

RELION® 620 SERIES

620 series

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 a 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

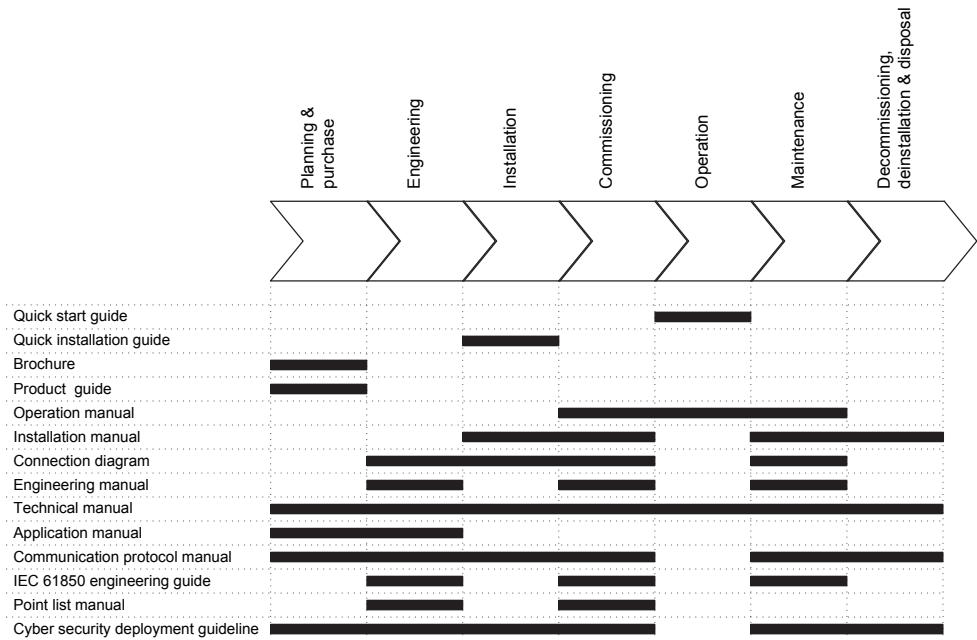


Figure 1: The intended use of documents during the product life cycle



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

1.3.2 Document revision history

Document revision/date	Product version	History
A/2015-12-11	2.0 FP1	First release
B/2019-06-19	2.0 FP1	Content updated



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	1MRS757646

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.
- Push button navigation in the LHMI menu structure is presented by using the push button icons.
To navigate between the options, use and .
- 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.
- This document assumes that the parameter setting visibility is "Advanced".

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	ANSI
Protection			
Three-phase non-directional overcurrent protection, low stage	PHLPTOC1	3I> (1)	51P-1 (1)
	PHLPTOC2	3I> (2)	51P-1 (2)
Three-phase non-directional overcurrent protection, high stage	PHHPTOC1	3I>> (1)	51P-2 (1)
	PHHPTOC2	3I>> (2)	51P-2 (2)
Three-phase non-directional overcurrent protection, instantaneous stage	PHIPTOC1	3I>>> (1)	50P/51P (1)
	PHIPTOC2	3I>>> (2)	50P/51P (2)
Three-phase directional overcurrent protection, low stage	DPHLPDOC1	3I> -> (1)	67-1 (1)
	DPHLPDOC2	3I> -> (2)	67-1 (2)
Three-phase directional overcurrent protection, high stage	DPHHPDOC1	3I>> -> (1)	67-2 (1)
	DPHHPDOC2	3I>> -> (2)	67-2 (2)
Three-phase voltage-dependent overcurrent protection	PHPVOC1	3I(U)> (1)	51V (1)
	PHPVOC2	3I(U)> (2)	51V (2)
Non-directional earth-fault protection, low stage	EFLPTOC1	Io> (1)	51N-1 (1)
	EFLPTOC2	Io> (2)	51N-1 (2)
Non-directional earth-fault protection, high stage	EFHPTOC1	Io>> (1)	51N-2 (1)
	EFHPTOC2	Io>> (2)	51N-2 (2)
Non-directional earth-fault protection, instantaneous stage	EFIPTOC1	Io>>> (1)	50N/51N (1)
Directional earth-fault protection, low stage	DEFLPDEF1	Io> -> (1)	67N-1 (1)
	DEFLPDEF2	Io> -> (2)	67N-1 (2)
	DEFLPDEF3	Io> -> (3)	67N-1 (3)
Directional earth-fault protection, high stage	DEFHPDEF1	Io>> -> (1)	67N-2 (1)
Admittance-based earth-fault protection	EFPADM1	Yo> -> (1)	21YN (1)
	EFPADM2	Yo> -> (2)	21YN (2)
	EFPADM3	Yo> -> (3)	21YN (3)
Wattmetric-based earth-fault protection	WPWDE1	Po> -> (1)	32N (1)
	WPWDE2	Po> -> (2)	32N (2)
	WPWDE3	Po> -> (3)	32N (3)
Multifrequency admittance-based earth-fault protection	MFADPSDE1	Io> -> Y (1)	67YN (1)
Transient/intermittent earth-fault protection	INTRPTEF1	Io> -> IEF (1)	67NIEF (1)
Harmonics-based earth-fault protection	HAEFPTOC1	Io>HA (1)	51NHA (1)
Table continues on next page			

Function	IEC 61850	IEC 60617	ANSI
Negative-sequence overcurrent protection	NSPTOC1	I2> (1)	46 (1)
	NSPTOC2	I2> (2)	46 (2)
Phase discontinuity protection	PDNSPTOC1	I2/I1> (1)	46PD (1)
Residual overvoltage protection	ROVPTOV1	Uo> (1)	59G (1)
	ROVPTOV2	Uo> (2)	59G (2)
	ROVPTOV3	Uo> (3)	59G (3)
Three-phase undervoltage protection	PHPTUV1	3U< (1)	27 (1)
	PHPTUV2	3U< (2)	27 (2)
	PHPTUV3	3U< (3)	27 (3)
	PHPTUV4	3U< (4)	27 (4)
Single-phase undervoltage protection, secondary side	PHAPTV1	U_A< (1)	27_A (1)
Three-phase overvoltage protection	PHPTOV1	3U> (1)	59 (1)
	PHPTOV2	3U> (2)	59 (2)
	PHPTOV3	3U> (3)	59 (3)
Single-phase overvoltage protection, secondary side	PHAPTOV1	U_A> (1)	59_A (1)
Positive-sequence undervoltage protection	PSPTUV1	U1< (1)	47U+ (1)
	PSPTUV2	U1< (2)	47U+ (2)
Negative-sequence overvoltage protection	NSPTOV1	U2> (1)	47O- (1)
	NSPTOV2	U2> (2)	47O- (2)
Frequency protection	FRPFRQ1	f>/f<,df/dt (1)	81 (1)
	FRPFRQ2	f>/f<,df/dt (2)	81 (2)
	FRPFRQ3	f>/f<,df/dt (3)	81 (3)
	FRPFRQ4	f>/f<,df/dt (4)	81 (4)
	FRPFRQ5	f>/f<,df/dt (5)	81 (5)
	FRPFRQ6	f>/f<,df/dt (6)	81 (6)
Overexcitation protection	OEPVPH1	U/f> (1)	24 (1)
	OEPVPH2	U/f> (2)	24 (2)
Three-phase thermal protection for feeders, cables and distribution transformers	T1PTTR1	3Ith>F (1)	49F (1)
Three-phase thermal overload protection, two time constants	T2PTTR1	3Ith>T/G/C (1)	49T/G/C (1)
Negative-sequence overcurrent protection for machines	MNSPTOC1	I2>M (1)	46M (1)
	MNSPTOC2	I2>M (2)	46M (2)
Loss of phase (undercurrent)	PHPTUC1	3I< (1)	37 (1)
	PHPTUC2	3I< (2)	37 (2)
Loss of load supervision	LOFLPTUC1	3I< (1)	37 (1)
	LOFLPTUC2	3I< (2)	37 (2)
Motor load jam protection	JAMPTOC1	Ist> (1)	51LR (1)
Table continues on next page			

Function	IEC 61850	IEC 60617	ANSI
Motor start-up supervision	STTPMSU1	Is2t n< (1)	49,66,48,51LR (1)
Phase reversal protection	PREVPTOC1	I2>> (1)	46R (1)
Thermal overload protection for motors	MPTTR1	3Ith>M (1)	49M (1)
Stabilized and instantaneous differential protection for machines	MPDIF1	3dI>M/G (1)	87M/G (1)
High-impedance/flux-balance based differential protection for motors	MHZPDIF1	3dIH>M (1)	87MH (1)
Stabilized and instantaneous differential protection for two-winding transformers	TR2PTDF1	3dI>T (1)	87T (1)
Numerical stabilized low-impedance restricted earth-fault protection	LREFPNDF1	dloLo> (1)	87NL (1)
	LREFPNDF2	dloLo> (2)	87NL (2)
High-impedance based restricted earth-fault protection	HREFPDIF1	dloHi> (1)	87NH (1)
	HREFPDIF2	dloHi> (2)	87NH (2)
Circuit breaker failure protection	CCBRBRF1	3I>/Io>BF (1)	51BF/51NBF (1)
	CCBRBRF2	3I>/Io>BF (2)	51BF/51NBF (2)
	CCBRBRF3	3I>/Io>BF (3)	51BF/51NBF (3)
Three-phase inrush detector	INRPHAR1	3I2f> (1)	68 (1)
Master trip	TRPPTRC1	Master Trip (1)	94/86 (1)
	TRPPTRC2	Master Trip (2)	94/86 (2)
	TRPPTRC3	Master Trip (3)	94/86 (3)
	TRPPTRC4	Master Trip (4)	94/86 (4)
Arc protection	ARCSARC1	ARC (1)	50L/50NL (1)
	ARCSARC2	ARC (2)	50L/50NL (2)
	ARCSARC3	ARC (3)	50L/50NL (3)
High-impedance fault detection	PHIZ1	HIF (1)	HIZ (1)
Load-shedding and restoration	LSHDPFRQ1	UFLS/R (1)	81LSH (1)
	LSHDPFRQ2	UFLS/R (2)	81LSH (2)
	LSHDPFRQ3	UFLS/R (3)	81LSH (3)
	LSHDPFRQ4	UFLS/R (4)	81LSH (4)
	LSHDPFRQ5	UFLS/R (5)	81LSH (5)
	LSHDPFRQ6	UFLS/R (6)	81LSH (6)
Table continues on next page			

Function	IEC 61850	IEC 60617	ANSI
Multipurpose protection	MAPGAPC1	MAP (1)	MAP (1)
	MAPGAPC2	MAP (2)	MAP (2)
	MAPGAPC3	MAP (3)	MAP (3)
	MAPGAPC4	MAP (4)	MAP (4)
	MAPGAPC5	MAP (5)	MAP (5)
	MAPGAPC6	MAP (6)	MAP (6)
	MAPGAPC7	MAP (7)	MAP (7)
	MAPGAPC8	MAP (8)	MAP (8)
	MAPGAPC9	MAP (9)	MAP (9)
	MAPGAPC10	MAP (10)	MAP (10)
	MAPGAPC11	MAP (11)	MAP (11)
	MAPGAPC12	MAP (12)	MAP (12)
	MAPGAPC13	MAP (13)	MAP (13)
	MAPGAPC14	MAP (14)	MAP (14)
	MAPGAPC15	MAP (15)	MAP (15)
	MAPGAPC16	MAP (16)	MAP (16)
	MAPGAPC17	MAP (17)	MAP (17)
	MAPGAPC18	MAP (18)	MAP (18)
Automatic switch-onto-fault logic (SOF)	CVPSOF1	CVPSOF (1)	SOFT/21/50 (1)
Voltage vector shift protection	VVSPPAM1	VS (1)	78V (1)
Directional reactive power undervoltage protection	DQPTUV1	Q> -> ,3U< (1)	32Q,27 (1)
	DQPTUV2	Q> -> ,3U< (2)	32Q,27 (2)
Underpower protection	DUPPDPR1	P< (1)	32U (1)
	DUPPDPR2	P< (2)	32U (2)
Reverse power/directional overpower protection	DOPPDPR1	P>/Q> (1)	32R/32O (1)
	DOPPDPR2	P>/Q> (2)	32R/32O (2)
	DOPPDPR3	P>/Q> (3)	32R/32O (3)
Three-phase underexcitation protection	UEXPDIS1	X< (1)	40 (1)
	UEXPDIS2	X< (2)	40 (2)
Low-voltage ride-through protection	LVRTPTUV1	U<RT (1)	27RT (1)
	LVRTPTUV2	U<RT (2)	27RT (2)
	LVRTPTUV3	U<RT (3)	27RT (3)
Rotor earth-fault protection	MREFPTOC1	Io>R (1)	64R (1)
High-impedance differential protection for phase A	HIAPDIF1	dHi_A> (1)	87A (1)
High-impedance differential protection for phase B	HIBPDIF1	dHi_B> (1)	87B (1)
High-impedance differential protection for phase C	HICPDIF1	dHi_C> (1)	87C (1)
Table continues on next page			

Function	IEC 61850	IEC 60617	ANSI
Circuit breaker uncorresponding position start-up	UPCALH1	CBUPS (1)	CBUPS (1)
	UPCALH2	CBUPS (2)	CBUPS (2)
	UPCALH3	CBUPS (3)	CBUPS (3)
Three-independent-phase non-directional overcurrent protection, low stage	PH3LPTOC1	3I_3> (1)	51P-1_3 (1)
	PH3LPTOC2	3I_3> (2)	51P-1_3 (2)
Three-independent-phase non-directional overcurrent protection, high stage	PH3HPTOC1	3I_3>> (1)	51P-2_3 (1)
	PH3HPTOC2	3I_3>> (2)	51P-2_3 (2)
Three-independent-phase non-directional overcurrent protection, instantaneous stage	PH3IPTOC1	3I_3>>> (1)	50P/51P_3 (1)
Directional three-independent-phase directional overcurrent protection, low stage	DPH3LPDOC1	3I_3> -> (1)	67-1_3 (1)
	DPH3LPDOC2	3I_3> -> (2)	67-1_3 (2)
Directional three-independent-phase directional overcurrent protection, high stage	DPH3HPDOC1	3I_3>> -> (1)	67-2_3 (1)
	DPH3HPDOC2	3I_3>> -> (2)	67-2_3 (2)
Three-phase overload protection for shunt capacitor banks	COLPTOC1	3I> 3I< (1)	51C/37 (1)
Current unbalance protection for shunt capacitor banks	CUBPTOC1	dI>C (1)	51NC-1 (1)
Shunt capacitor bank switching resonance protection, current based	SRCPOTOC1	TD> (1)	55TD (1)
Control			
Circuit-breaker control	CBXCBR1	I <-> O CB (1)	I <-> O CB (1)
	CBXCBR2	I <-> O CB (2)	I <-> O CB (2)
	CBXCBR3	I <-> O CB (3)	I <-> O CB (3)
Disconnector control	DCXSWI1	I <-> O DCC (1)	I <-> O DCC (1)
	DCXSWI2	I <-> O DCC (2)	I <-> O DCC (2)
	DCXSWI3	I <-> O DCC (3)	I <-> O DCC (3)
	DCXSWI4	I <-> O DCC (4)	I <-> O DCC (4)
Earthing switch control	ESXSWI1	I <-> O ESC (1)	I <-> O ESC (1)
	ESXSWI2	I <-> O ESC (2)	I <-> O ESC (2)
	ESXSWI3	I <-> O ESC (3)	I <-> O ESC (3)
Disconnector position indication	DCSXSWI1	I <-> O DC (1)	I <-> O DC (1)
	DCSXSWI2	I <-> O DC (2)	I <-> O DC (2)
	DCSXSWI3	I <-> O DC (3)	I <-> O DC (3)
	DCSXSWI4	I <-> O DC (4)	I <-> O DC (4)
Earthing switch indication	ESSXSWI1	I <-> O ES (1)	I <-> O ES (1)
	ESSXSWI2	I <-> O ES (2)	I <-> O ES (2)
	ESSXSWI3	I <-> O ES (3)	I <-> O ES (3)
Emergency start-up	ESMGAPC1	ESTART (1)	ESTART (1)
Table continues on next page			

Function	IEC 61850	IEC 60617	ANSI
Autoreclosing	DARREC1	O -> I (1)	79 (1)
	DARREC2	O -> I (2)	79 (2)
Synchronism and energizing check	SECRSYN1	SYNC (1)	25 (1)
Tap changer position indication	TPOSYLTC1	TPOS M (1)	84M (1)
Tap changer control with voltage regulator	OLATCC1	COLTC (1)	90V (1)
Condition monitoring and supervision			
Circuit-breaker condition monitoring	SSCBR1	CBCM (1)	CBCM (1)
	SSCBR2	CBCM (2)	CBCM (2)
	SSCBR3	CBCM (3)	CBCM (3)
Trip circuit supervision	TCSSCBR1	TCS (1)	TCM (1)
	TCSSCBR2	TCS (2)	TCM (2)
Current circuit supervision	CCSPVC1	MCS 3I (1)	MCS 3I (1)
	CCSPVC2	MCS 3I (2)	MCS 3I (2)
Current transformer supervision for high-impedance protection scheme for phase A	HZCCASPVC1	MCS I_A (1)	MCS I_A (1)
Current transformer supervision for high-impedance protection scheme for phase B	HZCCBSPVC1	MCS I_B (1)	MCS I_B (1)
Current transformer supervision for high-impedance protection scheme for phase C	HZCCCSPVC1	MCS I_C (1)	MCS I_C (1)
Advanced current circuit supervision for transformers	CTSRCTF1	MCS 3I,I2 (1)	MCS 3I,I2 (1)
Fuse failure supervision	SEQSPVC1	FUSEF (1)	60 (1)
Runtime counter for machines and devices	MDSOPT1	OPTS (1)	OPTM (1)
	MDSOPT2	OPTS (2)	OPTM (2)
Measurement			
Three-phase current measurement	CMMXU1	3I (1)	3I (1)
	CMMXU2	3I (2)	3I (2)
Sequence current measurement	CSMSQI1	I1, I2, I0 (1)	I1, I2, I0 (1)
	CSMSQI2	I1, I2, I0 (B) (1)	I1, I2, I0 (B) (1)
Residual current measurement	RESCMMXU1	Io (1)	In (1)
	RESCMMXU2	Io (2)	In (2)
Three-phase voltage measurement	VMMXU1	3U (1)	3V (1)
Single-phase voltage measurement	VAMMXU2	U_A (2)	V_A (2)
	VAMMXU3	U_A (3)	V_A (3)
Residual voltage measurement	RESVMMXU1	Uo (1)	Vn (1)
Sequence voltage measurement	VSMSQI1	U1, U2, U0 (1)	V1, V2, V0 (1)
Three-phase power and energy measurement	PEMMXU1	P, E (1)	P, E (1)
Load profile record	LDPRLRC1	LOADPROF (1)	LOADPROF (1)
Table continues on next page			

Function	IEC 61850	IEC 60617	ANSI
Frequency measurement	FMMXU1	f (1)	f (1)
Fault location			
Fault locator	SCEFRFLO1	FLOC (1)	21FL (1)
Power quality			
Current total demand distortion	CMHAI1	PQM3I (1)	PQM3I (1)
Voltage total harmonic distortion	VMHAI1	PQM3U (1)	PQM3V (1)
Voltage variation	PHQVVR1	PQMU (1)	PQMV (1)
Voltage unbalance	VSQVUB1	PQUUB (1)	PQVUB (1)
Other			
Minimum pulse timer (2 pcs)	TPGAPC1	TP (1)	TP (1)
	TPGAPC2	TP (2)	TP (2)
	TPGAPC3	TP (3)	TP (3)
	TPGAPC4	TP (4)	TP (4)
Minimum pulse timer (2 pcs, second resolution)	TPSGAPC1	TPS (1)	TPS (1)
	TPSGAPC2	TPS (2)	TPS (2)
Minimum pulse timer (2 pcs, minute resolution)	TPMGAPC1	TPM (1)	TPM (1)
	TPMGAPC2	TPM (2)	TPM (2)
Pulse timer (8 pcs)	PTGAPC1	PT (1)	PT (1)
	PTGAPC2	PT (2)	PT (2)
Time delay off (8 pcs)	TOFGAPC1	TOF (1)	TOF (1)
	TOFGAPC2	TOF (2)	TOF (2)
	TOFGAPC3	TOF (3)	TOF (3)
	TOFGAPC4	TOF (4)	TOF (4)
Time delay on (8 pcs)	TONGAPC1	TON (1)	TON (1)
	TONGAPC2	TON (2)	TON (2)
	TONGAPC3	TON (3)	TON (3)
	TONGAPC4	TON (4)	TON (4)
Set-reset (8 pcs)	SRGAPC1	SR (1)	SR (1)
	SRGAPC2	SR (2)	SR (2)
	SRGAPC3	SR (3)	SR (3)
	SRGAPC4	SR (4)	SR (4)
Move (8 pcs)	MVGAPC1	MV (1)	MV (1)
	MVGAPC2	MV (2)	MV (2)
	MVGAPC3	MV (3)	MV (3)
	MVGAPC4	MV (4)	MV (4)
Integer value move	MVI4GAPC1	MVI4 (1)	MVI4 (1)
	MVI4GAPC2	MVI4 (2)	MVI4 (2)
	MVI4GAPC3	MVI4 (3)	MVI4 (3)
	MVI4GAPC4	MVI4 (4)	MVI4 (4)
Table continues on next page			

Function	IEC 61850	IEC 60617	ANSI
Analog value scaling	SCA4GAPC1	SCA4 (1)	SCA4 (1)
	SCA4GAPC2	SCA4 (2)	SCA4 (2)
	SCA4GAPC3	SCA4 (3)	SCA4 (3)
	SCA4GAPC4	SCA4 (4)	SCA4 (4)
Generic control point (16 pcs)	SPCGAPC1	SPC (1)	SPC (1)
	SPCGAPC2	SPC (2)	SPC (2)
	SPCGAPC3	SPC (3)	SPC (3)
	SPCRGAPC1	SPCR (1)	SPCR (1)
Remote generic control points			
Local generic control points	SPCLGAPC1	SPCL (1)	SPCL (1)
Generic up-down counters	UDFCNT1	UDCNT (1)	UDCNT (1)
	UDFCNT2	UDCNT (2)	UDCNT (2)
	UDFCNT3	UDCNT (3)	UDCNT (3)
	UDFCNT4	UDCNT (4)	UDCNT (4)
	UDFCNT5	UDCNT (5)	UDCNT (5)
	UDFCNT6	UDCNT (6)	UDCNT (6)
	UDFCNT7	UDCNT (7)	UDCNT (7)
	UDFCNT8	UDCNT (8)	UDCNT (8)
	UDFCNT9	UDCNT (9)	UDCNT (9)
	UDFCNT10	UDCNT (10)	UDCNT (10)
	UDFCNT11	UDCNT (11)	UDCNT (11)
	UDFCNT12	UDCNT (12)	UDCNT (12)
Programmable buttons (16 buttons)	FKEYGGIO1	FKEY (1)	FKEY (1)
Logging functions			
Disturbance recorder	RDRE1	DR (1)	DFR (1)
Fault recorder	FLTRFRC1	FAULTREC (1)	FAULTREC (1)
Sequence event recorder	SER1	SER (1)	SER (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 REF620

Table 2: Supported functions

Function	IEC 61850	A (CTs/VTs)	B (Sensors)
		FE201	FE202
Protection			
Three-phase non-directional overcurrent protection, low stage	PHLPTOC	1	1
Three-phase non-directional overcurrent protection, high stage	PHHPTOC	2	2
Three-phase non-directional overcurrent protection, instantaneous stage	PHIPTOC	1	1
Three-phase directional overcurrent protection, low stage	DPHLPDOC	2	2
Three-phase directional overcurrent protection, high stage	DPHHPDOC	2	2
Table continues on next page			

Section 2

DNP3 data mappings

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Function	IEC 61850	A (CTs/VTs)	B (Sensors)
		FE201	FE202
Three-phase voltage-dependent overcurrent protection	PHPVOC	2	2
Non-directional earth-fault protection, low stage	EFLPTOC	2	2
Non-directional earth-fault protection, high stage	EFHPTOC	1	1
Non-directional earth-fault protection, instantaneous stage	EFIPTOC1	1	1
Directional earth-fault protection, low stage	DEFLPDEF	3	3 ¹⁾
Directional earth-fault protection, high stage	DEFHPDEF	1	1 ¹⁾
Admittance-based earth-fault protection	EFPADM	3	3 ¹⁾
Wattmetric-based earth-fault protection	WPWDE	3	3 ¹⁾
Multifrequency admittance-based earth-fault protection	MFADPSDE	1	1 ¹⁾
Transient/intermittent earth-fault protection	INTRPTEF	1	1 ¹⁾
Harmonics-based earth-fault protection	HAEFPTOC	1	1
Negative-sequence overcurrent protection	NSPTOC	2	2
Phase discontinuity protection	PDNSPTOC	1	1
Residual overvoltage protection	ROVPTOV	3	3 ¹⁾
Three-phase undervoltage protection	PHPTUV	4	4
Single-phase undervoltage protection, secondary side	PHAPTVU	1	
Three-phase overvoltage protection	PHPTOV	3	3
Single-phase overvoltage protection, secondary side	PHAPTOV	1	
Positive-sequence undervoltage protection	PSPTUV	2	2
Negative-sequence overvoltage protection	NSPTOV	2	2
Frequency protection	FRPFRQ	6	6
Three-phase thermal protection for feeders, cables and distribution transformers	T1PTTR	1	1
Loss of phase (underrun)	PHPTUC	1	1
Circuit breaker failure protection	CCBRBRF	3	3
Three-phase inrush detector	INRPHAR	1	1
Master trip	TRPPTRC	4	4
Arc protection	ARCSARC	(3)	(3)
High-impedance fault detection	PHIZ	1	1
Load-shedding and restoration	LSHDPFRQ	6	6
Multipurpose protection	MAPGAPC	18	18
Automatic switch-onto-fault logic (SOF)	CVPSOF	1	1
Voltage vector shift protection	VVSPPAM	(1)	(1)
Directional reactive power undervoltage protection	DQPTUV	(2)	(2)
Table continues on next page			

Function	IEC 61850	A (CTs/VTs)	B (Sensors)
		FE201	FE202
Underpower protection	DUPPDPR	(2)	(2)
Reverse power/directional overpower protection	DOPPDPR	(2)	(2)
Low-voltage ride-through protection	LVRTPTUV	(3)	(3)
High-impedance differential protection for phase A	HIAPDIF	1	
High-impedance differential protection for phase B	HIBPDIF	1	
High-impedance differential protection for phase C	HICPDIF	1	
Circuit breaker uncorresponding position start-up	UPCALH	3	3
Three-independent-phase non-directional overcurrent protection, low stage	PH3LPTOC	2	2
Three-independent-phase non-directional overcurrent protection, high stage	PH3HPTOC	2	2
Three-independent-phase non-directional overcurrent protection, instantaneous stage	PH3IPTOC	1	1
Directional three-independent-phase directional overcurrent protection, low stage	DPH3LPDOC	2	2
Directional three-independent-phase directional overcurrent protection, high stage	DPH3HPDOC	2	2
Three-phase overload protection for shunt capacitor banks	COLPTOC	(1)	
Current unbalance protection for shunt capacitor banks	CUBPTOC	(1)	
Shunt capacitor bank switching resonance protection, current based	SRCPTOC	(1)	
Control			
Circuit-breaker control	CBXCBR	3	3
Disconnecter control	DCXSWI	4	4
Earthing switch control	ESXSWI	3	3
Disconnecter position indication	DCSXSWI	4	4
Earthing switch indication	ESSXSWI	3	3
Autoreclosing	DARREC	2	2
Synchronism and energizing check	SECRSYN	1	(1) ²⁾
Condition monitoring and supervision			
Circuit-breaker condition monitoring	SSCBR	3	3
Trip circuit supervision	TCSSCBR	2	2
Current circuit supervision	CCSPVC	1	1
Current transformer supervision for high-impedance protection scheme for phase A	HZCCASPVC	1	
Current transformer supervision for high-impedance protection scheme for phase B	HZCCBSPVC	1	
Current transformer supervision for high-impedance protection scheme for phase C	HZCCCSPVC	1	
Fuse failure supervision	SEQSPVC	1	1
Table continues on next page			

Function	IEC 61850	A (CTs/VTs)	B (Sensors)
		FE201	FE202
Runtime counter for machines and devices	MDSOPT	2	2
Measurement			
Three-phase current measurement	CMMXU	1	1
Sequence current measurement	CSMSQI	1	1
Residual current measurement	RESCMMXU	1	1
Three-phase voltage measurement	VMMXU	1	1
Single-phase voltage measurement	VAMMXU	1	(1) ²
Residual voltage measurement	RESVMMXU	1	
Sequence voltage measurement	VSMSQI	1	1
Three-phase power and energy measurement	PEMMXU	1	1
Load profile record	LDPRLRC	1	1
Frequency measurement	FMMXU	1	1
Fault location			
Fault locator	SCEFRFLO	(1)	(1)
Power quality			
Current total demand distortion	CMHAI	1	1
Voltage total harmonic distortion	VMHAI	1	1
Voltage variation	PHQVVR	1	1
Voltage unbalance	VSQVUB	1	1
Other			
Minimum pulse timer (2 pcs)	TPGAPC	4	4
Minimum pulse timer (2 pcs, second resolution)	TPSGAPC	2	2
Minimum pulse timer (2 pcs, minute resolution)	TPMGAPC	2	2
Pulse timer (8 pcs)	PTGAPC	2	2
Time delay off (8 pcs)	TOFGAPC	4	4
Time delay on (8 pcs)	TONGAPC	4	4
Set-reset (8 pcs)	SRGAPC	4	4
Move (8 pcs)	MVGAPC	4	4
Integer value move	MVI4GAPC	4	4
Analog value scaling	SCA4GAPC	4	4
Generic control point (16 pcs)	SPCGAPC	3	3
Remote generic control points	SPCRGAPC	1	1
Local generic control points	SPCLGAPC	1	1
Generic up-down counters	UDFCNT	12	12
Programmable buttons (16 buttons)	FKEYGGIO	1	1
Logging functions			
Disturbance recorder	RDRE	1	1
Table continues on next page			

Function	IEC 61850	A (CTs/VTs)	B (Sensors)
		FE201	FE202
Fault recorder	FLTRFRC	1	1
Sequence event recorder	SER	1	1
1, 2, ... = Number of included instances. The instances of a protection function represent the number of identical protection function blocks available in the standard configuration. () = optional			

- 1) U_o is calculated from the measured phase voltages
 2) Available only with IEC 61850-9-2 LE

2.2.2

Supported functions in REM620

Table 3: Supported functions

Function	IEC 61850	A (CTs/VTs)	B (Sensors)
		ME201	ME202
Protection			
Three-phase non-directional overcurrent protection, low stage	PHLPTOC	1	1
Three-phase non-directional overcurrent protection, high stage	PHHPTOC	2	2
Three-phase non-directional overcurrent protection, instantaneous stage	PHIPTOC	1	1
Three-phase directional overcurrent protection, low stage	DPHLPDOC	1	1
Three-phase directional overcurrent protection, high stage	DPHPDOC	2	2
Three-phase voltage-dependent overcurrent protection	PHPVOC	2	2
Non-directional earth-fault protection, low stage	EFLPTOC	1 ¹⁾ 2)	1 ²⁾
Non-directional earth-fault protection, high stage	EFHPTOC	1 ¹⁾ 2)	1 ²⁾
Non-directional earth-fault protection, instantaneous stage	EFIPTOC1	1 ¹⁾ 2)	1 ²⁾
Directional earth-fault protection, low stage	DEFLPDEF	1 ¹⁾ 2)	1 ²⁾ 3)
Directional earth-fault protection, high stage	DEFHPDEF	1 ¹⁾ 2)	1 ²⁾ 3)
Residual overvoltage protection	ROVPTOV	3	3 ³⁾
Three-phase undervoltage protection	PHPTUV	4	4
Single-phase undervoltage protection, secondary side	PHAPTV	1	
Three-phase overvoltage protection	PHPTOV	3	3
Single-phase overvoltage protection, secondary side	PHAPTOV	1	
Positive-sequence undervoltage protection	PSPTUV	2	2
Negative-sequence overvoltage protection	NSPTOV	2	2
Frequency protection	FRPFRQ	6	6
Table continues on next page			

Section 2

DNP3 data mappings

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Function	IEC 61850	A (CTs/VTs)	B (Sensors)
		ME201	ME202
Negative-sequence overcurrent protection for machines	MNSPTOC	2	2
Loss of load supervision	LOFLPTUC	2	2
Motor load jam protection	JAMPTOC	1	1
Motor start-up supervision	STTPMSU	1	1
Phase reversal protection	PREVPTOC	1	1
Thermal overload protection for motors	MPTTR	1	1
Stabilized and instantaneous differential protection for machines	MPDIF	1	
High-impedance/flux-balance based differential protection for motors	MHZPDIF	1	
High-impedance based restricted earth-fault protection	HREFPDIF	1	
Circuit breaker failure protection	CCBRBRF	3	3
Master trip	TRPPTRC	4	4
Arc protection	ARCSARC	(3) ⁴⁾	(3) ⁴⁾
Multipurpose protection	MAPGAPC	18	18
Automatic switch-onto-fault logic (SOF)	CVPSOF	1	1
Directional reactive power undervoltage protection	DQPTUV	(2)	(2)
Underpower protection	DUPPDPR	(2)	(2)
Reverse power/directional overpower protection	DOPPDPR	(3)	(3)
Three-phase underexcitation protection	UEXPDIS	(2)	(2)
Low-voltage ride-through protection	LVRTPTUV	(3)	(3)
Rotor earth-fault protection	MREFPTOC	1	1
Control			
Circuit-breaker control	CBXCBR	3	3
Disconnecter control	DCXSWI	4	4
Earthing switch control	ESXSWI	3	3
Disconnecter position indication	DCSXSWI	4	4
Earthing switch indication	ESSXSWI	3	3
Emergency start-up	ESMGAPC	1	1
Synchronism and energizing check	SECRSYN	1	(1) ⁵⁾
Condition monitoring and supervision			
Circuit-breaker condition monitoring	SSCBR	3	3
Trip circuit supervision	TCSSCBR	2	2
Current circuit supervision	CCSPVC	1	1
Fuse failure supervision	SEQSPVC	1	1
Runtime counter for machines and devices	MDSOPT	2	2
Measurement			
Table continues on next page			

Function	IEC 61850	A (CTs/VTs)	B (Sensors)
		ME201	ME202
Three-phase current measurement	CMMXU	2	1
Sequence current measurement	CSMSQI	2	1
Residual current measurement	RESCMMXU	1	1
Three-phase voltage measurement	VMMXU	1	1
Single-phase voltage measurement	VAMMXU	1	(1) ⁵⁾
Residual voltage measurement	RESVMMXU	1	
Sequence voltage measurement	VSMSQI	1	1
Three-phase power and energy measurement	PEMMXU	1	1
Load profile record	LDPRLRC	1	1
Frequency measurement	FMMXU	1	1
Power quality			
Current total demand distortion	CMHAI	1	1
Voltage total harmonic distortion	VMHAI	1	1
Voltage variation	PHQVVR	1	1
Voltage unbalance	VSQVUB	1	1
Other			
Minimum pulse timer (2 pcs)	TPGAPC	4	4
Minimum pulse timer (2 pcs, second resolution)	TPSGAPC	2	2
Minimum pulse timer (2 pcs, minute resolution)	TPMGAPC	2	2
Pulse timer (8 pcs)	PTGAPC	2	2
Time delay off (8 pcs)	TOFGAPC	4	4
Time delay on (8 pcs)	TONGAPC	4	4
Set-reset (8 pcs)	SRGAPC	4	4
Move (8 pcs)	MVGAPC	4	4
Integer value move	MVI4GAPC	4	4
Analog value scaling	SCA4GAPC	4	4
Generic control point (16 pcs)	SPCGAPC	3	3
Remote generic control points	SPCRGAPC	1	1
Local generic control points	SPCLGAPC	1	1
Generic up-down counters	UDFCNT	12	12
Programmable buttons (16 buttons)	FKEYGGIO	1	1
Logging functions			
Disturbance recorder	RDRE	1	1
Fault recorder	FLTRFRC	1	1
Sequence event recorder	SER	1	1
1, 2, ... = Number of included instances. The instances of a protection function represent the number of identical protection function blocks available in the standard configuration. () = optional			

- 1) Function uses calculated value when the high-impedance based restricted earth-fault protection is used
 2) Function uses calculated value when the rotor earth-fault protection is used

-
- 3) U_o is calculated from the measured phase voltages
 - 4) I_o is calculated from the measured phase currents
 - 5) Available only with IEC 61850-9-2 LE

2.2.3

Supported functions in RET620

Table 4: Supported functions

Function	IEC 61850	A (CTs/VTs)
		TE201
Protection		
Three-phase non-directional overcurrent protection, low stage	PHLPTOC1	1 HV
	PHLPTOC2	1 LV
Three-phase non-directional overcurrent protection, high stage	PHHPTOC1	1 HV
	PHHPTOC2	1 LV
Three-phase non-directional overcurrent protection, instantaneous stage	PHIPTOC1	1 HV
	PHIPTOC2	1 LV
Three-phase directional overcurrent protection, low stage	DPHLPDOC	1 HV
Three-phase directional overcurrent protection, high stage	DPHHPDOC	1 HV
Non-directional earth-fault protection, low stage	EFLPTOC1	1 HV1)
	EFLPTOC2	1 LV1)
Non-directional earth-fault protection, high stage	EFHPTOC1	1 HV1)
	EFHPTOC2	1 LV1)
Directional earth-fault protection, low stage	DEFLPDEF	2 HV1)
Directional earth-fault protection, high stage	DEFHPDEF	1 HV1)
Negative-sequence overcurrent protection	NSPTOC1	1 HV
	NSPTOC2	1 LV
Residual overvoltage protection	ROVPTOV	3 HV
Three-phase undervoltage protection	PHPTUV	4 HV
Three-phase overvoltage protection	PHPTOV	3 HV
Positive-sequence undervoltage protection	PSPTUV	2 HV
Negative-sequence overvoltage protection	NSPTOV	2 HV
Frequency protection	FRPFRQ	3 HV
Overexcitation protection	OEPVPH	2 HV
Three-phase thermal overload protection, two time constants	T2PTTR	1 HV
Loss of phase (undercurrent)	PHPTUC1	1 HV
	PHPTUC2	1 LV
Stabilized and instantaneous differential protection for two-winding transformers	TR2PTDF	1
Table continues on next page		

Function	IEC 61850	A (CTs/VTs) TE201
Numerical stabilized low-impedance restricted earth-fault protection	LREFPNDF1	1 HV
	LREFPNDF2	1 LV
High-impedance based restricted earth-fault protection	HREFPDIF1	1 HV
	HREFPDIF2	1 LV
Circuit breaker failure protection	CCBRBRF1	1 HV
	CCBRBRF2	1 LV
	CCBRBRF3	1 HV
Three-phase inrush detector	INRPHAR	1 HV
Master trip	TRPPTRC	4
Arc protection	ARCSARC	(3) ²⁾
Load-shedding and restoration	LSHDPFRQ	6 HV
Multipurpose protection	MAPGAPC	18
Automatic switch-onto-fault logic (SOF)	CVPSOF	1 HV
Underpower protection	DUPPDPR	2 HV
Reverse power/directional overpower protection	DOPPDPR	3 HV
Control		
Circuit-breaker control	CBXCBR1	1 HV
	CBXCBR2	1 LV
	CBXCBR3	1 HV
Disconnector control	DCXSWI1	1 HV
	DCXSWI2	1 HV
	DCXSWI3	1 LV
	DCXSWI4	1 LV
Earthing switch control	ESXSWI1	1 HV
	ESXSWI2	1 LV
	ESXSWI3	1 HV
Disconnector position indication	DCSXSWI1	1 HV
	DCSXSWI2	1 HV
	DCSXSWI3	1 LV
	DCSXSWI4	1 LV
Earthing switch indication	ESSXSWI1	1 HV
	ESSXSWI2	1 LV
	ESSXSWI3	1 HV
Synchronism and energizing check	SECRSYN	1 HV
Tap changer position indication	TPOSYLTC	1
Tap changer control with voltage regulator	OLATCC	(1) LV
Table continues on next page		

Function	IEC 61850	A (CTs/VTs)
		TE201
Condition monitoring and supervision		
Circuit-breaker condition monitoring	SSCBR1	1 HV
	SSCBR2	1 LV
	SSCBR3	1 HV
Trip circuit supervision	TCSSCBR1	1 HV
	TCSSCBR2	1 LV
Current circuit supervision	CCSPVC1	1 HV
	CCSPVC2	1 LV
Advanced current circuit supervision for transformers	CTSRCTF	1
Fuse failure supervision	SEQSPVC	1 HV
Runtime counter for machines and devices	MDSOPT	2
Measurement		
Three-phase current measurement	CMMXU1	1 HV
	CMMXU2	1 LV
Sequence current measurement	CSMSQI1	1 HV
	CSMSQI2	1 LV
Residual current measurement	RESCMMXU1	1 HV
	RESCMMXU2	1 LV
Three-phase voltage measurement	VMMXU	1 HV
Single-phase voltage measurement	VAMMXU2	1 LV
	VAMMXU3	1 HV
Residual voltage measurement	RESVMMXU	1 HV
Sequence voltage measurement	VSMSQI	1 HV
Three-phase power and energy measurement	PEMMXU	1 HV
Load profile record	LDPRLRC	1 HV
Frequency measurement	FMMXU	1 HV
Power quality		
Current total demand distortion	CMHAI	1 HV
Voltage total harmonic distortion	VMHAI	1 HV
Voltage variation	PHQVVR	1 HV
Voltage unbalance	VSQVUB	1 HV
Other		
Minimum pulse timer (2 pcs)	TPGAPC	4
Minimum pulse timer (2 pcs, second resolution)	TPSGAPC	2
Minimum pulse timer (2 pcs, minute resolution)	TPMGAPC	2
Pulse timer (8 pcs)	PTGAPC	2
Table continues on next page		

Function	IEC 61850	A (CTs/VTs) TE201
Time delay off (8 pcs)	TOFGAPC	4
Time delay on (8 pcs)	TONGAPC	4
Set-reset (8 pcs)	SRGAPC	4
Move (8 pcs)	MVGAPC	4
Integer value move	MVI4GAPC	4
Analog value scaling	SCA4GAPC	4
Generic control point (16 pcs)	SPCGAPC	3
Remote generic control points	SPCRGAPC	1
Local generic control points	SPCLGAPC	1
Generic up-down counters	UDFCNT	12
Programmable buttons (16 buttons)	FKEYGGIO	1
Logging functions		
Disturbance recorder	RDRE	1
Fault recorder	FLTRFRC	1
Sequence event recorder	SER	1
1, 2, ... = Number of included instances. The instances of a protection function represent the number of identical protection function blocks available in the standard configuration. () = optional HV = The function block is to be used on the high-voltage side in the application. LV = The function block is to be used on the low-voltage side in the application.		

- 1) Function uses calculated value when the high-impedance based restricted earth-fault protection is used
- 2) I_0 is calculated from the measured phase currents

2.3 Binary inputs

Table 5: 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 6: 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 7: 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 8: 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 9: 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.

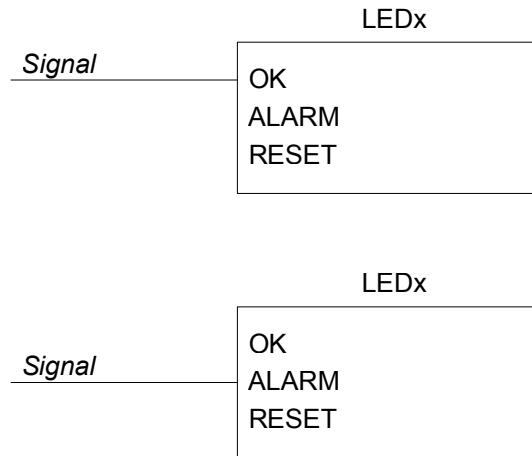


Figure 2: Signal wired to either OK or Alarm input

Table 10: 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.

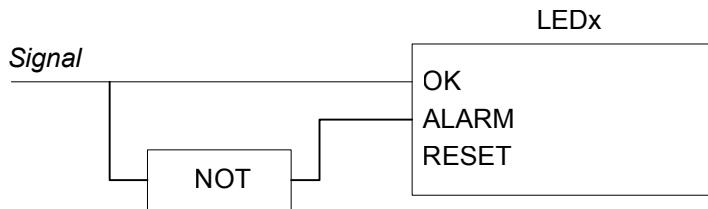


Figure 3: Signal wired to both OK and ALARM inputs – inverted to the other



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.

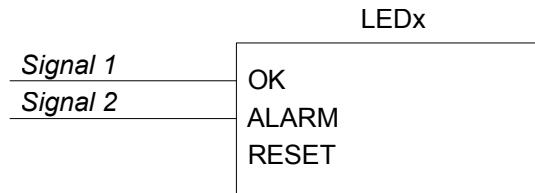


Figure 4: Separate signals wired to OK and ALARM inputs

Table 11: LD0.LEDGIGO1 LHMI LED indications - two state cases (1)

IEC 61850 name	SA name	Description	Values
LD0.LEDGIGO1			
.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 12: 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 13: 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 14: 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			
.SynlItlByps.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 15: *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.CBCSWI2			
.SynlItlByps.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
.Opln.general	TRRET	Operate, re-trip	1=Operate
.Str.general	CB_FAULT_AL	Start, timer running	1=Start

2.3.2.3 CTRL.CBXCBR3 Circuit breaker control (3)

Table 16: *CTRL.CBXCBR3 Circuit breaker control (3)*

IEC 61850 name	SA name	Description	Values
CTRL.CBCILO3			
.EnaCls.stVal	ENA_CLOSE	Close enabled	1=Enabled
.EnaOpn.stVal	ENA_OPEN	Open enabled	1=Enabled
CTRL.CBCSWI3			
.SynlItlByps.stVal	ITL_BYPASS	Interlocking bypass	1=Bypassed
.Pos.stSeld	SELECTED	CB selected	1=Selected
CTRL.CBXCBR3			
.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked
LD0.CCBRBRF3			
.OpEx.general	TRBU	Failure ext.trip	1=Failure
.Opln.general	TRRET	Operate, re-trip	1=Operate
.Str.general	CB_FAULT_AL	Start, timer running	1=Start

2.3.2.4

CTRL.DCXSWI1 Disconnector control (1)

Table 17: 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

2.3.2.5

CTRL.DCXSWI2 Disconnector control (2)

Table 18: 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
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

2.3.2.6

CTRL.DCXSWI3 Disconnector control (3)

Table 19: 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

2.3.2.7 CTRL.DCXSWI4 Disconnector control (4)

Table 20: *CTRL.DCXSWI4 Disconnector control (4)*

IEC 61850 name	SA name	Description	Values
CTRL.DCCIGO4			
.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

2.3.2.8 CTRL.ESXSWI1 Earthing switch control (1)

Table 21: *CTRL.ESXSWI1 Earthing switch control (1)*

IEC 61850 name	SA name	Description	Values
CTRL.ESCILO1			
.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.ESCSWI1			
.Pos.stSeld	SELECTED	CB selected	1=Selected
CTRL.ESXSWI1			
.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked

2.3.2.9 CTRL.ESXSWI2 Earthing switch control (2)

Table 22: *CTRL.ESXSWI2 Earthing switch control (2)*

IEC 61850 name	SA name	Description	Values
CTRL.ESCILO2			
.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.ESCSWI2			
.Pos.stSeld	SELECTED	CB selected	1=Selected
CTRL.ESXSWI2			
.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked

2.3.2.10

CTRL.ESXSWI3 Earthing switch control (3)

Table 23: CTRL.ESXSWI3 Earthing switch control (3)

IEC 61850 name	SA name	Description	Values
CTRL.ESCILO3			
.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.ESCSWI3			
.Pos.stSelD	SELECTED	CB selected	1=Selected
CTRL.ESXSWI3			
.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.ARCSARC1 Arc protection (1)

Table 24: LD0.ARCSARC1 Arc protection (1)

IEC 61850 name	SA name	Description	Values
LD0.ARCSARC11			
.FADet.stVal	ARC_FLT_DET	Arc detected	1=Detected
LD0.ARCPTRC11			
.Op.general	OPERATE	Operate	1=Operate

2.3.3.2

LD0.ARCSARC2 Arc protection (2)

Table 25: LD0.ARCSARC2 Arc protection (2)

IEC 61850 name	SA name	Description	Values
LD0.ARCSARC21			
.FADet.stVal	ARC_FLT_DET	Arc detected	1=Detected
LD0.ARCPTRC21			
.Op.general	OPERATE	Operate	1=Operate

2.3.3.3 LD0.ARCSARC3 Arc protection (3)

Table 26: LD0.ARCSARC3 Arc protection (3)

IEC 61850 name	SA name	Description	Values
LD0.ARCSARC31			
.FADet.stVal	ARC_FLT_DET	Arc detected	1=Detected
LD0.ARCPTRC31			
.Op.general	OPERATE	Operate	1=Operate

2.3.3.4 LD0.HZCCASPVC1 Current transformer supervision for high-impedance protection scheme for phase A (1)

Table 27: LD0.HZCCASPVC1 Current transformer supervision for high-impedance protection scheme for phase A (1)

IEC 61850 name	SA name	Description	Value
LD0.HZCCASPVC1			
.Alm.stVal	ALARM	Phase A alarm	1=Alarm

2.3.3.5 LD0.HZCCBSPVC1 Current transformer supervision for high-impedance protection scheme for phase B (1)

Table 28: LD0.HZCCBSPVC1 Current transformer supervision for high-impedance protection scheme for phase B (1)

IEC 61850 name	SA name	Description	Value
LD0.HZCCBSPVC1			
.Alm.stVal	ALARM	Phase A alarm	1=Alarm

2.3.3.6 LD0.HZCCCSPVC1 Current transformer supervision for high-impedance protection scheme for phase C (1)

Table 29: LD0.HZCCCSPVC1 Current transformer supervision for high-impedance protection scheme for phase C (1)

IEC 61850 name	SA name	Description	Value
LD0.HZCCCSPVC1			
.Alm.stVal	ALARM	Phase A alarm	1=Alarm

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

Table 30: 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

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

Table 31: 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

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

Table 32: 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

2.3.3.10 LD0.MDSOPT2 Runtime counter for machines and devices (2)

Table 33: LD0.MDSOPT2 Runtime counter for machines and devices (2)

IEC 61850 name	SA name	Description	Values
LD0.MDSOPT2			
.OpTmAlm.stVal	ALARM	Accum. op. time alarm	1=Alarm
.OpTmWrn.stVal	WARNING	Accum. op. time warning	1=Warning

2.3.3.11 LD0.RESTCTR1 Io CT supervision (1)

Table 34: 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

2.3.3.12 LD0.RESTCTR2 Io CT supervision (2)

Table 35: LD0.RESTCTR2 Io CT supervision (2)

IEC 61850 name	SA name	Description	Values
LD0.RESTCTR2			
.Alm.stVal	ALARM	Alarm	1=Alarm
.Wrn.stVal	WARNING	Warning	1=Warning

2.3.3.13 LD0.RESTVTR1 Uo VT supervision (1)

Table 36: 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

2.3.3.14 LD0.RESTVTR2 Uo VT supervision (2)

Table 37: LD0.RESTVTR2 Uo VT supervision (2)

IEC 61850 name	SA name	Description	Values
LD0.RESTVTR2			
.Alm.stVal	ALARM	Alarm	1=Alarm
.Wrn.stVal	WARNING	Warning	1=Warning

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

Table 38: 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

2.3.3.16
LD0.SSCBR2 Circuit-breaker condition monitoring (2)
Table 39: 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
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

2.3.3.17
LD0.SSCBR3 Circuit-breaker condition monitoring (3)
Table 40: LD0.SSCBR3 Circuit-breaker condition monitoring (3)

IEC 61850 name	SA name	Description	Values
LD0.SSCBR3			
.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.SSIMG3			
.InsAlm.stVal	PRES_ALM	Low pressure alarm	1=Alarm
.InsBlk.stVal	PRES_LO	Low pressure lockout	1=Lockout
LD0.SSOPM3			
.SprChaAlm.stVal	SPR_CHR_ALM	Spring charge time alarm	1=Alarm

2.3.3.18 LD0.TCSSCBR1 Trip circuit supervision (1)

Table 41: LD0.TCSSCBR1 Trip circuit supervision (1)

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

2.3.3.19 LD0.TCSSCBR2 Trip circuit supervision (2)

Table 42: LD0.TCSSCBR2 Trip circuit supervision (2)

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

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

Table 43: 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

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

Table 44: 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

2.3.4 Automatic control functions

2.3.4.1 LD0.OLATCC1 Tap changer control with voltage regulator (1)

Table 45: LD0.OLATCC1 Tap changer control with voltage regulator (1)

IEC 61850 name	SA name	Description	Values
LD0.OLATCC1			
.ParOp.stVal	PARALLEL	Parallel or single op.	1=Parallel
.Auto.stVal	AUTO	Auto or manual op.	1=Auto
.TapOpR.stVal	RAISE_OWN	Raise command	1=Raise

Table continues on next page

IEC 61850 name	SA name	Description	Values
.TapOpL.stVal	LOWER_OWN	Lower command	1=Lower
.TapOpErr.stVal	ALARM	Alarm	1=Alarm
.EndPosR.stVal	-	Block raise	1=Raise
.EndPosL.stVal	-	Block lower	1=Lower
.LTCBlkAHi.stVal	BLKD_I_LOD	Over current blocking	1=Block
.LTCBlkVLo.stVal	BLKD_U_UN	Under voltage blocking	1=Block
.LTCRnbk.stVal	RNBK_U_OV	Raise voltage runback block	1=Block
.CircAHiBlk.stVal	BLKD_I_CIR	High circulating current block	1=Block
.Blk.stVal	BLKD_LTCBLK	External blocking	1=Block
.ErrPar.stVal	PAR_FAIL	Parallel failure detected	1=Failure

2.3.5 Metering and measurand functions

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

Table 46: 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

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

Table 47: 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

2.3.5.3 LD0.RESCMMXU1 Residual current measurement (1)

Table 48: 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

2.3.5.4 LD0.RESCMMXU2 Residual current measurement (2)

Table 49: LD0.RESCMMXU2 Residual current measurement (2)

IEC 61850 name	SA name	Description	Values
LD0.RESCMMXU2			
.HiAlm.stVal	HIGH_ALARM	High alarm	1=Alarm
.HiWrn.stVal	HIGH_WARN	High warning	1=Warning

2.3.5.5 LD0.RESVMMXU1 Residual voltage measurement (1)

Table 50: 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

2.3.5.6 LD0.VAMMXU2 Single-phase voltage measurement (2)

Table 51: LD0.VAMMXU2 Single-phase voltage measurement (2)

IEC 61850 name	SA name	Description	Value
LD0.VAMMXU2			
.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

2.3.5.7 LD0.VAMMXU3 Single-phase voltage measurement (3)

Table 52: LD0.VAMMXU3 Single-phase voltage measurement (3)

IEC 61850 name	SA name	Description	Value
LD0.VAMMXU3			
.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

2.3.5.8**LD0.VMMXU1 Three-phase voltage measurement (1)****Table 53:** 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

2.3.6**Power quality functions****2.3.6.1****LD0.CMHAI1 Current total demand distortion (1)****Table 54:** LD0.CMHAI1 Current total demand distortion (1)

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

2.3.6.2**LD0.PHQVVR1 Voltage variation (1)****Table 55:** 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

2.3.6.3**LD0.VMHAI1 Voltage total harmonic distortion (1)****Table 56:** LD0.VMHAI1 Voltage total harmonic distortion (1)

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

2.3.6.4 LD0.VSQVUB1 Voltage unbalance (1)

Table 57: 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

2.3.7 Protection functions

2.3.7.1 LD0.COLxPTOC1/CULPTOC1 Capacitor bank overload protection (1)

Table 58: LD0.COLxPTOC1/CULPTOC1 Capacitor bank overload protection (1)

IEC 61850 name	SA name	Description	Values
LD0.COL1PTOC1			
.Op.general	OPERATE	Overload operate	1=Operate
.Str.general	START	Overload start	1=Start
LD0.COL2PTOC1			
.Op.general	ALARM	Alarm	1=Alarm
LD0.COLPTUC1			
.Op.general	OPERATE	Undercurrent operate	1=Operate
.Str.general	START	Undercurrent start	1=Start

2.3.7.2 LD0.CUBxPTOC1 Capacitor bank unbalance current, double Y bridge (1)

Table 59: LD0.CUBxPTOC1 Capacitor bank unbalance current, double Y bridge (1)

IEC 61850 name	SA name	Description	Values
LD0.CUB2PTOC1			
.Op.general	OPERATE	Unbalance operate	1=Operate
.Str.general	START	Unbalance start	1=Start
LD0.CUB1PTOC1			
.Op.general	ALARM	Alarm	1=Alarm

2.3.7.3 LD0.CVPSOF1 Automatic switch-onto-fault logic (SOF) (1)

Table 60: LD0.CVPSOF1 Automatic switch-onto-fault logic (SOF) (1)

IEC 61850 name	SA name	Description	Value
LD0.CVPSOF1			
.TrFltSt.stVal	OPERATE	Trip fault state	1=Trip fault

2.3.7.4

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

Table 61: 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

2.3.7.5

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

Table 62: 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

2.3.7.6

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

Table 63: 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

2.3.7.7

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

Table 64: 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

2.3.7.8

LD0.DOPPDPR1 Reverse power/directional overpower protection (1)

Table 65: LD0.DOPPDPR1 Reverse power/directional overpower protection (1)

IEC 61850 name	SA name	Description	Value
LD0.DPPDOP1			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.7.9 LD0.DOPPDPR2 Reverse power/directional overpower protection (2)

Table 66: LD0.DOPPDPR2 Reverse power/directional overpower protection (2)

IEC 61850 name	SA name	Description	Value
LD0.DPPDOP2			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.7.10 LD0.DOPPDPR3 Reverse power/directional overpower protection (3)

Table 67: LD0.DOPPDPR3 Reverse power/directional overpower protection (3)

IEC 61850 name	SA name	Description	Value
LD0.DPPDOP3			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.7.11 LD0.DPH3HPDOC1 Directional three-independent-phase directional overcurrent protection, high stage (1)

Table 68: LD0.DPH3HPDOC1 Directional three-independent-phase directional overcurrent protection, high stage (1)

IEC 61850 name	SA name	Description	Values
LD0.DPH3HPTOC1		High stage (1)	
.Op.general	OPERATE	-Operate	1=Operate
.Str.general	START	-Start	1=Start

2.3.7.12 LD0.DPH3HPDOC2 Directional three-independent-phase directional overcurrent protection, high stage (2)

Table 69: LD0.DPH3HPDOC2 Directional three-independent-phase directional overcurrent protection, high stage (2)

IEC 61850 name	SA name	Description	Values
LD0.DPH3HPTOC2		High stage (2)	
.Op.general	OPERATE	-Operate	1=Operate
.Str.general	START	-Start	1=Start

2.3.7.13 LD0.DPH3LPDOC1 Directional three-independent-phase directional overcurrent protection, low stage (1)
Table 70: LD0.DPH3LPDOC1 Directional three-independent-phase directional overcurrent protection, low stage (1)

IEC 61850 name	SA name	Description	Values
LD0.DPH3LPTOC1		Low stage (1)	
.Op.general	OPERATE	-Operate	1=Operate
.Str.general	START	-Start	1=Start

2.3.7.14 LD0.DPH3LPDOC2 Directional three-independent-phase directional overcurrent protection, low stage (2)
Table 71: LD0.DPH3LPDOC2 Directional three-independent-phase directional overcurrent protection, low stage (2)

IEC 61850 name	SA name	Description	Values
LD0.DPH3LPTOC2		Low stage (2)	
.Op.general	OPERATE	-Operate	1=Operate
.Str.general	START	-Start	1=Start

2.3.7.15 LD0.DPHHPDOC1 Three-phase directional overcurrent protection, high stage (1)
Table 72: 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

2.3.7.16 LD0.DPHHPDOC2 Three-phase directional overcurrent protection, high stage (2)
Table 73: 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
.Str.general	START	-Start	1=Start

2.3.7.17

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

Table 74: 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

2.3.7.18

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

Table 75: 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

2.3.7.19

LD0.DQPTUV1 Directional reactive power undervoltage protection (1)

Table 76: LD0.DQPTUV1 Directional reactive power undervoltage protection (1)

IEC 61850 name	SA name	Description	Value
LD0.DQPTUV1			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.7.20 LD0.DQPTUV2 Directional reactive power undervoltage protection (2)
Table 77: LD0.DQPTUV2 Directional reactive power undervoltage protection (2)

IEC 61850 name	SA name	Description	Value
LD0.DQPTUV2			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.7.21 LD0.DUPPDPR1 Underpower protection (1)
Table 78: LD0.DUPPDPR1 Underpower protection (1)

IEC 61850 name	SA name	Description	Value
LD0.DPPDUP1			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.7.22 LD0.DUPPDPR2 Underpower protection (2)
Table 79: LD0.DUPPDPR2 Underpower protection (2)

IEC 61850 name	SA name	Description	Value
LD0.DPPDUP2			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.7.23 LD0.EFHPTOC1 Non-directional earth-fault protection, high stage (1)
Table 80: 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

2.3.7.24 LD0.EFHPTOC2 Non-directional earth-fault protection, high stage (2)
Table 81: LD0.EFHPTOC2 Non-directional earth-fault protection, high stage (2)

IEC 61850 name	SA name	Description	Values
LD0.EFHPTOC2		High stage (2)	
.Op.general	OPERATE	Operate	1=Operate
.Str.general	START	Start	1=Start

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

Table 82: 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

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

Table 83: 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

2.3.7.27 LD0.EFLPTOC2 Non-directional earth-fault protection, low stage (2)

Table 84: LD0.EFLPTOC2 Non-directional earth-fault protection, low stage (2)

IEC 61850 name	SA name	Description	Values
LD0.EFLPTOC2		Low stage (2)	
.Op.general	OPERATE	Operate	1=Operate
.Str.general	START	Start	1=Start

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

Table 85: 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

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

Table 86: 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

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

Table 87: 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

2.3.7.31 LD0.FRPFRQ1 Frequency protection (1)

Table 88: 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

2.3.7.32 LD0.FRPFRQ2 Frequency protection (2)

Table 89: 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

2.3.7.33 LD0.FRPFRQ3 Frequency protection (3)

Table 90: LD0.FRPFRQ3 Frequency protection (3)

IEC 61850 name	SA name	Description	Values
LD0.FRPTRC3			
.Str.general	START	Stage start	1=Start
LD0.FRPTOF3		Overfrequency	
.Op.general	OPR_OFRQ	-Operate	1=Operate
LD0.FRPTUF3		Underfrequency	
.Op.general	OPR_UFRQ	-Operate	1=Operate
LD0.FRPFRC3		Frequency gradient	
.Op.general	OPR_FRG	-Operate	1=Operate

2.3.7.34 LD0.FRPFRQ4 Frequency protection (4)

Table 91: LD0.FRPFRQ4 Frequency protection (4)

IEC 61850 name	SA name	Description	Values
LD0.FRPTRC4			
.Str.general	START	Stage start	1=Start
LD0.FRPTOF4		Overfrequency	
.Op.general	OPR_OFRQ	-Operate	1=Operate
LD0.FRPTUF4		Underfrequency	
.Op.general	OPR_UFRQ	-Operate	1=Operate
LD0.FRPFRC4		Frequency gradient	
.Op.general	OPR_FRG	-Operate	1=Operate

2.3.7.35 LD0.FRPFRQ5 Frequency protection (5)

Table 92: LD0.FRPFRQ5 Frequency protection (5)

IEC 61850 name	SA name	Description	Values
LD0.FRPTRC5			
.Str.general	START	Stage start	1=Start
LD0.FRPTOF5		Overfrequency	
.Op.general	OPR_OFRQ	-Operate	1=Operate
LD0.FRPTUF5		Underfrequency	
.Op.general	OPR_UFRQ	-Operate	1=Operate
LD0.FRPFRC5		Frequency gradient	
.Op.general	OPR_FRG	-Operate	1=Operate

2.3.7.36 LD0.FRPFRQ6 Frequency protection (6)

Table 93: LD0.FRPFRQ6 Frequency protection (6)

IEC 61850 name	SA name	Description	Values
LD0.FRPTRC6			
.Str.general	START	Stage start	1=Start
LD0.FRPTOF6		Overfrequency	
.Op.general	OPR_OFRQ	-Operate	1=Operate
LD0.FRPNUF6		Underfrequency	
.Op.general	OPR_UFRQ	-Operate	1=Operate
LD0.FRPFRC6		Frequency gradient	
.Op.general	OPR_FRG	-Operate	1=Operate

2.3.7.37 LD0.HAEFPCTOC1 Harmonics-based earth-fault protection (1)

Table 94: LD0.HAEFPCTOC1 Harmonics-based earth-fault protection (1)

IEC 61850 name	SA name	Description	Values
LD0.HAEFPCTOC1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.38 LD0.HIAPDIF1 High-impedance differential protection for phase A (1)

Table 95: LD0.HIAPDIF1 High-impedance differential protection for phase A (1)

IEC 61850 name	SA name	Description	Value
LD0.HIAPDIF1			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.7.39 LD0.HIBPDIF1 High-impedance differential protection for phase B (1)

Table 96: LD0.HIBPDIF1 High-impedance differential protection for phase B (1)

IEC 61850 name	SA name	Description	Value
LD0.HIBPDIF1			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.7.40 LD0.HICPDIF1 High-impedance differential protection for phase C (1)

Table 97: LD0.HICPDIF1 High-impedance differential protection for phase C (1)

IEC 61850 name	SA name	Description	Value
LD0.HICPDIF1			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.7.41 LD0.HREFPDIF1 High-impedance based restricted earth-fault protection (1)

Table 98: LD0.HREFPDIF1 High-impedance based restricted earth-fault protection (1)

IEC 61850 name	SA name	Description	Values
LD0.HREFPDIF1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.42 LD0.HREFPDIF2 High-impedance based restricted earth-fault protection (2)

Table 99: LD0.HREFPDIF2 High-impedance based restricted earth-fault protection (2)

IEC 61850 name	SA name	Description	Values
LD0.HREFPDIF2			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

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

Table 100: 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

2.3.7.44**LD0.INTRPTEF1 Transient/intermittent earth-fault protection (1)****Table 101:** 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

2.3.7.45**LD0.JAMPTOC1 Motor load jam protection (1)****Table 102:** LD0.JAMPTOC1 Motor load jam protection (1)

IEC 61850 name	SA name	Description	Values
LD0.JAMPTOC1			
.Op.general	OPERATE	Stage operate	1=Operate
.Op.phsA		Phs A operate	1=Operate
.Op.phsB		Phs B operate	1=Operate
.Op.phsC		Phs C operate	1=Operate

2.3.7.46**LD0.LEDPTRC1 Global protection signals (1)****Table 103:** 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

2.3.7.47**LD0.LOFLPTUC1 Loss of load supervision (1)****Table 104:** LD0.LOFLPTUC1 Loss of load supervision (1)

IEC 61850 name	SA name	Description	Values
LD0.LOFLPTUC1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.48

LD0.LOFLPTUC2 Loss of load supervision (2)

Table 105: LD0.LOFLPTUC2 Loss of load supervision (2)

IEC 61850 name	SA name	Description	Values
LD0.LOFLPTUC2			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.49

LD0.LREFPNDF1 Numerical stabilized low-impedance restricted earth-fault protection (1)

Table 106: LD0.LREFPNDF1 Numerical stabilized low-impedance restricted earth-fault protection (1)

IEC 61850 name	SA name	Description	Values
LD0.LREFPNDF1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.50

LD0.LREFPNDF2 Numerical stabilized low-impedance restricted earth-fault protection (2)

Table 107: LD0.LREFPNDF2 Numerical stabilized low-impedance restricted earth-fault protection (2)

IEC 61850 name	SA name	Description	Values
LD0.LREFPDNDF2			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.51

LD0.LSHDPFRQ1 Load-shedding and restoration (1)

Table 108: 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

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

Table 109: 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

2.3.7.53 LD0.LSHDPFRQ3 Load-shedding and restoration (3)

Table 110: LD0.LSHDPFRQ3 Load-shedding and restoration (3)

IEC 61850 name	SA name	Description	Values
LD0.LSHDPTRC3			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start
LD0.LSHDPTOF3			
.Str.general	ST_REST	Start restore	1=Start
.Op.general	RESTORE	Restored	1=Restored

2.3.7.54 LD0.LSHDPFRQ4 Load-shedding and restoration (4)

Table 111: LD0.LSHDPFRQ4 Load-shedding and restoration (4)

IEC 61850 name	SA name	Description	Values
LD0.LSHDPTRC4			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start
LD0.LSHDPTOF4			
.Str.general	ST_REST	Start restore	1=Start
.Op.general	RESTORE	Restored	1=Restored

2.3.7.55 LD0.LSHDPFRQ5 Load-shedding and restoration (5)

Table 112: LD0.LSHDPFRQ5 Load-shedding and restoration (5)

IEC 61850 name	SA name	Description	Values
LD0.LSHDPTRC5			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start
Table continues on next page			

IEC 61850 name	SA name	Description	Values
LD0.LSHDPTOF5			
.Str.general	ST_REST	Start restore	1=Start
.Op.general	RESTORE	Restored	1=Restored

2.3.7.56 LD0.LSHDPFRQ6 Load-shedding and restoration (6)

Table 113: LD0.LSHDPFRQ6 Load-shedding and restoration (6)

IEC 61850 name	SA name	Description	Values
LD0.LSHDPTRC6			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start
LD0.LSHDPTOF6			
.Str.general	ST_REST	Start restore	1=Start
.Op.general	RESTORE	Restored	1=Restored

2.3.7.57 LD0.LVRTPTUV1 Low-voltage ride-through protection (1)

Table 114: LD0.LVRTPTUV1 Low-voltage ride-through protection (1)

IEC 61850 name	SA name	Description	Value
LD0.LVRTPTUV1			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.7.58 LD0.LVRTPTUV2 Low-voltage ride-through protection (2)

Table 115: LD0.LVRTPTUV2 Low-voltage ride-through protection (2)

IEC 61850 name	SA name	Description	Value
LD0.LVRTPTUV2			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.7.59 LD0.LVRTPTUV3 Low voltage ride through protection (3)

Table 116: LD0.LVRTPTUV3 Low voltage ride through protection (3)

IEC 61850 name	SA name	Description	Value
LD0.LVRTPTUV3			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.7.60 LD0.MFADPSDE1 Multifrequency admittance-based earth-fault protection (1)
Table 117: 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

2.3.7.61 LD0.MHZPDIF1 High impedance, flux-balance based, motor differential protection (1)
Table 118: LD0.MHZPDIF1 High impedance, flux-balance based, motor differential protection (1)

IEC 61850 name	SA name	Description	Value
LD0.MHZPDIF1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.62 LD0.MNSPTOC1 Negative-sequence overcurrent protection for machines (1)
Table 119: LD0.MNSPTOC1 Negative-sequence overcurrent protection for machines (1)

IEC 61850 name	SA name	Description	Values
LD0.MNSPTOC1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.63 LD0.MNSPTOC2 Negative-sequence overcurrent protection for machines (2)
Table 120: LD0.MNSPTOC2 Negative-sequence overcurrent protection for machines (2)

IEC 61850 name	SA name	Description	Values
LD0.MNSPTOC2			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.64 LD0.MPDIF1 Stabilized and instantaneous differential protection for machines (1)

Table 121: LD0.MPDIF1 Stabilized and instantaneous differential protection for machines (1)

IEC 61850 name	SA name	Description	Value
LD0.MPTRC1			
.Op.general	OPERATE	General operate	1=Operate
.Op.phsA		Phs A operate	1=Operate
.Op.phsB		Phs B operate	1=Operate
.Op.phsC		Phs C operate	1=Operate
LD0.MLPDIF1			
.BlkIntnSt.general	INT_BLKD	Internal block	1=Blocked
.BlkIntnSt.phsA	INT_BLKD_A	Internal block phs A	1=Blocked
.BlkIntnSt.phsB	INT_BLKD_B	Internal block phs B	1=Blocked
.BlkIntnSt.phsC	INT_BLKD_C	Internal block phs C	1=Blocked

2.3.7.65 LD0.MPTTR1 Thermal overload protection for motors (1)

Table 122: LD0.MPTTR1 Thermal overload protection for motors (1)

IEC 61850 name	SA name	Description	Values
LD0.MPTTR1			
.AlmThm.general	ALARM	Thermal alarm	1=Alarm
.Op.general	OPERATE	Thermal operate	1=Operate
.Strlnh.general	BLK_RESTART	Block restart	1=Restart

2.3.7.66 LD0.MREFPTOC1 Rotor earth-fault protection (1)

Table 123: LD0.MREFPTOC1 Rotor earth-fault protection (1)

IEC 61850 name	SA name	Description	Value
LD0.MRE1PTOC1			
.Op.general	ALARM	Alarm	1=Alarm
LD0.MRE2PTOC1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

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

Table 124: 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

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

Table 125: 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

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

Table 126: 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

2.3.7.70 LD0.NSPTOV2 Negative-sequence overvoltage protection (2)

Table 127: LD0.NSPTOV2 Negative-sequence overvoltage protection (2)

IEC 61850 name	SA name	Description	Values
LD0.NSPTOV2			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.71 LD0.OEPVPH1 Overexcitation protection (1)

Table 128: LD0.OEPVPH1 Overexcitation protection (1)

IEC 61850 name	SA name	Description	Values
LD0.OEPVPH1			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.7.72 LD0.OEPVPH2 Overexcitation protection (2)

Table 129: LD0.OEPVPH2 Overexcitation protection (2)

IEC 61850 name	SA name	Description	Values
LD0.OEPVPH2			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.7.73 LD0.PDNSPTOC1 Phase discontinuity protection (1)

Table 130: 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

2.3.7.74 LD0.PH3HPTOC1 Three-independent-phase non-directional overcurrent protection, high stage (1)

Table 131: LD0.PH3HPTOC1 Three-independent-phase non-directional overcurrent protection, high stage (1)

IEC 61850 name	SA name	Description	Values
LD0.PH3HPTOC1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.75 LD0.PH3HPTOC2 Three-independent-phase non-directional overcurrent protection, high stage (2)

Table 132: LD0.PH3HPTOC2 Three-independent-phase non-directional overcurrent protection, high stage (2)

IEC 61850 name	SA name	Description	Values
LD0.PH3HPTOC2			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.76 LD0.PH3IPTOC1 Three-independent-phase non-directional overcurrent protection, instantaneous stage (1)
Table 133: LD0.PH3IPTOC1 Three-independent-phase non-directional overcurrent protection, instantaneous stage (1)

IEC 61850 name	SA name	Description	Values
LD0.PH3IPTOC1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.77 LD0.PH3LPTOC1 Three-independent-phase non-directional overcurrent protection, low stage (1)
Table 134: LD0.PH3LPTOC1 Three-independent-phase non-directional overcurrent protection, low stage (1)

IEC 61850 name	SA name	Description	Values
LD0.PH3LPTOC1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.78 LD0.PH3LPTOC2 Three-independent-phase non-directional overcurrent protection, low stage (2)
Table 135: LD0.PH3LPTOC2 Three-independent-phase non-directional overcurrent protection, low stage (2)

IEC 61850 name	SA name	Description	Values
LD0.PH3LPTOC2			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.79 LD0.PHAPTOV1 Single-phase overvoltage protection, secondary side (1)
Table 136: LD0.PHAPTOV1 Single-phase overvoltage protection, secondary side (1)

IEC 61850 name	SA name	Description	Value
LD0.PHAPTOV1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.80 PHAPTV1 Single-phase undervoltage protection, secondary side (1)

Table 137: PHAPTV1 Single-phase undervoltage protection, secondary side (1)

IEC 61850 name	SA name	Description	Value
LD0.PHAPTV1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

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

Table 138: 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

2.3.7.82 LD0.PHHPTOC2 Three-phase non-directional overcurrent protection, high stage (2)

Table 139: LD0.PHHPTOC2 Three-phase non-directional overcurrent protection, high stage (2)

IEC 61850 name	SA name	Description	Values
LD0.PHHPTOC2			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

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

Table 140: 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

2.3.7.84 LD0.PHIPTOC2 Three-phase non-directional overcurrent protection, instantaneous stage (2)
Table 141: 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

2.3.7.85 LD0.PHIZ1 High-impedance fault detection (1)
Table 142: LD0.PHIZ1 High-impedance fault detection (1)

IEC 61850 name	SA name	Description	Values
LD0.PHIZ1			
.Op.general	OPERATE	Stage operate	1 = Operate
.Str.general	START	Stage start	1 = Start

2.3.7.86 LD0.PHLPTOC1 Three-phase non-directional overcurrent protection, low stage (1)
Table 143: 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

2.3.7.87 LD0.PHLPTOC2 Three-phase non-directional overcurrent protection, low stage (2)
Table 144: LD0.PHLPTOC2 Three-phase non-directional overcurrent protection, low stage (2)

IEC 61850 name	SA name	Description	Values
LD0.PHLPTOC2			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.88

LD0.PHPTOV1 Three-phase overvoltage protection (1)

Table 145: 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

2.3.7.89

LD0.PHPTOV2 Three-phase overvoltage protection (2)

Table 146: 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
.Str.phsA		phase A start	1=Start
.Str.phsB		phase B start	1=Start
.Str.phsC		phase C start	1=Start

2.3.7.90

LD0.PHPTOV3 Three-phase overvoltage protection (3)

Table 147: 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

2.3.7.91**LD0.PHPTUC1 Loss of phase (undercurrent) (1)****Table 148:** *LD0.PHPTUC1 Loss of phase (undercurrent) (1)*

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

2.3.7.92**LD0.PHPTUC2 Loss of phase (undercurrent) (2)****Table 149:** *LD0.PHPTUC2 Loss of phase (undercurrent) (2)*

IEC 61850 name	SA name	Description	Value
LD0.PHPTUC2			
.Str.general	START	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
.Op.general	OPERATE	General operate	1=Operate
.Op.phsA		Phs A operate	1=Operate
.Op.phsB		Phs B operate	1=Operate
.Op.phsC		Phs C operate	1=Operate

2.3.7.93**LD0.PHPTUV1 Three-phase undervoltage protection (1)****Table 150:** *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

2.3.7.94

LD0.PHPTUV2 Three-phase undervoltage protection (2)

Table 151: 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

2.3.7.95

LD0.PHPTUV3 Three-phase undervoltage protection (3)

Table 152: 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

2.3.7.96

LD0.PHPTUV4 Three-phase undervoltage protection (4)

Table 153: LD0.PHPTUV4 Three-phase undervoltage protection (4)

IEC 61850 name	SA name	Description	Values
LD0.PHPTUV4			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.97**LD0.PHPVOC1 Three-phase voltage-dependent overcurrent protection (1)****Table 154:** LD0.PHPVOC1 Three-phase voltage-dependent overcurrent protection (1)

IEC 61850 name	SA name	Description	Value
LD0.PHPVOC1			
.Str.general	START	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
.Op.general	OPERATE	General operate	1=Operate
.Op.phsA		Phs A operate	1=Operate
.Op.phsB		Phs B operate	1=Operate
.Op.phsC		Phs C operate	1=Operate

2.3.7.98**LD0.PHPVOC2 Three-phase voltage-dependent overcurrent protection (2)****Table 155:** LD0.PHPVOC2 Three-phase voltage-dependent overcurrent protection (2)

IEC 61850 name	SA name	Description	Value
LD0.PHPVOC2			
.Str.general	START	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
.Op.general	OPERATE	General operate	1=Operate
.Op.phsA		Phs A operate	1=Operate
.Op.phsB		Phs B operate	1=Operate
.Op.phsC		Phs C operate	1=Operate

2.3.7.99**LD0.PREVPTOC1 Phase reversal protection (1)****Table 156:** LD0.PREVPTOC1 Phase reversal protection (1)

IEC 61850 name	SA name	Description	Values
LD0.PREVPTOC1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

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

Table 157: 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

2.3.7.101 LD0.PSPTUV2 Positive-sequence undervoltage protection (2)

Table 158: LD0.PSPTUV2 Positive-sequence undervoltage protection (2)

IEC 61850 name	SA name	Description	Values
LD0.PSPTUV2			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.102 LD0.ROVPTOV1 Residual overvoltage protection (1)

Table 159: 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

2.3.7.103 LD0.ROVPTOV2 Residual overvoltage protection (2)

Table 160: 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

2.3.7.104 LD0.ROVPTOV3 Residual overvoltage protection (3)

Table 161: LD0.ROVPTOV3 Residual overvoltage protection (3)

IEC 61850 name	SA name	Description	Values
LD0.ROVPTOV3			
.Op.general	OPERATE	Stage 3 operate	1=Operate
.Str.general	START	Stage 3 start	1=Start

2.3.7.105 LD0.SRCPTOC1 Shunt capacitor bank switching resonance protection, current based (1)
Table 162: *LD0.SRCPTOC1 Shunt capacitor bank switching resonance protection, current based (1)*

IEC 61850 name	SA name	Description	Values
LD0.SRC2PTOC1			
.Op.general	OPERATE	Resonance operate	1=Operate
LD0.SRC1PTOC1			
.Op.general	ALARM	Alarm	1=Alarm

2.3.7.106 LD0.STTPMSU1 Motor start-up supervision (1)
Table 163: *LD0.STTPMSU1 Motor start-up supervision (1)*

IEC 61850 name	SA name	Description	Values
LD0.STTPMRI1			
.Op.general	OPR_STALL	Thermal stress operate	1=Operate
.StrInh.stVal	LOCK_START	Restart lockout	1=Lockout
LD0.STTPMSS1			
.Op.general	OPR_IIT	Stalling operate	1=Operate
.Str.general	MOT_START	Startup in progress	1=In progress

2.3.7.107 LD0.T1PTTR1 Three-phase thermal protection for feeders, cables and distribution transformers (1)
Table 164: *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

2.3.7.108 LD0.T2PTTR1 Three-phase thermal overload protection, two time constants (1)
Table 165: *LD0.T2PTTR1 Three-phase thermal overload protection, two time constants (1)*

IEC 61850 name	SA name	Description	Values
LD0.T2PTTR1			
.AlmThm.general	ALARM	Thermal alarm	1=Alarm
.Op.general	OPERATE	General operate	1=Operate
.Str.general	START	General start	1=Start

2.3.7.109 LD0.TR2PTDF1 Stabilized and instantaneous differential protection for two-winding transformers (1)

Table 166: *LD0.TR2PTDF1 Stabilized and instantaneous differential protection for two-winding transformers (1)*

IEC 61850 name	SA name	Description	Value
LD0.TR2PTRC1			
.Op.general	OPERATE	General operate	1=Operate
.Op.phsA	OPR_A	Phs A operate	1=Operate
.Op.phsB	OPR_B	Phs B operate	1=Operate
.Op.phsC	OPR_C	Phs C operate	1=Operate
LD0.TR2LPDIF1			
.BlkWavSt.general	BLKD WAV	Waveform block, general	1=Blocking
.BlkWavSt.phsA	BLKD WAV_A	Waveform block, phs A	1=Blocking
.BlkWavSt.phsB	BLKD WAV_B	Waveform block, phs B	1=Blocking
.BlkWavSt.phsC	BLKD WAV_C	Waveform block, phs C	1=Blocking
.Blk2HSt.general	BLKD2H	2 nd harmonic res. block, general	1=Blocking
.Blk2HSt.phsA	BLKD2H_A	2 nd harmonic res. block, Phs A	1=Blocking
.Blk2HSt.phsB	BLKD2H_B	2 nd harmonic res. block, Phs B	1=Blocking
.Blk2HSt.phsC	BLKD2H_C	2 nd harmonic res. block, phs C	1=Blocking
.Blk5HSt.general	BLKD5H	5 th harmonic res. block, general	1=Blocking
.Blk5HSt.phsA	BLKD5H_A	5 th harmonic res. block, phs A	1=Blocking
.Blk5HSt.phsB	BLKD5H_B	5 th harmonic res. block, phs B	1=Blocking
.Blk5HSt.phsC	BLKD5H_C	5 th harmonic res. block, phs C	1=Blocking

2.3.7.110 LD0.TRPPTRC1 Master trip (1)

Table 167: *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

2.3.7.111 LD0.TRPPTRC2 Master trip (2)

Table 168: *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

2.3.7.112 LD0.TRPPTRC3 Master trip (3)
Table 169: *LD0.TRPPTRC3 Master trip (3)*

IEC 61850 name	SA name	Description	Values
LD0.TRPPTRC3			
.Op.general		Operate input signal	1=Operate
.Tr.general		Trip output signal	1=Trip

2.3.7.113 LD0.TRPPTRC4 Master trip (4)
Table 170: *LD0.TRPPTRC4 Master trip (4)*

IEC 61850 name	SA name	Description	Values
LD0.TRPPTRC4			
.Op.general		Operate input signal	1=Operate
.Tr.general		Trip output signal	1=Trip

2.3.7.114 LD0.UEXPDIS1 Three-phase underexcitation protection (1)
Table 171: *LD0.UEXPDIS1 Three-phase underexcitation protection (1)*

IEC 61850 name	SA name	Description	Value
LD0.UEXPDIS1			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.7.115 LD0.UEXPDIS2 Three-phase underexcitation protection (2)
Table 172: *LD0.UEXPDIS2 Three-phase underexcitation protection (2)*

IEC 61850 name	SA name	Description	Value
LD0.UEXPDIS2			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.7.116 LD0.UPCALH1 Circuit breaker uncorresponding position start-up (1)
Table 173: *LD0.UPCALH1 Circuit breaker uncorresponding position start-up (1)*

IEC 61850 name	SA name	Description	Value
LD0.UPCALH1			
GrAlm.stVal	OPERATE	Operate	1=Operate

2.3.7.117 LD0.UPCALH2 Circuit breaker uncorresponding position start-up (2)

Table 174: LD0.UPCALH2 Circuit breaker uncorresponding position start-up (2)

IEC 61850 name	SA name	Description	Value
LD0.UPCALH2			
GrAlm.stVal	OPERATE	Operate	1=Operate

2.3.7.118 LD0.UPCALH3 Circuit breaker uncorresponding position start-up (3)

Table 175: LD0.UPCALH3 Circuit breaker uncorresponding position start-up (3)

IEC 61850 name	SA name	Description	Value
LD0.UPCALH3			
GrAlm.stVal	OPERATE	Operate	1=Operate

2.3.7.119 LD0.VVSPPAM1 Voltage vector shift protection (1)

Table 176: LD0.VVSPPAM1 Voltage vector shift protection (1)

IEC 61850 name	SA name	Description	Value
LD0.VVSPPAM1			
.Op.general	OPERATE	Stage operate	1=Operate
.BlkIntnSt.general	INT_BLKD	Internal block	1=Blocked

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

Table 177: 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

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

Table 178: 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

2.3.7.122**LD0.WPWDE3 Wattmetric-based earth-fault protection (3)****Table 179:** 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

2.3.8**Protection-related functions****2.3.8.1****LD0.CTSRCTF1 Advanced current circuit supervision for transformers (1)****Table 180:** LD0.CTSRCTF1 Advanced current circuit supervision for transformers (1)

IEC 61850 name	SA name	Description	Value
LD0.CTSRCTF1			
.Alm.general	ALARM	Alarm	1=Alarm
.Op.general	FAIL	CT secondary failure	1=Operate

2.3.8.2**DR.RDRE1 Disturbance recorder (1)****Table 181:** 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

2.3.8.3**LD0.CCSPVC1 Current circuit supervision (1)****Table 182:** LD0.CCSPVC1 Current circuit supervision (1)

IEC 61850 name	SA name	Description	Value
LD0.CCSPVC1			
.FailACirc.general	FAIL	Failure	1=Failure
.SigFailAlm.stVal	ALARM	Alarm	1=Alarm

2.3.8.4 LD0.CCSPVC2 Current circuit supervision (2)

Table 183: LD0.CCSPVC2 Current circuit supervision (2)

IEC 61850 name	SA name	Description	Value
LD0.CCSPVC2			
.FailACirc.general	FAIL	Failure	1=Failure
.SigFailAlm.stVal	ALARM	Alarm	1=Alarm

2.3.8.5 LD0.DARREC1 Autoreclosing (1)

Table 184: 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

2.3.8.6

LD0.DARREC2 Autoreclosing (2)

Table 185: 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

2.3.8.7

LD0.LDPRLRC1 Load profile record (1)

Table 186: 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

2.3.8.8 LD0.SCEFRFLO1 Fault locator (1)

Table 187: 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

2.3.8.9 LD0.SECRSYN1 Synchronism and energizing check (1)

Table 188: 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

2.3.8.10 LD0.SEQSPVC1 Fuse failure supervision (1)

Table 189: 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

2.3.9 Generic functions

2.3.9.1 LD0.FKEYGGIO1 Programmable buttons (16 buttons) (1)

Table 190: LD0.FKEYGGIO1 Programmable buttons (16 buttons) (1)

IEC 61850 name	SA name	Description	Value
LD0.FKEYGGIO1			
.SPCSO1.stVal	L1	LED 1	0=Off, 1=On
.SPCSO2.stVal	L2	LED 2	0=Off, 1=On
.SPCSO3.stVal	L3	LED 3	0=Off, 1=On
.SPCSO4.stVal	L4	LED 4	0=Off, 1=On
.SPCSO5.stVal	L5	LED 5	0=Off, 1=On
.SPCSO6.stVal	L6	LED 6	0=Off, 1=On
.SPCSO7.stVal	L7	LED 7	0=Off, 1=On
.SPCSO8.stVal	L8	LED 8	0=Off, 1=On

Table continues on next page

IEC 61850 name	SA name	Description	Value
.SPCSO9.stVal	L9	LED 9	0=Off, 1=On
.SPCSO10.stVal	L10	LED 10	0=Off, 1=On
.SPCSO11.stVal	L11	LED 11	0=Off, 1=On
.SPCSO12.stVal	L12	LED 12	0=Off, 1=On
.SPCSO13.stVal	L13	LED 13	0=Off, 1=On
.SPCSO14.stVal	L14	LED 14	0=Off, 1=On
.SPCSO15.stVal	L15	LED 15	0=Off, 1=On
.SPCSO16.stVal	L16	LED 16	0=Off, 1=On

2.3.9.2 LD0.ESMGAPC1 Emergency start-up (1)

Table 191: LD0.ESMGAPC1 Emergency start-up (1)

IEC 61850 name	SA name	Description	Values
LD0.ESMGAPC1			
.Str.general	ST_EMERG_ENA	Emergency start	1=Start

2.3.9.3 LD0.MAPGAPC1 Multipurpose protection (1)

Table 192: 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

2.3.9.4 LD0.MAPGAPC2 Multipurpose protection (2)

Table 193: 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

2.3.9.5 LD0.MAPGAPC3 Multipurpose protection (3)

Table 194: 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

2.3.9.6 LD0.MAPGAPC4 Multipurpose protection (4)

Table 195: 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

2.3.9.7 LD0.MAPGAPC5 Multipurpose protection (5)

Table 196: 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

2.3.9.8 LD0.MAPGAPC6 Multipurpose protection (6)

Table 197: 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

2.3.9.9 LD0.MAPGAPC7 Multipurpose protection (7)

Table 198: LD0.MAPGAPC7 Multipurpose protection (7)

IEC 61850 name	SA name	Description	Values
LD0.MAPGAPC7			
.Op.general	OPERATE	Stage operate	1 = Operate
.Str.general	START	Stage start	1 = Start

2.3.9.10 LD0.MAPGAPC8 Multipurpose protection (8)

Table 199: LD0.MAPGAPC8 Multipurpose protection (8)

IEC 61850 name	SA name	Description	Values
LD0.MAPGAPC8			
.Op.general	OPERATE	Stage operate	1 = Operate
.Str.general	START	Stage start	1 = Start

2.3.9.11 LD0.MAPGAPC9 Multipurpose protection (9)

Table 200: LD0.MAPGAPC9 Multipurpose protection (9)

IEC 61850 name	SA name	Description	Values
LD0.MAPGAPC9			
.Op.general	OPERATE	Stage operate	1 = Operate
.Str.general	START	Stage start	1 = Start

2.3.9.12 LD0.MAPGAPC10 Multipurpose protection (10)

Table 201: LD0.MAPGAPC10 Multipurpose protection (10)

IEC 61850 name	SA name	Description	Values
LD0.MAPGAPC10			
.Op.general	OPERATE	Stage operate	1 = Operate
.Str.general	START	Stage start	1 = Start

2.3.9.13 LD0.MAPGAPC11 Multipurpose protection (11)

Table 202: LD0.MAPGAPC11 Multipurpose protection (11)

IEC 61850 name	SA name	Description	Values
LD0.MAPGAPC11			
.Op.general	OPERATE	Stage operate	1 = Operate
.Str.general	START	Stage start	1 = Start

2.3.9.14 LD0.MAPGAPC12 Multipurpose protection (12)

Table 203: LD0.MAPGAPC12 Multipurpose protection (12)

IEC 61850 name	SA name	Description	Values
LD0.MAPGAPC12			
.Op.general	OPERATE	Stage operate	1 = Operate
.Str.general	START	Stage start	1 = Start

2.3.9.15 LD0.MAPGAPC13 Multipurpose protection (13)

Table 204: LD0.MAPGAPC13 Multipurpose protection (13)

IEC 61850 name	SA name	Description	Values
LD0.MAPGAPC13			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.9.16 LD0.MAPGAPC14 Multipurpose protection (14)

Table 205: LD0.MAPGAPC14 Multipurpose protection (14)

IEC 61850 name	SA name	Description	Values
LD0.MAPGAPC14			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.9.17 LD0.MAPGAPC15 Multipurpose protection (15)

Table 206: LD0.MAPGAPC15 Multipurpose protection (15)

IEC 61850 name	SA name	Description	Values
LD0.MAPGAPC15			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.9.18 LD0.MAPGAPC16 Multipurpose protection (16)

Table 207: LD0.MAPGAPC16 Multipurpose protection (16)

IEC 61850 name	SA name	Description	Values
LD0.MAPGAPC16			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.9.19 LD0.MAPGAPC17 Multipurpose protection (17)

Table 208: LD0.MAPGAPC17 Multipurpose protection (17)

IEC 61850 name	SA name	Description	Values
LD0.MAPGAPC17			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.9.20 LD0.MAPGAPC18 Multipurpose protection (18)

Table 209: LD0.MAPGAPC18 Multipurpose protection (18)

IEC 61850 name	SA name	Description	Values
LD0.MAPGAPC18			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.9.21

LD0.MVGAPC1 Move (8 pcs) (1)

Table 210: 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

2.3.9.22

LD0.MVGAPC2 Move (8 pcs) (2)

Table 211: 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
.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

2.3.9.23

LD0.MVGAPC3 Move (8 pcs) (3)

Table 212: LD0.MVGAPC3 Move (8 pcs) (3)

IEC 61850 name	SA name	Description	Values
LD0.MVGAPC3			
.Q1.stVal	-	Input 1 signal	0/1=Off/On
.Q2.stVal	-	Input 2 signal	0/1=Off/On
.Q3.stVal	-	Input 3 signal	0/1=Off/On
.Q4.stVal	-	Input 4 signal	0/1=Off/On
.Q5.stVal	-	Input 5 signal	0/1=Off/On
.Q6.stVal	-	Input 6 signal	0/1=Off/On
.Q7.stVal	-	Input 7 signal	0/1=Off/On
.Q8.stVal	-	Input 8 signal	0/1=Off/On

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

Table 213: LD0.MVGAPC4 Move (8 pcs) (4)

IEC 61850 name	SA name	Description	Values
LD0.MVGAPC4			
.Q1.stVal	-	Input 1 signal	0/1=Off/On
.Q2.stVal	-	Input 2 signal	0/1=Off/On
.Q3.stVal	-	Input 3 signal	0/1=Off/On
.Q4.stVal	-	Input 4 signal	0/1=Off/On
.Q5.stVal	-	Input 5 signal	0/1=Off/On
.Q6.stVal	-	Input 6 signal	0/1=Off/On
.Q7.stVal	-	Input 7 signal	0/1=Off/On
.Q8.stVal	-	Input 8 signal	0/1=Off/On

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

Table 214: 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

2.3.9.26

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

Table 215: 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

2.3.9.27

LD0.SPCGAPC3 Generic control point (16 pcs) (3)

Table 216: LD0.SPCGAPC3 Generic control point (16 pcs) (3)

IEC 61850 name	SA name	Description	Values
LD0.SPCGAPC3			
.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

Table continues on next page

IEC 61850 name	SA name	Description	Values
.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

2.3.9.28 LD0.SPCLGAPC1 Local generic control points (1)

Table 217: LD0.SPCLGAPC1 Local generic control points (1)

IEC 61850 name	SA name	Description	Values
LD0.SPCLGAPC1			
.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

2.3.9.29 LD0.SPCRGAPC1 Remote generic control points (1)

Table 218: LD0.SPCRGAPC1 Remote generic control points (1)

IEC 61850 name	SA name	Description	Values
LD0.SPCRGAPC1			
.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

Table continues on next page

IEC 61850 name	SA name	Description	Values
.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

2.3.10 Physical and raw I/O data

2.3.10.1 LD0.XAGGIO130 Physical I/O

Table 219: 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

2.3.10.2 LD0.XBGGIO115 Physical I/O

Table 220: LD0.XBGGIO115 Physical I/O

IEC 61850 name	SA name	Description	Values
LD0.XBGGIO115			
.Ind1.stVal	-	XB115-Input 1	1/0=ON/OFF
.Ind2.stVal	-	XB115-Input 2	1/0=ON/OFF
.Ind3.stVal	-	XB115-Input 3	1/0=ON/OFF
.Ind4.stVal	-	XB115-Input 4	1/0=ON/OFF
.Ind5.stVal	-	XB115-Input 5	1/0=ON/OFF
.Ind6.stVal	-	XB115-Input 6	1/0=ON/OFF
.Ind7.stVal	-	XB115-Input 7	1/0=ON/OFF
.Ind8.stVal	-	XB115-Input 8	1/0=ON/OFF
.SPCSO1.stVal	-	XB115-Output 1	1/0=ON/OFF
.SPCSO2.stVal	-	XB115-Output 2	1/0=ON/OFF
.SPCSO3.stVal	-	XB115-Output 3	1/0=ON/OFF
.SPCSO4.stVal	-	XB115-Output 4	1/0=ON/OFF

2.3.10.3 LD0.XBRGGIO130 Alarm/warning

Table 221: LD0.XBRGGIO130 Alarm/warning

IEC 61850 name	SA name	Description	Values
LD0.XBRGGIO130			
.Alm1.stVal	-	XBRGGIO130 Alarm	1=Alarm
.Wrn1.stVal	-	XBRGGIO130 Warning	1=Warning
.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

2.3.10.4 LD0.XGGIO100 Physical I/O

Table 222: 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

2.3.10.5 LD0.XGGIO105 Physical I/O

Table 223: LD0.XGGIO105 Physical I/O

IEC 61850 name	SA name	Description	Values
LD0.XGGIO105			
.Ind1.stVal	-	X105-Input 1	1/0=ON/OFF
.Ind2.stVal	-	X105-Input 2	1/0=ON/OFF
.Ind3.stVal	-	X105-Input 3	1/0=ON/OFF
.Ind4.stVal	-	X105-Input 4	1/0=ON/OFF
.Ind5.stVal	-	X105-Input 5	1/0=ON/OFF
.Ind6.stVal	-	X105-Input 6	1/0=ON/OFF
.Ind7.stVal	-	X105-Input 7	1/0=ON/OFF
.Ind8.stVal	-	X105-Input 8	1/0=ON/OFF
.SPCSO1.stVal	-	X105-Output 1	1/0=ON/OFF
.SPCSO2.stVal	-	X105-Output 2	1/0=ON/OFF
.SPCSO3.stVal	-	X105-Output 3	1/0=ON/OFF
.SPCSO4.stVal	-	X105-Output 4	1/0=ON/OFF

2.3.10.6 LD0.XGGIO110 Physical I/O

Table 224: 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

2.3.10.7 LD0.XGGIO120 Physical I/O

Table 225: 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

2.3.10.8 LD0.XHBGGIO105 Physical I/O

Table 226: LD0.XHBGGIO105 Physical I/O

IEC 61850 name	SA name	Description	Values
LD0.XHBGGIO105			
.Ind1.stVal	-	XHB105-Input 1	1/0=ON/OFF
.Ind2.stVal	-	XHB105-Input 2	1/0=ON/OFF
.Ind3.stVal	-	XHB105-Input 3	1/0=ON/OFF
.Ind4.stVal	-	XHB105-Input 4	1/0=ON/OFF
.Ind5.stVal	-	XHB105-Input 5	1/0=ON/OFF
.Ind6.stVal	-	XHB105-Input 6	1/0=ON/OFF
.Ind7.stVal	-	XHB105-Input 7	1/0=ON/OFF

Table continues on next page

IEC 61850 name	SA name	Description	Values
.Ind8.stVal	-	XHB105-Input 8	1/0=ON/OFF
.SPCSO1.stVal	-	XHB105-Output 1	1/0=ON/OFF
.SPCSO2.stVal	-	XHB105-Output 2	1/0=ON/OFF
.SPCSO3.stVal	-	XHB105-Output 3	1/0=ON/OFF

2.3.10.9 LD0.XRGGIO105 Alarm/warning

Table 227: LD0.XRGGIO105 Alarm/warning

IEC 61850 name	SA name	Description	Values
LD0.XRGGIO105			
.Alm1.stVal	-	XRGGIO105 Alarm	1=Alarm
.Wrn1.stVal	-	XRGGIO105 Warning	1=Warning

2.3.10.10 LD0.XRGGIO110 Alarm/warning

Table 228: LD0.XRGGIO110 Alarm/warning

IEC 61850 name	SA name	Description	Values
LD0.XRGGIO110			
.Alm1.stVal	-	XRGGIO110 Alarm	1=Alarm
.Wrn1.stVal	-	XRGGIO110 Warning	1=Warning

2.4 Binary outputs

Table 229: 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 230: 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 231: 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 232: 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.CBXCBR3 Circuit-breaker control (3)

Table 233: CTRL.CBXCBR3 Circuit-breaker control (3)

IEC 61850 name	SA name	Description	Type
CTRL.CBCSWI3			
.Pos.Oper.ctlVal	-	Circuit breaker control	On/Off

2.4.2.4 CTRL.DCXSWI1 Disconnector control (1)

Table 234: CTRL.DCXSWI1 Disconnector control (1)

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

2.4.2.5 CTRL.DCXSWI2 Disconnector control (2)

Table 235: CTRL.DCXSWI2 Disconnector control (2)

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

2.4.2.6 CTRL.DCXSWI3 Disconnector control (3)

Table 236: CTRL.DCXSWI3 Disconnector control (3)

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

2.4.2.7 CTRL.DCXSWI4 Disconnector control (4)

Table 237: CTRL.DCXSWI4 Disconnector control (4)

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

2.4.2.8 CTRL.ESXSWI1 Earthing switch control (1)

Table 238: CTRL.ESXSWI1 Earthing switch control (1)

IEC 61850 name	SA name	Description	Type
CTRL.ESCSWI1			
.Pos.Oper.ctlVal	-	Earth switch control	On/Off

2.4.2.9 CTRL.ESXSWI2 Earthing switch control (2)

Table 239: CTRL.ESXSWI2 Earthing switch control (2)

IEC 61850 name	SA name	Description	Type
CTRL.ESCSWI2			
.Pos.Oper.ctlVal	-	Earth switch control	On/Off

2.4.2.10 CTRL.ESXSWI3 Earthing switch control (3)

Table 240: CTRL.ESXSWI3 Earthing switch control (3)

IEC 61850 name	SA name	Description	Type
CTRL.ESCSWI3			
.Pos.Oper.ctlVal	-	Earth switch control	On/Off

2.4.3 Sensors and monitoring functions

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

Table 241: 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 242: 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

2.4.3.3 LD0.SSCBR3 Circuit-breaker condition monitoring (3)

Table 243: LD0.SSCBR3 Circuit-breaker condition monitoring (3)

IEC 61850 name	SA name	Description	Type
LD0.SSCBR3			
.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.SSOPM3			
.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 244: 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 245: 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 recorder (1)

Table 246: FLTRFRC1 Fault recorder (1)

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

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

Table 247: 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

2.4.4.5 LD0.RESCMMXU1 Residual current measurement (1)

Table 248: LD0.RESCMMXU1 Residual current measurement (1)

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

2.4.4.6**LD0.RESCMMXU2 Residual current measurement (2)****Table 249:** LD0.RESCMMXU2 Residual current measurement (2)

IEC 61850 name	SA name	Description	Values
LD0.RESCMMXU2			
.RcdRs.Oper.ctlVal		Reset min./max. demands	On

2.4.4.7**LD0.RESVMMXU1 Residual voltage measurement (1)****Table 250:** LD0.RESVMMXU1 Residual voltage measurement (1)

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

2.4.5**Power quality functions****2.4.5.1****LD0.CMHAI1 Current total demand distortion (1)****Table 251:** 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 252:** LD0.PHQVVR1 Voltage variation (1)

IEC 61850 name	SA name	Description	Type
LD0.PHQVVR1			
.CntRs.Oper.ctlVal		Reset counters	1=Reset

2.4.5.3**LD0.VMHAI1 Voltage total harmonic distortion (1)****Table 253:** 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 254: 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 255: 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

2.4.6.3 LD0.LSHDPFRQ3 Load-shedding and restoration (3)

Table 256: LD0.LSHDPFRQ3 Load-shedding and restoration (3)

IEC 61850 name	SA name	Description	Type
LD0.LSHDPTOF3			
.ManRest.Oper.ctlVal	MAN_RESTORE	Manual restore	On
.BlkRest.Oper.ctlVal	BLK_REST	Cancel restore	On

2.4.6.4 LD0.LSHDPFRQ4 Load-shedding and restoration (4)

Table 257: LD0.LSHDPFRQ4 Load-shedding and restoration (4)

IEC 61850 name	SA name	Description	Type
LD0.LSHDPTOF4			
.ManRest.Oper.ctlVal	MAN_RESTORE	Manual restore	On
.BlkRest.Oper.ctlVal	BLK_REST	Cancel restore	On

2.4.6.5 LD0.LSHDPFRQ5 Load-shedding and restoration (5)

Table 258: LD0.LSHDPFRQ5 Load-shedding and restoration (5)

IEC 61850 name	SA name	Description	Type
LD0.LSHDPTOF5			
.ManRest.Oper.ctlVal	MAN_RESTORE	Manual restore	On
.BlkRest.Oper.ctlVal	BLK_REST	Cancel restore	On

2.4.6.6 LD0.LSHDPFRQ6 Load-shedding and restoration (6)

Table 259: LD0.LSHDPFRQ6 Load-shedding and restoration (6)

IEC 61850 name	SA name	Description	Type
LD0.LSHDPTOF6			
.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 DR.RDRE1 Disturbance recorder (1)

Table 260: 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

2.4.7.2 LD0.DARREC1 Autoreclosing (1)

Table 261: 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

2.4.7.3 LD0.DARREC2 Autoreclosing (2)

Table 262: 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

2.4.7.4 LD0.LDPRLRC1 Load profile record (1)

Table 263: LD0.LDPRLRC1 Load profile record (1)

IEC 61850 name	SA name	Description	Value
LD0.LDPRLRC1			
.RcdRs.Oper.ctlVal		Reset record	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 264: 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
.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 265: 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
Table continues on next page			

IEC 61850 name	SA name	Description	Type
.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.SPCGAPC3 Generic control point (16 pcs) (3)

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 266: LD0.SPCGAPC3 Generic control point (16 pcs) (3)

IEC 61850 name	SA name	Description	Type
LD0.SPCGAPC3			
.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

2.4.8.4

LD0.SPCRGAPC1 Remote generic control points (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 267: LD0.SPCRGAPC1 Remote generic control points (1)

IEC 61850 name	SA name	Description	Type
LD0.SPCRGAPC1			
.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

2.4.8.5

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

Table 268: 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

2.4.8.6

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

Table 269: LD0.SRGAPC2 Set-reset (8 pcs) (2)

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

2.4.8.7

LD0.SRGAPC3 Set-reset (8 pcs) (3)

Table 270: LD0.SRGAPC3 Set-reset (8 pcs) (3)

IEC 61850 name	SA name	Description	Type
LD0.SRGAPC3			
.Rs1.Oper.ctrlVal	-	Reset flip-flop 1	On
.Rs2.Oper.ctrlVal	-	Reset flip-flop 2	On
.Rs3.Oper.ctrlVal	-	Reset flip-flop 3	On
.Rs4.Oper.ctrlVal	-	Reset flip-flop 4	On
.Rs5.Oper.ctrlVal	-	Reset flip-flop 5	On
.Rs6.Oper.ctrlVal	-	Reset flip-flop 6	On
.Rs7.Oper.ctrlVal	-	Reset flip-flop 7	On
.Rs8.Oper.ctrlVal	-	Reset flip-flop 8	On

2.4.8.8

LD0.SRGAPC4 Set-reset (8 pcs) (4)

Table 271: LD0.SRGAPC4 Set-reset (8 pcs) (4)

IEC 61850 name	SA name	Description	Type
LD0.SRGAPC4			
.Rs1.Oper.ctrlVal	-	Reset flip-flop 1	On
.Rs2.Oper.ctrlVal	-	Reset flip-flop 2	On
.Rs3.Oper.ctrlVal	-	Reset flip-flop 3	On
.Rs4.Oper.ctrlVal	-	Reset flip-flop 4	On
.Rs5.Oper.ctrlVal	-	Reset flip-flop 5	On
.Rs6.Oper.ctrlVal	-	Reset flip-flop 6	On
.Rs7.Oper.ctrlVal	-	Reset flip-flop 7	On
.Rs8.Oper.ctrlVal	-	Reset flip-flop 8	On

2.5 Analog inputs

Table 272: 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 273: 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 274: 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 275: 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 276: 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 277: 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

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
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 278: *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 279: *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.CBXCBR3 Circuit-breaker control (3)

Table 280: *CTRL.CBXCBR3 Circuit-breaker control (3)*

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.CBCSWI3					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0...3	R	0,3,0,3

2.5.2.4 CTRL.DCSXSWI1 Disconnector position indication (1)

Table 281: *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

2.5.2.5**CTRL.DCSXSWI2 Disconnector position indication (2)****Table 282:** *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

2.5.2.6**CTRL.DCSXSWI3 Disconnector position indication (3)****Table 283:** *CTRL.DCSXSWI3 Disconnector position indication (3)*

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.DCSXSWI3					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0...3	R	0,3,0,3

2.5.2.7**CTRL.DCSXSWI4 Disconnector position indication (4)****Table 284:** *CTRL.DCSXSWI4 Disconnector position indication (4)*

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.DCSXSWI4					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0...3	R	0,3,0,3

2.5.2.8**CTRL.DCXSWI1 Disconnector control (1)****Table 285:** *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

2.5.2.9**CTRL.DCXSWI2 Disconnector control (2)****Table 286:** *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

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2.5.2.10 CTRL.DCXSWI3 Disconnector control (3)

Table 287: 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

2.5.2.11 CTRL.DCXSWI4 Disconnector control (4)

Table 288: 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

2.5.2.12 CTRL.ESSXSWI1 Earthing switch indication (1)

Table 289: 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

2.5.2.13 CTRL.ESSXSWI2 Earthing switch indication (2)

Table 290: 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

2.5.2.14 CTRL.ESSXSWI3 Earthing switch indication (3)

Table 291: 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

2.5.2.15 CTRL.ESXSWI1 Earthing switch control (1)

Table 292: CTRL.ESXSWI1 Earthing switch control (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.ESXSWI1					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0...3	R	0,3,0,3

2.5.2.16 CTRL.ESXSWI2 Earthing switch control (2)

Table 293: CTRL.ESXSWI2 Earthing switch control (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.ESXSWI2					
.Pos.stVal	POSITION	Intermediate=0; Off=1; On=2; Bad=3	0...3	R	0,3,0,3

2.5.2.17 CTRL.ESXSWI3 Earthing switch control (3)

Table 294: CTRL.ESXSWI3 Earthing switch control (3)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
CTRL.ESXSWI3					
.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.ARCSARC11 Arc protection (1)

Table 295: LD0.ARCSARC11 Arc protection (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.ARCSARC11					
.FACntRs.stVal		Arc 1 operation counter	0...65535	R	0,65535,0,65535

2.5.3.2 LD0.ARCSARC21 Arc protection (2)

Table 296: LD0.ARCSARC21 Arc protection (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.ARCSARC21					
.FACntRs.stVal		Arc 2 operation counter	0...65535	R	0,65535,0,65535

2.5.3.3 LD0.ARCSARC31 Arc protection (3)

Table 297: LD0.ARCSARC31 Arc protection (3)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.ARCSARC31					
.FACntRs.stVal		Arc 3 operation counter	0...65535	R	0,65535,0,65535

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

Table 298: 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

2.5.3.5 LD0.MDSOPT2 Runtime counter for machines and devices (2)

Table 299: LD0.MDSOPT2 Runtime counter for machines and devices (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.MDSOPT2					
.OpTmh.stVal		Operation time	0...300000 [h]	R	0,300000,0,300000

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

Table 300: 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
.OpTmOpen.mag	T_TRV_OP	Opening travel time	0...60000 [ms]	R	0,60000,0,60000
.OpTmClose.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
.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

2.5.3.7

LD0.SSCBR2 Circuit-breaker condition monitoring (2)

Table 301: 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

2.5.3.8

LD0.SSCBR3 Circuit-breaker condition monitoring (3)

Table 302: LD0.SSCBR3 Circuit-breaker condition monitoring (3)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SSCBR3					
.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.SSOPM3					
.TmsSprCha.mag	T_SPR_CHR	Spring charging time	0...99.99 [s]	R	0,100,0,10000
LD0.SPH1SCBR3					
.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.SPH2SCBR3					
.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.SPH3SCBR3					
.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

2.5.3.9 LD0.TPOSYLTC1 Tap changer position indication (1)

Table 303: LD0.TPOSYLTC1 Tap changer position indication (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.TPOSYLTC1					
.TapPos.valWTr.posVal	TAP_POS	Tap changer position	-64...63	R	-64,63,-64,63

2.5.4 Automatic control functions

2.5.4.1 LD0.OLATCC1 Tap changer control with voltage regulator (1)

Table 304: LD0.OLATCC1 Tap changer control with voltage regulator (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.OLATCC1					
.CtlDIOn.stVal	TIMER_STS	Timer mode	0...5	R	0,5,0,5
.CtlOpModSt.stVal	OPR_MODE_STS	Operation mode	0...6	R	0,6,0,6

2.5.5 Metering and measurand functions

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

Table 305: 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					
.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

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.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

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

Table 306: 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
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

2.5.5.3 LD0.CSMSQI1 Sequence current measurement (1)

Table 307: 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

2.5.5.4 LD0.CSMSQI2 Sequence current measurement (2)

Table 308: 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

2.5.5.5 LD0.FLTRFRC1 Fault recorder (1)

Table 309: LD0.FLTRFRC1 Fault recorder (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.FLTRFRC1					
		Values only for reading ¹⁾			
.OpTm.t		Captured time (year)	0...3000		0,3000,0,3000
.OpTm.t		Captured time (month)	1...12		1,12,1,12
.OpTm.t		Captured time (day)	1...31		1,31,1,31
.OpTm.t		Captured time (hour)	0...23		0,23,2,23
.OpTm.t		Captured time (minute)	0...59		0,59,0,59
.OpTm.t		Captured time (second)	0...59		0,59,0,59
.OpTm.t		Captured time (msec)	0...999		0,999,0,999
		Event updated values ²⁾			
.OpCnt.stVal		Fault record number	0...999999		0,999999,0,999999
.ProFcn.stVal		Protection function	-32767...32768		-32768,32767,-32768,32767
.Hz.mag		Frequency	30.00...80.00 [Hz]		30,80,3000,8000
.StrDur.mag		Start duration	0...100.00 [%]		0,100,0,10000

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.StrOpTm.mag		Operate time	0.000...999999 .999 [s]		0,10000000,0,10000000
.FltPtR.mag		Fault reactance	0...1000000.00 [ohm]		0,1000000,0,1000000
.FltDiskm.mag		Fault distance	0.00...3000.00 [pu]		0,3000,0,300000
.ActSetGr.stVal		Active setting group	1...6		1,6,1,6
.ShotPntr.stVal		AR Shot pointer	1...7		1,7,1,7
.Max50DifAA.mag		Max. diff. current phs A	0.000...80.000 [pu]		0,80,0,8000
.Max50DifAB.mag		Max. diff. current phs B	0.000...80.000 [pu]		0,80,0,8000
.Max50DifAC.mag		Max. diff. current phs C	0.000...80.000 [pu]		0,80,0,8000
.Max50RstAA.mag		Max. bias current phs A	0.000...50.000 [pu]		0,50,0,5000
.Max50RstAB.mag		Max. bias current phs B	0.000...50.000 [pu]		0,50,0,5000
.Max50RstAC.mag		Max. bias current phs C	0.000...50.000 [pu]		0,50,0,5000
.DifAPhsA.mag		Diff. current phs A	0.000...80.000 [pu]		0,80,0,8000
.DifAPhsB.mag		Diff. current phs B	0.000...80.000 [pu]		0,80,0,8000
.DifAPhsC.mag		Diff. current phs C	0.000...80.000 [pu]		0,80,0,8000
.RstAPhsA.mag		Bias current phs A	0.000...50.000 [pu]		0,50,0,5000
.RstAPhsB.mag		Bias current phs B	0.000...50.000 [pu]		0,50,0,5000
.RstAPhsC.mag		Bias current phsC	0.000...50.000 [pu]		0,50,0,5000
.DifARes.mag		Diff. current lo	0.000...80.000 [pu]		0,80,0,8000
.RstARes.mag		Bias current lo	0.000...50.000 [pu]		0,50,0,5000
.Max50APhsA1.mag		Max. current phs A(1)	0.000...50.000 [xIn]		0,50,0,5000
.Max50APhsB1.mag		Max. current phs B(1)	0.000...50.000 [xIn]		0,50,0,5000
.Max50APhsC1.mag		Max. current phs C(1)	0.000...50.000 [xIn]		0,50,0,5000
.Max50ARes1.mag		Max. current lo(1)	0.000...50.000 [xIn]		0,50,0,5000
.APhsA1.mag		Current phs A(1)	0.000...50.000 [xIn]		0,50,0,5000
.APhsB1.mag		Current phs B(1)	0.000...50.000 [xIn]		0,50,0,5000

Table continues on next page

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IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.APhsC1.mag		Current phs C(1)	0.000...50.000 [xIn]		0,50,0,5000
.ARes1.mag		Current Io(1)	0.000...50.000 [xIn]		0,50,0,5000
.AResClc1.mag		Current Io-Calc(1)	0.000...50.000 [xIn]		0,50,0,5000
.APsSeq1.mag		Current Ps-Seq(1)	0.000...50.000 [xIn]		0,50,0,5000
.ANgSeq1.mag		Current Ng-Seq(1)	0.000...50.000 [xIn]		0,50,0,5000
.APhsA2.mag		Current phs A(2)	0.000...50.000 [xIn]		0,50,0,5000
.APhsB2.mag		Current phs B(2)	0.000...50.000 [xIn]		0,50,0,5000
.APhsC2.mag		Current phs C(2)	0.000...50.000 [xIn]		0,50,0,5000
.ARes2.mag		Current Io(2)	0.000...50.000 [xIn]		0,50,0,5000
.AResClc2.mag		Current Io-Calc(2)	0.000...50.000 [xIn]		0,50,0,5000
.APsSeq2.mag		Current Ps-Seq(2)	0.000...50.000 [xIn]		0,50,0,5000
.ANgSeq2.mag		Current Ng-Seq(2)	0.000...50.000 [xIn]		0,50,0,5000
.PhVPhsA1.mag		Voltage phs A(1)	0.000...4.000 [xUn]		0,4,0,4000
.PhVPhsB1.mag		Voltage phs B(1)	0.000...4.000 [xUn]		0,4,0,4000
.PhVPhsC1.mag		Voltage phs C(1)	0.000...4.000 [xUn]		0,4,0,4000
.PPVPhsAB1.mag		Voltage phs AB(1)	0.000...4.000 [xUn]		0,4,0,4000
.PPVPhsBC1.mag		Voltage phs BC(1)	0.000...4.000 [xUn]		0,4,0,4000
.PPVPhsCA1.mag		Voltage phs CA(1)	0.000...4.000 [xUn]		0,4,0,4000
.VRes1.mag		Voltage Uo(1)	0.000...4.000 [xUn]		0,4,0,4000
.VZro1.mag		Voltage Zro-Seq(1)	0.000...4.000 [xUn]		0,4,0,4000
.VPsSeq1.mag		Voltage Ps-Seq(1)	0.000...4.000 [xUn]		0,4,0,4000
.VNgsSeq1.mag		Voltage Ng-Seq(1)	0.000...4.000 [xUn]		0,4,0,4000
.PhVPhsA2.mag		Voltage phs A(2)	0.000...4.000 [xUn]		0,4,0,4000
.PhVPhsB2.mag		Voltage phs B(2)	0.000...4.000 [xUn]		0,4,0,4000

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.PhVPhsC2.mag		Voltage phs C(2)	0.000...4.000 [xUn]		0,4,0,4000
.PPVPhsAB2.mag		Voltage phs AB(2)	0.000...4.000 [xUn]		0,4,0,4000
.PPVPhsBC2.mag		Voltage phs BC(2)	0.000...4.000 [xUn]		0,4,0,4000
.PPVPhsCA2.mag		Voltage phs CA(2)	0.000...4.000 [xUn]		0,4,0,4000
.VRes2.mag		Voltage Uo(2)	0.000...4.000 [xUn]		0,4,0,4000
.VZro2.mag		Voltage Zro-Seq(2)	0.000...4.000 [xUn]		0,4,0,4000
.VPsSeq2.mag		Voltage Ps-Seq(2)	0.000...4.000 [xUn]		0,4,0,4000
.VNgSeq2.mag		Voltage Ng-Seq(2)	0.000...4.000 [xUn]		0,4,0,4000
.MaxTmpRl.mag		PTTR thermal level	0.00...99.99		0,99.99,0,9999
.AMaxNgPs.mag		PDNSPTOC1 ratio I2/I1	0.00...999.99 [%]		0,999.99,0,99999
.DifANAngVN1.mag.		Angle Uo-lo(1)	-180.00...180.0 0 deg		-180,180,-18000,18000
.DifAAAngVBC1.mag.		Angle UBC-IA(1)	-180.00...180.0 0 deg		-180,180,-18000,18000
.DifABAAngVCA1.mag		Angle UCA-IB(1)	-180.00...180.0 0 deg		-180,180,-18000,18000
.DifACAngVAB1.mag		Angle UAB-IC(1)	-180.00...180.0 0 deg		-180,180,-18000,18000
.DifANAngVN2.mag.		Angle Uo-lo(2)	-180.00...180.0 0 deg		-180,180,-18000,18000
.DifAAAngVBC2.mag.		Angle UBC-IA(2)	-180.00...180.0 0 deg		-180,180,-18000,18000
.DifABAAngVCA2.mag		Angle UCA-IB(2)	-180.00...180.0 0 deg		-180,180,-18000,18000
.DifACAngVAB2.mag		Angle UAB-IC(2)	-180.00...180.0 0 deg		-180,180,-18000,18000
.HzRteChg.mag		Frequency gradient	-10.00...10.00 [Hz/s]		-10,10,-1000,1000
.CondNeut.mag		Conductance Yo	-1000.00...100 0.00 [mS]		-1000,1000,-100000,100000
.SusNeut.mag		Susceptance Yo	-1000.00...100 0.00 [mS]		-1000,1000,-100000,100000
.PPLoopRis.mag		Fault loop resistance	-1000.00...100 0.00 [ohm]		-1000.00,1000.00,-100000,1 00000
.PPLoopReact.mag		Fault loop reactance	-1000.00...100 0.00 [ohm]		-1000.00,1000.00,-100000,1 00000
.CBCIrtm.mag		Breaker clear time	0.000...3.000 [s]		0,3,0,3000

- 1) When reading out fault record values on demand, DNP3 cannot give timestamps for data objects, meaning the timestamps for the moment the objects were recorded. Instead, the timetag of the fault record is available for reading in seven regular DNP3 analog objects.
- 2) If fault record values are received as DNP3 events when they are recorded, the object timestamps, that is, the fault record timestamps, are given in the DNP3 event messages.

2.5.5.6 LD0.FMMXU1 Frequency measurement (1)

Table 310: 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

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

Table 311: 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

2.5.5.8

LD0.RESCMMXU1 Residual current measurement (1)

Table 312: 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

2.5.5.9

LD0.RESCMMXU2 Residual current measurement (2)

Table 313: LD0.RESCMMXU2 Residual current measurement (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.RESCMMXU2					
.A.res.instCVal.mag	Io-A	Residual current	0.00...50.00 [xIn]	R	0,50,0,5000
LD0.RCAVMMXU2					
.A.res.cVal.mag	I_DMD_RES	Residual current demand	0.00...50.00 [xIn]	R	0,50,0,5000
LD0.RCMAMMXU2					
.A.res.cVal.mag	Max demand Io	Residual current max. demand	0.00...50.00 [xIn]	R	0,50,0,5000
LD0.RCMIMMXU2					
.A.res.cVal.mag	Min demand Io	Residual current min. demand	0.00...50.00 [xIn]	R	0,50,0,5000

2.5.5.10

LD0.RESVMMXU1 Residual voltage measurement (1)

Table 314: 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
Table continues on next page					

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IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
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

2.5.5.11 LD0.VAMMXU2 Single-phase voltage measurement (2)

Table 315: LD0.VAMMXU2 Single-phase voltage measurement (2)

IEC 61850 name	SA name	Description	Value	S	Arg 1,2,3,4
LD0.VAMMXU2					
.PhV.phsA.cVal.mag	U_DB_A	Phase voltage A	0.00...4.00 [xUn]	R	0,4,0,400
.PPV.phsAB.cVal.mag	U_DB_AB	Phase-to-phase voltage AB	0.00...4.00 [xUn]	R	0,4,0,400
LD0.VAAVMMXU2					
.PhV.phsA.cVal.mag	U_DMD_A	Demand value phsA	0.00...4.00 [xUn]	R	0,4,0,400
.PPV.phsAB.cVal.mag	U_DMD_AB	Demand value phsAB	0.00...4.00 [xUn]	R	0,4,0,400

2.5.5.12 LD0.VAMMXU3 Single-phase voltage measurement (3)

Table 316: LD0.VAMMXU3 Single-phase voltage measurement (3)

IEC 61850 name	SA name	Description	Value	S	Arg 1,2,3,4
LD0.VAMMXU3					
.PhV.phsA.cVal.mag	U_DB_A	Phase voltage A	0.00...4.00 [xUn]	R	0,4,0,400
.PPV.phsAB.cVal.mag	U_DB_AB	Phase-to-phase voltage AB	0.00...4.00 [xUn]	R	0,4,0,400
LD0.VAAVMMXU3					
.PhV.phsA.cVal.mag	U_DMD_A	Demand value phsA	0.00...4.00 [xUn]	R	0,4,0,400
.PPV.phsAB.cVal.mag	U_DMD_AB	Demand value phsAB	0.00...4.00 [xUn]	R	0,4,0,400

2.5.5.13

LD0.VMMXU1 Three-phase voltage measurement (1)

Table 317: 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
.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

2.5.5.14

LD0.VSMSQI1 Sequence voltage measurement (1)

Table 318: 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

2.5.6 Power quality functions

2.5.6.1 LD0.CMHAI1 Current total demand distortion (1)

Table 319: 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
.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

2.5.6.2 LD0.PHQVVR1 Voltage variation (1)

Table 320: 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

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.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

2.5.6.3 LD0.VMHAI1 Voltage total harmonic distortion (1)

Table 321: 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

2.5.7 Protection functions

2.5.7.1 LD0.MPTTR1 Thermal overload protection for motors (1)

Table 322: LD0.MPTTR1 Thermal overload protection for motors (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.MPTTR1					
.TmpRI	THERM_LEVEL	Thermal level	-99...999	R	-99,999,-99,999

2.5.7.2 LD0.PHIZ1 High-impedance fault detection (1)

Table 323: LD0.PHIZ1 High-impedance fault detection (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.PHIZ1					
.Str.dirGeneral		Start direction	0...10	R	0,10,0,10

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

Table 324: 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
.TmpRI.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

2.5.7.4 LD0.T2PTTR1 Three-phase thermal overload protection, two time constants (1)

Table 325: LD0.T2PTTR1 Three-phase thermal overload protection, two time constants (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.T2PTTR1					
.Tmp.mag	-	Object temperature	-100...9999.9	R	-100,9999.9,0,-1000,99999
.TmpRI.mag	-	Relative temperature	0...99.9	R	0,99.9,0,999

2.5.8 Protection-related functions

2.5.8.1 DR.RDRE1 Disturbance recorder (1)

Table 326: 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

2.5.8.2

LD0.DARREC1 Autoreclosing (1)

Table 327: 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...214748364 7		0,2147483647,0,214748364 7
.RecCnt1.stVal		Shot 1 counter	0...214748364 7		0,2147483647,0,214748364 7
.RecCnt2.stVal		Shot 2 counter	0...214748364 7		0,2147483647,0,214748364 7
.RecCnt3.stVal		Shot 3 counter	0...214748364 7		0,2147483647,0,214748364 7
.RecCnt4.stVal		Shot 4 counter	0...214748364 7		0,2147483647,0,214748364 7
.RecCnt5.stVal		Shot 5 counter	0...214748364 7		0,2147483647,0,214748364 7
.FrqOpCnt.stVal		Shot 6 counter	0...214748364 7		0,2147483647,0,214748364 7

2.5.8.3

LD0.DARREC2 Autoreclosing (2)

Table 328: 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...214748364 7		0,2147483647,0,214748364 7
.RecCnt1.stVal		Shot 1 counter	0...214748364 7		0,2147483647,0,214748364 7
.RecCnt2.stVal		Shot 2 counter	0...214748364 7		0,2147483647,0,214748364 7
.RecCnt3.stVal		Shot 3 counter	0...214748364 7		0,2147483647,0,214748364 7
.RecCnt4.stVal		Shot 4 counter	0...214748364 7		0,2147483647,0,214748364 7
.RecCnt5.stVal		Shot 5 counter	0...214748364 7		0,2147483647,0,214748364 7
.FrqOpCnt.stVal		Shot 6 counter	0...214748364 7		0,2147483647,0,214748364 7

2.5.8.4 LD0.SCEFRFLO1 Fault locator (1)

Table 329: *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
.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

2.5.8.5 LD0.SECRSYN1 Synchronism and energizing check (1)

Table 330: *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

2.5.9 Generic functions

2.5.9.1 LD0.MVI4GAPC1 Integer value move (1)

Table 331: *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

2.5.9.2

LD0.MVI4GAPC2 Integer value move (2)

Table 332: LD0.MVI4GAPC2 Integer value move (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
.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

2.5.9.3

LD0.MVI4GAPC3 Integer value move (3)

Table 333: LD0.MVI4GAPC3 Integer value move (3)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.MVI4GAPC3					
.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

2.5.9.4

LD0.MVI4GAPC4 Integer value move (4)

Table 334: LD0.MVI4GAPC4 Integer value move (4)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.MVI4GAPC4					
.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

2.5.9.5

LD0.SCA4GAPC1 Analog value scaling (1)

Table 335: 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

2.5.9.6 LD0.SCA4GAPC2 Analog value scaling (2)

Table 336: 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

2.5.9.7 LD0.SCA4GAPC3 Analog value scaling (3)

Table 337: 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

2.5.9.8 LD0.SCA4GAPC4 Analog value scaling (4)

Table 338: 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

2.5.10 Physical and raw I/O data

2.5.10.1 LD0.XBRGGIO130 RTD inputs

Table 339: LD0.XBRGGIO130 RTD inputs

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.XBRGGIO130					
.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

2.5.10.2 LD0.XRGGIO105 RTD inputs

Table 340: LD0.XRGGIO105 RTD inputs

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.XRGGIO105					
.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
.AnIn4.instMag	AI_VAL4	RTD input 4	-10000... 10000	R	-1E4,1E4,-1E4,1E4
.AnIn5.instMag	AI_VAL5	RTD input 5	-10000... 10000	R	-1E4,1E4,-1E4,1E4
.AnIn6.instMag	AI_VAL6	RTD input 6	-10000... 10000	R	-1E4,1E4,-1E4,1E4
.AnIn7.instMag	AI_VAL7	RTD input 7	-10000... 10000	R	-1E4,1E4,-1E4,1E4
.AnIn8.instMag	AI_VAL8	RTD input 8	-10000... 10000	R	-1E4,1E4,-1E4,1E4

2.5.10.3 LD0.XRGGIO110 RTD inputs

Table 341: LD0.XRGGIO110 RTD inputs

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.XRGGIO110					
.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

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.AnIn3.instMag	AI_VAL3	RTD input 3	-10000... 10000	R	-1E4,1E4,-1E4,1E4
.AnIn4.instMag	AI_VAL4	RTD input 4	-10000... 10000	R	-1E4,1E4,-1E4,1E4
.AnIn5.instMag	AI_VAL5	RTD input 5	-10000... 10000	R	-1E4,1E4,-1E4,1E4
.AnIn6.instMag	AI_VAL6	RTD input 6	-10000... 10000	R	-1E4,1E4,-1E4,1E4
.AnIn7.instMag	AI_VAL7	RTD input 7	-10000... 10000	R	-1E4,1E4,-1E4,1E4
.AnIn8.instMag	AI_VAL8	RTD input 8	-10000... 10000	R	-1E4,1E4,-1E4,1E4

2.6 Double-bit binary inputs

Table 342: 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 343: 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 344: 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.CBXCBR3 Circuit-breaker control (3)**Table 345:** *CTRL.CBXCBR3 Circuit-breaker control (3)*

IEC 61850 name	SA name	Description	Values
CTRL.CBCSWI3			
.pos.stVal		CB3 position	00, 01, 10, 11

2.6.1.4

CTRL.DCSXSWI1 Disconnector position indication (1)**Table 346:** *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 347:** *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.DCSXSWI3 Disconnector position indication (3)**Table 348:** *CTRL.DCSXSWI3 Disconnector position indication (3)*

IEC 61850 name	SA name	Description	Values
CTRL.DCSXSWI3			
.pos.stVal		DC3 position	00, 01, 10, 11

2.6.1.7

CTRL.DCSXSWI4 Disconnector position indication (4)**Table 349:** *CTRL.DCSXSWI4 Disconnector position indication (4)*

IEC 61850 name	SA name	Description	Values
CTRL.DCSXSWI4			
.pos.stVal		DC4 position	00, 01, 10, 11

2.6.1.8

CTRL.DCXSWI1 Disconnector control (1)**Table 350:** *CTRL.DCXSWI1 Disconnector control (1)*

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

2.6.1.9 CTRL.DCXSWI2 Disconnector control (2)

Table 351: CTRL.DCXSWI2 Disconnector control (2)

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

2.6.1.10 CTRL.DCXSWI3 Disconnector control (3)

Table 352: CTRL.DCXSWI3 Disconnector control (3)

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

2.6.1.11 CTRL.DCXSWI4 Disconnector control (4)

Table 353: CTRL.DCXSWI4 Disconnector control (4)

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

2.6.1.12 CTRL.ESSXSWI1 Earthing switch indication (1)

Table 354: CTRL.ESSXSWI1 Earthing switch indication (1)

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

2.6.1.13 CTRL.ESSXSWI2 Earthing switch indication (2)

Table 355: CTRL.ESSXSWI2 Earthing switch indication (2)

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

2.6.1.14 CTRL.ESSXSWI3 Earthing switch indication (3)

Table 356: CTRL.ESSXSWI3 Earthing switch indication (3)

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

2.6.1.15**CTRL.ESXSWI1 Earthing switch control (1)***Table 357: CTRL.ESXSWI1 Earthing switch control (1)*

IEC 61850 name	SA name	Description	Values
CTRL.ESCSWI1			
.pos.stVal		ES1 position	00, 01, 10, 11

2.6.1.16**CTRL.ESXSWI2 Earthing switch control (2)***Table 358: CTRL.ESXSWI2 Earthing switch control (2)*

IEC 61850 name	SA name	Description	Values
CTRL.ESCSWI2			
.pos.stVal		ES2 position	00, 01, 10, 11

2.6.1.17**CTRL.ESXSWI3 Earthing switch control (3)***Table 359: CTRL.ESXSWI3 Earthing switch control (3)*

IEC 61850 name	SA name	Description	Values
CTRL.ESCSWI3			
.pos.stVal		ES3 position	00, 01, 10, 11

2.7**Counters***Table 360: 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 Metering and measurand functions

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

Table 361: 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 Generic functions

2.7.2.1 LD0.MVI4GAPC1 Integer value move (1)

Table 362: 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

2.7.2.2 LD0.MVI4GAPC2 Integer value move (2)

Table 363: 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

2.7.2.3

LD0.MVI4GAPC3 Integer value move (3)

Table 364: LD0.MVI4GAPC3 Integer value move (3)

IEC 61850 name	SA name	Description	Values
LD0.MVI4GAPC3			
.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

2.7.2.4

LD0.MVI4GAPC4 Integer value move (4)

Table 365: LD0.MVI4GAPC4 Integer value move (4)

IEC 61850 name	SA name	Description	Values
LD0.MVI4GAPC4			
.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 outputs

Table 366: 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 367: 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 Automatic control functions

2.8.2.1 LD0.OLATCC1 Tap changer control with voltage regulator (1)

Table 368: LD0.OLATCC1 Tap changer control with voltage regulator (1)

IEC 61850 name	SA name	Description	Values
LD0.OLATCC1			
.TapChg.Oper.ctlVal		Tap changer control	0/1/2=Cancel/ Lower/Rise

2.8.3 Metering and measurand fucntions

2.8.3.1 LD0.FLTRFRC1 Fault recorder (1)

Table 369: LD0.FLTRFRC1 Fault recorder (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 370: Device profile document

DNP3 device profile document		
Vendor name:		ABB Oy
Device name:		
Highest DNP level supported: For requests: Level 2+ For responses: Level 2+		Device function: <input type="radio"/> Master <input checked="" type="radio"/> 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): Transmitted: 292 Received: 292		Maximum application fragment size (octets): Transmitted: Configurable (256...2048) Received: 2048
Maximum data link re-tries: <input type="radio"/> None <input type="radio"/> Fixed <input checked="" type="radio"/> Configurable (0...65535)		Maximum application layer re-tries: <input checked="" type="radio"/> None <input type="radio"/> Configurable
Requires data link layer confirmation: <input type="radio"/> Never <input type="radio"/> Always <input type="radio"/> Sometimes <input checked="" type="radio"/> Configurable as: "Never", "Only for multi-frame messages", or "Always"		
Requires application layer confirmation: <input type="radio"/> Never <input type="radio"/> Always <input type="radio"/> When reporting event data (slave devices only) <input type="radio"/> When sending multi-fragment responses (slave devices only)		
Table continues on next page		

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DNP3 device profile document						
<input type="radio"/> Sometimes <input checked="" type="radio"/> Configurable as: "Only when reporting event data", or "When reporting event data or multi-fragment messages"						
Timeouts while waiting for:						
Data link confirm:	<input type="radio"/>	None	<input type="radio"/>	Fixed at _____	<input type="radio"/>	Variable
Complete appl. fragment:	<input checked="" type="radio"/>	None	<input type="radio"/>	Fixed at _____	<input type="radio"/>	Variable
Application confirm:	<input type="radio"/>	None	<input type="radio"/>	Fixed at _____	<input type="radio"/>	Variable
Complete appl. response:	<input checked="" type="radio"/>	None	<input type="radio"/>	Fixed at _____	<input type="radio"/>	Variable
Others:	Select/Operate Arm timeout, configurable in DNP setting parameters. Regardless 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	<input checked="" type="radio"/>	Never	<input type="radio"/>	Always	<input type="radio"/>	Sometimes
SELECT/ OPERATE	<input type="radio"/>	Never	<input type="radio"/>	Always	<input type="radio"/>	Sometimes
DIRECT OPERATE	<input type="radio"/>	Never	<input type="radio"/>	Always	<input type="radio"/>	Sometimes
DIRECT OPERATE - NO ACK	<input type="radio"/>	Never	<input type="radio"/>	Always	<input type="radio"/>	Sometimes
Count > 1 (Count > 1 is accepted but ignored)	<input checked="" type="radio"/>	Never	<input type="radio"/>	Always	<input type="radio"/>	Sometimes
Pulse on	<input checked="" type="radio"/>	Never	<input type="radio"/>	Always	<input type="radio"/>	Sometimes
Pulse off	<input checked="" type="radio"/>	Never	<input type="radio"/>	Always	<input type="radio"/>	Sometimes
Latch on	<input type="radio"/>	Never	<input checked="" type="radio"/>	Always	<input type="radio"/>	Sometimes
Latch off	<input type="radio"/>	Never	<input checked="" type="radio"/>	Always	<input type="radio"/>	Sometimes
Queue	<input checked="" type="radio"/>	Never	<input type="radio"/>	Always	<input type="radio"/>	Sometimes
Clear queue	<input checked="" type="radio"/>	Never	<input type="radio"/>	Always	<input type="radio"/>	Sometimes
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:			
<input type="radio"/> Never <input type="radio"/> Only when time-tagged <input type="radio"/> Only non-time-tagged <input checked="" type="radio"/> Configurable to send one or the other			<input type="radio"/> Never <input type="radio"/> Binary input change with time <input type="radio"/> Binary input change with relative time <input checked="" type="radio"/> Configurable			
Sends unsolicited responses:			Sends static data in unsolicited responses:			
<input checked="" type="radio"/> Never <input type="radio"/> Configurable			<input checked="" type="radio"/> Never <input type="radio"/> When device restarts			
Table continues on next page						

DNP3 device profile document																							
<ul style="list-style-type: none"> <input type="radio"/> Only certain objects <input type="radio"/> Sometimes <input type="radio"/> ENABLE/DISABLE UNSOLICITED function codes supported 	<ul style="list-style-type: none"> <input type="radio"/> When status flags change 	No other options are permitted.																					
Default counter object/variation: <ul style="list-style-type: none"> <input checked="" type="radio"/> No counters reported <input type="radio"/> Configurable <input type="radio"/> Default object Default variation: <input type="radio"/> Point-by-point list attached 	Counters roll over at: <ul style="list-style-type: none"> <input checked="" type="radio"/> No counters reported <input type="radio"/> Configurable (Counter roll-over depends on the root-data object) <input type="radio"/> 16 bits <input type="radio"/> 32 bits <input type="radio"/> Other value: _____ <input type="radio"/> Point-by-point list attached 																						
Sends multi-fragment responses: <ul style="list-style-type: none"> <input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Configurable 																							
Sequential file transfer support: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Append file mode</td> <td style="width: 30%; text-align: center;"><input type="radio"/> Yes</td> <td style="width: 30%; text-align: center;"><input checked="" type="radio"/> No</td> </tr> <tr> <td>Custom status code strings</td> <td style="text-align: center;"><input type="radio"/> Yes</td> <td style="text-align: center;"><input checked="" type="radio"/> No</td> </tr> <tr> <td>Permissions field</td> <td style="text-align: center;"><input type="radio"/> Yes</td> <td style="text-align: center;"><input checked="" type="radio"/> No</td> </tr> <tr> <td>File events assigned to class</td> <td style="text-align: center;"><input type="radio"/> Yes</td> <td style="text-align: center;"><input checked="" type="radio"/> No</td> </tr> <tr> <td>File events send immediately</td> <td style="text-align: center;"><input type="radio"/> Yes</td> <td style="text-align: center;"><input checked="" type="radio"/> No</td> </tr> <tr> <td>Multiple blocks in a fragment</td> <td style="text-align: center;"><input type="radio"/> Yes</td> <td style="text-align: center;"><input checked="" type="radio"/> No</td> </tr> <tr> <td>Max number of files open</td> <td style="text-align: center;">0</td> <td></td> </tr> </table>	Append file mode	<input type="radio"/> Yes	<input checked="" type="radio"/> No	Custom status code strings	<input type="radio"/> Yes	<input checked="" type="radio"/> No	Permissions field	<input type="radio"/> Yes	<input checked="" type="radio"/> No	File events assigned to class	<input type="radio"/> Yes	<input checked="" type="radio"/> No	File events send immediately	<input type="radio"/> Yes	<input checked="" type="radio"/> No	Multiple blocks in a fragment	<input type="radio"/> Yes	<input checked="" type="radio"/> No	Max number of files open	0			
Append file mode	<input type="radio"/> Yes	<input checked="" type="radio"/> No																					
Custom status code strings	<input type="radio"/> Yes	<input checked="" type="radio"/> No																					
Permissions field	<input type="radio"/> Yes	<input checked="" type="radio"/> No																					
File events assigned to class	<input type="radio"/> Yes	<input checked="" type="radio"/> No																					
File events send immediately	<input type="radio"/> Yes	<input checked="" type="radio"/> No																					
Multiple blocks in a fragment	<input type="radio"/> Yes	<input checked="" type="radio"/> No																					
Max number of files open	0																						
• = Selected, <input type="radio"/> = 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.

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Table 371: *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 = 1) 08 (limited qty)	129 (response)	00, 01 (start-stop) 17, 28 (index) ²⁾
			2 (write)	07 (limited qty = 1)		
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	Unsynchro nized time and date CTO			129 (response) 130 (unsol. resp)	07 (limited qty) (qty = 1)

Table continues on next page

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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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