

RELION® PROTECTION AND CONTROL

615 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

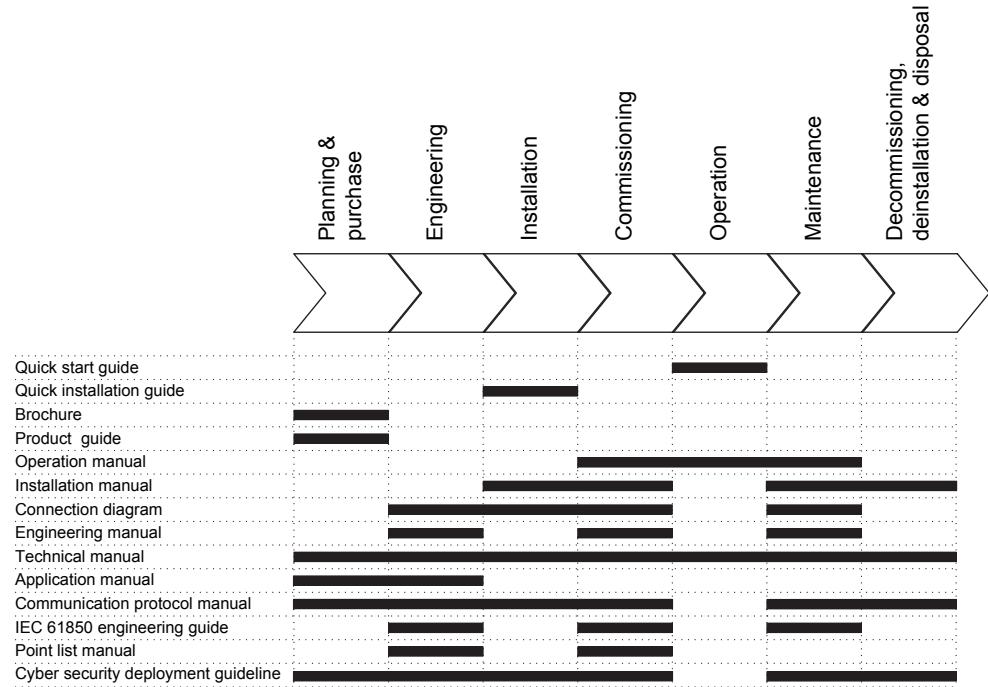


Figure 1: The intended use of documents during the product life cycle



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

1.3.2 Document revision history

Document revision/date	Product version	History
A/2014-01-24	5.0	First release
B/2015-10-30	5.0 FP1	Content updated to correspond to the product series version
C/2016-05-20	5.0 FP1	Content updated
D/2018-12-20	5.0 FP1	Content updated



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1.3.3

Related documentation

Name of the document	Document ID
DNP3 Communication Protocol Manual	1MRS756709

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	IEC-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)
Three-phase voltage-dependent overcurrent protection	PHPVOC1	3I(U)> (1)	51V (1)
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)
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)
Transient/intermittent earth-fault protection	INTRTEF1	Io> -> IEF (1)	67NIEF (1)

Table continues on next page

Function	IEC 61850	IEC 60617	IEC-ANSI
Harmonics-based earth-fault protection	HAEFPTOC1	Io>HA (1)	51NHA (1)
Non-directional (cross-country) earth-fault protection, using calculated Io	EFHPTOC1	Io>> (1)	51N-2 (1)
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)
Three-phase overvoltage protection	PHPTOV1	3U> (1)	59 (1)
	PHPTOV2	3U> (2)	59 (2)
	PHPTOV3	3U> (3)	59 (3)
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	FRPFHQ1	f>/f<,df/dt (1)	81 (1)
	FRPFHQ2	f>/f<,df/dt (2)	81 (2)
	FRPFHQ3	f>/f<,df/dt (3)	81 (3)
	FRPFHQ4	f>/f<,df/dt (4)	81 (4)
	FRPFHQ5	f>/f<,df/dt (5)	81 (5)
	FRPFHQ6	f>/f<,df/dt (6)	81 (6)
Overexcitation protection	OEPVPH1	U/f> (1)	24 (1)
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 load supervision	LOFLPTUC1	3I< (1)	37 (1)
Motor load jam protection	JAMPTOC1	Ist> (1)	51LR (1)
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)
Binary signal transfer	BSTGGIO1	BST (1)	BST (1)
Table continues on next page			

Function	IEC 61850	IEC 60617	IEC-ANSI
Stabilized and instantaneous differential protection for two-winding transformers	TR2PTDF1	3dI>T (1)	87T (1)
Numerically stabilized low-impedance restricted earth-fault protection	LREFPNDF1	dIoLo> (1)	87NL (1)
High-impedance based restricted earth-fault protection	HREFPDIF1	dIoHi> (1)	87NH (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)
Circuit breaker failure protection	CCBRBRF1	3I>/Io>BF (1)	51BF/51NBF (1)
Three-phase inrush detector	INRPHAR1	3I2f> (1)	68 (1)
Switch onto fault	CBPSOF1	SOTF (1)	SOTF (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)
	TRPPTRC5	Master Trip (5)	94/86 (5)
	TRPPTRC6	Master Trip (6)	94/86 (6)
Arc protection	ARC SARC1	ARC (1)	50L/50NL (1)
	ARC SARC2	ARC (2)	50L/50NL (2)
	ARC SARC3	ARC (3)	50L/50NL (3)
Table continues on next page			

Function	IEC 61850	IEC 60617	IEC-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)
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)
Fault locator	SCEFRFLO1	FLOC (1)	21FL (1)
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)
Three-phase current unbalance protection for shunt capacitor banks	HCUBPTOC1	3dI>C (1)	51NC-2 (1)
Shunt capacitor bank switching resonance protection, current based	SRCPTOC1	TD>(1)	55TD (1)
Line differential protection with in-zone power transformer	LNPLDF1	3Id/I>(1)	87L (1)
High-impedance fault detection	PHIZ1	HIF (1)	HIZ (1)
Stabilized and instantaneous differential protection for machines	MPDIF1	3dI>G/M (1)	87G/M (1)
Third harmonic-based stator earth-fault protection	H3EFPSEF1	dUo>/Uo3H (1)	27/59THD (1)
Underpower protection	DUPPDPR1	P<(1)	32U (1)
	DUPPDPR2	P<(2)	32U (2)
Table continues on next page			

Function	IEC 61850	IEC 60617	IEC-ANSI
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)
Three-phase underimpedance protection	UZPDIS1	Z>G (1)	21G (1)
Out-of-step protection	OOSRPSB1	OOS (1)	78 (1)
Multifrequency admittance-based earth-fault protection	MFADPSDE1	Io> ->Y (1)	67YN (1)
Interconnection functions			
Directional reactive power undervoltage protection	DQPTUV1	Q> ->,3U< (1)	32Q,27 (1)
Low-voltage ride-through protection	LVRTPTUV1	U<RT (1)	27RT (1)
	LVRTPTUV2	U<RT (2)	27RT (2)
	LVRTPTUV3	U<RT (3)	27RT (3)
Voltage vector shift protection	VVSPPAM1	VS (1)	78V (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)
Control			
Circuit-breaker control	CBXCBR1	I <-> O CB (1)	I <-> O CB (1)
Disconnecter control	DCXSWI1	I <-> O DCC (1)	I <-> O DCC (1)
	DCXSWI2	I <-> O DCC (2)	I <-> O DCC (2)
Earthing switch control	ESXSWI1	I <-> O ESC (1)	I <-> O ESC (1)
Disconnecter 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)
Earthing switch indication	ESSXSWI1	I <-> O ES (1)	I <-> O ES (1)
	ESSXSWI2	I <-> O ES (2)	I <-> O ES (2)
Emergency start-up	ESMGAPC1	ESTART (1)	ESTART (1)
Autoreclosing	DARREC1	O -> I (1)	79 (1)
Tap changer position indication	TPOSYLTC1	TPOSM (1)	84M (1)
Tap changer control with voltage regulator	OLATCC1	COLTC (1)	90V (1)
Synchronism and energizing check	SECRSYN1	SYNC (1)	25 (1)
Condition monitoring and supervision			
Circuit-breaker condition monitoring	SSCBR1	CBCM (1)	CBCM (1)
Table continues on next page			

Function	IEC 61850	IEC 60617	IEC-ANSI
Trip circuit supervision	TCSSCBR1	TCS (1)	TCM (1)
	TCSSCBR2	TCS (2)	TCM (2)
Current circuit supervision	CCSPVC1	MCS 3I (1)	MCS 3I (1)
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)
Fuse failure supervision	SEQSPVC1	FUSEF (1)	60 (1)
Protection communication supervision	PCSITPC1	PCS (1)	PCS (1)
Runtime counter for machines and devices	MDSOPT1	OPTS (1)	OPTM (1)
Measurement			
Disturbance recorder	RDRE1	DR (1)	DFR (1)
Load profile record	LDPRLRC1	LOADPROF (1)	LOADPROF (1)
Fault record	FLTRFRC1	FAULTREC (1)	FAULTREC (1)
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)
Residual current measurement	RESCMMXU1	Io (1)	In (1)
	RESCMMXU2	Io (2)	In (2)
Three-phase voltage measurement	VMMXU1	3U (1)	3V (1)
	VMMXU2	3U (2)	3V (2)
Residual voltage measurement	RESVMMXU1	Uo (1)	Vn (1)
	RESVMMXU2	Uo (2)	Vn (2)
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)
RTD/mA measurement	XRGGIO130	X130 (RTD) (1)	X130 (RTD) (1)
Frequency measurement	FMMXU1	f (1)	f (1)
IEC 61850-9-2 LE sampled value sending	SMVSENDER	SMVSENDER	SMVSENDER
IEC 61850-9-2 LE sampled value receiving (voltage sharing)	SMVRCV	SMVRCV	SMVRCV
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)
Table continues on next page			

Function	IEC 61850	IEC 60617	IEC-ANSI
Minimum pulse timer (2 pcs, second resolution)	TPSGAPC1	TPS (1)	TPS (1)
Minimum pulse timer (2 pcs, minute resolution)	TPMGAPC1	TPM (1)	TPM (1)
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)
Generic control point (16 pcs)	SPCGAPC1	SPC (1)	SPC (1)
	SPCGAPC2	SPC (2)	SPC (2)
Analog value scaling	SCA4GAPC1	SCA4 (1)	SCA4 (1)
	SCA4GAPC2	SCA4 (2)	SCA4 (2)
	SCA4GAPC3	SCA4 (3)	SCA4 (3)
	SCA4GAPC4	SCA4 (4)	SCA4 (4)
Integer value move	MVI4GAPC1	MVI4 (1)	MVI4 (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 RED615

Table 2: Supported functions

Function	IEC 61850	A	B	C	D	E
Protection						
Three-phase non-directional overcurrent protection, low stage	PHLPTOC	1	1	1		
Three-phase non-directional overcurrent protection, high stage	PHHPTOC	2	2	2		
Three-phase non-directional overcurrent protection, instantaneous stage	PHIPTOC	1	1	1	1	1
Three-phase directional overcurrent protection, low stage	DPHLPDOC				2	2
Three-phase directional overcurrent protection, high stage	DPHHPDOC				1	1
Non-directional earth-fault protection, low stage	EFLPTOC			2		
Non-directional earth-fault protection, high stage	EFHPTOC			1		
Non-directional earth-fault protection, instantaneous stage	EFIPTOC			1		
Directional earth-fault protection, low stage	DEFLPDEF		2 ¹⁾		2	2 ²⁾
Directional earth-fault protection, high stage	DEFHPDEF		1 ¹⁾		1	1 ²⁾
Admittance-based earth-fault protection ³⁾	EFPADM		(3) ¹⁾³⁾		(3) ³⁾	(3) ²⁾³⁾
Table continues on next page						

Section 2

DNP3 data mappings

1MRS758069 D

Function	IEC 61850	A DE01	B DE02	C DE03	D DE04	E DE05
Wattmetric-based earth-fault protection ³⁾	WPWDE		(3) ¹⁾³⁾		(3) ³⁾	(3) ²⁾³⁾
Transient/intermittent earth-fault protection	INTRPTEF		1 ¹⁾⁴⁾		1 ⁴⁾	1 ²⁾⁴⁾
Harmonics-based earth-fault protection ³⁾	HAEFPTOC		(1) ³⁾⁴⁾	(1) ³⁾⁴⁾	(1) ³⁾⁴⁾	(1) ³⁾⁴⁾
Non-directional (cross-country) earth-fault protection, using calculated Io	EFHPTOC		1		1	1
Negative-sequence overcurrent protection	NSPTOC	2	2	2	2	2
Phase discontinuity protection	PDNSPTOC		1	1	1	1
Residual overvoltage protection	ROVPTOV		3 ¹⁾		3	3 ²⁾
Three-phase undervoltage protection	PHPTUV				3	3
Three-phase overvoltage protection	PHPTOV				3	3
Positive-sequence undervoltage protection	PSPTUV				1	1
Negative-sequence overvoltage protection	NSPTOV				1	1
Frequency protection	FRPFRQ				4	4
Three-phase thermal protection for feeders, cables and distribution transformers	T1PTTR		1	1	1	1
Three-phase thermal overload protection, two time constants	T2PTTR		1	1	1	1
Binary signal transfer	BSTGGIO	1	1	1	1	1
Circuit breaker failure protection	CCBRBRF	1 ⁵⁾	1	1	1	1
Three-phase inrush detector	INRPHAR	1	1	1	1	1
Switch onto fault	CBPSOF	1	1	1	1	1
Master trip	TRPPTRC	2	2	2	2	2
Multipurpose protection	MAPGAPC	18	18	18	18	18
Fault locator	SCEFRFLO				(1)	(1)
Line differential protection with in-zone power transformer	LNPLDF	1	1	1	1	1
High-impedance fault detection	PHIZ	1	1	1	1	
Power quality						
Current total demand distortion	CMHAI				(1) ⁶⁾	(1) ⁶⁾
Voltage total harmonic distortion	VMHAI				(1) ⁶⁾	(1) ⁶⁾
Voltage variation	PHQVVVR				(1) ⁶⁾	(1) ⁶⁾
Voltage unbalance	VSQVUB				(1) ⁶⁾	(1) ⁶⁾
Control						
Circuit-breaker control	CBXCBR	1	1	1	1	1
Disconnecter control	DCXSWI	2	2	2	2	2
Earthing switch control	ESXSWI	1	1	1	1	1
Disconnecter position indication	DCSXSWI	3	3	3	3	3
Earthing switch indication	ESSXSWI	2	2	2	2	2
Autoreclosing	DARREC		(1)	(1)	(1)	(1)
Synchronism and energizing check	SECRSYN				1	(1) ⁷⁾
Condition monitoring and supervision						
Circuit-breaker condition monitoring	SSCBR		1	1	1	1
Trip circuit supervision	TCSSCBR	2	2	2	2	2
Current circuit supervision	CCSPVC	1	1	1	1	1
Fuse failure supervision	SEQSPVC				1	1
Protection communication supervision	PCSITPC	1	1	1	1	1
Runtime counter for machines and devices	MDSOPT	1	1	1	1	1
Measurement						
Disturbance recorder	RDRE	1	1	1	1	1
Load profile record	LDPRRLRC	1	1	1	1	1
Fault record	FLTRFRC	1	1	1	1	1
Three-phase current measurement	CMMXU	1	1	1	1	1
Sequence current measurement	CSMSQI	1	1	1	1	1
Residual current measurement	RESCMMXU		1	1	1	1

Table continues on next page

Function	IEC 61850	A	B	C	D	E
		DE01	DE02	DE03	DE04	DE05
Three-phase voltage measurement	VMMXU				2	1 (1) ⁷⁾
Residual voltage measurement	RESVMMXU		1		1	
Sequence voltage measurement	VSMSQI				1	1
Three-phase power and energy measurement	PEMMXU				1	1
RTD/mA measurement	XRGGIO130				(1)	
Frequency measurement	FMMXU				1	1
IEC 61850-9-2 LE sampled value sending ⁷⁾⁸⁾	SMVSENDER				(1)	(1)
IEC 61850-9-2 LE sampled value receiving (voltage sharing) ⁷⁾⁸⁾	SMVRCV				(1)	(1)
Other						
Minimum pulse timer (2 pcs)	TPGAPC	4	4	4	4	4
Minimum pulse timer (2 pcs, second resolution)	TPSGAPC	1	1	1	1	1
Minimum pulse timer (2 pcs, minute resolution)	TPMGAPC	1	1	1	1	1
Pulse timer (8 pcs)	PTGAPC	2	2	2	2	2
Time delay off (8 pcs)	TOFGAPC	4	4	4	4	4
Time delay on (8 pcs)	TONGAPC	4	4	4	4	4
Set-reset (8 pcs)	SRGAPC	4	4	4	4	4
Move (8 pcs)	MVGAPC	2	2	2	2	2
Generic control point (16 pcs)	SPCGAPC	2	2	2	2	2
Analog value scaling (4 pcs)	SCA4GAPC	4	4	4	4	4
Integer value move (4 pcs)	MVI4GAPC	1	1	1	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) "Uo measured" is always used.
- 2) "Uo calculated" is always used.
- 3) One of the following can be ordered as an option: admittance-based E/F, wattmetric-based E/F or harmonics-based E/F.
- 4) "Io measured" is always used.
- 5) "Io calculated" is always used.
- 6) Power quality option includes current total demand distortion, voltage total harmonic distortion, voltage variation and voltage unbalance.
- 7) Available only with IEC 61850-9-2
- 8) Available only with COM0031...0037

2.2.2 Supported functions in REF615

Table 3: *Supported functions*

Function	IEC 61850	A	B	C	D	E	F	G	H	J	K	L	N
		FE01	FE02	FE03	FE04	FE05	FE06	FE07	FE08	FE09	FE10	FE11	FE12
Protection													
Three-phase non-directional overcurrent protection, low stage	PHLPTOC	1	1	1	1	1			1		1	2	2
Three-phase non-directional overcurrent protection, high stage	PHHPTOC	2	2	2	2	2			2		1	1	1
Three-phase non-directional overcurrent protection, instantaneous stage	PHIPTOC	1	1	1	1	1	1	1	1	1	1	1	1
Three-phase directional overcurrent protection, low stage	DPHLPDOC						2	2		2	1	2	2

Table continues on next page

Section 2

DNP3 data mappings

1MRS758069 D

Function	IEC 61850	A	B	C	D	E	F	G	H	J	K	L	N
		FE01	FE02	FE03	FE04	FE05	FE06	FE07	FE08	FE09	FE10	FE11	FE12
Three-phase directional overcurrent protection, high stage	DPHPDOC						1	1		1	1	1	1
Non-directional earth-fault protection, low stage	EFLPTOC			2	2				2		2	2	2
Non-directional earth-fault protection, high stage	EFHPTOC			1	1				1		1		1
Non-directional earth-fault protection, instantaneous stage	EFIPTOC			1	1				1		1	1	1
Directional earth-fault protection, low stage	DEFLPDEF	2 ¹⁾	2 ¹⁾			2	2	2 ²⁾		2	1	2 ²⁾	2
Directional earth-fault protection, high stage	DEFHPDEF	1 ¹⁾	1 ¹⁾			1	1	1 ²⁾		1	1	1 ²⁾	1
Admittance-based earth-fault protection ³⁾	EFPADM	(3) ¹⁾³⁾	(3) ¹⁾³⁾			(3) ³⁾	(3) ³⁾	(3) ²⁾³⁾		(3) ³⁾		(3) ²⁾³⁾	(3) ³⁾
Wattmetric-based earth-fault protection ³⁾	WPWDE	(3) ¹⁾³⁾	(3) ¹⁾³⁾			(3) ³⁾	(3) ³⁾	(3) ²⁾³⁾		(3) ³⁾		(3) ²⁾³⁾	(3) ³⁾
Transient/intermittent earth-fault protection	INTRPTEF	1 ⁴⁾	1 ⁴⁾			1 ⁴⁾	1 ⁴⁾			1 ⁴⁾		1 ²⁾⁴⁾	1 ⁴⁾
Harmonics-based earth-fault protection ³⁾	HAEFPTOC		(1) ³⁾⁴⁾		(1) ³⁾⁴⁾		(1) ³⁾⁴⁾			(1) ³⁾⁴⁾		(1) ³⁾⁴⁾	(1) ³⁾⁴⁾
Non-directional (cross-country) earth-fault protection, using calculated Io	EFHPTOC	1	1			1	1	1		1		1	
Negative-sequence overcurrent protection	NSPTOC	2	2	2	2	2	2	2	2	2	2	2	2
Phase discontinuity protection	PDNSPTOC	1	1	1	1	1	1	1	1	1		1	1
Residual overvoltage protection	ROVPTOV	3 ¹⁾	3 ¹⁾			3	3	3 ²⁾	3	3	2	3 ²⁾	3
Three-phase undervoltage protection	PHPTUV						3	3	3	3	2	3	3
Three-phase overvoltage protection	PHPTOV						3	3	3	3	2	3	3
Positive-sequence undervoltage protection	PSPTUV						1	1		1		2	2
Negative-sequence overvoltage protection	NSPTOV						1	1		1		2	2
Frequency protection	FRPFRQ								3	3	3	6	6
Three-phase thermal protection for feeders, cables and distribution transformers	T1PTTR	1	1	1	1	1	1	1		1	1	1	1
High-impedance based restricted earth-fault protection	HREFPDIF										1 ⁵⁾		
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

Table continues on next page

Function	IEC 61850	A	B	C	D	E	F	G	H	J	K	L	N
		FE01	FE02	FE03	FE04	FE05	FE06	FE07	FE08	FE09	FE10	FE11	FE12
Circuit breaker failure protection	CCBRBRF	1	1	1	1	1	1	1	1	1	1	1	1
Three-phase inrush detector	INRPHAR	1	1	1	1	1	1	1	1	1	1	1	1
Switch onto fault	CBPSOF	1	1	1	1	1	1	1	1	1	1	1	1
Master trip	TRPPTRC	2	2 (3) ⁶⁾	2	2 (3) ⁶⁾								
Arc protection	ARCSARC	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Multipurpose protection	MAPGAPC	18	18	18	18	18	18	18	18	18	18	18	18
Fault locator	SCEFFRLO										(1)	(1)	(1)
High-impedance fault detection	PHIZ		1		1	1	1	1	1	1			1
Reverse power/directional overpower protection	DOPPDPR											2	2
Multifrequency admittance-based earth-fault protection	MFADPSDE											1	1
Interconnection functions													
Directional reactive power undervoltage protection	DQPTUV											(1)	(1)
Low-voltage ride-through protection	LVRTPTUV											(3)	(3)
Voltage vector shift protection	VVSPPAM											(1)	(1)
Power quality													
Current total demand distortion	CMHAI										(1) ⁷⁾	(1) ⁷⁾	(1) ⁷⁾
Voltage total harmonic distortion	VMHAI										(1) ⁷⁾	(1) ⁷⁾	(1) ⁷⁾
Voltage variation	PHQVVR										(1) ⁷⁾	(1) ⁷⁾	(1) ⁷⁾
Voltage unbalance	VSQVUB										(1) ⁷⁾	(1) ⁷⁾	(1) ⁷⁾
Control													
Circuit-breaker control	CBXCBR	1	1	1	1	1	1	1	1	1	1	1	1
Disconnecter control	DCXSWI		2		2	2	2	2	2	2	2	2	2
Earthing switch control	ESXSWI		1		1	1	1	1	1	1	1	1	1
Disconnecter position indication	DCSXSWI		3		3	3	3	3	3	3	3	3	3
Earthing switch indication	ESSXSWI		2		2	2	2	2	2	2	2	2	2
Autoreclosing	DARREC	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Synchronism and energizing check	SECRSYN							(1) ⁸⁾	1	1	1	(1) ⁸⁾	1
Condition monitoring and supervision													
Circuit-breaker condition monitoring	SSCBR		1		1	1	1	1	1	1	1	1	1
Trip circuit supervision	TCSSCBR	2	2	2	2	2	2	2	2	2	2	2	2
Current circuit supervision	CCSPVC					1	1	1	1	1	1	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
Table continues on next page													

Section 2

DNP3 data mappings

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Function	IEC 61850	A	B	C	D	E	F	G	H	J	K	L	N
		FE01	FE02	FE03	FE04	FE05	FE06	FE07	FE08	FE09	FE10	FE11	FE12
Current transformer supervision for high-impedance protection scheme for phase C	HZCCCSPVC												1
Fuse failure supervision	SEQSPVC					1	1	1	1	1	1	1	1
Runtime counter for machines and devices	MDSOPT	1	1	1	1	1	1	1	1	1	1	1	1
Measurement													
Disturbance recorder	RDRE	1	1	1	1	1	1	1	1	1	1	1	1
Load profile record	LDPRLRC		1		1	1	1	1	1	1	1	1	1
Fault record	FLTRFRC	1	1	1	1	1	1	1	1	1	1	1	1
Three-phase current measurement	CMMXU	1	1	1	1	1	1	1	1	1	1	1	1
Sequence current measurement	CSMSQI	1	1	1	1	1	1	1	1	1	1	1	1
Residual current measurement	RESCMMXU	1	1	1	1	1	1	1	1	1	2	1	1
Three-phase voltage measurement	VMMXU					1	1	1	2	2	2	1	2
Residual voltage measurement	RESVMMXU	1	1			1	1		1	1	1		1
Sequence voltage measurement	VSMSQI					1	1	1	1	1	1	1	1
Three-phase power and energy measurement	PEMMXU					1	1	1	1	1	1	1	1
RTD/mA measurement	XRGPIO130		(1)		(1)	(1)	(1)		(1)	(1)			(1)
Frequency measurement	FMMXU					1	1	1	1	1	1	1	1
IEC 61850-9-2 LE sampled value sending ⁸⁾⁹⁾	SMVSENDER					(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
IEC 61850-9-2 LE sampled value receiving (voltage sharing) ⁸⁾⁹⁾	SMVRCV					(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Other													
Minimum pulse timer (2 pcs)	TPGAPC	4	4	4	4	4	4	4	4	4	4	4	4
Minimum pulse timer (2 pcs, second resolution)	TPSGAPC	1	1	1	1	1	1	1	1	1	1	1	1
Minimum pulse timer (2 pcs, minute resolution)	TPMGAPC	1	1	1	1	1	1	1	1	1	1	1	1
Pulse timer (8 pcs)	PTGAPC	2	2	2	2	2	2	2	2	2	2	2	2
Time delay off (8 pcs)	TOFGAPC	4	4	4	4	4	4	4	4	4	4	4	4
Time delay on (8 pcs)	TONGAPC	4	4	4	4	4	4	4	4	4	4	4	4
Set-reset (8 pcs)	SRGAPC	4	4	4	4	4	4	4	4	4	4	4	4
Move (8 pcs)	MVGAPC	2	2	2	2	2	2	2	2	2	2	2	2
Generic control point (16 pcs)	SPCGAPC	2	2	2	2	2	2	2	2	2	2	2	2
Analog value scaling (4 pcs)	SCA4GAPC	4	4	4	4	4	4	4	4	4	4	4	4
Integer value move (4 pcs)	MVI4GAPC	1	1	1	1	1	1	1	1	1	1	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) "Uo measured" is always used.

- 2) "Uo calculated" is always used.
- 3) One of the following can be ordered as an option: admittance-based E/F, wattmetric-based E/F or harmonics-based E/F.
- 4) "Io measured" is always used.
- 5) "IoB measured" is always used.
- 6) Master trip is included and connected to the corresponding HSO in the configuration only when the BIO0007 module is used. If additionally the ARC option is selected, ARCSARC is connected in the configuration to the corresponding master trip input.
- 7) Power quality option includes current total demand distortion, voltage total harmonic distortion, voltage variation and voltage unbalance.
- 8) Available only with IEC 61850-9-2
- 9) Available only with COM0031...0037

2.2.3 Supported functions in REG615

Table 4: *Supported functions*

Function	IEC 61850	A	C	D
		GE01	GE03	GE04
Protection				
Three-phase non-directional overcurrent protection, low stage	PHLPTOC		1	1
Three-phase non-directional overcurrent protection, high stage	PHHPTOC		1	1
Three-phase non-directional overcurrent protection, instantaneous stage	PHIPTOC	1	1	1
Three-phase directional overcurrent protection, low stage	DPHLPOC	2		1 TR
Three-phase directional overcurrent protection, high stage	DPPHPDOC	1		1 TR
Three-phase voltage-dependent overcurrent protection	PHPVOC		1	1
Non-directional earth-fault protection, high stage	EFHPTOC	1	1	1
Directional earth-fault protection, low stage	DEFLPDEF	2	2	2
Directional earth-fault protection, high stage	DEFHPDEF	1	1	1
Transient/intermittent earth-fault protection	INTRTEF	1 ¹⁾		
Negative-sequence overcurrent protection	NSPTOC	2		
Negative-sequence overcurrent protection for machines	MNSPTOC		2	2
Residual overvoltage protection	ROVPTOV	2	2	2
Three-phase undervoltage protection	PHPTUV	2	2	2
Three-phase overvoltage protection	PHPTOV	2	2	2
Positive-sequence undervoltage protection	PSPTUV	2	2	2
Negative-sequence overvoltage protection	NSPTOV	2	2	2
Frequency protection	FRPFHQ	6	6	4
Overexcitation protection	OEPVPH		1	1
Three-phase thermal protection for feeders, cables and distribution transformers	T1PTTR	1		
Three-phase thermal overload protection, two time constants	T2PTTR		1	1
Circuit breaker failure protection	CCCBRBF	1	1 ²⁾	1 ²⁾
Three-phase inrush detector	INRPHAR	1	1	1
Master trip	TRPPTRC	2 (3) ³⁾	3 (3) ³⁾	3 (3) ³⁾
Arc protection	ARCSARC	(3)	(3) ²⁾	(3) ²⁾
Multipurpose protection	MAPGAPC	18	18	18
Stabilized and instantaneous differential protection for machines	MPDIF			1
Third harmonic-based stator earth-fault protection	H3EFPSEF		1	
Underpower protection	DUPPDPR		2	2
Reverse power/directional overpower protection	DOPPDPR	2	3	2
Three-phase underexcitation protection	UEXPDIS		1	1
Three-phase underimpedance protection	UZPDIS		1	
Out-of-step protection	OOSRPSB		1	1
Interconnection functions				
Directional reactive power undervoltage protection	DQPTUV	1		

Table continues on next page

Section 2

DNP3 data mappings

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Function	IEC 61850	A	C	D
	GE01	GE03	GE04	
Low-voltage ride-through protection	LVRTPTUV	3		
Voltage vector shift protection	VVSPPAM	1		
Power quality				
Current total demand distortion	CMHAI	(1) ⁴⁾	(1) ⁴⁾	(1) ⁴⁾
Voltage total harmonic distortion	VMHAI	(1) ⁴⁾	(1) ⁴⁾	(1) ⁴⁾
Voltage variation	PHQVVR	(1) ⁴⁾	(1) ⁴⁾	(1) ⁴⁾
Voltage unbalance	VSQVUB	(1) ⁴⁾	(1) ⁴⁾	(1) ⁴⁾
Control				
Circuit-breaker control	CBXCBR	1	1	1
Disconnecter control	DCXSWI	2	2	2
Earthing switch control	ESXSWI	1	1	1
Disconnecter position indication	DCSXSWI	3	3	3
Earthing switch indication	ESSXSWI	2	2	2
Synchronism and energizing check	SECRSYN	1		1
Condition monitoring and supervision				
Circuit-breaker condition monitoring	SSCBR	1	1	1
Trip circuit supervision	TCSSCBR	2	2	2
Current circuit supervision	CCSPVC	1		
Fuse failure supervision	SEQSPVC	1	1	1
Runtime counter for machines and devices	MDSOPT	1	1	1
Measurement				
Disturbance recorder	RDRE	1	1	1
Load profile record	LDPRLRC	1	1	1
Fault record	FLTRFRC	1	1	1
Three-phase current measurement	CMMXU	1	1	2
Sequence current measurement	CSMSQI	1	1	1
Residual current measurement	RESCMMXU	1	1	1
Three-phase voltage measurement	VMMXU	2	1	2
Residual voltage measurement	RESVMMXU	1	2	1
Sequence voltage measurement	VSMSQI	1	1	1
Three-phase power and energy measurement	PEMMXU	1	1	1
RTD/mA measurement	XRGGIO130	(1)	(1)	(1)
Frequency measurement	FMMXU	1	1	1
IEC 61850-9-2 LE sampled value sending ⁵⁾⁶⁾	SMVSENDER	(1)	(1)	(1)
IEC 61850-9-2 LE sampled value receiving (voltage sharing) ⁵⁾⁶⁾	SMVRCV	(1)	(1)	(1)
Other				
Minimum pulse timer (2 pcs)	TPGAPC	4	4	4
Minimum pulse timer (2 pcs, second resolution)	TPSGAPC	1	1	1
Minimum pulse timer (2 pcs, minute resolution)	TPMGAPC	1	1	1
Pulse timer (8 pcs)	PTGAPC	2	2	2
Time delay off (8 pcs)	TOFGAPC	4	4	4
Time delay on (8 pcs)	TONGAPC	4	4	4
Set-reset (8 pcs)	SRGAPC	4	4	4
Move (8 pcs)	MVGAPC	2	2	2
Generic control point (16 pcs)	SPCGAPC	2	2	2
Analog value scaling (4 pcs)	SCA4GAPC	4	4	4
Integer value move (4 pcs)	MVI4GAPC	1	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

TR = The function block is to be used on the terminal side in the application.

- 1) "Io measured" is always used.
- 2) "Io calculated" is always used.

- 3) Master trip is included and connected to the corresponding HSO in the configuration only when the BIO0007 module is used. If additionally the ARC option is selected, ARCSARC is connected in the configuration to the corresponding master trip input.
- 4) Power quality option includes current total demand distortion, voltage total harmonic distortion, voltage variation and voltage unbalance.
- 5) Available only with IEC 61850-9-2
- 6) Available only with COM0031...0037

2.2.4 Supported functions in REM615

Table 5: *Supported functions*

Function	IEC 61850	A	B	C	D
		ME01	ME02	ME03	ME04
Protection					
Three-phase non-directional overcurrent protection, low stage	PHLPTOC	1	1	1	1
Three-phase non-directional overcurrent protection, high stage	PHHPTOC	1	1	1	1
Three-phase non-directional overcurrent protection, instantaneous stage	PHIPTOC	1	1	1	1
Non-directional earth-fault protection, low stage	EFLPTOC	1			
Non-directional earth-fault protection, high stage	EFHPTOC	1	1	1	1
Directional earth-fault protection, low stage	DEFLPDEF		1 ¹⁾	1	1 ¹⁾
Three-phase undervoltage protection	PHPTUV		1	1	1
Positive-sequence undervoltage protection	PSPTUV		1	1	1
Negative-sequence overvoltage protection	NSPTOV		1	1	1
Frequency protection	FRPFRQ		2	2	2
Negative-sequence overcurrent protection for machines	MNSPTOC	2	2	2	2
Loss of load supervision	LOFLPTUC	1	1	1	1
Motor load jam protection	JAMPTOC	1	1	1	1
Motor start-up supervision	STTPMSU	1	1	1	1
Phase reversal protection	PREVPTOC	1	1	1	1
Thermal overload protection for motors	MPTTR	1	1	1	1
Circuit breaker failure protection	CCBRBRF	1	1	1	1
Master trip	TRPPTRC	2 (3) ²⁾	2 (3) ²⁾	2 (3) ²⁾	2 (3) ²⁾
Arc protection	ARCSARC	(3)	(3)	(3)	(3)
Multipurpose protection	MAPGAPC	18	18	18	18
Control					
Circuit-breaker control	CBXCBR	1	1	1	1
Disconnecter control	DCXSWI	2	2	2	2
Earthing switch control	ESXSWI	1	1	1	1
Disconnecter position indication	DCSXSWI	3	3	3	3
Earthing switch indication	ESSXSWI	2	2	2	2
Emergency start-up	ESMGAPC	1	1	1	1
Condition monitoring and supervision					
Circuit-breaker condition monitoring	SSCBR	1	1	1	1
Trip circuit supervision	TCSSCBR	2	2	2	2
Current circuit supervision	CCSPVC	1	1	1	1
Fuse failure supervision	SEQSPVC		1	1	1
Runtime counter for machines and devices	MDSOPT	1	1	1	1
Measurement					
Disturbance recorder	RDRE	1	1	1	1
Load profile record	LDPRLRC	1	1	1	1
Fault record	FLTRFRC	1	1	1	1
Three-phase current measurement	CMMXU	1	1	1	1

Table continues on next page

Section 2 DNP3 data mappings

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Function	IEC 61850	A	B	C	D
		ME01	ME02	ME03	ME04
Sequence current measurement	CSMSQI	1	1	1	1
Residual current measurement	RESCLMMXU	1	1	1	1
Three-phase voltage measurement	VMMXU		1	1	1
Residual voltage measurement	RESVMMXU			1	
Sequence voltage measurement	VSMSQI		1	1	1
Three-phase power and energy measurement	PEMMXU		1	1	1
RTD/mA measurement	XRGPIO130	(1)	(1)		
Frequency measurement	FMMXU1		1	1	1
IEC 61850-9-2 LE sampled value sending ³⁾⁴⁾	SMVSENDER		(1)	(1)	(1)
IEC 61850-9-2 LE sampled value receiving (voltage sharing) 3)4)	SMVRCV		(1)	(1)	(1)
Other					
Minimum pulse timer (2 pcs)	TPGAPC	4	4	4	4
Minimum pulse timer (2 pcs, second resolution)	TPSGAPC	1	1	1	1
Minimum pulse timer (2 pcs, minute resolution)	TPMGAPC	1	1	1	1
Pulse timer (8 pcs)	PTGAPC	2	2	2	2
Time delay off (8 pcs)	TOFGAPC	4	4	4	4
Time delay on (8 pcs)	TONGAPC	4	4	4	4
Set-reset (8 pcs)	SRGAPC	4	4	4	4
Move (8 pcs)	MVGAPC	2	2	2	2
Generic control point (16 pcs)	SPCGAPC	2	2	2	2
Analog value scaling (4 pcs)	SCA4GAPC	4	4	4	4
Integer value move (4 pcs)	MVI4GAPC	1	1	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) "Uo calculated" is always used.
- 2) Master trip is included and connected to the corresponding HSO in the configuration only when the BIO0007 module is used. If additionally the ARC option is selected, ARCSARC is connected in the configuration to the corresponding master trip input.
- 3) Available only with IEC 61850-9-2
- 4) Available only with COM0031-0037

2.2.5 Supported functions in RET615

Table 6: *Supported functions*

Function	IEC 61850	A	B	C	D	E	F	G	H
		TE01	TE02	TE03	TE04	TE05	TE06	TE07	TE08
Protection									
Three-phase non-directional overcurrent protection, low stage	PHLPTOC1	1 HV	1 HV	1 HV	1 HV	1 HV	1 HV	1 HV	1 HV
	PHLPTOC2	1 LV	1 LV	1 LV	1 LV	1 LV	1 LV	1 LV	1 LV
Three-phase non-directional overcurrent protection, high stage	PHHPTOC1	1 HV	1 HV	1 HV	1 HV	1 HV	1 HV	1 HV	1 HV
	PHHPTOC2	1 LV	1 LV	1 LV	1 LV	1 LV	1 LV	1 LV	1 LV
Three-phase non-directional overcurrent protection, instantaneous stage	PHIPTOC1	1 HV	1 HV	1 HV	1 HV	1 HV	1 HV	1 HV	1 HV
	PHIPTOC2	1 LV	1 LV	1 LV	1 LV	1 LV	1 LV	1 LV	1 LV
Non-directional earth-fault protection, low stage	EFLPTOC1	1 HV		1 HV 1)		1 HV		1 HV 1)	
	EFLPTOC2		1 LV		1 LV 2)		1 LV		1 LV 2)
Non-directional earth-fault protection, high stage	EFHPTOC1	1 HV		1 HV 1)		1 HV		1 HV 1)	
	EFHPTOC2		1 LV		1 LV 2)		1 LV		1 LV 2)
Negative-sequence overcurrent protection	NSPTOC1	1 HV	1 HV	1 HV	1 HV	1 HV	1 HV	1 HV	1 HV
	NSPTOC2	1 LV	1 LV	1 LV	1 LV	1 LV	1 LV	1 LV	1 LV

Table continues on next page

Function	IEC 61850	A	B	C	D	E	F	G	H
		TE01	TE02	TE03	TE04	TE05	TE06	TE07	TE08
Residual overvoltage protection	ROVPTOV					2 HV	2 HV	2 HV	2 HV
Three-phase undervoltage protection	PHPTUV					2 HV	2 HV	2 HV	2 HV
Three-phase overvoltage protection	PHPTOV					2 HV	2 HV	2 HV	2 HV
Three-phase thermal overload protection, two time constants	T2PTTR	1 HV							
Stabilized and instantaneous differential protection for two-winding transformers	TR2PTDF	1	1	1	1	1	1	1	1
Numerically stabilized low-impedance restricted earth-fault protection	LREFPNDF	1 HV	1 LV			1 HV	1 LV		
High-impedance based restricted earth-fault protection	HREFPDIF			1 HV	1 LV 3)			1 HV	1 LV 3)
Circuit breaker failure protection	CCBRBRF	1 HV 1)							
Master trip	TRPPTRC	2 (3) 4)							
Arc protection	ARCSARC	(3) LV 5)							
Multipurpose protection	MAPGAPC	18	18	18	18	18	18	18	18
Control									
Circuit-breaker control	CBXCBR	1 HV							
Disconnecter control	DCXSXI	2	2	2	2	2	2	2	2
Earthing switch control	ESXSXI	1	1	1	1	1	1	1	1
Disconnecter position indication	DCSXSWI	3	3	3	3	3	3	3	3
Earthing switch indication	ESSXSXI	2	2	2	2	2	2	2	2
Tap changer position indication	TPOSYLTC	1	1	1	1	1	1	1	1
Condition monitoring and supervision									
Circuit-breaker condition monitoring	SSCBR	1 HV							
Trip circuit supervision	TCSSCBR	2	2	2	2	2	2	2	2
Fuse failure supervision	SEQSPVC					1	1	1	1
Runtime counter for machines and devices	MDSOPT	1	1	1	1	1	1	1	1
Measurement									
Disturbance recorder	RDRE	1	1	1	1	1	1	1	1
Load profile record	LDPRLRC	1	1	1	1	1	1	1	1
Fault record	FLTRFRC	1	1	1	1	1	1	1	1
Three-phase current measurement	CMMXU1	1 HV							
	CMMXU2	1 LV							
Sequence current measurement	CSMSQI1	1 HV							
Residual current measurement	RESCMMXU1	1 HV		1 HV		1 HV		1 HV	
	RESCMMXU2		1 LV		1 LV		1 LV		1 LV
Three-phase voltage measurement	VMMXU					1 HV	1 HV	1 HV	1 HV
Residual voltage measurement	RESVMMXU					1 HV	1 HV	1 HV	1 HV
Sequence voltage measurement	VSMSQI					1 HV	1 HV	1 HV	1 HV
Three-phase power and energy measurement	PEMMXU					1 HV	1 HV	1 HV	1 HV
RTD/mA measurement	XRGGIO130	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Frequency measurement	FMMXU					1	1	1	1
IEC 61850-9-2 LE sampled value sending 6)7)	SMVSENDER					(1)	(1)	(1)	(1)
IEC 61850-9-2 LE sampled value receiving (voltage sharing) 6)7)	SMVRCV					(1)	(1)	(1)	(1)
Other									
Minimum pulse timer (2 pcs)	TPGAPC	4	4	4	4	4	4	4	4
Minimum pulse timer (2 pcs, second resolution)	TPSGAPC	1	1	1	1	1	1	1	1
Table continues on next page									

Section 2

DNP3 data mappings

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Function	IEC 61850	A	B	C	D	E	F	G	H
		TE01	TE02	TE03	TE04	TE05	TE06	TE07	TE08
Minimum pulse timer (2 pcs, minute resolution)	TPMGAPC	1	1	1	1	1	1	1	1
Pulse timer (8 pcs)	PTGAPC	2	2	2	2	2	2	2	2
Time delay off (8 pcs)	TOFGAPC	4	4	4	4	4	4	4	4
Time delay on (8 pcs)	TONGAPC	4	4	4	4	4	4	4	4
Set-reset (8 pcs)	SRGAPC	4	4	4	4	4	4	4	4
Move (8 pcs)	MVGAPC	2	2	2	2	2	2	2	2
Generic control point (16 pcs)	SPCGAPC	2	2	2	2	2	2	2	2
Analog value scaling (4 pcs)	SCA4GAPC	4	4	4	4	4	4	4	4
Integer value move (4 pcs)	MVI4GAPC	1	1	1	1	1	1	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
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) "Io calculated" is always used.
- 2) IoB calculated is always used.
- 3) "IoB measured" is always used.
- 4) Master trip is included and connected to the corresponding HSO in the configuration only when the BIO0007 module is used. If additionally the ARC option is selected, ARCSARC is connected in the configuration to the corresponding master trip input.
- 5) "IoB calculated" and "3IB" are always used.
- 6) Available only with IEC 61850-9-2
- 7) Available only with COM0031-0037

2.2.6 Supported functions in REU615

Table 7: *Supported functions*

Function	IEC 61850	A	B
		UE01	UE02
Protection			
Three-phase non-directional overcurrent protection, low stage	PHLPTOC		1
Three-phase non-directional overcurrent protection, high stage	PHHPTOC		1
Three-phase non-directional overcurrent protection, instantaneous stage	PHIPTOC		1
Residual overvoltage protection	ROVPTOV	3	
Three-phase undervoltage protection	PHPTUV	3	3
Three-phase overvoltage protection	PHPTOV	3	3
Positive-sequence undervoltage protection	PSPTUV	2	
Negative-sequence overvoltage protection	NSPTOV	2	
Frequency protection	FRPFRQ	6	
Three-phase thermal overload protection, two time constants	T2PTTR		1
Master trip	TRPPTRC	2	2
Arc protection	ARCSARC	(3) ¹⁾	
Multipurpose protection	MAPGAPC	18	18
Load-shedding and restoration	LSDHDPFRQ	5	
Control			
Circuit-breaker control	CBXCBR	1	1
Disconnecter control	DCXSWI	2	2
Earthing switch control	ESXSWI	1	1
Disconnecter position indication	DCSXSWI	3	3
Earthing switch indication	ESSXSWI	2	2
Tap changer position indication	TPOSYLT		1
Tap changer control with voltage regulator	OLATCC		1

Table continues on next page

Function	IEC 61850	A	B
	UE01	UE02	
Synchronism and energizing check	SECRSYN	1	
Condition monitoring and supervision			
Trip circuit supervision	TCSSCBR	2	2
Current circuit supervision	CCSPVC		1
Fuse failure supervision	SEQSPVC		1
Runtime counter for machines and devices	MDSOPT	1	1
Measurement			
Disturbance recorder	RDRE	1	1
Load profile record	LDPRLRC	1	1
Fault record	FLTRFRC	1	1
Three-phase current measurement	CMMXU		1
Sequence current measurement	CSMSQI		1
Three-phase voltage measurement	VMMXU	2	1
Residual voltage measurement	RESVMMXU	1	
Sequence voltage measurement	VSMSQI	1	1
Three-phase power and energy measurement	PEMMXU		1
RTD/mA measurement	XRGGIO130		(1)
Frequency measurement	FMMXU	1	
IEC 61850-9-2 LE sampled value sending ²⁾³⁾	SMVSENDER	(1)	(1)
IEC 61850-9-2 LE sampled value receiving (voltage sharing) ²⁾³⁾	SMVRCV	(1)	(1)
Other			
Minimum pulse timer (2 pcs)	TPGAPC	4	4
Minimum pulse timer (2 pcs, second resolution)	TPSGAPC	1	1
Minimum pulse timer (2 pcs, minute resolution)	TPMGAPC	1	1
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	2	2
Generic control point (16 pcs)	SPCGAPC	2	2
Analog value scaling (4 pcs)	SCA4GAPC	4	4
Integer value move (4 pcs)	MVI4GAPC	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) Light only
- 2) Available only with IEC 61850-9-2
- 3) Available only with COM0031-0037

2.2.7 Supported functions in REV615

Table 8: *Supported functions*

Function	IEC 61850	A	B
	VE01	VE02	
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
Non-directional earth-fault protection, low stage	EFLPTOC	2	
Non-directional earth-fault protection, high stage	EFHPTOC	1	1
Table continues on next page			

Section 2

DNP3 data mappings

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Function	IEC 61850	A	B
	VE01	VE02	
Non-directional earth-fault protection, instantaneous stage	EFIPTOC	1	
Directional earth-fault protection, low stage	DEFLPDEF		2
Directional earth-fault protection, high stage	DEFHPDEF		1
Transient/intermittent earth-fault protection	INTRPTEF		1 ¹⁾
Negative-sequence overcurrent protection	NSPTOC	2	2
Residual overvoltage protection	ROVPTOV		1 2 ²⁾
Three-phase undervoltage protection	PHPTUV		2
Three-phase overvoltage protection	PHPTOV		2
Positive-sequence undervoltage protection	PSPTUV		1
Negative-sequence overvoltage protection	NSPTOV		1
Three-phase thermal overload protection, two time constants	T2PTTR	1	1
Circuit breaker failure protection	CCBRBRF	1	1
Master trip	TRPPTRC	2 (3) ³⁾	2 (3) ³⁾
Arc protection	ARCSARC	(3)	(3)
Multipurpose protection	MAPGAPC	18	18
Three-phase overload protection for shunt capacitor banks	COLPTOC	1	1
Current unbalance protection for shunt capacitor banks	CUBPTOC	1 ⁴⁾	1 ⁴⁾
Three-phase current unbalance protection for shunt capacitor banks	HCUBPTOC	1 ⁴⁾	1 ⁴⁾
Shunt capacitor bank switching resonance protection, current based	SRCPTOC	1	1
Power quality			
Current total demand distortion	CMHAI	(1) ⁵⁾	(1) ⁶⁾
Voltage total harmonic distortion	VMHAI		(1) ⁶⁾
Voltage variation	PHQVWR		(1) ⁶⁾
Voltage unbalance	VSQVUB		(1) ⁶⁾
Control			
Circuit-breaker control	CBXCBR	1	1
Disconnector control	DCXSWI	2	2
Earthing switch control	ESXSWI	1	1
Disconnector position indication	DCSXSWI	3	3
Earthing switch indication	ESSXSWI	2	2
Condition monitoring and supervision			
Circuit-breaker condition monitoring	SSCBR	1	1
Trip circuit supervision	TCSSCBR	2	2
Current circuit supervision	CCSPVC	1	1
Fuse failure supervision	SEQSPVC		1
Runtime counter for machines and devices	MDSOPT	1	1
Measurement			
Disturbance recorder	RDRE	1	1
Load profile record	LDPRLRC	1	1
Fault record	FLTRFR	1	1
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
Residual voltage measurement	RESVMMXU		2
Sequence voltage measurement	VSMSQI		1
Three-phase power and energy measurement	PEMMXU		1
RTD/mA measurement	XRGGIO130	(1)	(1)
Frequency measurement	FMMXU		1
IEC 61850-9-2 LE sampled value sending ⁷⁾⁸⁾	SMVSENDER		(1)

Table continues on next page

Function	IEC 61850	A	B
		VE01	VE02
IEC 61850-9-2 LE sampled value receiving (voltage sharing) 7)8)	SMVRCV		(1)
Other			
Minimum pulse timer (2 pcs)	TPGAPC	4	4
Minimum pulse timer (2 pcs, second resolution)	TPSGAPC	1	1
Minimum pulse timer (2 pcs, minute resolution)	TPMGAPC	1	1
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	2	2
Generic control point (16 pcs)	SPCGAPC	2	2
Analog value scaling (4 pcs)	SCA4GAPC	4	4
Integer value move (4 pcs)	MVI4GAPC	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) "Io measured" is always used.
- 2) "Uob measured" is always used.
- 3) Master trip is included and connected to the corresponding HSO in the configuration only when the BIO0007 module is used. If additionally the ARC option is selected, ARCSARC is connected to the corresponding master trip input in the configuration.
- 4) The lnb measurement values are taken from this block and put in the Measurment view.
- 5) Power quality option includes only current total demand distortion.
- 6) Power quality option includes current total demand distortion, voltage total harmonic distortion, voltage variation and voltage unbalance.
- 7) Available only with IEC 61850-9-2
- 8) Available only with COM0031-0037

2.3 Binary inputs

Table 9: 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 10: *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 11: *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 12: *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 13: *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.

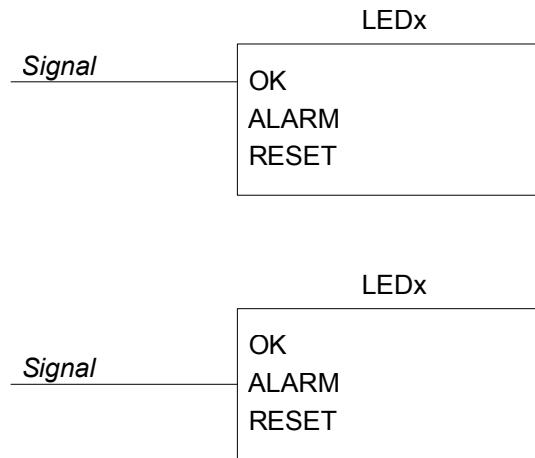


Figure 2: Signal wired to either OK or Alarm input

Table 14: 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.

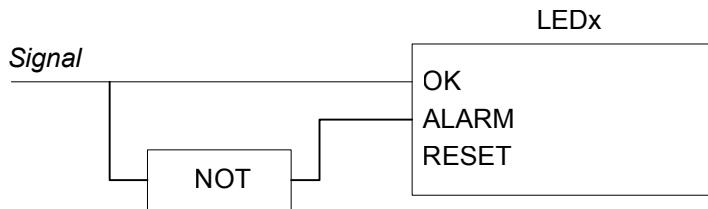


Figure 3: Signal wired to both OK and ALARM inputs – inverted to the other



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.

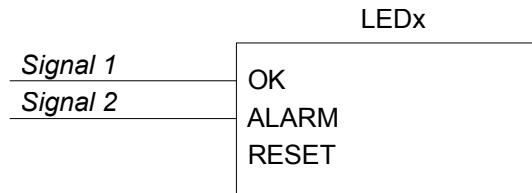


Figure 4: Separate signals wired to OK and ALARM inputs

Table 15: 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.PCSITPC1 Protection communication supervision (1)

Table 16: LD0.PCSITPC1 Protection communication supervision (1)

IEC 61850 name	SA name	Description	Value
LD0.PCSITPC1			
.HealthAlm.stVal	ALARM	Protection communication alarm	1=Alarm

2.3.1.8 LD0.RCHLCCH1 Redundant Ethernet supervision (1)

Table 17: 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

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

Table 18: 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 19: 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			
.SynlntlBypstVal	ITL_BYPASS	Interlocking bypass	1=Bypassed
.Pos.stSelD	SELECTED	CB selected	1=Selected
CTRL.CBXCBR1			
.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked

Table continues on next page

IEC 61850 name	SA name	Description	Values
.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.DCXSWI1 Disconnector control (1)

Table 20: *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.stSel	SELECTED	CB selected	1=Selected
CTRL.DCXSWI1			
.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked

2.3.2.3 CTRL.DCXSWI2 Disconnector control (2)

Table 21: *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.stSel	SELECTED	CB selected	1=Selected
CTRL.DCXSWI2			
.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked

2.3.2.4

CTRL.ESXSWI1 Earthing switch control (1)

Table 22: 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

2.3.3

Sensors and monitoring functions

2.3.3.1

LD0.ARCSARC1 Arc protection (1)

Table 23: 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 24: 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 25: 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.BSTGGIO1 Binary signal transfer (1)

Table 26: LD0.BSTGGIO1 Binary signal transfer (1)

IEC 61850 name	SA name	Description	Values
LD0.BSTGGIO1			
.Alm1.stVal	SEND_SIG_A	Send alarm	1=Alarm
.Alm2.stVal	RECV_SIG_A	Receive alarm	1=Alarm

2.3.3.5 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

2.3.3.6 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

2.3.3.7 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

2.3.3.8 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

2.3.3.9 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

2.3.3.10 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

2.3.3.11 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

2.3.3.12 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

2.3.3.13 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

2.3.3.14 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

2.3.3.15 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

2.3.3.16 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

Table continues on next page

IEC 61850 name	SA name	Description	Values
.InsBlk.stVal	PRES_LO	Low pressure lockout	1=Lockout
LD0.SSOPM1			
.SprChaAlm.stVal	SPR_CHR_ALM	Spring charge time alarm	1=Alarm

2.3.3.17 LD0.TCSSCBR1 Trip circuit supervision (1)

Table 39: LD0.TCSSCBR1 Trip circuit supervision (1)

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

2.3.3.18 LD0.TCSSCBR2 Trip circuit supervision (2)

Table 40: LD0.TCSSCBR2 Trip circuit supervision (2)

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

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

Table 41: 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

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

Table 42: LD0.UL1TVTR2 Three-phase VT supervision (2)

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

2.3.3.21 LD0.XARGGI0130 Alarm/warning

Table 43: LD0.XARGGI0130 Alarm/warning

IEC 61850 name	SA name	Description	Values
LD0.XARGGI0130			
.Alm.stVal		XARGGI0130 Alarm	1=Alarm
.Wrn.stVal		XARGGI0130 Warning	1=Warning

2.3.3.22 LD0.XRGGIO130 Alarm/warning

Table 44: LD0.XRGGIO130 Alarm/warning

IEC 61850 name	SA name	Description	Values
LD0.XRGGIO130			
.Alm.stVal	-	XRGGIO130 Alarm	1=Alarm
.Wrn.stVal	-	XRGGIO130 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
.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
.LTCB1kAHi.stVal	BLKD_I_LOD	Over current blocking	1=Block
.LTCB1kVLo.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.RESVMMXU2 Residual voltage measurement (2)

Table 51: LD0.RESVMMXU2 Residual voltage measurement (2)

IEC 61850 name	SA name	Description	Values
LD0.RESVMMXU2			
.HiAlm.stVal	HIGH_ALARM	High alarm	1=Alarm
.HiWrn.stVal	HIGH_WARNING	High warning	1=Warning

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

Table 52: 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

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

Table 53: LD0.VMMXU2 Three-phase voltage measurement (2)

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

2.3.6 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	1=Alarm

2.3.6.2 LD0.CMHAI2 Current total demand distortion (2)

Table 55: LD0.CMHAI2 Current total demand distortion (2)

IEC 61850 name	SA name	Description	Values
LD0.CMHAI2			
.Alm.stVal	ALARM	Distortion alarm	1=Alarm

2.3.6.3 LD0.PHQVVR1 Voltage variation (1)

Table 56: LD0.PHQVVR1 Voltage variation (1)

IEC 61850 name	SA name	Description	Values
LD0.PHQVVR1			
.VarStrGen.stVal	-	Variation event detected	1=Detected
.VarEnd.stVal	-	Variation event ended	1=Ended
.SwellOp.stVal	-	Swell event detected	1=Detected
.DipOp.stVal	-	Dip event detected	1=Detected
.IntrOp.stVal	-	Interruption event detected	1=Detected

2.3.6.4 LD0.VMHAI1 Voltage total harmonic distortion (1)

Table 57: LD0.VMHAI1 Voltage total harmonic distortion (1)

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

2.3.6.5 LD0.VMHAI2 Voltage total harmonic distortion (2)

Table 58: LD0.VMHAI2 Voltage total harmonic distortion (2)

IEC 61850 name	SA name	Description	Values
LD0.VMHAI2			
.Alm.stVal	ALARM	Distortion alarm	1=Alarm

2.3.6.6 LD0.VSQVUB1 Voltage unbalance (1)

Table 59: 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.CBPSOF1 Switch onto fault (1)

Table 60: LD0.CBPSOF1 Switch onto fault (1)

IEC 61850 name	SA name	Description	Value
LD0.CBPSOF1			
.Op.general	OPERATE	Stage operate	1=Operate

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

Table 61: 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

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

Table 62: 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

2.3.7.4

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

Table 63: 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 64: 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 65: 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.DOPPDPR1 Reverse power/directional overpower protection (1)

Table 66: 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

2.3.7.8

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

Table 67: 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

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

Table 68: 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

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

Table 69: 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

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

Table 70: 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

2.3.7.12 LD0.DPHLPDOC2 Three-phase directional overcurrent protection, low stage (2)
Table 71: *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

2.3.7.13 LD0.DQPTUV1 Directional reactive power undervoltage protection (1)
Table 72: *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

2.3.7.14 LD0.DUPPDPR1 Underpower protection (1)
Table 73: *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

2.3.7.15 LD0.DUPPDPR2 Underpower protection (2)
Table 74: *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

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

Table 75: 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

2.3.7.17 LD0.EFHPTOC2 Non-directional earth-fault protection, high stage (2)

Table 76: 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

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

Table 77: 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

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

Table 78: 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

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

Table 79: 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

2.3.7.21 LD0.EFPADM1 Admittance-based earth-fault protection (1)
Table 80: 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

2.3.7.22 LD0.EFPADM2 Admittance-based earth-fault protection (2)
Table 81: 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

2.3.7.23 LD0.EFPADM3 Admittance-based earth-fault protection (3)
Table 82: 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

2.3.7.24 LD0.FRPFRQ1 Frequency protection (1)
Table 83: 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.FRPNUF1		Underfrequency	
.Op.general	OPR_UFRQ	-Operate	1=Operate
LD0.FRPFRC1		Frequency gradient	
.Op.general	OPR_FRG	-Operate	1=Operate

2.3.7.25 LD0.FRPFRQ2 Frequency protection (2)

Table 84: 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

2.3.7.26 LD0.FRPFRQ3 Frequency protection (3)

Table 85: 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

2.3.7.27 LD0.FRPFRQ4 Frequency protection (4)

Table 86: 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

2.3.7.28**LD0.FRPFRQ5 Frequency protection (5)****Table 87:** 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.FRPNUF5		Underfrequency	
.Op.general	OPR_UFRQ	-Operate	1=Operate
LD0.FRPFRC5		Frequency gradient	
.Op.general	OPR_FRG	-Operate	1=Operate

2.3.7.29**LD0.FRPFRQ6 Frequency protection (6)****Table 88:** LD0.FRPFRQ6 Frequency protection (6)

IEC 61850 name	SA name	Description	Values
LD0.FRPTRC6			
.Str.general	START	Stage start	1=Start
LD0.FRPNUF6		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

2.3.7.30**LD0.H3EFPSEF1 Third harmonic-based stator earth-fault protection (1)****Table 89:** LD0.H3EFPSEF1 Third harmonic-based stator earth-fault protection (1)

IEC 61850 name	SA name	Description	Value
LD0.H3EFPTRC1			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate
LD0.H3EFPTOV1			
.BlklnntnSt.general	INT_BLKD	Internally blocked	1=Blocked

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

Table 90: LD0.HAEFPTOC1 Harmonics-based earth-fault protection (1)

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

2.3.7.32 LD0.HCUBxPTOC1 Capacitor bank unbalance current, H bridge (1)

Table 91: LD0.HCUBxPTOC1 Capacitor bank unbalance current, H bridge (1)

IEC 61850 name	SA name	Description	Values
LD0.HCUB2PTOC1			
.Op.general	OPERATE	Unbalance operate	1=Operate
.Str.general	START	Unbalance start	1=Start
LD0.HCUB1PTOC1			
.Op.general	ALARM	Alarm	1=Alarm

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

Table 92: 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

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

Table 93: 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

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

Table 94: 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

2.3.7.36 LD0.HREFPDIF1 High-impedance based restricted earth-fault protection (1)
Table 95: 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

2.3.7.37 LD0.HREFPDIF2 High-impedance based restricted earth-fault protection (2)
Table 96: 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

2.3.7.38 LD0.INRPHAR1 Three-phase inrush detector (1)
Table 97: 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

2.3.7.39 LD0INTRTEF1 Transient/intermittent earth-fault protection (1)
Table 98: LD0INTRTEF1 Transient/intermittent earth-fault protection (1)

IEC 61850 name	SA name	Description	Values
LD0INTRTEF1			
.Op.general	OPERATE	Stage operate	1=Operate
.Str.general	START	Stage start	1=Start

2.3.7.40

LD0.JAMPTOC1 Motor load jam protection (1)

Table 99: 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

2.3.7.41

LD0.LEDPTRC1 Global protection signals (1)

Table 100: 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

2.3.7.42

LD0.LNPLDF1 Line differential protection with in-zone power transformer (1)

Table 101: LD0.LNPLDF1 Line differential protection with in-zone power transformer (1)

IEC 61850 name	SA name	Description	Values
LD0.LNPTRC1			
.Op.general	OPERATE	Operate (Local or remote)	1=Operate
.Str.general	START	Start (Local or remote)	1=Start
.Op.phsA		Phs A operate	1=Operate
.Op.phsB		Phs B operate	1=Operate
.Op.phsC		Phs C operate	1=Operate
.Str.phsA		Phs A start	1=Start
.Str.phsB		Phs B start	1=Start
.Str.phsC		Phs C start	1=Start

2.3.7.43**LD0.LOFLPTUC1 Loss of load supervision (1)****Table 102:** *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

2.3.7.44**LD0.LREFPNDF1 Numerically stabilized low-impedance restricted earth-fault protection (1)****Table 103:** *LD0.LREFPNDF1 Numerically 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

2.3.7.45**LD0.LSHDPFRQ1 Load-shedding and restoration (1)****Table 104:** *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

2.3.7.46**LD0.LSHDPFRQ2 Load-shedding and restoration (2)****Table 105:** *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

2.3.7.47

LD0.LSHDPFRQ3 Load-shedding and restoration (3)

Table 106: 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

2.3.7.48

LD0.LSHDPFRQ4 Load-shedding and restoration (4)

Table 107: 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

2.3.7.49

LD0.LSHDPFRQ5 Load-shedding and restoration (5)

Table 108: 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
LD0.LSHDPTOF5			
.Str.general	ST_REST	Start restore	1=Start
.Op.general	RESTORE	Restored	1=Restored

2.3.7.50

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

Table 109: 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

2.3.7.51 LD0.LVRTPTUV2 Low-voltage ride-through protection (2)
Table 110: 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

2.3.7.52 LD0.LVRTPTUV3 Low voltage ride through protection (3)
Table 111: 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

2.3.7.53 LD0.MFADPSDE1 Multifrequency admittance-based earth-fault protection (1)
Table 112: 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

2.3.7.54 LD0.MNSPTOC1 Negative-sequence overcurrent protection for machines (1)
Table 113: 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

2.3.7.55 LD0.MNSPTOC2 Negative-sequence overcurrent protection for machines (2)

Table 114: 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

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

Table 115: 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

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

Table 116: 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

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

Table 117: 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

2.3.7.59 LD0.NSPTOC2 Negative-sequence overcurrent protection (2)
Table 118: 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

2.3.7.60 LD0.NSPTOV1 Negative-sequence overvoltage protection (1)
Table 119: 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

2.3.7.61 LD0.NSPTOV2 Negative-sequence overvoltage protection (2)
Table 120: 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

2.3.7.62 LD0.OEPVPH1 Overexcitation protection (1)
Table 121: 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

2.3.7.63 LD0.PDNSPTOC1 Phase discontinuity protection (1)
Table 122: 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

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

Table 123: 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

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

Table 124: 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

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

Table 125: 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

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

Table 126: 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

2.3.7.68 LD0.PHIZ1 High-impedance fault detection (1)
Table 127: *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

2.3.7.69 LD0.PHLPTOC1 Three-phase non-directional overcurrent protection, low stage (1)
Table 128: *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

2.3.7.70 LD0.PHLPTOC2 Three-phase non-directional overcurrent protection, low stage (2)
Table 129: *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

2.3.7.71 LD0.PHPTOV1 Three-phase overvoltage protection (1)
Table 130: *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
Table continues on next page			

IEC 61850 name	SA name	Description	Values
.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

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

Table 131: 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

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

Table 132: 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

2.3.7.74**LD0.PHPTUV1 Three-phase undervoltage protection (1)****Table 133:** *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

2.3.7.75**LD0.PHPTUV2 Three-phase undervoltage protection (2)****Table 134:** *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

2.3.7.76**LD0.PHPTUV3 Three-phase undervoltage protection (3)****Table 135:** *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

2.3.7.77 LD0.PHPVOC1 Three-phase voltage-dependent overcurrent protection (1)

Table 136: 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

2.3.7.78 LD0.PREVPTOC1 Phase reversal protection (1)

Table 137: 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

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

Table 138: 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

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

Table 139: 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

2.3.7.81 LD0.ROVPTOV1 Residual overvoltage protection (1)

Table 140: 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

2.3.7.82 LD0.ROVPTOV2 Residual overvoltage protection (2)

Table 141: 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

2.3.7.83 LD0.ROVPTOV3 Residual overvoltage protection (3)

Table 142: 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

2.3.7.84 LD0.SRCPTOC1 Capacitor resonance protection (1)

Table 143: LD0.SRCPTOC1 Capacitor resonance protection (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

2.3.7.85 LD0.STTPMSU1 Motor start-up supervision (1)

Table 144: 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

Table continues on next page

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DNP3 data mappings

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IEC 61850 name	SA name	Description	Values
LD0.STTPMSS1			
.Op.general	OPR_IIT	Stalling operate	1=Operate
.Str.general	MOT_START	Startup in progress	1=In progress

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

Table 145: 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

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

Table 146: 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

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

Table 147: 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	BLKDWAV	Waveform block, general	1=Blocking
.BlkWavSt.phsA	BLKDWAV_A	Waveform block, phs A	1=Blocking
.BlkWavSt.phsB	BLKDWAV_B	Waveform block, phs B	1=Blocking
.BlkWavSt.phsC	BLKDWAV_C	Waveform block, phs C	1=Blocking

Table continues on next page

IEC 61850 name	SA name	Description	Value
.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

2.3.7.89 LD0.TRPPTRC1 Master trip (1)

Table 148: 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

2.3.7.90 LD0.TRPPTRC2 Master trip (2)

Table 149: 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

2.3.7.91 LD0.TRPPTRC3 Master trip (3)

Table 150: 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

2.3.7.92 LD0.TRPPTRC4 Master trip (4)

Table 151: 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

2.3.7.93 LD0.TRPPTRC5 Master trip (5)

Table 152: LD0.TRPPTRC5 Master trip (5)

IEC 61850 name	SA name	Description	Values
LD0.TRPPTRC5			
.Op.general		Operate input signal	1=Operate
.Tr.general		Trip output signal	1=Trip

2.3.7.94 LD0.TRPPTRC6 Master trip (6)

Table 153: LD0.TRPPTRC6 Master trip (6)

IEC 61850 name	SA name	Description	Values
LD0.TRPPTRC6			
.Op.general		Operate input signal	1=Operate
.Tr.general		Trip output signal	1=Trip

2.3.7.95 LD0.UEXPDIS1 Three-phase underexcitation protection (1)

Table 154: 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

2.3.7.96 LD0.UZPDIS1 Three-phase underimpedance protection (1)

Table 155: LD0.UZPDIS1 Three-phase underimpedance protection (1)

IEC 61850 name	SA name	Description	Value
LD0.UZPDIS1			
.Str.general	START	Stage start	1=Start
.Op.general	OPERATE	Stage operate	1=Operate

2.3.7.97**LD0.VVSPPAM1 Voltage vector shift protection (1)****Table 156:** 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

2.3.7.98**LD0.WPWDE1 Wattmetric-based earth-fault protection (1)****Table 157:** 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

2.3.7.99**LD0.WPWDE2 Wattmetric-based earth-fault protection (2)****Table 158:** 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

2.3.7.100**LD0.WPWDE3 Wattmetric-based earth-fault protection (3)****Table 159:** 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 DR.RDRE1 Disturbance recorder (1)

Table 160: 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

2.3.8.2 LD0.CCSPVC1 Current circuit supervision (1)

Table 161: 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

2.3.8.3 LD0.DARREC1 Autoreclosing (1)

Table 162: 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
Table continues on next page			

IEC 61850 name	SA name	Description	Values
.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

2.3.8.4 LD0.LDPRLRC1 Load profile record (1)

Table 163: 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

2.3.8.5 LD0.OOSRPSB1 Out-of-step protection (1)

Table 164: LD0.OOSRPSB1 Out-of-step protection (1)

IEC 61850 name	SA name	Description	Values
LD0.OOSRPSB1			
.Op.general	OPERATE	Out-of-step trip, zone 1 or 2	1=Trip
.BlkZn.stVal	OSB	Out-of-step block, zone 1	1=Block
.Blk2Zn.stVal	OSB_Z2	Out-of-step block, zone 2	1=Block
.SwgOp.general	SWING_OP	Out-of-step trip, zone 3	1=Trip

2.3.8.6 LD0.SCEFRFLO1 Fault locator (1)

Table 165: 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

2.3.8.7 LD0.SECRSYN1 Synchronism and energizing check (1)

Table 166: 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

2.3.8.8 LD0.SEQSPVC1 Fuse failure supervision (1)

Table 167: 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.ESMGAPC1 Emergency start-up (1)

Table 168: LD0.ESMGAPC1 Emergency start-up (1)

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

2.3.9.2 LD0.MAPGAPC1 Multipurpose protection (1)

Table 169: 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

2.3.9.3 LD0.MAPGAPC2 Multipurpose protection (2)

Table 170: 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

2.3.9.4

LD0.MAPGAPC3 Multipurpose protection (3)

Table 171: 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

2.3.9.5

LD0.MAPGAPC4 Multipurpose protection (4)

Table 172: 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

2.3.9.6

LD0.MAPGAPC5 Multipurpose protection (5)

Table 173: 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

2.3.9.7

LD0.MAPGAPC6 Multipurpose protection (6)

Table 174: 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

2.3.9.8

LD0.MAPGAPC7 Multipurpose protection (7)

Table 175: 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

2.3.9.9 LD0.MAPGAPC8 Multipurpose protection (8)

Table 176: 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

2.3.9.10 LD0.MAPGAPC9 Multipurpose protection (9)

Table 177: 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

2.3.9.11 LD0.MAPGAPC10 Multipurpose protection (10)

Table 178: 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

2.3.9.12 LD0.MAPGAPC11 Multipurpose protection (11)

Table 179: 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

2.3.9.13 LD0.MAPGAPC12 Multipurpose protection (12)

Table 180: 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

2.3.9.14 LD0.MAPGAPC13 Multipurpose protection (13)

Table 181: 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

2.3.9.15 LD0.MAPGAPC14 Multipurpose protection (14)

Table 182: 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

2.3.9.16 LD0.MAPGAPC15 Multipurpose protection (15)

Table 183: 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

2.3.9.17 LD0.MAPGAPC16 Multipurpose protection (16)

Table 184: 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

2.3.9.18 LD0.MAPGAPC17 Multipurpose protection (17)

Table 185: 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

2.3.9.19 LD0.MAPGAPC18 Multipurpose protection (18)

Table 186: 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

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

Table 187: 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

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

Table 188: 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

2.3.9.22

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

Table 189: 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

2.3.9.23

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

Table 190: 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

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

2.3.10 Physical and raw I/O data

2.3.10.1 LD0.BSTGGIO1 Binary signal transfer (1)

Table 191: LD0.BSTGGIO1 Binary signal transfer (1)

IEC 61850 name	SA name	Description	Values
LD0.BSTGGIO1			
.SPCSO1.stVal	RECV_SIG_1	Output 1 state	0/1=Off/On
.SPCSO2.stVal	RECV_SIG_2	Output 2 state	0/1=Off/On
.SPCSO3.stVal	RECV_SIG_3	Output 3 state	0/1=Off/On
.SPCSO4.stVal	RECV_SIG_4	Output 4 state	0/1=Off/On
.SPCSO5.stVal	RECV_SIG_5	Output 5 state	0/1=Off/On
.SPCSO6.stVal	RECV_SIG_6	Output 6 state	0/1=Off/On
.SPCSO7.stVal	RECV_SIG_7	Output 7 state	0/1=Off/On
.SPCSO8.stVal	RECV_SIG_8	Output 8 state	0/1=Off/On
.Ind1.stVal	SEND_SIG_1	Input 1 state	0/1=Off/On
.Ind2.stVal	SEND_SIG_2	Input 2 state	0/1=Off/On
.Ind3.stVal	SEND_SIG_3	Input 3 state	0/1=Off/On
.Ind4.stVal	SEND_SIG_4	Input 4 state	0/1=Off/On
.Ind5.stVal	SEND_SIG_5	Input 5 state	0/1=Off/On
.Ind6.stVal	SEND_SIG_6	Input 6 state	0/1=Off/On
.Ind7.stVal	SEND_SIG_7	Input 7 state	0/1=Off/On
.Ind8.stVal	SEND_SIG_8	Input 8 state	0/1=Off/On

2.3.10.2 LD0.XAGGIO130 Physical I/O

Table 192: 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

2.3.10.3 LD0.XBGGIO110 Physical I/O

Table 193: LD0.XBGGIO110 Physical I/O

IEC 61850 name	SA name	Description	Values
LD0.XBGGIO110			
.Ind1.stVal		XB110-Input 1	1/0=ON/OFF
.Ind2.stVal		XB110-Input 2	1/0=ON/OFF
.Ind3.stVal		XB110-Input 3	1/0=ON/OFF
.Ind4.stVal		XB110-Input 4	1/0=ON/OFF
.Ind5.stVal		XB110-Input 5	1/0=ON/OFF
.Ind6.stVal		XB110-Input 6	1/0=ON/OFF
.Ind7.stVal		XB110-Input 7	1/0=ON/OFF
.Ind8.stVal		XB110-Input 8	1/0=ON/OFF
.SPCSO1.stVal		XB110-Output 1	1/0=ON/OFF
.SPCSO2.stVal		XB110-Output 1	1/0=ON/OFF
.SPCSO3.stVal		XB110-Output 1	1/0=ON/OFF
.SPCSO4.stVal		XB110-Output 1	1/0=ON/OFF

2.3.10.4 LD0.XGGIO100 Physical I/O

Table 194: 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.XGGIO110 Physical I/O

Table 195: 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

Table continues on next page

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IEC 61850 name	SA name	Description	Values
.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

2.3.10.6 LD0.XGGIO120 Physical I/O

Table 196: 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

2.3.10.7 LD0.XGGIO130 Physical I/O

Table 197: LD0.XGGIO130 Physical I/O

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

2.4

Binary outputs

Table 198: 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 199: LD0.LLN0/LDEV1 Reset indications and LEDs, reset device (1)

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

2.4.2

Switchgear functions

2.4.2.1

CTRL.CBXCBR1 Circuit-breaker control (1)

Table 200: CTRL.CBXCBR1 Circuit-breaker control (1)

IEC 61850 name	SA name	Description	Type
CTRL.CBCSW1			
.Pos.Oper.ctVal	-	Circuit breaker control	On/Off

2.4.2.2 CTRL.DCXSWI1 Disconnector control (1)

Table 201: CTRL.DCXSWI1 Disconnector control (1)

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

2.4.2.3 CTRL.DCXSWI2 Disconnector control (2)

Table 202: CTRL.DCXSWI2 Disconnector control (2)

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

2.4.2.4 CTRL.ESXSWI1 Earthing switch control (1)

Table 203: CTRL.ESXSWI1 Earthing switch control (1)

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

2.4.3 Sensors and monitoring functions

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

Table 204: 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

2.4.4 Metering and measurand functions

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

Table 205: 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 206: LD0.CMMXU2 Three-phase current measurement (2)

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

2.4.4.3 LD0.FLTRFRC1 Fault record (1)

Table 207: FLTRFRC1 Fault record (1)

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

2.4.4.4 LD0.PEMMTR1 Reset accumulated energy values (1)

Table 208: LD0.PEMMTR1 Reset accumulated energy values (1)

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

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

Table 209: 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

2.4.4.6 LD0.RESCMMXU1 Residual current measurement (1)

Table 210: LD0.RESCMMXU1 Residual current measurement (1)

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

2.4.4.7 LD0.RESCMMXU2 Residual current measurement (2)

Table 211: LD0.RESCMMXU2 Residual current measurement (2)

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

2.4.4.8 LD0.RESVMMXU1 Residual voltage measurement (1)

Table 212: LD0.RESVMMXU1 Residual voltage measurement (1)

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

2.4.4.9 LD0.RESVMMXU2 Residual voltage measurement (2)

Table 213: LD0.RESVMMXU2 Residual voltage measurement (2)

IEC 61850 name	SA name	Description	Value
LD0.RESVMMXU2			
.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 214: 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 215: LD0.PHQVVR1 Voltage variation (1)

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

2.4.5.3 LD0.VMHAI1 Voltage total harmonic distortion (1)

Table 216: 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 217: 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 218: 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 219: 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 220: *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 221: *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

2.4.7 Protection-related functions

2.4.7.1 DR.RDRE1 Disturbance recorder (1)

Table 222: *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 223: *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.LDPRLRC1 Load profile record (1)

Table 224: *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.BSTGGIO1 Binary signal transfer (1)

Table 225: LD0.BSTGGIO1 Binary signal transfer (1)

IEC 61850 name	SA name	Description	Type
LD0.BSTGGIO1			
.SPCSO1.Oper.ctlVal		Output 1	0/1=Off/On
.SPCSO2.Oper.ctlVal		Output 2	0/1=Off/On
.SPCSO3.Oper.ctlVal		Output 3	0/1=Off/On
.SPCSO4.Oper.ctlVal		Output 4	0/1=Off/On
.SPCSO5.Oper.ctlVal		Output 5	0/1=Off/On
.SPCSO6.Oper.ctlVal		Output 6	0/1=Off/On
.SPCSO7.Oper.ctlVal		Output 7	0/1=Off/On
.SPCSO8.Oper.ctlVal		Output 8	0/1=Off/On

2.4.8.2 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 226: 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

2.4.8.3

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

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

2.4.8.4

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

Table 228: LD0.SRGAPC1 Set-reset (8 pcs) (1)

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

2.4.8.5

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

Table 229: 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

2.4.8.6

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

Table 230: 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

2.4.8.7

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

Table 231: 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 232: 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 233: 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 234: 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 235: 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 236: 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 237: 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

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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 238: *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.DCSXSWI1 Disconnector position indication (1)

Table 239: *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

2.5.2.3 CTRL.DCSXSWI2 Disconnector position indication (2)

Table 240: *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

2.5.2.4 CTRL.DCSXSWI3 Disconnector position indication (3)

Table 241: *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

2.5.2.5 CTRL.DCXSWI1 Disconnector control (1)

Table 242: CTRL.DCXSWI1 Disconnector control (1)

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

2.5.2.6 CTRL.DCXSWI2 Disconnector control (2)

Table 243: CTRL.DCXSWI2 Disconnector control (2)

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

2.5.2.7 CTRL.ESSXSWI1 Earthing switch indication (1)

Table 244: 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

2.5.2.8 CTRL.ESSXSWI2 Earthing switch indication (2)

Table 245: 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

2.5.2.9 CTRL.ESXSWI1 Earthing switch control (1)

Table 246: 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

2.5.3 Sensors and monitoring functions

2.5.3.1 LD0.ARCSARC11 Arc protection (1)

Table 247: 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 248: 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 249: 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 250: 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 251: 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 252: LD0.SSCBR1 Circuit-breaker condition monitoring (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.SSCBR1					
.OpCntRs.stVal	NO_OPR	Number of CB operations	0...99999	R	0,99999,0,99999
.InaTmdCnt.stVal	INA_DAYS	CB inactive days	0...9999	R	0,9999,0,9999
.OpTmOpn.mag	T_TRV_OP	Opening travel time	0...60000 [ms]	R	0,60000,0,60000
.OpTmCls.mag	T_TRV_CL	Closing travel time	0...60000 [ms]	R	0,60000,0,60000
LD0.SSOPM1					
.TmsSprCha.mag	T_SPR_CHR	Spring charging time	0...99.99 [s]	R	0,100,0,10000
LD0.SPH1SCBR1					
.AccmAPwr.mag	IPOW_A	Phs A acc. currents power	0...30000	R	0,30000,0,30000
.RmnNumOp.stVal	CB_LIFE_A	Phs A remaining life	-99999...99999	R	-99999,99999,-99999,99999
LD0.SPH2SCBR1					
.AccmAPwr.mag	IPOW_B	Phs B acc. currents power	0...30000	R	0,30000,0,30000
.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.TPOSYLT1 Tap changer position indication (1)

Table 253: LD0.TPOSYLT1 Tap changer position indication (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.TPOSYLT1					
.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 254: LD0.OLATCC1 Tap changer control with voltage regulator (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.OLATCC1					
.CtlIDOn.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 255: 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
.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 256: 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
Table continues on next page					

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
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 257: 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 [xIn]	R	0,50,0,5000
.SeqA.c2.instCVal.mag	I2_INST	Negative magnitude	0.00...50.0 [xIn]	R	0,50,0,5000
.SeqA.c3.instCVal.mag	I3_INST	Zero magnitude	0.00...50.0 [xIn]	R	0,50,0,5000

2.5.5.4 LD0.FLTRFRC1 Fault record (1)

Table 258: LD0.FLTRFRC1 Fault record (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

Table continues on next page

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

Table continues on next page

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

Table continues on next page

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IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.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
.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
.VNgsSeq2.mag		Voltage Ng-Seq(2)	0.000...4.000 [xUn]		0,4,0,4000
.MaxTmpRI.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
.DifABAngVCA1.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
.DifABAngVCA2.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

Table continues on next page

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

2.5.5.5 LD0.FMMXU1 Frequency measurement (1)

Table 259: 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

2.5.5.6 LD0.HAEFPTOC1 Current harmonics (1)

Table 260: LD0.HAEFPTOC1 Current harmonics (1)

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

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

Table 261: 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					

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IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.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 262: 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 263: 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					

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.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 264: LD0.RESVMMXU1 Residual voltage measurement (1)

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

2.5.5.11 LD0.RESVMMXU2 Residual voltage measurement (2)

Table 265: LD0.RESVMMXU2 Residual voltage measurement (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.RESVMMXU2					
.PhV.res.instCVal.mag	Uo-A	Residual voltage	0.00...4.00 [xUn]	R	0,4,0,400
LD0.RVAVMMXU2					
.PhV.res.cVal.mag	U_DMD_RES	Residual voltage demand	0.00...4.00 [xUn]	R	0,4,0,400
LD0.RVMAMMXU2					
.PhV.res.cVal.mag	Max demand Uo	Residual voltage max. demand	0.00...4.00 [xUn]	R	0,4,0,400
LD0.RVMIMMXU2					
.PhV.res.cVal.mag	Min demand Uo	Residual volatge min. demand	0.00...4.00 [xUn]	R	0,4,0,400

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LD0.VMMXU1 Three-phase voltage measurement (1)

Table 266: 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

2.5.5.13

LD0.VMMXU2 Three-phase voltage measurement (2)

Table 267: LD0.VMMXU2 Three-phase voltage measurement (2)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.VMMXU2.PhV		Phase-to-ground voltage			
.phsA.cVal.mag	U_INST_A	Phs A magnitude	0.00...4.00 [xUn]	R	0,4,0,400
.phsB.cVal.mag	U_INST_B	Phs B magnitude	0.00...4.00 [xUn]	R	0,4,0,400
.phsC.cVal.mag	U_INST_C	Phs C magnitude	0.00...4.00 [xUn]	R	0,4,0,400
LD0.VMMXU2.PPV		Phase-to-phase voltage			
.phsAB.cVal.mag	U_DB_AB	Phs AB magnitude	0.00...4.00 [xUn]	R	0,4,0,400

Table continues on next page

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.phsBC.cVal.mag	U_DB_BA	Phs BC magnitude	0.00...4.00 [xUn]	R	0,4,0,400
.phsCA.cVal.mag	U_DB_CA	Phs CA magnitude	0.00...4.00 [xUn]	R	0,4,0,400
LD0.VAVMMXU2.PhV		Phase-to-ground voltage			
.phsA.cVal.mag	U_DMD_A	Phs A demand value	0.00...4.00 [xUn]	R	0,4,0,400
.phsB.cVal.mag	U_DMD_B	Phs B demand value	0.00...4.00 [xUn]	R	0,4,0,400
.phsC.cVal.mag	U_DMD_C	Phs C demand value	0.00...4.00 [xUn]	R	0,4,0,400
LD0.VAVMMXU2.PPV		Phase-to-phase voltage			
.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 268: 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 269: 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

Table continues on next page

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IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
.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 270: LD0.PHQVVR1 Voltage variation (1)

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

2.5.6.3

LD0.VMHAI1 Voltage total harmonic distortion (1)

Table 271: 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.LNPDEF1 Line differential protection (1)

Table 272: LD0.LNPDEF1 Line differential protection (1)

IEC 61850 name	SA name	Description	Values	S	Arg 1,2,3,4
LD0.LNPDEF1					
.DifAClc.phsA.cVal.mag		Phase A diff. Current	0.00...80.0 [xIn]	R	0,80,0,8000
.DifAClc.phsB.cVal.mag		Phase B diff. Current	0.00...80.0 [xIn]	R	0,80,0,8000
.DifAClc.phsC.cVal.mag		Phase C diff. Current	0.00...80.0 [xIn]	R	0,80,0,8000
.RstA.phsA.cVal.mag		Phase A stab. Current	0.00...80.0 [xIn]	R	0,80,0,8000
.RstA.phsB.cVal.mag		Phase B stab. Current	0.00...80.0 [xIn]	R	0,80,0,8000
.RstA.phsC.cVal.mag		Phase C stab. Current	0.00...80.0 [xIn]	R	0,80,0,8000

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

Table 273: 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

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

Table 274: 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

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

Table 275: 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

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

Table 276: 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 277: 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 278: LD0.DARREC1 Autoreclosing (1)

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

2.5.8.3 LD0.SCEFRFLO1 Fault locator (1)

Table 279: 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
Table continues on next page					

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

2.5.8.4 LD0.SECRSYN1 Synchronism and energizing check (1)

Table 280: 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 281: 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.SCA4GAPC1 Analog value scaling (1)

Table 282: 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

2.5.9.3

LD0.SCA4GAPC2 Analog value scaling (2)

Table 283: 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

2.5.9.4

LD0.SCA4GAPC3 Analog value scaling (3)

Table 284: 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

2.5.9.5

LD0.SCA4GAPC4 Analog value scaling (4)

Table 285: 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

2.5.9.6

LD0.XARGGIO130 RTD inputs

Table 286: LD0.XARGGIO130 RTD inputs

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

2.5.9.7 LD0.XRGGIO130 RTD inputs

Table 287: *LD0.XRGGIO130 RTD inputs*

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

2.6 Double-bit binary inputs

Table 288: *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 289: *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.DCXSWI1 Disconnector control (1)

Table 290: CTRL.DCXSWI1 Disconnector control (1)

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

2.6.1.3 CTRL.DCXSWI2 Disconnector control (2)

Table 291: CTRL.DCXSWI2 Disconnector control (2)

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

2.6.1.4 CTRL.DCSXSWI1 Disconnector position indication (1)

Table 292: 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 293: 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 294: 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.ESXSWI1 Earthing switch control (1)

Table 295: CTRL.ESXSWI1 Earthing switch control (1)

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

2.6.1.8 CTRL.ESSXSWI1 Earthing switch indication (1)

Table 296: CTRL.ESSXSWI1 Earthing switch indication (1)

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

2.6.1.9 CTRL.ESSXSWI2 Earthing switch indication (2)

Table 297: CTRL.ESSXSWI2 Earthing switch indication (2)

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

2.7 Counters

Table 298: 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 299: 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 300: 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

2.8 Analog outputs

Table 301: 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 302: 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 303: *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 record (1)

Table 304: *LD0.FLTRFRC1 Fault record (1)*

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

Section 3 DNP3 protocol implementation

3.1 DNP3 device profile

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

Table 305: Device profile document

DNP3 device profile document		
Vendor name:		ABB Oy
Device name:		RED615, REF615, REG615, REM615, RET615, REU615, REV615
Highest DNP level supported: For requests: For responses:	Level 2+ 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: Received:	292 292	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 type="radio"/> Never <input checked="" 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 checked="" 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 type="radio"/> No counters reported <input checked="" 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 type="radio"/> No counters reported <input checked="" type="radio"/> Configurable (Counter roll-over depends on the source-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: 33%;">Append file mode</td><td style="width: 33%;"><input type="radio"/> Yes</td><td style="width: 33%;"><input checked="" type="radio"/> No</td></tr> <tr> <td>Custom status code strings</td><td><input type="radio"/> Yes</td><td><input checked="" type="radio"/> No</td></tr> <tr> <td>Permissions field</td><td><input type="radio"/> Yes</td><td><input checked="" type="radio"/> No</td></tr> <tr> <td>File events assigned to class</td><td><input type="radio"/> Yes</td><td><input checked="" type="radio"/> No</td></tr> <tr> <td>File events send immediately</td><td><input type="radio"/> Yes</td><td><input checked="" type="radio"/> No</td></tr> <tr> <td>Multiple blocks in a fragment</td><td><input type="radio"/> Yes</td><td><input checked="" type="radio"/> No</td></tr> <tr> <td>Max number of files open</td><td>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,○ = 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 306: *Implementation table*

OBJECT			REQUEST (Slave will parse)		RESPONSE (Slave 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, 27, 28 (index)		
1	1 (default) ¹⁾	Binary input	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 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, 27, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index) ²⁾
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	Binary input change with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
3	0	Double bit input – any variation	1 (read) 22 (assign class)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)		
3	1 ¹⁾	Double bit output	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index) ²⁾
3	2	Double bit input with status	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index) ²⁾
4	0	Double bit input change - any variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
4	1	Double bit input change without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
4	2	Double bit input change with 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, 27, 28 (index)		
10	1	Binary output	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index) ²⁾
10	2 ¹⁾	Binary output status	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 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

Table continues on next page

OBJECT			REQUEST (Slave will parse)		RESPONSE (Slave will respond with)	
20	0	Binary counter — any variation	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)		
20	1	32-bit binary counter (with flag)	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00,01 (start-stop) 17, 28 (index) ²⁾
20	2	16-bit binary counter (with flag)	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00,01 (start-stop) 17, 28 (index) ²⁾
20	5 ¹⁾	32-bit binary counter without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00,01 (start-stop) 17, 28 (index) ²⁾
20	6	16-bit binary counter without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00,01 (start-stop) 17, 28 (index) ²⁾
21	0	Frozen counter — any variation	1 (read) 22 (assign class)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)		
21	1	32-bit frozen counter (with flag)	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00,01 (start-stop) 17, 28 (index)
21	2	16-bit frozen counter (with flag)	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00,01 (start-stop) 17, 28 (index)
21	5	32-bit frozen counter with time of freeze	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00,01 (start-stop) 17, 28 (index)
21	6	16-bit frozen counter with time of freeze	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00,01 (start-stop) 17, 28 (index)
21	9	32-bit frozen counter without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00,01 (start-stop) 17, 28 (index)
21	10	16-bit frozen counter without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00,01 (start-stop) 17, 28 (index)
22	0	Counter change event — any variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
22	1 ¹⁾	32-bit counter change event without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
22	2	16-bit counter change event without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)

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OBJECT			REQUEST (Slave will parse)		RESPONSE (Slave will respond with)	
22	5	32-bit counter change event with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
22	6	16-bit counter change event with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
23	0	Frozen counter event — any variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
23	1	32-bit frozen counter event	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
23	2	16-bit frozen counter event	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
23	5	32-bit frozen counter event with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
23	6	16-bit frozen counter event with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
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, 27, 28 (index)		
30	1	32-bit analog input	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00,01 (start-stop) 17, 28 (index) ²⁾
30	2	16-bit analog input	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00,01 (start-stop) 17, 28 (index) ²⁾
30	3 ¹⁾	32-bit analog input without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 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, 27, 28 (index)	129 (response)	00,01 (start-stop) 17, 28 (index) ²⁾
30	5	Short floating point	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00,01 (start-stop) 17, 28 (index) ²⁾
30	6	Long floating point	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 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 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	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)

Table continues on next page

OBJECT			REQUEST (Slave will parse)		RESPONSE (Slave will respond with)	
32	5	Short floating point 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	6	Long floating point 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	7	Short floating point 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	8	Long floating point analog change event with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
40	0	Analog output status	1 (read) 22 (assign class)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)		
40	1	32-bit analog output status	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00,01 (start-stop) 17, 28 (index)
40	2	16-bit analog output status	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00,01 (start-stop) 17, 28 (index)
40	3	Short floating point analog output status	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00,01 (start-stop) 17, 28 (index)
40	4	Long floating point analog output status	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 27, 28 (index)	129 (response)	00,01 (start-stop) 17, 28 (index)
41	1	32-bit analog output block	3 (select) 4 (operate) 5 (direct op) 6 (dir.op. noack)	17, 28 (index)	129 (response)	Echo of request
41	2	16-bit analog output block	3 (select) 4 (operate) 5 (direct op) 6 (dir.op. noack)	17, 28 (index)	129 (response)	Echo of request
41	3	Short floating point analog output block	3 (select) 4 (operate) 5 (direct op) 6 (dir.op. noack)	17, 28 (index)	129 (response)	Echo of request
41	4	Long floating point analog output block	3 (select) 4 (operate) 5 (direct op) 6 (dir.op. noack)	17, 28 (index)	129 (response)	Echo of request
42	0	Analog output event — any variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
42	1	32-bit analog output event without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
42	2	16-bit analog output event without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)

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Section 3

DNP3 protocol implementation

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OBJECT			REQUEST (Slave will parse)		RESPONSE (Slave will respond with)	
42	3	32-bit analog output event with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
42	4	16-bit analog output event with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
42	5	Short floating point analog output event without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
42	6	Long floating point analog output event without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
42	7	Short floating point analog output event with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
42	8	Long floating point analog output 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 ¹⁾	Time and date	1 (read)	07, (limited qty = 1)	129 (response)	07 (limited qty = 1)
			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	Unsynchronized time and date CTO			129 (response) 130 (unsol. resp)	07 (limited qty) (qty = 1)
52	1	Time delay coarse			129 (response)	07 (limited qty) (qty = 1)
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) 07, 08 (limited qty)		
			20 (enbl. unsol.) 21 (dab.unsol.) 22 (assign class)	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) 20 (enbl. unsol.) 21 (dab.unsol.) 22 (assign class)	06 (no range, or all) 06 (no range, or all) 07, 08 (limited qty)		
80	1	Internal indications	1 (read)	00, 01 (start-stop)	129 (response)	00,01 (start-stop)
			2 (write) ³⁾	00 (start-stop) index=7		
No object (function code only)			13 (cold restart)			

Table continues on next page

OBJECT	REQUEST (Slave will parse)	RESPONSE (Slave will respond with)
No object (function code only)	14 (warm restart)	
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. Otherwise, static object requests sent with qualifiers 00, 01, 06, 07 or 08 are responded with qualifiers 00 or 01. (For change event objects, qualifiers 17 or 28 are always responded.)
- 3) Writings of internal indications are only supported for index 7 (Restart IIn1-7).

Section 4

Glossary

AFL	Application function block library
CROB	Control relay output block
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
HSO	High-speed output
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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