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 IED. 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 IED 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

The application manual contains application descriptions and setting guidelines sorted per function. The manual can be used to find out when and for what purpose a typical protection function can be used. The manual can also be used when calculating settings.

The communication protocol manual describes a communication protocol supported by the IED. The manual concentrates on vendor-specific implementations.

The engineering guide provides information for IEC 61850 engineering of the 615 series protection IEDs with PCM600 and IET600. This guide concentrates especially on the configuration of GOOSE communication with these tools. The guide can be used as a technical reference during the engineering phase, installation and commissioning phase, and during normal service. For more details on tool usage, see the PCM600 documentation.

The engineering manual contains instructions on how to engineer the IEDs using the different tools in PCM600. The manual provides instructions on how to set up a PCM600 project and insert IEDs to the project structure. The manual also

recommends a sequence for engineering of protection and control functions, LHMI functions as well as communication engineering for IEC 61850 and other supported protocols.

The installation manual contains instructions on how to install the IED. The manual provides procedures for mechanical and electrical installation. The chapters are organized in chronological order in which the IED should be installed.

The operation manual contains instructions on how to operate the IED once it has been commissioned. The manual provides instructions for monitoring, controlling and setting the IED. The manual also describes how to identify disturbances and how to view calculated and measured power grid data to determine the cause of a fault.

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

The technical manual contains application and functionality descriptions and lists function blocks, logic diagrams, input and output signals, setting parameters and technical data sorted per function. The manual can be used as a technical reference during the engineering phase, installation and commissioning phase, and during normal service.

1.3.2 Document revision history

Document revision/date	Product version	History
A/2008-07-02	1.1	First release
B/2009-03-04	2.0	Content updated to correspond to the product version
C/2009-07-03	2.0	Content updated
D/2010-06-11	3.0	Content updated to correspond to the product version
E/2012-05-11	4.0	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	1MRS756468

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 in this manual 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 ↓.
- HMI menu paths are presented in bold.
  Select **Main menu/Settings**.
- LHMI messages are shown in Courier font.
  To save the changes in non-volatile 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".
- IED input/output messages and monitored data names are shown in Courier font.
  When the function starts, the `START` output is set to TRUE.

1.4.3 Functions, codes and symbols

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)
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>> ->	67-2
Non-directional earth-fault protection, low stage	EFLPTOC1	Io> (1)	51N-1 (1)
	EFLPTOC2	Io> (2)	51N-1 (2)
Non-directional earth-fault protection, high stage	EFHPTOC1	Io>> (1)	51N-2 (1)
Non-directional earth-fault protection, instantaneous stage	EFIPTOC1	Io>>>	50N/51N
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>> ->	67N-2
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	67NIEF
Harmonics based earth-fault protection	HAEFPTOC1	Io>HA	51NHA
Non-directional (cross-country) earth fault protection, using calculated Io	EFHPTOC1	Io>> (1)	51N-2 (1)
Negative-sequence overcurrent protection	NSPTOC1	I2> (1)	46 (1)
	NSPTOC2	I2> (2)	46 (2)
Phase discontinuity protection	PDNSPTOC1	I2/I1>	46PD
Residual overvoltage protection	ROVPTOV1	Uo> (1)	59G (1)
	ROVPTOV2	Uo> (2)	59G (2)
	ROVPTOV3	Uo> (3)	59G (3)
Three-phase undervoltage protection	PHPTUV1	3U< (1)	27 (1)
	PHPTUV2	3U< (2)	27 (2)
	PHPTUV3	3U< (3)	27 (3)
Table continues on next page			

Function	IEC 61850	IEC 60617	IEC-ANSI
Three-phase overvoltage protection	PHPTOV1	3U> (1)	59 (1)
	PHPTOV2	3U> (2)	59 (2)
	PHPTOV3	3U> (3)	59 (3)
Positive-sequence undervoltage protection	PSPTUV1	U1< (1)	47U+ (1)
Negative-sequence overvoltage protection	NSPTOV1	U2> (1)	47O- (1)
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)
Three-phase thermal protection for feeders, cables and distribution transformers	T1PTTR1	3Ith>F	49F
Circuit breaker failure protection	CCBRBRF1	3I>/Io>BF	51BF/51NBF
Three-phase inrush detector	INRPHAR1	3I2f>	68
Master trip	TRPPTRC1	Master Trip (1)	94/86 (1)
	TRPPTRC2	Master Trip (2)	94/86 (2)
Arc protection	ARCSARC1	ARC (1)	50L/50NL (1)
	ARCSARC2	ARC (2)	50L/50NL (2)
	ARCSARC3	ARC (3)	50L/50NL (3)
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)
Control			
Circuit-breaker control	CBXCBR1	I <-> O CB	I <-> O CB
Disconnector 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	I <-> O ESC
Disconnector position indication	DCSXSWI1	I <-> O DC (1)	I <-> O DC (1)
	DCSXSWI2	I <-> O DC (2)	I <-> O DC (2)
	DCSXSWI3	I <-> O DC (3)	I <-> O DC (3)
Earthing switch indication	ESSXSWI1	I <-> O ES (1)	I <-> O ES (1)
	ESSXSWI2	I <-> O ES (2)	I <-> O ES (2)
Auto-reclosing	DARREC1	O -> I	79
Synchronism and energizing check	SECRSYN1	SYNC	25
Condition monitoring			
Circuit-breaker condition monitoring	SSCBR1	CBCM	CBCM
Trip circuit supervision	TCSSCBR1	TCS (1)	TCM (1)
	TCSSCBR2	TCS (2)	TCM (2)
Current circuit supervision	CCRDIF1	MCS 3I	MCS 3I
Fuse failure supervision	SEQRFUF1	FUSEF	60
Measurement			

Table continues on next page

Function	IEC 61850	IEC 60617	IEC-ANSI
Disturbance recorder	RDRE1	-	-
Three-phase current measurement	CMMXU1	3I	3I
Sequence current measurement	CSMSQI1	I1, I2, I0	I1, I2, I0
Residual current measurement	RESCMMXU1	Io	In
Three-phase voltage measurement	VMMXU1	3U	3U
Residual voltage measurement	RESVMMXU1	Uo	Vn
Sequence voltage measurement	VSMSQI1	U1, U2, U0	U1, U2, U0
Three-phase power and energy measurement	PEMMXU1	P, E	P, E
Frequency measurement	FMMXU1	f	f

Section 2   Modbus data mappings

2.1   Overview

This document describes the Modbus data points and structures available in REF615 Ver.4.0. The point lists describe a superset of all data available through the standard configurations A, B, C, D, E, F, G and H including the optional functionalities. The names of the standard configurations are FE01, FE02, FE03, FE04, FE05, FE06, FE07, FE08 and FE09 respectively.

The majority of the Modbus data points are valid for all standard configurations. Some data points are standard configuration or optional application dependent and thus not available in each IED. 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

Table 2:   Supported functions in REF615

IEC 61850	FE01	FE02	FE03	FE04	FE05	FE06	FE07	FE08	FE09
PHLPTOC1	•	•	•	•	•			•	
PHHPTOC1	•	•	•	•	•			•	
PHHPTOC2	•	•	•	•	•			•	
PHIPTOC1	•	•	•	•	•	•	•	•	•
DPHLPDOC1						•	•		•
DPHLPDOC2						•	•		•
DPHHPDOC1						•	•		•
EFLPTOC1			•	•				•	
EFLPTOC2			•	•				•	
EFHPTOC1			•	•				•	
EFIPTOC1			•	•				•	
DEFLPDEF1	•	•			•	•	•		•
DEFLPDEF2	•	•			•	•	•		•
DEFHPDEF1	•	•			•	•	•		•
EFPADM1	o	o			o	o	o		o
EFPADM2	o	o			o	o	o		o
EFPADM3	o	o			o	o	o		o
Table continues on next page									

IEC 61850	FE01	FE02	FE03	FE04	FE05	FE06	FE07	FE08	FE09
WPWDE1	o	o			o	o	o		o
WPWDE2	o	o			o	o	o		o
WPWDE3	o	o			o	o	o		o
INTRPTEF1	●	●			●	●			●
HAEFPTOC1		o		o		o			o
EFHPTOC1	●	●			●	●	●		●
NSPTOC1	●	●	●	●	●	●	●	●	●
NSPTOC2	●	●	●	●	●	●	●	●	●
PDNSPTOC1	●	●	●	●	●	●	●	●	●
ROVPTOV1	●	●			●	●	●	●	●
ROVPTOV2	●	●			●	●	●	●	●
ROVPTOV3	●	●			●	●	●	●	●
PHPTUV1						●	●	●	●
PHPTUV2						●	●	●	●
PHPTUV3						●	●	●	●
PHPTOV1						●	●	●	●
PHPTOV2						●	●	●	●
PHPTOV3						●	●	●	●
PSPTUV1						●	●		●
NSPTOV1						●	●		●
FRPFRQ1								●	●
FRPFRQ2								●	●
FRPFRQ3								●	●
T1PTTR1	●	●	●	●	●	●	●		●
CCBRBRF1	●	●	●	●	●	●	●	●	●
INRPHAR1	●	●	●	●	●	●	●	●	●
TRPPTRC1	●	●	●	●	●	●	●	●	●
TRPPTRC2	●	●	●	●	●	●	●	●	●
ARCSARC1	o	o	o	o	o	o	o	o	o
ARCSARC2	o	o	o	o	o	o	o	o	o
ARCSARC3	o	o	o	o	o	o	o	o	o
CMHAI1									o
VMHAI1									o
PHQVVR1									o
CBXCBR1	●	●	●	●	●	●	●	●	●
DCXSWI1		●		●	●	●	●	●	●
DCXSWI2		●		●	●	●	●	●	●
ESXSWI1		●		●	●	●	●	●	●
DCSXSWI1		●		●	●	●	●	●	●
Table continues on next page									

IEC 61850	FE01	FE02	FE03	FE04	FE05	FE06	FE07	FE08	FE09
DCSXSWI2		•		•	•	•	•	•	•
DCSXSWI3		•		•	•	•	•	•	•
ESSXSWI1		•		•	•	•	•	•	•
ESSXSWI2		•		•	•	•	•	•	•
DARREC1	o	o	o	o	o	o	o	o	o
SECRSYN1								•	•
SSCBR1		•		•	•	•	•	•	•
TCSSCBR1	•	•	•	•	•	•	•	•	•
TCSSCBR2	•	•	•	•	•	•	•	•	•
CCRDIF1					•	•	•	•	•
SEQRFUF1					•	•	•	•	•
RDRE1	•	•	•	•	•	•	•	•	•
CMMXU1	•	•	•	•	•	•	•	•	•
CSMSQI1	•	•	•	•	•	•	•	•	•
RESCMMXU1	•	•	•	•	•	•	•	•	•
VMMXU1					•	•	•	•	•
RESVMMXU1	•	•			•	•		•	•
VSMSQI1					•	•	•	•	•
PEMMXU1					•	•	•	•	•
FMMXU1								•	•

• = available in the device variant, o = optionally available in the device variant

2.3 Point list for REF615 Ver.4.0 FE01-09

2.3.1 Indications

Table 3:   *Explanations of the indications table columns*

Column name	Description
IEC 61850 name	Original IED data object identification. Described in the IEC 61850 format as Logical Device.Logical Node and thereafter .Data Object.Data Attribute. Logical Node is the same as the application function block name.
SA name	The signal may have a defined label that is visible for example in ACT.
Description	Short description of the signal. See the application function block documentation for more details.
Value	Meaning of the value states.

2.3.1.1 CommonData1

Table 4: *CommonData1*

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	.LocRem.stVal.Station	-	Station state	1=Station
		DR.RDRE1			
2722	170.02	.RcdMade.stVal	-	DR recording made	1=Made
2723	170.03	.mcd			
		LD0.LLN0			
2726	170.06	.SetSeld.stVal		Settings reserved	1=Reserved
2727	170.07	.mcd			
2728	170.08	.SetChg.stVal		Settings changed	1=Changed
2729	170.09	.mcd			

2.3.1.2 LD0.DARREC1 AR state

Table 5: *LD0.DARREC1 AR state*

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

2.3.1.3 LD0.LEDPTRC1 Global conditioning

Table 6: *LD0.LEDPTRC1 Global conditioning*

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			

2.3.1.4 LD0.TRPPTRC1 Protection trip conditioning (1)

Table 7:   LD0.TRPPTRC1 Protection trip conditioning (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			

2.3.1.5 LD0.TRPPTRC2 Protection trip conditioning (2)

Table 8:   LD0.TRPPTRC2 Protection trip conditioning (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			

2.3.1.6 LD0.CMMXU1 Phase current limit supervision (1)

Table 9:   LD0.CMMXU1 Phase current limit supervision (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			

2.3.1.7 LD0.RESCMMXU1 Residual current limit supervision (1)

Table 10: LD0.RESCMMXU1 Residual current limit supervision (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			

2.3.1.8 LD0.RESVMMXU1 Residual voltage limit supervision (1)

Table 11: LD0.RESVMMXU1 Residual voltage limit supervision (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			

2.3.1.9 LD0.LEDGGIO1 Indication LED states

Table 12: LD0.LEDGGIO1 Indication LED states

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.LEDGGIO1			
2768	173.00	.SPCSO1.stVal	-	LED 1 state	0/1=Off/On
2769	173.01	.SPCSO2.stVal	-	LED 2 state	0/1=Off/On
2770	173.02	.SPCSO3.stVal	-	LED 3 state	0/1=Off/On
2771	173.03	.SPCSO4.stVal	-	LED 4 state	0/1=Off/On
2772	173.04	.SPCSO5.stVal	-	LED 5 state	0/1=Off/On
2773	173.05	.SPCSO6.stVal	-	LED 6 state	0/1=Off/On
2774	173.06	.SPCSO7.stVal	-	LED 7 state	0/1=Off/On
2775	173.07	.SPCSO8.stVal	-	LED 8 state	0/1=Off/On
2776	173.08	.SPCSO9.stVal	-	LED 9 state	0/1=Off/On
2777	173.09	.SPCSO10.stVal	-	LED 10 state	0/1=Off/On
2778	173.10	.SPCSO11.stVal	-	LED 11 state	0/1=Off/On
2779	173.11	< reserved >			0

2.3.1.10 LD0.TCSSCBR1 Trip circuit supervision (1)

Table 13: LD0.TCSSCBR1 Trip circuit supervision (1)

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

2.3.1.11 LD0.TCSSCBR2 Trip circuit supervision (2)

Table 14: LD0.TCSSCBR2 Trip circuit supervision (2)

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

2.3.1.12 LD0.VMMXU1 Phase voltage limit supervision (1)

Table 15: LD0.VMMXU1 Phase voltage limit supervision (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			

2.3.1.13 CTRL.DCSXSWI1 Disconnector 1 mom position

Table 16: CTRL.DCSXSWI1 Disconnector 1 mom position

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)

2.3.1.14　　　　　　CTRL.DCSXSWI2 Disconnector 2 mom position

Table 17:　　　　CTRL.DCSXSWI2 Disconnector 2 mom position

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)

2.3.1.15　　　　　　CTRL.DCSXSWI3 Disconnector 3 mom position

Table 18:　　　　CTRL.DCSXSWI3 Disconnector 3 mom position

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)

2.3.1.16　　　　　　CTRL.ESSXSWI1 Earth switch 1 mom position

Table 19:　　　　CTRL.ESSXSWI1 Earth switch 1 mom position

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)

2.3.1.17　　　　　　CTRL.CBCSWI1 Circuit breaker 1 mom position

Table 20:　　　　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)

2.3.1.18 CTRL.ESSXSWI2 Earth switch 2 mom position

Table 21:   CTRL.ESSXSWI2 Earth switch 2 mom position

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)

2.3.1.19 CTRL.CBCSWI1 Circuit breaker 1 mom+mcd position

Table 22:   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			

2.3.1.20 CTRL.CBCILO1 Circuit breaker 1 enable signals

Table 23:   CTRL.CBCILO1 Circuit breaker 1 enable signals

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

2.3.1.21 CTRL.CCBRBRF1 Circuit breaker 1 failure protection

Table 24:   CTRL.CCBRBRF1 Circuit breaker 1 failure protection

BitA	RegA	IEC 61850 name	SA name	Description	Values
		CTRL.CCBRBRF1			
2828	176.12	.Str.general	CB_FAULT_AL	Timer running	1=Running
2829	176.13	.mcd			
2830	176.14	.OpEx.general	TRBU	Fail, external trip	1=Ext.trip
Table continues on next page					

BitA	RegA	IEC 61850 name	SA name	Description	Values
2831	176.15	.mcd			
2832	177.00	.OpIn.general	TRRET	Internal re-trip	1=Re-trip
2833	177.01	.mcd			

2.3.1.22 CTRL.CBXCBR1 Circuit breaker 1 blocking signals

Table 25: CTRL.CBXCBR1 Circuit breaker 1 blocking signals

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			
2840	177.08	.ItlByPss.stVal	ITL_BYPASS	Interlock bypass	1=Bypass
2841	177.09	.mcd			

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

Table 26: 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			

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

Table 27: 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			

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

Table 28:   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			

2.3.1.26 LD0.SSCBR1 Circuit breaker 1 condition monitoring

Table 29:   LD0.SSCBR1 Circuit breaker 1 condition monitoring

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
2850	178.02	.SprChaAlm.stVal	SPR_CHR_ALM	Spring charge alarm	1=Alarm
2851	178.03	.OpNumAlm.stVal	OPR_ALM	CB operations alarm	1=Alarm
2852	178.04	.OpNumLO.stVal	OPR_LO	CB operations lockout	1=Lockout
2853	178.05	.LonTmAlm.stVal	MON_ALM	CB inactive alarm	1=Alarm
2854	178.06	.PresAlm.stVal	PRES_ALM	Low pressure alarm	1=Alarm
2855	178.07	.PresLO.stVal	PRES_LO	Low pressure lockout	1=Lockout
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	.CBLifAlm.stVal	CB_LIFE_ALM	CB lifetime alarm	1=Alarm

2.3.1.27 LD0.PHLPTOC1 Phase overcurrent protection, low stage (1)

Table 30:   LD0.PHLPTOC1 Phase 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		phsA start	1=Start
2883	180.03	.mcd			
2884	180.04	.Str.phsB		phsB start	1=Start
2885	180.05	.mcd			
2886	180.06	.Str.phsC		phsC start	1=Start
Table continues on next page					

BitA	RegA	IEC 61850 name	SA name	Description	Values
2887	180.07	.mcd			
2888	180.08	.Op.general	OPERATE	General operate	1=Operate
2889	180.09	.mcd			

2.3.1.28 LD0.PHHPTOC1 Phase overcurrent protection, high stage (1)

Table 31: LD0.PHHPTOC1 Phase 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		phsA start	1=Start
2893	180.13	.mcd			
2894	180.14	.Str.phsB		phsB start	1=Start
2895	180.15	.mcd			
2896	181.00	.Str.phsC		phsC start	1=Start
2897	181.01	.mcd			
2898	181.02	.Op.general	OPERATE	General operate	1=Operate
2899	181.03	.mcd			

2.3.1.29 LD0.PHHPTOC2 Phase overcurrent protection, high stage (2)

Table 32: LD0.PHHPTOC2 Phase 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		phsA start	1=Start
2903	181.07	.mcd			
2904	181.08	.Str.phsB		phsB start	1=Start
2905	181.09	.mcd			
2906	181.10	.Str.phsC		phsC start	1=Start
2907	181.11	.mcd			
2908	181.12	.Op.general	OPERATE	General operate	1=Operate
2909	181.13	.mcd			

2.3.1.30 LD0.PHIPTOC1 Phase overcurrent protection, instantaneous stage (1)

Table 33: LD0.PHIPTOC1 Phase 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		phsA start	1=Start
2913	182.01	.mcd			
2914	182.02	.Str.phsB		phsB start	1=Start
2915	182.03	.mcd			
2916	182.04	.Str.phsC		phsC start	1=Start
2917	182.05	.mcd			
2918	182.06	.Op.general	OPERATE	General operate	1=Operate
2919	182.07	.mcd			

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

Table 34: 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			

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

Table 35: 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			

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

Table 36: 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			

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

Table 37: 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			

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

Table 38: 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			

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

Table 39: 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			

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

Table 40: 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			

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

Table 41: 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			

2.3.1.39 LD0.PDNSPTOC1 Phase discontinuity protection (1)

Table 42: 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			

2.3.1.40 LD0.NSPTOC1 Negative-sequence overcurrent protection, stage 1

Table 43: LD0.NSPTOC1 Negative-sequence overcurrent protection, stage 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			

2.3.1.41   LD0.NSPTOC2 Negative-sequence overcurrent protection, stage 2

Table 44:   LD0.NSPTOC2 Negative-sequence overcurrent protection, stage 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			

2.3.1.42   LD0.INRPHAR1 Three-phase inrush detection

Table 45:   LD0.INRPHAR1 Three-phase inrush detection

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.INRPHAR1			
2964	185.04	.Str.general	BLK2H	General start	1=Start
2965	185.05	.mcd			
2966	185.06	.Str.phsA		phsA start	1=Start
2967	185.07	.mcd			
2968	185.08	.Str.phsB		phsB start	1=Start
2969	185.09	.mcd			
2970	185.10	.Str.phsC		phsC start	1=Start
2971	185.11	.mcd			

2.3.1.43   LD0.T1PTTR1 Thermal overload protection (1)

Table 46:   LD0.T1PTTR1 Thermal overload protection (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
2975	185.15	.mcd			
2976	186.00	.Op.general	OPERATE	General operate	1=Operate
2977	186.01	.mcd			

2.3.1.44 LD0.ARCSARC1 Fault arc protection, stage 1

Table 47:   LD0.ARCSARC1 Fault arc protection, stage 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			

2.3.1.45 LD0.ARCSARC2 Fault arc protection, stage 2

Table 48:   LD0.ARCSARC2 Fault arc protection, stage 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			

2.3.1.46 LD0.ARCSARC3 Fault arc protection, stage 3

Table 49:   LD0.ARCSARC3 Fault arc protection, stage 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			

2.3.1.47 LD0.SEQRFUF1 Fuse failure protection

Table 50: LD0.SEQRFUF1 Fuse failure protection

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.SEQRFUF1			
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			

2.3.1.48 CTRL.CCRDIF1 Current circuit failure detection

Table 51: CTRL.CCRDIF1 Current circuit failure detection

BitA	RegA	IEC 61850 name	SA name	Description	Values
		CTRL.CCRDIF1			
3002	187.10	.Alm.stVal	ALARM	Alarm	1=Alarm
3003	187.11	.mcd			
3004	187.12	.Op.general	FAIL	Failure operate	1=Operate
3005	187.13	.mcd			

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

Table 52: LD0.DPHLPDOC1 Three-phase directional overcurrent protection, low stage (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.DPHLPTOC1			
3006	187.14	.Str.general	START	General start	1=Start
3007	187.15	.mcd			
3008	188.00	.Str.phsA		phsA start	1=Start
3009	188.01	.mcd			
3010	188.02	.Str.phsB		phsB start	1=Start
3011	188.03	.mcd			
3012	188.04	.Str.phsC		phsC start	1=Start
3013	188.05	.mcd			
3014	188.06	.Op.general	OPERATE	General operate	1=Operate
3015	188.07	.mcd			

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

Table 53:   LD0.DPHLPDOC2 Three-phase directional overcurrent protection, low stage (2)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.DPHLPTOC2			
3016	188.08	.Str.general	START	General start	1=Start
3017	188.09	.mcd			
3018	188.10	.Str.phsA		phsA start	1=Start
3019	188.11	.mcd			
3020	188.12	.Str.phsB		phsB start	1=Start
3021	188.13	.mcd			
3022	188.14	.Str.phsC		phsC start	1=Start
3023	188.15	.mcd			
3024	189.00	.Op.general	OPERATE	General operate	1=Operate
3025	189.01	.mcd			

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

Table 54:   LD0.DPHHPDOC1 Three-phase directional overcurrent protection, high stage (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.DPHHPTOC1			
3026	189.02	.Str.general	START	General start	1=Start
3027	189.03	.mcd			
3028	189.04	.Str.phsA		phsA start	1=Start
3029	189.05	.mcd			
3030	189.06	.Str.phsB		phsB start	1=Start
3031	189.07	.mcd			
3032	189.08	.Str.phsC		phsC start	1=Start
3033	189.09	.mcd			
3034	189.10	.Op.general	OPERATE	General operate	1=Operate
3035	189.11	.mcd			

2.3.1.52 LD0.DARREC1 Autorecloser

Table 55: *LD0.DARREC1 Autorecloser*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.DARREC1			
3040	190.00	.PrgRec.stVal	INPRO	AR in progess	1=In progress
3041	190.01	.mcd			
3042	190.02	.PrgRec1.stVal	INPRO_1	1st shot in progess	1=In progress
3043	190.03	.mcd			
3044	190.04	.PrgRec2.stVal	INPRO_2	2nd shot in progess	1=In progress
3045	190.05	.mcd			
3046	190.06	.PrgRec3.stVal	INPRO_3	3rd shot in progess	1=In progress
3047	190.07	.mcd			
3048	190.08	.PrgRec4.stVal	INPRO_4	4th shot in progess	1=In progress
3049	190.09	.mcd			
3050	190.10	.PrgRec5.stVal	INPRO_5	5th shot in progess	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	.Op.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			

2.3.1.53 LD0.PHPTOV1 Phase overvoltage protection (1)

Table 56: LD0.PHPTOV1 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		phsA start	1=Start
3091	193.03	.mcd			
3092	193.04	.Str.phsB		phsB start	1=Start
3093	193.05	.mcd			
3094	193.06	.Str.phsC		phsC start	1=Start
3095	193.07	.mcd			
3096	193.08	.Op.general	OPERATE	General operate	1=Operate
3097	193.09	.mcd			

2.3.1.54 LD0.PHPTOV2 Phase overvoltage protection (2)

Table 57: LD0.PHPTOV2 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			
3100	193.12	.Str.phsA		phsA start	1=Start
3101	193.13	.mcd			
3102	193.14	.Str.phsB		phsB start	1=Start
3103	193.15	.mcd			
3104	194.00	.Str.phsC		phsC start	1=Start
Table continues on next page					

BitA	RegA	IEC 61850 name	SA name	Description	Values
3105	194.01	.mcd			
3106	194.02	.Op.general	OPERATE	General operate	1=Operate
3107	194.03	.mcd			

2.3.1.55 LD0.PHPTOV3 Phase overvoltage protection (3)

Table 58: LD0.PHPTOV3 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		phsA start	1=Start
3111	194.07	.mcd			
3112	194.08	.Str.phsB		phsB start	1=Start
3113	194.09	.mcd			
3114	194.10	.Str.phsC		phsC start	1=Start
3115	194.11	.mcd			
3116	194.12	.Op.general	OPERATE	General operate	1=Operate
3117	194.13	.mcd			

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

Table 59: 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			
3120	195.00	.Str.phsA		phsA start	1=Start
3121	195.01	.mcd			
3122	195.02	.Str.phsB		phsB start	1=Start
3123	195.03	.mcd			
3124	195.04	.Str.phsC		phsC start	1=Start
3125	195.05	.mcd			
3126	195.06	.Op.general	OPERATE	General operate	1=Operate
3127	195.07	.mcd			

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

Table 60: 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			
3130	195.10	.Str.phsA		phsA start	1=Start
3131	195.11	.mcd			
3132	195.12	.Str.phsB		phsB start	1=Start
3133	195.13	.mcd			
3134	195.14	.Str.phsC		phsC start	1=Start
3135	195.15	.mcd			
3136	196.00	.Op.general	OPERATE	General operate	1=Operate
3137	196.01	.mcd			

2.3.1.58 LD0.PHPTUV1 Phase undervoltage protection (1)

Table 61: LD0.PHPTUV1 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		phsA start	1=Start
3141	196.05	.mcd			
3142	196.06	.Str.phsB		phsB start	1=Start
3143	196.07	.mcd			
3144	196.08	.Str.phsC		phsC start	1=Start
3145	196.09	.mcd			
3146	196.10	.Op.general	OPERATE	General operate	1=Operate
3147	196.11	.mcd			

2.3.1.59 LD0.PHPTUV2 Phase undervoltage protection (2)

Table 62: LD0.PHPTUV2 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		phsA start	1=Start
Table continues on next page					

BitA	RegA	IEC 61850 name	SA name	Description	Values
3151	196.15	.mcd			
3152	197.00	.Str.phsB		phsB start	1=Start
3153	197.01	.mcd			
3154	197.02	.Str.phsC		phsC start	1=Start
3155	197.03	.mcd			
3156	197.04	.Op.general	OPERATE	General operate	1=Operate
3157	197.05	.mcd			

2.3.1.60 LD0.PHPTUV3 Phase undervoltage protection (3)

Table 63: *LD0.PHPTUV3 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		phsA start	1=Start
3161	197.09	.mcd			
3162	197.10	.Str.phsB		phsB start	1=Start
3163	197.11	.mcd			
3164	197.12	.Str.phsC		phsC start	1=Start
3165	197.13	.mcd			
3166	197.14	.Op.general	OPERATE	General operate	1=Operate
3167	197.15	.mcd			

2.3.1.61 LD0.ROVPTOV1 Residual overvoltage protection (1)

Table 64: *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			

2.3.1.62 LD0.ROVPTOV2 Residual overvoltage protection (2)

Table 65: 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			

2.3.1.63 LD0.ROVPTOV3 Residual overvoltage protection (3)

Table 66: 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			

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

Table 67: 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			

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

Table 68: 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			

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

Table 69: 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			

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

Table 70: 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			

2.3.1.68 LD0.CMHAI1 Current total demand distortion

Table 71: LD0.CMHAI1 Current total demand distortion

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

2.3.1.69 LD0.VMHAI1 Voltage total demand distortion

Table 72: LD0.VMHAI1 Voltage total demand distortion

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

2.3.1.70 LD0.PH1QVVR1 PQ - Voltage variation signals

Table 73: LD0.PH1QVVR1 PQ - Voltage variation signals

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
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			

2.3.1.71 CTRL.DCXSWI1 Controllable discon. 1 mom position data

Table 74: CTRL.DCXSWI1 Controllable discon. 1 mom position data

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.DCCILO1			
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			
3482	217.10	.ItlByPss.stVal	ITL_BYPASS	Interlock bypass	1=Bypass
3483	217.11	.mcd			

2.3.1.72 CTRL.DCXSWI2 Controllable discon. 2 mom position data

Table 75: CTRL.DCXSWI2 Controllable discon. 2 mom position data

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.DCCILO2			
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			
3494	218.06	.ItlByPss.stVal	ITL_BYPASS	Interlock bypass	1=Bypass
3495	218.07	.mcd			

2.3.1.73 CTRL.ESXSWI1 Controllable earth switch 1 mom position

Table 76: CTRL.ESXSWI1 Controllable earth switch 1 mom position

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			
3506	219.02	.ItlByPss.stVal	ITL_BYPASS	Interlock bypass	1=Bypass
3507	219.03	.mcd			

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

Table 77:   *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			
3186	199.02	.Ind2.stVal		X130-Input 2 State	0/1=Off/On
3187	199.03	.mcd			
3188	199.04	.Ind3.stVal		X130-Input 3 State	0/1=Off/On
3189	199.05	.mcd			
3190	199.06	.Ind4.stVal		X130-Input 4 State	0/1=Off/On
3191	199.07	.mcd			
3192	199.08	.Ind5.stVal		X130-Input 5 State	0/1=Off/On
3193	199.09	.mcd			
3194	199.10	.Ind6.stVal		X130-Input 6 State	0/1=Off/On
3195	199.11	.mcd			
3264	204.00	.SPCSO1.stVal		X130-Output 1 State	0/1=Off/On
3265	204.01	.mcd			
3266	204.02	.SPCSO2.stVal		X130-Output 2 State	0/1=Off/On
3267	204.03	.mcd			
3268	204.04	.SPCSO3.stVal		X130-Output 3 State	0/1=Off/On
3269	204.05	.mcd			

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

Table 78:   *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			
3202	200.02	.Ind2.stVal		X120-Input 2 State	0/1=Off/On
3203	200.03	.mcd			
3204	200.04	.Ind3.stVal		X120-Input 3 State	0/1=Off/On
3205	200.05	.mcd			
3206	200.06	.Ind4.stVal		X120-Input 4 State	0/1=Off/On
3207	200.07	.mcd			

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

Table 79: 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			
3218	201.02	.Ind2.stVal		X110-Input 2 State	0/1=Off/On
3219	201.03	.mcd			
3220	201.04	.Ind3.stVal		X110-Input 3 State	0/1=Off/On
3221	201.05	.mcd			
3222	201.06	.Ind4.stVal		X110-Input 4 State	0/1=Off/On
3223	201.07	.mcd			
3224	201.08	.Ind5.stVal		X110-Input 5 State	0/1=Off/On
3225	201.09	.mcd			
3226	201.10	.Ind6.stVal		X110-Input 6 State	0/1=Off/On
3227	201.11	.mcd			
3228	201.12	.Ind7.stVal		X110-Input 7 State	0/1=Off/On
3229	201.13	.mcd			
3230	201.14	.Ind8.stVal		X110-Input 8 State	0/1=Off/On
3231	201.15	.mcd			
3232	202.00	.SPCSO1.stVal		X110-Output 1 State	0/1=Off/On
3233	202.01	.mcd			
3234	202.02	.SPCSO2.stVal		X110-Output 2 State	0/1=Off/On
3235	202.03	.mcd			
3236	202.04	.SPCSO3.stVal		X110-Output 3 State	0/1=Off/On
3237	202.05	.mcd			
3238	202.06	.SPCSO4.stVal		X110-Output 4 State	0/1=Off/On
3239	202.07	.mcd			

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

Table 80: 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			
3250	203.02	.SPCSO2.stVal		X100-Output 2 State	0/1=Off/On
3251	203.03	.mcd			
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			
3254	203.06	.SPCSO4.stVal		X100-Output 4 State	0/1=Off/On
3255	203.07	.mcd			
3256	203.08	.SPCSO5.stVal		X100-Output 5 State	0/1=Off/On
3257	203.09	.mcd			
3258	203.10	.SPCSO6.stVal		X100-Output 6 State	0/1=Off/On
3259	203.11	.mcd			

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

Table 81: *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			
3282	205.02	.Ind2.stVal		XA130-Input 2 State	0/1=Off/On
3283	205.03	.mcd			
3284	205.04	.Ind3.stVal		XA130-Input 3 State	0/1=Off/On
3285	205.05	.mcd			
3286	205.06	.Ind4.stVal		XA130-Input 4 State	0/1=Off/On
3287	205.07	.mcd			

2.3.1.79 LD0.MVGAPC1 Multipurpose binary inputs (1)

Table 82: *LD0.MVGAPC1 Multipurpose binary inputs (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.MVGAPC1			
3536	221.00	.Q1.stVal		Input 1	0/1=Off/On
3537	221.01	.mcd			
3538	221.02	.Q2.stVal		Input 2	0/1=Off/On
3539	221.03	.mcd			
3540	221.04	.Q3.stVal		Input 3	0/1=Off/On
3541	221.05	.mcd			
3542	221.06	.Q4.stVal		Input 4	0/1=Off/On
3543	221.07	.mcd			
3544	221.08	.Q5.stVal		Input 5	0/1=Off/On
3545	221.09	.mcd			
3546	221.10	.Q6.stVal		Input 6	0/1=Off/On
3547	221.11	.mcd			
Table continues on next page					

BitA	RegA	IEC 61850 name	SA name	Description	Values
3548	221.12	.Q7.stVal		Input 7	0/1=Off/On
3549	221.13	.mcd			
3550	221.14	.Q8.stVal		Input 8	0/1=Off/On
3551	221.15	.mcd			

2.3.1.80 LD0.MVGAPC2 Multipurpose binary inputs (2)

Table 83: LD0.MVGAPC2 Multipurpose binary inputs (2)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.MVGAPC2			
3552	222.00	.Q1.stVal		Input 1	0/1=Off/On
3553	222.01	.mcd			
3554	222.02	.Q2.stVal		Input 2	0/1=Off/On
3555	222.03	.mcd			
3556	222.04	.Q3.stVal		Input 3	0/1=Off/On
3557	222.05	.mcd			
3558	222.06	.Q4.stVal		Input 4	0/1=Off/On
3559	222.07	.mcd			
3560	222.08	.Q5.stVal		Input 5	0/1=Off/On
3561	222.09	.mcd			
3562	222.10	.Q6.stVal		Input 6	0/1=Off/On
3563	222.11	.mcd			
3564	222.12	.Q7.stVal		Input 7	0/1=Off/On
3565	222.13	.mcd			
3566	222.14	.Q8.stVal		Input 8	0/1=Off/On
3567	222.15	.mcd			

2.3.1.81 LD0.SPCGGIO2 Multipurpose binary output states (2)

Table 84: LD0.SPCGGIO2 Multipurpose binary output states (2)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.SPCGGIO2			
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
Table continues on next page					

BitA	RegA	IEC 61850 name	SA name	Description	Values
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
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			

2.3.2 Indications in FE08

2.3.2.1 LD0.SECRSYN1 Synchrocheck (1)

Table 85:   LD0.SECRSYN1 Synchrocheck (1)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.SECRSYN1			
3184	199.00	.SynPrg	SYNC_INPRO	Synch. in progress	1=In progress
3185	199.01	.mcd			
3186	199.02	.FailCmd	CMD_FAIL_AL	Close request fail	1=Failed
3187	199.03	.mcd			
3188	199.04	.FailSyn	CL_FAIL_AL	Close cmd fail	1=Failed
3189	199.05	.mcd			

2.3.2.2 LD0.FRPFRQ1 Frequency protection (1)

Table 86: *LD0.FRPFRQ1 Frequency protection (1)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.FRPTRC1			
3200	200.00	.Str.general	START	Stage 1 start	1=Start
3201	200.01	.mcd			
		LD0.FRPTOF1		Overfrequency	
3202	200.02	.Op.general	OPR_OFRQ	Operate	1=Operate
3203	200.03	.mcd			
		LD0.FRPTUF1		Underfrequency	
3204	200.04	.Op.general	OPR_UFRQ	Operate	1=Operate
3205	200.05	.mcd			
		LD0.FRPFRC1		Frequency gradient	
3206	200.06	.Op.general	OPR_FRG	Operate	1=Operate
3207	200.07	.mcd			

2.3.2.3 LD0.FRPFRQ2 Frequency protection (2)

Table 87: *LD0.FRPFRQ2 Frequency protection (2)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.FRPTRC2			
3208	200.08	.Str.general	START	Stage 2 start	1=Start
3209	200.09	.mcd			
		LD0.FRPTOF2		Overfrequency	
3210	200.10	.Op.general	OPR_OFRQ	Operate	1=Operate
3211	200.11	.mcd			
		LD0.FRPTUF2		Underfrequency	
3212	200.12	.Op.general	OPR_UFRQ	Operate	1=Operate
3213	200.13	.mcd			
		LD0.FRPFRC2		Frequency gradient	
3214	200.14	.Op.general	OPR_FRG	Operate	1=Operate
3215	200.15	.mcd			

2.3.2.4   LD0.FRPFRQ3 Frequency protection (3)

Table 88:   *LD0.FRPFRQ3 Frequency protection (3)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.FRPTRC3			
3216	201.00	.Str.general	START	Stage 3 start	1=Start
3217	201.01	.mcd			
		LD0.FRPTOF3		Overfrequency	
3218	201.02	.Op.general	OPR_OFRQ	Operate	1=Operate
3219	201.03	.mcd			
		LD0.FRPTUF3		Underfrequency	
3220	201.04	.Op.general	OPR_UFRQ	Operate	1=Operate
3221	201.05	.mcd			
		LD0.FRPFRC3		Frequency gradient	
3222	201.06	.Op.general	OPR_FRG	Operate	1=Operate
3223	201.07	.mcd			

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

Table 89:   *LD0.XGGIO130 Physical I/O states (BIO card X130)*

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.XGGIO130			
3344	209.00	.Ind1.stVal		X130-Input 1 State	0/1=Off/On
3345	209.01	.mcd			
3346	209.02	.Ind2.stVal		X130-Input 2 State	0/1=Off/On
3347	209.03	.mcd			
3348	209.04	.Ind3.stVal		X130-Input 3 State	0/1=Off/On
3349	209.05	.mcd			
3350	209.06	.Ind4.stVal		X130-Input 4 State	0/1=Off/On
3351	209.07	.mcd			
3352	209.08	.Ind5.stVal		X130-Input 5 State	0/1=Off/On
3353	209.09	.mcd			
3354	209.10	.Ind6.stVal		X130-Input 6 State	0/1=Off/On
3355	209.11	.mcd			
3424	214.00	.SPCSO1.stVal		X130-Output 1 State	0/1=Off/On
3425	214.01	.mcd			
3426	214.02	.SPCSO2.stVal		X130-Output 2 State	0/1=Off/On
3427	214.03	.mcd			
3428	214.04	.SPCSO3.stVal		X130-Output 3 State	0/1=Off/On
3429	214.05	.mcd			

2.3.2.6 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			
3360	210.00	.Ind1.stVal		X120-Input 1 State	0/1=Off/On
3361	210.01	.mcd			
3362	210.02	.Ind2.stVal		X120-Input 2 State	0/1=Off/On
3363	210.03	.mcd			
3364	210.04	.Ind3.stVal		X120-Input 3 State	0/1=Off/On
3365	210.05	.mcd			
3366	210.06	.Ind4.stVal		X120-Input 4 State	0/1=Off/On
3367	210.07	.mcd			

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

Table 91: LD0.XGGIO110 Physical I/O states (BIO card X110)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.XGGIO110			
3376	211.00	.Ind1.stVal		X110-Input 1 State	0/1=Off/On
3377	211.01	.mcd			
3378	211.02	.Ind2.stVal		X110-Input 2 State	0/1=Off/On
3379	211.03	.mcd			
3380	211.04	.Ind3.stVal		X110-Input 3 State	0/1=Off/On
3381	211.05	.mcd			
3382	211.06	.Ind4.stVal		X110-Input 4 State	0/1=Off/On
3383	211.07	.mcd			
3384	211.08	.Ind5.stVal		X110-Input 5 State	0/1=Off/On
3385	211.09	.mcd			
3386	211.10	.Ind6.stVal		X110-Input 6 State	0/1=Off/On
3387	211.11	.mcd			
3388	211.12	.Ind7.stVal		X110-Input 7 State	0/1=Off/On
3389	211.13	.mcd			
3390	211.14	.Ind8.stVal		X110-Input 8 State	0/1=Off/On
3391	211.15	.mcd			
3392	212.00	.SPCSO1.stVal		X110-Output 1 State	0/1=Off/On
3393	212.01	.mcd			
3394	212.02	.SPCSO2.stVal		X110-Output 2 State	0/1=Off/On
3395	212.03	.mcd			
3396	212.04	.SPCSO3.stVal		X110-Output 3 State	0/1=Off/On
Table continues on next page					

BitA	RegA	IEC 61850 name	SA name	Description	Values
3397	212.05	.mcd			
3398	212.06	.SPCSO4.stVal		X110-Output 4 State	0/1=Off/On
3399	212.07	.mcd			

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

Table 92:   LD0.XGGIO100 Physical I/O states (PSM card X100)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.XGGIO100			
3408	213.00	.SPCSO1.stVal		X100-Output 1 State	0/1=Off/On
3409	213.01	.mcd			
3410	213.02	.SPCSO2.stVal		X100-Output 2 State	0/1=Off/On
3411	213.03	.mcd			
3412	213.04	.SPCSO3.stVal		X100-Output 3 State	0/1=Off/On
3413	213.05	.mcd			
3414	213.06	.SPCSO4.stVal		X100-Output 4 State	0/1=Off/On
3415	213.07	.mcd			
3416	213.08	.SPCSO5.stVal		X100-Output 5 State	0/1=Off/On
3417	213.09	.mcd			
3418	213.10	.SPCSO6.stVal		X100-Output 6 State	0/1=Off/On
3419	213.11	.mcd			

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

Table 93:   LD0.XAGGIO130 Physical I/O states (AIM card XA130)

BitA	RegA	IEC 61850 name	SA name	Description	Values
		LD0.XAGGIO130			
3440	215.00	.Ind1.stVal		XA130-Input 1 State	0/1=Off/On
3441	215.01	.mcd			
3442	215.02	.Ind2.stVal		XA130-Input 2 State	0/1=Off/On
3443	215.03	.mcd			
3444	215.04	.Ind3.stVal		XA130-Input 3 State	0/1=Off/On
3445	215.05	.mcd			
3446	215.06	.Ind4.stVal		XA130-Input 4 State	0/1=Off/On
3447	215.07	.mcd			

2.3.3 Registers

Table 94:   *Explanations of the registers table columns*

Column name	Description
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 ACT.
Description	Short description of the signal. See the application function block documentation for more details.
Values	The value range of the original IEC 61850 value, that is, before scaling.

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

Table 95:   *User definable registers [Alt.1], visible on 3x and 4x*

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
(0)	Reg				< not mappable- not visible >	Obs PLC addr.
1	Reg				User Register 1	
2	Reg				User Register 2	
3	:				:	
:	:				:	
:	:				:	
127	Reg				User Register 127	

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

Table 96:   *User definable bits [Alt.2], visible on 0x,1x,3x and 4x*

BitA	Typ	Scale	IEC 61580 name	SA name	Description	Values
(0)	Bit				< not mappable - not visible >	Obs PLC addr.
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	
Table continues on next page						

BitA	Typ	Scale	IEC 61580 name	SA name	Description	Values
:	:				:	
:	:				:	
2046	Bit				Usr Reg 127.Bit 14	
2047	Bit				Usr Reg 127.Bit 15	

2.3.3.3 SSR1 System status register 1 - device health

Table 97:   *SSR1 System status register 1 - device health*

RegA	Typ	Scale	IEC 61580 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

2.3.3.4 SSR2 System status register 2 - IED mode and state

Table 98:   *SSR2 System status register 2 - IED mode and state*

RegA	Typ	Scale	IEC 61580 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				IED timesynch failure	1=Failure
129.07	Bit				< reserved >	0
Table continues on next page						

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
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

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

Table 99:   SSR3 System status register 3 - data available 1 (client-dependent)

RegA	Typ	Scale	IEC 61580 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
130.13	Bit				< reserved >	0
130.14	Bit				< reserved >	0
130.15	Bit				< reserved >	0

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

Table 100:   SSR4 System status register 4 - data available 2 (client-dependent - user-definable)

RegA	Typ	Scale	IEC 61580 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

Table continues on next page

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
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

2.3.3.7 SSR5 System status register 5 - device alive register

Table 101: SSR5 System status register 5 - device alive register

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
132	u16	1			Device alive counter	0..65535

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

Table 102: SSR6 System status register 6 - control command status (client-dependent)

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
					Last cmd result code	See doc.
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	See doc.
133.08	Bit				- bit 0	
133.09	Bit				- bit 1	
					Command state	See doc.
133.10	Bit				- bit 0	
133.11	Bit				- bit 1	
Table continues on next page						

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
					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	

2.3.3.9 LD0.DARREC1 Autorecloser values

Table 103: *LD0.DARREC1 Autorecloser values*

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.DARREC1			
135	i16	1	.AutoRecSt.stVal	STATUS	AR state	-2..4 (see doc)
136	u16	1	.ShotPntr.stVal	SHOT_PTR	AR shot pointer value	0..6
137	u16	1	.OpCntRs.stVal	COUNTER	AR operation counter	0..65535

2.3.3.10 LD0.CMMXU1 Phase current measurements (1)

Table 104: *LD0.CMMXU1 Phase current measurements (1)*

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.CMMXU1		Phase current (1)	
138	u16	1000	.A.phsA.instCVal.mag	I_INST_A	- phsA amplitude	0.00..40.0 [xIn]
139	u16	1000	.A.phsB.instCVal.mag	I_INST_B	- phsB amplitude	0.00..40.0 [xIn]
140	u16	1000	.A.phsC.instCVal.mag	I_INST_C	- phsC amplitude	0.00..40.0 [xIn]

2.3.3.11 LD0.RESCMMXU1 Residual current measurement (1)

Table 105: *LD0.RESCMMXU1 Residual current measurement (1)*

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.RESCMMXU1		Residual current (1)	
141	u16	1000	.A.res.instCVal.mag	I0_INST	- amplitude	0.00..40.0 [xIn]

2.3.3.12   LD0.RESVMMXU1 Residual voltage measurement (1)

Table 106:   *LD0.RESVMMXU1 Residual voltage measurement (1)*

RegA	Typ	Scale	IEC 61580 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]

2.3.3.13   LD0.CMSQI1 Sequence of current measurements (1)

Table 107:   *LD0.CMSQI1 Sequence of current measurements (1)*

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.CMSQI1		Sequence of currents	
143	u16	1000	.SeqA.c1.instCVal.mag	I1_INST	- positive amplitude	0.00..40.0 [xln]
144	u16	1000	.SeqA.c2.instCVal.mag	I2_INST	- negative amplitude	0.00..40.0 [xln]
145	u16	1000	.SeqA.c2.instCVal.mag	I3_INST	- zero amplitude	0.00..40.0 [xln]

2.3.3.14   LD0.T1PTTR1 Thermal protection values (1)

Table 108:   *LD0.T1PTTR1 Thermal protection values (1)*

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.T1PTTR1			
146	i16	1	.Tmp.mag	TEMP	Object temperature	-100.0… 9999.9 [C]
147	u16	1	.TmpRl.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	.001	.TmmsOp.stVal	THERMLEV_ST	Est. time to operate	0…600,000 [ms]
150	u16	.001	.TmmsRecEna.stVal	THERMLEV_END	Est. time to deactivate block	0…600,000 [ms]

2.3.3.15   LD0.HAEFMHAI1 Current harmonics (1)

Table 109:   *LD0.HAEFMHAI1 Current harmonics (1)*

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.HAEFMHAI1			
151	u16	10	.HRmsA.res.cVal.mag	I_HARM_RES	Current harmonics	0..250.0 [A]

2.3.3.16 LD0.VMMXU1 Voltage measurements (1)

Table 110: *LD0.VMMXU1 Voltage measurements (1)*

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.VMMXU1		Phase-ground voltage (1)	
152	u16	1000	.phV.phsA.cVal.mag	U_DB_A	- phsA amplitude	0.00..4.00 [xUn]
153	u16	1000	.phV.phsB.cVal.mag	U_DB_B	- phsB amplitude	0.00..4.00 [xUn]
154	u16	1000	.phV.phsC.cVal.mag	U_DB_C	- phsC amplitude	0.00..4.00 [xUn]
			LD0.VMMXU1		Phase-phase voltage (1)	
155	u16	1000	.PPV.phsAB.cVal.mag	U_DB_AB	- phsAB amplitude	0.00..4.00 [xUn]
156	u16	1000	.PPV.phsBC.cVal.mag	U_DB_BC	- phsBC amplitude	0.00..4.00 [xUn]
157	u16	1000	.PPV.phsCA.cVal.mag	U_DB_CA	- phsCA amplitude	0.00..4.00 [xUn]

2.3.3.17 LD0.VMSQI1 Sequence of voltage measurements (1)

Table 111: *LD0.VMSQI1 Sequence of voltage measurements (1)*

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.VMSQI1		Sequence of voltages	
158	u16	1000	.SeqA.c1.instCVal.mag	U1_INST	- positive amplitude	0.00..4.00 [xUn]
159	u16	1000	.SeqA.c2.instCVal.mag	U2_INST	- negative amplitude	0.00..4.00 [xUn]
160	u16	1000	.SeqA.c2.instCVal.mag	U3_INST	- zero amplitude	0.00..4.00 [xUn]

2.3.3.18 LD0.PEMMXU1 Three-phase power measurements

Table 112: *LD0.PEMMXU1 Three-phase power measurements*

RegA	Typ	Scale	IEC 61580 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

2.3.3.19 LD0.FMMXU1 Frequency measurement

Table 113: *LD0.FMMXU1 Frequency measurement*

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.FMMXU1			
168	u16	100	.Hz.mag	F_DB	Frequency	35.00..75.00 [Hz]

2.3.3.20 LD0.SECRSYN1 Synchrocheck

Table 114: *LD0.SECRSYN1 Synchrocheck*

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.SECRSYN1			
169	u16	1	.EnSt.stVal	ENERG_STATE	Energ. state of line and bus	0..4 (see doc)

2.3.3.21 Indication bits mirrored in registers

Table 115: *Indication bits mirrored in registers*

RegA	Typ	Scale	IEC 61580 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)	

2.3.3.22 LD0.PEMSTA1 Power measurement demand values (1)

Table 116: *LD0.PEMSTA1 Power measurement demand values (1)*

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.PEMSTA1		Demand	
1939	i32	1	.AvW.mag		- Active power P (high)	-/+ 999,999
1940					- (low word)	
1941	i32	1	.AvVAr.mag		- Reactive power Q (high)	-/+ 999,999
1942					- (low word)	
1943	i32	1	.AvVA.mag		- Apparent power S (high)	-/+ 999,999
1944					- (low word)	
1945	i16	1000	.AvPF.mag		- Power factor	-1..1
1946					< reserved >	0
					Max values:	
Table continues on next page						

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
1947	i32	1	.MaxW.mag		- Active power P (high)	-/+ 999,999
1948					- (low word)	
1949	i32	1	.MaxVAr.mag		- Reactive power Q (high)	-/+ 999,999
1950					- (low word)	
1951	i32	1	.MaxVA.mag		- Apparent power S (high)	-/+ 999,999
1952					- (low word)	
1953					< reserved >	0

2.3.3.23 LD0.VMSTA1 Voltage demand values (1)

Table 117: LD0.VMSTA1 Voltage demand values (1)

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.VMSTA1		Demand phase-to-ground	
1954	u16	1000	.AvVPhsA.mag	U_DMD_A	- phsA amplitude	0..4.0 [xUn]
1955	u16	1000	.AvVPhsB.mag	U_DMD_B	- phsB amplitude	0..4.0 [xUn]
1956	u16	1000	.AvVPhsC.mag	U_DMD_C	- phsC amplitude	0..4.0 [xUn]
					Demand phase-to-phase	
1957	u16	1000	.AvVPhsAB.mag	U_DMD_AB	- phsAB amplitude	0..4.0 [xUn]
1958	u16	1000	.AvVPhsBC.mag	U_DMD_BC	- phsBC amplitude	0..4.0 [xUn]
1959	u16	1000	.AvVPhsCA.mag	U_DMD_CA	- phsCA amplitude	0..4.0 [xUn]
					Update time stamp	See doc.
1960	u16	-			- Year - month	
1961	u16	-			- Day - hour	
1962	u16	-			- Minute - second	
1963	u16	-			- Milliseconds	
1964	u16	-			- Time quality	

2.3.3.24 LD0.RESVMSTA1 Residual voltage demand value (1)

Table 118: LD0.RESVMSTA1 Residual voltage demand value (1)

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.RESVMSTA1		Demand value	
1977	u16	1000	.AvVolts.mag	U_DMD_RES	- residual amplitude	0.00..4.0 [xUn]
					Update time stamp	See doc.
1978	u16	-			- Year - month	
1979	u16	-			- Day - hour	
1980	u16	-			- Minute - second	
1981	u16	-			- Milliseconds	
Table continues on next page						

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
1982	u16	-			- Time quality	
1983	u16	1000	.MaxVolts.mag	Max demand Uo	- Max Uo demand	0.00..4.0 [xUn]
					Update time stamp	See doc.
1984	u16	-			- Year - month	
1985	u16	-			- Day - hour	
1986	u16	-			- Minute - second	
1987	u16	-			- Milliseconds	
1988	u16	-			- Time quality	

2.3.3.25 LD0.RESCMSTA1 Residual current demand value (1)

Table 119: LD0.RESCMSTA1 Residual current demand value (1)

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.RESCMSTA1		Demand value	
1989	u16	1000	.AvAmps.mag	I_DMD_RES	- residual amplitude	0.00..40.0 [xIn]
					Update time stamp	See doc.
1990	u16	-			- Year - month	
1991	u16	-			- Day - hour	
1992	u16	-			- Minute - second	
1993	u16	-			- Milliseconds	
1994	u16	-			- Time quality	
1995	u16	1000	.MaxAmps.mag	Max demand Io	- Max Io demand	0.00..40.0 [xIn]
					Update time stamp	See doc.
1996	u16	-			- Year - month	
1997	u16	-			- Day - hour	
1998	u16	-			- Minute - second	
1999	u16	-			- Milliseconds	
2000	u16	-			- Time quality	

2.3.3.26　　LD0.CMSTA1 Phase current demand values (1)

Table 120:　　LD0.CMSTA1 Phase current demand values (1)

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.CMSTA1		Demand value	
2001	u16	1000	.AvAmpsA.mag	I_DMD_A	- phsA amplitude	0.00..40.0 [xIn]
2002	u16	1000	.AvAmpsB.mag	I_DMD_B	- phsB amplitude	0.00..40.0 [xIn]
2003	u16	1000	.AvAmpsC.mag	I_DMD_C	- phsC amplitude	0.00..40.0 [xIn]
					Update time stamp	See doc.
2004	u16	-			- Year - month	
2005	u16	-			- Day - hour	
2006	u16	-			- Minute - second	
2007	u16	-			- Milliseconds	
2008	u16	-			- Time quality	
2009	u16	1000	.MaxAmpsA.mag	Max demand IL1	- Max phsA demand	0.00..40.0 [xIn]
					Update time stamp	See doc.
2010	u16	-			- Year - month	
2011	u16	-			- Day - hour	
2012	u16	-			- Minute - second	
2013	u16	-			- Milliseconds	
2014	u16	-			- Time quality	
2015	u16	1000	.MaxAmpsB.mag	Max demand IL2	- Max phsB demand	0.00..40.0 [xIn]
					Update time stamp	See doc.
2016	u16	-			- Year - month	
2017	u16	-			- Day - hour	
2018	u16	-			- Minute - second	
2019	u16	-			- Milliseconds	
2020	u16	-			- Time quality	
2021	u16	1000	.MaxAmpsC.mag	Max demand IL3	- Max phsC demand	0.00..40.0 [xIn]
					Update time stamp	see doc.
2022	u16	-			- Year - month	
2023	u16	-			- Day - hour	
Table continues on next page						

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
2024	u16	-			- Minute - second	
2025	u16	-			- Milliseconds	
2026	u16	-			- Time quality	

2.3.3.27 CTRL.CBCSWI1 Circuit breaker operation counter (1)

Table 121:   CTRL.CBCSWI1 Circuit breaker operation counter (1)

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			CTRL.CBCSWI1			
2027	u16	1	.OpCntRs.stVal	Operation counter	Operation counter	0…65535

2.3.3.28 LD0.ARCSARCx1 Fault arc counters

Table 122:   LD0.ARCSARCx1 Fault arc counters

RegA	Typ	Scale	IEC 61580 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

2.3.3.29 LD0.DARREC1 Autorecloser counters

Table 123:   LD0.DARREC1 Autorecloser counters

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.DARREC1			
2031	u16	1	.OpCnt1.stVal	CNT_SHOT1	AR 1st shot counter	0…65535
2032	u16	1	.OpCnt2.stVal	CNT_SHOT2	AR 1st shot counter	0…65535
2033	u16	1	.OpCnt3.stVal	CNT_SHOT3	AR 1st shot counter	0…65535
2034	u16	1	.OpCnt4.stVal	CNT_SHOT4	AR 1st shot counter	0…65535
2035	u16	1	.OpCnt5.stVal	CNT_SHOT5	AR 1st shot counter	0…65535
2036	u16	1	.FrqOpCnt.stVal	FRQ_OPR_CNT	AP freq.op. counter	0…65535

2.3.3.30   LD0.PEMMTR1 Three-phase energy measurements

Table 124:   LD0.PEMMTR1 Three-phase energy measurements

RegA	Typ	Scale	IEC 61580 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 [kVAr]
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 [kVAr]
2044			.DemVArh.actVal		(low word)	

2.3.3.31   System diagnostic values

Table 125:   System diagnostic values

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.LPHD1			
2050	u16	1	.PhyHealth1.stVal	Warning	Last warning code	see doc.
2051	u16	1	.PhyHealth2.stVal	Internal fault	Last internal fault code	see doc.
			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
2056	u16	1	.WacTrg.stVal		Num of watchdog resets	0..65535
2057	u16	1	.NumCmpChg.stVal		Num of conf. changes	0..65535

2.3.3.32   LD0.SSCBR1 Circuit-breaker condition monitoring values

Table 126:   LD0.SSCBR1 Circuit-breaker condition monitoring values

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.SSCBR1			
2060	u16	1	.InaTmdCnt.stVal	INA_DAYS	CB inactive days	0..65535
2061	u16	1	.TmmsOpn.mag	T_TRV_OP	Open travel time	0..60000 [ms]
2062	u16	1	.TmmsCls.mag	T_TRV_CL	Close travel time	0..60000 [ms]
Table continues on next page						

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
2063	u16	100	.TmsSprCha.mag	T_SPR_CHR	Spring charge time	0.00…99.99 [s]
2064	i16	1	.RmnLifPhA.stVal	CB_LIFE_A	Remain.life phsA	-/+ 9999
2065	i16	1	.RmnLifPhB.stVal	CB_LIFE_B	Remain.life phsB	-/+ 9999
2066	i16	1	.RmnLifPhC.stVal	CB_LIFE_C	Remain.life phsC	-/+ 9999
2067	u16	1	.AccAPwrPhA.mag	IPOW_A	Iyt phsA	0..1E6
2068	u16	1	.AccAPwrPhB.mag	IPOW_B	Iyt phsB	0..1E6
2069	u16	1	.AccAPwrPhC.mag	IPOW_C	Iyt phsC	0..1E6

2.3.3.33 LD0.PH1QVVR1 Short duration voltage variations

Table 127: LD0.PH1QVVR1 Short duration voltage variations

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.PH1QVVR1		Voltage swell:	
2100	u32	1	.SwlInstCnt.stVal	INSTSWELLCNT	- Inst counter (high)	0…
2101					- (low word)	2147483647
2102	u32	1	.SwlMomCnt.stVal	MOMSWELLCNT	- Mom counter (high)	0…
2103					- (low word)	2147483647
2104	u32	1	.SwlTmpCnt.stVal	TEMPSWELLCNT	- Temp counter (high)	0…
2105					- (low word)	2147483647
2106	u32	1	.SwlMaxCnt.stVal	MAXDURSWELLCNT	- Max duration.counter (high)	0…
2107					- (low word)	2147483647
					Voltage dip:	
2108	u32	1	.DipInstCnt.stVal	INSTDIPCNT	- Inst counter (high)	0…
2109					- (low word)	2147483647
2110	u32	1	.DipMomCnt.stVal	MOMDIPCNT	- Mom counter (high)	0…
2111					- (low word)	2147483647
2112	u32	1	.DipTmpCnt.stVal	TEMPDIPCNT	- Temp counter (high)	0…
2113					- (low word)	2147483647
2114	u32	1	.DipMaxCnt.stVal	MAXDURDIPCNT	- Max duration.counter (high)	0…
2115					- (low word)	2147483647
					Voltage interrupts:	
2116	u32	1	.IntrMomCnt.stVal	MOMINTCNT	- Mom counter (high)	0…
2117					- (low word)	2147483647
2118	u32	1	.IntrTmpCnt.stVal	TEMPINTCNT	- Temp counter (high)	0…
2119					- (low word)	2147483647
2120	u32	1	.IntrSstCnt.stVal	SUSTINTCNT	- Sustain counter (high)	0…
2121					- (low word)	2147483647
2122	u32	1	.IntrMaxCnt.stVal	MAXDURINTCNT	- Max duration.counter (high)	0…

2.3.3.34 LD0.CMHAI1 Current total demand distortion

Table 128: LD0.CMHAI1 Current total demand distortion

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.CMHAI1		3 2nd 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:	
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.phsB.cVal.mag	-	- phsC	0..500.00 [%]

2.3.3.35 LD0.VMHAI1 Voltage total demand distortion

Table 129: LD0.VMHAI1 Voltage total demand distortion

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
			LD0.VMHAI1		3 2nd mean value:	
2170	u16	100	.ThdPhV.phsA.cVal.mag	3SMHTHD_A	- phsA	0..500.00 [%]
2171	u16	100	.ThdPhV.phsB.cVal.mag	3SMHTDD_B	- phsB	0..500.00 [%]
2172	u16	100	.ThdPhV.phsC.cVal.mag	3SMHTDD_C	- phsC	0..500.00 [%]
					Demand value:	
2173	u16	100	.DmdThdPhV.phsA.cVal.mag	DMD_TDD_A	- phsA	0..500.00 [%]
2174	u16	100	.DmdThdPhV.phsB.cVal.mag	DMD_TDD_B	- phsB	0..500.00 [%]
2175	u16	100	.DmdThdPhV.phsC.cVal.mag	DMD_TDD_C	- phsC	0..500.00 [%]
					Max demand value:	
2176	u16	100	.MaxDmdThdV.phsA.cVal.mag	-	- phsA	0..500.00 [%]
2177	u16	100	.MaxDmdThdV.phsB.cVal.mag	-	- phsB	0..500.00 [%]
2178	u16	100	.MaxDmdThdV.phsC.cVal.mag	-	- phsC	0..500.00 [%]

2.3.3.36   Control structure 1

Table 130:   *Control structure 1*

RegA	Typ	Scale	IEC 61580 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 >

2.3.3.37   Control structure 2

Table 131:   *Control structure 2*

RegA	Typ	Scale	IEC 61580 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 >

2.3.3.38   Control structure 3

Table 132:   *Control structure 3*

RegA	Typ	Scale	IEC 61580 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 >

2.3.3.39   Control structure 4

Table 133:   *Control structure 4*

RegA	Typ	Scale	IEC 61580 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 >

2.3.3.40 Control structure 5

Table 134: *Control structure 5*

RegA	Typ	Scale	IEC 61580 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 >

2.3.3.41 Control structure 6

Table 135: *Control structure 6*

RegA	Typ	Scale	IEC 61580 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 >

2.3.3.42 Control structure 7

Table 136: *Control structure 7*

RegA	Typ	Scale	IEC 61580 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 >

2.3.3.43 Control structure 8

Table 137: *Control structure 8*

RegA	Typ	Scale	IEC 61580 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 >

2.3.3.44 Device ID string

Table 138:   *Device ID string*

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
9000	u16				ASCII coded string	see doc.
...						
9120	u16					

2.3.3.45 IED Real-time clock (in local time mode) - read and write (synchronize)

Table 139:   *IED Real-time clock (in local time mode) - read and write (synchronize)*

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
9201					Control register	0..2 (see doc.)
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

2.3.3.46 IED real-time clock (in UTC time mode) - read and write (synchronize)

Table 140:   *IED real-time clock (in UTC time mode) - read and write (synchronize)*

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
9211					Control register	0..2 (see doc.)
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

2.3.3.47 Time and reason for latest IED reset

Table 141: Time and reason for latest IED reset

RegA	Typ	Scale	IEC 61580 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

2.3.3.48 Active parameter setting group - read and write

Table 142: Active parameter setting group - read and write

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
9231	u16	1			Active setting group	1..6

2.3.3.49 Event record structure

Table 143: Event record structure

RegA	Typ	Scale	IEC 61580 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	see doc.
9259	u16	1			Data object ID1	see doc.
Table continues on next page						

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
9260	u16	1			Data object ID2	see doc.
9261	u16	1			Event data value 1	see doc.
9262	u16	1			Event data value 2	see doc.
					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	see doc.
9270	u16	1			Data object ID1	see doc.
9271	u16	1			Data object ID2	see doc.
9272	u16	1			Event data value 1	see doc.
9273	u16	1			Event data value 2	see doc.
					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	see doc.
9281	u16	1			Data object ID1	see doc.
9282	u16	1			Data object ID2	see doc.
9283	u16	1			Event data value 1	see doc.
9284	u16	1			Event data value 2	see doc.
					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
Table continues on next page						

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
9290	u16	1			- Millisecond	Millisecond
9291	u16	1			Event identification	see doc.
9292	u16	1			Data object ID1	see doc.
9293	u16	1			Data object ID2	see doc.
9294	u16	1			Event data value 1	see doc.
9295	u16	1			Event data value 2	see doc.
					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
9299	u16	1			- Day, Hour	Day/Hour
9300	u16	1			- Minute, Second	Min/Sec
9301	u16	1			- Millisecond	Millisecond
9302	u16	1			Event identification	see doc.
9303	u16	1			Data object ID1	see doc.
9304	u16	1			Data object ID2	see doc.
9305	u16	1			Event data value 1	see doc.
9306	u16	1			Event data value 2	see doc.
					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	see doc.
9314	u16	1			Data object ID1	see doc.
9315	u16	1			Data object ID2	see doc.
9316	u16	1			Event data value 1	see doc.
9317	u16	1			Event data value 2	see doc.
					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	

Table continues on next page

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
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	see doc.
9325	u16	1			Data object ID1	see doc.
9326	u16	1			Data object ID2	see doc.
9327	u16	1			Event data value 1	see doc.
9328	u16	1			Event data value 2	see doc.
					Record 8 data to read:	If selected
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	see doc.
9336	u16	1			Data object ID1	see doc.
9337	u16	1			Data object ID2	see doc.
9338	u16	1			Event data value 1	see doc.
9339	u16	1			Event data value 2	see doc.
					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	see doc.
9347	u16	1			Data object ID1	see doc.
9348	u16	1			Data object ID2	see doc.
9349	u16	1			Event data value 1	see doc.
9350	u16	1			Event data value 2	see doc.
Table continues on next page						

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
					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	see doc.
9358	u16	1			Data object ID1	see doc.
9359	u16	1			Data object ID2	see doc.
9360	u16	1			Event data value 1	see doc.
9361	u16	1			Event data value 2	see doc.

2.3.3.50 Fault record structure header

Table 144:   Fault record structure header

RegA	Typ	Scale	IEC 61580 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	see doc.
			LD0.FLTMSTA1		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	.StrDur.mag		- Start duration	0..100.00 [%]
9413	u32	1000	.OpTm.mag		- Operate time [ms] (high)	0..999999.999
9414					- (low word)	
Table continues on next page						

RegA	Typ	Scale	IEC 61580 name	SA name	Description	Values
9415	u16	1	.ActSG.stVal		- Active setting group	1..6
9416	u16	1	.ShotPntr.stVal		- AR shot pointer value	0..7
9417	u16				< reserved >	0
9418	u16				< reserved >	0
9419	u16				< reserved >	0
9420	u16				< reserved >	0
9421	u16				< reserved >	0

2.3.3.51 Fault record data

Table 145: Fault record data

RegA	Typ	Scale	IEC 61580 name	SA name	Description	
			LD0.FLTMSTA1			
9422	u16	1000	.MaxAmpsA.mag		Max phsA current	0..50.0 [xIn]
9423	u16	1000	.MaxAmpsB.mag		Max phsB current	0..50.0 [xIn]
9424	u16	1000	.MaxAmpsC.mag		Max phsC current	0..50.0 [xIn]
9425	u16	1000	.MaxAmpsN.mag		Max residual current	0..50.0 [xIn]
9426	u16	1000	.AmpsA.mag		PhsA current	0..50.0 [xIn]
9427	u16	1000	.AmpsB.mag		PhsB current	0..50.0 [xIn]
9428	u16	1000	.AmpsC.mag		PhsC current	0..50.0 [xIn]
9429	u16	1000	.AmpsN.mag		Residual current	0..50.0 [xIn]
9430	u16	1000	.AmpsNClc.mag		Residual current (calc)	0..50.0 [xIn]
9431	u16	1000	.AmpsPsSeq.mag		Positive seq. current	0..50.0 [xIn]
9432	u16	1000	.AmpsNgSeq.mag		Negative seq. current	0..50.0 [xIn]
9433	u16	1000	.VoltsA.mag		PhsA voltage	0..4.00 [xUn]
9434	u16	1000	.VoltsB.mag		PhsB voltage	0..4.00 [xUn]
9435	u16	1000	.VoltsC.mag		PhsC voltage	0..4.00 [xUn]
9436	u16	1000	.VoltsAB.mag		PhsAB voltage	0..4.00 [xUn]
9437	u16	1000	.VoltsBC.mag		PhsBC voltage	0..4.00 [xUn]
9438	u16	1000	.VoltsCA.mag		PhsCA voltage	0..4.00 [xUn]
9439	u16	1000	.VoltsN.mag		Residual voltage	0..4.00 [xUn]
9440	u16	1000	.VZroSeq.mag		Zero seq. voltage	0..4.00 [xUn]
9441	u16	1000	.VPsSeq.mag		Positive seq. voltage	0..4.00 [xUn]
9442	u16	1000	.VNgSeq.mag		Negative seq. voltage	0..4.00 [xUn]
9443	u16	1000	.VoltsAb.mag		PhsAb voltage	0..4.00 [xUn]
9444	u16	1000	.VoltsABb.mag		PhsABb voltage	0..4.00 [xUn]
9445	i16	10	.DifAngN.mag		Uo-Io angle	-/+ 180.0 [Deg]
9446	i16	10	.DifAngBC.mag		PhsB-C angle	-/+ 180.0 [Deg]
Table continues on next page						

RegA	Typ	Scale	IEC 61580 name	SA name	Description	
9447	i16	10	.DifAngCA.mag		PhsC-A angle	-/+ 180.0 [Deg]
9448	i16	10	.DifAngAB.mag		PhsA-B angle	-/+ 180.0 [Deg]
9449	u16	100	.Hz.mag		Frequency	30..80.00 [Hz]
9450	i16	100	.HzS.mag		Frequency gradient	-/+10.00 [Hz/s]
9451	u16	100	.PDNS1MxRat.mag		PDNSPTOC1 ratio I2/I1	0..999.99 [%]
	u16	100	.MaxTmpRl.mag		Relative temperature	0..99.99

2.3.4 Controls

Table 146:   Explanations of the controls table columns

Column name	Description
IEC 61850 name	Original IED data object identification. Described in the IEC 61850 format as Logical Device.Logical Node and thereafter .Data Object.Data Attribute. Logical Node is the same as the application function block name.
SA name	The signal may have a defined label that is visible for example in ACT.
Description	Short description of the signal. See the application function block documentation for more details.
Value	Meaning of the written value.

2.3.4.1 CTRL.CBCSWI1 Circuit breaker (1) control

Table 147:   CTRL.CBCSWI1 Circuit breaker (1) control

0xA	CS	IEC 61580 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

2.3.4.2 Reset, acknowledge and trigger points (A)

Table 148:   Reset, acknowledge and trigger points (A)

0xA	CS	IEC 61580 name	SA name	Description	Values
		LD0.LLN0			
2060	2.00	.LEDRs1.Oper.ctlVal		Reset indications and LEDs	1=Reset
2061	2.01	.LEDRs2.Oper.ctlVal		Reset Alarm LEDs	1=Reset
Table continues on next page					

0xA	CS	IEC 61580 name	SA name	Description	Values
		LD0.PEMSTA1			
2062	2.02	.RecRs.Oper.ctlVal		Reset Power max demands	1=Reset
		LD0.DARREC1			
2063	2.03	.RsRec.Oper.ctlVal		Reset reclosing	1=Reset
2064	2.04	.RsCnt.ctlVal		Reset reclosing counters	1=Reset
		LD0.SSCBR1			
2065	2.05	.RsAccAPwr.Oper.ctlVal		Reset CB accum. energy	1=Reset
2066	2.06	.RsCBWear.Oper.ctlVal		Reset CB wear data	1=Reset
		DR.RDRE1			
2067	2.07	.RcdTrg.Oper.ctlVal		Trig DR recording	1=Trig
2068	2.08	.MemClr.Oper.ctlVal		Clear DR memory	1=Clear
		LD0.CMSTA1			
2069	2.09	.RecRs.Oper.ctlVal		Reset Max current1 demands	1=Reset
		LD0.PEMMXU1			
2070	2.10	.SupDmdRs.Oper.ctlVal		Reset energy values	1=Reset
		LD0.SCCBR1			
2071	2.11	.RsTrvTm.Oper.ctlVal		Reset CB travel time	1=Reset
2072	2.12	.RsSprChaTm.Oper.ctlVal		Reset CB spring charge time	1=Reset
		LD0.RESCMSTA1			
2073	2.13	.RecRs.Oper.ctlVal		Reset Io (1) max demands	1=Reset
		LD0.RESVMSTA1			
2074	2.14	.RecRs.Oper.ctlVal		Reset Uo (1) max demands	1=Reset

2.3.4.3   LD0.LPHD1 IED warm reset

Table 149:   LD0.LPHD1 IED warm reset

0xA	CS	IEC 61580 name	SA name	Description	Values
		LD0.LPHD1			
2080	3.00	.RsDev.Oper.ctlVal		Warm reboot of IED	1=Reboot

2.3.4.4   LD0.SRGAPC1 Reset SRGAPC1 generic flip-flops

Table 150:   LD0.SRGAPC1 Reset SRGAPC1 generic flip-flops

0xA	CS	IEC 61580 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 61580 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

2.3.4.5 LD0.SRGAPC2 Reset SRGAPC2 generic flip-flops

Table 151: LD0.SRGAPC2 Reset SRGAPC2 generic flip-flops

0xA	CS	IEC 61580 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

2.3.4.6 LD0.SPCGGIO1 Multipurpose binary outputs (1)

The binary outputs may 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 "1" and "0" values. The persistent type is the same as the toggled mode on LHMI and WHMI.

Table 152: LD0.SPCGGIO1 Multipurpose binary outputs (1)

0xA	CS	IEC 61580 name	SA name	Description	Values
		LD0.SPCGGIO1			
2112	5.00	.SPCS01.ctlVal		Output 1 control	0/1=Off/On
2113	5.01	.SPCS02.ctlVal		Output 2 control	0/1=Off/On
2114	5.02	.SPCS03.ctlVal		Output 3 control	0/1=Off/On
2115	5.03	.SPCS04.ctlVal		Output 4 control	0/1=Off/On
2116	5.04	.SPCS05.ctlVal		Output 5 control	0/1=Off/On
2117	5.05	.SPCS06.ctlVal		Output 6 control	0/1=Off/On
2118	5.06	.SPCS07.ctlVal		Output 7 control	0/1=Off/On
2119	5.07	.SPCS08.ctlVal		Output 8 control	0/1=Off/On
2120	5.08	.SPCS09.ctlVal		Output 9 control	0/1=Off/On
2121	5.09	.SPCS10.ctlVal		Output 10 control	0/1=Off/On
Table continues on next page					

0xA	CS	IEC 61580 name	SA name	Description	Values
2122	5.10	.SPCS11.ctlVal		Output 11 control	0/1=Off/On
2123	5.11	.SPCS12.ctlVal		Output 12 control	0/1=Off/On
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

2.3.4.7   LD0.SPCGGIO2 Multipurpose binary outputs (2)

The binary outputs may 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 "1" and "0" values. The persistent type is the same as the toggled mode on LHMI and WHMI.

Table 153:   *LD0.SPCGGIO2 Multipurpose binary outputs (2)*

0xA	CS	IEC 61580 name	SA name	Description	Values
		LD0.SPCGGIO2			
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

2.3.4.8 CTRL.DCCSWI1 Disconnector (1) control

Table 154: *CTRL.DCCSWI1 Disconnector (1) control*

0xA	CS	IEC 61580 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

2.3.4.9 CTRL.DCCSWI2 Disconnector (2) control

Table 155: *CTRL.DCCSWI2 Disconnector (2) control*

0xA	CS	IEC 61580 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

2.3.4.10 CTRL.ESCSWI1 Earth switch (1) control

Table 156: *CTRL.ESCSWI1 Earth switch (1) control*

0xA	CS	IEC 61580 name	SA name	Description	Values
		CTRL.ESCXSWI1			
2054	1.06	.Pos.Oper.ctlVal		Select open	1=Select
2055	1.07	.Pos.Oper.ctlVal		Select close	1=Select
2056	1.08	.Pos.Oper.ctlVal		Cancel selection	1=Cancel
2057	1.09	.Pos.Oper.ctlVal		Execute selection	1=Execute
2058	1.10	.Pos.Oper.ctlVal		Direct open	1=Open
2059	1.11	.Pos.Oper.ctlVal		Direct close	1=Close

Section 3   Glossary

615 series	Series of numerical IEDs for low-end protection and supervision applications of utility substations, and industrial switchgear and equipment
EMC	Electromagnetic compatibility
HMI	Human-machine interface
IEC	International Electrotechnical Commission
IEC 61850	International standard for substation communication and modeling
IED	Intelligent electronic device
IET600	Integrated Engineering Toolbox in PCM600
LHMI	Local human-machine interface
PCM600	Protection and Control IED Manager

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