



Relion® 615 series

Feeder Protection and Control REF615 Modbus Point List Manual



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Conformity

This product complies with the directive of the Council of the European Communities on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive 2004/108/EC) and concerning electrical equipment for use within specified voltage limits (Low-voltage directive 2006/95/EC). This conformity is the result of tests conducted by ABB in accordance with the product standards EN 50263 and EN 60255-26 for the EMC directive, and with the product standards EN 60255-1 and EN 60255-27 for the low voltage directive. The IED is designed in accordance with the international standards of the IEC 60255 series.

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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

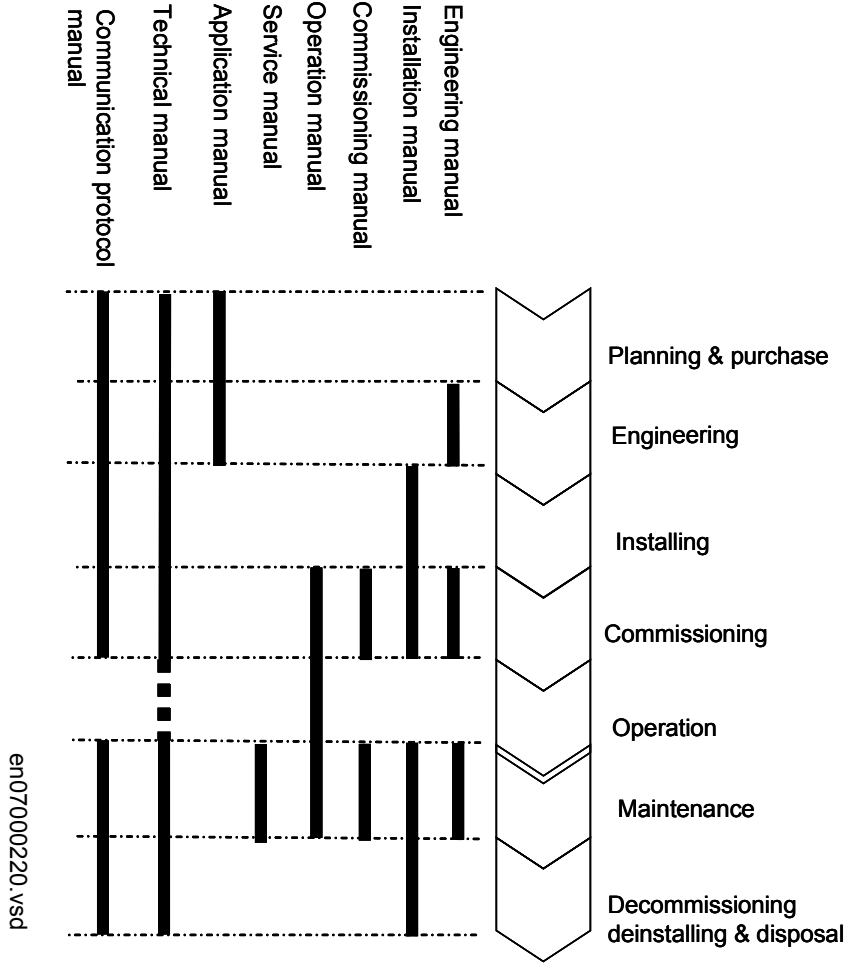


Figure 1: The intended use of manuals in different lifecycles

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 commissioning manual contains instructions on how to commission the IED. The manual can also be used by system engineers and maintenance personnel for assistance during the testing phase. The manual provides procedures for checking of external circuitry and energizing the IED, parameter setting and configuration as

well as verifying settings by secondary injection. The manual describes the process of testing an IED in a substation which is not in service. The chapters are organized in chronological order in which the IED should be commissioned.

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 service manual contains instructions on how to service and maintain the IED. The manual also provides procedures for de-energizing, de-commissioning and disposal of the IED.

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 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.

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

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.



Some of the manuals are not available yet.

1.3.2 Document revision history

Document revision/date	Product version	History
A/2009-09-29	2.0	First release
B/2010-07-02	3.0	Content updated



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

Safety indication 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 to 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 should be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process performance leading to personal injury or death. Therefore, comply fully with all warning and caution notices.

1.4.2

Manual conventions

Conventions used in IED manuals. 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, for example:
To navigate between the options, use  and .
- HMI menu paths are presented in bold, for example:
Select **Main menu/Settings**.
- LHMI messages are shown in Courier font, for example:
To save the changes in non-volatile memory, select **Yes** and press .
- Parameter names are shown in italics, for example:
The function can be enabled and disabled with the *Operation* setting.
- Parameter values are indicated with quotation marks, for example:

- The corresponding parameter values are "On" and "Off".
IED input/output messages and monitored data names are shown in Courier font, for example:
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, instance 1	PHLPTOC1	3I> (1)	51P-1 (1)
Three-phase non-directional overcurrent protection, high stage, instance 1	PHHPTOC1	3I>> (1)	51P-2 (1)
Three-phase non-directional overcurrent protection, high stage, instance 2	PHHPTOC2	3I>> (2)	51P-2 (2)
Three-phase non-directional overcurrent protection, instantaneous stage, instance 1	PHIPTOC1	3I>>> (1)	50P/51P (1)
Three-phase directional overcurrent protection, low stage, instance 1	DPHLPDOC1	3I> -> (1)	67-1 (1)
Three-phase directional overcurrent protection, low stage, instance 2	DPHLPDOC2	3I> -> (2)	67-1 (2)
Three-phase directional overcurrent protection, high stage	DPHHPDOC1	3I>> ->	67-2
Non-directional earth-fault protection, low stage, instance 1	EFLPTOC1	I0> (1)	51N-1 (1)
Non-directional earth-fault protection, low stage, instance 2	EELPTOC2	I0> (2)	51N-1 (2)
Non-directional earth-fault protection, high stage, instance 1	EFHPTOC1	I0>> (1)	51N-2 (1)
Non-directional earth-fault protection, instantaneous stage	EFIPTOC1	I0>>>	50N/51N
Directional earth-fault protection, low stage, instance 1	DEFLPDEF1	I0> -> (1)	67N-1 (1)
Directional earth-fault protection, low stage, instance 2	DEFLPDEF2	I0> -> (2)	67N-1 (2)
Directional earth-fault protection, high stage	DEHHPDEF1	I0>> ->	67N-2
Admittance based earth-fault protection, instance 1	EFPADM1	Y0> -> (1)	21YN (1)
Admittance based earth-fault protection, instance 2	EFPADM2	Y0> -> (2)	21YN (2)
Admittance based earth-fault protection, instance 3	EFPADM3	Y0> -> (3)	21YN (3)
Table continues on next page			

Function	IEC 61850	IEC 60617	IEC-ANSI
Transient / intermittent earth-fault protection	INTRPTEF1	I ₀ > I _{EF}	67NIEF
Non-directional (cross-country) earth fault protection, using calculated I ₀	EFHPTOC1	I ₀ > (1)	51N-2 (1)
Negative-sequence overcurrent protection, instance 1	NSPTOC1	I ₂ > (1)	46 (1)
Negative-sequence overcurrent protection, instance 2	NSPTOC2	I ₂ > (2)	46 (2)
Phase discontinuity protection	PDNSPTOC1	I ₂ /I ₁ >	46PD
Residual overvoltage protection, instance 1	ROVPTOV1	U ₀ > (1)	59G (1)
Residual overvoltage protection, instance 2	ROVPTOV2	U ₀ > (2)	59G (2)
Residual overvoltage protection, instance 3	ROVPTOV3	U ₀ > (3)	59G (3)
Three-phase undervoltage protection, instance 1	PHPТУV1	3U < (1)	27 (1)
Three-phase undervoltage protection, instance 2	PHPТУV2	3U < (2)	27 (2)
Three-phase undervoltage protection, instance 3	PHPТУV3	3U < (3)	27 (3)
Three-phase overvoltage protection, instance 1	PHPTOV1	3U > (1)	59 (1)
Three-phase overvoltage protection, instance 2	PHPTOV2	3U > (2)	59 (2)
Three-phase overvoltage protection, instance 3	PHPTOV3	3U > (3)	59 (3)
Positive-sequence undervoltage protection, instance 1	PSPTUV1	U ₁ < (1)	47U+ (1)
Negative-sequence overvoltage protection, instance 1	NSPTOV1	U ₂ > (1)	47O- (1)
Frequency protection, instance 1	FRPFRQ1	f > /f<, df/dt (1)	81 (1)
Frequency protection, instance 2	FRPFRQ2	f > /f<, df/dt (2)	81 (2)
Frequency protection, instance 3	FRPFRQ3	f > /f<, df/dt (3)	81 (3)
Load shedding and restoration, instance 1	LSHDPFRQ1	UFLS/R (1)	81LSH (1)
Load shedding and restoration, instance 2	LSHDPFRQ2	UFLS/R (2)	81LSH (2)
Load shedding and restoration, instance 3	LSHDPFRQ3	UFLS/R (3)	81LSH (3)
Switch on to fault	CBRSOF1	SOTF	SOTF
Uncorresponding position detection	UPSCBR1	UPSS	UPSM
Three-phase thermal protection for feeders, cables and distribution transformers	T1PTTR1	3Ith > F	49F
Circuit breaker failure protection	CCBRBRF1	3I > I ₀ > BF	51BF/51NBF
Three-phase inrush detector	INRPHAR1	3I2I >	68

Table continues on next page

Section 1 Introduction

Function	IEC 61850	IEC 60617	IEC-ANSI
Master trip, instance 1	TRPPTRC1	Master Trip (1)	94/86 (1)
Master trip, instance 2	TRPPTRC2	Master Trip (2)	94/86 (2)
Arc protection, instance 1	ARCSARC1	ARC (1)	50L/50NL (1)
Arc protection, instance 2	ARCSARC2	ARC (2)	50L/50NL (2)
Arc protection, instance 3	ARCSARC3	ARC (3)	50L/50NL (3)
Control			
Circuit-breaker control	CBXCBR1	I <-> O CB	I <-> O CB
Disconnecter position indication, instance 1	DCSXSWI1	I <-> O DC (1)	I <-> O DC (1)
Disconnecter position indication, instance 2	DCSXSWI2	I <-> O DC (2)	I <-> O DC (2)
Disconnecter position indication, instance 3	DCSXSWI3	I <-> O DC (3)	I <-> O DC (3)
Earthing switch indication	ESSXSWI1	I <-> O ES	I <-> O ES
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, instance 1	TCSSCBR1	TCS (1)	TCM (1)
Trip circuit supervision, instance 2	TCSSCBR2	TCS (2)	TCM (2)
Current circuit supervision	CCRDIF1	MCS 3I	MCS 3I
Fuse failure supervision	SEGRFUF1	FUSEF	60
Measurement			
Disturbance recorder	RDRE1	-	-
Three-phase current measurement, instance 1	CMMXU1	3I	3I
Sequence current measurement	CSMSQI1	I1, I2, I0	I1, I2, I0
Residual current measurement, instance 1	RESCMMXU1	I0	I _n
Three-phase voltage measurement	VMMXU1	3U	3U
Residual voltage measurement	RESVMMXU1	U0	V _n
Sequence voltage measurement	VSMSQI1	U1, U2, U0	U1, U2, U0
Three-phase power and energy measurement, including power factor	(M)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. 3.0. The point lists describe a superset of all data available through the standard configurations A, B, C, D, E, F, G, J and K including the optional functionalities. The names of the standard configurations are FC01, FC02, FC03, FC04, FC05, FC06, FC07, FC51 and FC52 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.

Point list table columns

0x addr	Coil (0X) PLC address, base address = 1
Addr.	Signal address
AFL-Common SA name	AFL name of the corresponding data signal
Bit addr	Bit (1X and 0X) PLC address, base address = 1
Ctrl bit	Control bit (0..15) within control structure
Ctrl struct	Control structure number
Description	Signal description
Ds	Object resides as default in some IEC 61850 data set (Y = yes, N = no)
Identification	IED's internal IEC 61850 signal name
IEC 61850 name	IEC 61850 signal description
Mode	Control object mode: unsecured or secured
Reg addr	Modbus register address (3X or 4X). PLC address, base address = 1
Reg.bit	Register PLC address (3X and 4X) and bit within register (0..15)
Scale	Scale factor, default setting
Type	Register type and value interpretation: signed or unsigned
Value range	Value range of the signal

Section 2

Modbus data mappings

2.2 Point list for REF615 Ver. 3.0 FC01-07, 51 and FC52

Table 2: Registers FC01-07, 52

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
128						System status register 1	See Modbus CPM
129						System status register 2	See Modbus CPM
130						System status register 3	See Modbus CPM
131						System status register 4	See Modbus CPM
132						System status register 5	See Modbus CPM
133						System status register 6	See Modbus CPM
134						(reserved)	0
Frequently updated registers, all variants							
135	i16	1	LD0.DARREC1.AutoRecSt.stVal	DARREC1.STATUS		Autoreclosing status[.stVal] -	-2...4 (See documentation)
136	u16	1	LD0.DARREC1.ShotPntr.stVal	DARREC1.SHOT_PTR		AR shot pointer value[.stVal] -	0...6
137	u16	1	LD0.DARREC1.OpCntRs.stVal	DARREC1.COUNTER		AR resettable operation counter (all shots) [stVal] -	0...2147483647
138	u16	1000	LD0.CMMXU1.A.phsA.instCVal.mag	CMMXU1.I_DB_A		Phase current A amplitude [phsA.instCVal.mag] -	0...40.00 [xIn]
139	u16	1000	LD0.CMMXU1.A.phsB.instCVal.mag	CMMXU1.I_DB_B		Phase current B amplitude [phsB.instCVal.mag] -	0...40.00 [xIn]
140	u16	1000	LD0.CMMXU1.A.phsC.instCVal.mag	CMMXU1.I_DB_C		Phase current C amplitude [phsC.instCVal.mag] -	0...40.00 [xIn]
141	u16	1000	LD0.RESCMMXU1.A.res.instCVal.mag	RESCMMXU1.I0_DB		Residual current amplitude [.res.instCVal.mag] -	0...40.00 [xIn]
142	u16	1000	LD0.RESVMMXU1.PhV.res.instCVal.mag	RESCMMXU1.U0_DB		Residual voltage amplitude [.res.instCVal.mag] -	0...4.00 [xUn]
143	u16	1000	LD0.CSMSQI1.SeqA.c1.instCVal.mag	CMSQI1.I1_DB		Positive sequence current amplitude [.c1.instCVal.mag] -	0...40.00 [xIn]
144	u16	1000	LD0.CSMSQI1.SeqA.c2.instCVal.mag	CMSQI1.I2_DB		Negative sequence current amplitude [.c2.instCVal.mag] -	0...40.00 [xIn]
145	u16	1000	LD0.CSMSQI1.SeqA.c3.instCVal.mag	CMSQI1.I3_DB		Zero sequence current amplitude [.c3.instCVal.mag] -	0...40.00 [xIn]
146	i16	1	LD0.T1PTTR1.Tmp.mag	T1PTTR1.TEMP		Protected object temperature [.mag] -	-100.0...9999.9 [Celsius]
147	i16	1	LD0.T1PTTR1.TmpRI.mag	T1PTTR1.TEMP_RL		Relative temperature [.mag] -	0.00...99.99 [Celsius]
148	i16	1	LD0.T1PTTR1.TmpUsed.mag	T1PTTR1.TEMP_AMB		Ambient temperature used in calculations [.mag] -	-99...999.99 [Celsius]
149	i16	0.001	LD0.T1PTTR1.TmmsOp.stVal	T1PTTR1.THERMLEV_S T		Estimated time to operate[.stVal] -	0...600000 [ms]
150	i16	0.001	LD0.T1PTTR1.TmmsRecEna.stVal	T1PTTR1.THERMLEV_E ND		Estimated time to deactivate BLK_CLOSE[.stVal] -	0...600000 [ms]
151						(reserved)	0
Frequently updated registers, variants FC05,06,52							
152	u16	1000	LD0.VMMXU1.phV.phsA.cVal.mag	VMMXU1.U_DB_A		Phase-to-ground voltage A amplitude [phsA.cVal.mag] -	0...4.00 [xUn]
153	u16	1000	LD0.VMMXU1.phV.phsB.cVal.mag	VMMXU1.U_DB_B		Phase-to-ground voltage B amplitude [phsB.cVal.mag] -	0...4.00 [xUn]
154	u16	1000	LD0.VMMXU1.phV.phsC.cVal.mag	VMMXU1.U_DB_C		Phase-to-ground voltage C amplitude [phsC.cVal.mag] -	0...4.00 [xUn]

Table continues on next page

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
155	u16	1000	LD0.VMMXU1.PPV.phsAB.cVal.mag	VMMXU1.U_DB_AB		Phase-to-phase voltage AB amplitude [.phsAB.cVal.mag] -	0...4.00 [xUn]
156	u16	1000	LD0.VMMXU1.PPV.phsBC.cVal.mag	VMMXU1.U_DB_BC		Phase-to-phase voltage BC amplitude [.phsBC.cVal.mag] -	0...4.00 [xUn]
157	u16	1000	LD0.VMMXU1.PPV.phsCA.cVal.mag	VMMXU1.U_DB_CA		Phase-to-phase voltage CA amplitude [.phsCA.cVal.mag] -	0...4.00 [xUn]
158	u16	1000	LD0.VSMSQI1.SeqA.c1.cVal.mag	VMSQI1.I1_DB		Positive sequence voltage amplitude [.c1.instCVal.mag] -	0...4.00 [xUn]
159	u16	1000	LD0.VSMSQI1.SeqA.c2.cVal.mag	VMSQI1.I2_DB		Negative sequence voltage amplitude [.c2.instCVal.mag] -	0...4.00 [xUn]
160	u16	1000	LD0.VSMSQI1.SeqA.c3.cVal.mag	VMSQI1.I3_DB		Zero sequence voltage amplitude [.c3.instCVal.mag] -	0...4.00 [xUn]
161	i32	1	LD0.PEMMXU1.TotW.instMag	PEMMXU1.P_DB		Total active power P [.instMag] - High word	-999999...999999 (units = see documentation)
162	i32	1	LD0.PEMMXU1.TotW.instMag	-		Total active power P [.instMag] - Low word	
163	i32	1	LD0.PEMMXU1.TotVAr.instMag	PEMMXU1.Q_DB		Total reactive power Q [.instMag] - High word	-999999...999999 (units = see documentation)
164			LD0.PEMMXU1.TotVAr.instMag	-		Total reactive power Q [.instMag] - Low word	
165	i32	1	LD0.PEMMXU1.TotVA.instMag	PEMMXU1.S_DB		Total apparent power S [.instMag] - High word	-999999...999999 (units = see documentation)
166			LD0.PEMMXU1.TotVA.instMag	-		Total apparent power S [.instMag] - Low word	
167	i16	1000	LD0.PEMMXU1.TotPF.instMag	PEMMXU1.PF_DB		Average power factor [.instMag] -	-1...1
168						(reserved)	0
Synchrocheck energization state FC06,52							
169	u16	1	LD0.SECRSYN1.EnSt.stVal	SECRSYN1.ENERG_STATE		Energization state of Line and Bus	0...4 (see description)
170						Indication bits mirrored and packed in registers 170 onwards	See 'Indications' table
...							
2000							
Phase current demand values (latest values), all variants							
2001	u16	1000	LD0.CMSTA1.AvAmps1.mag	CMMXU1.I_DMD_A		Demand value of phase A current[.mag] -	0...40.00 [xIn]
2002	u16	1000	LD0.CMSTA1.AvAmps2.mag	CMMXU1.I_DMD_B		Demand value of phase B current[.mag] -	0...40.00 [xIn]
2003	u16	1000	LD0.CMSTA1.AvAmps3.mag	CMMXU1.I_DMD_C		Demand value of phase C current[.mag] -	0...40.00 [xIn]
2004			Time structure	-		Update time of demand values phase A..C current -reg 1	Time structure (See Modbus CPM)
2005						Update time of demand values phase A..C current -reg 2	
2006						Update time of demand values phase A..C current -reg 3	
2007						Update time of demand values phase A..C current -reg 4	
2008						Update time of demand values phase A..C current -reg 5	

Table continues on next page

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
Maximum phase current demand values, all variants							
2009	u16	1000	LD0.CMSTA1.MaxAmps1.mag	CMMXU1.Max demand IL1		Maximum demand value for phase A[.mag] -	0...40.00 [xIn]
2010			Time structure	-		Update time of phase A max value -reg 1	Time structure (See Modbus CPM)
2011						Update time of phase A max value -reg 2	
2012						Update time of phase A max value -reg 3	
2013						Update time of phase A max value -reg 4	
2014						Update time of phase A max value -reg 5	
2015	u16	1000	LD0.CMSTA1.MaxAmps2.mag	CMMXU1.Max demand IL2		Maximum demand value for phase B[.mag] -	0...40.00 [xIn]
2016			Time structure	-		Update time of phase A max value -reg 1	Time structure (See Modbus CPM)
2017						Update time of phase A max value -reg 2	
2018						Update time of phase A max value -reg 3	
2019						Update time of phase A max value -reg 4	
2020						Update time of phase A max value -reg 5	
2021	u16	1000	LD0.CMSTA1.MaxAmps3.mag	CMMXU1.Max demand IL3		Maximum demand value for phase C[.mag] -	0...40.00 [xIn]
2022			Time structure	-		Update time of phase A max value -reg 1	Time structure (See Modbus CPM)
2023						Update time of phase A max value -reg 2	
2024						Update time of phase A max value -reg 3	
2025						Update time of phase A max value -reg 4	
2026						Update time of phase A max value -reg 5	
Counters - Circuit breaker, autorecloser							
2027	u16	1	CTRL.CBCSW11.OpCntRs.stVal	CBXCBR1.Operation counter		Circuit breaker operation counter[.stVal] -	0...65535
2028	u16	1	LD0.ARCSARC11.FACntRs.stVal	-		Fault arc1 counter[.stVal] -	0...65535
2029	u16	1	LD0.ARCSARC21.FACntRs.stVal	-		Fault arc2 counter[.stVal] -	0...65535
2030	u16	1	LD0.ARCSARC31.FACntRs.stVal	-		Fault arc3 counter[.stVal] -	0...65535
2031	u16	1	LD0.DARREC1.OpCnt1.stVal	DARREC1.CNT_SHOT1		Auto recloser operation counter (1st shot) [.stVal] -	0...65535
2032	u16	1	LD0.DARREC1.OpCnt2.stVal	DARREC1.CNT_SHOT2		Autorecloser operation counter (2nd shot) [.stVal] -	0...65535
2033	u16	1	LD0.DARREC1.OpCnt3.stVal	DARREC1.CNT_SHOT3		Autorecloser operation counter (3rd shot) [.stVal] -	0...65535
2034	u16	1	LD0.DARREC1.OpCnt4.stVal	DARREC1.CNT_SHOT4		Autorecloser operation counter (4th shot)[.stVal] -	0...65335
2035	u16	1	LD0.DARREC1.OpCnt5.stVal	DARREC1.CNT_SHOT5		Autorecloser operation counter (5th shot)[.stVal] -	0...65535
2036	u16	1	LD0.DARREC1.FrqOpCnt.stVal	DARREC1.FRQ_OPR_CN T		Autorecloser frequent operation counter[.stVal] -	0...65535
2037						(reserved)	0
2038						(reserved)	0
2039						(reserved)	0
Table continues on next page							

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
Energy counters, FC05,06,52							
2040	u32	1	LD0.PEMMTR1.SupWh.actVal	-		Reverse active energy Wh [.actVal] - high word	0...999999999 (units = see docs.)
2041			LD0.PEMMTR1.SupWh.actVal	-		Reverse active energy [.actVal] - low word	
2042	u32	1	LD0.PEMMTR1.SupVArh.actVal	-		Reverse reactive energy [.actVal] - high word	0...999999999 (units = see docs.)
2043			LD0.PEMMTR1.SupVArh.actVal	-		Reverse reactive energy [.actVal] - low word	
2044	u32	1	LD0.PEMMTR1.DemWh.actVal	-		Forward active energy Wh [.actVal] - high word	0...999999999 (units = see docs.)
2045			LD0.PEMMTR1.DemWh.actVal	-		Forward active energy Wh [.actVal] - low word	
2046	u32	1	LD0.PEMMTR1.DemVArh.actVal	-		Forward reactive energy VAr [.actVal] - high word	0...999999999 (units = see docs.)
2047			LD0.PEMMTR1.DemVArh.actVal	-		Forward reactive energy VAr [.actVal] - low word	
2048						(reserved)	0
2049						(reserved)	0
Diagnostics, all variants							
2050	u16	1	LD0.LPHD1.PhyHealth1.stVal	Warning		Physical device - Warning[.stVal] -	See documentation
2051	u16	1	LD0.LPHD1.PhyHealth2.stVal	Internal Fault		Physical device - Internal Fault[.stVal] -	See documentation
2052	u16	1	DR.RDRE1.FltNum.stVal	-		Disturbance recorder - Number of recordings[.stVal] -	0...N
2053	u16	1	DR.RDRE1.MemUsed.stVal	-		Disturbance recorder - Rec. memory used[.stVal] -	0...100 [%]
2054	u16	1	LD0.LPHD1.NumPwrUp.stVal	-		Physical device - Number of Power ups[.stVal] -	0...65535
2055	u16	1	LD0.LPHD1.WrmStr.stVal	-		Physical device - Number of Warm starts[.stVal] -	0...65535
2056	u16	1	LD0.LPHD1.WacTrg.stVal	-		Physical device - Number of watchdog device resets detected[.stVal] -	0...65535
2057						(reserved)	0
2058						(reserved)	0
2059						(reserved)	0
Circuit breaker condition monitoring							
2060	u16	1	LD0.SSCBR1.InaTmdCnt.stVal	SSCBR1.INA_DAYS		SSCBR1 - The number of days CB has been inactive[.stVal] -	0...9999
2061	u16	1	LD0.SSCBR1.TmmsOpn.mag	SSCBR1.T_TRV_OP		SSCBR1 - Travel time of the CB during opening operation[.mag] -	0...60000 [ms]
2062	u16	1	LD0.SSCBR1.TmmsCls.mag	SSCBR1.T_TRV_CL		SSCBR1 - Travel time of the CB during closing operation[.mag] -	0...60000 [ms]
2063	u16	100	LD0.SSCBR1.TmsSprCha.mag	SSCBR1.T_SPR_CHR		SSCBR1 - The charging time of the CB spring[.mag] -	0.00...99.99 [sec]
2064	i16	1	LD0.SSCBR1.RmnLifPhA.stVal	SSCBR1.CB_LIFE_A		SSCBR1 - CB remaining life phase A[.stVal] -	-9999...9999
2065	i16	1	LD0.SSCBR1.RmnLifPhB.stVal	SSCBR1.CB_LIFE_B		SSCBR1 - CB remaining life phase B[.stVal] -	-9999...9999
2066	i16	1	LD0.SSCBR1.RmnLifPhC.stVal	SSCBR1.CB_LIFE_C		SSCBR1 - CB remaining life phase C[.stVal] -	-9999...9999

Table continues on next page

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
2067	u16	1	LD0.SSCBR1.AccAPwrPhA.mag	SSCBR1.IPOW_A		SSCBR1 - Accumulated currents power (lyt), phase A[.mag] -	0.00...1000000.00
2068	u16	1	LD0.SSCBR1.AccAPwrPhB.mag	SSCBR1.IPOW_B		SSCBR1 - Accumulated currents power (lyt), phase B[.mag] -	0.00...1000000.00
2069	u16	1	LD0.SSCBR1.AccAPwrPhC.mag	SSCBR1.IPOW_C		SSCBR1 - Accumulated currents power (lyt), phase C[.mag] -	0.00...1000000.00
2070						(reserved)	0
...							
8000							
Control structure 1							
8001	u16					Control Struct 1 - Execute register	Control structure (See Modbus CPM)
8002	u16					Control Struct 1 - Password 1	
8003	u16					Control Struct 1 - Password 2	
8004	u16		Control structure 1 bit definitions are found in Modbus Controls table			Control Struct 1 - Control register	
8005	u16					Control Struct 1 - Confirm register	
Control structure 2							
8006	u16					Control Struct 2 - Execute register	Control structure (See Modbus CPM)
8007	u16					Control Struct 2 - Password 1	
8008	u16					Control Struct 2 - Password 2	
8009	u16		Control structure 2 bit definitions are found in Modbus Controls table			Control Struct 2 - Control register	
8010	u16					Control Struct 2 - Confirm register	
Control structure 3							
8011	u16					Control Struct 3 - Execute register	Control structure (See Modbus CPM)
8012	u16					Control Struct 3 - Password 1	
8013	u16					Control Struct 3 - Password 2	
8014	u16		Control structure 3 bit definitions are found in Modbus Controls table			Control Struct 3 - Control register	
8015	u16					Control Struct 3 - Confirm register	
Control structure 4							
8016	u16					Control Struct 4 - Execute register	Control structure (See Modbus CPM)
8017	u16					Control Struct 4 - Password 1	
8018	u16					Control Struct 4 - Password 2	
8019	u16		Control structure 4 bit definitions are found in Modbus Controls table			Control Struct 4 - Control register	
8020	u16					Control Struct 4 - Confirm register	
Control structure 5							
Table continues on next page							

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
8021	u16					Control Struct 5 - Execute register	Control structure (See Modbus CPM)
8022	u16					Control Struct 5 - Password 1	
8023	u16					Control Struct 5 - Password 2	
8024	u16		Control structure 5 bit definitions are found in Modbus Controls table			Control Struct 5 - Control register	
8025	u16					Control Struct 5 - Confirm register	
8026						(reserved)	0
...							
9000							
Device ID string							
9001						Max length of device ID string may be 128 registers	Device Id string (See Modbus CPM)
9002						(reserved)	0
...							
9128							
Device real-time clock in local time							
9201	u16					Real-time struct - Control register (0..2)	
9202	u16					Real-time struct - Year (2000..2999)	
9203	u16					Real-time struct - Month (1..12)	
9204	u16					Real-time struct - Day (1..31)	
9205	u16					Real-time struct - Hour (0..23)	
9206	u16					Real-time struct - Minute (0..59)	
9207	u16					Real-time struct - Seconds (0..59)	
9208	u16					Real-time struct - Milliseconds (0..999)	
9209						(reserved)	0
9210						(reserved)	0
Device real-time clock in UTC time							
9211	u16					Real-time struct UTC - Control register (0..2)	
9212	u16					Real-time struct UTC - Year (2000..2999)	
9213	u16					Real-time struct UTC - Month (1..12)	
9214	u16					Real-time struct UTC - Day (1..31)	
9215	u16					Real-time struct UTC - Hour (0..23)	
9216	u16					Real-time struct UTC - Minute (0..59)	
9217	u16					Real-time struct UTC - Seconds (0..59)	
9218	u16					Real-time struct UTC - Milliseconds (0..999)	
9219						(reserved)	0
9220						(reserved)	0
Timestamp of last device reset							
9221	u16					Reset time struct - Year (2000..2999)	
Table continues on next page							

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
9222	u16					Reset time struct - Month (1..12)	
9223	u16					Reset time struct - Day (1..31)	
9224	u16					Reset time struct - Hour (0..23)	
9225	u16					Reset time struct - Minute (0..59)	
9226	u16					Reset time struct - Seconds (0..59)	
9227	u16					Reset time struct - Milliseconds (0..999)	
9228	u16					Reset time struct - Reason	1 = Cold reset 2 = Watchdog reset 4 = Warm reset
9229						(reserved)	0
...							
9249							
Event record structure							
9250	u16	0	Event read selection	-		Number of events records in multiple event reading	1...10
9251	i16	0				Event read operation selection	-499...3
9252	u16	0	Event record 1 (11 registers)	-		Event record struct - Sequence number	Event record structure (See Modbus CPM)
9253	u16	0				Event record struct - Unread records left	
9254	u16	0				Event record struct - TimeStamp (Year,Month)	
9255	u16	0				Event record struct - TimeStamp (Day, Hour)	
9256	u16	0				Event record struct - TimeStamp (Min, Sec)	
9257	u16	0				Event record struct - TimeStamp (Milliseconds)	
9258	u16	0				Event record struct - Event identification	
9259	u16	0				Event record struct - Data object ID 1	
9260	u16	0				Event record struct - Data object ID 2	
9261	u16	0				Event record struct - Data value	
9262	u16	0				Event record struct - Data value	
9263 ... 9273			Event record 2 (11 registers)	-		Event record structure	Event record structure (See Modbus CPM)
9274 ... 9284			Event record 3 (11 registers)	-		Event record structure	Event record structure (See Modbus CPM)
9285 ... 9295			Event record 4 (11 registers)	-		Event record structure	Event record structure (See Modbus CPM)
9296 ... 9306			Event record 5 (11 registers)	-		Event record structure	Event record structure (See Modbus CPM)
9307 ... 9317			Event record 6 (11 registers)	-		Event record structure	Event record structure (See Modbus CPM)
Table continues on next page							

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
9318 ... 9328			Event record 7 (11 registers)	-		Event record structure	Event record structure (See Modbus CPM)
9329 ... 9339			Event record 8 (11 registers)	-		Event record structure	Event record structure (See Modbus CPM)
9340 ... 9350			Event record 9 (11 registers)	-		Event record structure	Event record structure (See Modbus CPM)
9351 ... 9361			Event record 10 (11 registers)	-		Event record structure	Event record structure (See Modbus CPM)
9362 ...						(reserved)	0
9400							
Fault record structure							
9401	i16	0	Fault record read selection	-		Fault record read operation selection	-99...3
9402	u16	0				Fault record struct - Sequence number	Header
9403	u16	0				Fault record struct - Unread records left	
9404	u16	0				Fault record struct - TimeStamp (Year,Month)	
9405	u16	0				Fault record struct - TimeStamp (Day, Hour)	
9406	u16	0				Fault record struct - TimeStamp (Min, Sec)	
9407	u16	0				Fault record struct - TimeStamp (Milliseconds)	
9408	u16	0				Fault record struct - TimeStamp (Time quality)	
Fault record data, all variants							
9409	u16	1	LD0.FLTmSTA1.StrDur.mag	-	Y	Maximum start duration of all stages during the fault	0.0...100.0 [%]
9410	u16	1	LD0.FLTmSTA1.ActSG.stVal	-	Y	Active parameter setting group during the fault	1...6
9411						(reserved)	0
9412	u16	1000	LD0.FLTmSTA1.MaxAmpsA.mag	-	Y	Max phase A current during fault	0.00 50.00 [xIn]
9413	u16	1000	LD0.FLTmSTA1.MaxAmpsB.mag	-	Y	Max phase B current during fault	0.00 50.00 [xIn]
9414	u16	1000	LD0.FLTmSTA1.MaxAmpsC.mag	-	Y	Max phase C current during fault	0.00 50.00 [xIn]
9415	u16	1000	LD0.FLTmSTA1.MaxAmpsN.mag	-	Y	Max residual current during fault	0.00 50.00 [xIn]
9416	u16	1000	LD0.FLTmSTA1.AmpsA.mag	-	Y	Phase A current at moment of trip	0.00 50.00 [xIn]
9417	u16	1000	LD0.FLTmSTA1.AmpsB.mag	-	Y	Phase B current at moment of trip	0.00 50.00 [xIn]
9418	u16	1000	LD0.FLTmSTA1.AmpsC.mag	-	Y	Phase C current at moment of trip	0.00 50.00 [xIn]
9419	u16	1000	LD0.FLTmSTA1.AmpsN.mag	-	Y	Residual current at moment of trip	0.00 50.00 [xIn]
9420	u16	1000	LD0.FLTmSTA1.AmpsNCIc.mag	-	Y	Residual CIc current at moment of trip	0.00 50.00 [xIn]
9421	u16	1000	LD0.FLTmSTA1.AmpsPsSeq.mag	-	Y	Positive sequence current at moment of trip	0.00 50.00 [xIn]
9422	u16	1000	LD0.FLTmSTA1.AmpsNgSeq.mag	-	Y	Negative sequence current at moment of trip	0.00 50.00 [xIn]
9423	u16	1000	LD0.FLTmSTA1.VoltsA.mag	-	Y	Phase A voltage at moment of trip	0...4.00 [xUn]
Table continues on next page							

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
9424	u16	1000	LD0.FLTMSTA1.VoltsB.mag	-	Y	Phase B voltage at moment of trip	0...4.00 [xUn]
9425	u16	1000	LD0.FLTMSTA1.VoltsC.mag	-	Y	Phase C voltage at moment of trip	0...4.00 [xUn]
9426	u16	1000	LD0.FLTMSTA1.VoltsAB.mag	-	Y	Phase-to-phase voltage AB at moment of trip	0...4.00 [xUn]
9427	u16	1000	LD0.FLTMSTA1.VoltsBC.mag	-	Y	Phase-to-phase voltage BC at moment of trip	0...4.00 [xUn]
9428	u16	1000	LD0.FLTMSTA1.VoltsCA.mag	-	Y	Phase-to-phase voltage CA at moment of trip	0...4.00 [xUn]
9429	u16	1000	LD0.FLTMSTA1.VoltsN.mag	-	Y	Residual voltage at moment of trip	0...4.00 [xUn]
9430	u16	1000	LD0.FLTMSTA1.VZroSeq.mag	-	Y	Zero sequence voltage at moment of trip	0...4.00 [xUn]
9431	u16	1000	LD0.FLTMSTA1.VPsSeq.mag	-	Y	Positive sequence voltage at moment of trip	0...4.00 [xUn]
9432	u16	1000	LD0.FLTMSTA1.VNgSeq.mag	-	Y	Negative sequence voltage at moment of trip	0...4.00 [xUn]
9433	u16	100	LD0.FLTMSTA1.MaxTmpRI.mag	-	Y	Max relative temperature	0.00...99.99 [degrees Celsius]
9434	i16	10	LD0.FLTMSTA1.DifNAngN.mag	-	Y	Angle residual voltage - residual current	-180.00...180.00 [degrees]
9435	i16	10	LD0.FLTMSTA1.DifAAngBC.mag	-	Y	Angle phase B to phase C voltage - phase A current	-180.00...180.00 [degrees]
9436	i16	10	LD0.FLTMSTA1.DifBAngCA.mag	-	Y	Angle phase C to phase A voltage - phase B current	-180.00...180.00 [degrees]
9437	i16	10	LD0.FLTMSTA1.DifCAngAB.mag	-	Y	Angle phase A to phase B voltage - phase C current	-180.00...180.00 [degrees]
9438	u16	100	LD0.FLTMSTA1.PDNS1MxRat.mag	-	Y	PDNSPTOC1 ratio I2/I1	0.00...999.99 [%]
9439	u16	100	LD0.FLTMSTA1.Hz.mag	-	Y	Frequency at moment of trip	30.00...80.00 [Hz]
9440	i16	100	LD0.FLTMSTA1.HzS.mag	-	Y	Frequency gradient at moment of trip	-10.00...10.00 Hz/s
9441	i16	100	LD0.FLTMSTA1.CondN.mag	-	Y	Conductance at moment of trip	-1000.00...1000.00 mS
9442	i16	100	LD0.FLTMSTA1.SusN.mag	-	Y	Susceptance at moment of trip	-1000.00...1000.00 mS

Table 3: Registers FC51

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
128						System status register 1	See Modbus CPM
129						System status register 2	See Modbus CPM
130						System status register 3	See Modbus CPM
131						System status register 4	See Modbus CPM
132						System status register 5	See Modbus CPM
133						System status register 6	See Modbus CPM
134						(reserved)	0
Frequently updated registers							
135	i16	1	LD0.DARREC1.AutoRecSt.stVal	DARREC1.STATUS		Autoreclosing status[.stVal] -	-2...4 (See documentation)
136	u16	1	LD0.DARREC1.ShotPntr.stVal	DARREC1.SHOT_PTR		AR shot pointer value[.stVal] -	0...6
137	u16	1	LD0.DARREC1.OpCntRs.stVal	DARREC1.COUNTER		AR resettable operation counter (all shots) [.stVal] -	0...2147483647
138	u16	1000	LD0.CMMXU1.A.phsA.instCVal.mag	CMMXU1.I_DB_A		Phase current A amplitude [.phsA.instCVal.mag] -	0...40.00 [xIn]
139	u16	1000	LD0.CMMXU1.A.phsB.instCVal.mag	CMMXU1.I_DB_B		Phase current B amplitude [.phsB.instCVal.mag] -	0...40.00 [xIn]
140	u16	1000	LD0.CMMXU1.A.phsC.instCVal.mag	CMMXU1.I_DB_C		Phase current C amplitude [.phsC.instCVal.mag] -	0...40.00 [xIn]
141	u16	1000	LD0.RESCMMXU1.A.res.instCVal.mag	RESCMMXU1.I0_DB		Residual current amplitude [.res.instCVal.mag] -	0...40.00 [xIn]
142	u16	1000	LD0.RESVMMXU1.PhV.res.instCVal.mag	RESCMMXU1.U0_DB		Residual voltage amplitude [.res.instCVal.mag] -	0...4.00 [xUn]
143	u16	1000	LD0.CSMSQI1.SeqA.c1.instCVal.mag	CMSQI1.I1_DB		Positive sequence current amplitude [.c1.instCVal.mag] -	0...40.00 [xIn]
144	u16	1000	LD0.CSMSQI1.SeqA.c2.instCVal.mag	CMSQI1.I2_DB		Negative sequence current amplitude [.c2.instCVal.mag] -	0...40.00 [xIn]
145	u16	1000	LD0.CSMSQI1.SeqA.c3.instCVal.mag	CMSQI1.I3_DB		Zero sequence current amplitude [.c3.instCVal.mag] -	0...40.00 [xIn]
146	u16	1000	LD0.CMMXU2.A.phsA.instCVal.mag	CMMXU2.I_DB_A		Phase current A amplitude [.phsA.instCVal.mag] -	0...40.00 [xIn]
147	u16	1000	LD0.CMMXU2.A.phsB.instCVal.mag	CMMXU2.I_DB_B		Phase current B amplitude [.phsB.instCVal.mag] -	0...40.00 [xIn]
148	u16	1000	LD0.CMMXU2.A.phsC.instCVal.mag	CMMXU2.I_DB_C		Phase current C amplitude [.phsC.instCVal.mag] -	0...40.00 [xIn]
149						(reserved)	0
150						(reserved)	0
151						(reserved)	0
Frequently updated registers							
152	u16	1000	LD0.VMMXU1.phV.phsA.cVal.mag	VMMXU1.U_DB_A		Phase-to-ground voltage A amplitude [.phsA.cVal.mag] -	0...4.00 [xUn]
153	u16	1000	LD0.VMMXU1.phV.phsB.cVal.mag	VMMXU1.U_DB_B		Phase-to-ground voltage B amplitude [.phsB.cVal.mag] -	0...4.00 [xUn]

Table continues on next page

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
154	u16	1000	LD0.VMMXU1.phV.phsC.cVal.mag	VMMXU1.U_DB_C		Phase-to-ground voltage C amplitude [.phsC.cVal.mag] -	0...4.00 [xUn]
155	u16	1000	LD0.VMMXU1.PPV.phsAB.cVal.mag	VMMXU1.U_DB_AB		Phase-to-phase voltage AB amplitude [.phsAB.cVal.mag] -	0...4.00 [xUn]
156	u16	1000	LD0.VMMXU1.PPV.phsBC.cVal.mag	VMMXU1.U_DB_BC		Phase-to-phase voltage BC amplitude [.phsBC.cVal.mag] -	0...4.00 [xUn]
157	u16	1000	LD0.VMMXU1.PPV.phsCA.cVal.mag	VMMXU1.U_DB_CA		Phase-to-phase voltage CA amplitude [.phsCA.cVal.mag] -	0...4.00 [xUn]
158	u16	1000	LD0.VSMSQI1.SeqA.c1.cVal.mag	VMSQI1.I1_DB		Positive sequence voltage amplitude [.c1.instCVal.mag] -	0...4.00 [xUn]
159	u16	1000	LD0.VSMSQI1.SeqA.c2.cVal.mag	VMSQI1.I2_DB		Negative sequence voltage amplitude [.c2.instCVal.mag] -	0...4.00 [xUn]
160	u16	1000	LD0.VSMSQI1.SeqA.c3.cVal.mag	VMSQI1.I3_DB		Zero sequence voltage amplitude [.c3.instCVal.mag] -	0...4.00 [xUn]
161	i32	1	LD0.MPEMMXU1.TotW.instMag	PEMMXU1.P_DB		Total active power P [.instMag] - High word	-999999...999999 (units = see documentation)
162			LD0.MPEMMXU1.TotW.instMag	-		Total active power P [.instMag] - Low word	
163	i32	1	LD0.MPEMMXU1.TotVAr.instMag	PEMMXU1.Q_DB		Total reactive power Q [.instMag] - High word	-999999...999999 (units = see documentation)
164			LD0.MPEMMXU1.TotVAr.instMag	-		Total reactive power Q [.instMag] - Low word	
165	i32	1	LD0.MPEMMXU1.TotVA.instMag	PEMMXU1.S_DB		Total apparent power S [.instMag] - High word	-999999...999999 (units = see documentation)
166			LD0.MPEMMXU1.TotVA.instMag	-		Total apparent power S [.instMag] - Low word	
167	i16	1000	LD0.MPEMMXU1.TotPF.instMag	PEMMXU1.PF_DB		Average power factor [.instMag] -	-1...1
168	i16	1000	LD0.FMMXU1.Hz.stVal	FMMXU1.F_DB		Frequency [.stVal] -	10...75 [Hz]
169	u16	1	LD0.SECRSYN1.EnSt.stVal	SECRSYN1.ENERG_STATE	Y	Energization state of Line and Bus	0...4 (see documentation)
170						(reserved)	0
...							
2000							
Phase current demand values (latest values)							
2001	u16	1000	LD0.CMSTA1.AvAmps1.mag	CMMXU1.I_DMD_A		Demand value of phase A current[.mag] -	0...40.00 [xIn]
2002	u16	1000	LD0.CMSTA1.AvAmps2.mag	CMMXU1.I_DMD_B		Demand value of phase B current[.mag] -	0...40.00 [xIn]
2003	u16	1000	LD0.CMSTA1.AvAmps3.mag	CMMXU1.I_DMD_C		Demand value of phase C current[.mag] -	0...40.00 [xIn]
2004			Time structure	-		Update time of demand values phase A..C current -reg 1	Time structure (See Modbus CPM)
2005						Update time of demand values phase A..C current -reg 2	
2006						Update time of demand values phase A..C current -reg 3	
2007						Update time of demand values phase A..C current -reg 4	
2008						Update time of demand values phase A..C current -reg 5	
Table continues on next page							

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
Maximum phase current demand values							
2009	u16	1000	LD0.CMSTA1.MaxAmps1.mag	CMMXU1.Max demand IL1		Maximum demand value for phase A[.mag] -	0...40.00 [xIn]
2010			Time structure	-		Update time of phase A max value -reg 1	Time structure (See Modbus CPM)
2011						Update time of phase A max value -reg 2	
2012						Update time of phase A max value -reg 3	
2013						Update time of phase A max value -reg 4	
2014						Update time of phase A max value -reg 5	
2015	u16	1000	LD0.CMSTA1.MaxAmps2.mag	CMMXU1.Max demand IL2		Maximum demand value for phase B[.mag] -	0...40.00 [xIn]
2016			Time structure	-		Update time of phase A max value -reg 1	Time structure (See Modbus CPM)
2017						Update time of phase A max value -reg 2	
2018						Update time of phase A max value -reg 3	
2019						Update time of phase A max value -reg 4	
2020						Update time of phase A max value -reg 5	
2021	u16	1000	LD0.CMSTA1.MaxAmps3.mag	CMMXU1.Max demand IL3		Maximum demand value for phase C[.mag] -	0...40.00 [xIn]
2022			Time structure	-		Update time of phase A max value -reg 1	Time structure (See Modbus CPM)
2023						Update time of phase A max value -reg 2	
2024						Update time of phase A max value -reg 3	
2025						Update time of phase A max value -reg 4	
2026						Update time of phase A max value -reg 5	
Counters - Circuit breaker, autorecloser							
2027	u16	1	CTRL.CBCSW11.OpCntRs.stVal	CBXCBR1.Operation counter		Circuit breaker operation counter[.stVal] -	0...65535
2028	u16	1	LD0.ARCsARC11.FACntRs.stVal	-		Fault arc1 counter[.stVal] -	0...65535
2029	u16	1	LD0.ARCsARC21.FACntRs.stVal	-		Fault arc2 counter[.stVal] -	0...65535
2030	u16	1	LD0.ARCsARC31.FACntRs.stVal	-		Fault arc3 counter[.stVal] -	0...65535
2031	u16	1	LD0.DARREC1.OpCnt1.stVal	DARREC1.CNT_SHOT1		Auto recloser operation counter (1st shot) [.stVal] -	0...65535
2032	u16	1	LD0.DARREC1.OpCnt2.stVal	DARREC1.CNT_SHOT2		Autorecloser operation counter (2nd shot) [.stVal] -	0...65535
2033	u16	1	LD0.DARREC1.OpCnt3.stVal	DARREC1.CNT_SHOT3		Autorecloser operation counter (3rd shot)[.stVal] -	0...65535
2034	u16	1	LD0.DARREC1.OpCnt4.stVal	DARREC1.CNT_SHOT4		Autorecloser operation counter (4th shot)[.stVal] -	0...65535
2035	u16	1	LD0.DARREC1.OpCnt5.stVal	DARREC1.CNT_SHOT5		Autorecloser operation counter (5th shot)[.stVal] -	0...65535
2036	u16	1	LD0.DARREC1.FrqOpCnt.stVal	DARREC1.FRQ_OPR_CN T		Autorecloser frequent operation counter[.stVal] -	0...65535
2037						(reserved)	0
2038						(reserved)	0
2039						(reserved)	0
Table continues on next page							

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
Energy counters							
2040	u32	1	LD0.MPEMMTR1.SupWh.actVal	-		Reverse active energy Wh [.actVal] - high word	0...999999999 (units = see docs.)
2041			LD0.MPEMMTR1.SupWh.actVal	-		Reverse active energy [.actVal] - low word	
2042	u32	1	LD0.MPEMMTR1.SupVArh.actVal	-		Reverse reactive energy [.actVal] - high word	0...999999999 (units = see docs.)
2043			LD0.MPEMMTR1.SupVArh.actVal	-		Reverse reactive energy [.actVal] - low word	
2044	u32	1	LD0.MPEMMTR1.DemWh.actVal	-		Forward active energy Wh [.actVal] - high word	0...999999999 (units = see docs.)
2045			LD0.MPEMMTR1.DemWh.actVal	-		Forward active energy Wh [.actVal] - low word	
2046	u32	1	LD0.MPEMMTR1.DemVArh.actVal	-		Forward reactive energy VAr [.actVal] - high word	0...999999999 (units = see docs.)
2047			LD0.MPEMMTR1.DemVArh.actVal	-		Forward reactive energy VAr [.actVal] - low word	
2048						(reserved)	0
2049						(reserved)	0
Diagnostics							
2050	u16	1	LD0.LPHD1.PhyHealth1.stVal	Warning		Physical device - Warning[.stVal] -	See documentation
2051	u16	1	LD0.LPHD1.PhyHealth2.stVal	Internal Fault		Physical device - Internal Fault[.stVal] -	See documentation
2052	u16	1	DR.RDRE1.FltNum.stVal	-		Disturbance recorder - Number of recordings[.stVal] -	0...N
2053	u16	1	DR.RDRE1.MemUsed.stVal	-		Disturbance recorder - Rec. memory used[.stVal] -	0...100 [%]
2054	u16	1	LD0.LPHD1.NumPwrUp.stVal	-		Physical device - Number of Power ups[.stVal] -	0...65535
2055	u16	1	LD0.LPHD1.WrmStr.stVal	-		Physical device - Number of Warm starts[.stVal] -	0...65535
2056	u16	1	LD0.LPHD1.WacTrg.stVal	-		Physical device - Number of watchdog device resets detected[.stVal] -	0...65535
2057	u16	1	LD0.LPHD1.NumCmpChg.stVal	-		Number of composition changes	0...65535
2058						(reserved)	0
2059						(reserved)	0
Circuit breaker condition monitoring							
2060	u16	1	LD0.SSCBR1.InaTmdCnt.stVal	SSCBR1.INA_DAYS		SSCBR1 - The number of days CB has been inactive[.stVal] -	0...9999
2061	u16	1	LD0.SSCBR1.TmmsOpn.mag	SSCBR1.T_TRV_OP		SSCBR1 - Travel time of the CB during opening operation[.mag] -	0...60000 [ms]
2062	u16	1	LD0.SSCBR1.TmmsCls.mag	SSCBR1.T_TRV_CL		SSCBR1 - Travel time of the CB during closing operation[.mag] -	0...60000 [ms]
2063	u16	100	LD0.SSCBR1.TmsSprCha.mag	SSCBR1.T_SPR_CHR		SSCBR1 - The charging time of the CB spring[.mag] -	0.00...99.99 [sec]
2064	i16	1	LD0.SSCBR1.RmnLifPhA.stVal	SSCBR1.CB_LIFE_A		SSCBR1 - CB remaining life phase A[.stVal] -	-9999...9999
2065	i16	1	LD0.SSCBR1.RmnLifPhB.stVal	SSCBR1.CB_LIFE_B		SSCBR1 - CB remaining life phase B[.stVal] -	-9999...9999
2066	i16	1	LD0.SSCBR1.RmnLifPhC.stVal	SSCBR1.CB_LIFE_C		SSCBR1 - CB remaining life phase C[.stVal] -	-9999...9999

Table continues on next page

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
2067	u16	1	LD0.SSCBR1.AccAPwrPhA.mag	SSCBR1.IPOW_A		SSCBR1 - Accumulated currents power (lyt), phase A[.mag] -	0.00...1000000.00
2068	u16	1	LD0.SSCBR1.AccAPwrPhB.mag	SSCBR1.IPOW_B		SSCBR1 - Accumulated currents power (lyt), phase B[.mag] -	0.00...1000000.00
2069	u16	1	LD0.SSCBR1.AccAPwrPhC.mag	SSCBR1.IPOW_C		SSCBR1 - Accumulated currents power (lyt), phase C[.mag] -	0.00...1000000.00
2070						(reserved)	0
...							
2080							
2081	u16	1000	LD0.CMSTA2.AvAmps1.mag			Demand value of phase A current[.mag] -	0...40.00 [xIn]
2082	u16	1000	LD0.CMSTA2.AvAmps2.mag			Demand value of phase B current[.mag] -	0...40.00 [xIn]
2083	u16	1000	LD0.CMSTA2.AvAmps3.mag			Demand value of phase C current[.mag] -	0...40.00 [xIn]
2084	u16	1	Time structure			Update time of demand values phase A..C current -reg 1	Time structure (See Modbus CPM)
2085						Update time of demand values phase A..C current -reg 2	
2086						Update time of demand values phase A..C current -reg 3	
2087						Update time of demand values phase A..C current -reg 4	
2088						Update time of demand values phase A..C current -reg 5	
2089	u16	1000	LD0.CMSTA2.MaxAmps1.mag			Maximum demand value for phase A[.mag] -	0...40.00 [xIn]
2090	u16	1	Time structure			Update time of phase A max value -reg 1	Time structure (See Modbus CPM)
2091						Update time of phase A max value -reg 2	
2092						Update time of phase A max value -reg 3	
2093						Update time of phase A max value -reg 4	
2094						Update time of phase A max value -reg 5	
2095	u16	1000	LD0.CMSTA2.MaxAmps2.mag			Maximum demand value for phase B[.mag] -	0...40.00 [xIn]
2096	u16	1	Time structure			Update time of phase B max value -reg 1	Time structure (See Modbus CPM)
2097						Update time of phase B max value -reg 2	
2098						Update time of phase B max value -reg 3	
2099						Update time of phase B max value -reg 4	
2100						Update time of phase B max value -reg 5	
2101	u16	1000	LD0.CMSTA2.MaxAmps3.mag			Maximum demand value for phase C[.mag] -	0...40.00 [xIn]
2102	u16	1	Time structure			Update time of phase C max value -reg 1	Time structure (See Modbus CPM)
						Update time of phase C max value -reg 2	
						Update time of phase C max value -reg 3	
						Update time of phase C max value -reg 4	

Table continues on next page

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
						Update time of phase C max value -reg 5	
Control structure 1							
8001	u16					Control Struct 1 - Execute register	Control structure (See Modbus CPM)
8002	u16					Control Struct 1 - Password 1	
8003	u16					Control Struct 1 - Password 2	
8004	u16		Control structure 1 bit definitions are found in Modbus Controls table			Control Struct 1 - Control register	
8005	u16					Control Struct 1 - Confirm register	
Control structure 2							
8006	u16					Control Struct 2 - Execute register	Control structure (See Modbus CPM)
8007	u16					Control Struct 2 - Password 1	
8008	u16					Control Struct 2 - Password 2	
8009	u16		Control structure 2 bit definitions are found in Modbus Controls table			Control Struct 2 - Control register	
8010	u16					Control Struct 2 - Confirm register	
Control structure 3							
8011	u16					Control Struct 3 - Execute register	Control structure (See Modbus CPM)
8012	u16					Control Struct 3 - Password 1	
8013	u16					Control Struct 3 - Password 2	
8014	u16		Control structure 3 bit definitions are found in Modbus Controls table			Control Struct 3 - Control register	
8015	u16					Control Struct 3 - Confirm register	
Control structure 4							
8016	u16					Control Struct 4 - Execute register	Control structure (See Modbus CPM)
8017	u16					Control Struct 4 - Password 1	
8018	u16					Control Struct 4 - Password 2	
8019	u16		Control structure 4 bit definitions are found in Modbus Controls table			Control Struct 4 - Control register	
8020	u16					Control Struct 4 - Confirm register	
Control structure 5							
8021	u16					Control Struct 5 - Execute register	Control structure (See Modbus CPM)
8022	u16					Control Struct 5 - Password 1	
8023	u16					Control Struct 5 - Password 2	
8024	u16		Control structure 5 bit definitions are found in Modbus Controls table			Control Struct 5 - Control register	
8025	u16					Control Struct 5 - Confirm register	
8026						(reserved)	0
Table continues on next page							

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
...							
9000							
Device ID string							
9001						Max length of device ID string may be 128 registers	Device Id string (See Modbus CPM)
9002						(reserved)	0
...							
9128							
Device real-time clock in local time							
9201	u16					Real-time struct - Control register (0..2)	
9202	u16					Real-time struct - Year (2000..2999)	
9203	u16					Real-time struct - Month (1..12)	
9204	u16					Real-time struct - Day (1..31)	
9205	u16					Real-time struct - Hour (0..23)	
9206	u16					Real-time struct - Minute (0..59)	
9207	u16					Real-time struct - Seconds (0..59)	
9208	u16					Real-time struct - Milliseconds (0..999)	
9209						(reserved)	0
9210						(reserved)	0
Device real-time clock in UTC time							
9211	u16					Real-time struct UTC - Control register (0..2)	
9212	u16					Real-time struct UTC - Year (2000..2999)	
9213	u16					Real-time struct UTC - Month (1..12)	
9214	u16					Real-time struct UTC - Day (1..31)	
9215	u16					Real-time struct UTC - Hour (0..23)	
9216	u16					Real-time struct UTC - Minute (0..59)	
9217	u16					Real-time struct UTC - Seconds (0..59)	
9218	u16					Real-time struct UTC - Milliseconds (0..999)	
9219						(reserved)	0
9220						(reserved)	0
Timestamp of last device reset							
9221	u16					Reset time struct - Year (2000..2999)	
9222	u16					Reset time struct - Month (1..12)	
9223	u16					Reset time struct - Day (1..31)	
9224	u16					Reset time struct - Hour (0..23)	
9225	u16					Reset time struct - Minute (0..59)	
9226	u16					Reset time struct - Seconds (0..59)	
9227	u16					Reset time struct - Milliseconds (0..999)	
9228	u16					Reset time struct - Reason	1 = Cold reset

Table continues on next page

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
							2 = Watchdog reset 4 = Warm reset
9229						(reserved)	0
...							
9249							
Event record structure							
9250	u16	0	Event read selection			Number of events records in multiple event reading	1...10
9251	i16	0				Event read operation selection	-499...3
9252	u16	0	Event record 1 (11 registers)			Event record struct - Sequence number	Event record structure (See Modbus CPM)
9253	u16	0				Event record struct - Unread records left	
9254	u16	0				Event record struct - TimeStamp (Year,Month)	
9255	u16	0				Event record struct - TimeStamp (Day, Hour)	
9256	u16	0				Event record struct - TimeStamp (Min, Sec)	
9257	u16	0				Event record struct - TimeStamp (Milliseconds)	
9258	u16	0				Event record struct - Event identification	
9259	u16	0				Event record struct - Data object ID 1	
9260	u16	0				Event record struct - Data object ID 2	
9261	u16	0				Event record struct - Data value	
9262	u16	0				Event record struct - Data value	
9263 ... 9273			Event record 2 (11 registers)			Event record structure	Event record structure (See Modbus CPM)
9274 ... 9284			Event record 3 (11 registers)			Event record structure	Event record structure (See Modbus CPM)
9285 ... 9295			Event record 4 (11 registers)			Event record structure	Event record structure (See Modbus CPM)
9296 ... 9306			Event record 5 (11 registers)			Event record structure	Event record structure (See Modbus CPM)
9307 ... 9317			Event record 6 (11 registers)			Event record structure	Event record structure (See Modbus CPM)
9318 ... 9328			Event record 7 (11 registers)			Event record structure	Event record structure (See Modbus CPM)
9329 ... 9339			Event record 8 (11 registers)			Event record structure	Event record structure (See Modbus CPM)
Table continues on next page							

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
9340 ... 9350			Event record 9 (11 registers)			Event record structure	Event record structure (See Modbus CPM)
9351 ... 9361			Event record 10 (11 registers)			Event record structure	Event record structure (See Modbus CPM)
9362 ...						(reserved)	0
9400							
Fault record structure							
9401	i16	0	Fault record read selection			Fault record read operation selection	-99...3
9402	u16	0				Fault record struct - Sequence number	Header
9403	u16	0				Fault record struct - Unread records left	
9404	u16	0				Fault record struct - TimeStamp (Year,Month)	
9405	u16	0				Fault record struct - TimeStamp (Day, Hour)	
9406	u16	0				Fault record struct - TimeStamp (Min, Sec)	
9407	u16	0				Fault record struct - TimeStamp (Milliseconds)	
9408	u16	0				Fault record struct - TimeStamp (Time quality)	
Fault record data							
9409	u16	1	LD0.FLTMSTA1.StrDur.mag	-	Y	Maximum start duration of all stages during the fault	0.0...100.0 [%]
9410	u16	1	LD0.FLTMSTA1.ActSG.stVal	-	Y	Active parameter setting group during the fault	1...6
9411						(reserved)	0
9412	u16	1000	LD0.FLTMSTA1.MaxAmpsA.mag	-	Y	Max phase A current during fault	0.00 50.00 [xIn]
9413	u16	1000	LD0.FLTMSTA1.MaxAmpsB.mag	-	Y	Max phase B current during fault	0.00 50.00 [xIn]
9414	u16	1000	LD0.FLTMSTA1.MaxAmpsC.mag	-	Y	Max phase C current during fault	0.00 50.00 [xIn]
9415	u16	1000	LD0.FLTMSTA1.MaxAmpsN.mag	-	Y	Max residual current during fault	0.00 50.00 [xIn]
9416	u16	1000	LD0.FLTMSTA1.AmpsA.mag	-	Y	Phase A current at moment of trip	0.00 50.00 [xIn]
9417	u16	1000	LD0.FLTMSTA1.AmpsB.mag	-	Y	Phase B current at moment of trip	0.00 50.00 [xIn]
9418	u16	1000	LD0.FLTMSTA1.AmpsC.mag	-	Y	Phase C current at moment of trip	0.00 50.00 [xIn]
9419	u16	1000	LD0.FLTMSTA1.AmpsN.mag	-	Y	Residual current at moment of trip	0.00 50.00 [xIn]
9420	u16	1000	LD0.FLTMSTA1.AmpsNClc.mag	-	Y	Residual Clc current at moment of trip	0.00 50.00 [xIn]
9421						(reserved)	0
9422						(reserved)	0
9423	u16	1000	LD0.FLTMSTA1.VoltsA.mag	-	Y	Phase A voltage at moment of trip	0...4.00 [xUn]
9424	u16	1000	LD0.FLTMSTA1.VoltsB.mag	-	Y	Phase B voltage at moment of trip	0...4.00 [xUn]
9425	u16	1000	LD0.FLTMSTA1.VoltsC.mag	-	Y	Phase C voltage at moment of trip	0...4.00 [xUn]
9426	u16	1000	LD0.FLTMSTA1.VoltsAB.mag	-	Y	Phase-to-phase voltage AB at moment of trip	0...4.00 [xUn]
9427	u16	1000	LD0.FLTMSTA1.VoltsBC.mag	-	Y	Phase-to-phase voltage BC at moment of trip	0...4.00 [xUn]
9428	u16	1000	LD0.FLTMSTA1.VoltsCA.mag	-	Y	Phase-to-phase voltage CA at moment of trip	0...4.00 [xUn]
Table continues on next page							

Reg addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
9429	u16	1000	LD0.FLTMSTA1.VoltsN.mag	-	Y	Residual voltage at moment of trip	0...4.00 [xUn]
9430	u16	1000	LD0.FLTMSTA1.VZroSeq.mag	-	Y	Zero sequence voltage at moment of trip	0...4.00 [xUn]
9431	u16	1000	LD0.FLTMSTA1.VPsSeq.mag	-	Y	Positive sequence voltage at moment of trip	0...4.00 [xUn]
9432	u16	1000	LD0.FLTMSTA1.VNgSeq.mag	-	Y	Negative sequence voltage at moment of trip	0...4.00 [xUn]
9433						(reserved)	0
9434	i16	10	LD0.FLTMSTA1.DifNAngN.mag	-	Y	Angle residual voltage - residual current	-180.00...180.00 [degrees]
9435	i16	10	LD0.FLTMSTA1.DifAAngBC.mag	-	Y	Angle phase B to phase C voltage - phase A current	-180.00...180.00 [degrees]
9436	i16	10	LD0.FLTMSTA1.DifBAngCA.mag	-	Y	Angle phase C to phase A voltage - phase B current	-180.00...180.00 [degrees]
9437	i16	10	LD0.FLTMSTA1.DifCAngAB.mag	-	Y	Angle phase A to phase B voltage - phase C current	-180.00...180.00 [degrees]
9438	u16	100	LD0.FLTMSTA1.PDNS1MxRat.mag	-	Y	PDNSPTOC1 ratio I2/I1	0.00...999.99 [%]
9439	u16	100	LD0.FLTMSTA1.Hz.mag	-	Y	Frequency at moment of trip	30.00...80.00 [Hz]
9440	i16	100	LD0.FLTMSTA1.HzS.mag	-	Y	Frequency gradient at moment of trip	-10.00...10.00 Hz/s
9441						(reserved)	0
9442						(reserved)	0
9443	u16	1000	LD0.FLTMSTA1.MaxAmpsAb.mag	-	Y	Max phase Ab current during fault	0.00 50.00 [xIn]
9444	u16	1000	LD0.FLTMSTA1.MaxAmpsBb.mag	-	Y	Max phase Bb current during fault	0.00 50.00 [xIn]
9445	u16	1000	LD0.FLTMSTA1.MaxAmpsCb.mag	-	Y	Max phase Cb current during fault	0.00 50.00 [xIn]
9446	u16	1000	LD0.FLTMSTA1.AmpsAb.mag	-	Y	Phase Ab current at moment of trip	0.00 50.00 [xIn]
9447	u16	1000	LD0.FLTMSTA1.AmpsBb.mag	-	Y	Phase Bb current at moment of trip	0.00 50.00 [xIn]
9448	u16	1000	LD0.FLTMSTA1.AmpsCb.mag	-	Y	Phase Cb current at moment of trip	0.00 50.00 [xIn]

Table 4: *Indications*

Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
2720	170.00	CTRL.LLN0.Loc.stVal	-	Y	Local/Remote state - mom	0=Local, 1=Remote
2721	170.01	CTRL.LLN0.LocRem.Station	-	Y	Station - mom	0 = OFF, 1 =ON
2722	170.02	DR.RDRE1.RcdMade.stVal	-		Disturbance recorder file ready	1=DR file captured
2723	170.03	DR.RDRE1.RcdMade.stVal			Disturbance recorder file ready - MCD	
2724	170.04	LD0.DARREC1.AROn.stVal	DARREC1.AR_ON		Autorecloser state	0=AR Off, 1=AR On
2725	170.05				(reserved)	0
...	...					
2735	170.15					
Global conditioning, all variants						
2736	171.00	LD0.LEDPTRC1.Str.general	-	Y	Start (.general)- mom	1=Start (LEDPTRC)
2737	171.01	LD0.LEDPTRC1.Str.general			Start (.general) - MCD	
2738	171.02	LD0.LEDPTRC1.Op.general	-	Y	Operate (.general) - mom	1=Operate (LEDPTRC)
2739	171.03	LD0.LEDPTRC1.Op.general			Operate(.general) - MCD	
Protection trip conditioning (1), all variants						
2740	171.04	LD0.TRPPTRC1.Op.general	-	Y	Input signal (.general)- mom	1=Input signal ON
2741	171.05	LD0.TRPPTRC1.Op.general			Input signal (.general) - MCD	
2742	171.06	LD0.TRPPTRC1.Tr.general	-	Y	Trip output signal (.general) - mom	1=Trip output signal ON
2743	171.07	LD0.TRPPTRC1.Tr.general			Trip output signal (.general) - MCD	
Protection trip conditioning (2), all variants						
2744	171.08	LD0.TRPPTRC2.Op.general	-	Y	Input signal (.general) - mom	1=Input signal ON
2745	171.09	LD0.TRPPTRC2.Op.general			Input signal (.general) - MCD	
2746	171.10	LD0.TRPPTRC2.Tr.general	-	Y	Trip output signal [.general] - mom	1=Trip output signal ON
2747	171.11	LD0.TRPPTRC2.Tr.general			Trip output signal [.general] - MCD	
2748	171.12				(reserved)	0
2749	171.13				(reserved)	0
2750	171.14				(reserved)	0
2751	171.15				(reserved)	0
Phase current value limit supervision, all variants						
2752	172.00	LD0.CMMXU1.HiAlm.stVal	CMMXU1.HIGH_ALARM	Y	High alarm[.stVal] - mom	1=High alarm
2753	172.01	LD0.CMMXU1.HiAlm.stVal			High alarm[.stVal] - MCD	
2754	172.02	LD0.CMMXU1.HiWrn.stVal	CMMXU1.HIGH_WARN	Y	High warning[.stVal] - mom	1=High warning
2755	172.03	LD0.CMMXU1.HiWrn.stVal			High warning[.stVal] - MCD	
2756	172.04	LD0.CMMXU1.LoWrn.stVal	CMMXU1.LOW_WARN	Y	Low warning[.stVal] - mom	1=Low warning
2757	172.05	LD0.CMMXU1.LoWrn.stVal			Low warning[.stVal] - MCD	
2758	172.06	LD0.CMMXU1.LoAlm.stVal	CMMXU1.LOW_ALARM	Y	Low alarm[.stVal] - mom	1=Low alarm
2759	172.07	LD0.CMMXU1.LoAlm.stVal			Low alarm[.stVal] - MCD	
Residual current value limit supervision, all variants						
2760	172.08	LD0.RESCMMXU1.HiAlm.stVal	RESCMMXU1.HIGH_ALARM	Y	High alarm[.stVal] - mom	1= High alarm

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Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
2761	172.09	LD0.RESCMMXU1.HiAlm.stVal			High alarm[.stVal] - MCD	
2762	172.10	LD0.RESCMMXU1.HiWrn.stVal	RESCMMXU1.HIGH_WARN	Y	High warning[.stVal] - mom	1=High warning
2763	172.11	LD0.RESCMMXU1.HiWrn.stVal			High warning[.stVal] - MCD	
Residual voltage value limit supervision, FC01,2,05,06,51,52						
2764	172.12	LD0.RESVMMXU1.HiAlm.stVal	RESVMMXU1.HIGH_ALARM	Y	High alarm[.stVal] - mom	1=High alarm
2765	172.13	LD0.RESVMMXU1.HiAlm.stVal			High alarm[.stVal] - MCD	
2766	172.14	LD0.RESVMMXU1.HiWrn.stVal	RESVMMXU1.HIGH_WARN	Y	High warning[.stVal] - mom	1=High warning
2767	172.15	LD0.RESVMMXU1.HiWrn.stVal			High warning[.stVal] - MCD	
Indication LED states, all variants						
2768	173.00	LD0.LEDGGIO1.SPCSO1.stVal	-	Y	LED 1[.stVal] - mom	1=LED ON
2769	173.01	LD0.LEDGGIO1.SPCSO2.stVal	-	Y	LED 2[.stVal] - mom	1=LED ON
2770	173.02	LD0.LEDGGIO1.SPCSO3.stVal	-	Y	LED 3[.stVal] - mom	1=LED ON
2771	173.03	LD0.LEDGGIO1.SPCSO4.stVal	-	Y	LED 4[.stVal] - mom	1=LED ON
2772	173.04	LD0.LEDGGIO1.SPCSO5.stVal	-	Y	LED 5[.stVal] - mom	1=LED ON
2773	173.05	LD0.LEDGGIO1.SPCSO6.stVal	-	Y	LED 6[.stVal] - mom	1=LED ON
2774	173.06	LD0.LEDGGIO1.SPCSO7.stVal	-	Y	LED 7[.stVal] - mom	1=LED ON
2775	173.07	LD0.LEDGGIO1.SPCSO8.stVal	-	Y	LED 8[.stVal] - mom	1=LED ON
2776	173.08	LD0.LEDGGIO1.SPCSO9.stVal	-	Y	LED 9[.stVal] - mom	1=LED ON
2777	173.09	LD0.LEDGGIO1.SPCSO10.stVal	-	Y	LED 10[.stVal] - mom	1=LED ON
2778	173.10	LD0.LEDGGIO1.SPCSO11.stVal	-	Y	LED 11[.stVal] - mom	1=LED ON
2779	173.11				(reserved)	0
Trip circuit supervision (1), all variants						
2780	173.12	LD0.TCSSCBR1.CirAlm.stVal	TCSSCBR1.ALARM	Y	Alarm[.stVal] - mom	1=TCS1 Alarm
2781	173.13	LD0.TCSSCBR1.CirAlm.stVal			Alarm[.stVal] - MCD	
Trip circuit supervision (2), all variants						
2782	173.14	LD0.TCSSCBR2.CirAlm.stVal	TCSSCBR2.ALARM	Y	Alarm[.stVal] - mom	1=TCS2 Alarm
2783	173.15	LD0.TCSSCBR2.CirAlm.stVal			Alarm[.stVal] - MCD	
Phase-to-phase voltage limit supervision, FC05,06,51,52						
2784	174.00	LD0.VMMXU1.HiAlm.stVal	VMMXU1.HIGH_ALARM	Y	High alarm[.stVal] - mom	1=High alarm
2785	174.01	LD0.VMMXU1.HiAlm.stVal			High alarm[.stVal] - MCD	
2786	174.02	LD0.VMMXU1.HiWrn.stVal	VMMXU1.HIGH_WARN	Y	High warning[.stVal] - mom	1=High warning
2787	174.03	LD0.VMMXU1.HiWrn.stVal			High warning[.stVal] - MCD	
2788	174.04	LD0.VMMXU1.LoWrn.stVal	VMMXU1.LOW_WARN	Y	Low warning[.stVal] - mom	1=Low warning
2789	174.05	LD0.VMMXU1.LoWrn.stVal			Low warning[.stVal] - MCD	
2790	174.06	LD0.VMMXU1.LoAlm.stVal	VMMXU1.LOW_ALARM	Y	Low alarm[.stVal] - mom	1=Low alarm
2791	174.07	LD0.VMMXU1.LoAlm.stVal			Low alarm[.stVal] - MCD	
Disconnecter (1) position, FC02,04,05,06,51,52						
2792	174.08	CTRL.DCSXSWI1.Pos.stVal	DCSXSWI1.POSITION	Y	close mom	1=Close
2793	174.09	CTRL.DCSXSWI1.Pos.stVal	-	Y	open mom	1=Open
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Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
2794	174.10	CTRL.DCSXSWI1.Pos.stVal	-		error position	1=Faulty or Intermediate
Disconnecter (2) position, FC02,04,05,06,51						
2795	174.11	CTRL.DCSXSWI2.Pos.stVal	DCSXSWI2.POSITION	Y	close mom	1=Close
2796	174.12	CTRL.DCSXSWI2.Pos.stVal	-	Y	open mom	1=Open
2797	174.13	CTRL.DCSXSWI2.Pos.stVal	-		error position	1=Faulty or Intermediate
Disconnecter (3) position, FC02,04,05,06,51,52						
2798	174.14	CTRL.DCSXSWI3.Pos.stVal	DCSXSWI3.POSITION	Y	close mom	1=Close
2799	174.15	CTRL.DCSXSWI3.Pos.stVal	-	Y	open mom	1=Open
2800	175.00	CTRL.DCSXSWI3.Pos.stVal	-		error position	1=Faulty or Intermediate
Earth disconnecter position, FC02,04,05,06,51,52						
2801	175.01	CTRL.ESSXSWI1.Pos.stVal	ESSXSWI1.POSITION	Y	close mom	1=Close
2802	175.02	CTRL.ESSXSWI1.Pos.stVal	-	Y	open mom	1=Open
2803	175.03	CTRL.ESSXSWI1.Pos.stVal	-		error position	1=Faulty or Intermediate
Circuit breaker position, all variants						
2804	175.04	CTRL.CBCSWI1.Pos.stVal	CBXCBR1.POSITION	Y	close mom	1=Close
2805	175.05	CTRL.CBCSWI1.Pos.stVal	-	Y	open mom	1=Open
2806	175.06	CTRL.CBCSWI1.Pos.stVal	-		error position	1=Faulty or Intermediate
2807	175.07				(reserved)	0
Phase current (b) value limit supervision, FC51						
2808	172.00	LD0.CMMXU2.HiAlm.stVal	CMMXU2.HIGH_ALARM	Y	High alarm[.stVal] - mom	1=High alarm
2809	172.01	LD0.CMMXU2.HiAlm.stVal			High alarm[.stVal] - MCD	
2810	172.02	LD0.CMMXU2.HiWrn.stVal	CMMXU2.HIGH_WARN	Y	High warning[.stVal] - mom	1=High warning
2811	172.03	LD0.CMMXU2.HiWrn.stVal			High warning[.stVal] - MCD	
2812	172.04	LD0.CMMXU2.LoWrn.stVal	CMMXU2.LOW_WARN	Y	Low warning[.stVal] - mom	1=Low warning
2813	172.05	LD0.CMMXU2.LoWrn.stVal			Low warning[.stVal] - MCD	
2814	172.06	LD0.CMMXU2.LoAlm.stVal	CMMXU2.LOW_ALARM	Y	Low alarm[.stVal] - mom	1=Low alarm
2815	172.07	LD0.CMMXU2.LoAlm.stVal			Low alarm[.stVal] - MCD	
Circuit breaker position + momentary change detect, all variants						
2816	176.00	CTRL.CBCSWI1.Pos.stVal	CBXCBR1.POSITION	Y	close mom	1=Close
2817	176.01	CTRL.CBCSWI1.Pos.stVal			close MCD	
2818	176.02	CTRL.CBCSWI1.Pos.stVal	-	Y	open mom	1=Open
2819	176.03	CTRL.CBCSWI1.Pos.stVal			open MCD	
2820	176.04				(reserved)	0
2821	176.05				(reserved)	0
Circuit breaker selected for control operation, all variants						
2822	176.06	CTRL.CBCSWI1.Pos.stSeld	CBXCBR1.SELECTED	Y	Selected (.stSeld) - mom	1=Selected
2823	176.07	CTRL.CBCSWI1.Pos.stSeld			Selected [.stSeld] - MCD	
Circuit breaker control enable signals, all variants						
2824	176.08	CTRL.CBCILO1.EnaOpn.stVal	CBXCBR1.ENA_OPEN	Y	Open enabled (.stVal) - mom	1=Open enabled
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Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
2825	176.09	CTRL.CBCILO1.EnaCls.stVal	CBXCBR1.ENA_CLOSE	Y	Close enabled (.stVal) - mom	1=Close enabled
Circuit breaker failure detection and -protection, all variants						
2826	176.10	LD0.CCBRBRF1.InStr.stVal			Start command[.stVal] - mom	1=Start command
2827	176.11	LD0.CCBRBRF1.InStr.stVal			Start command[.stVal] - MCD	
2828	176.12	LD0.CCBRBRF1.Str.general	CCBRBRF1.CB_FAULT_AL	Y	Start, timer running[.general] - mom	1=Start, timer running
2829	176.13	LD0.CCBRBRF1.Str.general			Start, timer running[.general] - MCD	
2830	176.14	LD0.CCBRBRF1.OpEx.general	CCBRBRF1.TRBU	Y	Failure, external trip [.general] - mom	1=Failure, external trip
2831	176.15	LD0.CCBRBRF1.OpEx.general			Failure, external trip [.general] - MCD	
2832	177.00	LD0.CCBRBRF1.Opln.general	CCBRBRF1.TRRET	Y	Operate, internal retrip (.general) - mom	1=Operate, internal re-trip
2833	177.01	LD0.CCBRBRF1.Opln.general			Operate, internal retrip (.general) - MCD	
2834	177.02	LD0.CCBRBRF1.InPosCls.stVal	CCBRBRF1.POSCLOSE	Y	CB in closed position[.stVal] - mom	1=CB Closed
2835	177.03	LD0.CCBRBRF1.InCBFlt.stVal			CB faulty and unable to trip[.stVal] - mom	1=CB faulty, trip unable
2836	177.04	CTRL.CBXCBR1.BlkOpn.stVal	CBXCBR1.BLK_OPEN	Y	Open blocked [.stVal] - mom	1 = Open blocked
2837	177.05	CTRL.CBXCBR1.BlkOpn.stVal			Open blocked [.stVal] - MCD	
2838	177.06	CTRL.CBXCBR1.BlkCls.stVal	CBXCBR1.BLK_CLOSE	Y	Close blocked [.stVal] - mom	1 = Close blocked
2839	177.07	CTRL.CBXCBR1.BlkCls.stVal			Close blocked [.stVal] - MCD	
Admittance based earthfault protection - 2 stages (FC01,02,07)						
2840	177.08	LD0.EFPADM1.Str.general	EFPADM1.START	Y	Stage1 start [.general] - mom	1 = Stage1 start
2841	177.09	LD0.EFPADM1.Str.general			Stage1 start [.general] - MCD	
2842	177.10	LD0.EFPADM1.Op.general	EFPADM1.OPERATE	Y	Stage1 operate [.general] - mom	1 = Stage1 operate
2843	177.11	LD0.EFPADM1.Op.general			Stage1 operate [.general] - MCD	
2844	177.12	LD0.EFPADM2.Str.general	EFPADM2.START	Y	Stage2 start [.general] - mom	1 = Stage2 start
2845	177.13	LD0.EFPADM2.Str.general			Stage2 start [.general] - MCD	
2846	177.14	LD0.EFPADM2.Op.general	EFPADM2.OPERATE	Y	Stage2 operate [.general] - mom	1 = Stage2 operate
2847	177.15	LD0.EFPADM2.Op.general			Stage2 operate [.general] - MCD	
Circuit breaker condition monitoring, FC02,04,05,06,51,52						
2848	178.00	LD0.SSCBR1.OpnAlm.stVal	SSCBR1.TRV_T_OP_ALM	Y	Open travel time exceeded (.stVal) - mom	1=Open travel time alarm
2849	178.01	LD0.SSCBR1.ClsAlm.stVal	SSCBR1.TRV_T_CL_ALM	Y	Close travel time exceeded (.stVal) - mom	1=Close travel time alarm
2850	178.02	LD0.SSCBR1.SprChaAlm.stVal	SSCBR1.SPR_CHR_ALM	Y	Spring charging time exceeded (.stVal)- mom	1=Spring charging time alarm
2851	178.03	LD0.SSCBR1.OpNumAlm.stVal	SSCBR1.OPR_ALM	Y	Num of CB operations alarm (.stVal)- mom	1=CB operations alarm
2852	178.04	LD0.SSCBR1.OpNumLO.stVal	SSCBR1.OPR_LO	Y	Num of CB operations lockout limit (.stVal) - mom	1=CB operations lockout alarm
2853	178.05	LD0.SSCBR1.LonTmAlm.stVal	SSCBR1.MON_ALM	Y	CB "not operated for long time"alarm (.stVal)- mom	1=CB unactive alarm
2854	178.06	LD0.SSCBR1.PresAlm.stVal	SSCBR1.PRES_ALM	Y	Pressure below alarm level[.stVal] - mom	1=Low pressure alarm
2855	178.07	LD0.SSCBR1.PresLO.stVal	SSCBR1.PRES_LO	Y	Pressure below lockout level[.stVal] - mom	1=Low pressure lockout alarm
2856	178.08	LD0.SSCBR1.APwrAlm.stVal	SSCBR1.IPOW_ALM	Y	Acc. currents power (lyt),alarm limit[.stVal] - mom	1=lyt alarm
2857	178.09	LD0.SSCBR1.APwrLO.stVal	SSCBR1.IPOW_LO	Y	Acc. currents power (lyt),lockout limit[.stVal] - mom	1=lyt lockout alarm
2858	178.10	LD0.SSCBR1.CBLifAlm.stVal	SSCBR1.CB_LIFE_ALM	Y	Remaining life of CB exceeded alarm limit[.stVal] - mom	1=CB life alarm
2859	178.11				(reserved)	0
Admittance based earthfault protection - 1 stage (FC01,02,07)						
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Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
2860	178.12	LD0.EFPADM3.Str.general	EFPADM3.START	Y	Stage3 start [.general] - mom	1 = Stage3 start
2861	178.13	LD0.EFPADM3.Str.general			Stage3 start [.general] - MCD	
2862	178.14	LD0.EFPADM3.Op.general	EFPADM3.OPERATE	Y	Stage3 operate [.general] - mom	1 = Stage3 operate
2863	178.15	LD0.EFPADM3.Op.general			Stage3 operate [.general] - MCD	
...	...					
2879	179.15					
Phase overcurrent protection signals (3 stages), FC01,02,03,04,05						
2880	180.00	LD0.PHLPTOC1.Str.general	PHLPTOC1.START	Y	Low stage Start[.general] - mom	1=Low stage start
2881	180.01	LD0.PHLPTOC1.Str.general			Low stage Start[.general] - MCD	
2882	180.02	LD0.PHLPTOC1.Str.phsA	-	Y	Low stage Start[.phsA] - mom	1=Low stage phsA start
2883	180.03	LD0.PHLPTOC1.Str.phsA			Low stage Start[.phsA] - MCD	
2884	180.04	LD0.PHLPTOC1.Str.phsB	-	Y	Low stage Start[.phsB] - mom	1=Low stage phsB start
2885	180.05	LD0.PHLPTOC1.Str.phsB			Low stage Start[.phsB] - MCD	
2886	180.06	LD0.PHLPTOC1.Str.phsC	-	Y	Low stage Start[.phsC] - mom	1=Low stage phsC start
2887	180.07	LD0.PHLPTOC1.Str.phsC			Low stage Start[.phsC] - MCD	
2888	180.08	LD0.PHLPTOC1.Op.general	PHLPTOC1.OPERATE	Y	Low stage Operate[.general] - mom	1=Low stage operate
2889	180.09	LD0.PHLPTOC1.Op.general			Low stage Operate[.general] - MCD	
2890	180.10	LD0.PHHPTOC1.Str.general	PHHPTOC1.START	Y	High(1) stage Start[.general] - mom	1=High(1) stage start
2891	180.11	LD0.PHHPTOC1.Str.general			High(1) stage Start[.general] - MCD	
2892	180.12	LD0.PHHPTOC1.Str.phsA	-	Y	High(1) stage Start[.phsA] - mom	1=High(1) stage phsA start
2893	180.13	LD0.PHHPTOC1.Str.phsA			High(1) stage Start[.phsA] - MCD	
2894	180.14	LD0.PHHPTOC1.Str.phsB	-	Y	High(1) stage Start[.phsB] - mom	1=High(1) stage phsB start
2895	180.15	LD0.PHHPTOC1.Str.phsB			High(1) stage Start[.phsB] - MCD	
2896	181.00	LD0.PHHPTOC1.Str.phsC	-	Y	High(1) stage Start[.phsC] - mom	1=High(1) stage phsC start
2897	181.01	LD0.PHHPTOC1.Str.phsC			High(1) stage Start[.phsC] - MCD	
2898	181.02	LD0.PHHPTOC1.Op.general	PHHPTOC1.OPERATE	Y	High(1) stage Operate[.general] - mom	1=High(1) stage operate
2899	181.03	LD0.PHHPTOC1.Op.general			High(1) stage Operate[.general] - MCD	
2900	181.04	LD0.PHHPTOC2.Str.general	PHHPTOC2.START	Y	High(2) stage Start[.general] - mom	1=High(2) stage start
2901	181.05	LD0.PHHPTOC2.Str.general			High(2) stage Start[.general] - MCD	
2902	181.06	LD0.PHHPTOC2.Str.phsA	-	Y	High(2) stage Start[.phsA] - mom	1=High(2) stage phsA start
2903	181.07	LD0.PHHPTOC2.Str.phsA			High(2) stage Start[.phsA] - MCD	
2904	181.08	LD0.PHHPTOC2.Str.phsB	-	Y	High(2) stage Start[.phsB] - mom	1=High(2) stage phsB start
2905	181.09	LD0.PHHPTOC2.Str.phsB			High(2) stage Start[.phsB] - MCD	
2906	181.10	LD0.PHHPTOC2.Str.phsC	-	Y	High(2) stage Start[.phsC] - mom	1=High(2) stage phsC start
2907	181.11	LD0.PHHPTOC2.Str.phsC			High(2) stage Start[.phsC] - MCD	
2908	181.12	LD0.PHHPTOC2.Op.general	PHHPTOC2.OPERATE	Y	High(2) stage Operate[.general] - mom	1=High(2) stage operate
2909	181.13	LD0.PHHPTOC2.Op.general			High(2) stage Operate[.general] - MCD	
Phase overcurrent protection signals (1 stage)						
2910	181.14	LD0.PHIPTOC1.Str.general	PHIPTOC1.START	Y	Instantaneous stage Start[.general] - mom	1=Instantaneous stage start

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Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
2911	181.15	LD0.PHIPTOC1.Str.general			Instantaneous stage Start[.general] - MCD	
2912	182.00	LD0.PHIPTOC1.Str.phsA	-	Y	Instantaneous stage Start[.phsA] - mom	1=Inst. stage phsA start
2913	182.01	LD0.PHIPTOC1.Str.phsA			Instantaneous stage Start[.phsA] - MCD	
2914	182.02	LD0.PHIPTOC1.Str.phsB	-	Y	Instantaneous stage Start[.phsB] - mom	1=Inst. stage phsB start
2915	182.03	LD0.PHIPTOC1.Str.phsB			Instantaneous stage Start[.phsB] - MCD	
2916	182.04	LD0.PHIPTOC1.Str.phsC	-	Y	Instantaneous stage Start[.phsC] - mom	1=Inst. stage phsC start
2917	182.05	LD0.PHIPTOC1.Str.phsC			Instantaneous stage Start[.phsC] - MCD	
2918	182.06	LD0.PHIPTOC1.Op.general	PHIPTOC1.OPERATE	Y	Instantaneous stage Operate[.general] - mom	1=Instantaneous stage operate
2919	182.07	LD0.PHIPTOC1.Op.general			Instantaneous stage Operate[.general] - MCD	
Directional earth-fault protection signals (3 stages), FC01,02,05,06,51,52						
2920	182.08	LD0.DEFLPTOC1.Str.general	DEFLPTOC1.START	Y	Low(1) stage Start[.general] - mom	1=Low(1) stage start
2921	182.09	LD0.DEFLPTOC1.Str.general			Low(1) stage Start[.general] - MCD	
2922	182.10	LD0.DEFLPTOC1.Op.general	DEFLPTOC1.OPERATE	Y	Low(1) stage Operate[.general] - mom	1=Low(1) stage operate
2923	182.11	LD0.DEFLPTOC1.Op.general			Low(1) stage Operate[.general] - MCD	
2924	182.12	LD0.DEFLPTOC2.Str.general	DEFLPTOC2.START	Y	Low(2) stage Start[.general] - mom	1=Low(2) stage start
2925	182.13	LD0.DEFLPTOC2.Str.general			Low(2) stage Start[.general] - MCD	
2926	182.14	LD0.DEFLPTOC2.Op.general	DEFLPTOC2.OPERATE	Y	Low(2) stage Operate[.general] - mom	1=Low(2) stage operate
2927	182.15	LD0.DEFLPTOC2.Op.general			Low(2) stage Operate[.general] - MCD	
2928	183.00	LD0.DEFHPTOC1.Str.general	DEFHPTOC1.START	Y	High stage Start[.general] - mom	1=High stage start
2929	183.01	LD0.DEFHPTOC1.Str.general			High stage Start[.general] - MCD	
2930	183.02	LD0.DEFHPTOC1.Op.general	DEFHPTOC1.OPERATE	Y	High stage Operate[.general] - mom	1=High stage operate
2931	183.03	LD0.DEFHPTOC1.Op.general			High stage Operate[.general] - MCD	
Non-directional earth-fault and sensitive earth-fault protection signals (4 stages), FC03,04 (EFHPTOC1 in all variants)						
2932	183.04	LD0.EFLPTOC1.Str.general	EFLPTOC1.START	Y	Low(1) stage Start[.general] - mom	1=Low(1) stage start
2933	183.05	LD0.EFLPTOC1.Str.general			Low(1) stage Start[.general] - MCD	
2934	183.06	LD0.EFLPTOC1.Op.general	EFLPTOC1.OPERATE	Y	Low(1) stage Operate[.general] - mom	1=Low(1) stage operate
2935	183.07	LD0.EFLPTOC1.Op.general			Low(1) stage Operate[.general] - MCD	
2936	183.08	LD0.EFLPTOC2.Str.general	EFLPTOC2.START	Y	Low(2) stage Start[.general] - mom	1=Low(2) stage start
2937	183.09	LD0.EFLPTOC2.Str.general			Low(2) stage Start[.general] - MCD	
2938	183.10	LD0.EFLPTOC2.Op.general	EFLPTOC2.OPERATE	Y	Low(2) stage Operate[.general] - mom	1=Low(2) stage operate
2939	183.11	LD0.EFLPTOC2.Op.general			Low(2) stage Operate[.general] - MCD	
2940	183.12	LD0.EFHPTOC1.Str.general	EFHPTOC1.START	Y	High stage Start[.general] - mom	1=High stage start
2941	183.13	LD0.EFHPTOC1.Str.general			High stage Start[.general] - MCD	
2942	183.14	LD0.EFHPTOC1.Op.general	EFHPTOC1.OPERATE	Y	High stage Operate[.general] - mom	1=High stage operate
2943	183.15	LD0.EFHPTOC1.Op.general			High stage Operate[.general] - MCD	
2944	184.00	LD0.EFIPTOC1.Str.general	EFIPTOC1.START	Y	Instantaneous stage Start[.general] - mom	1=Instantaneous stage start
2945	184.01	LD0.EFIPTOC1.Str.general			Instantaneous stage Start[.general] - MCD	
2946	184.02	LD0.EFIPTOC1.Op.general	EFIPTOC1.OPERATE	Y	Instantaneous stage Operate[.general] - mom	1=Instantaneous stage operate
2947	184.03	LD0.EFIPTOC1.Op.general			Instantaneous stage Operate[.general] - MCD	
Table continues on next page						

Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
Transient/Intermittent earth-fault protection signals (1 stage), FC01,02,05,06,51,52						
2948	184.04	LD0.INTRPTEF1.Str.general	INTRPTEF1.START	Y	Start[.general] - mom	1=Stage start
2949	184.05	LD0.INTRPTEF1.Str.general			Start[.general] - MCD	
2950	184.06	LD0.INTRPTEF1.Op.general	INTRPTEF1.OPERATE	Y	Operate[.general] - mom	1=Stage operate
2951	184.07	LD0.INTRPTEF1.Op.general			Operate[.general] - MCD	
Phase discontinuity protection signals (1 stage), all variants						
2952	184.08	LD0.PDNSPTOC1.Str.general	PDNSPTOC1.START	Y	Start[.general] - mom	1=Stage start
2953	184.09	LD0.PDNSPTOC1.Str.general			Start[.general] - MCD	
2954	184.10	LD0.PDNSPTOC1.Op.general	PDNSPTOC1.OPERATE	Y	Operate[.general] - mom	1=Stage operate
2955	184.11	LD0.PDNSPTOC1.Op.general			Operate[.general] - MCD	
Negative sequence overcurrent protection signals (2 stages), all variants						
2956	184.12	LD0.NSPTOC1.Str.general	NSPTOC1.START	Y	Stage1 Start[.general] - mom	1=Stage1 start
2957	184.13	LD0.NSPTOC1.Str.general			Stage1 Start[.general] - MCD	
2958	184.14	LD0.NSPTOC1.Op.general	NSPTOC1.OPERATE	Y	Stage1 Operate[.general] - mom	1=Stage1 operate
2959	184.15	LD0.NSPTOC1.Op.general			Stage1 Operate[.general] - MCD	
2960	185.00	LD0.NSPTOC2.Str.general	NSPTOC2.START	Y	Stage2 Start[.general] - mom	1=Stage2 start
2961	185.01	LD0.NSPTOC2.Str.general			Stage2 Start[.general] - MCD	
2962	185.02	LD0.NSPTOC2.Op.general	NSPTOC2.OPERATE	Y	Stage2 Operate[.general] - mom	1=Stage2 operate
2963	185.03	LD0.NSPTOC2.Op.general			Stage2 Operate[.general] - MCD	
Three-phase inrush detection signals, all variants						
2964	185.04	LD0.INRPHAR1.Str.general	INRPHAR1.BLK2H	Y	Start[.general] - mom	1=Start general
2965	185.05	LD0.INRPHAR1.Str.general			Start[.general] - MCD	
2966	185.06	LD0.INRPHAR1.Str.phsA	-	Y	Start[.phsA] - mom	1=Start phsA
2967	185.07	LD0.INRPHAR1.Str.phsA			Start[.phsA] - MCD	
2968	185.08	LD0.INRPHAR1.Str.phsB	-	Y	Start[.phsB] - mom	1=Start phsB
2969	185.09	LD0.INRPHAR1.Str.phsB			Start[.phsB] - MCD	
2970	185.10	LD0.INRPHAR1.Str.phsC	-	Y	Start[.phsC] - mom	1=Start phsC
2971	185.11	LD0.INRPHAR1.Str.phsC			Start[.phsC] - MCD	
Thermal overload protection signals (1 stage), all variants						
2972	185.12	LD0.T1PTTR1.Str.general	T1PTTR1.START	Y	Start[.general] - mom	1=Start
2973	185.13	LD0.T1PTTR1.Str.general			Start[.general] - MCD	
2974	185.14	LD0.T1PTTR1.AlmThm.general	T1PTTR1.ALARM	Y	Thermal Alarm[.general] - mom	1=Thermal alarm
2975	185.15	LD0.T1PTTR1.AlmThm.general			Thermal Alarm[.general] - MCD	
2976	186.00	LD0.T1PTTR1.Op.general	T1PTTR1.OPERATE	Y	Operate[.general] - mom	1=Operate
2977	186.01	LD0.T1PTTR1.Op.general			Operate[.general] - MCD	
ARC protection signals (3 stages), optional in all variants						
2978	186.02	LD0.ARCsARC11.FADet.stVal	ARCSARC1.ARC_FLT_DET	Y	Stage1 Fault arc detected[.stVal] - mom	1=Stage1 arc detected
2979	186.03	LD0.ARCsARC11.FADet.stVal			Stage1 Fault arc detected[.stVal] - MCD	
2980	186.04	LD0.ARCsARC11.InRemFA.stVal	-	Y	Stage1 Remote Fault arc detected[.stVal] - mom	1=Stage1 remote arc detected
Table continues on next page						

Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
2981	186.05	LD0.ARCSARC11.InRemFA.stVal			Stage1 Remote Fault arc detected[.stVal] - MCD	
2982	186.06	LD0.ARCPTRC11.Op.general	ARCSARC1.OPERATE	Y	Stage1 Operate[.general] - mom	1=Stage1 operate
2983	186.07	LD0.ARCPTRC11.Op.general			Stage1 Operate[.general] - MCD	
2984	186.08	LD0.ARCSARC21.FADet.stVal	ARCSARC2.ARC_FLT_DET	Y	Stage2 Fault arc detected[.stVal] - mom	1=Stage2 arc detected
2985	186.09	LD0.ARCSARC21.FADet.stVal			Stage2 Fault arc detected[.stVal] - MCD	
2986	186.10	LD0.ARCSARC21.InRemFA.stVal	-	Y	Stage2 Remote Fault arc detected[.stVal] - mom	1=Stage2 remote arc detected
2987	186.11	LD0.ARCSARC21.InRemFA.stVal			Stage2 Remote Fault arc detected[.stVal] - MCD	
2988	186.12	LD0.ARCPTRC21.Op.general	ARCSARC2.OPERATE	Y	Stage2 Operate[.general] - mom	1=Stage2 operate
2989	186.13	LD0.ARCPTRC21.Op.general			Stage2 Operate[.general] - MCD	
2990	186.14	LD0.ARCSARC31.FADet.stVal	ARCSARC3.ARC_FLT_DET	Y	Stage3 Fault arc detected[.stVal] - mom	1=Stage3 arc detected
2991	186.15	LD0.ARCSARC31.FADet.stVal			Stage3 Fault arc detected[.stVal] - MCD	
2992	187.00	LD0.ARCSARC31.InRemFA.stVal	-	Y	Stage3 Remote Fault arc detected[.stVal] - mom	1=Stage3 remote arc detected
2993	187.01	LD0.ARCSARC31.InRemFA.stVal			Stage3 Remote Fault arc detected[.stVal] - MCD	
2994	187.02	LD0.ARCPTRC31.Op.general	ARCSARC3.OPERATE	Y	Stage3 Operate[.general] - mom	1=Stage3 operate
2995	187.03	LD0.ARCPTRC31.Op.general			Stage3 Operate[.general] - MCD	
Fuse failure protection (1 stage), FC05,06,51,52						
2996	187.04	LD0.SEQRFUF1.Str.general	SEQRFUF1.FUSEF_U	Y	Start[.general] - mom	1=Start general
2997	187.05	LD0.SEQRFUF1.Str.phsA			Start[.general] - MCD	
2998	187.06	LD0.SEQRFUF1.Str3Ph.general	SEQRFUF1.FUSEF_3PH	Y	Start[.general] - mom	1=Start 3phase general
2999	187.07	LD0.SEQRFUF1.Str3Ph.phsB			Start[.general] - MCD	
3000	187.08				(reserved)	0
3001	187.09				(reserved)	0
Current circuit failure detection (1 stage), FC05,06,51,52						
3002	187.10	LD0.CCRDIF1.Alm.stVal	CCRDIF1.ALARM	Y	Alarm[.general] - mom	1=Alarm
3003	187.11	LD0.CCRDIF1.Alm.stVal			Alarm[.general] - MCD	
3004	187.12	LD0.CCRDIF1.Op.general	CCRDIF1.FAIL	Y	Operate[.general] - mom	1=Operate
3005	187.13	LD0.CCRDIF1.Op.general			Operate[.general] - MCD	
Three-phase directional overcurrent protection (3 stages), FC06,51,52						
3006	187.14	LD0.DPHLPTOC1.Str.general	DPHLPDEF1.START	Y	Low stage 1 Start[.general] - mom	1=Low stage1 start
3007	187.15	LD0.DPHLPTOC1.Str.general			Low stage 1 Start[.general] - MCD	
3008	188.00	LD0.DPHLPTOC1.Str.phsA	-	Y	Low stage 1 Start[.phsA] - mom	1=Low stage1 phsA start
3009	188.01	LD0.DPHLPTOC1.Str.phsA			Low stage 1 Start[.phsA] - MCD	
3010	188.02	LD0.DPHLPTOC1.Str.phsB	-	Y	Low stage 1 Start[.phsB] - mom	1=Low stage1 phsB start
3011	188.03	LD0.DPHLPTOC1.Str.phsB			Low stage 1 Start[.phsB] - MCD	
3012	188.04	LD0.DPHLPTOC1.Str.phsC	-	Y	Low stage 1 Start[.phsC] - mom	1=Low stage1 phsC start
3013	188.05	LD0.DPHLPTOC1.Str.phsC			Low stage 1 Start[.phsC] - MCD	
3014	188.06	LD0.DPHLPTOC1.Op.general	DPHLPDEF1.OPERATE	Y	Low stage 1 Operate[.general] - mom	1=Low stage1 operate
3015	188.07	LD0.DPHLPTOC1.Op.general			Low stage 1 Operate[.general] - MCD	
3016	188.08	LD0.DPHLPTOC2.Str.general	DPHLPDEF2.START	Y	Low stage 2 Start[.general] - mom	1=Low stage2 start
Table continues on next page						

Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
3017	188.09	LD0.DPHLPTOC2.Str.general			Low stage 2 Start[.general] - MCD	
3018	188.10	LD0.DPHLPTOC2.Str.phsA	-	Y	Low stage 2 Start[.phsA] - mom	1=Low stage2 phsA start
3019	188.11	LD0.DPHLPTOC2.Str.phsA			Low stage 2 Start[.phsA] - MCD	
3020	188.12	LD0.DPHLPTOC2.Str.phsB	-	Y	Low stage 2 Start[.phsB] - mom	1=Low stage2 phsB start
3021	188.13	LD0.DPHLPTOC2.Str.phsB			Low stage 2 Start[.phsB] - MCD	
3022	188.14	LD0.DPHLPTOC2.Str.phsC	-	Y	Low stage 2 Start[.phsC] - mom	1=Low stage2 phsC start
3023	188.15	LD0.DPHLPTOC2.Str.phsC			Low stage 2 Start[.phsC] - MCD	
3024	189.00	LD0.DPHLPTOC2.Op.general	DPHLPDEF2.OPERATE	Y	Low stage 2 Operate[.general] - mom	1=Low stage2 operate
3025	189.01	LD0.DPHLPTOC2.Op.general			Low stage 2 Operate[.general] - MCD	
3026	189.02	LD0.DPHHPTOC1.Str.general	DPHHPDEF1.START	Y	High stage 1 Start[.general] - mom	1=High stage1 start
3027	189.03	LD0.DPHHPTOC1.Str.general			High stage 1 Start[.general] - MCD	
3028	189.04	LD0.DPHHPTOC1.Str.phsA	-	Y	High stage 1 Start[.phsA] - mom	1=High stage1 phsA start
3029	189.05	LD0.DPHHPTOC1.Str.phsA			High stage 1 Start[.phsA] - MCD	
3030	189.06	LD0.DPHHPTOC1.Str.phsB	-	Y	High stage 1 Start[.phsB] - mom	1=High stage1 phsB start
3031	189.07	LD0.DPHHPTOC1.Str.phsB			High stage 1 Start[.phsB] - MCD	
3032	189.08	LD0.DPHHPTOC1.Str.phsC	-	Y	High stage 1 Start[.phsC] - mom	1=High stage1 phsC start
3033	189.09	LD0.DPHHPTOC1.Str.phsC			High stage 1 Start[.phsC] - MCD	
3034	189.10	LD0.DPHHPTOC1.Op.general	DPHHPDEF1.OPERATE	Y	High stage 1 Operate[.general] - mom	1=High stage1 operate
3035	189.11	LD0.DPHHPTOC1.Op.general			High stage 1 Operate[.general] - MCD	
3036	189.12				(reserved)	0
3037	189.13				(reserved)	0
3038	189.14				(reserved)	0
3039	189.15				(reserved)	0
Autorecloser detailed signals, optional in all variants						
3040	190.00	LD0.DARREC1.PrgRec.stVal	DARREC1.INPRO	Y	AR in progress [.stVal] - mom	1=In progress
3041	190.01	LD0.DARREC1.PrgRec.stVal			AR in progress [.stVal] - MCD	
3042	190.02	LD0.DARREC1.PrgRec1.stVal	DARREC1.INPRO_1	Y	AR in progress 1st reclose[.stVal] - mom	1=In progress
3043	190.03	LD0.DARREC1.PrgRec1.stVal			AR in progress 1st reclose[.stVal] - MCD	
3044	190.04	LD0.DARREC1.PrgRec2.stVal	DARREC1.INPRO_2	Y	AR in progress 2nd reclose[.stVal] - mom	1=In progress
3045	190.05	LD0.DARREC1.PrgRec2.stVal			AR in progress 2nd reclose[.stVal] - MCD	
3046	190.06	LD0.DARREC1.PrgRec3.stVal	DARREC1.INPRO_3	Y	AR in progress 3rd reclose[.stVal] - mom	1=In progress
3047	190.07	LD0.DARREC1.PrgRec3.stVal			AR in progress 3rd reclose[.stVal] - MCD	
3048	190.08	LD0.DARREC1.PrgRec4.stVal	DARREC1.INPRO_4	Y	AR in progress 4th reclose[.stVal] - mom	1=In progress
3049	190.09	LD0.DARREC1.PrgRec4.stVal			AR in progress 4th reclose[.stVal] - MCD	
3050	190.10	LD0.DARREC1.PrgRec5.stVal	DARREC1.INPRO_5	Y	AR in progress 5th reclose[.stVal] - mom	1=In progress
3051	190.11	LD0.DARREC1.PrgRec5.stVal			AR in progress 5th reclose[.stVal] - MCD	
3052	190.12	LD0.DARREC1.SucRec.stVal	DARREC1.SUC_RECL	Y	Successful reclose status[.stVal] - mom	1=Successful reclose
3053	190.13	LD0.DARREC1.SucRec.stVal			Successful reclose status[.stVal] - MCD	
3054	190.14	LD0.DARREC1.UnsRec.stVal	DARREC1.UNSUC_RECL	Y	Unsuccessful reclose status[.stVal] - mom	1=Unsuccessful reclose

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Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
3055	190.15	LD0.DARREC1.UnsRec.stVal			Unsuccessful reclose status[.stVal] - MCD	
3056	191.00	LD0.DARREC1.InInhRec.stVal	-	Y	Inhibit reclose (status)[.stVal] - mom	1=Reclose inhibit
3057	191.01	LD0.DARREC1.InInhRec.stVal			Inhibit reclose (status)[.stVal] - MCD	
3058	191.02	LD0.DARREC1.InBlkThm.stVal	-	Y	Thermal block (status)[.stVal] - mom	1=Thermal block
3059	191.03	LD0.DARREC1.InBlkThm.stVal			Thermal block (status)[.stVal] - MCD	
3060	191.04	LD0.DARREC1.LO.stVal	DARREC1.LOCKED	Y	Lockout status[.stVal] - mom	1=Lockout
3061	191.05	LD0.DARREC1.LO.stVal			Lockout status[.stVal] - MCD	
3062	191.06	LD0.DARREC1.RdyRec.stVal	DARREC1.READY	Y	Ready reclose status[.stVal] - mom	1=Reclose ready
3063	191.07	LD0.DARREC1.RdyRec.stVal			Ready reclose status[.stVal] - MCD	
3064	191.08	LD0.DARREC1.ActRec.stVal	DAAREC1.ACTIVE	Y	Active reclose status[.stVal] - mom	1=Reclose active
3065	191.09	LD0.DARREC1.ActRec.stVal			Active reclose status[.stVal] - MCD	
3066	191.10	LD0.DARREC1.PrgDsr.stVal	DARREC1.DISCN_INPRO	Y	Discrimination time in progress[.stVal] - mom	1=Discrimination time in progress
3067	191.11	LD0.DARREC1.PrgDsr.stVal			Discrimination time in progress[.stVal] - MCD	
3068	191.12	LD0.DARREC1.PrgCutOut.stVal	DARREC1.CUTOUT_INPRO	Y	Cutout time in progress[.stVal] - mom	1=Cutout time in progress
3069	191.13	LD0.DARREC1.PrgCutOut.stVal			Cutout time in progress[.stVal] - MCD	
3070	191.14	LD0.DARREC1.FrqOpAlm.stVal	DARREC1.FRQ_OP_ALM	Y	Frequent operation counter alarm[.stVal] - mom	1=Frequent operation alarm
3071	191.15	LD0.DARREC1.FrqOpAlm.stVal			Frequent operation counter alarm[.stVal] - MCD	
3072	192.00	LD0.DARREC1.RclTmStr.stVal	-	Y	Reclaim time started[.stVal] - mom	1=Reclaim time started
3073	192.01	LD0.DARREC1.RclTmStr.stVal			Reclaim time started[.stVal] - MCD	
3074	192.02	LD0.DARREC1.ProCrd.stVal	-	Y	Protection coordination[.stVal] - mom	1=Protection coordination
3075	192.03	LD0.DARREC1.ProCrd.stVal			Protection coordination[.stVal] - MCD	
3076	192.04	LD0.DARREC1.CBManCls.stVal	DARREC1.MAN_CB_CL	Y	CB manually closed[.stVal] - mom	1=CB manually closed
3077	192.05	LD0.DARREC1.CBManCls.stVal			CB manually closed[.stVal] - MCD	
3078	192.06	LD0.DARREC1.Op.general	DARREC1.CLOSE_CB	Y	Operate (close command to XCBR)[.general] - mom	1=Close command to CB
3079	192.07	LD0.DARREC1.Op.general			Operate (close command to XCBR)[.general] - MCD	
3080	192.08	LD0.DARREC1.OpOpn.general	DARREC1.OPEN_CB	Y	Operate (open command to XCBR)[.general] - mom	1=Open command to CB
3081	192.09	LD0.DARREC1.OpOpn.general			Operate (open command to XCBR)[.general] - MCD	
3082	192.10	LD0.DARREC1.UnsCBCls.stVal	DARREC1.UNSUC_CB	Y	Unsuccessful CB closing status[.stVal] - mom	1=Unsuccessful CB closing
3083	192.11	LD0.DARREC1.UnsCBCls.stVal			Unsuccessful CB closing status[.stVal] - MCD	
3084	192.12	LD0.DARREC1.WtMstr.stVal	DARREC1.CMD_WAIT	Y	Master signal to follower[.stVal] - mom	1=Master signal to follower
3085	192.13	LD0.DARREC1.WtMstr.stVal			Master signal to follower[.stVal] - MCD	
Switch onto fault protection, FC06,51,52						
3086	192.14	LD0.CBRSOF1.Op.general	CBRSOF1.OPERATE	Y	Operate [.general] - mom	1 = Operate
3087	192.15	LD0.CBRSOF1.Op.general			Operate [.general] - MCD	

Table 5: *Indications in FC06,51 and 52*

Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
Phase overvoltage protection (3 stages), FC06,51,52						
3088	193.00	LD0.PHPTOV1.Str.general	PHPTOV1.START	Y	Stage 1 Start[.general] - mom	1=Stage1 start
3089	193.01	LD0.PHPTOV1.Str.general			Stage 1 Start[.general] - MCD	
3090	193.02	LD0.PHPTOV1.Str.phsA	-	Y	Stage 1 Start[.phsA] - mom	1=Stage1 phsA start
3091	193.03	LD0.PHPTOV1.Str.phsA			Stage 1 Start[.phsA] - MCD	
3092	193.04	LD0.PHPTOV1.Str.phsB	-	Y	Stage 1 Start[.phsB] - mom	1=Stage1 phsB start
3093	193.05	LD0.PHPTOV1.Str.phsB			Stage 1 Start[.phsB] - MCD	
3094	193.06	LD0.PHPTOV1.Str.phsC	-	Y	Stage 1 Start[.phsC] - mom	1=Stage1 phsC start
3095	193.07	LD0.PHPTOV1.Str.phsC			Stage 1 Start[.phsC] - MCD	
3096	193.08	LD0.PHPTOV1.Op.general	PHPTOV1.OPERATE	Y	Stage 1 Operate[.general] - mom	1=Stage1 operate
3097	193.09	LD0.PHPTOV1.Op.general			Stage 1 Operate[.general] - MCD	
3098	193.10	LD0.PHPTOV2.Str.general	PHPTOV2.START	Y	Stage 2 Start[.general] - mom	1=Stage2 start
3099	193.11	LD0.PHPTOV2.Str.general			Stage 2 Start[.general] - MCD	
3100	193.12	LD0.PHPTOV2.Str.phsA	-	Y	Stage 2 Start[.phsA] - mom	1=Stage2 phsA start
3101	193.13	LD0.PHPTOV2.Str.phsA			Stage 2 Start[.phsA] - MCD	
3102	193.14	LD0.PHPTOV2.Str.phsB	-	Y	Stage 2 Start[.phsB] - mom	1=Stage2 phsB start
3103	193.15	LD0.PHPTOV2.Str.phsB			Stage 2 Start[.phsB] - MCD	
3104	194.00	LD0.PHPTOV2.Str.phsC	-	Y	Stage 2 Start[.phsC] - mom	1=Stage2 phsC start
3105	194.01	LD0.PHPTOV2.Str.phsC			Stage 2 Start[.phsC] - MCD	
3106	194.02	LD0.PHPTOV2.Op.general	PHPTOV2.OPERATE	Y	Stage 2 Operate[.general] - mom	1=Stage2 operate
3107	194.03	LD0.PHPTOV2.Op.general			Stage 2 Operate[.general] - MCD	
3108	194.04	LD0.PHPTOV3.Str.general	PHPTOV3.START	Y	Stage 3 Start[.general] - mom	1=Stage3 start
3109	194.05	LD0.PHPTOV3.Str.general			Stage 3 Start[.general] - MCD	
3110	194.06	LD0.PHPTOV3.Str.phsA	-	Y	Stage 3 Start[.phsA] - mom	1=Stage3 phsA start
3111	194.07	LD0.PHPTOV3.Str.phsA			Stage 3 Start[.phsA] - MCD	
3112	194.08	LD0.PHPTOV3.Str.phsB	-	Y	Stage 3 Start[.phsB] - mom	1=Stage3 phsB start
3113	194.09	LD0.PHPTOV3.Str.phsB			Stage 3 Start[.phsB] - MCD	
3114	194.10	LD0.PHPTOV3.Str.phsC	-	Y	Stage 3 Start[.phsC] - mom	1=Stage3 phsC start
3115	194.11	LD0.PHPTOV3.Str.phsC			Stage 3 Start[.phsC] - MCD	
3116	194.12	LD0.PHPTOV3.Op.general	PHPTOV3.OPERATE	Y	Stage 3 Operate[.general] - mom	1=Stage3 operate
3117	194.13	LD0.PHPTOV3.Op.general			Stage 3 Operate[.general] - MCD	
Positive sequence undervoltage protection (1 stage), FC06,51,52						
3118	194.14	LD0.PSPTUV1.Str.general	PHPTUV1.START	Y	Stage 1 Start[.general] - mom	1=Stage1 start
3119	194.15	LD0.PSPTUV1.Str.general			Stage 1 Start[.general] - MCD	
3120	195.00	LD0.PSPTUV1.Str.phsA	-	Y	Stage 1 Start[.phsA] - mom	1=Stage1 phsA start
3121	195.01	LD0.PSPTUV1.Str.phsA			Stage 1 Start[.phsA] - MCD	
3122	195.02	LD0.PSPTUV1.Str.phsB	-	Y	Stage 1 Start[.phsB] - mom	1=Stage1 phsB start
3123	195.03	LD0.PSPTUV1.Str.phsB			Stage 1 Start[.phsB] - MCD	
Table continues on next page						

Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
3124	195.04	LD0.PSPTUV1.Str.phsC	-	Y	Stage 1 Start[.phsC] - mom	1=Stage1 phsC start
3125	195.05	LD0.PSPTUV1.Str.phsC			Stage 1 Start[.phsC] - MCD	
3126	195.06	LD0.PSPTUV1.Op.general	PHPTUV1.OPERATE	Y	Stage 1 Operate[.general] - mom	1=Stage1 operate
3127	195.07	LD0.PSPTUV1.Op.general			Stage 1 Operate[.general] - MCD	
Negative sequence overvoltage (1 stage), FC06,51,52						
3128	195.08	LD0.NSPTOV1.Str.general	NSPTOV1.START	Y	Stage 1 Start[.general] - mom	1=Stage1 start
3129	195.09	LD0.NSPTOV1.Str.general			Stage 1 Start[.general] - MCD	
3130	195.10	LD0.NSPTOV1.Str.phsA	-	Y	Stage 1 Start[.phsA] - mom	1=Stage1 phsA start
3131	195.11	LD0.NSPTOV1.Str.phsA			Stage 1 Start[.phsA] - MCD	
3132	195.12	LD0.NSPTOV1.Str.phsB	-	Y	Stage 1 Start[.phsB] - mom	1=Stage1 phsB start
3133	195.13	LD0.NSPTOV1.Str.phsB			Stage 1 Start[.phsB] - MCD	
3134	195.14	LD0.NSPTOV1.Str.phsC	-	Y	Stage 1 Start[.phsC] - mom	1=Stage1 phsC start
3135	195.15	LD0.NSPTOV1.Str.phsC			Stage 1 Start[.phsC] - MCD	
3136	196.00	LD0.NSPTOV1.Op.general	NSPTOV1.OPERATE	Y	Stage 1 Operate[.general] - mom	1=Stage1 operate
3137	196.01	LD0.NSPTOV1.Op.general			Stage 1 Operate[.general] - MCD	
Phase undervoltage protection (3 stages), FC06,51,52						
3138	196.02	LD0.PHPTUV1.Str.general	PHPTUV1.START	Y	Stage 1 Start[.general] - mom	1=Stage1 start
3139	196.03	LD0.PHPTUV1.Str.general			Stage 1 Start[.general] - MCD	
3140	196.04	LD0.PHPTUV1.Str.phsA	-	Y	Stage 1 Start[.phsA] - mom	1=Stage1 phsA start
3141	196.05	LD0.PHPTUV1.Str.phsA			Stage 1 Start[.phsA] - MCD	
3142	196.06	LD0.PHPTUV1.Str.phsB	-	Y	Stage 1 Start[.phsB] - mom	1=Stage1 phsB start
3143	196.07	LD0.PHPTUV1.Str.phsB			Stage 1 Start[.phsB] - MCD	
3144	196.08	LD0.PHPTUV1.Str.phsC	-	Y	Stage 1 Start[.phsC] - mom	1=Stage1 phsC start
3145	196.09	LD0.PHPTUV1.Str.phsC			Stage 1 Start[.phsC] - MCD	
3146	196.10	LD0.PHPTUV1.Op.general	PHPTUV1.OPERATE	Y	Stage 1 Operate[.general] - mom	1=Stage1 operate
3147	196.11	LD0.PHPTUV1.Op.general			Stage 1 Operate[.general] - MCD	
3148	196.12	LD0.PHPTUV2.Str.general	PHPTUV2.START	Y	Stage 2 Start[.general] - mom	1=Stage2 start
3149	196.13	LD0.PHPTUV2.Str.general			Stage 2 Start[.general] - MCD	
3150	196.14	LD0.PHPTUV2.Str.phsA	-	Y	Stage 2 Start[.phsA] - mom	1=Stage2 phsA start
3151	196.15	LD0.PHPTUV2.Str.phsA			Stage 2 Start[.phsA] - MCD	
3152	197.00	LD0.PHPTUV2.Str.phsB	-	Y	Stage 2 Start[.phsB] - mom	1=Stage2 phsB start
3153	197.01	LD0.PHPTUV2.Str.phsB			Stage 2 Start[.phsB] - MCD	
3154	197.02	LD0.PHPTUV2.Str.phsC	-	Y	Stage 2 Start[.phsC] - mom	1=Stage2 phsC start
3155	197.03	LD0.PHPTUV2.Str.phsC			Stage 2 Start[.phsC] - MCD	
3156	197.04	LD0.PHPTUV2.Op.general	PHPTUV2.OPERATE	Y	Stage 2 Operate[.general] - mom	1=Stage2 operate
3157	197.05	LD0.PHPTUV2.Op.general			Stage 2 Operate[.general] - MCD	
3158	197.06	LD0.PHPTUV3.Str.general	-	Y	Stage 3 Start[.general] - mom	1=Stage3 start
3159	197.07	LD0.PHPTUV3.Str.general			Stage 3 Start[.general] - MCD	
3160	197.08	LD0.PHPTUV3.Str.phsA	-	Y	Stage 3 Start[.phsA] - mom	1=Stage3 phsA start
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Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
3161	197.09	LD0.PHPTUV3.Str.phsA			Stage 3 Start[.phsA] - MCD	
3162	197.10	LD0.PHPTUV3.Str.phsB	-	Y	Stage 3 Start[.phsB] - mom	1=Stage3 phsB start
3163	197.11	LD0.PHPTUV3.Str.phsB			Stage 3 Start[.phsB] - MCD	
3164	197.12	LD0.PHPTUV3.Str.phsC	-	Y	Stage 3 Start[.phsC] - mom	1=Stage3 phsC start
3165	197.13	LD0.PHPTUV3.Str.phsC			Stage 3 Start[.phsC] - MCD	
3166	197.14	LD0.PHPTUV3.Op.general	-	Y	Stage 3 Operate[.general] - mom	1=Stage3 operate
3167	197.15	LD0.PHPTUV3.Op.general			Stage 3 Operate[.general] - MCD	
Residual overvoltage protection (3 stages) FC06,51,52						
3168	198.00	LD0.ROVPTOV1.Str.general	ROVPTOV1.START	Y	Stage 1 Start[.general] - mom	1=Stage1 start
3169	198.01	LD0.ROVPTOV1.Str.general			Stage 1 Start[.general] - MCD	
3170	198.02	LD0.ROVPTOV1.Op.general	ROVPTOV1.OPERATE	Y	Stage 1 Operate[.general] - mom	1=Stage1 operate
3171	198.03	LD0.ROVPTOV1.Op.general			Stage 1 Operate[.general] - MCD	
3172	198.04	LD0.ROVPTOV2.Str.general	ROVPTOV2.START	Y	Stage 2 Start[.general] - mom	1=Stage2 start
3173	198.05	LD0.ROVPTOV2.Str.general			Stage 2 Start[.general] - MCD	
3174	198.06	LD0.ROVPTOV2.Op.general	ROVPTOV2.OPERATE	Y	Stage 2 Operate[.general] - mom	1=Stage2 operate
3175	198.07	LD0.ROVPTOV2.Op.general			Stage 2 Operate[.general] - MCD	
3176	198.08	LD0.ROVPTOV3.Str.general	-	Y	Stage 3 Start[.general] - mom	1=Stage3 start
3177	198.09	LD0.ROVPTOV3.Str.general			Stage 3 Start[.general] - MCD	
3178	198.10	LD0.ROVPTOV3.Op.general	-	Y	Stage 3 Operate[.general] - mom	1=Stage3 operate
3179	198.11	LD0.ROVPTOV3.Op.general			Stage 3 Operate[.general] - MCD	
Uncorresponding position startup (FC51)						
3180	198.12	LD0.UPSCBR1.Op.general	UPSCBR1.OPERATE	Y	Operate[.general] - mom	1=Operate
3181	198.13	LD0.UPSCBR1.Op.general			Operate[.general] - MCD	
3182	198.14				(reserved)	0
3183	198.15				(reserved)	0
Frequency protection (3 stages) FC06,51,52						
3184	199.00	FRPTRC1.Str.general	FRPFRQ1.START	Y	Stage 1 start [.general] - mom	1=Stage 1 start
3185	199.01	FRPTRC1.Str.general			Stage 1 start [.general] - MCD	
3186	199.02	FRPTOF1.Op.general	FRPFRQ1.OPR_OFRQ	Y	Stage 1 overfrequency operate [.general] - mom	1=Stage 1 overfrequency operate
3187	199.03	FRPTOF1.Op.general			Stage 1 overfrequency operate [.general] - MCD	
3188	199.04	FRPTUF1.Op.general	FRPFRQ1.OPR_UFRQ	Y	Stage 1 underfrequency operate [.general] - mom	1=Stage 1 underfrequency operate
3189	199.05	FRPTUF1.Op.general			Stage 1 underfrequency operate [.general] - MCD	
3190	199.06	FRPFRC1.Op.general	FRPFRQ1.OPR_FRG	Y	Stage 1 frequency gradient operate [.general] - mom	1=Stage 1 frequency gradient operate
3191	199.07	FRPFRC1.Op.general			Stage 1 frequency gradient operate [.general] - MCD	
3192	199.08	FRPTRC2.Str.general	FRPFRQ2.START	Y	Stage 2 start [.general] - mom	1=Stage 2 start
3193	199.09	FRPTRC2.Str.general			Stage 2 start [.general] - MCD	
3194	199.10	FRPTOF2.Op.general	FRPFRQ2.OPR_OFRQ	Y	Stage 2 overfrequency operate [.general] - mom	1=Stage 2 overfrequency operate
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Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
3195	199.11	FRPTOF2.Op.general			Stage 2 overfrequency operate [.general] - MCD	
3196	199.12	FRPTUF2.Op.general	FRPFRQ2.OPR_UFRQ	Y	Stage 2 underfrequency operate [.general] - mom	1=Stage 2 underfrequency operate
3197	199.13	FRPTUF2.Op.general			Stage 2 underfrequency operate [.general] - MCD	
3198	199.14	FRPFRC2.Op.general	FRPFRQ2.OPR_FRG	Y	Stage 2 frequency gradient operate [.general] - mom	1=Stage 2 frequency gradient operate
3199	199.15	FRPFRC2.Op.genera			Stage 2 frequency gradient operate [.general] - MCD	
3200	200.00	FRPTRC3.Str.general	FRPFRQ3.START	Y	Stage 3 start [.general] - mom	1=Stage 3 start
3201	200.01	FRPTRC3.Str.general			Stage 3 start [.general] - MCD	
3202	200.02	FRPTOF3.Op.general	FRPFRQ3.OPR_OFRQ	Y	Stage 3 overfrequency operate [.general] - mom	1=Stage 3 overfrequency operate
3203	200.03	FRPTOF3.Op.general			Stage 3 overfrequency operate [.general] - MCD	
3204	200.04	FRPTUF3.Op.general	FRPFRQ3.OPR_UFRQ	Y	Stage 3 underfrequency operate [.general] - mom	1=Stage 3 underfrequency operate
3205	200.05	FRPTUF3.Op.general			Stage 3 underfrequency operate [.general] - MCD	
3206	200.06	FRPFRC3.Op.general	FRPFRQ3.OPR_FRG	Y	Stage 3 frequency gradient operate [.general] - mom	1=Stage 3 frequency gradient operate
3207	200.07	FRPFRC3.Op.genera			Stage 3 frequency gradient operate [.general] - MCD	
3207	200.08				(reserved)	0
...	...					
3231	201.15					
Synchrocheck FC06,51,52						
3232	202.00	SECRSYN1.SynPrg.stVal	SECRSYN1.SYNC_INPRO	Y	Synchronization in progress [.stVal] - mom	1=Syncronization in progress
3233	202.01	SECRSYN1.SynPrg.stVal			Synchronization in progress [.stVal] - MCD	
3234	202.02	SECRSYN1.FailCmd.stVal	SECRSYN1.CMD_FAIL_AL	Y	CB closing request failed [.stVal] - mom	1=Close request failed
3235	202.03	SECRSYN1.FailCmd.stVal			CB closing request failed [.stVal] - mom	
3236	202.04	SECRSYN1.FailSyn.stVal	SECRSYN1.CL_FAIL_AL	Y	CB closing command failed [.stVal] - mom	1=Close command failed
3237	202.05	SECRSYN1.FailSyn.stVal			CB closing command failed [.stVal] - MCD	
3238	202.06				(reserved)	0
...	...					
3247	202.15					
Load shedding (3 stages) FC51						
3248	203.00	LSHDPTRC1.Str.general	LSHDPFRQ1.START	Y	Stage1 start [.general] - mom	1=Stage1 start
3249	203.01	LSHDPTRC1.Str.general			Stage1 start [.general] - MCD	
3250	203.02	LSHDPTRC1.Op.general	LSHDPFRQ1.OPERATE	Y	Stage1 operate [.general] - mom	1=Stage1 operate
3251	203.03	LSHDPTRC1.Op.general			Stage1 operate [.general] - MCD	
3252	203.04	LSHDPTRC1.RestLodStr.general	LSHDPFRQ1.ST_REST	Y	Stage1 start of restore [.general] - mom	1=Stage1 start of restore
3253	203.05	LSHDPTRC1.RestLodStr.general			Stage1 start of restore [.general] - MCD	
3254	203.06	LSHDPTRC1.RestLodOp.general	LSHDPFRQ1.RESTORE	Y	Stage1 restore the load [.general] - mom	1=Stage1 restore the load
3255	203.07	LSHDPTRC1.RestLodOp.general			Stage1 restore the load [.general] - MCD	
3256	203.08	LSHDPTRC2.Str.general	LSHDPFRQ2.START	Y	Stage2 start [.general] - mom	1=Stage2 start
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Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
3257	203.09	LSHDPTRC2.Str.general			Stage2 start [.general] - MCD	
3258	203.10	LSHDPTRC2.Op.general	LSHDPFRQ2.OPERATE	Y	Stage2 operate [.general] - mom	1=Stage2 operate
3259	203.11	LSHDPTRC2.Op.general			Stage2 operate [.general] - MCD	
3260	203.12	LSHDPTRC2.RestLodStr.general	LSHDPFRQ2.ST_REST	Y	Stage2 start of restore [.general] - mom	1=Stage2 start of restore
3261	203.13	LSHDPTRC2.RestLodStr.general			Stage2 start of restore [.general] - MCD	
3262	203.14	LSHDPTRC2.RestLodOp.general	LSHDPFRQ2.RESTORE	Y	Stage2 restore the load [.general] - mom	1=Stage2 restore the load
3263	203.15	LSHDPTRC2.RestLodOp.general			Stage2 restore the load [.general] - MCD	
3264	204.00	LSHDPTRC3.Str.general	LSHDPFRQ3.START	Y	Stage3 start [.general] - mom	1=Stage3 start
3265	204.01	LSHDPTRC3.Str.general			Stage3 start [.general] - MCD	
3266	204.02	LSHDPTRC3.Op.general	LSHDPFRQ3.OPERATE	Y	Stage3 operate [.general] - mom	1=Stage3 operate
3267	204.03	LSHDPTRC3.Op.general			Stage3 operate [.general] - MCD	
3268	204.04	LSHDPTRC3.RestLodStr.general	LSHDPFRQ3.ST_REST	Y	Stage3 start of restore [.general] - mom	1=Stage3 start of restore
3269	204.05	LSHDPTRC3.RestLodStr.general			Stage3 start of restore [.general] - MCD	
3270	204.06	LSHDPTRC3.RestLodOp.general	LSHDPFRQ3.RESTORE	Y	Stage3 restore the load [.general] - mom	1=Stage3 restore the load
3271	204.07	LSHDPTRC3.RestLodOp.general			Stage3 restore the load [.general] - MCD	
3272	204.08				(reserved)	0
...	...					
3343	208.15					
Physical I/O signal states (BIO-card X130)						
3344	209.00	LD0.XGGIO130.Ind1.stVal	-	Y	X130-Input 1[.stVal] - mom	1=ON, 0=OFF
3345	209.01	LD0.XGGIO130.Ind1.stVal			X130-Input 1[.stVal] - MCD	
3346	209.02	LD0.XGGIO130.Ind2.stVal	-	Y	X130-Input 2[.stVal] - mom	1=ON, 0=OFF
3347	209.03	LD0.XGGIO130.Ind2.stVal			X130-Input 2[.stVal] - MCD	
3348	209.04	LD0.XGGIO130.Ind3.stVal	-	Y	X130-Input 3[.stVal] - mom	1=ON, 0=OFF
3349	209.05	LD0.XGGIO130.Ind3.stVal			X130-Input 3[.stVal] - MCD	
3350	209.06	LD0.XGGIO130.Ind4.stVal	-	Y	X130-Input 4[.stVal] - mom	1=ON, 0=OFF
3351	209.07	LD0.XGGIO130.Ind4.stVal			X130-Input 4[.stVal] - MCD	
3352	209.08	LD0.XGGIO130.Ind5.stVal	-	Y	X130-Input 5[.stVal] - mom	1=ON, 0=OFF
3353	209.09	LD0.XGGIO130.Ind5.stVal			X130-Input 5[.stVal] - MCD	
3354	209.10	LD0.XGGIO130.Ind6.stVal	-	Y	X130-Input 6[.stVal] - mom	1=ON, 0=OFF
3355	209.11	LD0.XGGIO130.Ind6.stVal			X130-Input 6[.stVal] - MCD	
3356	209.12				(reserved)	0
3357	209.13				(reserved)	0
3358	209.14				(reserved)	0
3359	209.15				(reserved)	0
Physical I/O signal states (AIM-card X120)						
3360	210.00	LD0.XGGIO120.Ind1.stVal	-	Y	X120-Input 1[.stVal] - mom	1=ON, 0=OFF
3361	210.01	LD0.XGGIO120.Ind1.stVal			X120-Input 1[.stVal] - MCD	
3362	210.02	LD0.XGGIO120.Ind2.stVal	-	Y	X120-Input 2[.stVal] - mom	1=ON, 0=OFF

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Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
3363	210.03	LD0.XGGIO120.Ind2.stVal			X120-Input 2[.stVal] - MCD	
3364	210.04	LD0.XGGIO120.Ind3.stVal	-	Y	X120-Input 3[.stVal] - mom	1=ON, 0=OFF
3365	210.05	LD0.XGGIO120.Ind3.stVal			X120-Input 3[.stVal] - MCD	
3366	210.06	LD0.XGGIO120.Ind4.stVal	-	Y	X120-Input 4[.stVal] - mom	1=ON, 0=OFF
3367	210.07	LD0.XGGIO120.Ind4.stVal			X120-Input 4[.stVal] - MCD	
3368	210.08				(reserved)	0
3369	210.09				(reserved)	0
3370	210.10				(reserved)	0
3371	210.11				(reserved)	0
3372	210.12				(reserved)	0
3373	210.13				(reserved)	0
3374	210.14				(reserved)	0
3375	210.15				(reserved)	0
Physical I/O signal states (BIO-card X110)						
3376	211.00	LD0.XGGIO110.Ind1.stVal	-	Y	X110-Input 1[.stVal] - mom	1=ON, 0=OFF
3377	211.01	LD0.XGGIO110.Ind1.stVal			X110-Input 1[.stVal] - MCD	
3378	211.02	LD0.XGGIO110.Ind2.stVal	-	Y	X110-Input 2[.stVal] - mom	1=ON, 0=OFF
3379	211.03	LD0.XGGIO110.Ind2.stVal			X110-Input 2[.stVal] - MCD	
3380	211.04	LD0.XGGIO110.Ind3.stVal	-	Y	X110-Input 3[.stVal] - mom	1=ON, 0=OFF
3381	211.05	LD0.XGGIO110.Ind3.stVal			X110-Input 3[.stVal] - MCD	
3382	211.06	LD0.XGGIO110.Ind4.stVal	-	Y	X110-Input 4[.stVal] - mom	1=ON, 0=OFF
3383	211.07	LD0.XGGIO110.Ind4.stVal			X110-Input 4[.stVal] - MCD	
3384	211.08	LD0.XGGIO110.Ind5.stVal	-	Y	X110-Input 5[.stVal] - mom	1=ON, 0=OFF
3385	211.09	LD0.XGGIO110.Ind5.stVal			X110-Input 5[.stVal] - MCD	
3386	211.10	LD0.XGGIO110.Ind6.stVal	-	Y	X110-Input 6[.stVal] - mom	1=ON, 0=OFF
3387	211.11	LD0.XGGIO110.Ind6.stVal			X110-Input 6[.stVal] - MCD	
3388	211.12	LD0.XGGIO110.Ind7.stVal	-	Y	X110-Input 7[.stVal] - mom	1=ON, 0=OFF
3389	211.13	LD0.XGGIO110.Ind7.stVal			X110-Input 7[.stVal] - MCD	
3390	211.14	LD0.XGGIO110.Ind8.stVal	-	Y	X110-Input 8[.stVal] - mom	1=ON, 0=OFF
3391	211.15	LD0.XGGIO110.Ind8.stVal			X110-Input 8[.stVal] - MCD	
3392	212.00	LD0.XGGIO110.SPCSO1.stVal	-	Y	X110-Output 1[.stVal] - mom	1=ON, 0=OFF
3393	212.01	LD0.XGGIO110.SPCSO1.stVal			X110-Output 1[.stVal] - MCD	
3394	212.02	LD0.XGGIO110.SPCSO2.stVal	-	Y	X110-Output 2[.stVal] - mom	1=ON, 0=OFF
3395	212.03	LD0.XGGIO110.SPCSO2.stVal			X110-Output 2[.stVal] - MCD	
3396	212.04	LD0.XGGIO110.SPCSO3.stVal	-	Y	X110-Output 3[.stVal] - mom	1=ON, 0=OFF
3397	212.05	LD0.XGGIO110.SPCSO3.stVal			X110-Output 3[.stVal] - MCD	
3398	212.06	LD0.XGGIO110.SPCSO4.stVal	-	Y	X110-Output 4[.stVal] - mom	1=ON, 0=OFF
3399	212.07	LD0.XGGIO110.SPCSO4.stVal			X110-Output 4[.stVal] - MCD	
3400	212.08				(reserved)	0

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Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
3401	212.09				(reserved)	0
3402	212.10				(reserved)	0
3403	212.11				(reserved)	0
3404	212.12				(reserved)	0
3405	212.13				(reserved)	0
3046	212.14				(reserved)	0
3047	212.15				(reserved)	0
Physical I/O signal states (PSM-card X100)						
3408	213.00	LD0.XGGIO100.SPCSO1.stVal	-	Y	X100-Output 1[.stVal] - mom	1=ON, 0=OFF
3409	213.01	LD0.XGGIO100.SPCSO1.stVal			X100-Output 1[.stVal] - MCD	
3410	213.02	LD0.XGGIO100.SPCSO2.stVal	-	Y	X100-Output 2[.stVal] - mom	1=ON, 0=OFF
3411	213.03	LD0.XGGIO100.SPCSO2.stVal			X100-Output 2[.stVal] - MCD	
3412	213.04	LD0.XGGIO100.SPCSO3.stVal	-	Y	X100-Output 3[.stVal] - mom	1=ON, 0=OFF
3413	213.05	LD0.XGGIO100.SPCSO3.stVal			X100-Output 3[.stVal] - MCD	
3414	213.06	LD0.XGGIO100.SPCSO4.stVal	-	Y	X100-Output 4[.stVal] - mom	1=ON, 0=OFF
3415	213.07	LD0.XGGIO100.SPCSO4.stVal			X100-Output 4[.stVal] - MCD	
3416	213.08	LD0.XGGIO100.SPCSO5.stVal	-	Y	X100-Output 5[.stVal] - mom	1=ON, 0=OFF
3417	213.09	LD0.XGGIO100.SPCSO5.stVal			X100-Output 5[.stVal] - MCD	
3418	213.10	LD0.XGGIO100.SPCSO6.stVal	-	Y	X100-Output 6[.stVal] - mom	1=ON, 0=OFF
3419	213.11	LD0.XGGIO100.SPCSO6.stVal			X100-Output 6[.stVal] - MCD	
3420	213.12				(reserved)	0
3421	213.13				(reserved)	0
3422	213.14				(reserved)	0
3423	213.15				(reserved)	0
Physical I/O signal states (BIO-card X130)						
3424	214.00	LD0.XGGIO130.SPCSO1.stVal	-	Y	X130-Output 1[.stVal] - mom	1=ON, 0=OFF
3425	214.01	LD0.XGGIO130.SPCSO1.stVal			X130-Output 1[.stVal] - MCD	
3426	214.02	LD0.XGGIO130.SPCSO2.stVal	-	Y	X130-Output 2[.stVal] - mom	1=ON, 0=OFF
3427	214.03	LD0.XGGIO130.SPCSO2.stVal			X130-Output 2[.stVal] - MCD	
3428	214.04	LD0.XGGIO130.SPCSO3.stVal	-	Y	X130-Output 3[.stVal] - mom	1=ON, 0=OFF
3429	214.05	LD0.XGGIO130.SPCSO3.stVal			X130-Output 3[.stVal] - MCD	
Physical I/O signal states (AIM-card XA130)						
3440	215.00	LD0.XAGGIO130.Ind1.stVal	-	Y	XA130-Input 1 - mom	1=ON, 0=OFF
3441	215.01	LD0.XAGGIO130.Ind1.stVal			XA130-Input 1[.stVal] - MCD	
3342	215.02	LD0.XAGGIO130.Ind2.stVal	-	Y	XA130-Input 2 - mom	1=ON, 0=OFF
3443	215.03	LD0.XAGGIO130.Ind2.stVal			XA130-Input 2[.stVal] - MCD	
3444	215.04	LD0.XAGGIO130.Ind3.stVal	-	Y	XA130-Input 3 - mom	1=ON, 0=OFF
Table continues on next page						

Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range
3445	215.05	LD0.XAGGIO130.Ind3.stVal			XA130-Input 3[.stVal] - MCD	
3446	215.06	LD0.XAGGIO130.Ind4.stVal	-	Y	XA130-Input 4 - mom	1=ON, 0=OFF
3447	215.07	LD0.XAGGIO130.Ind4.stVal			XA130-Input 4[.stVal] - MCD	

Table 6: *Indications in FC01-05 and FC07*

Bit addr	Reg.bit	Original IEC 61850 data	AFL-Common SA name	Ds	Signal name	Value range
3088	193.00				(reserved)	0
...	...					
3183	198.15					
Physical I/O signal states (BIO-card X130)						
3184	199.00	LD0.XGGIO130.Ind1.stVal	-	Y	X130-Input 1[.stVal] - mom	1=ON, 0=OFF
3185	199.01	LD0.XGGIO130.Ind1.stVal			X130-Input 1[.stVal] - MCD	
3186	199.02	LD0.XGGIO130.Ind2.stVal	-	Y	X130-Input 2[.stVal] - mom	1=ON, 0=OFF
3187	199.03	LD0.XGGIO130.Ind2.stVal			X130-Input 2[.stVal] - MCD	
3188	199.04	LD0.XGGIO130.Ind3.stVal	-	Y	X130-Input 3[.stVal] - mom	1=ON, 0=OFF
3189	199.05	LD0.XGGIO130.Ind3.stVal			X130-Input 3[.stVal] - MCD	
3190	199.06	LD0.XGGIO130.Ind4.stVal	-	Y	X130-Input 4[.stVal] - mom	1=ON, 0=OFF
3191	199.07	LD0.XGGIO130.Ind4.stVal			X130-Input 4[.stVal] - MCD	
3192	199.08	LD0.XGGIO130.Ind5.stVal	-	Y	X130-Input 5[.stVal] - mom	1=ON, 0=OFF
3193	199.09	LD0.XGGIO130.Ind5.stVal			X130-Input 5[.stVal] - MCD	
3194	199.10	LD0.XGGIO130.Ind6.stVal	-	Y	X130-Input 6[.stVal] - mom	1=ON, 0=OFF
3195	199.11	LD0.XGGIO130.Ind6.stVal			X130-Input 6[.stVal] - MCD	
3196	199.12				(reserved)	0
3197	199.13				(reserved)	0
3198	199.14				(reserved)	0
3199	199.15				(reserved)	0
Physical I/O signal states (AIM-card X120)						
3200	200.00	LD0.XGGIO120.Ind1.stVal	-	Y	X120-Input 1[.stVal] - mom	1=ON, 0=OFF
3201	200.01	LD0.XGGIO120.Ind1.stVal			X120-Input 1[.stVal] - MCD	
3202	200.02	LD0.XGGIO120.Ind2.stVal	-	Y	X120-Input 2[.stVal] - mom	1=ON, 0=OFF
3203	200.03	LD0.XGGIO120.Ind2.stVal			X120-Input 2[.stVal] - MCD	
3204	200.04	LD0.XGGIO120.Ind3.stVal	-	Y	X120-Input 3[.stVal] - mom	1=ON, 0=OFF
3205	200.05	LD0.XGGIO120.Ind3.stVal			X120-Input 3[.stVal] - MCD	
3206	200.06	LD0.XGGIO120.Ind4.stVal	-	Y	X120-Input 4[.stVal] - mom	1=ON, 0=OFF
3207	200.07	LD0.XGGIO120.Ind4.stVal			X120-Input 4[.stVal] - MCD	
3208	200.08				(reserved)	0
3209	200.09				(reserved)	0
3210	200.10				(reserved)	0
3211	200.11				(reserved)	0
3212	200.12				(reserved)	0
3213	200.13				(reserved)	0
3214	200.14				(reserved)	0
3215	200.15				(reserved)	0
Physical I/O signal states (BIO-card X110)						
Table continues on next page						

Bit addr	Reg.bit	Original IEC 61850 data	AFL-Common SA name	Ds	Signal name	Value range
3216	201.00	LD0.XGGIO110.Ind1.stVal	-	Y	X110-Input 1[.stVal] - mom	1=ON, 0=OFF
3217	201.01	LD0.XGGIO110.Ind1.stVal			X110-Input 1[.stVal] - MCD	
3218	201.02	LD0.XGGIO110.Ind2.stVal	-	Y	X110-Input 2[.stVal] - mom	1=ON, 0=OFF
3219	201.03	LD0.XGGIO110.Ind2.stVal			X110-Input 2[.stVal] - MCD	
3220	201.04	LD0.XGGIO110.Ind3.stVal	-	Y	X110-Input 3[.stVal] - mom	1=ON, 0=OFF
3221	201.05	LD0.XGGIO110.Ind3.stVal			X110-Input 3[.stVal] - MCD	
3222	201.06	LD0.XGGIO110.Ind4.stVal	-	Y	X110-Input 4[.stVal] - mom	1=ON, 0=OFF
3223	201.07	LD0.XGGIO110.Ind4.stVal			X110-Input 4[.stVal] - MCD	
3224	201.08	LD0.XGGIO110.Ind5.stVal	-	Y	X110-Input 5[.stVal] - mom	1=ON, 0=OFF
3225	201.09	LD0.XGGIO110.Ind5.stVal			X110-Input 5[.stVal] - MCD	
3226	201.10	LD0.XGGIO110.Ind6.stVal	-	Y	X110-Input 6[.stVal] - mom	1=ON, 0=OFF
3227	201.11	LD0.XGGIO110.Ind6.stVal			X110-Input 6[.stVal] - MCD	
3228	201.12	LD0.XGGIO110.Ind7.stVal	-	Y	X110-Input 7[.stVal] - mom	1=ON, 0=OFF
3229	201.13	LD0.XGGIO110.Ind7.stVal			X110-Input 7[.stVal] - MCD	
3230	201.14	LD0.XGGIO110.Ind8.stVal	-	Y	X110-Input 8[.stVal] - mom	1=ON, 0=OFF
3231	201.15	LD0.XGGIO110.Ind8.stVal			X110-Input 8[.stVal] - MCD	
3232	202.00	LD0.XGGIO110.SPCSO1.stVal	-	Y	X110-Output 1[.stVal] - mom	1=ON, 0=OFF
3233	202.01	LD0.XGGIO110.SPCSO1.stVal			X110-Output 1[.stVal] - MCD	
3234	202.02	LD0.XGGIO110.SPCSO2.stVal	-	Y	X110-Output 2[.stVal] - mom	1=ON, 0=OFF
3235	202.03	LD0.XGGIO110.SPCSO2.stVal			X110-Output 2[.stVal] - MCD	
3236	202.04	LD0.XGGIO110.SPCSO3.stVal	-	Y	X110-Output 3[.stVal] - mom	1=ON, 0=OFF
3237	202.05	LD0.XGGIO110.SPCSO3.stVal			X110-Output 3[.stVal] - MCD	
3238	202.06	LD0.XGGIO110.SPCSO4.stVal	-	Y	X110-Output 4[.stVal] - mom	1=ON, 0=OFF
3239	202.07	LD0.XGGIO110.SPCSO4.stVal			X110-Output 4[.stVal] - MCD	
3240	202.08				(reserved)	0
3241	202.09				(reserved)	0
3242	202.10				(reserved)	0
3243	202.11				(reserved)	0
3244	202.12				(reserved)	0
3245	202.13				(reserved)	0
3246	202.14				(reserved)	0
3247	202.15				(reserved)	0
Physical I/O signal states (PSM-card X100)						
3248	203.00	LD0.XGGIO100.SPCSO1.stVal	-	Y	X100-Output 1[.stVal] - mom	1=ON, 0=OFF
3249	203.01	LD0.XGGIO100.SPCSO1.stVal			X100-Output 1[.stVal] - MCD	
3250	203.02	LD0.XGGIO100.SPCSO2.stVal	-	Y	X100-Output 2[.stVal] - mom	1=ON, 0=OFF
3251	203.03	LD0.XGGIO100.SPCSO2.stVal			X100-Output 2[.stVal] - MCD	
3252	203.04	LD0.XGGIO100.SPCSO3.stVal	-	Y	X100-Output 3[.stVal] - mom	1=ON, 0=OFF
3253	203.05	LD0.XGGIO100.SPCSO3.stVal			X100-Output 3[.stVal] - MCD	
Table continues on next page						

Bit addr	Reg.bit	Original IEC 61850 data	AFL-Common SA name	Ds	Signal name	Value range
3254	203.06	LD0.XGGIO100.SPCSO4.stVal	-	Y	X100-Output 4[.stVal] - mom	1=ON, 0=OFF
3255	203.07	LD0.XGGIO100.SPCSO4.stVal			X100-Output 4[.stVal] - MCD	
3256	203.08	LD0.XGGIO100.SPCSO5.stVal	-	Y	X100-Output 5[.stVal] - mom	1=ON, 0=OFF
3257	203.09	LD0.XGGIO100.SPCSO5.stVal			X100-Output 5[.stVal] - MCD	
3258	203.10	LD0.XGGIO100.SPCSO6.stVal	-	Y	X100-Output 6[.stVal] - mom	1=ON, 0=OFF
3259	203.11	LD0.XGGIO100.SPCSO6.stVal			X100-Output 6[.stVal] - MCD	
3260	203.12				(reserved)	0
3261	203.13				(reserved)	0
3262	203.14				(reserved)	0
3263	203.15				(reserved)	0
Physical I/O signal states (BIO-card X130)						
3264	204.00	LD0.XGGIO130.SPCSO1.stVal	-	Y	X130-Output 1[.stVal] - mom	1=ON, 0=OFF
3265	204.01	LD0.XGGIO130.SPCSO1.stVal			X130-Output 1[.stVal] - MCD	
3266	204.02	LD0.XGGIO130.SPCSO2.stVal	-	Y	X130-Output 2[.stVal] - mom	1=ON, 0=OFF
3267	204.03	LD0.XGGIO130.SPCSO2.stVal			X130-Output 2[.stVal] - MCD	
3268	204.04	LD0.XGGIO130.SPCSO3.stVal	-	Y	X130-Output 3[.stVal] - mom	1=ON, 0=OFF
3269	204.05	LD0.XGGIO130.SPCSO3.stVal			X130-Output 3[.stVal] - MCD	
Physical I/O signal states (AIM-card XA130)						
3280	205.00	LD0.XAGGIO130.Ind1.stVal	-	Y	XA130-Input 1 - mom	1=ON, 0=OFF
3281	205.01	LD0.XAGGIO130.Ind1.stVal			XA130-Input 1[.stVal] - MCD	
3282	205.02	LD0.XAGGIO130.Ind2.stVal	-	Y	XA130-Input 2 - mom	1=ON, 0=OFF
3283	205.03	LD0.XAGGIO130.Ind2.stVal			XA130-Input 2[.stVal] - MCD	
3284	205.04	LD0.XAGGIO130.Ind3.stVal	-	Y	XA130-Input 3 - mom	1=ON, 0=OFF
3285	205.05	LD0.XAGGIO130.Ind3.stVal			XA130-Input 3[.stVal] - MCD	
3286	205.06	LD0.XAGGIO130.Ind4.stVal	-	Y	XA130-Input 4 - mom	1=ON, 0=OFF
3287	205.07	LD0.XAGGIO130.Ind4.stVal			XA130-Input 4[.stVal] - MCD	
Multipurpose indications (All variants)						
3536	221.00	LD0.MVGAPC1.Q1.stVal	-		Input 1 [.stVal] - mom	0 = Input OFF, 1 = Input ON
3537	221.01	LD0.MVGAPC1.Q1.stVal			Input 1 [.stVal] - MCD	
3538	221.02	LD0.MVGAPC1.Q2.stVal	-		Input 2 [.stVal] - mom	0 = Input OFF, 1 = Input ON
3539	221.03	LD0.MVGAPC1.Q2.stVal			Input 2 [.stVal] - MCD	
3540	221.04	LD0.MVGAPC1.Q3.stVal	-		Input 3 [.stVal] - mom	0 = Input OFF, 1 = Input ON
3541	221.05	LD0.MVGAPC1.Q3.stVal			Input 3 [.stVal] - MCD	
3542	221.06	LD0.MVGAPC1.Q4.stVal	-		Input 4 [.stVal] - mom	0 = Input OFF, 1 = Input ON
3543	221.07	LD0.MVGAPC1.Q4.stVal			Input 4 [.stVal] - MCD	
3544	221.08	LD0.MVGAPC1.Q5.stVal	-		Input 5 [.stVal] - mom	0 = Input OFF, 1 = Input ON
3545	221.09	LD0.MVGAPC1.Q5.stVal			Input 5 [.stVal] - MCD	
3546	221.10	LD0.MVGAPC1.Q6.stVal	-		Input 6 [.stVal] - mom	0 = Input OFF, 1 = Input ON
3547	221.11	LD0.MVGAPC1.Q6.stVal			Input 6 [.stVal] - MCD	
Table continues on next page						

Bit addr	Reg.bit	Original IEC 61850 data	AFL-Common SA name	Ds	Signal name	Value range
3548	221.12	LD0.MVGAPC1.Q7.stVal	-		Input 7 [.stVal] - mom	0 = Input OFF, 1 = Input ON
3549	221.13	LD0.MVGAPC1.Q7.stVal			Input 7 [.stVal] - MCD	
3550	221.14	LD0.MVGAPC1.Q8.stVal	-		Input 8 [.stVal] - mom	0 = Input OFF, 1 = Input ON
3551	221.15	LD0.MVGAPC1.Q8.stVal			Input 8 [.stVal] - MCD	

2.2.1 Reference Title

Table 7: Modbus controls

0x addr	Ctrl struct	Ctrl bit	Mode	Identification	Description
2048	1	0	Uns	 CTRL.CBCSWI1.Pos.ctlVal	CBXCBR1 - Switch, general - Open
2049		1	Uns		CBXCBR1 - Switch, general - Close
2050		2	Uns		CBXCBR1 - Switch, general - Cancel
2051		3	Uns		CBXCBR1 - Switch, general - Operate
2052		4	Uns		CBXCBR1 - Switch, general - Direct open
2053		5	Uns		CBXCBR1 - Switch, general - Direct close
2060	2	0	Uns	LD0.LLN0.LEDRs1.ctlVal	General - Indications and LEDs - 1=Activate
2061		1	Uns	LD0.LLN0.LEDRs2.ctlVal	General - Alarm LEDs - 1=Activate
2062		2	Uns	LD0.LLN0.RecRs.ctlVal	General - All data - 1=Activate
2063		3	Uns	LD0.DARREC1.RsRec.ctlVal	Reset reclosing - 1=Activate
2064		4	Uns	LD0.DARREC1.RsCnt.ctlVal	Reset reclosing counters - 1=Activate
2065		5	Uns	LD0.SSCBR1.RsAccAPwr.ctlVal	Reset accumulation energy - 1=Activate
2066		6	Uns	LD0.SSCBR1.RsCBWear.ctlVal	Reset input for CB remaining life and operation counter - 1=Activate
2067		7	Uns	DR.RDRE1.RcdTrg.ctlVal	Disturbance recorder - Trig recording - 1=Activate
2068		8	Uns	DR.RDRE1.MemClr.ctlVal	Disturbance recorder - Disturbance records - 1=Activate
2069		9	Uns	LD0.CMSTA1.RecRs.ctlVal	CMMXU1 - CMMXU1 max.demands - 1=Reset
2070		10	Uns	LD0.(M)PEMMXU1.SupDmdRs.ctlVal	Reset accumulated energy - 1=Reset
2071		11	Uns	LD0.SCCBR1.RsTrvTm.ctlVal	Reset travelling time alarm - 1=Reset
2072		12	Uns	LD0.SCCBR1.RsSprChaTm.ctlVal	Reset spring charge time alarm - 1=Reset
2073		13	Uns	LD0.CMSTA2.RecRs.ctlVal	CMMXU2 - CMMXU2 max.demands - 1=Reset
2074					(reserved)
2075					(reserved)
2076					(reserved)
2077					(reserved)
2078					(reserved)
2079					(reserved)
2080	3	0	Uns	LD0.LPHD1.RsDev.ctlVal	Physical device - Reset device - 1=Activate
2096	4	0	Uns	LD0.SRGAPC1.Rs1.ctlVal	Reset SRGAPC1 flip-flop 1
2097		1	Uns	LD0.SRGAPC1.Rs2.ctlVal	Reset SRGAPC1 flip-flop 2
2098		2	Uns	LD0.SRGAPC1.Rs3.ctlVal	Reset SRGAPC1 flip-flop 3
2099		3	Uns	LD0.SRGAPC1.Rs4.ctlVal	Reset SRGAPC1 flip-flop 4
2100		4	Uns	LD0.SRGAPC1.Rs5.ctlVal	Reset SRGAPC1 flip-flop 5
2101		5	Uns	LD0.SRGAPC1.Rs6.ctlVal	Reset SRGAPC1 flip-flop 6
2102		6	Uns	LD0.SRGAPC1.Rs7.ctlVal	Reset SRGAPC1 flip-flop 7
2103		7	Uns	LD0.SRGAPC1.Rs8.ctlVal	Reset SRGAPC1 flip-flop 8

Section 3 Glossary

AFL	Application function block library
AIM	Analog input module
AR	Autoreclosing
BIO	Binary input and output
CB	Circuit breaker
CPM	Communication protocol manual
DR	Disturbance recorder
EMC	Electromagnetic compatibility
HMI	Human-machine interface
I/O	Input/output
IEC	International Electrotechnical Commission
IEC 61850	International standard for substation communication and modelling
IED	Intelligent electronic device
LED	Light-emitting diode
LHMI	Local human-machine interface
MCD	Momentary change detect
Modbus	A serial communication protocol developed by the Modicon company in 1979. Originally used for communication in PLCs and RTU devices.
PCM600	Protection and Control IED Manager
PLC	Programmable logic controller
PSM	Power supply module
TCS	Trip-circuit supervision
UTC	Coordinated universal time

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