB life and op. counter	On
.RsTrvTm.Oper.ctlVal	RST_TRV_T	Reset travel time alarm	On
LD0.SSOPM2			
.RsSprChaTm.Oper.ctlVal	RST_SPR_T	Reset spring charge alarm	On

2.4.4 Metering and measurand functions

2.4.4.1 LD0.CMMXU1 Three-phase current measurement (1)

Table 161: LD0.CMMXU1 Three-phase current measurement (1)

IEC 61850 name	SA name	Description	Values
LD0.CMMXU1			
.RcdRs.Oper.ctlVal		Reset min./max. demands	On

2.4.4.2 LD0.CMMXU2 Three-phase current measurement (2)

Table 162: LD0.CMMXU2 Three-phase current measurement (2)

IEC 61850 name	SA name	Description	Values
LD0.CMMXU2			
.RcdRs.Oper.ctlVal		Reset min./max. demands	On

2.4.4.3 LD0.FLTRFRC1 Fault record (1)

Table 163: FLTRFRC1 Fault record (1)

IEC 61850 name	SA name	Description	Values
LD0.FLTRFRC1			
.RcdRs.Oper.ctlVal		Reset fault records	On

2.4.4.4 LD0.PEMMTR1 Reset accumulated energy values (1)

Table 164: LD0.PEMMTR1 Reset accumulated energy values (1)

IEC 61850 name	SA name	Description	Type
LD0.PEMMTR1			
.SupDmdRs.Oper.ctlVal	RSTACM	Reset accum. energy	On

2.4.4.5 LD0.PEMMTR2 Reset accumulated energy values (2)

Table 165: LD0.PEMMTR2 Reset accumulated energy values (2)

IEC 61850 name	SA name	Description	Type
LD0.PEMMTR2			
.SupDmdRs.Oper.ctlVal	RSTACM	Reset accum. energy	On

2.4.4.6 LD0.PEMMXU1 Three-phase power and energy measurement (1)

Table 166: LD0.PEMMXU1 Three-phase power and energy measurement (1)

IEC 61850 name	SA name	Description	Value
LD0.PEMMXU1			
.RcdRs.Oper.ctlVal		Reset power demands	On

2.4.4.7 LD0.PEMMXU2 Three-phase power and energy measurement (2)

Table 167: LD0.PEMMXU2 Three-phase power and energy measurement (2)

IEC 61850 name	SA name	Description	Value
LD0.PEMMXU2			
.RcdRs.Oper.ctlVal		Reset power demands	On

2.4.4.8 LD0.RESCMMXU1 Residual current measurement (1)

Table 168: LD0.RESCMMXU1 Residual current measurement (1)

IEC 61850 name	SA name	Description	Values
LD0.RESCMMXU1			
.RcdRs.Oper.ctlVal		Reset min./max. demands	On

2.4.4.9 LD0.RESVMMXU1 Residual voltage measurement (1)

Table 169: LD0.RESVMMXU1 Residual voltage measurement (1)

IEC 61850 name	SA name	Description	Value
LD0.RESVMMXU1			
.RcdRs.Oper.ctlVal		Reset min./max. demands	On

2.4.4.10 LD0.SPEMMXU1 Single-phase power and energy measurement (1)

Table 170: LD0.SPEMMXU1 Single-phase power and energy measurement (1)

IEC 61850 name	SA name	Description	Values
LD0.SPEMMXU1			
.SupDmdRs.Oper.ctlVal		Reset of accumulated energy reading	1=Reset
LD0.SPEMMTR1			
SupDmdRs.Oper.ctlVal		Reset of min/max demands	1=Reset

2.4.4.11 LD0.SPEMMXU2 Single-phase power and energy measurement (2)

Table 171: LD0.SPEMMXU2 Single-phase power and energy measurement (2)

IEC 61850 name	SA name	Description	Values
LD0.SPEMMXU2			
.SupDmdRs.Oper.ctlVal		Reset of accumulated energy reading	1=Reset
LD0.SPEMMTR2			
SupDmdRs.Oper.ctlVal		Reset of min/max demands	1=Reset

2.4.5 Power quality functions

2.4.5.1 LD0.CMHAI1 Current total demand distortion (1)

Table 172: LD0.CMHAI1 Current total demand distortion (1)

IEC 61850 name	SA name	Description	Type
LD0.CMHAI1			
.RcdRs.Oper.ctlVal		Reset max. demands	1=Reset

2.4.5.2 LD0.PHQVVR1 Voltage variation (1)

Table 173: LD0.PHQVVR1 Voltage variation (1)

IEC 61850 name	SA name	Description	Type
LD0.PH1QVVR1			
.CntRs.Oper.ctlVal		Reset counters	1=Reset

2.4.5.3 LD0.VMHAI1 Voltage total harmonic distortion (1)

Table 174: LD0.VMHAI1 Voltage total harmonic distortion (1)

IEC 61850 name	SA name	Description	Type
LD0.VMHAI1			
.RcdRs.Oper.ctlVal		Reset max. demands	1=Reset

2.4.6 Protection functions

2.4.6.1 LD0.LSHDPFRQ1 Load-shedding and restoration (1)

Table 175: LD0.LSHDPFRQ1 Load-shedding and restoration (1)

IEC 61850 name	SA name	Description	Type
LD0.LSHDPTOF1			
.ManRest.Oper.ctlVal	MAN_RESTORE	Manual restore	On
.BlkRest.Oper.ctlVal	BLK_REST	Cancel restore	On

2.4.6.2 LD0.LSHDPFRQ2 Load-shedding and restoration (2)

Table 176: LD0.LSHDPFRQ2 Load-shedding and restoration (2)

IEC 61850 name	SA name	Description	Type
LD0.LSHDPTOF2			
.ManRest.Oper.ctlVal	MAN_RESTORE	Manual restore	On
.BlkRest.Oper.ctlVal	BLK_REST	Cancel restore	On

2.4.7 Protection-related functions

2.4.7.1 LD0.DARREC1 Autoreclosing (1)

Table 177: LD0.DARREC1 Autoreclosing (1)

IEC 61850 name	SA name	Description	Type
LD0.DARREC1			
.CntRs.Oper.ctlVal	-	AR reset all counters	On
.RecRs.Oper.ctlVal	-	AR reset	On

2.4.7.2 LD0.DARREC2 Autoreclosing (2)

Table 178: LD0.DARREC2 Autoreclosing (2)

IEC 61850 name	SA name	Description	Type
LD0.DARREC2			
.CntRs.Oper.ctlVal	-	AR reset all counters	On
.RecRs.Oper.ctlVal	-	AR reset	On

2.4.7.3 LD0.LDPRLRC1 Load profile record (1)

Table 179: LD0.LDPRLRC1 Load profile record (1)

IEC 61850 name	SA name	Description	Value
LD0.LDPRLRC1			
.RcdRs.Oper.ctlVal		Reset record	On

2.4.7.4 DR.RDRE1 Disturbance recorder (1)

Table 180: DR.RDRE1 Disturbance recorder (1)

IEC 61850 name	SA name	Description	Type
DR.RDRE1			
.MemClr.Oper.ctlVal	-	Clear all records	On
.RcdTrg.Oper.ctlVal	-	Trig recording	On

2.4.8 Generic functions

2.4.8.1 LD0.SPCGAPC1 Generic control point (16 pcs) (1)

The binary outputs can be configured either as pulse- or persistent-type outputs. Pulse-type outputs are triggered with the write value "1". Persistent-type outputs can be written with both values "1" and "0" values. The setting mode "toggled" for local operation corresponds to "persistent" for remote operation.

Table 181: LD0.SPCGAPC1 Generic control point (16 pcs) (1)

IEC 61850 name	SA name	Description	Type
LD0.SPCGAPC1			
.SPCSO1.Oper.ctlVal	-	Output 1 control	On/Off
.SPCSO2.Oper.ctlVal	-	Output 2 control	On/Off
.SPCSO3.Oper.ctlVal	-	Output 3 control	On/Off
.SPCSO4.Oper.ctlVal	-	Output 4 control	On/Off
.SPCSO5.Oper.ctlVal	-	Output 5 control	On/Off
.SPCSO6.Oper.ctlVal	-	Output 6 control	On/Off

Table continues on next page

IEC 61850 name	SA name	Description	Type
.SPCSO7.Oper.ctlVal	-	Output 7 control	On/Off
.SPCSO8.Oper.ctlVal	-	Output 8 control	On/Off
.SPCSO9.Oper.ctlVal	-	Output 9 control	On/Off
.SPCSO10.Oper.ctlVal	-	Output 10 control	On/Off
.SPCSO11.Oper.ctlVal	-	Output 11 control	On/Off
.SPCSO12.Oper.ctlVal	-	Output 12 control	On/Off
.SPCSO13.Oper.ctlVal	-	Output 13 control	On/Off
.SPCSO14.Oper.ctlVal	-	Output 14 control	On/Off
.SPCSO15.Oper.ctlVal	-	Output 15 control	On/Off
.SPCSO16.Oper.ctlVal	-	Output 16 control	On/Off

2.4.8.2 LD0.SPCGAPC2 Generic control point (16 pcs) (2)

The binary outputs can be configured either as pulse- or persistent-type outputs. Pulse-type outputs are triggered with the write value "1". Persistent-type outputs can be written with both values "1" and "0". The setting mode "toggled" for local operation corresponds to "persistent" for remote operation.

Table 182: LD0.SPCGAPC2 Generic control point (16 pcs) (2)

IEC 61850 name	SA name	Description	Type
LD0.SPCGAPC2			
.SPCSO1.Oper.ctlVal	-	Output 1 control	On/Off
.SPCSO2.Oper.ctlVal	-	Output 2 control	On/Off
.SPCSO3.Oper.ctlVal	-	Output 3 control	On/Off
.SPCSO4.Oper.ctlVal	-	Output 4 control	On/Off
.SPCSO5.Oper.ctlVal	-	Output 5 control	On/Off
.SPCSO6.Oper.ctlVal	-	Output 6 control	On/Off
.SPCSO7.Oper.ctlVal	-	Output 7 control	On/Off
.SPCSO8.Oper.ctlVal	-	Output 8 control	On/Off
.SPCSO9.Oper.ctlVal	-	Output 9 control	On/Off
.SPCSO10.Oper.ctlVal	-	Output 10 control	On/Off
.SPCSO11.Oper.ctlVal	-	Output 11 control	On/Off
.SPCSO12.Oper.ctlVal	-	Output 12 control	On/Off
.SPCSO13.Oper.ctlVal	-	Output 13 control	On/Off
.SPCSO14.Oper.ctlVal	-	Output 14 control	On/Off
.SPCSO15.Oper.ctlVal	-	Output 15 control	On/Off
.SPCSO16.Oper.ctlVal	-	Output 16 control	On/Off

2.4.8.3 LD0.SPCRGAPC1 Remote generic control points (1)

Table 183: LD0.SPCRGAPC1 Remote generic control points (1)

IEC 61850 name	SA name	Description	Values
LD0.SPCRGAPC1			
.SPCSO1.Oper.ctlVal		Output 1 control	1=On; 0=Off
.SPCSO2.Oper.ctlVal		Output 2 control	1=On; 0=Off
.SPCSO3.Oper.ctlVal		Output 3 control	1=On; 0=Off
.SPCSO4.Oper.ctlVal		Output 4 control	1=On; 0=Off
.SPCSO5.Oper.ctlVal		Output 5 control	1=On; 0=Off
.SPCSO6.Oper.ctlVal		Output 6 control	1=On; 0=Off
.SPCSO7.Oper.ctlVal		Output 7 control	1=On; 0=Off
.SPCSO8.Oper.ctlVal		Output 8 control	1=On; 0=Off
.SPCSO9.Oper.ctlVal		Output 9 control	1=On; 0=Off
.SPCSO10.Oper.ctlVal		Output 10 control	1=On; 0=Off
.SPCSO11.Oper.ctlVal		Output 11 control	1=On; 0=Off
.SPCSO12.Oper.ctlVal		Output 12 control	1=On; 0=Off
.SPCSO13.Oper.ctlVal		Output 13 control	1=On; 0=Off
.SPCSO14.Oper.ctlVal		Output 14 control	1=On; 0=Off
.SPCSO15.Oper.ctlVal		Output 15 control	1=On; 0=Off
.SPCSO16.Oper.ctlVal		Output 16 control	1=On; 0=Off

2.4.8.4 LD0.SRGAPC1 Set-reset (8 pcs) (1)

Table 184: LD0.SRGAPC1 Set-reset (8 pcs) (1)

IEC 61850 name	SA name	Description	Type
LD0.SRGAPC1			
.Rs1.Oper.ctlVal	-	Reset flip-flop 1	On
.Rs2.Oper.ctlVal	-	Reset flip-flop 2	On
.Rs3.Oper.ctlVal	-	Reset flip-flop 3	On
.Rs4.Oper.ctlVal	-	Reset flip-flop 4	On
.Rs5.Oper.ctlVal	-	Reset flip-flop 5	On
.Rs6.Oper.ctlVal	-	Reset flip-flop 6	On
.Rs7.Oper.ctlVal	-	Reset flip-flop 7	On
.Rs8.Oper.ctlVal	-	Reset flip-flop 8	On

2.4.8.5 LD0.SRGAPC2 Set-reset (8 pcs) (2)

Table 185: LD0.SRGAPC2 Set-reset (8 pcs) (2)

IEC 61850 name	SA name	Description	Type
LD0.SRGAPC2			
.Rs1.Oper.ctlVal	-	Reset flip-flop 1	On
.Rs2.Oper.ctlVal	-	Reset flip-flop 2	On
.Rs3.Oper.ctlVal	-	Reset flip-flop 3	On
.Rs4.Oper.ctlVal	-	Reset flip-flop 4	On
.Rs5.Oper.ctlVal	-	Reset flip-flop 5	On
.Rs6.Oper.ctlVal	-	Reset flip-flop 6	On
.Rs7.Oper.ctlVal	-	Reset flip-flop 7	On
.Rs8.Oper.ctlVal	-	Reset flip-flop 8	On

2.5 Analog inputs

Table 186: Explanations of the analog input table columns

Column name	Description
IEC 61850 name	Original IED data object identification. Described in the IEC 61850 format as Logical Device.Logical Node and thereafter .Data Object.Data Attribute. Logical Node is the same as the application function block name.
SA name	The signal may have a defined label that is visible, for example, in the Application Configuration tool in PCM600.
Description	Short description of the signal. See the technical manual for more information.
Values	The value range of the original IEC 61850 data. Scaling is needed to convert floating point data into DNP3 integer values.
S	Scaling type selected as default. Default “R” means ratio scaling. See the DNP3 communication protocol manual for details.
Arg 1, 2, 3, 4	Scaling argument values as default. When ratio scaling is selected, the four values correspond to min value in, max value in, min value out, and max value out. See the DNP3 communication protocol manual for details.

2.5.1 System functions

2.5.1.1 CTRL.LLN0 Local/remote/station/off and combinations

Table 187: CTRL.LLN0 Local/remote/station/off and combinations

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.LLN0					
.LocKeyHMI.stVal		0=Off; 1=Loc; 2=Rem; 3=Stat; 4=L+R; 5=L+S; 6=L+S+R; 7=S+R	0…7	R	0,65535,0,65535

2.5.1.2 LD0.GNRLLTMS1 Time synchronization (1)

Table 188: LD0.GNRLLTMS1 Time synchronization (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.GNRLLTMS1					
.TmSyn.stVal	SMV Synch accuracy	IEC 61850-9-2 status	0=No sync; 1=Local; 2=Global	R	0,65535,0,65535
.TmSrcSt.stVal	Synch source	Current synch. source	0...99[1)]	R	0,65535,0,65535

1) See the technical manual.

2.5.1.3 LD0.LEDGGIO1 LHMI LED indications, 3 states (1)

Table 189: LD0.LEDGGIO1 LHMI LED indications, 3 states (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.LEDGGIO1					
.LEDSt1.stVal	-	LED 1 state	0/1/3=Off/Ok/ Alarm	R	0,3,0,3
.LEDSt2.stVal	-	LED 2 state	0/1/3=Off/Ok/ Alarm	R	0,3,0,3
.LEDSt3.stVal	-	LED 3 state	0/1/3=Off/Ok/ Alarm	R	0,3,0,3
.LEDSt4.stVal	-	LED 4 state	0/1/3=Off/Ok/ Alarm	R	0,3,0,3
.LEDSt5.stVal	-	LED 5 state	0/1/3=Off/Ok/ Alarm	R	0,3,0,3
.LEDSt6.stVal	-	LED 6 state	0/1/3=Off/Ok/ Alarm	R	0,3,0,3
.LEDSt7.stVal	-	LED 7 state	0/1/3=Off/Ok/ Alarm	R	0,3,0,3
.LEDSt8.stVal	-	LED 8 state	0/1/3=Off/Ok/ Alarm	R	0,3,0,3
.LEDSt9.stVal	-	LED 9 state	0/1/3=Off/Ok/ Alarm	R	0,3,0,3
.LEDSt10.stVal	-	LED 10 state	0/1/3=Off/Ok/ Alarm	R	0,3,0,3
.LEDSt11.stVal	-	LED 11 state	0/1/3=Off/Ok/ Alarm	R	0,3,0,3

2.5.1.4 LD0.LLN0 Active parameter setting group

Table 190: LD0.LLN0 Active parameter setting group

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.LLN0					
.ActSetGr.stVal		Active setting group	1…6	R	1,6,1,6

2.5.1.5 LD0.LLN0/LPHD1/LDEV1 System values (1)

Table 191: LD0.LLN0/LPHD1/LDEV1 System values (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.LLN0					
.ParChgCnt.stVal		Num. of setting changes	0…65535	R	0,65535,0,65535
LD0.LDEV1					
.DevWrn.stVal	Warning	Warning code	0…65535	R	0,65535,0,65535
.DevFail.stVal	Internal Fault	Internal fault code	0…65535	R	0,65535,0,65535
.ChgAckCnt.stVal		Num. of comp. changes	0…65535	R	0,65535,0,65535
LD0.LPHD1					
.PhyHealth.stVal		Global health code	0…10	R	0,10,0,10
.NumPwrUp.stVal		Num. of power ups	0…65535	R	0,65535,0,65535
.WacTrg.stVal		Num. of watchdog resets	0…65535	R	0,65535,0,65535
.WrmStr.stVal		Num. of warm starts	0…65535	R	0,65535,0,65535

2.5.2 Switchgear functions

2.5.2.1 CTRL.CBXCBR1 Circuit-breaker control (1)

Table 192: CTRL.CBXCBR1 Circuit-breaker control (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.CBCSWI1					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.2 CTRL.CBXCBR2 Circuit-breaker control (2)

Table 193: CTRL.CBXCBR2 Circuit-breaker control (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.CBCSWI2					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.3 CTRL.DCSXSWI1 Disconnector position indication (1)

Table 194: CTRL.DCSXSWI1 Disconnector position indication (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.DCSXSWI1					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.4 CTRL.DCSXSWI2 Disconnector position indication (2)

Table 195: CTRL.DCSXSWI2 Disconnector position indication (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.DCSXSWI2					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.5 CTRL.DCXSWI1 Disconnector control (1)

Table 196: CTRL.DCXSWI1 Disconnector control (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.DCXSWI1					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.6 CTRL.DCXSWI2 Disconnector control (2)

Table 197: CTRL.DCXSWI2 Disconnector control (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.DCXSWI2					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.7 CTRL.DCXSWI3 Disconnector control (3)

Table 198: CTRL.DCXSWI3 Disconnector control (3)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.DCXSWI3					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.8 CTRL.DCXSWI4 Disconnector control (4)

Table 199: CTRL.DCXSWI4 Disconnector control (4)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.DCXSWI4					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.9 CTRL.DCXSWI5 Disconnector control (5)

Table 200: CTRL.DCXSWI5 Disconnector control (5)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.DCXSWI5					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.10 CTRL.DCXSWI6 Disconnector control (6)

Table 201: CTRL.DCXSWI6 Disconnector control (6)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.DCXSWI6					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.11 CTRL.DCXSWI7 Disconnector control (7)

Table 202: CTRL.DCXSWI7 Disconnector control (7)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.DCXSWI7					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.12 CTRL.DCXSWI8 Disconnector control (8)

Table 203: CTRL.DCXSWI8 Disconnector control (8)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.DCXSWI8					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.13 CTRL.ESSXSWI1 Earthing switch indication (1)

Table 204: CTRL.ESSXSWI1 Earthing switch indication (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.ESSXSWI1					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.14 CTRL.ESSXSWI2 Earthing switch indication (2)

Table 205: CTRL.ESSXSWI2 Earthing switch indication (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.ESSXSWI2					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.15 CTRL.ESSXSWI3 Earthing switch indication (3)

Table 206: CTRL.ESSXSWI3 Earthing switch indication (3)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.ESSXSWI3					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.16 CTRL.ESSXSWI4 Earthing switch indication (4)

Table 207: CTRL.ESSXSWI4 Earthing switch indication (4)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.ESSXSWI4					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.17 CTRL.ESSXSWI5 Earthing switch indication (5)

Table 208: CTRL.ESSXSWI5 Earthing switch indication (5)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.ESSXSWI5					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.18 CTRL.ESSXSWI6 Earthing switch indication (6)

Table 209: CTRL.ESSXSWI6 Earthing switch indication (6)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.ESSXSWI6					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.19 CTRL.ESSXSWI7 Earthing switch indication (7)

Table 210: CTRL.ESSXSWI7 Earthing switch indication (7)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.ESSXSWI7					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.2.20 CTRL.ESSXSWI8 Earthing switch indication (8)

Table 211: CTRL.ESSXSWI8 Earthing switch indication (8)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.ESSXSWI8					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0…3	R	0,3,0,3

2.5.3 Sensors and monitoring functions

2.5.3.1 LD0.MDSOPT1 Runtime counter for machines and devices (1)

Table 212: LD0.MDSOPT1 Runtime counter for machines and devices (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.MDSOPT1					
.OpTmh.stVal		Operation time	0…300000 [h]	R	0,300000,0,300000

2.5.3.2 LD0.SSCBR1 Circuit-breaker condition monitoring (1)

Table 213: LD0.SSCBR1 Circuit-breaker condition monitoring (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SSCBR1					
.OpCntRs.stVal	NO_OPR	Number of CB operations	0...99999	R	0,99999,0,99999
.InaTmdCnt.stVal	INA_DAYS	CB inactive days	0...9999	R	0,9999,0,9999
.OpTmOpn.mag	T_TRV_OP	Opening travel time	0…60000 [ms]	R	0,60000,0,60000
.OpTmCls.mag	T_TRV_CL	Closing travel time	0…60000 [ms]	R	0,60000,0,60000
LD0.SSOPM1					
.TmsSprCha.mag	T_SPR_CHR	Spring charging time	0...99.99 [s]	R	0,100,0,10000
LD0.SPH1SCBR1					
.AccmAPwr.mag	IPOW_A	Phs A acc. currents power	0…30000	R	0,30000,0,30000
.RmnNumOp.stVal	CB_LIFE_A	Phs A remaining life	-99999...99999	R	-99999,99999,-99999,99999
LD0.SPH2SCBR1					
.AccmAPwr.mag	IPOW_B	Phs B acc. currents power	0…30000	R	0,30000,0,30000

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.RmnNumOp.stVal	CB_LIFE_B	Phs B remaining life	-99999...99999	R	-99999,99999,-99999,99999
LD0.SPH3SCBR1					
.AccmAPwr.mag	IPOW_C	Phs C acc. currents power	0…30000	R	0,30000,0,30000
.RmnNumOp.stVal	CB_LIFE_C	Phs C remaining life	-99999...99999	R	-99999,99999,-99999,99999

2.5.3.3 LD0.SSCBR2 Circuit-breaker condition monitoring (2)

Table 214: LD0.SSCBR2 Circuit-breaker condition monitoring (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SSCBR2					
.OpCntRs.stVal	NO_OPR	Number of CB operations	0...99999	R	0,99999,0,99999
.InaTmdCnt.stVal	INA_DAYS	CB inactive days	0...9999	R	0,9999,0,9999
.OpTmOpn.mag	T_TRV_OP	Opening travel time	0…60000 [ms]	R	0,60000,0,60000
.OpTmCls.mag	T_TRV_CL	Closing travel time	0…60000 [ms]	R	0,60000,0,60000
LD0.SSOPM2					
.TmsSprCha.mag	T_SPR_CHR	Spring charging time	0...99.99 [s]	R	0,100,0,10000
LD0.SPH1SCBR2					
.AccmAPwr.mag	IPOW_A	Phs A acc. currents power	0…30000	R	0,30000,0,30000
.RmnNumOp.stVal	CB_LIFE_A	Phs A remaining life	-99999...99999	R	-99999,99999,-99999,99999
LD0.SPH2SCBR2					
.AccmAPwr.mag	IPOW_B	Phs B acc. currents power	0…30000	R	0,30000,0,30000
.RmnNumOp.stVal	CB_LIFE_B	Phs B remaining life	-99999...99999	R	-99999,99999,-99999,99999
LD0.SPH3SCBR2					
.AccmAPwr.mag	IPOW_C	Phs C acc. currents power	0…30000	R	0,30000,0,30000
.RmnNumOp.stVal	CB_LIFE_C	Phs C remaining life	-99999...99999	R	-99999,99999,-99999,99999

2.5.4 Metering and measurand functions

2.5.4.1 LD0.CMMXU1 Three-phase current measurement (1)

Table 215: LD0.CMMXU1 Three-phase current measurement (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.CMMXU1		Phase-to-ground current			
.A.phsA.instCVal.mag	IL1-A	Phs A magnitude	0.00...50.00 [xIn]	R	0,50,0,5000
.A.phsB.instCVal.mag	IL2-A	Phs B magnitude	0.00...50.00 [xIn]	R	0,50,0,5000
.A.phsC.instCVal.mag	IL3-A	Phs C magnitude	0.00...50.00 [xIn]	R	0,50,0,5000
LD0.CAVMMXU1					

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.A.phsA.cVal.mag	I_DMD_A	Phs A demand value	0.00...50.00 [xIn]	R	0,50,0,5000
.A.phsB.cVal.mag	I_DMD_B	Phs B demand value	0.00...50.00 [xIn]	R	0,50,0,5000
.A.phsC.cVal.mag	I_DMD_C	Phs C demand value	0.00...50.00 [xIn]	R	0,50,0,5000
LD0.CMAMMXU1					
.A.phsA.cVal.mag	Max demand IL1	Phs A max. demand value	0.00...50.00 [xIn]	R	0,50,0,5000
.A.phsB.cVal.mag	Max demand IL2	Phs B max. demand value	0.00...50.00 [xIn]	R	0,50,0,5000
.A.phsC.cVal.mag	Max demand IL3	Phs C max. demand value	0.00...50.00 [xIn]	R	0,50,0,5000
LD0.CMIMMXU1					
.A.phsA.cVal.mag	Min demand IL1	Phs A min. demand value	0.00...50.00 [xIn]	R	0,50,0,5000
.A.phsB.cVal.mag	Min demand IL2	Phs B. min demand value	0.00...50.00 [xIn]	R	0,50,0,5000
.A.phsC.cVal.mag	Min demand IL3	Phs C min. demand value	0.00...50.00 [xIn]	R	0,50,0,5000

2.5.4.2 LD0.CMMXU2 Three-phase current measurement (2)

Table 216: LD0.CMMXU2 Three-phase current measurement (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.CMMXU2		Phase-to-ground current			
.A.phsA.instCVal.mag	IL1-A	Phs A magnitude	0.00...50.00 [xIn]	R	0,50,0,5000
.A.phsB.instCVal.mag	IL2-A	Phs B magnitude	0.00...50.00 [xIn]	R	0,50,0,5000
.A.phsC.instCVal.mag	IL3-A	Phs C magnitude	0.00...50.00 [xIn]	R	0,50,0,5000
LD0.CAVMMXU2					
.A.phsA.cVal.mag	I_DMD_A	Phs A demand value	0.00...50.00 [xIn]	R	0,50,0,5000
.A.phsB.cVal.mag	I_DMD_B	Phs B demand value	0.00...50.00 [xIn]	R	0,50,0,5000
.A.phsC.cVal.mag	I_DMD_C	Phs C demand value	0.00...50.00 [xIn]	R	0,50,0,5000
LD0.CMAMMXU2					
.A.phsA.cVal.mag	Max demand IL1	Phs A max. demand value	0.00...50.00 [xIn]	R	0,50,0,5000
.A.phsB.cVal.mag	Max demand IL2	Phs B max. demand value	0.00...50.00 [xIn]	R	0,50,0,5000
.A.phsC.cVal.mag	Max demand IL3	Phs C max. demand value	0.00...50.00 [xIn]	R	0,50,0,5000

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.CMIMMXU2					
.A.phsA.cVal.mag	Min demand IL1	Phs A min. demand value	0.00...50.00 [xIn]	R	0,50,0,5000
.A.phsB.cVal.mag	Min demand IL2	Phs B min. demand value	0.00...50.00 [xIn]	R	0,50,0,5000
.A.phsC.cVal.mag	Min demand IL3	Phs C min. demand value	0.00...50.00 [xIn]	R	0,50,0,5000

2.5.4.3 LD0.CSMSQI1 Sequence current measurement (1)

Table 217: LD0.CSMSQI1 Sequence current measurement (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.CSMSQI1		Sequence of currents			
.SeqA.c1.instCVal.mag	I1_INST	Positive magnitude	0.00...50.0 [×In]	R	0,50,0,5000
.SeqA.c2.instCVal.mag	I2_INST	Negative magnitude	0.00...50.0 [×In]	R	0,50,0,5000
.SeqA.c3.instCVal.mag	I3_INST	Zero magnitude	0.00...50.0 [×In]	R	0,50,0,5000

2.5.4.4 LD0.CSMSQI2 Sequence current measurement (2)

Table 218: LD0.CSMSQI2 Sequence current measurement (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.CSMSQI2		Sequence of currents			
.SeqA.c1.instCVal.mag	I1_INST	Positive magnitude	0.00...50.0 [×In]	R	0,50,0,5000
.SeqA.c2.instCVal.mag	I2_INST	Negative magnitude	0.00...50.0 [×In]	R	0,50,0,5000
.SeqA.c3.instCVal.mag	I3_INST	Zero magnitude	0.00...50.0 [×In]	R	0,50,0,5000

2.5.4.5 LD0.FLTRFRC1 Fault record (1)

Table 219: LD0.FLTRFRC1 Fault record (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.FLTRFRC1					
.OpTm.t		Captured time (year)	0...3000	R	0,3000,0,3000
.OpTm.t		Captured time (month)	1…12	R	1,12,1,12
.OpTm.t		Captured time (day)	1..31	R	1,31,1,31
.OpTm.t		Captured time (hour)	0…23	R	0,23,0,23
.OpTm.t		Captured time (minute)	0…59	R	0,59,0,59

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.OpTm.t		Captured time (second)	0…59	R	0,59,0,59
.OpTm.t		Captured time (millisecond)	0…999	R	0,999,0,999
.OpCnt.stVal		Fault record number	0...999999	R	0,999999,0,999999
.StrDur.mag		Start duration	0.00...100.00 [%]	R	0,100,0,10000
.StrOpTm.mag		Operate time	0...999999.999 [s]	R	0,10000000,0,10000000
.ProFcn.stVal		Protection function	Code (see doc)	R	-32768,32767,-32768,32767
.ActSetGr.stVal		Active setting group	1…6	R	1,6,1,6
.ShotPntr.stVal		AR Shot pointer	1…5	R	1,5,1,5
.FltDiskm.mag		Fault distance	0.00...3000.00 pu	R	0,3000,0,300000
.FltPtR.mag		Fault resistance	0.00...1000000 .00 [ohm]	R	0,1000000,0,100000000
.PhReact.mag		Fault reactance	0.00...1000000 .00 [ohm]	R	0,1000000,0,100000000
.Max50APhsA1.mag		Maximum phase A current 1	0.000...50.000 [xIn]	R	0,50,0,50000
.Max50APhsB1.mag		Maximum phase B current 1	0.000...50.000 [xIn]	R	0,50,0,50000
.Max50APhsC1.mag		Maximum phase C current 1	0.000...50.000 [xIn]	R	0,50,0,50000
.Max50ARes1.mag		Maximum residual current 1	0.000...50.000 [xIn]	R	0,50,0,50000
.APhsA1.mag		Phase A current 1	0.000...50.000 [xIn]	R	0,50,0,50000
.APhsB1.mag		Phase B current 1	0.000...50.000 [xIn]	R	0,50,0,50000
.APhsC1.mag		Phase C current 1	0.000...50.000 [xIn]	R	0,50,0,50000
.ARes1.mag		Residual current 1	0.000...50.000 [xIn]	R	0,50,0,50000
.AResClc1.mag		Calculated residual current 1	0.000...50.000 [xIn]	R	0,50,0,50000
.APsSeq1.mag		Positive sequence current 1	0.000...50.000 [xIn]	R	0,50,0,50000
.ANgSeq1.mag		Negtive sequence current 1	0.000...50.000 [xIn]	R	0,50,0,50000
.PhVPhsA1.mag		Phase A voltage 1	0.000...4.000 [xUn]	R	0,4,0,4000
.PhVPhsB1.mag		Phase B voltage 1	0.000...4.000 [xUn]	R	0,4,0,4000
.PhVPhsC1.mag		Phase C voltage 1	0.000...4.000 [xUn]	R	0,4,0,4000
.PPVPhsAB1.mag		Phase A-B voltage 1	0.000...4.000 [xUn]	R	0,4,0,4000

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.PPVPhsBC1.mag		Phase B-C voltage 1	0.000...4.000 [xUn]	R	0,4,0,4000
.PPVPhsCA1.mag		Phase C-A voltage 1	0.000...4.000 [xUn]	R	0,4,0,4000
.VRes1.mag		Residual voltage 1	0.000...4.000 [xUn]	R	0,4,0,4000
.VZro1.mag		Zero sequence voltage 1	0.000...4.000 [xUn]	R	0,4,0,4000
.VPsSeq1.mag		Positive sequence voltage 1	0.000...4.000 [xUn]	R	0,4,0,4000
.VNgSeq1.mag		Negative sequence voltage 1	0.000...4.000 [xUn]	R	0,4,0,4000
.MaxTmpRl.mag		PTTR thermal level	0.00...99.99	R	0,99.99,0,9999
.AMaxNgPs.mag		PDNSPTOC1 ratio I2/I1	0.00...999.99 [%]	R	0,999.99,0,99999
.DifANAngVN1.mag		Angle Uo - Io (1)	-180.00...180.00 [deg]	R	-180,180,-18000,18000
.DifAAAngVBC1.mag		Angle U23 - IL1 (1)	-180.00...180.00 [deg]	R	-180,180,-18000,18000
.DifABAngVCA1.mag		Angle U31 - IL2 (1)	-180.00...180.00 [deg]	R	-180,180,-18000,18000
.DifACAngVAB1.mag		Angle U12 - IL3 (1)	-180.00...180.00 [deg]	R	-180,180,-18000,18000
.Hz.mag		Frequency	30.00...80.00 [Hz]	R	30,80,3000,8000
.HzRteChg.mag		Frequency gradient	-10.00...10.00 [Hz/s]	R	-10,10,-1000,1000
.CondNeut.mag		Conductance Yo	-1000.00...1000.00 [mS]	R	-1000,1000,-100000,100000
.SusNeut.mag		Susceptance Yo	-1000.00...1000.00 [mS]	R	-1000,1000,-100000,100000
.VRes2.mag		Residual voltage 2	0.000...4.000 [xUn]	R	0,4,0,4000
.PhVPhsA2.mag		Phase A voltage 2	0.000...4.000 [xUn]	R	0,4,0,4000
.PhVPhsB2.mag		Phase B voltage 2	0.000...4.000 [xUn]	R	0,4,0,4000
.PhVPhsC2.mag		Phase C voltage 2	0.000...4.000 [xUn]	R	0,4,0,4000
.PPVPhsAB2.mag		Phase A-B voltage 2	0.000...4.000 [xUn]	R	0,4,0,4000
.PPVPhsBC2.mag		Phase B-C voltage 2	0.000...4.000 [xUn]	R	0,4,0,4000
.PPVPhsCA2.mag		Phase C-A voltage 2	0.000...4.000 [xUn]	R	0,4,0,4000
.VZro2.mag		Zero sequence voltage 2	0.000...4.000 [xUn]	R	0,4,0,4000
.VPsSeq2.mag		Positive sequence voltage 2	0.000...4.000 [xUn]	R	0,4,0,4000

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.VNgSeq2.mag		Negative sequence voltage 2	0.000...4.000 [xUn]	R	0,4,0,4000
.CBClrTm.mag		Breaker clear time	0.000...3.000 [s]	R	0,3,0,3000
.DifANAngVN2.mag		Angle Uo - Io (2)	-180.00...180.00 [deg]	R	-180,180,-18000,18000
.DifAAAngVBC2.mag		Angle U23 - IL1 (2)	-180.00...180.00 [deg]	R	-180,180,-18000,18000
.DifABAngVCA2.mag		Angle U31 - IL2 (2)	-180.00...180.00 [deg]	R	-180,180,-18000,18000
.DifACAngVAB2.mag		Angle U12 - IL3 (2)	-180.00...180.00 [deg]	R	-180,180,-18000,18000
.Max50APhsA2.mag		Maximum phase A current 2	0.000...50.000 [xIn]	R	0,50,0,50000
.Max50APhsB2.mag		Maximum phase B current 2	0.000...50.000 [xIn]	R	0,50,0,50000
.Max50APhsC2.mag		Maximum phase C current 2	0.000...50.000 [xIn]	R	0,50,0,50000
.Max50ARes2.mag		Maximum residual current 2	0.000...50.000 [xIn]	R	0,50,0,50000
.APhsA2.mag		Phase A current 2	0.000...50.000 [xIn]	R	0,50,0,50000
.APhsB2.mag		Phase B current 2	0.000...50.000 [xIn]	R	0,50,0,50000
.APhsC2.mag		Phase C current 2	0.000...50.000 [xIn]	R	0,50,0,50000
.ARes2.mag		Residual current 2	0.000...50.000 [xIn]	R	0,50,0,50000
.AResClc2.mag		Calculated residual current 2	0.000...50.000 [xIn]	R	0,50,0,50000
.APsSeq2.mag		Positive sequence current 2	0.000...50.000 [xIn]	R	0,50,0,50000
.ANgSeq2.mag		Negtive sequence current 2	0.000...50.000 [xIn]	R	0,50,0,50000
.Max50APhsA3.mag		Maximum phase A current 3	0.000...50.000 [xIn]	R	0,50,0,50000
.Max50APhsB3.mag		Maximum phase B current 3	0.000...50.000 [xIn]	R	0,50,0,50000
.Max50APhsC3.mag		Maximum phase C current 3	0.000...50.000 [xIn]	R	0,50,0,50000
.Max50ARes3.mag		Maximum residual current 3	0.000...50.000 [xIn]	R	0,50,0,50000
.APhsA3.mag		Phase A current 3	0.000...50.000 [xIn]	R	0,50,0,50000
.APhsB3.mag		Phase B current 3	0.000...50.000 [xIn]	R	0,50,0,50000
.APhsC3.mag		Phase C current 3	0.000...50.000 [xIn]	R	0,50,0,50000

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.ARes3.mag		Residual current 3	0.000...50.000 [xIn]	R	0,50,0,50000
.AResClc3.mag		Calculated residual current 3	0.000...50.000 [xIn]	R	0,50,0,50000
.APsSeq3.mag		Positive sequence current 3	0.000...50.000 [xIn]	R	0,50,0,50000
.ANgSeq3.mag		Negtive sequence current 3	0.000...50.000 [xIn]	R	0,50,0,50000
.Max50DifAA.mag		Max diff current IL1	0.000...80.000 pu	R	0,80,0,80000
.Max50DifAB.mag		Max diff current IL2	0.000...80.000 pu	R	0,80,0,80000
.Max50DifAC.mag		Max diff current IL3	0.000...80.000 pu	R	0,80,0,80000
.Max50RstAA.mag		Max bias current IL1	0.000…50.000 pu	R	0,50,0,50000
.Max50RstAB.mag		Max bias current IL2	0.000…50.000 pu	R	0,50,0,50000
.Max50RstAC.mag		Max bias current IL3	0.000…50.000 pu	R	0,50,0,50000
.DifAPhsA.mag		Diff current IL1	0.000...80.000 pu	R	0,80,0,80000
.DifAPhsB.mag		Diff current IL2	0.000...80.000 pu	R	0,80,0,80000
.DifAPhsC.mag		Diff current IL3	0.000...80.000 pu	R	0,80,0,80000
.RstAPhsA.mag		Bias current IL1	0.000…50.000 pu	R	0,50,0,50000
.RstAPhsB.mag		Bias current IL2	0.000…50.000 pu	R	0,50,0,50000
.RstAPhsC.mag		Bias current IL3	0.000…50.000 pu	R	0,50,0,50000
.DifARes.mag		Diff current Io	0.000...80.000 pu	R	0,80,0,80000
.RstARes.mag		Bias current Io	0.000…50.000 pu	R	0,50,0,50000
.PPLoopRis.mag		Fault loop resistance	-1000.00...1000.00 [ohm]	R	-1000,1000,-100000,100000
.PPLoopReact.mag		Fault loop reactance	-1000.00...1000.00 [ohm]	R	-1000,1000,-100000,100000

2.5.4.6 LD0.FMMXU1 Frequency measurement (1)

Table 220: LD0.FMMXU1 Frequency measurement (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.FMMXU1					
.Hz.mag	-	Frequency value	35…75 [Hz]	R	35,75,3500,7500

2.5.4.7 LD0.FMMXU2 Frequency measurement (2)

Table 221: LD0.FMMXU2 Frequency measurement (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.FMMXU2					
.Hz.mag	-	Frequency value	35…75 [Hz]	R	35,75,3500,7500

2.5.4.8 LD0.HAEFPTOC1 Current harmonics (1)

Table 222: LD0.HAEFPTOC1 Current harmonics (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.HAEFMHAI1					
.HRmsA.res.cVal.mag	-	Current harmonics	0…250 [A]	R	0,250,0,250

2.5.4.9 LD0.PEMMXU1 Three-phase power and energy measurement (1)

Table 223: LD0.PEMMXU1 Three-phase power and energy measurement (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.PEMMXU1					
.TotW.instMag	P-kW	Total active power	-/+999999.9	R	multiplied by 10
.TotVA.instMag	S-kVA	Total apparent power	-/+999999.9	R	multiplied by 10
.TotVAr.instMag	Q-kVAr	Total reactive power	-/+999999.9	R	multiplied by 10
.TotPF.instMag	PF	Average power factor	-1.00…1.00	R	-1,1,-100,100
LD0.PEAVMMXU1					
.TotW.mag		Total active power demand	-/+999999.9	R	multiplied by 10
.TotVAr.mag		Total apparent power demand	-/+999999.9	R	multiplied by 10
.TotVA.mag		Total reactive power demand	-/+999999.9	R	multiplied by 10
.TotPF.mag		Average power factor demand	-1.00…1.00	R	-1,1,-100,100
LD0.PEMAMMXU1					
.TotW.mag		Total active power demand max.	-/+999999.9	R	multiplied by 10
.TotVAr.mag		Total apparent power demand max.	-/+999999.9	R	multiplied by 10
.TotVA.mag		Total reactive power demand max.	-/+999999.9	R	multiplied by 10
LD0.PEMIMMXU1					
.TotW.mag		Total active power demand min.	-/+999999.9	R	multiplied by 10
.TotVAr.mag		Total apparent power demand min.	-/+999999.9	R	multiplied by 10
.TotVA.mag		Total reactive power demand min.	-/+999999.9	R	multiplied by 10

2.5.4.10 LD0.PEMMXU2 Three-phase power and energy measurement (2)

Table 224: LD0.PEMMXU2 Three-phase power and energy measurement (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.PEMMXU2					
.TotW.instMag	P-kW	Total active power	-/+999999.9	R	multiplied by 10
.TotVA.instMag	S-kVA	Total apparent power	-/+999999.9	R	multiplied by 10
.TotVAr.instMag	Q-kVAr	Total reactive power	-/+999999.9	R	multiplied by 10
.TotPF.instMag	PF	Average power factor	-1.00…1.00	R	-1,1,-100,100
LD0.PEAVMMXU2					
.TotW.mag		Total active power demand	-/+999999.9	R	multiplied by 10
.TotVAr.mag		Total apparent power demand	-/+999999.9	R	multiplied by 10
.TotVA.mag		Total reactive power demand	-/+999999.9	R	multiplied by 10
.TotPF.mag		Average power factor demand	-1.00…1.00	R	-1,1,-100,100
LD0.PEMAMMXU2					
.TotW.mag		Total active power demand max.	-/+999999.9	R	multiplied by 10
.TotVAr.mag		Total apparent power demand max.	-/+999999.9	R	multiplied by 10
.TotVA.mag		Total reactive power demand max.	-/+999999.9	R	multiplied by 10
LD0.PEMIMMXU2					
.TotW.mag		Total active power demand min.	-/+999999.9	R	multiplied by 10
.TotVAr.mag		Total apparent power demand min.	-/+999999.9	R	multiplied by 10
.TotVA.mag		Total reactive power demand min.	-/+999999.9	R	multiplied by 10

2.5.4.11 LD0.RESCMMXU1 Residual current measurement (1)

Table 225: LD0.RESCMMXU1 Residual current measurement (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.RESCMMXU1					
.A.res.instCVal.mag	Io-A	Residual current	0.00...50.00 [xIn]	R	0,50,0,5000
LD0.RCAVMMXU1					
.A.res.cVal.mag	I_DMD_RES	Residual current demand	0.00...50.00 [xIn]	R	0,50,0,5000
LD0.RCMAMMXU1					
.A.res.cVal.mag	Max demand Io	Residual current max. demand	0.00...50.00 [xIn]	R	0,50,0,5000
LD0.RCMIMMXU1					
.A.res.cVal.mag	Min demand Io	Residual current min. demand	0.00...50.00 [xIn]	R	0,50,0,5000

2.5.4.12 LD0.RESVMMXU1 Residual voltage measurement (1)

Table 226: LD0.RESVMMXU1 Residual voltage measurement (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.RESVMMXU1					
.PhV.res.instCVal.mag.f	Uo-A	Residual voltage	0.00…4.00 [xUn]	R	0,4,0,400
LD0.RVAVMMXU1					
.PhV.res.cVal.mag.f	U_DMD_RES	Residual voltage demand	0.00…4.00 [xUn]	R	0,4,0,400
LD0.RVMAMMXU1					
.PhV.res.cVal.mag.f	Max demand Uo	Residual voltage max. demand	0.00…4.00 [xUn]	R	0,4,0,400
LD0.RVMIMMXU1					
.PhV.res.cVal.mag.f	Min demand Uo	Residual volatge min. demand	0.00…4.00 [xUn]	R	0,4,0,400

2.5.4.13 LD0.SPEMMXU1 Single-phase power and energy measurement (1)

Table 227: LD0.SPEMMXU1 Single-phase power and energy measurement (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SPEMMXU1.W		Active power			
.phsA.instCVal.mag		-phase A	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.phsB.instCVal.mag		-phase B	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.phsC.instCVal.mag		-phase C	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
LD0.SPEMMXU1.VAr		Rective power			
.phsA.instCVal.mag		-phase A	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.phsB.instCVal.mag		-phase B	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.phsC.instCVal.mag		-phase C	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
LD0.SPEMMXU1.VA		Apparent power			
.phsA.instCVal.mag		-phase A	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.phsB.instCVal.mag		-phase B	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.phsC.instCVal.mag		-phase C	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
LD0.SPEMMXU1.PF		Power factor			
.phsA.instCVal.mag		-phase A	-1.00...1.00	R	-1,1,-1,1
.phsB.instCVal.mag		-phase B	-1.00...1.00	R	-1,1,-1,1
.phsC.instCVal.mag		-phase C	-1.00...1.00	R	-1,1,-1,1

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SPEAVMMXU1		W, demand			
.W.phsA.cVal.mag		-phase A	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.W.phsB.cVal.mag		-phase B	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.W.phsC.cVal.mag		-phase C	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
LD0.SPEMAMMXU1		W, max demand			
.W.phsA.cVal.mag		-phase A	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.W.phsB.cVal.mag		-phase B	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.W.phsC.cVal.mag		-phase C	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
LD0.SPEMIMMXU1		W, min demand			
.W.phsA.cVal.mag		-phase A	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.W.phsB.cVal.mag		-phase B	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.W.phsC.cVal.mag		-phase C	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
LD0.SPEAVMMXU1		VAr, demand			
.VAr.phsA.cVal.mag		-phase A	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.VAr.phsB.cVal.mag		-phase B	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.VAr.phsC.cVal.mag		-phase C	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
LD0.SPEMAMMXU1		VAr, max demand			
.VAr.phsA.cVal.mag		-phase A	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.VAr.phsB.cVal.mag		-phase B	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.VAr.phsC.cVal.mag		-phase C	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
LD0.SPEMIMMXU1		VAr, min demand			
.VAr.phsA.cVal.mag		-phase A	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.VAr.phsB.cVal.mag		-phase B	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.VAr.phsC.cVal.mag		-phase C	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
LD0.SPEAVMMXU1		VA, demand			
.VA.phsA.cVal.mag		-phase A	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.VA.phsB.cVal.mag		-phase B	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.VA.phsC.cVal.mag		-phase C	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
LD0.SPEMAMMXU1		VA, max demand			
.VA.phsA.cVal.mag		-phase A	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.VA.phsB.cVal.mag		-phase B	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.VA.phsC.cVal.mag		-phase C	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
LD0.SPEMIMMXU1		VA, min demand			
.VA.phsA.cVal.mag		-phase A	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.VA.phsB.cVal.mag		-phase B	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.VA.phsC.cVal.mag		-phase C	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
LD0.SPEAVMMXU1		PF, demand			
.PF.phsA.cVal.mag		-phase A	-1.00...1.00	R	-1,1,-1,1
.PF.phsB.cVal.mag		-phase B	-1.00...1.00	R	-1,1,-1,1
.PF.phsC.cVal.mag		-phase C	-1.00...1.00	R	-1,1,-1,1

2.5.4.14 LD0.SPEMMXU2 Single-phase power and energy measurement (2)

Table 228: LD0.SPEMMXU2 Single-phase power and energy measurement (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SPEMMXU2.W		Active power			
.phsA.instCVal.mag		-phase A	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.phsB.instCVal.mag		-phase B	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.phsC.instCVal.mag		-phase C	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
LD0.SPEMMXU2.VAr		Rective power			
.phsA.instCVal.mag		-phase A	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.phsB.instCVal.mag		-phase B	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.phsC.instCVal.mag		-phase C	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
LD0.SPEMMXU2.VA		Apparent power			
.phsA.instCVal.mag		-phase A	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.phsB.instCVal.mag		-phase B	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.phsC.instCVal.mag		-phase C	-999999.9...99 9999.9	R	-999999.99,999999.99,9999 9999,99999999
LD0.SPEMMXU2.PF		Power factor			
.phsA.instCVal.mag		-phase A	-1.00...1.00	R	-1,1,-1,1
.phsB.instCVal.mag		-phase B	-1.00...1.00	R	-1,1,-1,1
.phsC.instCVal.mag		-phase C	-1.00...1.00	R	-1,1,-1,1
LD0.SPEAVMMXU2		W, demand			
.W.phsA.cVal.mag		-phase A	-999999.9...99 9999.9	R	-999999.99,999999.99,9999 9999,99999999
.W.phsB.cVal.mag		-phase B	-999999.9...99 9999.9	R	-999999.99,999999.99,9999 9999,99999999
.W.phsC.cVal.mag		-phase C	-999999.9...99 9999.9	R	-999999.99,999999.99,9999 9999,99999999
LD0.SPEMAMMXU2		W, max demand			
.W.phsA.cVal.mag		-phase A	-999999.9...99 9999.9	R	-999999.99,999999.99,9999 9999,99999999
.W.phsB.cVal.mag		-phase B	-999999.9...99 9999.9	R	-999999.99,999999.99,9999 9999,99999999
.W.phsC.cVal.mag		-phase C	-999999.9...99 9999.9	R	-999999.99,999999.99,9999 9999,99999999
LD0.SPEMIMMXU2		W, min demand			
.W.phsA.cVal.mag		-phase A	-999999.9...99 9999.9	R	-999999.99,999999.99,9999 9999,99999999
.W.phsB.cVal.mag		-phase B	-999999.9...99 9999.9	R	-999999.99,999999.99,9999 9999,99999999
.W.phsC.cVal.mag		-phase C	-999999.9...99 9999.9	R	-999999.99,999999.99,9999 9999,99999999
LD0.SPEAVMMXU2		VAr, demand			
.VAr.phsA.cVal.mag		-phase A	-999999.9...99 9999.9	R	-999999.99,999999.99,9999 9999,99999999
.VAr.phsB.cVal.mag		-phase B	-999999.9...99 9999.9	R	-999999.99,999999.99,9999 9999,99999999
.VAr.phsC.cVal.mag		-phase C	-999999.9...99 9999.9	R	-999999.99,999999.99,9999 9999,99999999
LD0.SPEMAMMXU2		VAr, max demand			
.VAr.phsA.cVal.mag		-phase A	-999999.9...99 9999.9	R	-999999.99,999999.99,9999 9999,99999999
.VAr.phsB.cVal.mag		-phase B	-999999.9...99 9999.9	R	-999999.99,999999.99,9999 9999,99999999
.VAr.phsC.cVal.mag		-phase C	-999999.9...99 9999.9	R	-999999.99,999999.99,9999 9999,99999999
LD0.SPEMIMMXU2		VAr, min demand			
.VAr.phsA.cVal.mag		-phase A	-999999.9...99 9999.9	R	-999999.99,999999.99,9999 9999,99999999
.VAr.phsB.cVal.mag		-phase B	-999999.9...99 9999.9	R	-999999.99,999999.99,9999 9999,99999999

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.VAr.phsC.cVal.mag		-phase C	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
LD0.SPEAVMMXU2		VA, demand			
.VA.phsA.cVal.mag		-phase A	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.VA.phsB.cVal.mag		-phase B	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.VA.phsC.cVal.mag		-phase C	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
LD0.SPEMAMMXU2		VA, max demand			
.VA.phsA.cVal.mag		-phase A	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.VA.phsB.cVal.mag		-phase B	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.VA.phsC.cVal.mag		-phase C	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
LD0.SPEMIMMXU2		VA, min demand			
.VA.phsA.cVal.mag		-phase A	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.VA.phsB.cVal.mag		-phase B	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
.VA.phsC.cVal.mag		-phase C	-999999.9...999999.9	R	-999999.99,999999.99,99999999,99999999
LD0.SPEAVMMXU2		PF, demand			
.PF.phsA.cVal.mag		-phase A	-1.00...1.00	R	-1,1,-1,1
.PF.phsB.cVal.mag		-phase B	-1.00...1.00	R	-1,1,-1,1
.PF.phsC.cVal.mag		-phase C	-1.00...1.00	R	-1,1,-1,1

2.5.4.15 LD0.VMMXU1 Three-phase voltage measurement (1)

Table 229: LD0.VMMXU1 Three-phase voltage measurement (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.VMMXU1.PhV		Phase-to-ground voltage			
.phsA.cVal.mag	U_INST_A	Phs A magnitude	0.00…4.00 [xUn]	R	0,4,0,400
.phsB.cVal.mag	U_INST_B	Phs B magnitude	0.00…4.00 [xUn]	R	0,4,0,400
.phsC.cVal.mag	U_INST_C	Phs C magnitude	0.00…4.00 [xUn]	R	0,4,0,400
LD0.VMMXU1.PPV		Phase-to-phase voltage			
.phsAB.cVal.mag	U_DB_AB	Phs AB magnitude	0.00…4.00 [xUn]	R	0,4,0,400
.phsBC.cVal.mag	U_DB_BA	Phs BC magnitude	0.00…4.00 [xUn]	R	0,4,0,400

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.phsCA.cVal.mag	U_DB_CA	Phs CA magnitude	0.00…4.00 [xUn]	R	0,4,0,400
LD0.VAVMMXU1.PhV		Phase-to-ground voltage			
.phsA.cVal.mag	U_DMD_A	Phs A demand value	0.00…4.00 [xUn]	R	0,4,0,400
.phsB.cVal.mag	U_DMD_B	Phs B demand value	0.00…4.00 [xUn]	R	0,4,0,400
.phsC.cVal.mag	U_DMD_C	Phs C demand value	0.00…4.00 [xUn]	R	0,4,0,400
LD0.VAVMMXU1.PPV		Phase-to-phase voltage			
.phsAB.cVal.mag	U_DMD_AB	Phs AB demand value	0.00…4.00 [xUn]	R	0,4,0,400
.phsBC.cVal.mag	U_DMD_BC	Phs BC demand value	0.00…4.00 [xUn]	R	0,4,0,400
.phsCA.cVal.mag	U_DMD_CA	Phs CA demand value	0.00…4.00 [xUn]	R	0,4,0,400

2.5.4.16 LD0.VMMXU2 Three-phase voltage measurement (2)

Table 230: LD0.VMMXU2 Three-phase voltage measurement (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.VMMXU2.PhV		Phase-to-ground voltage			
.phsA.cVal.mag	U_INST_A	Phs A magnitude	0.00…4.00 [xUn]	R	0,4,0,400
.phsB.cVal.mag	U_INST_B	Phs B magnitude	0.00…4.00 [xUn]	R	0,4,0,400
.phsC.cVal.mag	U_INST_C	Phs C magnitude	0.00…4.00 [xUn]	R	0,4,0,400
LD0.VMMXU2.PPV		Phase-to-phase voltage			
.phsAB.cVal.mag	U_DB_AB	Phs AB magnitude	0.00…4.00 [xUn]	R	0,4,0,400
.phsBC.cVal.mag	U_DB_BA	Phs BC magnitude	0.00…4.00 [xUn]	R	0,4,0,400
.phsCA.cVal.mag	U_DB_CA	Phs CA magnitude	0.00…4.00 [xUn]	R	0,4,0,400
LD0.VAVMMXU2.PhV		Phase-to-ground voltage			
.phsA.cVal.mag	U_DMD_A	Phs A demand value	0.00…4.00 [xUn]	R	0,4,0,400
.phsB.cVal.mag	U_DMD_B	Phs B demand value	0.00…4.00 [xUn]	R	0,4,0,400
.phsC.cVal.mag	U_DMD_C	Phs C demand value	0.00…4.00 [xUn]	R	0,4,0,400
LD0.VAVMMXU2.PPV		Phase-to-phase voltage			

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.phsAB.cVal.mag	U_DMD_AB	Phs AB demand value	0.00…4.00 [xUn]	R	0,4,0,400
.phsBC.cVal.mag	U_DMD_BC	Phs BC demand value	0.00…4.00 [xUn]	R	0,4,0,400
.phsCA.cVal.mag	U_DMD_CA	Phs CA demand value	0.00…4.00 [xUn]	R	0,4,0,400

2.5.4.17 LD0.VSMSQI1 Sequence voltage measurement (1)

Table 231: LD0.VSMSQI1 Sequence voltage measurement (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.VSMSQI1		Sequence of voltages			
.SeqV.c1.cVal.mag	I1_DB	-Positive magnitude	0.00…4.00 [xUn]	R	0,4,0,400
.SeqV.c2.cVal.mag	I2_DB	-Negative magnitude	0.00…4.00 [xUn]	R	0,4,0,400
.SeqV.c3.cVal.mag	I3_DB	-Zero magnitude	0.00…4.00 [xUn]	R	0,4,0,400

2.5.4.18 LD0.VSMSQI2 Sequence voltage measurement (2)

Table 232: LD0.VSMSQI2 Sequence voltage measurement (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.VSMSQI2		Sequence of voltages			
.SeqV.c1.cVal.mag	I1_DB	-Positive magnitude	0.00…4.00 [xUn]	R	0,4,0,400
.SeqV.c2.cVal.mag	I2_DB	-Negative magnitude	0.00…4.00 [xUn]	R	0,4,0,400
.SeqV.c3.cVal.mag	I3_DB	-Zero magnitude	0.00…4.00 [xUn]	R	0,4,0,400

2.5.5 Power quality functions

2.5.5.1 LD0.CMHAI1 Current total demand distortion (1)

Table 233: LD0.CMHAI1 Current total demand distortion (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.CMHAI1					
.TddA.phsA.cVal.mag	3SMHTDD_A	3 sec mean TDD value phs A	0.00...500.00 [%]	R	0,500,0,500
.TddA.phsB.cVal.mag	3SMHTDD_B	3 sec mean TDD value phs B	0.00...500.00 [%]	R	0,500,0,500

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.TddA.phsC.cVal.mag	3SMHTDD_C	3 sec mean TDD value phs C	0.00...500.00 [%]	R	0,500,0,500
.DmdTddA.phsA.cVal	DMD_TDD_A	Demand TDD value phs A	0.00...500.00 [%]	R	0,500,0,500
.DmdTddA.phsB.cVal	DMD_TDD_B	Demand TDD value phs B	0.00...500.00 [%]	R	0,500,0,500
.DmdTddA.phsC.cVal	DMD_TDD_C	Demand TDD value phs C	0.00...500.00 [%]	R	0,500,0,500
.MaxDmdTddA.phsA.cVal.mag	Max demand TDD IL1	Maximum demand TDD for phase A	0.00...500.00 [%]	R	0,500,0,500
.MaxDmdTddA.phsB.cVal.mag	Max demand TDD IL2	Maximum demand TDD for phase B	0.00...500.00 [%]	R	0,500,0,500
.MaxDmdTddA.phsC.cVal.mag	Max demand TDD IL3	Maximum demand TDD for phase C	0.00...500.00 [%]	R	0,500,0,500

2.5.5.2 LD0.PHQVVR1 Voltage variation (1)

Table 234: LD0.PHQVVR1 Voltage variation (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.PH1QVVR1					
.SwlInstCnt.stVal	INSTSWELLCNT	Inst. swell counter	0...2147483647	R	0,2147483647,0,2147483647
.SwlMomCnt.stVal	MOMSWELLCNT	Mom. swell counter	0...2147483647	R	0,2147483647,0,2147483647
.SwlTmpCnt.stVal	TEMPSWELLCNT	Temp. swell counter	0...2147483647	R	0,2147483647,0,2147483647
.SwlMaxCnt.stVal	MAXDURSWELLCN	Max duration swell counter	0...2147483647	R	0,2147483647,0,2147483647
.DipInstCnt.stVal	INSTDIPCNT	Inst. dip counter	0...2147483647	R	0,2147483647,0,2147483647
.DipMomCnt.stVal	TEMPDIPCNT	Mom. dip counter	0...2147483647	R	0,2147483647,0,2147483647
.DipTmpCnt.stVal	MOMDIPCNT	Temp. dip counter	0...2147483647	R	0,2147483647,0,2147483647
.DipMaxCnt.stVal	MAXDURDIPCNT	Max duration dip counter	0...2147483647	R	0,2147483647,0,2147483647
.IntrMomCnt.stVal	MOMINTCNT	Mom. interruption counter	0...2147483647	R	0,2147483647,0,2147483647
.IntrTmpCnt.stVal	TEMPINTCNT	Temp. interruption counter	0...2147483647	R	0,2147483647,0,2147483647
.IntrSstCnt.stVal	SUSTINTCNT	Sustained Interr. counter	0...2147483647	R	0,2147483647,0,2147483647
.IntrMaxCnt.stVal	MAXDURINTCNT	Max duration interr. counter	0...2147483647	R	0,2147483647,0,2147483647

2.5.5.3 LD0.VMHAI1 Voltage total harmonic distortion (1)

Table 235: LD0.VMHAI1 Voltage total harmonic distortion (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.VMHAI1					
.ThdPhV.phsA.cVal.mag	3SMHTHD_A	3 sec mean THD value phs A	0.00...500.00 [%]	R	0,500,0,500
.ThdPhV.phsB.cVal.mag	3SMHTHD_B	3 sec mean THD value phs B	0.00...500.00 [%]	R	0,500,0,500
.ThdPhV.phsC.cVal.mag	3SMHTHD_C	3 sec mean THD value phs C	0.00...500.00 [%]	R	0,500,0,500
.DmdThdPhV.phsA.cVal.mag	DMD_THD_A	Demand THD value phs A	0.00...500.00 [%]	R	0,500,0,500
.DmdThdPhV.phsB.cVal.mag	DMD_THD_B	Demand THD value phs B	0.00...500.00 [%]	R	0,500,0,500
.DmdThdPhV.phsC.cVal.mag	DMD_THD_C	Demand THD value phs C	0.00...500.00 [%]	R	0,500,0,500
.MaxDmdThdV.phsA.cVal.mag	Max demand THD IL1	Maximum demand THD for phase A	0.00...500.00 [%]	R	0,500,0,500
.MaxDmdThdV.phsB.cVal.mag	Max demand THD IL2	Maximum demand THD for phase B	0.00...500.00 [%]	R	0,500,0,500
.MaxDmdThdV.phsC.cVal.mag	Max demand THD IL3	Maximum demand THD for phase C	0.00...500.00 [%]	R	0,500,0,500

2.5.6 Protection functions

2.5.6.1 LD0.T1PTTR1 Three-phase thermal protection for feeders, cables and distribution transformers (1)

Table 236: LD0.T1PTTR1 Three-phase thermal protection for feeders, cables and distribution transformers (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.T1PTTR1					
.Tmp.mag	-	Object temperature	-100…9999.9	R	-100,9999.9.0,-1000,99999
.TmpRl.mag	-	Relative temperature	0…99.9	R	0,99.9,0,999
.OpTm.stVal	-	Est. time to operate	0…60000 [s]	R	0,60000,0,60000
.BlkThmRsTm.stVal	-	Est. time to remove BLK_CLOSE	0…60000 [s]	R	0,60000,0,60000

2.5.7 Protection-related functions

2.5.7.1 LD0.DARREC1 Autoreclosing (1)

Table 237: LD0.DARREC1 Autoreclosing (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.DARREC1					
.AutoRecSt.stVal	STATUS	Autorec. status	-2…4		-2,4,-2,4
.ShotPntr.stVal	SHOT_PTR	Shot pointer value	1…7		1,7,1,7
.OpCntRs.stVal		Operation counter	0...2147483647		0,2147483647,0,2147483647
.RecCnt1.stVal		Shot 1 counter	0...2147483647		0,2147483647,0,2147483647
.RecCnt2.stVal		Shot 2 counter	0...2147483647		0,2147483647,0,2147483647
.RecCnt3.stVal		Shot 3 counter	0...2147483647		0,2147483647,0,2147483647
.RecCnt4.stVal		Shot 4 counter	0...2147483647		0,2147483647,0,2147483647
.RecCnt5.stVal		Shot 5 counter	0...2147483647		0,2147483647,0,2147483647
.FrqOpCnt.stVal		Shot 6 counter	0...2147483647		0,2147483647,0,2147483647

2.5.7.2 LD0.DARREC2 Autoreclosing (2)

Table 238: LD0.DARREC2 Autoreclosing (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.DARREC2					
.AutoRecSt.stVal	STATUS	Autorec. status	-2…4		-2,4,-2,4
.ShotPntr.stVal	SHOT_PTR	Shot pointer value	1…7		1,7,1,7
.OpCntRs.stVal		Operation counter	0...2147483647		0,2147483647,0,2147483647
.RecCnt1.stVal		Shot 1 counter	0...2147483647		0,2147483647,0,2147483647
.RecCnt2.stVal		Shot 2 counter	0...2147483647		0,2147483647,0,2147483647
.RecCnt3.stVal		Shot 3 counter	0...2147483647		0,2147483647,0,2147483647
.RecCnt4.stVal		Shot 4 counter	0...2147483647		0,2147483647,0,2147483647
.RecCnt5.stVal		Shot 5 counter	0...2147483647		0,2147483647,0,2147483647
.FrqOpCnt.stVal		Shot 6 counter	0...2147483647		0,2147483647,0,2147483647

2.5.7.3 LD0.DPSRDIR1 Three-phase power directional element (1)

Table 239: LD0.DPSRDIR1 Three-phase power directional element (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.DPSRDIR1					
.Dir.dirGeneral	DIRECTION	Direction information	0-Idle;1-forw;2-backw;3-Both	R	0,3,0,3

2.5.7.4 LD0.DPSRDIR2 Three-phase power directional element (2)

Table 240: LD0.DPSRDIR2 Three-phase power directional element (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.DPSRDIR2					
.Dir.dirGeneral	DIRECTION	Direction information	0-Idle;1-forw;2-backw;3-Both	R	0,3,0,3

2.5.7.5 DR.RDRE1 Disturbance recorder (1)

Table 241: DR.RDRE1 Disturbance recorder (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
DR.RDRE1					
.FltNum.stVal	-	Number of recordings	0…65535	R	0,65535,0,65535
.MemUsed.stVal	-	Rec. memory used	0…100 [%]	R	0,100,0,100

2.5.7.6 LD0.SCEFRFLO1 Fault locator (1)

Table 242: LD0.SCEFRFLO1 Fault locator (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.FLO1RFRC1					
.FltDiskm.mag		Fault distance	0…3000.000 [km]		0,3000,0,3000000
.FltLoop.stVal		Fault loop	0…7		0,7,0,7
.FltPtR.mag		Fault point resistance	0...1000000.0 [ohm]		0,1000000,0,10000000
.FltR.mag		Fault loop resistance	0...1000000.0 [ohm]		0,1000000,0,10000000
.FltX.mag		Fault loop reactance	0...1000000.0 [ohm]		0,1000000,0,10000000
.PhReact.mag		Fault phase reactance	0...1000000.0 [ohm]		0,1000000,0,10000000
.RatFltALod.mag		Fault to load current ratio	0...60000.00		0,60000,0,6000000

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.EqDisLod.mag		Estim. equivalent load distance	0.00...1.00		0,1,0,100
.PhGndCapac.mag		Estim. PE line capacitive reactance	0.0...1000000.0 [ohm]		0,1000000,0,10000000
.FltDisQ.stVal		Fault distance quality	0...511		0,512,0,512

2.5.7.7 LD0.SECRSYN1 Synchronism and energizing check (1)

Table 243: LD0.SECRSYN1 Synchronism and energizing check (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SECRSYN1					
.EnSt.stVal	-	Energization state	0…4	R	0,4,0,4

2.5.8 Generic functions

2.5.8.1 LD0.MVI4GAPC1 Integer value move (1)

Table 244: LD0.MVI4GAPC1 Integer value move (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.MVI4GAPC1					
.ISCSO1.stVal	OUT1	Analog value 1	0…N	R	0,1,0,1
.ISCSO1.stVal	OUT2	Analog value 2	0…N	R	0,1,0,1
.ISCSO1.stVal	OUT3	Analog value 3	0…N	R	0,1,0,1
.ISCSO1.stVal	OUT4	Analog value 4	0…N	R	0,1,0,1

2.5.8.2 LD0.MVI4GAPC2 Integer value moving function (2)

Table 245: LD0.MVI4GAPC2 Integer value moving function (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.MVI4GAPC2					
.ISCSO1.stVal	OUT1	Analog value 1	0…N	R	0,1,0,1
.ISCSO2.stVal	OUT2	Analog value 2	0…N	R	0,1,0,1
.ISCSO3.stVal	OUT3	Analog value 3	0…N	R	0,1,0,1
.ISCSO4.stVal	OUT4	Analog value 4	0…N	R	0,1,0,1

2.5.8.3 LD0.SCA4GAPC1 Analog value scaling (1)

Table 246: LD0.SCA4GAPC1 Analog value scaling (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SCA4GAPC1					
.AnValOut1.mag	AO1_VALUE	Analog value 1 after scaling	0…N	R	0,1,0,1
.AnValOut2.mag	AO2_VALUE	Analog value 2 after scaling	0…N	R	0,1,0,1
.AnValOut3.mag	AO3_VALUE	Analog value 3 after scaling	0…N	R	0,1,0,1
.AnValOut4.mag	AO4_VALUE	Analog value 4 after scaling	0…N	R	0,1,0,1

2.5.8.4 LD0.SCA4GAPC2 Analog value scaling (2)

Table 247: LD0.SCA4GAPC2 Analog value scaling (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SCA4GAPC2					
.AnValOut1.mag	AO1_VALUE	Analog value 1 after scaling	0…N	R	0,1,0,1
.AnValOut2.mag	AO2_VALUE	Analog value 2 after scaling	0…N	R	0,1,0,1
.AnValOut3.mag	AO3_VALUE	Analog value 3 after scaling	0…N	R	0,1,0,1
.AnValOut4.mag	AO4_VALUE	Analog value 4 after scaling	0…N	R	0,1,0,1

2.5.8.5 LD0.SCA4GAPC3 Analog value scaling (3)

Table 248: LD0.SCA4GAPC3 Analog value scaling (3)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SCA4GAPC3					
.AnValOut1.mag	AO1_VALUE	Analog value 1 after scaling	0…N	R	0,1,0,1
.AnValOut2.mag	AO2_VALUE	Analog value 2 after scaling	0…N	R	0,1,0,1
.AnValOut3.mag	AO3_VALUE	Analog value 3 after scaling	0…N	R	0,1,0,1
.AnValOut4.mag	AO4_VALUE	Analog value 4 after scaling	0…N	R	0,1,0,1

2.5.8.6 LD0.SCA4GAPC4 Analog value scaling (4)

Table 249: LD0.SCA4GAPC4 Analog value scaling (4)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SCA4GAPC4					
.AnValOut1.mag	AO1_VALUE	Analog value 1 after scaling	0…N	R	0,1,0,1
.AnValOut2.mag	AO2_VALUE	Analog value 2 after scaling	0…N	R	0,1,0,1
.AnValOut3.mag	AO3_VALUE	Analog value 3 after scaling	0…N	R	0,1,0,1
.AnValOut4.mag	AO4_VALUE	Analog value 4 after scaling	0…N	R	0,1,0,1

2.5.8.7 LD0.SCA4GAPC5 Analog value scaling (5)

Table 250: LD0.SCA4GAPC5 Analog value scaling (5)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SCA4GAPC5					
.AnValOut1.mag	AO1_VALUE	Analog value 1 after scaling	0…N	R	0,1,0,1
.AnValOut2.mag	AO2_VALUE	Analog value 2 after scaling	0…N	R	0,1,0,1
.AnValOut3.mag	AO3_VALUE	Analog value 3 after scaling	0…N	R	0,1,0,1
.AnValOut4.mag	AO4_VALUE	Analog value 4 after scaling	0…N	R	0,1,0,1

2.5.8.8 LD0.SCA4GAPC6 Analog value scaling (6)

Table 251: LD0.SCA4GAPC6 Analog value scaling (6)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SCA4GAPC6					
.AnValOut1.mag	AO1_VALUE	Analog value 1 after scaling	0…N	R	0,1,0,1
.AnValOut2.mag	AO2_VALUE	Analog value 2 after scaling	0…N	R	0,1,0,1
.AnValOut3.mag	AO3_VALUE	Analog value 3 after scaling	0…N	R	0,1,0,1
.AnValOut4.mag	AO4_VALUE	Analog value 4 after scaling	0…N	R	0,1,0,1

2.5.8.9 LD0.SCA4GAPC7 Analog value scaling (7)

Table 252: LD0.SCA4GAPC7 Analog value scaling (7)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SCA4GAPC7					
.AnValOut1.mag	AO1_VALUE	Analog value 1 after scaling	0…N	R	0,1,0,1
.AnValOut2.mag	AO2_VALUE	Analog value 2 after scaling	0…N	R	0,1,0,1
.AnValOut3.mag	AO3_VALUE	Analog value 3 after scaling	0…N	R	0,1,0,1
.AnValOut4.mag	AO4_VALUE	Analog value 4 after scaling	0…N	R	0,1,0,1

2.5.8.10 LD0.SCA4GAPC8 Analog value scaling (8)

Table 253: LD0.SCA4GAPC8 Analog value scaling (8)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SCA4GAPC8					
.AnValOut1.mag	AO1_VALUE	Analog value 1 after scaling	0…N	R	0,1,0,1
.AnValOut2.mag	AO2_VALUE	Analog value 2 after scaling	0…N	R	0,1,0,1
.AnValOut3.mag	AO3_VALUE	Analog value 3 after scaling	0…N	R	0,1,0,1
.AnValOut4.mag	AO4_VALUE	Analog value 4 after scaling	0…N	R	0,1,0,1

2.5.8.11 LD0.SCA4GAPC9 Analog value scaling (9)

Table 254: LD0.SCA4GAPC9 Analog value scaling (9)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SCA4GAPC9					
.AnValOut1.mag	AO1_VALUE	Analog value 1 after scaling	0…N	R	0,1,0,1
.AnValOut2.mag	AO2_VALUE	Analog value 2 after scaling	0…N	R	0,1,0,1
.AnValOut3.mag	AO3_VALUE	Analog value 3 after scaling	0…N	R	0,1,0,1
.AnValOut4.mag	AO4_VALUE	Analog value 4 after scaling	0…N	R	0,1,0,1

2.5.8.12 LD0.SCA4GAPC10 Analog value scaling (10)

Table 255: LD0.SCA4GAPC10 Analog value scaling (10)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SCA4GAPC10					
.AnValOut1.mag	AO1_VALUE	Analog value 1 after scaling	0…N	R	0,1,0,1
.AnValOut2.mag	AO2_VALUE	Analog value 2 after scaling	0…N	R	0,1,0,1
.AnValOut3.mag	AO3_VALUE	Analog value 3 after scaling	0…N	R	0,1,0,1
.AnValOut4.mag	AO4_VALUE	Analog value 4 after scaling	0…N	R	0,1,0,1

2.5.8.13 LD0.SCA4GAPC11 Analog value scaling (11)

Table 256: LD0.SCA4GAPC11 Analog value scaling (11)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SCA4GAPC11					
.AnValOut1.mag	AO1_VALUE	Analog value 1 after scaling	0…N	R	0,1,0,1
.AnValOut2.mag	AO2_VALUE	Analog value 2 after scaling	0…N	R	0,1,0,1
.AnValOut3.mag	AO3_VALUE	Analog value 3 after scaling	0…N	R	0,1,0,1
.AnValOut4.mag	AO4_VALUE	Analog value 4 after scaling	0…N	R	0,1,0,1

2.5.8.14 LD0.SCA4GAPC12 Analog value scaling (12)

Table 257: LD0.SCA4GAPC12 Analog value scaling (12)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SCA4GAPC12					
.AnValOut1.mag	AO1_VALUE	Analog value 1 after scaling	0…N	R	0,1,0,1
.AnValOut2.mag	AO2_VALUE	Analog value 2 after scaling	0…N	R	0,1,0,1
.AnValOut3.mag	AO3_VALUE	Analog value 3 after scaling	0…N	R	0,1,0,1
.AnValOut4.mag	AO4_VALUE	Analog value 4 after scaling	0…N	R	0,1,0,1

2.5.8.15 LD0.XARGGIO130 RTD inputs

Table 258: LD0.XARGGIO130 RTD inputs

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.XARGGIO130					
.AnIn1.instMag	AI_VAL1	RTD input 1	-10000… 10000	R	-1E4,1E4,-1E4,1E4
.AnIn2.instMag	AI_VAL2	RTD input 2	-10000… 10000	R	-1E4,1E4,-1E4,1E4
.AnIn3.instMag	AI_VAL3	RTD input 3	-10000… 10000	R	-1E4,1E4,-1E4,1E4

2.6 Double-bit binary inputs

Table 259: Explanations of the double-bit binary input table columns

Column name	Description
IEC 61850 name	Original IED data object identification. Described in the IEC 61850 format as Logical Device.Logical Node and thereafter .Data Object.Data Attribute. Logical Node is the same as the application function block name.
SA name	The signal may have a defined label that is visible, for example, in the Application Configuration tool in PCM600.
Description	Short description of the signal. See the technical manual for more information.
Values	4-pole states.

2.6.1 Switchgear functions

2.6.1.1 CTRL.CBXCBR1 Circuit-breaker control (1)

Table 260: CTRL.CBXCBR1 Circuit-breaker control (1)

IEC 61850 name	SA name	Description	Values
CTRL.CBCSWI1			
.pos.stVal		CB1 position	00, 01, 10, 11

2.6.1.2 CTRL.CBXCBR2 Circuit-breaker control (2)

Table 261: CTRL.CBXCBR2 Circuit-breaker control (2)

IEC 61850 name	SA name	Description	Values
CTRL.CBCSWI2			
.pos.stVal		CB2 position	00, 01, 10, 11

2.6.1.3 CTRL.DCXSWI1 Disconnector control (1)

Table 262: CTRL.DCXSWI1 Disconnector control (1)

IEC 61850 name	SA name	Description	Values
CTRL.DCCSWI1			
.pos.stVal		DC1 position	00 ,01, 10, 11

2.6.1.4 CTRL.DCSXSWI1 Disconnector position indication (1)

Table 263: CTRL.DCSXSWI1 Disconnector position indication (1)

IEC 61850 name	SA name	Description	Values
CTRL.DCSXSWI1			
.pos.stVal		DC1 position	00, 01, 10, 11

2.6.1.5 CTRL.DCSXSWI2 Disconnector position indication (2)

Table 264: CTRL.DCSXSWI2 Disconnector position indication (2)

IEC 61850 name	SA name	Description	Values
CTRL.DCSXSWI2			
.pos.stVal		DC2 position	00, 01, 10, 11

2.6.1.6 CTRL.DCXSWI2 Disconnector control (2)

Table 265: CTRL.DCXSWI2 Disconnector control (2)

IEC 61850 name	SA name	Description	Values
CTRL.DCCSWI2			
.pos.stVal		DC2 position	00, 01, 10 ,11

2.6.1.7 CTRL.DCXSWI3 Disconnector control (3)

Table 266: CTRL.DCXSWI3 Disconnector control (3)

IEC 61850 name	SA name	Description	Values
CTRL.DCCSWI3			
.pos.stVal		DC3 position	00, 01, 10 ,11

2.6.1.8 CTRL.DCXSWI4 Disconnector control (4)

Table 267: CTRL.DCXSWI4 Disconnector control (4)

IEC 61850 name	SA name	Description	Values
CTRL.DCCSWI4			
.pos.stVal		DC4 position	00, 01, 10 ,11

2.6.1.9 CTRL.DCXSWI5 Disconnector control (5)

Table 268: CTRL.DCXSWI5 Disconnector control (5)

IEC 61850 name	SA name	Description	Values
CTRL.DCCSWI5			
.pos.stVal		DC5 position	00, 01, 10 ,11

2.6.1.10 CTRL.DCXSWI6 Disconnector control (6)

Table 269: CTRL.DCXSWI6 Disconnector control (6)

IEC 61850 name	SA name	Description	Values
CTRL.DCCSWI6			
.pos.stVal		DC6 position	00, 01, 10 ,11

2.6.1.11 CTRL.DCXSWI7 Disconnector control (7)

Table 270: CTRL.DCXSWI7 Disconnector control (7)

IEC 61850 name	SA name	Description	Values
CTRL.DCCSWI7			
.pos.stVal		DC7 position	00, 01, 10 ,11

2.6.1.12 CTRL.DCXSWI8 Disconnector control (8)

Table 271: CTRL.DCXSWI8 Disconnector control (8)

IEC 61850 name	SA name	Description	Values
CTRL.DCCSWI8			
.pos.stVal		DC8 position	00, 01, 10 ,11

2.6.1.13 CTRL.ESSXSWI1 Earthing switch indication (1)

Table 272: CTRL.ESSXSWI1 Earthing switch indication (1)

IEC 61850 name	SA name	Description	Values
CTRL.ESSXSWI1			
.pos.stVal		ES1 position	00, 01, 10, 11

2.6.1.14 CTRL.ESSXSWI2 Earthing switch indication (2)

Table 273: CTRL.ESSXSWI2 Earthing switch indication (2)

IEC 61850 name	SA name	Description	Values
CTRL.ESSXSWI2			
.pos.stVal		ES2 position	00, 01, 10, 11

2.6.1.15 CTRL.ESSXSWI3 Earthing switch indication (3)

Table 274: CTRL.ESSXSWI3 Earthing switch indication (3)

IEC 61850 name	SA name	Description	Values
CTRL.ESSXSWI3			
.pos.stVal		ES3 position	00, 01, 10, 11

2.6.1.16 CTRL.ESSXSWI4 Earthing switch indication (4)

Table 275: CTRL.ESSXSWI4 Earthing switch indication (4)

IEC 61850 name	SA name	Description	Values
CTRL.ESSXSWI4			
.pos.stVal		ES4 position	00, 01, 10, 11

2.6.1.17 CTRL.ESSXSWI5 Earthing switch indication (5)

Table 276: CTRL.ESSXSWI5 Earthing switch indication (5)

IEC 61850 name	SA name	Description	Values
CTRL.ESSXSWI5			
.pos.stVal		ES5 position	00, 01, 10, 11

2.6.1.18 CTRL.ESSXSWI6 Earthing switch indication (6)

Table 277: CTRL.ESSXSWI6 Earthing switch indication (6)

IEC 61850 name	SA name	Description	Values
CTRL.ESSXSWI6			
.pos.stVal		ES6 position	00, 01, 10, 11

2.6.1.19 CTRL.ESSXSWI7 Earthing switch indication (7)

Table 278: CTRL.ESSXSWI7 Earthing switch indication (7)

IEC 61850 name	SA name	Description	Values
CTRL.ESSXSWI7			
.pos.stVal		ES7 position	00, 01, 10, 11

2.6.1.20 CTRL.ESSXSWI8 Earthing switch indication (8)

Table 279: CTRL.ESSXSWI8 Earthing switch indication (8)

IEC 61850 name	SA name	Description	Values
CTRL.ESSXSWI8			
.pos.stVal		ES8 position	00, 01, 10, 11

2.7 Counters

Table 280: Explanations of the counter table columns

Column name	Description
IEC 61850 name	Original IED data object identification. Described in the IEC 61850 format as Logical Device.Logical Node and thereafter .Data Object.Data Attribute. Logical Node is the same as the application function block name.
SA name	The signal may have a defined label that is visible, for example, in the Application Configuration tool in PCM600.
Description	Short description of the signal. See the technical manual for more information.
Values	Original IEC 61850 counters range.

2.7.1 Switchgear functions

2.7.1.1 CTRL.CBCSWI1 Circuit-breaker (1)

Table 281: CTRL.CBCSWI1 Circuit-breaker (1)

IEC 61850 name	SA name	Description	Values
CTRL.CBCSWI1			
.OpCntRs.stVal		Circuit breaker operation counter	0...10000

2.7.1.2 CTRL.CBCSWI2 Circuit-breaker (2)

Table 282: CTRL.CBCSWI2 Circuit-breaker (2)

IEC 61850 name	SA name	Description	Values
CTRL.CBCSWI2			
.OpCntRs.stVal		Circuit breaker operation counter	0...10000

2.7.2 Metering and measurand functions

2.7.2.1 LD0.PEMMXU1 Three-phase power and energy measurement (1)

Table 283: LD0.PEMMXU1 Three-phase power and energy measurement (1)

IEC 61850 name	SA name	Description	Values
LD0.PEMMTR1			
.SupWh.actVal	EA_RV_ACM	Accumulated reverse active energy value	0...999999999 [kWh]
.SupVArh.actVal	ER_RV_ACM	Accumulated reverse reactive energy value	0...999999999 [kVArh]
.DmdWh.actVal	EA_FWD_ACM	Accumulated forward active energy value	0...999999999 [kWh]
.DmdVArh.actVal	ER_FWD_ACM	Accumulated forward reactive energy value	0...999999999 [kVArh]

2.7.2.2 LD0.PEMMXU2 Three-phase power and energy measurement (2)

Table 284: LD0.PEMMXU2 Three-phase power and energy measurement (2)

IEC 61850 name	SA name	Description	Values
LD0.PEMMTR2			
.SupWh.actVal	EA_RV_ACM	Accumulated reverse active energy value	0...999999999 [kWh]
.SupVArh.actVal	ER_RV_ACM	Accumulated reverse reactive energy value	0...999999999 [kVArh]
.DmdWh.actVal	EA_FWD_ACM	Accumulated forward active energy value	0...999999999 [kWh]
.DmdVArh.actVal	ER_FWD_ACM	Accumulated forward reactive energy value	0...999999999 [kVArh]

2.7.2.3 LD0.SPEMMXU1 Single-phase power and energy measurement (1)

Table 285: LD0.SPEMMXU1 Single-phase power and energy measurement (1)

IEC 61850 name	SA name	Description	Values
LD0.SPEMMTR1			
.SupWhA.actVal		Reverse active energy, phs A	0...1E10 [Kwh]
.SupWhB.actVal		Reverse active energy, phs B	0...1E10 [Kwh]
.SupWhC.actVal		Reverse active energy, phs C	0...1E10 [Kwh]
.SupVArhA.actVal		Reverse reactive energy,phs A	0...1E10 [KVArh]
.SupVArhB.actVal		Reverse reactive energy,phs B	0...1E10 [KVArh]
.SupVArhC.actVal		Reverse reactive energy,phs C	0...1E10 [KVArh]
.DmdWhA.actVal		Forward active energy, phsA	0...1E10 [Kwh]
.DmdWhB.actVal		Forward active energy, phsB	0...1E10 [Kwh]

Table continues on next page

IEC 61850 name	SA name	Description	Values
.DmdWhC.actVal		Forward active energy, phsC	0...1E10 [Kwh]
.DmdVArhA.actVal		Forward reactive energy, phsA	0...1E10 [KVARh]
.DmdVArhB.actVal		Forward reactive energy, phsB	0...1E10 [KVARh]
.DmdVArhC.actVal		Forward reactive energy, phsC	0...1E10 [KVARh]

2.7.2.4 LD0.SPEMMXU2 Single-phase power and energy measurement (2)

Table 286: LD0.SPEMMXU2 Single-phase power and energy measurement (2)

IEC 61850 name	SA name	Description	Values
LD0.SPEMMTR2			
.SupWhA.actVal		Reverse active energy, phs A	0...1E10 [Kwh]
.SupWhB.actVal		Reverse active energy, phs B	0...1E10 [Kwh]
.SupWhC.actVal		Reverse active energy, phs C	0...1E10 [Kwh]
.SupVArhA.actVal		Reverse reactive energy,phs A	0...1E10 [KVArh]
.SupVArhB.actVal		Reverse reactive energy,phs B	0...1E10 [KVArh]
.SupVArhC.actVal		Reverse reactive energy,phs C	0...1E10 [KVArh]
.DmdWhA.actVal		Forward active energy, phsA	0...1E10 [Kwh]
.DmdWhB.actVal		Forward active energy, phsB	0...1E10 [Kwh]
.DmdWhC.actVal		Forward active energy, phsC	0...1E10 [Kwh]
.DmdVArhA.actVal		Forward reactive energy, phsA	0...1E10 [KVARh]
.DmdVArhB.actVal		Forward reactive energy, phsB	0...1E10 [KVARh]
.DmdVArhC.actVal		Forward reactive energy, phsC	0...1E10 [KVARh]

2.7.3 Generic functions

2.7.3.1 LD0.MVI4GAPC1 Integer value move (1)

Table 287: LD0.MVI4GAPC1 Integer value move (1)

IEC 61850 name	SA name	Description	Values
LD0.MVI4GAPC1			
.ISCSO1.stVal		Generic integer value 1 (counter usage)	0…N
.ISCSO2.stVal		Generic integer value 2 (counter usage)	0…N
.ISCSO3.stVal		Generic integer value 3 (counter usage)	0…N
.ISCSO4.stVal		Generic integer value 4 (counter usage)	0…N

2.7.3.2 LD0.MVI4GAPC2 Integer value move (2)

Table 288: LD0.MVI4GAPC2 Integer value move (2)

IEC 61850 name	SA name	Description	Values
LD0.MVI4GAPC2			
.ISCSO1.stVal		Generic integer value 1 (counter usage)	0…N
.ISCSO2.stVal		Generic integer value 2 (counter usage)	0…N
.ISCSO3.stVal		Generic integer value 3 (counter usage)	0…N
.ISCSO4.stVal		Generic integer value 4 (counter usage)	0…N

2.8 Analog ouputs

Table 289: Explanations of the double-bit binary input table columns

Column name	Description
IEC 61850 name	Original IED data object identification. Described in the IEC 61850 format as Logical Device.Logical Node and thereafter .Data Object.Data Attribute. Logical Node is the same as the application function block name.
SA name	The signal may have a defined label that is visible, for example, in the Application Configuration tool in PCM600.
Description	Short description of the signal. See the technical manual for more information.
Values	The value range of the original IEC 61850 data. Scaling is needed to convert floating point data into DNP3 integer values.

2.8.1 System functions

2.8.1.1 LD0.LLN0 Active setting group

Table 290: LD0.LLN0 Active setting group

IEC 61850 name	SA name	Description	Values
LD0.LLN0			
.ActSetGr.Oper.ctlVal		Change setting group	1…6

2.8.2 Metering and measurand functions

2.8.2.1 LD0.FLTRFRC1 Fault record (1)

Table 291: LD0.FLTRFRC1 Fault record (1)

IEC 61850 name	SA name	Description	Values
LD0.FLTRFRC1			
.SelRow.Oper.ctlVal		Select record for reading	1…N

Section 3 DNP3 protocol implementation

3.1 DNP3 device profile

The following table provides a device profile document in the standard format defined in the DNP3 Subset Definitions Document. In the DNP3 Subset Definitions Document it is referred to as a document, although it is in fact a table and only a component of a total interoperability guide. The table, in combination with the Implementation table and the point list tables, provides a complete configuration/ interoperability guide for communicating with a device.

Table 292: Device profile document

DNP3 device profile document			
Vendor name:		ABB Oy	
Device name:		REC615 RER615	
Highest DNP level supported:		Device function:	
For requests:	Level 2+	○	Master
For responses:	Level 2+	•	Slave
Notable objects, functions, and/or qualifiers supported in addition to the highest DNP levels supported (the complete list is described in the attached table): For static (non-change-event) object requests, request qualifier codes 07 and 08 (limited quantity), and 17 and 28 (index) are supported. Static object requests sent with qualifiers 07, or 08, will be responded with qualifiers 00 or 01. 16-bit and 32-bit Analog Change Events with Time may be requested.			
Maximum data link frame size (octets):		Maximum application fragment size (octets):	
Transmitted:	Configurable (50...292)	Transmitted:	Configurable (50...2048)
Received:	292	Received:	2048
Maximum data link re-tries:		Maximum application layer re-tries:	
○	None	•	None
○	Fixed	○	Configurable
•	Configurable (0...65535)		
Requires data link layer confirmation: ○ Never ○ Always ○ Sometimes • Configurable as: "Never", "Only for multi-frame messages", or "Always"			
Requires application layer confirmation: ○ Never ○ Always ○ When reporting event data (slave devices only)			

Table continues on next page

DNP3 device profile document								
	○	When sending multi-fragment responses (slave devices only)						
	○	Sometimes						
	•	Configurable as: "Only when reporting event data", or "When reporting event data or multi-fragment messages"						
Timeouts while waiting for:								
Data link confirm:	○	None	○	Fixed at ____	○	Variable	•	Configurable
Complete appl. fragment:	•	None	○	Fixed at ____	○	Variable	○	Configurable
Application confirm:	○	None	○	Fixed at ____	○	Variable	•	Configurable
Complete appl. response:	•	None	○	Fixed at ____	○	Variable	○	Configurable
Others:	Select/Operate Arm timeout, configurable in DNP setting parameters. Regrdless of the select timeout in the HMI. Need time interval, configurable Unsolicited notification delay, configurable Unsolicited response retry delay, configurable Unsolicited offline Interval, configurable							
Sends/Executes Control Operations:								
WRITE binary outputs	•	Never	○	Always	○	Sometimes	○	Configurable
SELECT/ OPERATE	○	Never	○	Always	○	Sometimes	•	Configurable
DIRECT OPERATE	○	Never	○	Always	○	Sometimes	•	Configurable
DIRECT OPERATE - NO ACK	○	Never	○	Always	○	Sometimes	•	Configurable
Count > 1 (Count > 1 is accepted but ignored)	•	Never	○	Always	○	Sometimes	○	Configurable
Pulse on	•	Never	○	Always	○	Sometimes	○	Configurable
Pulse off	•	Never	○	Always	○	Sometimes	○	Configurable
Latch on	○	Never	•	Always	○	Sometimes	○	Configurable
Latch off	○	Never	•	Always	○	Sometimes	○	Configurable
Queue	•	Never	○	Always	○	Sometimes	○	Configurable
Clear queue	•	Never	○	Always	○	Sometimes	○	Configurable
The circuit breaker control model is configurable for either direct or SBO mode in the circuit breaker settings. If the operation mode does not match the CROB, the returned CROB status is hardware error (4). All other control points may be controlled by either direct or SBO controls.								

Reports binary input change events when no specific variation requested:		Reports time-tagged binary input change events when no specific variation requested:	
○	Never	○	Never
○	Only when time-tagged	○	Binary input change with time
○	Only non-time-tagged	○	Binary input change with relative time
•	Configurable to send one or the other	•	Configurable
Sends unsolicited responses:		Sends static data in unsolicited responses:	
○	Never	•	Never

Table continues on next page

DNP3 device profile document					
• Configurable ○ Only certain objects ○ Sometimes • ENABLE/DISABLE UNSOLICITED function codes supported			○ When device restarts ○ When status flags change No other options are permitted.		
Default counter object/variation: • No counters reported ○ Configurable ○ Default object Default variation: ○ Point-by-point list attached			Counters roll over at: • No counters reported ○ Configurable (Counter roll-over depends on the root-data object) ○ 16 bits ○ 32 bits ○ Other value: _____ ○ Point-by-point list attached		
Sends multi-fragment responses: • Yes ○ No ○ Configurable					
Sequential file transfer support:					
Append file mode	○	Yes	•	No	
Custom status code strings	○	Yes	•	No	
Permissions field	○	Yes	•	No	
File events assigned to class	○	Yes	•	No	
File events send immediately	○	Yes	•	No	
Multiple blocks in a fragment	○	Yes	•	No	
Max number of files open	0				
• = Selected,○ = Not selected					

3.2 DNP3 implementation table

The following table identifies which object variations, function codes and qualifiers the protection relay supports in both request messages and response messages. For static (non-change-event) objects, requests sent with qualifiers 00, 01, 06, 07 or 08 are responded with qualifiers 00 or 01. Requests sent with qualifiers 17 or 28 are responded with qualifiers 17 or 28. For change-event objects, qualifiers 17 or 28 are always responded.

Table 293: Implementation table

OBJECT			REQUEST (Library will parse)		RESPONSE (Library will respond with)	
Object number	Variation number	Description	Function codes (dec)	Qualifier codes (hex)	Function codes (dec)	Qualifier codes (hex)
1	0	Binary input – any variation	1 (read) 22 (assign class)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)		
1	1 (default) 1)	Binary input	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index) 2)
1	2	Binary input with status	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index) 2)
2	0	Binary input change – any variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
2	1	Binary input change without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
2	2 1)	Binary input change with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
2	3	Binary input change with relative time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
10	0	Binary output status – any variation	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)		
10	1	Binary output	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index) 2)
12	1	Control relay output block	3 (select) 4 (operate) 5 (direct op) 6 (dir. op, noack)	17, 28 (index)	129 (response)	echo of request
30	0	Analog input - any variation	1 (read) 22 (assign class)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)		
30	1	32-bit analog input	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index) 2)

Table continues on next page

OBJECT			REQUEST (Library will parse)		RESPONSE (Library will respond with)	
30	2 (default) [1]	16-bit analog input	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index) [2]
30	3	32-bit analog input without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index) [2]
30	4	16-bit analog input without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index) [2]
32	0	Analog change event – any variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
32	1	32-bit analog change event without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
32	2	16-bit analog change event without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
32	3	32-bit analog change event with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
32	4 (default) [1]	16-bit analog change event with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
50	0	Time and date				
50	1 (default) [1]	Time and date	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07 (limited qty = 1l) 08 (limited qty)	129 (response)	00, 01 (start-stop) 17, 28 (index) [2]
			2 (write)	07 (limited qty = 1l)		
50	3	Time and date last recorded time	2 (write)	07 (limited qty)		
51	1	Time and date CTO			129 (response) 130 (unsol. resp)	07 (limited qty) (qty = 1)
51	2	Unsynchronized time and date CTO			129 (response) 130 (unsol. resp)	07 (limited qty) (qty = 1)

Table continues on next page

OBJECT			REQUEST (Library will parse)		RESPONSE (Library will respond with)	
52	2	Time delay fine			129 (response)	07 (limited qty) (qty = 1)
60	0	Not defined				
60	1	Class 0 data	1 (read)	06 (no range, or all)		
60	2	Class 1 data	1 (read)	06 (no range, or all)		
			20 (enbl. unsol.) 21 (dab. unsol.) 22 (assign class)	07, 08 (limited qty) 06 (no range, or all)		
60	3	Class 2 data	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
			20 (enbl. unsol.) 21 (dab. unsol.) 22 (assign class)	06 (no range, or all)		
60	4	Class 3 data	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
			20 (enbl. unsol.) 21 (dab. unsol.) 22 (assign class)	06 (no range, or all)		
80	1	Internal indications	1 (read)	00, 01 (start-stop)		
			2 (write) [3]	00 (start-stop) index=7		
No object (function code only)			13 (cold restart)		[4]	
No object (function code only)			14 (warm restart)		[4]	
No object (function code only)			23 (delay meas.)			
No object (function code only)			24 (record current time)			

1) A default variation refers to the variation responded when variation 0 is requested and/or in class 0, 1, 2, or 3 scans. Default variations are configurable; however, default settings for the configuration parameters are indicated in the table above.
2) For static (non-change-event) objects, qualifiers 17 or 28 are only responded when a request is sent with qualifiers 17 or 28, respectively. Otherwise, static object requests sent with qualifiers 00, 01, 06, 07, or 08, will be responded with qualifiers 00 or 01. (For change-event objects, qualifiers 17 or 28 are always responded.)
3) Writes of internal indications are only supported for index 7 (Restart IIN1-7)
4) Cold and warm restarts return an application layer acknowledge, but no restart action is taken.

Section 4 Glossary

AFL	Application function block library
CROB	Control relay output block
CTO	Common time of occurrence. The time and date CTO object is an information object that represents the absolute time of day.
DNP3	A distributed network protocol originally developed by Westronic. The DNP3 Users Group has the ownership of the protocol and assumes responsibility for its evolution.
EMC	Electromagnetic compatibility
HMI	Human-machine interface
IEC	International Electrotechnical Commission
IEC 61850	International standard for substation communication and modeling
IED	Intelligent electronic device
LHMI	Local human-machine interface
PCM600	Protection and Control IED Manager
SBO	Select-before-operate

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