

RELION® 615 SERIES

Feeder Protection and Control

REF615

Modbus Point List Manual





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Section 1 Introduction

1.1 This manual

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

1.2 Intended audience

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

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

1.3 Product documentation

1.3.1 Product documentation set

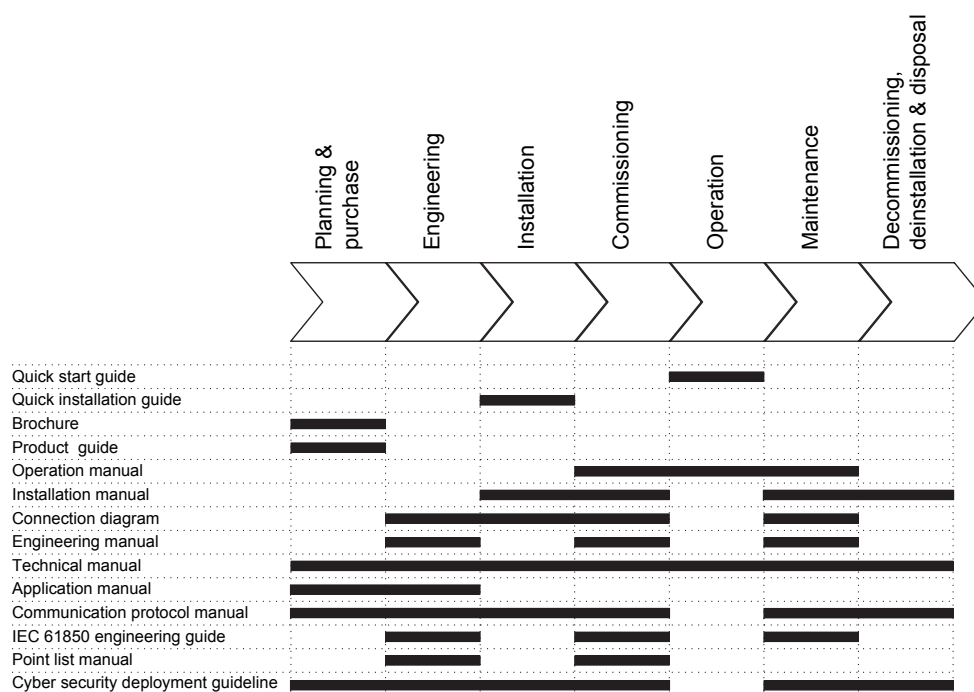


Figure 1: The intended use of documents during the product life cycle



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

1.3.2 Document revision history

Document revision/date	Product version	History
A/2009-09-29	2.0	First release
B/2010-07-02	3.0	Content updated
C/2014-05-16	4.1	Content updated to correspond to the product version
D/2019-04-30	5.0 FP1	Content updated to correspond to the product version



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

1.3.3 Related documentation

Name of the document	Document ID
Modbus Communication Protocol Manual	1MRS759002

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

Table 1: *REF615 functions, codes and symbols*

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)
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)
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)
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	INTRPTEF1	Io> -> IEF (1)	67NIEF (1)
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)
Table continues on next page			

Function	IEC 61850	IEC 60617	IEC-ANSI
Negative-sequence overcurrent protection	NSPTOC1	I ₂ > (1)	46 (1)
	NSPTOC2	I ₂ > (2)	46 (2)
Phase discontinuity protection	PDNSPTOC1	I ₂ /I ₁ > (1)	46PD (1)
Residual overvoltage protection	ROVPTOV1	U ₀ > (1)	59G (1)
	ROVPTOV2	U ₀ > (2)	59G (2)
	ROVPTOV3	U ₀ > (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	U ₁ < (1)	47U+ (1)
	PSPTUV2	U ₁ < (2)	47U+ (2)
Negative-sequence overvoltage protection	NSPTOV1	U ₂ > (1)	47O- (1)
	NSPTOV2	U ₂ > (2)	47O- (2)
Frequency protection	FRPFRQ1	f>/f<,df/dt (1)	81 (1)
	FRPFRQ2	f>/f<,df/dt (2)	81 (2)
	FRPFRQ3	f>/f<,df/dt (3)	81 (3)
	FRPFRQ4	f>/f<,df/dt (4)	81 (4)
	FRPFRQ5	f>/f<,df/dt (5)	81 (5)
	FRPFRQ6	f>/f<,df/dt (6)	81 (6)
Three-phase thermal protection for feeders, cables and distribution transformers	T1PTTR1	3I _{th} >F (1)	49F (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>/I ₀ >BF (1)	51BF/51NBF (1)
Three-phase inrush detector	INRPHAR1	3I _{2f} > (1)	68 (1)
Switch onto fault control	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)
Table continues on next page			

Function	IEC 61850	IEC 60617	IEC-ANSI
Arc protection	ARCSARC1	ARC (1)	50L/50NL (1)
	ARCSARC2	ARC (2)	50L/50NL (2)
	ARCSARC3	ARC (3)	50L/50NL (3)
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)
Fault locator	SCEFRFLO1	FLOC (1)	21FL (1)
High-impedance fault detection	PHIZ1	HIF (1)	HIZ (1)
Reverse power/directional overpower protection	DOPDPDR1	P>/Q> (1)	32R/32O (1)
	DOPDPDR2	P>/Q> (2)	32R/32O (2)
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	VVSPAM1	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			
Table continues on next page			

Function	IEC 61850	IEC 60617	IEC-ANSI
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	DCSXSXI1	I <-> O DC (1)	I <-> O DC (1)
	DCSXSXI2	I <-> O DC (2)	I <-> O DC (2)
	DCSXSXI3	I <-> O DC (3)	I <-> O DC (3)
Earthing switch indication	ESSXSXI1	I <-> O ES (1)	I <-> O ES (1)
	ESSXSXI2	I <-> O ES (2)	I <-> O ES (2)
Autoreclosing	DARREC1	O -> I (1)	79 (1)
Synchronism and energizing check	SECRSYN1	SYNC (1)	25 (1)
Condition monitoring			
Circuit-breaker condition monitoring	SSCBR1	CBCM (1)	CBCM (1)
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)
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)
Sequence current measurement	CSMSQI1	I1, I2, I0 (1)	I1, I2, I0 (1)
Residual current measurement	RESCMMXU1	I0 (1)	I _n (1)
Three-phase voltage measurement	VMMXU1	3U (1)	3V (1)
	VMMXU2	3U (2)	3V (2)
Residual voltage measurement	RESVMMXU1	U0 (1)	V _n (1)
Sequence voltage measurement	VSMSQI1	U1, U2, U0 (1)	V1, V2, V0 (1)
Three-phase power and energy measurement	PEMMXU1	P, E (1)	P, E (1)
RTD/mA measurement	XRGGIO130	X130 (RTD) (1)	X130 (RTD) (1)
Frequency measurement	FMMXU1	f (1)	f (1)
Table continues on next page			

Function	IEC 61850	IEC 60617	IEC-ANSI
IEC 61850-9-2 LE sampled value sending	SMVSENDER	SMVSENDER	SMVSENDER
IEC 61850-9-2 LE sampled value receiving (voltage sharing)	SMVRECEIVER	SMVRECEIVER	SMVRECEIVER
Other			
Minimum pulse timer (2 pcs)	TPGAPC1	TP (1)	TP (1)
	TPGAPC2	TP (2)	TP (2)
	TPGAPC3	TP (3)	TP (3)
	TPGAPC4	TP (4)	TP (4)
Minimum pulse timer (2 pcs, second resolution)	TPSGAPC1	TPS (1)	TPS (1)
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 Modbus data mappings

2.1 Overview

This document describes the Modbus data points and structures available in the protection relay. The point lists describe a superset of all data available through the standard configuration/s including the optional functionalities.

The majority of the Modbus data points are valid for all standard configurations. Some data points are standard configuration-dependent or optional application-dependent and thus not available in each protection relay. The unavailable, that means, unused, data points always return value 0 when they are read. The configuration-dependent and optional data do not overlap.

2.2 Supported functions

2.2.1 Supported functions in REF615

Table 2: *Supported functions*

Function	IEC 61850	C	D	J	N	Z
		FC03	FC04	FC09	FC12	FC52
Protection						
Three-phase non-directional overcurrent protection, low stage	PHLPTOC	1	1		2	
Three-phase non-directional overcurrent protection, high stage	PHHPTOC	2	2		1	
Three-phase non-directional overcurrent protection, instantaneous stage	PHIPTOC	1	1	1	1	1
Three-phase directional overcurrent protection, low stage	DPHLPDOC			2	2	2
Three-phase directional overcurrent protection, high stage	DPHHPDOC			1	1	1
Non-directional earth-fault protection, low stage	EFLPTOC	2	2		2	
Non-directional earth-fault protection, high stage	EFHPTOC	1	1		1	
Non-directional earth-fault protection, instantaneous stage	EFIPTOC	1	1		1	
Directional earth-fault protection, low stage	DEFLPDEF			2	2	2
Directional earth-fault protection, high stage	DEFHPDEF			1	1	1
Admittance-based earth-fault protection	EFPADM			(3) ¹⁾	(3) ¹⁾	(3) ¹⁾
Wattmetric-based earth-fault protection	WPWDE			(3) ¹⁾	(3) ¹⁾	(3) ¹⁾
Transient/intermittent earth-fault protection	INTRPTEF			1 ²⁾	1 ²⁾	1 ²⁾
Harmonics-based earth-fault protection	HAEFPTOC		(1) ¹⁾²⁾	(1) ¹⁾²⁾	(1) ¹⁾²⁾	(1) ¹⁾²⁾
Non-directional (cross-country) earth-fault protection, using calculated Io	EFHPTOC			1		1

Table continues on next page

Section 2

Modbus data mappings

1MRS756817 D

Function	IEC 61850	C	D	J	N	Z
		FC03	FC04	FC09	FC12	FC52
Negative-sequence overcurrent protection	NSPTOC	2	2	2	2	2
Phase discontinuity protection	PDNSPTOC	1	1	1	1	1
Residual overvoltage protection	ROVPTOV			3	3	3
Three-phase undervoltage protection	PHPTUV			3	3	3
Three-phase overvoltage protection	PHPTOV			3	3	3
Positive-sequence undervoltage protection	PSPTUV			1	2	1
Negative-sequence overvoltage protection	NSPTOV			1	2	1
Frequency protection	FRPFRQ			3	6	3
Three-phase thermal protection for feeders, cables and distribution transformers	T1PTTR	1	1	1	1	1
High-impedance differential protection for phase A	HIAPDIF				1	
High-impedance differential protection for phase B	HIBPDIF				1	
High-impedance differential protection for phase C	HICPDIF				1	
Circuit breaker failure protection	CCBRBRF	1	1	1	1	1
Three-phase inrush detector	INRPHAR	1	1	1	1	1
Switch onto fault control	CBPSOF	1	1	1	1	1
Master trip	TRPPTRC	2	2 (3) ³	2 (3) ³	2 (3) ³	2
Arc protection	ARCSARC	(3)	(3)	(3)	(3)	(3)
Multipurpose protection ⁴⁾	MAPGAPC	18	18	18	18	18
Fault locator	SCEFRFLO				(1)	
High-impedance fault detection	PHIZ		1	1	1	1
Reverse power/directional overpower protection	DOPDPDR				2	
Multifrequency admittance-based earth-fault protection	MFADPSDE				1	
Interconnection functions						
Directional reactive power undervoltage protection	DQPTUV				(1)	
Low-voltage ride-through protection	LVRTPTUV				(3)	
Voltage vector shift protection	VVSPAM				(1)	
Power quality						
Current total demand distortion	CMHAI			(1) ⁵⁾	(1) ⁵⁾	(1) ⁵⁾
Voltage total harmonic distortion	VMHAI			(1) ⁵⁾	(1) ⁵⁾	(1) ⁵⁾
Voltage variation	PHQVVR			(1) ⁵⁾	(1) ⁵⁾	(1) ⁵⁾
Voltage unbalance	VSQVUB			(1) ⁵⁾	(1) ⁵⁾	(1) ⁵⁾
Control						
Circuit-breaker control	CBXCBR	1	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
Table continues on next page						

Function	IEC 61850	C	D	J	N	Z
		FC03	FC04	FC09	FC12	FC52
Autoreclosing	DARREC	(1)	(1)	(1)	(1)	(1)
Synchronism and energizing check	SECRSYN			1	1	1
Condition monitoring						
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
Current transformer supervision for high-impedance protection scheme for phase A	HZCCASPVC				1	
Current transformer supervision for high-impedance protection scheme for phase B	HZCCBSPVC				1	
Current transformer supervision for high-impedance protection scheme for phase C	HZCCCSPVC				1	
Fuse failure supervision	SEQSPVC			1	1	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	LDPRLRC		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	1
Three-phase voltage measurement	VMMXU			2	2	2
Residual voltage measurement	RESVMMXU			1	1	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 ⁶⁾	SMVSENDER			(1)	(1)	(1)
IEC 61850-9-2 LE sampled value receiving (voltage sharing) ⁶⁾	SMVRECEIVER			(1)	(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
Table continues on next page						

Function	IEC 61850	C	D	J	N	Z
		FC03	FC04	FC09	FC12	FC52
Analog value scaling	SCA4GAPC	4	4	4	4	4
Integer value move	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) One of the following can be ordered as an option: admittance-based E/F, wattmetric-based E/F or harmonics-based E/F.
- 2) "Io 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) Used for RTD/mA based protection or analog GOOSE, for example
- 5) Power quality option includes current total demand distortion, voltage total harmonic distortion and voltage variation.
- 6) Available only with COM0031...0037

2.3 Indications

Table 3: *Explanations of the indications table columns*

Column name	Description
BitA	Default 0X and 1X bit address for the data.
RegA	Default 3X and 4X register.bit (00-15) address for the data.
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 value states.

2.3.1 Premapped indications

2.3.1.1 Common data 1

Table 4: *Common data 1*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		CTRL.LLN0			
2720	170.00	.Loc.stVal	-	Remote/Local state	0/1=Rem/Loc
2721	170.01	.LocKeyHMI.stVal.Station	-	Station state	1=Station
		DR.RDRE1			
2722	170.02	.RcdMade.stVal	-	DR recording made	1=Made
2723	170.03	.mcd			

2.3.1.2 CTRL.CBCILO1 Circuit breaker enable signals (1)**Table 5:** *CTRL.CBCILO1 Circuit breaker enable signals (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		CTRL.CBCILO1			
2824	176.08	.EnaOpn.stVal	ENA_OPEN	Open enabled	1=Enabled
2825	176.09	.EnaCls.stVal	ENA_CLOSE	Close enabled	1=Enabled

2.3.1.3 CTRL.CBCSWI1 Circuit breaker (1) mom. position**Table 6:** *CTRL.CBCSWI1 Circuit breaker (1) mom. position*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		CTRL.CBCSWI1	POSITION		
2804	175.04	.Pos.stVal.Close	-	Close bit	1=Close
2805	175.05	.Pos.stVal.Open	-	Open bit	1=Open
2806	175.06	.Pos.stVal.Fault	-	Fault bit	1=Pos(00/11)
2834	177.02	.SynItlByps.stVal	ITL_BYPASS	Interlock bypass	1=Bypass
2835	177.03	.mcd			

2.3.1.4 CTRL.CBCSWI1 Circuit breaker (1) mom+mcd position**Table 7:** *CTRL.CBCSWI1 Circuit breaker (1) mom+mcd position*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		CTRL.CBCSWI1	POSITION		
2816	176.00	.Pos.stVal.Close		Close bit	1=Close
2817	176.01	.mcd			
2818	176.02	.Pos.stVal.Open		Open bit	1=Open
2819	176.03	.mcd			
2820	176.04	< reserved >			
2821	176.05	< reserved >			
2822	176.06	.Pos.stSeld	SELECTED	CB selected for control	1=Selected
2823	176.07	.mcd			

2.3.1.5 CTRL.CBXCBR1 Circuit-breaker control (1)

Table 8: CTRL.CBXCBR1 Circuit-breaker control (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		CTRL.CBXCBR1			
2836	177.04	.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked
2837	177.05	.mcd			
2838	177.06	.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
2839	177.07	.mcd			

2.3.1.6 CTRL.DCSXSWI1 Disconnecter position indication (1)

Table 9: CTRL.DCSXSWI1 Disconnecter position indication (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		CTRL.DCSXSWI1	POSITION		
2792	174.08	.Pos.stVal.Close	-	Close bit	1=Close
2793	174.09	.Pos.stVal.Open	-	Open bit	1=Open
2794	174.10	.Pos.stVal.Fault	-	Fault bit	1=Pos(00/11)

2.3.1.7 CTRL.DCSXSWI2 Disconnecter position indication (2)

Table 10: CTRL.DCSXSWI2 Disconnecter position indication (2)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		CTRL.DCSXSWI2	POSITION		
2795	174.11	.Pos.stVal.Close	-	Close bit	1=Close
2796	174.12	.Pos.stVal.Open	-	Open bit	1=Open
2797	174.13	.Pos.stVal.Fault	-	Fault bit	1=Pos(00/11)

2.3.1.8 CTRL.DCSXSWI3 Disconnecter position indication (3)

Table 11: CTRL.DCSXSWI3 Disconnecter position indication (3)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		CTRL.DCSXSWI3	POSITION		
2798	174.14	.Pos.stVal.Close	-	Close bit	1=Close
2799	174.15	.Pos.stVal.Open	-	Open bit	1=Open
2800	175.00	.Pos.stVal.Fault	-	Fault bit	1=Pos(00/11)

2.3.1.9 CTRL.DCXSWI1 Disconnecter control (1)**Table 12:** *CTRL.DCXSWI1 Disconnecter control (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		CTRL.DCXSWI1	POSITION		
3472	217.00	.Pos.stVal.Close	-	Close bit	1=Close
3473	217.01	.Pos.stVal.Open	-	Open bit	1=Open
3474	217.02	.Pos.stVal.Fault	-	Fault bit	1=Pos(00/11)
3475	217.03	.Pos.stSeld	-	Control selected	1=Selected
		CTRL.DCCIO1			
3476	217.04	.EnaOpn.stVal	ENA_OPEN	Open enabled	1=Enabled
3477	217.05	.EnaCls.stVal	ENA_CLOSE	Close enabled	1=Enabled
		CTRL.DCXSWI1			
3478	217.06	.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked
3479	217.07	.mcd			
3480	217.08	.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
3481	217.09	.mcd			
		CTRL.DCCIO1			
3482	217.10	.ItlByps.stVal	ITL_BYPASS	Interlock bypass	1=Bypass
3483	217.11	.mcd			

2.3.1.10 CTRL.DCXSWI2 Disconnecter control (2)**Table 13:** *CTRL.DCXSWI2 Disconnecter control (2)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		CTRL.DCXSWI2	POSITION		
3484	217.12	.Pos.stVal.Close	-	Close bit	1=Close
3485	217.13	.Pos.stVal.Open	-	Open bit	1=Open
3486	217.14	.Pos.stVal.Fault	-	Fault bit	1=Pos(00/11)
3487	217.15	.Pos.stSeld	-	Control selected	1=Selected
		CTRL.DCCIO2			
3488	218.00	.EnaOpn.stVal	ENA_OPEN	Open enabled	1=Enabled
3489	218.01	.EnaCls.stVal	ENA_CLOSE	Close enabled	1=Enabled
		CTRL.DCXSWI2			
3490	218.02	.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked
3491	218.03	.mcd			
3492	218.04	.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
3493	218.05	.mcd			
		CTRL.DCCIO2			
3494	218.06	.ItlByps.stVal	ITL_BYPASS	Interlock bypass	1=Bypass
3495	218.07	.mcd			

2.3.1.11 CTRL.ESSXSWI1 Earthing switch indication (1)

Table 14: CTRL.ESSXSWI1 Earthing switch indication (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		CTRL.ESSXSWI1	POSITION		
2801	175.01	.Pos.stVal.Close	-	Close bit	1=Close
2802	175.02	.Pos.stVal.Open	-	Open bit	1=Open
2803	175.03	.Pos.stVal.Fault	-	Fault bit	1=Pos(00/11)

2.3.1.12 CTRL.ESSXSWI2 Earthing switch indication (2)

Table 15: CTRL.ESSXSWI2 Earthing switch indication (2)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		CTRL.ESSXSWI2	POSITION		
2807	175.07	.Pos.stVal.Close	-	Close bit	1=Close
2808	175.08	.Pos.stVal.Open	-	Open bit	1=Open
2809	175.09	.Pos.stVal.Fault	-	Fault bit	1=Pos(00/11)

2.3.1.13 CTRL.ESXSWI1 Earthing switch control (1)

Table 16: CTRL.ESXSWI1 Earthing switch control (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		CTRL.ESXSWI1	POSITION		
3496	218.08	.Pos.stVal.Close	-	Close bit	1=Close
3497	218.09	.Pos.stVal.Open	-	Open bit	1=Open
3498	218.10	.Pos.stVal.Fault	-	Fault bit	1=Pos(00/11)
3499	218.11	.Pos.stSeld	-	Control selected	1=Selected
		CTRL.ESCILO1			
3500	218.12	.EnaOpn.stVal	ENA_OPEN	Open enabled	1=Enabled
3501	218.13	.EnaCls.stVal	ENA_CLOSE	Close enabled	1=Enabled
		CTRL.ESXSWI1			
3502	218.14	.BlkOpn.stVal	BLK_OPEN	Open blocked	1=Blocked
3503	218.15	.mcd			
3504	219.00	.BlkCls.stVal	BLK_CLOSE	Close blocked	1=Blocked
3505	219.01	.mcd			
		CTRL.ESCILO1			
3506	219.02	.ItlByps.stVal	ITL_BYPASS	Interlock bypass	1=Bypass
3507	219.03	.mcd			

2.3.1.14 LD0.ARCSARC1 Arc protection (1)**Table 17:** *LD0.ARCSARC1 Arc protection (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.ARCSARC11			
2978	186.02	.FADet.stVal	ARC_FLT_DET	Arc detected	1=Detected
2979	186.03	.mcd			
		LD0.ARCPTRC11			
2982	186.06	.Op.general	OPERATE	Stage operate	1=Operate
2983	186.07	.mcd			

2.3.1.15 LD0.ARCSARC2 Arc protection (2)**Table 18:** *LD0.ARCSARC2 Arc protection (2)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.ARCSARC21			
2984	186.08	.FADet.stVal	ARC_FLT_DET	Arc detected	1=Detected
2985	186.09	.mcd			
		LD0.ARCPTRC21			
2988	186.12	.Op.general	OPERATE	Stage operate	1=Operate
2989	186.13	.mcd			

2.3.1.16 LD0.ARCSARC3 Arc protection (3)**Table 19:** *LD0.ARCSARC3 Arc protection (3)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.ARCSARC31			
2990	186.14	.FADet.stVal	ARC_FLT_DET	Arc detected	1=Detected
2991	186.15	.mcd			
		LD0.ARCPTRC31			
2994	187.02	.Op.general	OPERATE	Stage operate	1=Operate
2995	187.03	.mcd			

2.3.1.17 LD0.CCBBRBF1 Circuit breaker failure protection (1)**Table 20:** *LD0.CCBBRBF1 Circuit breaker failure protection (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.CCBBRBF1			
2828	176.12	.Str.general	CB_FAULT_AL	Timer running	1=Running
2829	176.13	.mcd			

Table continues on next page

BitA	RegA	IEC 61850 name	SA name	Description	Values
2830	176.14	.OpEx.general	TRBU	Fail, external trip	1=Ext.trip
2831	176.15	.mcd			
2832	177.00	.OpIn.general	TRRET	Internal re-trip	1=Re-trip
2833	177.01	.mcd			

2.3.1.18 LD0.CCSPVC1 Current circuit supervision (1)

Table 21: CTRL.CCSPVC1 Current circuit supervision (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.CCSPVC1			
3002	187.10	.SigFailAlm.stVal	ALARM	Alarm	1=Alarm
3003	187.11	.mcd			
3004	187.12	.FailACirc.general	FAIL	Failure operate	1=Operate
3005	187.13	.mcd			

2.3.1.19 LD0.CMHAI1 Current total demand distortion (1)

Table 22: LD0.CMHAI1 Current total demand distortion (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.CMHAI1			
3316	207.04	.Alm.stVal	ALARM		1=Alarm
3317	207.05	.mcd			

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

Table 23: LD0.CMMXU1 Three-phase current measurement (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.CMMXU1			
2752	172.00	.HiAlm.stVal	HIGH_ALARM	High alarm	1=Alarm
2753	172.01	.mcd			
2754	172.02	.HiWrn.stVal	HIGH_WARN	High warning	1=Warning
2755	172.03	.mcd			
2756	172.04	.LoWrn.stVal	LOW_WARN	Low warning	1=Warning
2757	172.05	.mcd			
2758	172.06	.LoAlm.stVal	LOW_ALARM	Low alarm	1=Alarm
2759	172.07	.mcd			

2.3.1.21 LD0.DARREC1 Autoreclosing (1)**Table 24:** *LD0.DARREC1 Autoreclosing (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.DARREC1			
3040	190.00	.PrgRec.stVal	INPRO	AR in progress	1=In progress
3041	190.01	.mcd			
3042	190.02	.PrgRec1.stVal	INPRO_1	1st shot in progress	1=In progress
3043	190.03	.mcd			
3044	190.04	.PrgRec2.stVal	INPRO_2	2nd shot in progress	1=In progress
3045	190.05	.mcd			
3046	190.06	.PrgRec3.stVal	INPRO_3	3rd shot in progress	1=In progress
3047	190.07	.mcd			
3048	190.08	.PrgRec4.stVal	INPRO_4	4th shot in progress	1=In progress
3049	190.09	.mcd			
3050	190.10	.PrgRec5.stVal	INPRO_5	5th shot in progress	1=In progress
3051	190.11	.mcd			
3052	190.12	.SucRec.stVal	SUC_RECL	Successful AR	1=Success
3053	190.13	.mcd			
3054	190.14	.UnsRec.stVal	UNSUC_RECL	Unsuccessful AR	1=Unsuccess
3055	190.15	.mcd			
3056	191.00	< reserved >			
3057	191.01	< reserved >			
3058	191.02	< reserved >			
3059	191.03	< reserved >			
3060	191.04	.LO.stVal	LOCKED	Lockout status	1=Lockout
3061	191.05	.mcd			
3062	191.06	.RdyRec.stVal	READY	Reclose ready	1=Ready
3063	191.07	.mcd			
3064	191.08	.ActRec.stVal	ACTIVE	Reclose active	1=Active
3065	191.09	.mcd			
3066	191.10	.PrgDsr.stVal	DISCR_INPRO	Discr.time in progress	1=In progress
3067	191.11	.mcd			
3068	191.12	.PrgCutOut.stVal	CUTOUT_INPRO	Cutout time in progress	1=In progress
3069	191.13	.mcd			
3070	191.14	.FrqOpAlm.stVal	FRQ_OP_ALM	Frequent op. Alarm	1=Alarm
3071	191.15	.mcd			
3072	192.00	.RclTmStr.stVal		Reclaim time started	
3073	192.01	.mcd			
3074	192.02	.ProCrd.stVal		Protection coordination	1=In progress
3075	192.03	.mcd			

Table continues on next page

BitA	RegA	IEC 61850 name	SA name	Description	Values
3076	192.04	.CBManCls.stVal	MAN_CB_CL	CB manually closed	1=CB closed
3077	192.05	.mcd			
3078	192.06	.OpCls.general	CLOSE_CB	Operate (close XCBR)	1=Close CB
3079	192.07	.mcd			
3080	192.08	.OpOpn.general	OPEN_CB	Operate (open XCBR)	1=Open CB
3081	192.09	.mcd			
3082	192.10	.UnsCBCls.stVal	UNSUC_CB	CB closing failed	1=Failed
3083	192.11	.mcd			
3084	192.12	.WtMstr.stVal	CMD_WAIT	Master signal to follower	1=Signal
3085	192.13	.mcd			

2.3.1.22 LD0.DARREC1 Autoreclosing state (1)

Table 25: LD0.DARREC1 Autoreclosing state (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.DARREC1			
2724	170.04	.AutoRecOn.stVal	AR_ON	AutoRecloser state	0/1=Off/On
2725	170.05	.mcd			

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

Table 26: LD0.DEFHPDEF1 Directional earth-fault protection, high stage (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.DEFHPTOC1			
2928	183.00	.Str.general	START	Stage start	1=Start
2929	183.01	.mcd			
2930	183.02	.Op.general	OPERATE	Stage operate	1=Operate
2931	183.03	.mcd			

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

Table 27: LD0.DEFLPDEF1 Directional earth-fault protection, low stage (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.DEFLPTOC1			
2920	182.08	.Str.general	START	Stage start	1=Start
2921	182.09	.mcd			
2922	182.10	.Op.general	OPERATE	Stage operate	1=Operate
2923	182.11	.mcd			

2.3.1.25 LD0.DEFLPDEF2 Directional earth-fault protection, low stage (2)**Table 28:** *LD0.DEFLPDEF2 Directional earth-fault protection, low stage (2)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.DEFLPTOC2			
2924	182.12	.Str.general	START	Stage start	1=Start
2925	182.13	.mcd			
2926	182.14	.Op.general	OPERATE	Stage operate	1=Operate
2927	182.15	.mcd			

2.3.1.26 LD0.DPHHPDOC1 Three-phase directional overcurrent protection, high stage (1)**Table 29:** *LD0.DPHHPDOC1 Three-phase directional overcurrent protection, high stage (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.DPHHPDOC1			
3026	189.02	.Str.general	START	General start	1=Start
3027	189.03	.mcd			
3028	189.04	.Str.phsA		Phs A start	1=Start
3029	189.05	.mcd			
3030	189.06	.Str.phsB		Phs B start	1=Start
3031	189.07	.mcd			
3032	189.08	.Str.phsC		Phs C start	1=Start
3033	189.09	.mcd			
3034	189.10	.Op.general	OPERATE	General operate	1=Operate
3035	189.11	.mcd			

2.3.1.27 LD0.DPHLPDOC1 Three-phase directional overcurrent protection, low stage (1)**Table 30:** *LD0.DPHLPDOC1 Three-phase directional overcurrent protection, low stage (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.DPHLPDOC1			
3006	187.14	.Str.general	START	General start	1=Start
3007	187.15	.mcd			
3008	188.00	.Str.phsA		Phs A start	1=Start
3009	188.01	.mcd			
3010	188.02	.Str.phsB		Phs B start	1=Start
3011	188.03	.mcd			
3012	188.04	.Str.phsC		Phs C start	1=Start

Table continues on next page

BitA	RegA	IEC 61850 name	SA name	Description	Values
3013	188.05	.mcd			
3014	188.06	.Op.general	OPERATE	General operate	1=Operate
3015	188.07	.mcd			

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

Table 31: LD0.DPHLPDOC2 Three-phase directional overcurrent protection, low stage (2)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.DPHLPDOC2			
3016	188.08	.Str.general	START	General start	1=Start
3017	188.09	.mcd			
3018	188.10	.Str.phsA		Phs A start	1=Start
3019	188.11	.mcd			
3020	188.12	.Str.phsB		Phs B start	1=Start
3021	188.13	.mcd			
3022	188.14	.Str.phsC		Phs C start	1=Start
3023	188.15	.mcd			
3024	189.00	.Op.general	OPERATE	General operate	1=Operate
3025	189.01	.mcd			

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

Table 32: LD0.EFHPTOC1 Non-directional earth-fault protection, high stage (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.EFHPTOC1			
2940	183.12	.Str.general	START	Stage start	1=Start
2941	183.13	.mcd			
2942	183.14	.Op.general	OPERATE	Stage operate	1=Operate
2943	183.15	.mcd			

2.3.1.30 LD0.EFIPTOC1 Non-directional earth-fault protection, instantaneous stage (1)**Table 33:** *LD0.EFIPTOC1 Non-directional earth-fault protection, instantaneous stage (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.EFIPTOC1			
2944	184.00	.Str.general	START	Stage start	1=Start
2945	184.01	.mcd			
2946	184.02	.Op.general	OPERATE	Stage operate	1=Operate
2947	184.03	.mcd			

2.3.1.31 LD0.EFLPTOC1 Non-directional earth-fault protection, low stage (1)**Table 34:** *LD0.EFLPTOC1 Non-directional earth-fault protection, low stage (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.EFLPTOC1			
2932	183.04	.Str.general	START	Stage start	1=Start
2933	183.05	.mcd			
2934	183.06	.Op.general	OPERATE	Stage operate	1=Operate
2935	183.07	.mcd			

2.3.1.32 LD0.EFLPTOC2 Non-directional earth-fault protection, low stage (2)**Table 35:** *LD0.EFLPTOC2 Non-directional earth-fault protection, low stage (2)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.EFLPTOC2			
2936	183.08	.Str.general	START	Stage start	1=Start
2937	183.09	.mcd			
2938	183.10	.Op.general	OPERATE	Stage operate	1=Operate
2939	183.11	.mcd			

2.3.1.33 LD0.EFPADM1 Admittance-based earth-fault protection (1)**Table 36:** *LD0.EFPADM1 Admittance-based earth-fault protection (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.EFPADM1			
2840	177.08	.Str.general	START	Stage start	1=Start
2841	177.09	.mcd			
2842	177.10	.Op.general	OPERATE	Stage operate	1=Operate
2843	177.11	.mcd			

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

Table 37: *LD0.EFPADM2 Admittance-based earth-fault protection (2)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.EFPADM2			
2844	177.12	.Str.general	START	Stage start	1=Start
2845	177.13	.mcd			
2846	177.14	.Op.general	OPERATE	Stage operate	1=Operate
2847	177.15	.mcd			

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

Table 38: *LD0.EFPADM3 Admittance-based earth-fault protection (3)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.EFPADM3			
2860	178.12	.Str.general	START	Stage start	1=Start
2861	178.13	.mcd			
2862	178.14	.Op.general	OPERATE	Stage operate	1=Operate
2863	178.15	.mcd			

2.3.1.36 LD0.FRPFRQ1 Frequency protection (1)

Table 39: *LD0.FRPFRQ1 Frequency protection (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.FRPTRC1			
4000	250.00	.Str.general	START	Stage 1 start	1=Start
4001	250.01	.mcd			
		LD0.FRPTOF1		Overfrequency	
4002	250.02	.Op.general	OPR_OFRQ	Operate	1=Operate
4003	250.03	.mcd			
		LD0.FRPTUF1		Underfrequency	
4004	250.04	.Op.general	OPR_UFRQ	Operate	1=Operate
4005	250.05	.mcd			
		LD0.FRPFRQ1		Frequency gradient	
4006	250.06	.Op.general	OPR_FRG	Operate	1=Operate
4007	250.07	.mcd			

2.3.1.37 LD0.FRPFRQ2 Frequency protection (2)**Table 40:** *LD0.FRPFRQ2 Frequency protection (2)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.FRPTRC2			
4008	250.08	.Str.general	START	Stage 2 start	1=Start
4009	250.09	.mcd			
		LD0.FRPTOF2		Overfrequency	
4010	250.10	.Op.general	OPR_OFRQ	Operate	1=Operate
4011	250.11	.mcd			
		LD0.FRPTUF2		Underfrequency	
4012	250.12	.Op.general	OPR_UFRQ	Operate	1=Operate
4013	250.13	.mcd			
		LD0.FRPFRQ2		Frequency gradient	
4014	250.14	.Op.general	OPR_FRG	Operate	1=Operate
4015	250.15	.mcd			

2.3.1.38 LD0.FRPFRQ3 Frequency protection (3)**Table 41:** *LD0.FRPFRQ3 Frequency protection (3)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.FRPTRC3			
4016	251.00	.Str.general	START	Stage 3 start	1=Start
4017	251.01	.mcd			
		LD0.FRPTOF3		Overfrequency	
4018	251.02	.Op.general	OPR_OFRQ	Operate	1=Operate
4019	251.03	.mcd			
		LD0.FRPTUF3		Underfrequency	
4020	251.04	.Op.general	OPR_UFRQ	Operate	1=Operate
4021	251.05	.mcd			
		LD0.FRPFRQ3		Frequency gradient	
4022	251.06	.Op.general	OPR_FRG	Operate	1=Operate
4023	251.07	.mcd			

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

Table 42: *LD0.HAEFPTOC1 Harmonics-based earth-fault protection (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.HAEFPTOC1			
3312	207.00	.Str.general	START	Stage start	1=Start
3313	207.01	.mcd			
3314	207.02	.Op.general	OPERATE	Stage operate	1=Operate
3315	207.03	.mcd			

2.3.1.40 LD0.INRPCHAR1 Three-phase inrush detector (1)

Table 43: *LD0.INRPCHAR1 Three-phase inrush detector (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.INRPCHAR1			
2964	185.04	.Str.general	BLK2H	General start	1=Start
2965	185.05	.mcd			
2966	185.06	.Str.phsA		Phs A start	1=Start
2967	185.07	.mcd			
2968	185.08	.Str.phsB		Phs B start	1=Start
2969	185.09	.mcd			
2970	185.10	.Str.phsC		Phs C start	1=Start
2971	185.11	.mcd			

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

Table 44: *LD0.INTRPTEF1 Transient/intermittent earth-fault protection (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.INTRPTEF1			
2948	184.04	.Str.general	START	Stage start	1=Start
2949	184.05	.mcd			
2950	184.06	.Op.general	OPERATE	Stage operate	1=Operate
2951	184.07	.mcd			

2.3.1.42 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 green for OK. Colors can, however, be reconfigured with a setting parameter.

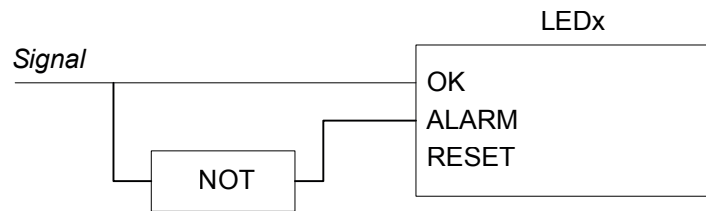


Figure 2: Signal wired to both OK and ALARM inputs – inverted to the other



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.

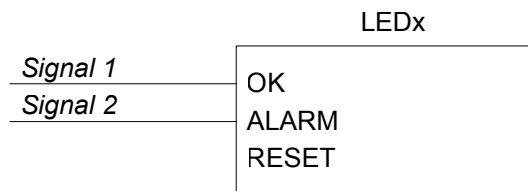


Figure 3: Separate signals wired to OK and ALARM inputs

Table 45: LD0.LEDGGIO1 Indication LED states Color1/Color2

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.LEDGGIO1			
3520	220.00	.LEDSt1.stVal	-	LED 1 state	0/1=Color1/2
3521	220.01	.LEDSt2.stVal	-	LED 2 state	0/1=Color1/2
3522	220.02	.LEDSt3.stVal	-	LED 3 state	0/1=Color1/2
3523	220.03	.LEDSt4.stVal	-	LED 4 state	0/1=Color1/2
3524	220.04	.LEDSt5.stVal	-	LED 5 state	0/1=Color1/2
3525	220.05	.LEDSt6.stVal	-	LED 6 state	0/1=Color1/2
3526	220.06	.LEDSt7.stVal	-	LED 7 state	0/1=Color1/2
3527	220.07	.LEDSt8.stVal	-	LED 8 state	0/1=Color1/2
3528	220.08	.LEDSt9.stVal	-	LED 9 state	0/1=Color1/2
3529	220.09	.LEDSt10.stVal	-	LED 10 state	0/1=Color1/2
3530	220.10	.LEDSt11.stVal	-	LED 11 state	0/1=Color1/2
3531	220.11	<reserved>			0

2.3.1.43

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 green for OK. Colors can, however, be reconfigured with a setting parameter.

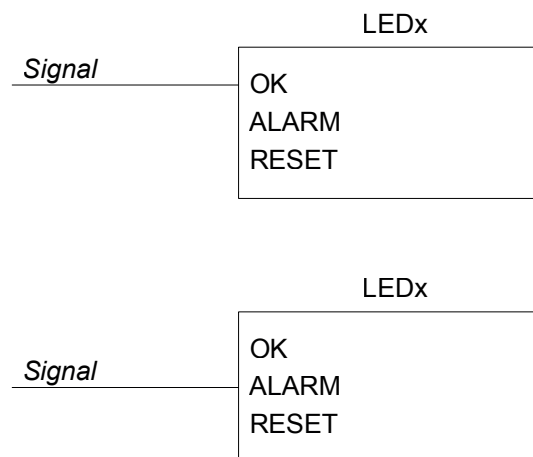


Figure 4: Signal wired to either OK or Alarm input

Table 46: LD0.LEDGGIO1 Indication LED states OFF/ColorX

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.LEDGGIO1			
2768	173.00	.LEDSt1.stVal	-	LED 1 state	0/1=Off/Color
2769	173.01	.LEDSt2.stVal	-	LED 2 state	0/1=Off/Color
2770	173.02	.LEDSt3.stVal	-	LED 3 state	0/1=Off/Color
2771	173.03	.LEDSt4.stVal	-	LED 4 state	0/1=Off/Color
2772	173.04	.LEDSt5.stVal	-	LED 5 state	0/1=Off/Color
2773	173.05	.LEDSt6.stVal	-	LED 6 state	0/1=Off/Color
2774	173.06	.LEDSt7.stVal	-	LED 7 state	0/1=Off/Color
2775	173.07	.LEDSt8.stVal	-	LED 8 state	0/1=Off/Color
2776	173.08	.LEDSt9.stVal	-	LED 9 state	0/1=Off/Color
2777	173.09	.LEDSt10.stVal	-	LED 10 state	0/1=Off/Color
2778	173.10	.LEDSt11.stVal	-	LED 11 state	0/1=Off/Color
2779	173.11	<reserved>			0

2.3.1.44 LD0.LEDPTRC1 Global conditioning (1)**Table 47:** *LD0.LEDPTRC1 Global conditioning (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.LEDPTRC1			
2736	171.00	.Str.general	-	Global start	1=Start
2737	171.01	.mcd			
2738	171.02	.Op.general	-	Global operate	1=Operate
2739	171.03	.mcd			

2.3.1.45 LD0.MFADPSDE1 Multifrequency admittance-based earth-fault protection (1)**Table 48:** *LD0.MFADPSDE1 Multifrequency admittance-based earth-fault protection (1)*

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

2.3.1.46 LD0.MVGAPC1 Move (8 pcs) (1)**Table 49:** *LD0.MVGAPC1 Move (8 pcs) (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.MVGAPC1			
3536	221.00	.SPCSO1.stVal		Input 1	0/1=Off/On
3537	221.01	.mcd			
3538	221.02	.SPCSO2.stVal		Input 2	0/1=Off/On
3539	221.03	.mcd			
3540	221.04	.SPCSO3.stVal		Input 3	0/1=Off/On
3541	221.05	.mcd			
3542	221.06	.SPCSO4.stVal		Input 4	0/1=Off/On
3543	221.07	.mcd			
3544	221.08	.SPCSO5.stVal		Input 5	0/1=Off/On
3545	221.09	.mcd			
3546	221.10	.SPCSO6.stVal		Input 6	0/1=Off/On
3547	221.11	.mcd			
3548	221.12	.SPCSO7.stVal		Input 7	0/1=Off/On

Table continues on next page

BitA	RegA	IEC 61850 name	SA name	Description	Values
3549	221.13	.mcd			
3550	221.14	.SPCSO8.stVal		Input 8	0/1=Off/On
3551	221.15	.mcd			

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

Table 50: LD0.MVGAPC2 Move (8 pcs) (2)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.MVGAPC2			
3552	222.00	.SPCSO1.stVal		Input 1	0/1=Off/On
3553	222.01	.mcd			
3554	222.02	.SPCSO2.stVal		Input 2	0/1=Off/On
3555	222.03	.mcd			
3556	222.04	.SPCSO3.stVal		Input 3	0/1=Off/On
3557	222.05	.mcd			
3558	222.06	.SPCSO4.stVal		Input 4	0/1=Off/On
3559	222.07	.mcd			
3560	222.08	.SPCSO5.stVal		Input 5	0/1=Off/On
3561	222.09	.mcd			
3562	222.10	.SPCSO6.stVal		Input 6	0/1=Off/On
3563	222.11	.mcd			
3564	222.12	.SPCSO7.stVal		Input 7	0/1=Off/On
3565	222.13	.mcd			
3566	222.14	.SPCSO8.stVal		Input 8	0/1=Off/On
3567	222.15	.mcd			

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

Table 51: LD0.NSPTOC1 Negative-sequence overcurrent protection (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.NSPTOC1			
2956	184.12	.Str.general	START	Stage start	1=Start
2957	184.13	.mcd			
2958	184.14	.Op.general	OPERATE	Stage operate	1=Operate
2959	184.15	.mcd			

2.3.1.49 LD0.NSPTOC2 Negative-sequence overcurrent protection (2)**Table 52:** *LD0.NSPTOC2 Negative-sequence overcurrent protection (2)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.NSPTOC2			
2960	185.00	.Str.general	START	Stage start	1=Start
2961	185.01	.mcd			
2962	185.02	.Op.general	OPERATE	Stage operate	1=Operate
2963	185.03	.mcd			

2.3.1.50 LD0.NSPTOV1 Negative-sequence overvoltage protection (1)**Table 53:** *LD0.NSPTOV1 Negative-sequence overvoltage protection (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.NSPTOV1			
3128	195.08	.Str.general	START	General start	1=Start
3129	195.09	.mcd			
3136	196.00	.Op.general	OPERATE	General operate	1=Operate
3137	196.01	.mcd			

2.3.1.51 LD0.PDNSPTOC1 Phase discontinuity protection (1)**Table 54:** *LD0.PDNSPTOC1 Phase discontinuity protection (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.PDNSPTOC1			
2952	184.08	.Str.general	START	Stage start	1=Start
2953	184.09	.mcd			
2954	184.10	.Op.general	OPERATE	Stage operate	1=Operate
2955	184.11	.mcd			

2.3.1.52 LD0.PHHPTOC1 Three-phase non-directional overcurrent protection, high stage (1)**Table 55:** *LD0.PHHPTOC1 Three-phase non-directional overcurrent protection, high stage (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.PHHPTOC1			
2890	180.10	.Str.general	START	General start	1=Start
2891	180.11	.mcd			
2892	180.12	.Str.phsA		Phs A start	1=Start
2893	180.13	.mcd			

Table continues on next page

BitA	RegA	IEC 61850 name	SA name	Description	Values
2894	180.14	.Str.phsB		Phs B start	1=Start
2895	180.15	.mcd			
2896	181.00	.Str.phsC		Phs C start	1=Start
2897	181.01	.mcd			
2898	181.02	.Op.general	OPERATE	General operate	1=Operate
2899	181.03	.mcd			

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

Table 56: LD0.PHHPTOC2 Three-phase non-directional overcurrent protection, high stage (2)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.PHHPTOC2			
2900	181.04	.Str.general	START	General start	1=Start
2901	181.05	.mcd			
2902	181.06	.Str.phsA		Phs A start	1=Start
2903	181.07	.mcd			
2904	181.08	.Str.phsB		Phs B start	1=Start
2905	181.09	.mcd			
2906	181.10	.Str.phsC		Phs C start	1=Start
2907	181.11	.mcd			
2908	181.12	.Op.general	OPERATE	General operate	1=Operate
2909	181.13	.mcd			

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

Table 57: LD0.PHIPTOC1 Three-phase non-directional overcurrent protection, instantaneous stage (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.PHIPTOC1			
2910	181.14	.Str.general	START	General start	1=Start
2911	181.15	.mcd			
2912	182.00	.Str.phsA		Phs A start	1=Start
2913	182.01	.mcd			
2914	182.02	.Str.phsB		Phs B start	1=Start
2915	182.03	.mcd			
2916	182.04	.Str.phsC		Phs C start	1=Start
2917	182.05	.mcd			
2918	182.06	.Op.general	OPERATE	General operate	1=Operate
2919	182.07	.mcd			

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

Table 58: *LD0.PHLPTOC1 Three-phase non-directional overcurrent protection, low stage (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.PHLPTOC1			
2880	180.00	.Str.general	START	General start	1=Start
2881	180.01	.mcd			
2882	180.02	.Str.phsA		Phs A start	1=Start
2883	180.03	.mcd			
2884	180.04	.Str.phsB		Phs B start	1=Start
2885	180.05	.mcd			
2886	180.06	.Str.phsC		Phs C start	1=Start
2887	180.07	.mcd			
2888	180.08	.Op.general	OPERATE	General operate	1=Operate
2889	180.09	.mcd			

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

Table 59: *LD0.PHPTOV1 Three-phase overvoltage protection (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.PHPTOV1			
3088	193.00	.Str.general	START	General start	1=Start
3089	193.01	.mcd			
3090	193.02	.Str.phsA		Phs A start	1=Start
3091	193.03	.mcd			
3092	193.04	.Str.phsB		Phs B start	1=Start
3093	193.05	.mcd			
3094	193.06	.Str.phsC		Phs C start	1=Start
3095	193.07	.mcd			
3096	193.08	.Op.general	OPERATE	General operate	1=Operate
3097	193.09	.mcd			

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

Table 60: *LD0.PHPTOV2 Three-phase overvoltage protection (2)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.PHPTOV2			
3098	193.10	.Str.general	START	General start	1=Start
3099	193.11	.mcd			

Table continues on next page

BitA	RegA	IEC 61850 name	SA name	Description	Values
3100	193.12	.Str.phsA		Phs A start	1=Start
3101	193.13	.mcd			
3102	193.14	.Str.phsB		Phs B start	1=Start
3103	193.15	.mcd			
3104	194.00	.Str.phsC		Phs C start	1=Start
3105	194.01	.mcd			
3106	194.02	.Op.general	OPERATE	General operate	1=Operate
3107	194.03	.mcd			

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

Table 61: LD0.PHPTOV3 Three-phase overvoltage protection (3)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.PHPTOV3			
3108	194.04	.Str.general	START	General start	1=Start
3109	194.05	.mcd			
3110	194.06	.Str.phsA		Phs A start	1=Start
3111	194.07	.mcd			
3112	194.08	.Str.phsB		Phs B start	1=Start
3113	194.09	.mcd			
3114	194.10	.Str.phsC		Phs C start	1=Start
3115	194.11	.mcd			
3116	194.12	.Op.general	OPERATE	General operate	1=Operate
3117	194.13	.mcd			

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

Table 62: LD0.PHPTUV1 Three-phase undervoltage protection (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.PHPTUV1			
3138	196.02	.Str.general	START	General start	1=Start
3139	196.03	.mcd			
3140	196.04	.Str.phsA		Phs A start	1=Start
3141	196.05	.mcd			
3142	196.06	.Str.phsB		Phs B start	1=Start
3143	196.07	.mcd			
3144	196.08	.Str.phsC		Phs C start	1=Start
3145	196.09	.mcd			
3146	196.10	.Op.general	OPERATE	General operate	1=Operate
3147	196.11	.mcd			

2.3.1.60 LD0.PHPTUV2 Three-phase undervoltage protection (2)**Table 63:** *LD0.PHPTUV2 Three-phase undervoltage protection (2)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.PHPTUV2			
3148	196.12	.Str.general	START	General start	1=Start
3149	196.13	.mcd			
3150	196.14	.Str.phsA		Phs A start	1=Start
3151	196.15	.mcd			
3152	197.00	.Str.phsB		Phs B start	1=Start
3153	197.01	.mcd			
3154	197.02	.Str.phsC		Phs C start	1=Start
3155	197.03	.mcd			
3156	197.04	.Op.general	OPERATE	General operate	1=Operate
3157	197.05	.mcd			

2.3.1.61 LD0.PHPTUV3 Three-phase undervoltage protection (3)**Table 64:** *LD0.PHPTUV3 Three-phase undervoltage protection (3)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.PHPTUV3			
3158	197.06	.Str.general	START	General start	1=Start
3159	197.07	.mcd			
3160	197.08	.Str.phsA		Phs A start	1=Start
3161	197.09	.mcd			
3162	197.10	.Str.phsB		Phs B start	1=Start
3163	197.11	.mcd			
3164	197.12	.Str.phsC		Phs C start	1=Start
3165	197.13	.mcd			
3166	197.14	.Op.general	OPERATE	General operate	1=Operate
3167	197.15	.mcd			

2.3.1.62 LD0.PHQVVR1 Voltage variation (1)**Table 65:** *LD0.PHQVVR1 Voltage variation (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.PH1QVVR1			
3328	208.00	.VarStrGen.stVal	-	Variation event detected	1=Detected
3329	208.01	.mcd			
3330	208.02	.VarEnd.stVal	-	Variation event ended	1=Ended

Table continues on next page

BitA	RegA	IEC 61850 name	SA name	Description	Values
3331	208.03	.mcd			
3332	208.04	.SwlOp.stVal	-	Swell event detected	1=Detected
3333	208.05	.mcd			
3334	208.06	.DipOp.stVal	-	Dip event detected	1=Detected
3335	208.07	.mcd			
3336	208.08	.IntrOp.stVal	-	Interruption event detected	1=Detected
3337	208.09	.mcd			

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

Table 66: LD0.PSPTUV1 Positive-sequence undervoltage protection (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.PSPTUV1			
3118	194.14	.Str.general	START	General start	1=Start
3119	194.15	.mcd			
3126	195.06	.Op.general	OPERATE	General operate	1=Operate
3127	195.07	.mcd			

2.3.1.64 LD0.RESCMMXU1 Residual current measurement (1)

Table 67: LD0.RESCMMXU1 Residual current measurement (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.RESCMMXU1			
2760	172.08	.HiAlm.stVal	HIGH_ALARM	High alarm	1=Alarm
2761	172.09	.mcd			
2762	172.10	.HiWrn.stVal	HIGH_WARN	High warning	1=Warning
2763	172.11	.mcd			

2.3.1.65 LD0.RESVMMXU1 Residual voltage measurement (1)

Table 68: LD0.RESVMMXU1 Residual voltage measurement (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.RESVMMXU1			
2764	172.12	.HiAlm.stVal	HIGH_ALARM	High alarm	1=Alarm
2765	172.13	.mcd			
2766	172.14	.HiWrn.stVal	HIGH_WARN	High warning	1=Warning
2767	172.15	.mcd			

2.3.1.66 LD0.ROVPTOV1 Residual overvoltage protection (1)**Table 69:** *LD0.ROVPTOV1 Residual overvoltage protection (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.ROVPTOV1			
3168	198.00	.Str.general	START	General start	1=Start
3169	198.01	.mcd			
3170	198.02	.Op.general	OPERATE	General operate	1=Operate
3171	198.03	.mcd			

2.3.1.67 LD0.ROVPTOV2 Residual overvoltage protection (2)**Table 70:** *LD0.ROVPTOV2 Residual overvoltage protection (2)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.ROVPTOV2			
3172	198.04	.Str.general	START	General start	1=Start
3173	198.05	.mcd			
3174	198.06	.Op.general	OPERATE	General operate	1=Operate
3175	198.07	.mcd			

2.3.1.68 LD0.ROVPTOV3 Residual overvoltage protection (3)**Table 71:** *LD0.ROVPTOV3 Residual overvoltage protection (3)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.ROVPTOV3			
3176	198.08	.Str.general	START	General start	1=Start
3177	198.09	.mcd			
3178	198.10	.Op.general	OPERATE	General operate	1=Operate
3179	198.11	.mcd			

2.3.1.69 LD0.SECRSYN1 Synchronism and energizing check (1)**Table 72:** *LD0.SECRSYN1 Synchronism and energizing check (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.SECRSYN1			
3882	242.10	.SynPrg	SYNC_INPRO	Synch. in progress	1=In progress
3883	242.11	.mcd			
3884	242.12	.FailCmd	CMD_FAIL_AL	Close request fail	1=Failed
3885	242.13	.mcd			
3886	242.14	.FailSyn	CL_FAIL_AL	Close cmd fail	1=Failed
3887	242.15	.mcd			

2.3.1.70 LD0.SEQSPVC1 Fuse failure supervision (1)

Table 73: *LD0.SEQSPVC1 Fuse failure supervision (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.SEQSPVC1			
2996	187.04	.Str.general	FUSEF_U	Start	1=Start
2997	187.05	.mcd			
2998	187.06	.Str3Ph.general	FUSEF_3PH	3-phase start	1=Start
2999	187.07	.mcd			

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

Table 74: *LD0.SPCGAPC2 Generic control point (16 pcs) (2)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.SPCGAPC2			
3632	227.00	.SPCS01.stVal		Ouput state 1	0/1=Off/On
3633	227.01	.mcd			
3634	227.02	.SPCS02.stVal		Ouput state 2	0/1=Off/On
3635	227.03	.mcd			
3636	227.04	.SPCS03.stVal		Ouput state 3	0/1=Off/On
3637	227.05	.mcd			
3638	227.06	.SPCS04.stVal		Ouput state 4	0/1=Off/On
3639	227.07	.mcd			
3640	227.08	.SPCS05.stVal		Ouput state 5	0/1=Off/On
3641	227.09	.mcd			
3642	227.10	.SPCS06.stVal		Ouput state 6	0/1=Off/On
3643	227.11	.mcd			
3644	227.12	.SPCS07.stVal		Ouput state 7	0/1=Off/On
3645	227.13	.mcd			
3646	227.14	.SPCS08.stVal		Ouput state 8	0/1=Off/On
3647	227.15	.mcd			
3648	228.00	.SPCS09.stVal		Ouput state 9	0/1=Off/On
3649	228.01	.mcd			
3650	228.02	.SPCS10.stVal		Ouput state 10	0/1=Off/On
3651	228.03	.mcd			
3652	228.04	.SPCS11.stVal		Ouput state 11	0/1=Off/On
3653	228.05	.mcd			
3654	228.06	.SPCS12.stVal		Ouput state 12	0/1=Off/On
3655	228.07	.mcd			
3656	228.08	.SPCS13.stVal		Ouput state 13	0/1=Off/On

Table continues on next page

BitA	RegA	IEC 61850 name	SA name	Description	Values
3657	228.09	.mcd			
3658	228.10	.SPCS14.stVal		Ouput state 14	0/1=Off/On
3659	228.11	.mcd			
3660	228.12	.SPCS15.stVal		Ouput state 15	0/1=Off/On
3661	228.13	.mcd			
3662	228.14	.SPCS16.stVal		Ouput state 16	0/1=Off/On
3663	228.15	.mcd			

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

Table 75: LD0.SSCBR1 Circuit-breaker condition monitoring (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.SSCBR1			
2848	178.00	.OpnAlm.stVal	TRV_T_OP_ALM	Opn travel time alarm	1=Alarm
2849	178.01	.ClsAlm.stVal	TRV_T_CL_ALM	Cls travel time alarm	1=Alarm
		LD0.SSOPM1			
2850	178.02	.SprChaAlm.stVal	SPR_CHR_ALM	Spring charge alarm	1=Alarm
		LD0.SSCBR1			
2851	178.03	.OpCntAlm.stVal	OPR_ALM	CB operations alarm	1=Alarm
2852	178.04	.OpCntLO.stVal	OPR_LO	CB operations lockout	1=Lockout
2853	178.05	.LonTmAlm.stVal	MON_ALM	CB inactive alarm	1=Alarm
		LD0.SSIGM1			
2854	178.06	.InsAlm.stVal	PRES_ALM	Low pressure alarm	1=Alarm
2855	178.07	.InsBlk.stVal	PRES_LO	Low pressure lockout	1=Lockout
		LD0.SSCBR1			
2856	178.08	.APwrAlm.stVal	IPOW_ALM	Lyt alarm	1=Alarm
2857	178.09	.APwrLO.stVal	IPOW_LO	Lyt lockout	1=Lockout
2858	178.10	.RmnNumOpAlm.stVal	CB_LIFE_ALM	CB lifetime alarm	1=Alarm

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

Table 76: LD0.T1PTTR1 Three-phase thermal protection for feeders, cables and distribution transformers (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.T1PTTR1			
2972	185.12	.Str.general	START	General start	1=Start
2973	185.13	.mcd			
2974	185.14	.AlmThm.general	ALARM	Thermal alarm	1=Alarm

Table continues on next page

BitA	RegA	IEC 61850 name	SA name	Description	Values
2975	185.15	.mcd			
2976	186.00	.Op.general	OPERATE	General operate	1=Operate
2977	186.01	.mcd			

2.3.1.74 LD0.TCSSCBR1 Trip circuit supervision (1)

Table 77: LD0.TCSSCBR1 Trip circuit supervision (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.TCSSCBR1			
2780	173.12	.CircAlm.stVal	ALARM	Supervision alarm	1=Alarm
2781	173.13	.mcd			

2.3.1.75 LD0.TCSSCBR2 Trip circuit supervision (2)

Table 78: LD0.TCSSCBR2 Trip circuit supervision (2)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.TCSSCBR2			
2782	173.14	.CircAlm.stVal	ALARM	Supervision alarm	1=Alarm
2783	173.15	.mcd			

2.3.1.76 LD0.TRPPTRC1 Master trip (1)

Table 79: LD0.TRPPTRC1 Master trip (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.TRPPTRC1			
2740	171.04	.Op.general	-	Op. input signal	1=Operate
2741	171.05	.mcd			
2742	171.06	.Tr.general	-	Trip output signal	1=Trip
2743	171.07	.mcd			

2.3.1.77 LD0.TRPPTRC2 Master trip (2)

Table 80: LD0.TRPPTRC2 Master trip (2)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.TRPPTRC2			
2744	171.08	.Op.general	-	Op. input signal	1=Operate
2745	171.09	.mcd			
2746	171.10	.Tr.general	-	Trip output signal	1=Trip
2747	171.11	.mcd			

2.3.1.78 LD0.VMHAI1 Voltage total harmonic distortion (1)**Table 81:** *LD0.VMHAI1 Voltage total harmonic distortion (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.VMHAI1			
3318	207.06	.Alm.stVal	ALARM		1=Alarm
3319	207.07	.mcd			

2.3.1.79 LD0.VMMXU1 Three-phase voltage measurement (1)**Table 82:** *LD0.VMMXU1 Three-phase voltage measurement (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.VMMXU1			
2784	174.00	.HiAlm.stVal	HIGH_ALARM	High alarm	1=Alarm
2785	174.01	.mcd			
2786	174.02	.HiWrn.stVal	HIGH_WARN	High warning	1=Warning
2787	174.03	.mcd			
2788	174.04	.LoWrn.stVal	LOW_WARN	Low warning	1=Warning
2789	174.05	.mcd			
2790	174.06	.LoAlm.stVal	LOW_ALARM	Low alarm	1=Alarm
2791	174.07	.mcd			

2.3.1.80 LD0.WPWDE1 Wattmetric-based earth-fault protection (1)**Table 83:** *LD0.WPWDE1 Wattmetric-based earth-fault protection (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.WPSDE1			
3296	206.00	.Str.general	START	Stage start	1=Start
3297	206.01	.mcd			
3298	206.02	.Op.general	OPERATE	Stage operate	1=Operate
3299	206.03	.mcd			

2.3.1.81 LD0.WPWDE2 Wattmetric-based earth-fault protection (2)**Table 84:** *LD0.WPWDE2 Wattmetric-based earth-fault protection (2)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.WPSDE2			
3300	206.04	.Str.general	START	Stage start	1=Start
3301	206.05	.mcd			
3302	206.06	.Op.general	OPERATE	Stage operate	1=Operate
3303	206.07	.mcd			

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

Table 85: *LD0.WPWDE3 Wattmetric-based earth-fault protection (3)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.WPSDE3			
3304	206.08	.Str.general	START	Stage start	1=Start
3305	206.09	.mcd			
3306	206.10	.Op.general	OPERATE	Stage operate	1=Operate
3307	206.11	.mcd			

2.3.1.83 LD0.XAGGIO130 Physical I/O states (AIM card XA130)

Table 86: *LD0.XAGGIO130 Physical I/O states (AIM card XA130)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.XAGGIO130			
3280	205.00	.Ind1.stVal		XA130-Input 1 State	0/1=Off/On
3281	205.01	.mcd			
		.mom-only		Mom only alternative	
3282	205.02	.Ind2.stVal		XA130-Input 2 State	0/1=Off/On
3283	205.03	.mcd			
		.mom-only		Mom only alternative	
3284	205.04	.Ind3.stVal		XA130-Input 3 State	0/1=Off/On
3285	205.05	.mcd			
		.mom-only		Mom only alternative	
3286	205.06	.Ind4.stVal		XA130-Input 4 State	0/1=Off/On
3287	205.07	.mcd			
		.mom-only		Mom only alternative	

2.3.1.84 LD0.XBGGIO110 Physical I/O states (BIO card XB110)

Table 87: *LD0.XBGGIO110 Physical I/O states (BIO card XB110)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.XBGGIO110			
3216	201.00	.Ind1.stVal		X110-Input 1 State	0/1=Off/On
3217	201.01	.mcd			
		.mom-only		Mom only alternative	
3218	201.02	.Ind2.stVal		X110-Input 2 State	0/1=Off/On
3219	201.03	.mcd			
		.mom-only		Mom only alternative	
3220	201.04	.Ind3.stVal		X110-Input 3 State	0/1=Off/On

Table continues on next page

BitA	RegA	IEC 61850 name	SA name	Description	Values
3221	201.05	.mcd			
		.mom-only		Mom only alternative	
3222	201.06	.Ind4.stVal		X110-Input 4 State	0/1=Off/On
3223	201.07	.mcd			
		.mom-only		Mom only alternative	
3224	201.08	.Ind5.stVal		X110-Input 5 State	0/1=Off/On
3225	201.09	.mcd			
		.mom-only		Mom only alternative	
3226	201.10	.Ind6.stVal		X110-Input 6 State	0/1=Off/On
3227	201.11	.mcd			
		.mom-only		Mom only alternative	
3228	201.12	.Ind7.stVal		X110-Input 7 State	0/1=Off/On
3229	201.13	.mcd			
		.mom-only		Mom only alternative	
3230	201.14	.Ind8.stVal		X110-Input 8 State	0/1=Off/On
3231	201.15	.mcd			
		.mom-only		Mom only alternative	
3232	202.00	.SPCSO1.stVal		X110-Output 1 State	0/1=Off/On
3233	202.01	.mcd			
		.mom-only		Mom only alternative	
3234	202.02	.SPCSO2.stVal		X110-Output 2 State	0/1=Off/On
3235	202.03	.mcd			
		.mom-only		Mom only alternative	
3236	202.04	.SPCSO3.stVal		X110-Output 3 State	0/1=Off/On
3237	202.05	.mcd			
		.mom-only		Mom only alternative	

2.3.1.85 LD0.XGGIO100 Physical I/O states (PSM card X100)

Table 88: LD0.XGGIO100 Physical I/O states (PSM card X100)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.XGGIO100			
3248	203.00	.SPCSO1.stVal		X100-Output 1 State	0/1=Off/On
3249	203.01	.mcd			
		.mom-only		Mom only alternative	
3250	203.02	.SPCSO2.stVal		X100-Output 2 State	0/1=Off/On
3251	203.03	.mcd			
		.mom-only		Mom only alternative	
3252	203.04	.SPCSO3.stVal		X100-Output 3 State	0/1=Off/On
Table continues on next page					

BitA	RegA	IEC 61850 name	SA name	Description	Values
3253	203.05	.mcd			
		.mom-only		Mom only alternative	
3254	203.06	.SPCSO4.stVal		X100-Output 4 State	0/1=Off/On
3255	203.07	.mcd			
		.mom-only		Mom only alternative	
3256	203.08	.SPCSO5.stVal		X100-Output 5 State	0/1=Off/On
3257	203.09	.mcd			
		.mom-only		Mom only alternative	
3258	203.10	.SPCSO6.stVal		X100-Output 6 State	0/1=Off/On
3259	203.11	.mcd			
		.mom-only		Mom only alternative	

2.3.1.86 LD0.XGGIO110 Physical I/O states (BIO card X110)

Table 89: LD0.XGGIO110 Physical I/O states (BIO card X110)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.XGGIO110			
3216	201.00	.Ind1.stVal		X110-Input 1 State	0/1=Off/On
3217	201.01	.mcd			
		.mom-only		Mom only alternative	
3218	201.02	.Ind2.stVal		X110-Input 2 State	0/1=Off/On
3219	201.03	.mcd			
		.mom-only		Mom only alternative	
3220	201.04	.Ind3.stVal		X110-Input 3 State	0/1=Off/On
3221	201.05	.mcd			
		.mom-only		Mom only alternative	
3222	201.06	.Ind4.stVal		X110-Input 4 State	0/1=Off/On
3223	201.07	.mcd			
		.mom-only		Mom only alternative	
3224	201.08	.Ind5.stVal		X110-Input 5 State	0/1=Off/On
3225	201.09	.mcd			
		.mom-only		Mom only alternative	
3226	201.10	.Ind6.stVal		X110-Input 6 State	0/1=Off/On
3227	201.11	.mcd			
		.mom-only		Mom only alternative	
3228	201.12	.Ind7.stVal		X110-Input 7 State	0/1=Off/On
3229	201.13	.mcd			
		.mom-only		Mom only alternative	
3230	201.14	.Ind8.stVal		X110-Input 8 State	0/1=Off/On

Table continues on next page

BitA	RegA	IEC 61850 name	SA name	Description	Values
3231	201.15	.mcd			
		.mom-only		Mom only alternative	
3232	202.00	.SPCSO1.stVal		X110-Output 1 State	0/1=Off/On
3233	202.01	.mcd			
		.mom-only		Mom only alternative	
3234	202.02	.SPCSO2.stVal		X110-Output 2 State	0/1=Off/On
3235	202.03	.mcd			
		.mom-only		Mom only alternative	
3236	202.04	.SPCSO3.stVal		X110-Output 3 State	0/1=Off/On
3237	202.05	.mcd			
		.mom-only		Mom only alternative	
3238	202.06	.SPCSO4.stVal		X110-Output 4 State	0/1=Off/On
3239	202.07	.mcd			
		.mom-only		Mom only alternative	

2.3.1.87 LD0.XGGIO120 Physical I/O states (AIM card X120)

Table 90: LD0.XGGIO120 Physical I/O states (AIM card X120)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.XGGIO120			
3200	200.00	.Ind1.stVal		X120-Input 1 State	0/1=Off/On
3201	200.01	.mcd			
		.mom-only		Mom only alternative	
3202	200.02	.Ind2.stVal		X120-Input 2 State	0/1=Off/On
3203	200.03	.mcd			
		.mom-only		Mom only alternative	
3204	200.04	.Ind3.stVal		X120-Input 3 State	0/1=Off/On
3205	200.05	.mcd			
		.mom-only		Mom only alternative	
3206	200.06	.Ind4.stVal		X120-Input 4 State	0/1=Off/On
3207	200.07	.mcd			
		.mom-only		Mom only alternative	

2.3.1.88 LD0.XGGIO130 Physical I/O states (BIO card X130)

Table 91: *LD0.XGGIO130 Physical I/O states (BIO card X130)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.XGGIO130			
3184	199.00	.Ind1.stVal		X130-Input 1 State	0/1=Off/On
3185	199.01	.mcd			
		.mom-only		Mom only alternative	
3186	199.02	.Ind2.stVal		X130-Input 2 State	0/1=Off/On
3187	199.03	.mcd			
		.mom-only		Mom only alternative	
3188	199.04	.Ind3.stVal		X130-Input 3 State	0/1=Off/On
3189	199.05	.mcd			
		.mom-only		Mom only alternative	
3190	199.06	.Ind4.stVal		X130-Input 4 State	0/1=Off/On
3191	199.07	.mcd			
		.mom-only		Mom only alternative	
3192	199.08	.Ind5.stVal		X130-Input 5 State	0/1=Off/On
3193	199.09	.mcd			
		.mom-only		Mom only alternative	
3194	199.10	.Ind6.stVal		X130-Input 6 State	0/1=Off/On
3195	199.11	.mcd			
		.mom-only		Mom only alternative	
3264	204.00	.SPCSO1.stVal		X130-Output 1 State	0/1=Off/On
3265	204.01	.mcd			
		.mom-only		Mom only alternative	
3266	204.02	.SPCSO2.stVal		X130-Output 2 State	0/1=Off/On
3267	204.03	.mcd			
		.mom-only		Mom only alternative	
3268	204.04	.SPCSO3.stVal		X130-Output 3 State	0/1=Off/On
3269	204.05	.mcd			
		.mom-only		Mom only alternative	

2.3.2 Unmapped indications

Unmapped indications are indication data that have no initial Modbus mapping locations, but can be added to the user-definable Modbus area using the Communication Management tool in PCM600. If Modbus events are enabled for these indication signals, the event identification is the user-definable area address.

2.3.2.1 All premapped three-phase protection function stages, operate/phase-dependent objects added

Table 92: All premapped three-phase protection function stages, operate/phase-dependent objects added

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.xxxxxxxx (various)			
		.Op.phsA		Phs A operate	1 = Operate
		.mcd			
		.Op.phsB		Phs B operate	1 = Operate
		.mcd			
		.Op.phsC		Phs C operate	1 = Operate
		.mcd			

2.3.2.2 Common data 2

Table 93: Common data 2

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.LDEV1			
		.StLstOv.stVal		Internal ind. overflow	1=Overflow
		.mcd			
		.MeasLstOv.stVal		Internal meas. overflow	1=Overflow
		.mcd			
		.ChgFlg.stVal		Configuration changed	1=Changed
		.mcd			
		.FacSet.stVal		Factory settings in use	1=In use
		.mcd			
		LD0.GNRLLTMS1			
		.TmChSt1.stVal		Time synch. status	0/1=Down/Up
		.mcd			
		LD0.SCHLCCH1			
		.ChLiv.stVal	CH1LIV	Ethernet channel 1 live	1=Live
		.mcd			
		LD0.SCHLCCH2			
		.ChLiv.stVal	CH2LIV	Ethernet channel 2 live	1=Live
		.mcd			
		LD0.SCHLCCH3			
		.ChLiv.stVal	CH3LIV	Ethernet channel 3 live	1=Live
		.mcd			

2.3.2.3 LD0.CBPSOF1 Switch onto fault (1)

Table 94: LD0.CBPSOF1 Switch onto fault (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.CBPSOF1			
		.Op.general	OPERATE	Stage operate	1=Operate
		.mcd			

2.3.2.4 LD0.DARREC1 Autoreclosing (1)

Table 95: LD0.DARREC1 Autoreclosing (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.DARREC1			
		.InInhRec.stVal	INHIBIT_RECL	Inhibit reclose	1=Inhibit
		.mcd			
		.InBlkThm.stVal	BLK_THERM	Thermal block	1=Block
		.mcd			

2.3.2.5 LD0.DIAGLCCH1 Ethernet supervision (1)

Table 96: LD0.DIAGLCCH1 Ethernet supervision (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.DIAGLCCH1			
		.ChLiv.stVal	CHLIV	Ethernet channel live	1=Live
		.mcd			
		.RedChLiv.stVal	REDCHLIV	Red. Ethernet channel live	1=Live
		.mcd			

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

Table 97: LD0.DOPPDPR1 Reverse power/directional overpower protection (1)

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

2.3.2.7 LD0.DOPPDPR2 Reverse power/directional overpower protection (2)**Table 98:** *LD0.DOPPDPR2 Reverse power/directional overpower protection (2)*

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

2.3.2.8 LD0.DQPTUV1 Directional reactive power undervoltage protection (1)**Table 99:** *LD0.DQPTUV1 Directional reactive power undervoltage protection (1)*

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

2.3.2.9 LD0.EFHPTOC2 Non-directional earth-fault protection, high stage (2)**Table 100:** *LD0.EFHPTOC2 Non-directional earth-fault protection, high stage (2)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.EFHPTOC2			
		.Str.general	START	General start	1 = Start
		.mcd			
		.Op.general	OPERATE	General operate	1 = Operate
		.mcd			

2.3.2.10 LD0.FRPFRQ4 Frequency protection (4)**Table 101:** *LD0.FRPFRQ4 Frequency protection (4)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.FRPTRC4			
		.Str.general	START	Stage 4 start	1 = Start
		.mcd			
		LD0.FRPTOF4		Overfrequency	
		.Op.general	OPR_OFRQ	Operate	1 = Operate
		.mcd			

Table continues on next page

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.FRPTUF4			
		.Op.general	OPR_UFRQ	Underfrequency	1 = Operate
		.mcd		Operate	
		LD0.FRPFRQ4			
		.Op.general	OPR_FRG	Frequency gradient	1 = Operate
		.mcd		Operate	

2.3.2.11 LD0.FRPFRQ5 Frequency protection (5)

Table 102: LD0.FRPFRQ5 Frequency protection (5)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.FRPTRC5			
		.Str.general	START	Stage 5 start	1=Start
		.mcd			
		LD0.FRPTOF5		Overfrequency	
		.Op.general	OPR_OFRQ	Operate	1=Operate
		.mcd			
		LD0.FRPTUF5		Underfrequency	
		.Op.general	OPR_UFRQ	Operate	1=Operate
		.mcd			
		LD0.FRPFRQ5		Frequency gradient	
		.Op.general	OPR_FRG	Operate	1=Operate
		.mcd			

2.3.2.12 LD0.FRPFRQ6 Frequency protection (6)

Table 103: LD0.FRPFRQ6 Frequency protection (6)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.FRPTRC6			
		.Str.general	START	Stage 6 start	1=Start
		.mcd			
		LD0.FRPTOF6		Overfrequency	
		.Op.general	OPR_OFRQ	Operate	1=Operate
		.mcd			
		LD0.FRPTUF6		Underfrequency	
		.Op.general	OPR_UFRQ	Operate	1=Operate
		.mcd			
		LD0.FRPFRQ6		Frequency gradient	
		.Op.general	OPR_FRG	Operate	1=Operate
		.mcd			

2.3.2.13 LD0.HIAPDIF1 High-impedance differential protection for phase A (1)**Table 104:** *LD0.HIAPDIF1 High-impedance differential protection for phase A (1)*

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

2.3.2.14 LD0.HIBPDIF1 High-impedance differential protection for phase B (1)**Table 105:** *LD0.HIBPDIF1 High-impedance differential protection for phase B (1)*

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

2.3.2.15 LD0.HICPDIF1 High-impedance differential protection for phase C (1)**Table 106:** *LD0.HICPDIF1 High-impedance differential protection for phase C (1)*

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

2.3.2.16 LD0.HZCCASPVC1 Current transformer supervision for high-impedance protection scheme for phase A (1)**Table 107:** *LD0.HZCCASPVC1 Current transformer supervision for high-impedance protection scheme for phase A (1)*

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

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

Table 108: *LD0.HZCCBSPVC1 Current transformer supervision for high-impedance protection scheme for phase B (1)*

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

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

Table 109: *LD0.HZCCCSPVC1 Current transformer supervision for high-impedance protection scheme for phase C (1)*

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

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

Table 110: *LD0.IL1TCTR1 Three-phase CT supervision (1)*

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

2.3.2.20 LD0.LDPRLRC1 Load profile record (1)

Table 111: *LD0.LDPRLRC1 Load profile record (1)*

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

2.3.2.21 LD0.LVRTPTUV1 Low-voltage ride-through protection (1)**Table 112:** *LD0.LVRTPTUV1 Low-voltage ride-through protection (1)*

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

2.3.2.22 LD0.LVRTPTUV2 Low-voltage ride-through protection (2)**Table 113:** *LD0.LVRTPTUV2 Low-voltage ride-through protection (2)*

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

2.3.2.23 LD0.LVRTPTUV3 Low-voltage ride-through protection (3)**Table 114:** *LD0.LVRTPTUV3 Low-voltage ride-through protection (3)*

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

2.3.2.24 LD0.MAPGAPC1 Multipurpose protection (1)**Table 115:** *LD0.MAPGAPC1 Multipurpose protection (1)*

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

2.3.2.25 LD0.MAPGAPC2 Multipurpose protection (2)

Table 116: LD0.MAPGAPC2 Multipurpose protection (2)

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

2.3.2.26 LD0.MAPGAPC3 Multipurpose protection (3)

Table 117: LD0.MAPGAPC3 Multipurpose protection (3)

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

2.3.2.27 LD0.MAPGAPC4 Multipurpose protection (4)

Table 118: LD0.MAPGAPC4 Multipurpose protection (4)

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

2.3.2.28 LD0.MAPGAPC5 Multipurpose protection (5)

Table 119: LD0.MAPGAPC5 Multipurpose protection (5)

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

2.3.2.29 LD0.MAPGAPC6 Multipurpose protection (6)**Table 120:** *LD0.MAPGAPC6 Multipurpose protection (6)*

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

2.3.2.30 LD0.MAPGAPC7 Multipurpose protection (7)**Table 121:** *LD0.MAPGAPC7 Multipurpose protection (7)*

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

2.3.2.31 LD0.MAPGAPC8 Multipurpose protection (8)**Table 122:** *LD0.MAPGAPC8 Multipurpose protection (8)*

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

2.3.2.32 LD0.MAPGAPC9 Multipurpose protection (9)**Table 123:** *LD0.MAPGAPC9 Multipurpose protection (9)*

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

2.3.2.33 LD0.MAPGAPC10 Multipurpose protection (10)

Table 124: LD0.MAPGAPC10 Multipurpose protection (10)

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

2.3.2.34 LD0.MAPGAPC11 Multipurpose protection (11)

Table 125: LD0.MAPGAPC11 Multipurpose protection (11)

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

2.3.2.35 LD0.MAPGAPC12 Multipurpose protection (12)

Table 126: LD0.MAPGAPC12 Multipurpose protection (12)

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

2.3.2.36 LD0.MAPGAPC13 Multipurpose protection (13)

Table 127: LD0.MAPGAPC13 Multipurpose protection (13)

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

2.3.2.37 LD0.MAPGAPC14 Multipurpose protection (14)**Table 128:** *LD0.MAPGAPC14 Multipurpose protection (14)*

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

2.3.2.38 LD0.MAPGAPC15 Multipurpose protection (15)**Table 129:** *LD0.MAPGAPC15 Multipurpose protection (15)*

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

2.3.2.39 LD0.MAPGAPC16 Multipurpose protection (16)**Table 130:** *LD0.MAPGAPC16 Multipurpose protection (16)*

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

2.3.2.40 LD0.MAPGAPC17 Multipurpose protection (17)**Table 131:** *LD0.MAPGAPC17 Multipurpose protection (17)*

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

2.3.2.41 LD0.MAPGAPC18 Multipurpose protection (18)

Table 132: LD0.MAPGAPC18 Multipurpose protection (18)

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

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

Table 133: LD0.MDSOPT1 Runtime counter for machines and devices (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.MDSOPT1			
		OpTmWrn.stVal	START	Accum.op.time Warn.	1 = Warning
		.mcd			
		OpTmAlm.stVal	OPERATE	Accum.op.time Alarm	1 = Alarm
		.mcd			

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

Table 134: LD0.MFADPSDE1 Multifrequency admittance-based earth-fault protection (1)

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

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

Table 135: LD0.NSPTOV2 Negative-sequence overvoltage protection (2)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.NSPTOV2			
		.Str.general	START	General start	1=Start
		.mcd			
		.Str.phsA		Phs A start	1=Start
		.mcd			

Table continues on next page

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

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

Table 136: LD0.PHIZ1 High-impedance fault detection (1)

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

2.3.2.46 LD0.PHLPTOC2 Three-phase non-directional overcurrent protection, low stage (2)

Table 137: LD0.PHLPTOC2 Three-phase non-directional overcurrent protection, low stage (2)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.PHLPTOC2			
		.Str.general	START	General start	1 = Start
		.mcd			
		.Str.phsA		Phs A start	1 = Start
		.mcd			
		.Str.phsB		Phs B start	1 = Start
		.mcd			
		.Str.phsC		Phs C start	1 = Start
		.mcd			
		.Op.general	OPERATE	General operate	1 = Operate
		.mcd			

Table continues on next page

BitA	RegA	IEC 61850 name	SA name	Description	Values
		.Op.phsA		Phs A operate	1 = Operate
		.mcd			
		.Op.phsB		Phs B operate	1 = Operate
		.mcd			
		.Op.phsC		Phs C operate	1 = Operate
		.mcd			

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

Table 138: LD0.PSPTUV2 Positive-sequence undervoltage protection (2)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.PSPTUV2			
		.Str.general	START	General start	1=Start
		.mcd			
		.Str.phsA		Phs A start	1=Start
		.mcd			
		.Str.phsB		Phs B start	1=Start
		.mcd			
		.Str.phsC		Phs C start	1=Start
		.mcd			
		.Op.general	OPERATE	General operate	1=Operate
		.mcd			
		.Op.phsA		Phs A operate	1=Operate
		.mcd			
		.Op.phsB		Phs B operate	1=Operate
		.mcd			
		.Op.phsC		Phs C operate	1=Operate
		.mcd			

2.3.2.48 LD0.RESTCTR1 lo CT supervision (1)

Table 139: LD0.RESTCTR1 lo CT supervision (1)

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

2.3.2.49 LD0.RESTCTR2 Io CT supervision (2)**Table 140:** *LD0.RESTCTR2 Io CT supervision (2)*

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

2.3.2.50 LD0.RESTVTR1 Uo VT supervision (1)**Table 141:** *LD0.RESTVTR1 Uo VT supervision (1)*

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

2.3.2.51 LD0.SCEFRFLO1 Fault locator (1)**Table 142:** *LD0.SCEFRFLO1 Fault locator (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.SCEFRFLO1			
		.Alm.stVal	ALARM	Fault locator alarm	1 = Alarm
		.mcd			
		.TrgSt.stVal	TRIGG	Distance calculation trig	1 = Triggered
		.mcd			

2.3.2.52 LD0.SPCGAPC1 Generic control point (16 pcs) (1)**Table 143:** *LD0.SPCGAPC1 Generic control point (16 pcs) (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.SPCGAPC1			
		.SPCSO1.stVal		Ouput state 1	0/1=Off/On
		.mcd			
		.SPCSO2.stVal		Ouput state 2	0/1=Off/On
		.mcd			
		.SPCSO3.stVal		Ouput state 3	0/1=Off/On

Table continues on next page

BitA	RegA	IEC 61850 name	SA name	Description	Values
		.mcd			
		.SPCSO4.stVal		Ouput state 4	0/1=Off/On
		.mcd			
		.SPCSO5.stVal		Ouput state 5	0/1=Off/On
		.mcd			
		.SPCSO6.stVal		Ouput state 6	0/1=Off/On
		.mcd			
		.SPCSO7.stVal		Ouput state 7	0/1=Off/On
		.mcd			
		.SPCSO8.stVal		Ouput state 8	0/1=Off/On
		.mcd			
		.SPCSO9.stVal		Ouput state 9	0/1=Off/On
		.mcd			
		.SPCSO10.stVal		Ouput state 10	0/1=Off/On
		.mcd			
		.SPCSO11.stVal		Ouput state 11	0/1=Off/On
		.mcd			
		.SPCSO12.stVal		Ouput state 12	0/1=Off/On
		.mcd			
		.SPCSO13.stVal		Ouput state 13	0/1=Off/On
		.mcd			
		.SPCSO14.stVal		Ouput state 14	0/1=Off/On
		.mcd			
		.SPCSO15.stVal		Ouput state 15	0/1=Off/On
		.mcd			
		.SPCSO16.stVal		Ouput state 16	0/1=Off/On
		.mcd			

2.3.2.53 LD0.TRPPTRC3 Master trip (3)

Table 144: LD0.TRPPTRC3 Master trip (3)

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

2.3.2.54 LD0.TRPPTRC4 Master trip (4)**Table 145:** *LD0.TRPPTRC4 Master trip (4)*

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

2.3.2.55 LD0.TRPPTRC5 Master trip (5)**Table 146:** *LD0.TRPPTRC5 Master trip (5)*

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

2.3.2.56 LD0.UL1TVTR1 Three-phase VT supervision (1)**Table 147:** *LD0.UL1TVTR1 Three-phase VT supervision (1)*

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

2.3.2.57 LD0.UL1TVTR2 Three-phase VT supervision (2)**Table 148:** *LD0.UL1TVTR2 Three-phase VT supervision (2)*

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

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

Table 149: *LD0.VMMXU2 Three-phase voltage measurement (2)*

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

2.3.2.59 LD0.VSQVUB1 Voltage unbalance (1)

Table 150: *LD0.VSQVUB1 Voltage unbalance (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Value
		LD0.VSQVUB1			
		.VarStr.stVal		Unbalance alarm	1=Alarm
		.mcd			
		.HiPctVUnb.stVal		Percentile Unbalance alarm	1=Alarm
		.mcd			

2.3.2.60 LD0.VVSPAM1 Voltage vector shift protection (1)

Table 151: *LD0.VVSPAM1 Voltage vector shift protection (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Value
		LD0.VVSPAM1			
		.Op.general	OPERATE	Stage operate	1=Operate
		.mcd			

2.3.2.61 LD0.XARGGIO130 Alarm/warning

Table 152: *LD0.XARGGIO130 Alarm/warning*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.XARGGIO130			
		.Alm.stVal		XARGGIO130 alarm	1 = Alarm
		.mcd			
		.Wrn.stVal		XARGGIO130 warning	1 = Warning
		.mcd			

2.3.2.62 LD0.XRGGIO130 Alarm/warning**Table 153:** *LD0.XRGGIO130 Alarm/warning*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.XRGGIO130			
		.Alm.stVal	-	XRGGIO130 alarm	1=Alarm
		.mcd			
		.Wrn.stVal	-	XRGGIO130 warning	1=Warning
		.mcd			

2.4 Registers**Table 154:** *Explanations of columns in register tables*

Column name	Description
RegA	Default 3X and 4X register address for the data.
Type	Type of the register. The alternatives are u16, u32 (unsigned 16 and 32 bits integer) or i16, i32 (signed 16 and 32 bit integer).
Scale	Scale factor as default. Also, an adjustable offset value exists that is set to 0 by default.
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. Also, if a register is writable, it is stated here.
Values	The value range of the original IEC 61850 value, that is, before scaling.

2.4.1 Premapped registers**2.4.1.1 Active parameter setting group - read and write****Table 155:** *Active parameter setting group - read and write*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
2301	u16	1			Active setting group	1...6

2.4.1.2 Control structure 1

Table 156: *Control structure 1*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
8001					Execute register	1
8002					Password reg 1	acc to setting
8003					Password reg 2	acc to setting
8004					Control register	< single bit >
8005					Confirm register	< single bit >

2.4.1.3 Control structure 2

Table 157: *Control structure 2*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
8006					Execute register	1
8007					Password reg 1	acc to setting
8008					Password reg 2	acc to setting
8009					Control register	< single bit >
8010					Confirm register	< single bit >

2.4.1.4 Control structure 3

Table 158: *Control structure 3*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
8011					Execute register	1
8012					Password reg 1	acc to setting
8013					Password reg 2	acc to setting
8014					Control register	< single bit >
8015					Confirm register	< single bit >

2.4.1.5 Control structure 4

Table 159: *Control structure 4*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
8016					Execute register	1
8017					Password reg 1	acc to setting
8018					Password reg 2	acc to setting
8019					Control register	< single bit >
8020					Confirm register	< single bit >

2.4.1.6 Control structure 5**Table 160:** *Control structure 5*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
8021					Execute register	1
8022					Password reg 1	acc to setting
8023					Password reg 2	acc to setting
8024					Control register	< single bit >
8025					Confirm register	< single bit >

2.4.1.7 Control structure 6**Table 161:** *Control structure 6*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
8026					Execute register	1
8027					Password reg 1	acc to setting
8028					Password reg 2	acc to setting
8029					Control register	< single bit >
8030					Confirm register	< single bit >

2.4.1.8 Control structure 7**Table 162:** *Control structure 7*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
8031					Execute register	1
8032					Password reg 1	acc to setting
8033					Password reg 2	acc to setting
8034					Control register	< single bit >
8035					Confirm register	< single bit >

2.4.1.9 Control structure 8**Table 163:** *Control structure 8*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
8036					Execute register	1
8037					Password reg 1	acc to setting
8038					Password reg 2	acc to setting
8039					Control register	< single bit >
8040					Confirm register	< single bit >

2.4.1.10 Device ID string

Table 164: *Device ID string*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
9000	u16				ASCII coded string	1)
...						
9120	u16					

1) See the technical manual.

2.4.1.11 Event record structure

Table 165: *Event record structure*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
					Selection write:	
9250	u16	1			- Num of multiple records	1...10
9251	i16	1			- Read selection	-499...3
					Record 1 data to read:	
9252	u16	1			- Record sequence num	1...9999
9253	u16	1			- Unread records left	0...499
					Timestamp of record	
9254	u16	1			- Year, Month	Year/Month
9255	u16	1			- Day, Hour	Day/Hour
9256	u16	1			- Minute, Second	Min/Sec
9257	u16	1			- Millisecond	Millisecond
9258	u16	1			Event identification	1)
9259	u16	1			Data object ID1	1)
9260	u16	1			Data object ID2	1)
9261	u16	1			Event data value 1	1)
9262	u16	1			Event data value 2	1)
					Record 2 data to read:	If selected
9263	u16	1			- Record sequence num	1..9999
9264	u16	1			- Unread records left	0..499
					Timestamp of record	
9265	u16	1			- Year, Month	Year/Month
9266	u16	1			- Day, Hour	Day/Hour
9267	u16	1			- Minute, Second	Min/Sec
9268	u16	1			- Millisecond	Millisecond
9269	u16	1			Event identification	1)

Table continues on next page

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
9270	u16	1			Data object ID1	1)
9271	u16	1			Data object ID2	1)
9272	u16	1			Event data value 1	1)
9273	u16	1			Event data value 2	1)
					Record 3 data to read:	If selected
9274	u16	1			- Record sequence num	1...9999
9275	u16	1			- Unread records left	0...499
					Timestamp of record	
9276	u16	1			- Year, Month	Year/Month
9277	u16	1			- Day, Hour	Day/Hour
9278	u16	1			- Minute, Second	Min/Sec
9279	u16	1			- Millisecond	Millisecond
9280	u16	1			Event identification	1)
9281	u16	1			Data object ID1	1)
9282	u16	1			Data object ID2	1)
9283	u16	1			Event data value 1	1)
9284	u16	1			Event data value 2	1)
					Record 4 data to read:	If selected
9285	u16	1			- Record sequence num	1...9999
9286	u16	1			- Unread records left	0...499
					Timestamp of record	
9287	u16	1			- Year, Month	Year/Month
9288	u16	1			- Day, Hour	Day/Hour
9289	u16	1			- Minute, Second	Min/Sec
9290	u16	1			- Millisecond	Millisecond
9291	u16	1			Event identification	1)
9292	u16	1			Data object ID1	1)
9293	u16	1			Data object ID2	1)
9294	u16	1			Event data value 1	1)
9295	u16	1			Event data value 2	1)
					Record 5 data to read:	If selected
9296	u16	1			- Record sequence num	1...9999
9297	u16	1			- Unread records left	0...499
					Timestamp of record	
9298	u16	1			- Year, Month	Year/Month

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Section 2

Modbus data mappings

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RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
9299	u16	1			- Day, Hour	Day/Hour
9300	u16	1			- Minute, Second	Min/Sec
9301	u16	1			- Millisecond	Millisecond
9302	u16	1			Event identification	1)
9303	u16	1			Data object ID1	1)
9304	u16	1			Data object ID2	1)
9305	u16	1			Event data value 1	1)
9306	u16	1			Event data value 2	1)
					Record 6 data to read:	If selected
9307	u16	1			- Record sequence num	1...9999
9308	u16	1			- Unread records left	0...499
					Timestamp of record	
9309	u16	1			- Year, Month	Year/Month
9310	u16	1			- Day, Hour	Day/Hour
9311	u16	1			- Minute, Second	Min/Sec
9312	u16	1			- Millisecond	Millisecond
9313	u16	1			Event identification	1)
9314	u16	1			Data object ID1	1)
9315	u16	1			Data object ID2	1)
9316	u16	1			Event data value 1	1)
9317	u16	1			Event data value 2	1)
					Record 7 data to read:	If selected
9318	u16	1			- Record sequence num	1...9999
9319	u16	1			- Unread records left	0...499
					Timestamp of record	
9320	u16	1			- Year, Month	Year/Month
9321	u16	1			- Day, Hour	Day/Hour
9322	u16	1			- Minute, Second	Min/Sec
9323	u16	1			- Millisecond	Millisecond
9324	u16	1			Event identification	1)
9325	u16	1			Data object ID1	1)
9326	u16	1			Data object ID2	1)
9327	u16	1			Event data value 1	1)
9328	u16	1			Event data value 2	1)
					Record 8 data to read:	If selected
Table continues on next page						

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
9329	u16	1			- Record sequence num	1...9999
9330	u16	1			- Unread records left	0...499
					Timestamp of record	
9331	u16	1			- Year, Month	Year/Month
9332	u16	1			- Day, Hour	Day/Hour
9333	u16	1			- Minute, Second	Min/Sec
9334	u16	1			- Millisecond	Millisecond
9335	u16	1			Event identification	1)
9336	u16	1			Data object ID1	1)
9337	u16	1			Data object ID2	1)
9338	u16	1			Event data value 1	1)
9339	u16	1			Event data value 2	1)
					Record 9 data to read:	If selected
9340	u16	1			- Record sequence num	1...9999
9341	u16	1			- Unread records left	0...499
					Timestamp of record	
9342	u16	1			- Year, Month	Year/Month
9343	u16	1			- Day, Hour	Day/Hour
9344	u16	1			- Minute, Second	Min/Sec
9345	u16	1			- Millisecond	Millisecond
9346	u16	1			Event identification	1)
9347	u16	1			Data object ID1	1)
9348	u16	1			Data object ID2	1)
9349	u16	1			Event data value 1	1)
9350	u16	1			Event data value 2	1)
					Record 10 data to read:	If selected
9351	u16	1			- Record sequence num	1...9999
9352	u16	1			- Unread records left	0...499
					Timestamp of record	
9353	u16	1			- Year, Month	Year/Month
9354	u16	1			- Day, Hour	Day/Hour
9355	u16	1			- Minute, Second	Min/Sec
9356	u16	1			- Millisecond	Millisecond
9357	u16	1			Event identification	1)
9358	u16	1			Data object ID1	1)
Table continues on next page						

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
9359	u16	1			Data object ID2	1)
9360	u16	1			Event data value 1	1)
9361	u16	1			Event data value 2	1)

1) See the technical manual.

2.4.1.12 Fault record structure header

Table 166: *Fault record structure header*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
					Selection write	
9401	i16	1			Read selection	-99...3
					Record data header	
9402	u16	1			Record sequence num	0...65535
9403	u16	1			Unread records left	0...99
					Timestamp of record	
9404	u16	1			Year, month	Year/Month
9405	u16	1			Day, hour	Day/Hour
9406	u16	1			Minute, second	Min/Sec
9407	u16	1			Millisecond	Millisecond
9408	u16	1			Timestamp quality	

2.4.1.13 Fault record data

The table shows all potential data available in the fault record application. Which data is actually recorded depends on the functions available and enabled in the protection relay's configuration.

Table 167: *Fault record data*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.FLTRFRC1		Fault record data	
9409	u32	1	.OpCnt.stVal		Fault record number (high)	0..999999
9410					(Low word)	
9411	i16	1	.ProFnc.stVal		Protection function	-32768...32767
9412	u16	100	.Hz.mag		Frequency	30...80.00 [Hz]
9413	u16	100	.StrDur.mag		Start duration	0...100.00 [%]
9414	u32	1000	.StrOpTm.mag		Operate time [ms] (high)	0...999999.999
9415					(Low word)	

Table continues on next page

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
9416	u32	100	.FltPtR.mag		Fault resistance	0.00... 1000000.00 ohms
9417					(Low word)	
9418	u32	100	.FltDiskm.mag		Fault distance	0.00... 9999.99 pu
9419					(Low word)	
9420	u16	1	.ActSetGr.stVal		Active setting group	1...6
9421	u16	1	.ShotPntr.stVal		AR shot pointer value	0...7
					Captured values during fault	
9422	u16	1000	.Max50DifAA.mag		Max. diff. current phs A	0.000...80.00 0 [pu]
9423	u16	1000	.Max50DifAB.mag		Max. diff. current phs B	0.000...80.00 0 [pu]
9424	u16	1000	.Max50DifAC.mag		Max. diff. current phs C	0.000...80.00 0 [pu]
9425	u16	1000	.Max50RstAA.mag		Max. bias current phs A	0.000... 50.000 [pu]
9426	u16	1000	.Max50RstAB.mag		Max. bias current phs B	0.000... 50.000 [pu]
9427	u16	1000	.Max50RstAC.mag		Max. bias current phs C	0.000... 50.000 [pu]
9428	u16	1000	.DifAPhsA.mag		Diff. current phs A	0.000...80.00 0 [pu]
9429	u16	1000	.DifAPhsB.mag		Diff. current phs B	0.000...80.00 0 [pu]
9430	u16	1000	.DifAPhsC.mag		Diff. current phs C	0.000...80.00 0 [pu]
9431	u16	1000	.RstAPhsA.mag		Bias current phs A	0.000... 50.000 [pu]
9432	u16	1000	.RstAPhsB.mag		Bias current phs B	0.000... 50.000 [pu]
9433	u16	1000	.RstAPhsC.mag		Bias current phs C	0.000... 50.000 [pu]
9434	u16	1000	.DifARes.mag		Diff. current Io	0.000...80.00 0 [pu]
9435	u16	1000	.RstARes.mag		Bias current Io	0.000... 50.000 [pu]
9436	u16	1000	.Max50APhsA1.mag		Max. current phs A(1)	0.000... 50.000 [×In]
9437	u16	1000	.Max50APhsB1.mag		Max. current phs B(1)	0.000... 50.000 [×In]
9438	u16	1000	.Max50APhsC1.mag		Max. current phs C(1)	0.000... 50.000 [×In]
9439	u16	1000	.Max50ARes1.mag		Max. current Io(1)	0.000... 50.000 [×In]
9440	u16	1000	.APhsA1.mag		Current phs A(1)	0.000... 50.000 [×In]
Table continues on next page						

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RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
9441	u16	1000	.APhsB1.mag		Current phs B(1)	0.000... 50.000 [×In]
9442	u16	1000	.APhsC1.mag		Current phs C(1)	0.000... 50.000 [×In]
9443	u16	1000	.ARes1.mag		Current Io(1)	0.000... 50.000 [×In]
9444	u16	1000	.AResClc1.mag		Current Io-Calc(1)	0.000... 50.000 [×In]
9445	u16	1000	.APsSeq1.mag		Current Ps-Seq(1)	0.000... 50.000 [×In]
9446	u16	1000	.ANgSeq1.mag		Current Ng-Seq(1)	0.000... 50.000 [×In]
9447	u16	1000	.PhVPhsA1.mag		Voltage phs A(1)	0.000...4.000 [×Un]
9448	u16	1000	.PhVPhsB1.mag		Voltage phs B(1)	0.000...4.000 [×Un]
9449	u16	1000	.PhVPhsC1.mag		Voltage phs C(1)	0.000...4.000 [×Un]
9450	u16	1000	.PPVPhsAB1.mag		Voltage phs AB(1)	0.000...4.000 [×Un]
9451	u16	1000	.PPVPhsBC1.mag		Voltage phs BC(1)	0.000...4.000 [×Un]
9452	u16	1000	.PPVPhsCA1.mag		Voltage phs CA(1)	0.000...4.000 [×Un]
9453	u16	1000	.VRes1.mag		Voltage Uo(1)	0.000...4.000 [×Un]
9454	u16	1000	.VZro1.mag		Voltage Zro-Seq(1)	0.000...4.000 [×Un]
9455	u16	1000	.VPsSeq1.mag		Voltage Ps-Seq(1)	0.000...4.000 [×Un]
9456	u16	1000	.VNgSeq1.mag		Voltage Ng-Seq(1)	0.000...4.000 [×Un]
9457	u16	100	.MaxTmpRI.mag		PTTR thermal level	0.00...99.99
9458	u16	100	.AMaxNgPs.mag		PDNSPTOC1 ratio I2/I1	0.00...999.99 [%]
9459	i16	100	.HzRteChg.mag		Frequency gradient	-10.00...10.0 0 [Hz/s]
9460	i16	100	.CondNeut.mag		Conductance Yo	-1000.00...10 00.00 [mS]
9461	i16	100	.SusNeut.mag		Susceptance Yo	-1000.00...10 00.00 [mS]
9462	i32	100	.PPLoopRis.mag		Fault loop resistance	-1000.00...10 00.00 [ohm]
9463	i32				(Low word)	
9464	i32	100	.PPLoopReact.mag		Fault loop reactance	-1000.00...10 00.00 [ohm]
9465	i32				(Low word)	

Table continues on next page

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
9466	u16	1000	.CBClrTm.mag		Breaker clear time	0.000...3.000 [s]
9467	u16	1000	.APhsA2.mag		Current phs A(2)	0.000...50.000 [$\times I_n$]
9468	u16	1000	.APhsB2.mag		Current phs B(2)	0.000...50.000 [$\times I_n$]
9469	u16	1000	.APhsC2.mag		Current phs C(2)	0.000...50.000 [$\times I_n$]
9470	u16	1000	.ARes2.mag		Current Io(2)	0.000...50.000 [$\times I_n$]
9471	u16	1000	.AResClc2.mag		Current Io-Calc(2)	0.000...50.000 [$\times I_n$]
9472	u16	1000	.APsSeq2.mag		Current Ps-Seq(2)	0.000...50.000 [$\times I_n$]
9473	u16	1000	.ANgSeq2.mag		Current Ng-Seq(2)	0.000...50.000 [$\times I_n$]
9474	u16	1000	.PhVPhsA2.mag		Voltage phs A(2)	0.000...4.000 [$\times U_n$]
9475	u16	1000	.PhVPhsB2.mag		Voltage phs B(2)	0.000...4.000 [$\times U_n$]
9476	u16	1000	.PhVPhsC2.mag		Voltage phs C(2)	0.000...4.000 [$\times U_n$]
9477	u16	1000	.PPVPhsAB2.mag		Voltage phs AB(2)	0.000...4.000 [$\times U_n$]
9478	u16	1000	.PPVPhsBC2.mag		Voltage phs BC(2)	0.000...4.000 [$\times U_n$]
9479	u16	1000	.PPVPhsCA2.mag		Voltage phs CA(2)	0.000...4.000 [$\times U_n$]
9480	u16	1000	.VRes2.mag		Voltage Uo(2)	0.000...4.000 [$\times U_n$]
9481	u16	1000	.VZro2.mag		Voltage Zro-Seq(2)	0.000...4.000 [$\times U_n$]
9482	u16	1000	.VPsSeq2.mag		Voltage Ps-Seq(2)	0.000...4.000 [$\times U_n$]
9483	u16	1000	.VNgSeq2.mag		Voltage Ng-Seq(2)	0.000...4.000 [$\times U_n$]
9484	i16	100	.DifANAngVN1.mag.		Angle Uo-Io(1)	-180.00...180.00 [deg]
9485	i16	100	.DifAAAngVBC1.mag.		Angle UBC-IA(1)	-180.00...180.00 [deg]
9486	i16	100	.DifABAngVCA1.mag		Angle UCA-IB(1)	-180.00...180.00 [deg]
9487	i16	100	.DifACAngVAB1.mag		Angle UAB-IC(1)	-180.00...180.00 [deg]
9488	i16	100	.DifANAngVN2.mag.		Angle Uo-Io(2)	-180.00...180.00 [deg]

Table continues on next page

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
9489	i16	100	.DifAAAngVBC2.mag.		Angle UBC-IA(2)	-180.00... 180.00 [deg]
9490	i16	100	.DifABAngVCA2.mag		Angle UCA-IB(2)	-180.00... 180.00 [deg]
9491	i16	100	.DifACAngVAB2.mag		Angle UAB-IC(2)	-180.00... 180.00 [deg]

2.4.1.14 Protection relay's real-time clock (in local time mode) - read and write (synchronize)

Table 168: *Protection relay's real-time clock (in local time mode) - read and write (synchronize)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
9201					Control register	0...2 ¹⁾
9202					Year	2000...2999
9203					Month	1...12
9204					Day	1...31
9205					Hour	0...23
9206					Minute	0...59
9207					Second	0...59
9208					Millisecond	0...999

1) See the technical manual.

2.4.1.15 Protection relay's real-time clock (in UTC time mode) - read and write (synchronize)

Table 169: *Protection relay's real-time clock (in UTC time mode) - read and write (synchronize)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
9211					Control register	0...2 ¹⁾
9212					Year	2000...2999
9213					Month	1...12
9214					Day	1...31
9215					Hour	0...23
9216					Minute	0...59
9217					Second	0...59
9218					Millisecond	0...999

1) See the technical manual.

2.4.1.16 Indication bits mirrored in registers

The pre-mapped indication bit data has been mapped from indication bit address 2720 onwards. The bit data is mirrored in registers starting from register address 170 onwards.

Table 170: *Indication bits mirrored in registers*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
170.00	Bit				Indication bit 2720 (0x1700)	
170.01	Bit				Indication bit 2721 (0x1701)	
:	:				:	
170.14	Bit				Indication bit 2734 (0x170E)	
170.15	Bit				Indication bit 2735 (0x170F)	
171.00	Bit				Indication bit 2736 (0x1710)	
:	:				:	

2.4.1.17 SSR1 System status register (1) device health

Table 171: *SSR1 System status register (1) device health*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
128.00	Bit				Device global error	1=Error
128.01	Bit				Device global warning	1=Warning
128.02	Bit				< reserved >	0
128.03	Bit				< reserved >	0
128.04	Bit				< reserved >	0
128.05	Bit				< reserved >	0
128.06	Bit				< reserved >	0
128.07	Bit				< reserved >	0
128.08	Bit				< reserved >	0
128.09	Bit				< reserved >	0
128.10	Bit				< reserved >	0
128.11	Bit				< reserved >	0
128.12	Bit				< reserved >	0
128.13	Bit				< reserved >	0
128.14	Bit				< reserved >	0
128.15	Bit				< reserved >	0

2.4.1.18 SSR2 System status register (2) protection relay's mode and state

Table 172: *SSR2 System status register (2) protection relay's mode and state*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
129.00	Bit				Device test mode	1=Test mode
129.01	Bit				< reserved >	0
129.02	Bit				Remote/Local state	0/1=Rem/Loc
					Active setting group	SG=1...6
129.03	Bit				- bit 0	
129.04	Bit				- bit 1	
129.05	Bit				- bit 2	
129.06	Bit				Protection relay's timesynch failure	1=Failure
129.07	Bit				< reserved >	0
129.08	Bit				Last reset cause a	1=Cold start
129.09	Bit				Last reset cause b	1=Watchdog
129.10	Bit				Last reset cause c	1=Warm start
129.11	Bit				< reserved >	0
129.12	Bit				< reserved >	0
129.13	Bit				< reserved >	0
129.14	Bit				< reserved >	0
129.15	Bit				< reserved >	0

2.4.1.19 SSR3 System status register (3) data available 1 (client-dependent)

Table 173: *SSR3 System status register (3) data available 1 (client-dependent)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
130.00	Bit				Unread event records available	1=Available
130.01	Bit				Unread fault records available	1=Available
130.02	Bit				< reserved >	0
130.03	Bit				< reserved >	0
130.04	Bit				Any momentary bit updated	1=Updated
130.05	Bit				Any mcd bit set	1=Set
130.06	Bit				Device restart bit	1=IED restart
130.07	Bit				< reserved >	0
130.08	Bit				Event record selected	1=Selected
130.09	Bit				Fault record selected	1=Selected
130.10	Bit				< reserved >	0
130.11	Bit				< reserved >	0
130.12	Bit				< reserved >	0

Table continues on next page

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
130.13	Bit				< reserved >	0
130.14	Bit				< reserved >	0
130.15	Bit				< reserved >	0

2.4.1.20 SSR4 System status register (4) data available 2 (client-dependent, user-definable)

Table 174: *SSR4 System status register (4) data available 2 (client-dependent, user-definable)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
131.00	Bit				Data category 1 has changed	1=Changed
131.01	Bit				Data category 2 has changed	1=Changed
131.02	Bit				Data category 3 has changed	1=Changed
131.03	Bit				Data category 4 has changed	1=Changed
131.04	Bit				Data category 5 has changed	1=Changed
131.05	Bit				Data category 6 has changed	1=Changed
131.06	Bit				Data category 7 has changed	1=Changed
131.07	Bit				Data category 8 has changed	1=Changed
131.08	Bit				Data category 9 has changed	1=Changed
131.09	Bit				Data category 10 has changed	1=Changed
131.10	Bit				Data category 11 has changed	1=Changed
131.11	Bit				Data category 12 has changed	1=Changed
131.12	Bit				Data category 13 has changed	1=Changed
131.13	Bit				Data category 14 has changed	1=Changed
131.14	Bit				Data category 15 has changed	1=Changed
131.15	Bit				Data category 16 has changed	1=Changed

2.4.1.21 SSR5 System status register (5) device alive register

Table 175: *SSR5 System status register (5) device alive register*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
132	u16	1			Device alive counter	0...65535

2.4.1.22 SSR6 System status register (6) control command status (client-dependent)

Table 176: *SSR6 System status register (6) control command status (client-dependent)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
					Last cmd result code	1)
133.00	Bit				- bit 0	
133.01	Bit				- bit 1	
133.02	Bit				- bit 2	
133.03	Bit				- bit 3	
133.04	Bit				- bit 4	
133.05	Bit				- bit 5	
133.06	Bit				- bit 6	
133.07	Bit				- bit 7	
					Response Type	1)
133.08	Bit				- bit 0	
133.09	Bit				- bit 1	
					Command state	1)
133.10	Bit				- bit 0	
133.11	Bit				- bit 1	
					Cmd sequence number	0...15
133.12	Bit				- bit 0	
133.13	Bit				- bit 1	
133.14	Bit				- bit 2	
133.15	Bit				- bit 3	

1) See the technical manual.

2.4.1.23 System diagnostic values

Table 177: *System diagnostic values*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.LDEV1			
2050	u16	1	.DevWrn.stVal	Warning	Last warning code	1)
2051	u16	1	.DevFail.stVal	Internal fault	Last internal fault code	1)
			DR.RDRE1			
2052	u16	1	.FltNum.stVal		Num. of DR recordings	0...N
2053	u16	1	.MemUsed.stVal		DR memory used	0...100 [%]
			LD0.LPHD1			
2054	u16	1	.NumPwrUp.stVal		Num. of cold starts	0...65535
2055	u16	1	.WrmStr.stVal		Num. of warm starts	0...65535

Table continues on next page

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
2056	u16	1	.WacTrg.stVal		Num. of watchdog resets	0...65535
			LD0.LDEV1			
2057	u16	1	.ChgAckCnt.stVal		Num. of conf. changes	0...65535
			LD0.LLN0			
	u16	1	.ParChgCnt.stVal		Num. of setting changes	0...65535

1) See the technical manual.

2.4.1.24 Time and reason for latest protection relay reset

Table 178: *Time and reason for latest protection relay reset*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
9221	u16	1			Year	2000...2999
9222	u16	1			Month	1...12
9223	u16	1			Day	1...31
9224	u16	1			Hour	0...23
9225	u16	1			Minute	0...59
9226	u16	1			Second	0...59
9227	u16	1			Millisecond	0...999
9228	u16	1			Reset reason	
9228.0	Bit				- bit 0	1=Cold start
9228.1	Bit				- bit 1	1=Watchdog
9228.2	Bit				- bit 2	1=Warm start

2.4.1.25 User-definable bits [Alt.2], visible on 0x,1x,3x and 4x

Table 179: *User-definable bits [Alt.2], visible on 0x,1x,3x and 4x*

BitA	Type	Scale	IEC 61850 name	SA name	Description	Values
(0)	Bit				< not mappable - not visible >	
1	Bit				Usr reg 1.Bit 01	
2	Bit				Usr reg 1.Bit 02	
3	Bit				Usr reg 1.Bit 03	
:	:				:	
:	:				:	
15	Bit				Usr reg 1.Bit 15	
16	Bit				Usr reg 2.Bit 00	
17	Bit				Usr reg 2.Bit 01	
:	:				:	
:	:				:	
2046	Bit				Usr reg 127.Bit 14	
2047	Bit				Usr reg 127.Bit 15	

2.4.1.26 User-definable registers [Alt.1], visible on 3x and 4x

Table 180: *User-definable registers [Alt.1], visible on 3x and 4x*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
(0)	Reg				< not mappable - not visible >	
1	Reg				User register 1	
2	Reg				User register 2	
3	:				:	
:	:				:	
:	:				:	
127	Reg				User register 127	

2.4.1.27 CTRL.CBCSWI1 Circuit breaker operation counter (1)

Table 181: *CTRL.CBCSWI1 Circuit breaker operation counter (1)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			CTRL.CBCSWI1			
2027	u16	1	.OpCntRs.stVal	Operation counter	Operation counter	0...65535

2.4.1.28 LD0.ARCSARCx1 Arc protection (x1)

Table 182: *LD0.ARCSARCx1 Arc protection (x1)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.ARCSARC11			
2028	u16	1	.FACntRs.stVal		Fault arc 1 counter	0...65535
			LD0.ARCSARC21			
2029	u16	1	.FACntRs.stVal		Fault arc 2 counter	0...65535
			LD0.ARCSARC31			
2030	u16	1	.FACntRs.stVal		Fault arc 3 counter	0...65535

2.4.1.29 LD0.CMHAI1 Current total demand distortion (1)

Table 183: *LD0.CMHAI1 Current total demand distortion (1)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.CMHAI1		3-second mean value:	
2150	u16	100	.TddA.phsA.cVal.mag	3SMHTDD_A	- phsA	0...500.00 [%]
2151	u16	100	.TddA.phsB.cVal.mag	3SMHTDD_B	- phsB	0...500.00 [%]
2152	u16	100	.TddA.phsC.cVal.mag	3SMHTDD_C	- phsC	0...500.00 [%]
					Demand value:	

Table continues on next page

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
2153	u16	100	.DmdTddA.phsA.cVal.mag	DMD_TDD_A	- phsA	0...500.00 [%]
2154	u16	100	.DmdTddA.phsB.cVal.mag	DMD_TDD_B	- phsB	0...500.00 [%]
2155	u16	100	.DmdTddA.phsC.cVal.mag	DMD_TDD_C	- phsC	0...500.00 [%]
					Max demand value:	
2156	u16	100	.MaxDmdTddA.phsA.cVal.mag	-	- phsA	0...500.00 [%]
2157	u16	100	.MaxDmdTddA.phsB.cVal.mag	-	- phsB	0...500.00 [%]
2158	u16	100	.MaxDmdTddA.phsC.cVal.mag	-	- phsC	0...500.00 [%]

2.4.1.30 LD0.CMMXU1 Phase current demand values (1)

Table 184: LD0.CMMXU1 Phase current demand values (1)

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.CAVMMXU1		Demand value	
2001	u16	1000	.A.phsA.cVal.mag	I_DMD_A	Phs A amplitude	0.00...50.0 [xIn]
2002	u16	1000	.A.phsB.cVal.mag	I_DMD_B	Phs B amplitude	0.00...50.0 [xIn]
2003	u16	1000	.A.phsC.cVal.mag	I_DMD_C	Phs C amplitude	0.00...50.0 [xIn]
2004					Year - month	
2005					Day - hour	
2006					Minute - second	
2007					Milliseconds	
2008					Time quality	
			LD0.CMAMMXU1		Max demand values	
2009	u16	1000	.A.phsA.cVal.mag	Max demand IL1	Phs A amplitude	0.00...50.0 [xIn]
2010					Year - month	
2011					Day - hour	
2012					Minute - second	
2013					Milliseconds	
2014					Time quality	
2015	u16	1000	.A.phsB.cVal.mag	Max demand IL2	Phs B amplitude	0.00...50.0 [xIn]
2016					Year - month	
2017					Day - hour	
2018					Minute - second	

Table continues on next page

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
2019					Milliseconds	
2020					Time quality	
2021	u16	1000	.A.phsC.cVal.mag	Max demand IL2	Phs C amplitude	0.00...50.0 [xIn]
2022					Year - month	
2023					Day - hour	
2024					Minute - second	
2025					Milliseconds	
2026					Time quality	
			LD0.CMIMMXU1		Min demand values	
	u16	1000	.A.phsA.cVal.mag	Max demand IL1	Phs A amplitude	0.00...50.0 [xIn]
	u16	1000	.A.phsB.cVal.mag	Max demand IL2	Phs B amplitude	0.00...50.0 [xIn]
	u16	1000	.A.phsC.cVal.mag	Max demand IL3	Phs C amplitude	0.00...50.0 [xIn]

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

Table 185: LD0.CMMXU1 Three-phase current measurement (1)

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.CMMXU1		Phase current (1)	
138	u16	1000	.A.phsA.instCVal.mag	I_INST_A	Phs A amplitude	0.00...40.0 [xIn]
139	u16	1000	.A.phsB.instCVal.mag	I_INST_B	Phs B amplitude	0.00...40.0 [xIn]
140	u16	1000	.A.phsC.instCVal.mag	I_INST_C	Phs C amplitude	0.00...40.0 [xIn]

2.4.1.32 LD0.CSMSQI1 Sequence current measurement (1)

Table 186: LD0.CSMSQI1 Sequence current measurement (1)

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.CSMSQI1		Sequence of currents	
143	u16	1000	.SeqA.c1.instCVal.mag	I1_INST	Positive amplitude	0.00...40.0 [xIn]
144	u16	1000	.SeqA.c2.instCVal.mag	I2_INST	Negative amplitude	0.00...40.0 [xIn]
145	u16	1000	.SeqA.c2.instCVal.mag	I3_INST	Zero amplitude	0.00...40.0 [xIn]

2.4.1.33 LD0.DARREC1 Autoreclosing counters (1)**Table 187:** *LD0.DARREC1 Autoreclosing counters (1)*

RegA	Typw	Scale	IEC 61850 name	SA name	Description	Values
			LD0.DARREC1			
2031	u16	1	.RecCnt1.stVal	CNT_SHOT1	AR 1st shot counter	0...65535
2032	u16	1	.RecCnt2.stVal	CNT_SHOT2	AR 2nd shot counter	0...65535
2033	u16	1	.RecCnt3.stVal	CNT_SHOT3	AR 3rd shot counter	0...65535
2034	u16	1	.RecCnt4.stVal	CNT_SHOT4	AR 4th shot counter	0...65535
2035	u16	1	.RecCnt5.stVal	CNT_SHOT5	AR 5th shot counter	0...65535
2036	u16	1	.FrqOpCnt.stVal	FRQ_OPR_CNT	AP freq. op. counter	0...65535

2.4.1.34 LD0.DARREC1 Autoreclosing values (1)**Table 188:** *LD0.DARREC1 Autoreclosing values (1)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.DARREC1			
135	i16	1	.AutoRecSt.stVal	STATUS	AR state	-2...4 ¹⁾
136	u16	1	.ShotPntr.stVal	SHOT_PTR	AR shot pointer value	0...6
137	u16	1	.OpCntRs.stVal	COUNTER	AR operation counter	0...65535

1) See the technical manual.

2.4.1.35 LD0.FMMXU1 Frequency measurement (1)**Table 189:** *LD0.FMMXU1 Frequency measurement (1)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.FMMXU1			
168	u16	100	.Hz.mag	F_DB	Frequency	35.00...75.00 [Hz]

2.4.1.36 LD0.HAEFMHAI1 Current harmonics (1)**Table 190:** *LD0.HAEFMHAI1 Current harmonics (1)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.HAEFMHAI1			
151	u16	10	.HRmsA.res.cVal.mag	I_HARM_RES	Current harmonics	0..250.0 [A]

2.4.1.37 LD0.PEMMTR1 Three-phase energy measurements (1)

Table 191: LD0.PEMMTR1 Three-phase energy measurements (1)

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.PEMMTR1			
2037	u32	1	.SupWh.actVal		Reverse active energy (high)	0...1E10 [kWh]
2038			.SupWh.actVal		(low word)	
2039	u32	1	.SupVARh.actVal		Reverse reactive energy (high)	0...1E10 [kVARh]
2040			.SupVARh.actVal		(low word)	
2041	u32	1	.DemWh.actVal		Forward active energy (high)	0...1E10 [kWh]
2042			.DemWh.actVal		(low word)	
2043	u32	1	.DemVARh.actVal		Forward reactive energy (high)	0...1E10 [kVARh]
2044			.DemVARh.actVal		(low word)	

2.4.1.38 LD0.PEMMXU1 Power measurement demand values (1)

Table 192: LD0.PEMMXU1 Power measurement demand values (1)

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.PEAVMMXU1		Demand value	
1939	i32	1	.TotW.mag		Active power P (high)	-/+ 999,999
1940					(Low word)	
1941	i32	1	.TotVAR.mag		Reactive power Q (high)	-/+ 999,999
1942					(Low word)	
1943	i32	1	.TotVA.mag		Apparent power S (high)	-/+ 999,999
1944					(Low word)	
1945	i16	1000	.TotPF.mag		Power factor	-1...1
			LD0.PEMAMMXU1		Max demand value	
	i32	1	.TotW.mag		Active power P	-/+ 999,999
	i32	1	.TotVAR.mag		Reactive power Q	-/+ 999,999
	i32	1	.TotVA.mag		Apparent power S	-/+ 999,999
			LD0.PEMIMMXU1		Min demand value	
	i32	1	.TotW.mag		Active power P	-/+ 999,999
	i32	1	.TotVAR.mag		Reactive power Q	-/+ 999,999
	i32	1	.TotVA.mag		Apparent power S	-/+ 999,999

2.4.1.39 LD0.PEMMXU1 Three-phase power and energy measurement (1)**Table 193:** *LD0.PEMMXU1 Three-phase power and energy measurement (1)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.PEMMXU1			
161	i32	1	.TotW.instMag	P_INST	Total active power P (high)	-/+ 999,999
162			.TotW.instMag		(low word)	
163	i32	1	.TotVAr.instMag	Q_INST	Total reactive power Q (high)	-/+ 999,999
164			.TotVAr.instMag		(low word)	
165	i32	1	.TotVA.instMag	S_INST	Total apparent power S (high)	-/+ 999,999
166			.TotVA.instMag		(low word)	
167	i16	1000	.TotPF.instMag	PF_INST	Average power factor	-1...1

2.4.1.40 LD0.PHQVVR1 Voltage variation (1)**Table 194:** *LD0.PHQVVR1 Voltage variation (1)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.PH1QVVR1		Voltage swell	
2200	u32	1	.SwlInstCnt.stVal	INSTSWELLCNT	- Inst counter (high)	0...
2201					- (Low word)	2147483647
2202	u32	1	.SwlMomCnt.stVal	MOMSWELLCNT	- Mom counter (high)	0...
2203					- (Low word)	2147483647
2204	u32	1	.SwlTmpCnt.stVal	TEMPSWELLCNT	- Temp counter (high)	0...
2205					- (Low word)	2147483647
2206	u32	1	.SwlMaxCnt.stVal	MAXDURSWELLCNT	- Max. duration.counter (high)	0...
2207					- (Low word)	2147483647
					Voltage dip	
2208	u32	1	.DipInstCnt.stVal	INSTDIPCNT	- Inst counter (high)	0...
2209					- (Low word)	2147483647
2210	u32	1	.DipMomCnt.stVal	MOMDIPCNT	- Mom counter (high)	0...
2211					- (Low word)	2147483647
2212	u32	1	.DipTmpCnt.stVal	TEMPDIPCNT	- Temp counter (high)	0...
2213					- (Low word)	2147483647
2214	u32	1	.DipMaxCnt.stVal	MAXDURDIPCNT	- Max. duration counter (high)	0...
2215					- (Low word)	2147483647
					Voltage interrupts	
2216	u32	1	.IntrMomCnt.stVal	MOMINTCNT	- Mom counter (high)	0...
2217					- (Low word)	2147483647
2218	u32	1	.IntrTmpCnt.stVal	TEMPINTCNT	- Temp counter (high)	0...
2219					- (Low word)	2147483647

Table continues on next page

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
2220	u32	1	.IntrSstCnt.stVal	SUSTINTCNT	- Sustain counter (high)	0...
2221					- (Low word)	2147483647
2222	u32	1	.IntrMaxCnt.stVal	MAXDURINTCNT	- Max. duration counter (high)	0...
2223					- (Low word)	

2.4.1.41 LD0.RESCMMXU1 Residual current demand value (1)

Table 195: LD0.RESCMMXU1 Residual current demand value (1)

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.RCAVMMXU1		Demand value	
1989	u16	1000	.A.res.cVal.mag	I_DMD_RES	Residual amplitude	0.00...50.0 [xIn]
1990					Year - month	
1991					Day - hour	
1992					Minute - second	
1993					Milliseconds	
1994					Time quality	
			LD0.RCMAMMXU1		Max. demand value	
1995	u16	1000	.A.res.cVal.mag	Max demand lo	Residual amplitude	0.00...50.0 [xIn]
1996					Year - month	
1997					Day - hour	
1998					Minute - second	
1999					Milliseconds	
2000					Time quality	
			LD0.RCMIMMXU1		Min. demand value	
	u16	1000	.A.res.cVal.mag	Min demand lo	Residual amplitude	0.00...50.0 [xIn]

2.4.1.42 LD0.RESCMMXU1 Residual current measurement (1)

Table 196: LD0.RESCMMXU1 Residual current measurement (1)

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.RESCMMXU1		Residual current (1)	
141	u16	1000	.A.res.instCVal.mag	IO_INST	- amplitude	0.00...40.0 [xIn]

2.4.1.43 LD0.RESVMMXU1 Residual voltage demand value (1)**Table 197:** *LD0.RESVMMXU1 Residual voltage demand value (1)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.RVAVMMXU1		Demand value	
1777	u16	1000	.PhV.res.cVal.mag	U_DMD_RES	Residual amplitude	0.00...4.0 [xUn]
1778					Year - month	
1779					Day - hour	
1780					Minute - second	
1781					Milliseconds	
1782					Time quality	
			LD0.RVMAMMXU1		Max. demand value	
1783	u16	1000	.PhV.res.cVal.mag	Max demand Uo	Residual amplitude	0.00...4.0 [xUn]
1784					Year - month	
1785					Day - hour	
1786					Minute - second	
1787					Milliseconds	
1788					Time quality	
			LD0.RVMIMMXU1		Min. demand value	
	u16	1000	.PhV.res.cVal.mag	Min demand Io	Residual amplitude	0.00...4.0 [xUn]

2.4.1.44 LD0.RESVMMXU1 Residual voltage measurement (1)**Table 198:** *LD0.RESVMMXU1 Residual voltage measurement (1)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.RESVMMXU1		Residual voltage (1)	
142	u16	1000	.A.res.instCVal.mag	U0_INST	- amplitude	0.00...4.00 [xUn]

2.4.1.45 LD0.SECRSYN1 Synchronism and energizing check (1)**Table 199:** *LD0.SECRSYN1 Synchronism and energizing check (1)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.SECRSYN1			
169	u16	1	.EnSt.stVal	ENERG_STATE	Energ. state of line and bus	0...4 ¹⁾

1) See the technical manual.

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

Table 200: LD0.SSCBR1 Circuit-breaker condition monitoring (1)

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.SSCBR1			
2060	u16	1	.InaTmdCnt.stVal	INA_DAYS	CB inactive days	0...65535
2061	u16	1	.OpTmOpn.mag	T_TRV_OP	Open travel time	0...60000 [ms]
2062	u16	1	.OpTmCls.mag	T_TRV_CL	Close travel time	0...60000 [ms]
			LD0.SSOPM1			
2063	u16	100	.TmsSprCha.mag	T_SPR_CHR	Spring charge time	0.00...99.99 [s]
			LD0.SPH1SCBR1			
2064	i16	1	.RmnNumOp.stVal	CB_LIFE_A	Remain.life phs A	-/+ 9999
			LD0.SPH2SCBR1			
2065	i16	1	.RmnNumOp.stVal	CB_LIFE_B	Remain.life phs B	-/+ 9999
			LD0.SPH3SCBR1			
2066	i16	1	.RmnNumOp.stVal	CB_LIFE_C	Remain.life phs C	-/+ 9999
			LD0.SPH1SCBR1			
2067	u16	1	.AccmAPwr.mag	IPOW_A	lyt phs A	0...1E6
			LD0.SPH2SCBR1			
2068	u16	1	.AccmAPwr.mag	IPOW_B	lyt phs B	0...1E6
			LD0.SPH3SCBR1			
2069	u16	1	.AccmAPwr.mag	IPOW_C	lyt phs C	0...1E6

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

Table 201: LD0.T1PTTR1 Three-phase thermal protection for feeders, cables and distribution transformers (1)

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.T1PTTR1			
146	i16	1	.Tmp.mag	TEMP	Object temperature	-100.0...9999.9 [C]
147	u16	1	.TmpRI.mag	TEMP_RL	Relative temperature	0.00...99.99 [C]
148	i16	1	.TmpUsed.mag	TEMP_AMB	Ambient temperature	-99...999.99 [C]
149	u16	1	.OpTm.stVal	T_OPERATE	Time to operate	0...60000 [s]
150	u16	1	.BlkThmRsTm.stVal	T_ENA_CLOSE	Time to deactivate block	0...60000 [s]

2.4.1.48 LD0.VMHAI1 Voltage total harmonic distortion (1)**Table 202:** *LD0.VMHAI1 Voltage total harmonic distortion (1)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.VMHAI1		3-second mean value	
2170	u16	100	.ThdPhV.phsA.cVal.mag	3SMHTHD_A	- Phs A	0...500.00 [%]
2171	u16	100	.ThdPhV.phsB.cVal.mag	3SMHTDD_B	- Phs B	0...500.00 [%]
2172	u16	100	.ThdPhV.phsC.cVal.mag	3SMHTDD_C	- Phs C	0...500.00 [%]
					Demand value:	
2173	u16	100	.DmdThdPhV.phsA.cVal.mag	DMD_TDD_A	- Phs A	0...500.00 [%]
2174	u16	100	.DmdThdPhV.phsB.cVal.mag	DMD_TDD_B	- Phs B	0...500.00 [%]
2175	u16	100	.DmdThdPhV.phsC.cVal.mag	DMD_TDD_C	- Phs C	0...500.00 [%]
					Max demand value	
2176	u16	100	.MaxDmdThdV.phsA.cVal.mag	-	- Phs A	0...500.00 [%]
2177	u16	100	.MaxDmdThdV.phsB.cVal.mag	-	- Phs B	0...500.00 [%]
2178	u16	100	.MaxDmdThdV.phsC.cVal.mag	-	- Phs C	0...500.00 [%]

2.4.1.49 LD0.VMMXU1 Three-phase voltage measurement (1)**Table 203:** *LD0.VMMXU1 Three-phase voltage measurement (1)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.VMMXU1		Phase-ground voltage (1)	
152	u16	1000	.phV.phsA.cVal.mag	U_DB_A	- Phs A amplitude	0.00...4.00 [xUn]
153	u16	1000	.phV.phsB.cVal.mag	U_DB_B	- Phs B amplitude	0.00...4.00 [xUn]
154	u16	1000	.phV.phsC.cVal.mag	U_DB_C	- Phs C amplitude	0.00...4.00 [xUn]
			LD0.VMMXU1		Phase-phase voltage (1)	
155	u16	1000	.PPV.phsAB.cVal.mag	U_DB_AB	- Phs AB amplitude	0.00...4.00 [xUn]
156	u16	1000	.PPV.phsBC.cVal.mag	U_DB_BC	- Phs BC amplitude	0.00...4.00 [xUn]
157	u16	1000	.PPV.phsCA.cVal.mag	U_DB_CA	- Phs CA amplitude	0.00...4.00 [xUn]

2.4.1.50 LD0.VMMXU1 Voltage demand values (1)

Table 204: LD0.VMMXU1 Voltage demand values (1)

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.VAVMMXU1		Demand value	
1954	u16	1000	.PhV.phsA.cVal.mag	U_DMD_A	Phs A amplitude	0.00...4.0 [×Un]
1955	u16	1000	.PhV.phsB.cVal.mag	U_DMD_B	Phs B amplitude	0.00...4.0 [×Un]
1956	u16	1000	.PhV.phsC.cVal.mag	U_DMD_C	Phs C amplitude	0.00...4.0 [×Un]
1957	u16	1000	.PPV.phsAB.cVal.mag	U_DMD_AB	Phs AB amplitude	0.00...4.0 [×Un]
1958	u16	1000	.PPV.phsBC.cVal.mag	U_DMD_BC	Phs BC amplitude	0.00...4.0 [×Un]
1959	u16	1000	.PPV.phsCA.cVal.mag	U_DMD_CA	Phs CA amplitude	0.00...4.0 [×Un]

2.4.1.51 LD0.VSMSQI1 Sequence voltage measurement (1)

Table 205: LD0.VSMSQI1 Sequence voltage measurement (1)

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.VSMSQI1		Sequence of voltages	
158	u16	1000	.SeqA.c1.instCVal.mag	U1_INST	- Positive amplitude	0.00...4.00 [×Un]
159	u16	1000	.SeqA.c2.instCVal.mag	U2_INST	- Negative amplitude	0.00...4.00 [×Un]
160	u16	1000	.SeqA.c2.instCVal.mag	U3_INST	- Zero amplitude	0.00...4.00 [×Un]

2.4.2 Unmapped registers

Unmapped registers are register data that have no initial Modbus mapping locations, but can be added to the user-definable Modbus area using the Communication Management tool in PCM600. The initial register type settings of these objects have little meaning, since it is always possible to redefine the settings completely for the user-definable register.

2.4.2.1 CTRL.LLN0 Local, Remote, Station, Off and Combinations

Table 206: CTRL.LLN0 Local, Remote, Station, Off and Combinations

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			CTRL.LLN0			
	u16	1	.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

2.4.2.2 LD0.LLN0/LPHD1/LDEV1 System values**Table 207:** *LD0.LLN0/LPHD1/LDEV1 System values*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.LLN0			
	u16	1	.ParChgCnt.stVal		Num. of setting changes	0...65535

2.4.2.3 LD0.MDSOPT1 Runtime counter for machines and devices (1)**Table 208:** *LD0.MDSOPT1 Runtime counter for machines and devices (1)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.MDSOPT1			
	u16	1	.OpTmh.stVal	OPR_TIME	Total operation hours	0...299999

2.4.2.4 LD0.MVI4GAPC1 Integer value move (1)**Table 209:** *LD0.MVI4GAPC1 Integer value move (1)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.MVI4GAPC1			
	i32	1	.ISCS01.stVal	OUT1	- Integer value 1 (high)	-/ +2147483647
					- Low word	
	i32	1	.ISCS02.stVal	OUT2	- Integer value 2 (high)	-/ +2147483647
					- Low word	
	i32	1	.ISCS03.stVal	OUT3	- Integer value 3 (high)	-/ +2147483647
					- Low word	
	i32	1	.ISCS04.stVal	OUT4	- Integer value 4 (high)	-/ +2147483647
					- Low word	

2.4.2.5 LD0.SCA4GAPC1 Analog value scaling (1)**Table 210:** *LD0.SCA4GAPC1 Analog value scaling (1)*

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.SCA4GAPC1			
	i16	1000	.AnValOut1.mag	AO1_VALUE	Analog value 1 after scaling	0...N
	i16	1000	.AnValOut2.mag	AO2_VALUE	Analog value 2 after scaling	0...N
	i16	1000	.AnValOut3.mag	AO3_VALUE	Analog value 3 after scaling	0...N
	i16	1000	.AnValOut4.mag	AO4_VALUE	Analog value 4 after scaling	0...N

2.4.2.6 LD0.SCA4GAPC2 Analog value scaling (2)

Table 211: LD0.SCA4GAPC2 Analog value scaling (2)

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.SCA4GAPC2			
	i16	1000	.AnValOut1.mag	AO1_VALUE	Analog value 1 after scaling	0...N
	i16	1000	.AnValOut2.mag	AO2_VALUE	Analog value 2 after scaling	0...N
	i16	1000	.AnValOut3.mag	AO3_VALUE	Analog value 3 after scaling	0...N
	i16	1000	.AnValOut4.mag	AO4_VALUE	Analog value 4 after scaling	0...N

2.4.2.7 LD0.SCA4GAPC3 Analog value scaling (3)

Table 212: LD0.SCA4GAPC3 Analog value scaling (3)

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.SCA4GAPC3			
	i16	1000	.AnValOut1.mag	AO1_VALUE	Analog value 1 after scaling	0...N
	i16	1000	.AnValOut2.mag	AO2_VALUE	Analog value 2 after scaling	0...N
	i16	1000	.AnValOut3.mag	AO3_VALUE	Analog value 3 after scaling	0...N
	i16	1000	.AnValOut4.mag	AO4_VALUE	Analog value 4 after scaling	0...N

2.4.2.8 LD0.SCA4GAPC4 Analog value scaling (4)

Table 213: LD0.SCA4GAPC4 Analog value scaling (4)

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.SCA4GAPC4			
	i16	1000	.AnValOut1.mag	AO1_VALUE	Analog value 1 after scaling	0...N
	i16	1000	.AnValOut2.mag	AO2_VALUE	Analog value 2 after scaling	0...N
	i16	1000	.AnValOut3.mag	AO3_VALUE	Analog value 3 after scaling	0...N
	i16	1000	.AnValOut4.mag	AO4_VALUE	Analog value 4 after scaling	0...N

2.4.2.9 LD0.SCEFRFLO1 Fault locator (1)

Table 214: LD0.SCEFRFLO1 Fault locator (1)

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.SCEFRFLO1			
	u16	1	.FltDiskm.mag	FLT_DISTANCE	Fault distance in pu	0... 3000.0000 [pu]
	u16	1	.FltLoop.stVal	FAULT_LOOP	Fault impedance loop	0...7 (see doc)
	u16	1	.FltPtR.mag	RF	Fault point resistance	0.0...1000000 .0 [ohm]

Table continues on next page

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
	u16	1	.FltR.mag	RFLOOP	Fault loop resistance	0.0...1000000 .0 [ohm]
	u16	1	.FltX.mag	XFLOOP	Fault loop reactance	0.0...1000000 .0 [ohm]
	u16	1	.PhReact.mag	XFPHASE	Fault phase reactance	0.0...1000000 .0 [ohm]
	u16	1	.RatFltALod.mag	IFLT_PER_ILD	Fault to load current ratio	0...60000.00
	u16	1	.EqDisLod.mag	S_CALC	Est. load distance	0.00...1.00
	u16	1	.PhGndCapac.mag	XC0F_CALC	Est. PhE capacitive reactance	0.0...1000000 .0 [ohm]
	u16	1	.FltDisQ.stVal	FLT_DIST_Q	Fault distance quality	0...511

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

Table 215: LD0.VMMXU2 Three-phase voltage measurement (2)

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.VMMXU2		Phase-ground voltage (2)	
	u16	1000	.phV.phsA.cVal.mag	U_DB_A	Phs A amplitude	0.00..4.00 [xUn]
	u16	1000	.phV.phsB.cVal.mag	U_DB_B	Phs B amplitude	0.00..4.00 [xUn]
	u16	1000	.phV.phsC.cVal.mag	U_DB_C	Phs C amplitude	0.00..4.00 [xUn]
			LD0.VMMXU2		Phase-phase voltage (2)	
	u16	1000	.PPV.phsAB.cVal.mag	U_DB_AB	Phs AB amplitude	0.00..4.00 [xUn]
	u16	1000	.PPV.phsBC.cVal.mag	U_DB_BC	Phs BC amplitude	0.00..4.00 [xUn]
	u16	1000	.PPV.phsCA.cVal.mag	U_DB_CA	Phs CA amplitude	0.00..4.00 [xUn]

2.4.2.11 LD0.VMMXU2 Voltage demand values (2)

Table 216: LD0.VMMXU2 Voltage demand values (2)

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.VAVMMXU2		Demand value	
	u16	1000	.PhV.phsA.cVal.mag	U_DMD_A	Phs A amplitude	0.00...4.0 [xUn]
	u16	1000	.PhV.phsB.cVal.mag	U_DMD_B	Phs B amplitude	0.00...4.0 [xUn]
	u16	1000	.PhV.phsC.cVal.mag	U_DMD_C	Phs C amplitude	0.00...4.0 [xUn]

Table continues on next page

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
	u16	1000	.PPV.phsAB.cVal.mag	U_DMD_AB	Phs AB amplitude	0.00...4.0 [×Un]
	u16	1000	.PPV.phsBC.cVal.mag	U_DMD_BC	Phs BC amplitude	0.00...4.0 [×Un]
	u16	1000	.PPV.phsCA.cVal.mag	U_DMD_CA	Phs CA amplitude	0.00...4.0 [×Un]

2.4.2.12 LD0.XARGGIO130 RTD input values

Table 217: LD0.XARGGIO130 RTD input values

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.XARGGIO130			
	i16	1	.AnIn1.mag	AI_VAL1	RTD input 1 in ohms	-/+ 10000.00
	i16	1	.AnIn2.mag	AI_VAL2	RTD input 2 in ohms	-/+ 10000.00
	i16	1	.AnIn3.mag	AI_VAL3	RTD input 3 in ohms	-/+ 10000.00
	i16	1	.AnIn4.mag	AI_VAL4	RTD input 4 in ohms	-/+ 10000.00

2.4.2.13 LD0.XRGGIO130 RTD input values

Table 218: LD0.XRGGIO130 RTD input values

RegA	Type	Scale	IEC 61850 name	SA name	Description	Values
			LD0.XRGGIO130			
	i16	1	.AnIn1.mag	AI_VAL1	RTD input 1 in ohms	-/+ 10000.00
	i16	1	.AnIn2.mag	AI_VAL2	RTD input 2 in ohms	-/+ 10000.00
	i16	1	.AnIn3.mag	AI_VAL3	RTD input 3 in ohms	-/+ 10000.00
	i16	1	.AnIn4.mag	AI_VAL4	RTD input 4 in ohms	-/+ 10000.00
	i16	1	.AnIn5.mag	AI_VAL5	RTD input 5 in ohms	-/+ 10000.00
	i16	1	.AnIn6.mag	AI_VAL6	RTD input 6 in ohms	-/+ 10000.00
	i16	1	.AnIn7.mag	AI_VAL7	RTD input 7 in ohms	-/+ 10000.00
	i16	1	.AnIn8.mag	AI_VAL8	RTD input 8 in ohms	-/+ 10000.00

2.5 Controls

Table 219: Explanations of the controls table columns

Column name	Description
0xA	Coil (0X) address for control value.
CS	Control structure and bit within the structure for control value.
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.
Table continues on next page	

Column name	Description
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 written value.

2.5.1 Reset, acknowledge and trigger points

Table 220: *Reset, acknowledge and trigger points*

0xA	CS	IEC 61850 name	SA name	Description	Values
		LD0.LLN0			
2060	2.00	.IndLEDRs.Oper.ctIVal		Reset indications and LEDs	1=Reset
2061	2.01	.ProgLEDRs.Oper.ctIVal		Reset Alarm LEDs	1=Reset
		LD0.PEMMXU1			
2062	2.02	.RcdRs.Oper.ctIVal		Reset Power max demands	1=Reset
		LD0.DARREC1			
2063	2.03	.RecRs.Oper.ctIVal		Reset reclosing	1=Reset
2064	2.04	.CntRs.Oper.ctIVal		Reset reclosing counters	1=Reset
		LD0.SSCBR1			
2065	2.05	.RsAccmAPwr.Oper.ctIVal		Reset CB accum. energy	1=Reset
2066	2.06	.RsCBWear.Oper.ctIVal		Reset CB wear data	1=Reset
		DR.RDRE1			
2067	2.07	.RcdTrg.Oper.ctIVal		Trig DR recording	1=Trig
2068	2.08	.MemClr.Oper.ctIVal		Clear DR memory	1=Clear
		LD0.CMMXU1			
2069	2.09	.RcdRs.Oper.ctIVal		Reset Max current1 demands	1=Reset
		LD0.PEMMTR1			
2070	2.10	.SupDmdRs.Oper.ctIVal		Reset energy values	1=Reset
		LD0.SCCBR1			
2071	2.11	.RsTrvTm.Oper.ctIVal		Reset CB travel time	1=Reset
2072	2.12	.RsSprChaTm.Oper.ctIVal		Reset CB spring charge time	1=Reset
		LD0.RESCMMXU1			
2073	2.13	.RcdRs.Oper.ctIVal		Reset Io (1) max demands	1=Reset
		LD0.RESVMMXU1			
2074	2.14	.RcdRs.Oper.ctIVal		Reset Uo (1) max demands	1=Reset

2.5.2 CTRL.CBCSWI1 Circuit breaker control (1)

Table 221: CTRL.CBCSWI1 Circuit breaker control (1)

0xA	CS	IEC 61850 name	SA name	Description	Values
		CTRL.CBCSWI1			
2048	1.00	.Pos.Oper.ctlVal		Select open	1=Select
2049	1.01	.Pos.Oper.ctlVal		Select close	1=Select
2050	1.02	.Pos.Oper.ctlVal		Cancel selection	1=Cancel
2051	1.03	.Pos.Oper.ctlVal		Execute selection	1=Execute
2052	1.04	.Pos.Oper.ctlVal		Direct open	1=Open
2053	1.05	.Pos.Oper.ctlVal		Direct close	1=Close

2.5.3 CTRL.DCXSWI1 Disconnecter control (1)

Table 222: CTRL.DCXSWI1 Disconnecter control (1)

0xA	CS	IEC 61850 name	SA name	Description	Values
		CTRL.DCCSWI1			
2144	7.00	.Pos.Oper.ctlVal		Select open	1=Select
2145	7.01	.Pos.Oper.ctlVal		Select close	1=Select
2146	7.02	.Pos.Oper.ctlVal		Cancel selection	1=Cancel
2147	7.03	.Pos.Oper.ctlVal		Execute selection	1=Execute
2148	7.04	.Pos.Oper.ctlVal		Direct open	1=Open
2149	7.05	.Pos.Oper.ctlVal		Direct close	1=Close

2.5.4 CTRL.DCXSWI2 Disconnecter control (2)

Table 223: CTRL.DCXSWI2 Disconnecter control (2)

0xA	CS	IEC 61850 name	SA name	Description	Values
		CTRL.DCCSWI2			
2150	7.06	.Pos.Oper.ctlVal		Select open	1=Select
2151	7.07	.Pos.Oper.ctlVal		Select close	1=Select
2152	7.08	.Pos.Oper.ctlVal		Cancel selection	1=Cancel
2153	7.09	.Pos.Oper.ctlVal		Execute selection	1=Execute
2154	7.10	.Pos.Oper.ctlVal		Direct open	1=Open
2155	7.11	.Pos.Oper.ctlVal		Direct close	1=Close

2.5.5 CTRL.ESXSWI1 Earthing switch control (1)

Table 224: CTRL.ESXSWI1 Earthing switch control (1)

0xA	CS	IEC 61850 name	SA name	Description	Values
		CTRL.ESXSWI1			
2054	1.06	.Pos.Oper.ctIVal		Select open	1=Select
2055	1.07	.Pos.Oper.ctIVal		Select close	1=Select
2056	1.08	.Pos.Oper.ctIVal		Cancel selection	1=Cancel
2057	1.09	.Pos.Oper.ctIVal		Execute selection	1=Execute
2058	1.10	.Pos.Oper.ctIVal		Direct open	1=Open
2059	1.11	.Pos.Oper.ctIVal		Direct close	1=Close

2.5.6 LD0.LDEV1 Protection relay's warm reset (1)

Table 225: LD0.LDEV1 Protection relay's warm reset (1)

0xA	CS	IEC 61850 name	SA name	Description	Values
		LD0.LDEV1			
2080	3.00	.WrmStrCmd.Oper.ctIVal		Warm reboot of protection relay	1=Reboot

2.5.7 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". The setting mode "toggled" for local operation corresponds to "persistent" for remote operation.

Table 226: LD0.SPCGAPC1 Generic control point (16 pcs) (1)

0xA	CS	IEC 61850 name	SA name	Description	Values
		LD0.SPCGAPC1			
2112	5.00	.SPCS01.ctIVal		Output 1 control	0/1=Off/On
2113	5.01	.SPCS02.ctIVal		Output 2 control	0/1=Off/On
2114	5.02	.SPCS03.ctIVal		Output 3 control	0/1=Off/On
2115	5.03	.SPCS04.ctIVal		Output 4 control	0/1=Off/On
2116	5.04	.SPCS05.ctIVal		Output 5 control	0/1=Off/On
2117	5.05	.SPCS06.ctIVal		Output 6 control	0/1=Off/On
2118	5.06	.SPCS07.ctIVal		Output 7 control	0/1=Off/On
2119	5.07	.SPCS08.ctIVal		Output 8 control	0/1=Off/On
2120	5.08	.SPCS09.ctIVal		Output 9 control	0/1=Off/On
2121	5.09	.SPCS10.ctIVal		Output 10 control	0/1=Off/On
2122	5.10	.SPCS11.ctIVal		Output 11 control	0/1=Off/On
2123	5.11	.SPCS12.ctIVal		Output 12 control	0/1=Off/On

Table continues on next page

0xA	CS	IEC 61850 name	SA name	Description	Values
2124	5.12	.SPCS13.ctlVal		Output 13 control	0/1=Off/On
2125	5.13	.SPCS14.ctlVal		Output 14 control	0/1=Off/On
2126	5.14	.SPCS15.ctlVal		Output 15 control	0/1=Off/On
2127	5.15	.SPCS16.ctlVal		Output 16 control	0/1=Off/On

2.5.8 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)

0xA	CS	IEC 61850 name	SA name	Description	Values
		LD0.SPCGAPC2			
2128	6.00	.SPCS01.ctlVal		Output 1 control	0/1=Off/On
2129	6.01	.SPCS02.ctlVal		Output 2 control	0/1=Off/On
2130	6.02	.SPCS03.ctlVal		Output 3 control	0/1=Off/On
2131	6.03	.SPCS04.ctlVal		Output 4 control	0/1=Off/On
2132	6.04	.SPCS05.ctlVal		Output 5 control	0/1=Off/On
2133	6.05	.SPCS06.ctlVal		Output 6 control	0/1=Off/On
2134	6.06	.SPCS07.ctlVal		Output 7 control	0/1=Off/On
2135	6.07	.SPCS08.ctlVal		Output 8 control	0/1=Off/On
2136	6.08	.SPCS09.ctlVal		Output 9 control	0/1=Off/On
2137	6.09	.SPCS10.ctlVal		Output 10 control	0/1=Off/On
2138	6.10	.SPCS11.ctlVal		Output 11 control	0/1=Off/On
2139	6.11	.SPCS12.ctlVal		Output 12 control	0/1=Off/On
2140	6.12	.SPCS13.ctlVal		Output 13 control	0/1=Off/On
2141	6.13	.SPCS14.ctlVal		Output 14 control	0/1=Off/On
2142	6.14	.SPCS15.ctlVal		Output 15 control	0/1=Off/On
2143	6.15	.SPCS16.ctlVal		Output 16 control	0/1=Off/On

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

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

0xA	CS	IEC 61850 name	SA name	Description	Values
		LD0.SRGAPC1			
2096	4.00	.Rs1.Oper.ctlVal		Reset flip-flop 1	1=Reset
2097	4.01	.Rs2.Oper.ctlVal		Reset flip-flop 2	1=Reset
2098	4.02	.Rs3.Oper.ctlVal		Reset flip-flop 3	1=Reset

Table continues on next page

0xA	CS	IEC 61850 name	SA name	Description	Values
2099	4.03	.Rs4.Oper.ctlVal		Reset flip-flop 4	1=Reset
2100	4.04	.Rs5.Oper.ctlVal		Reset flip-flop 5	1=Reset
2101	4.05	.Rs6.Oper.ctlVal		Reset flip-flop 6	1=Reset
2102	4.06	.Rs7.Oper.ctlVal		Reset flip-flop 7	1=Reset
2103	4.07	.Rs8.Oper.ctlVal		Reset flip-flop 8	1=Reset

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

Table 229: *LD0.SRGAPC2 Set-reset (8 pcs) (2)*

0xA	CS	IEC 61850 name	SA name	Description	Values
		LD0.SRGAPC2			
2104	4.08	.Rs1.Oper.ctlVal		Reset flip-flop 1	1=Reset
2105	4.09	.Rs2.Oper.ctlVal		Reset flip-flop 2	1=Reset
2106	4.10	.Rs3.Oper.ctlVal		Reset flip-flop 3	1=Reset
2107	4.11	.Rs4.Oper.ctlVal		Reset flip-flop 4	1=Reset
2108	4.12	.Rs5.Oper.ctlVal		Reset flip-flop 5	1=Reset
2109	4.13	.Rs6.Oper.ctlVal		Reset flip-flop 6	1=Reset
2110	4.14	.Rs7.Oper.ctlVal		Reset flip-flop 7	1=Reset
2111	4.15	.Rs8.Oper.ctlVal		Reset flip-flop 8	1=Reset

2.5.11 Unmapped control points

Table 230: *Unmapped control points*

IEC 61850 name	Description	Value
LD0.LLN0.MeasStatRs.Oper.ctlVal	Reset all min. and max. demands	1=Reset
LD0.LLN0.PQRs.Oper.ctlVal	Reset all power quality data	1=Reset
LD0.FLTRFRC1.RcdRs.Oper.ctlVal	Reset fault record data	1=Reset

Section 3 Glossary

EMC	Electromagnetic compatibility
GOOSE	Generic Object-Oriented Substation Event
HSO	High-speed output
IEC	International Electrotechnical Commission
IEC 61850	International standard for substation communication and modeling
IED	Intelligent electronic device
LED	Light-emitting diode
LHMI	Local human-machine interface
Modbus	A serial communication protocol developed by the Modicon company in 1979. Originally used for communication in PLCs and RTU devices.
PCM600	Protection and Control IED Manager



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