



Relion® 615 series

# Motor Protection and Control REM615 Modbus Point List Manual





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ABB Oy  
Distribution Automation  
P.O. Box 699  
FI-65101 Vaasa, Finland  
Telephone: +358 10 2211  
Facsimile: +358 10 22 41094  
<http://www.abb.com/substationautomation>

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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

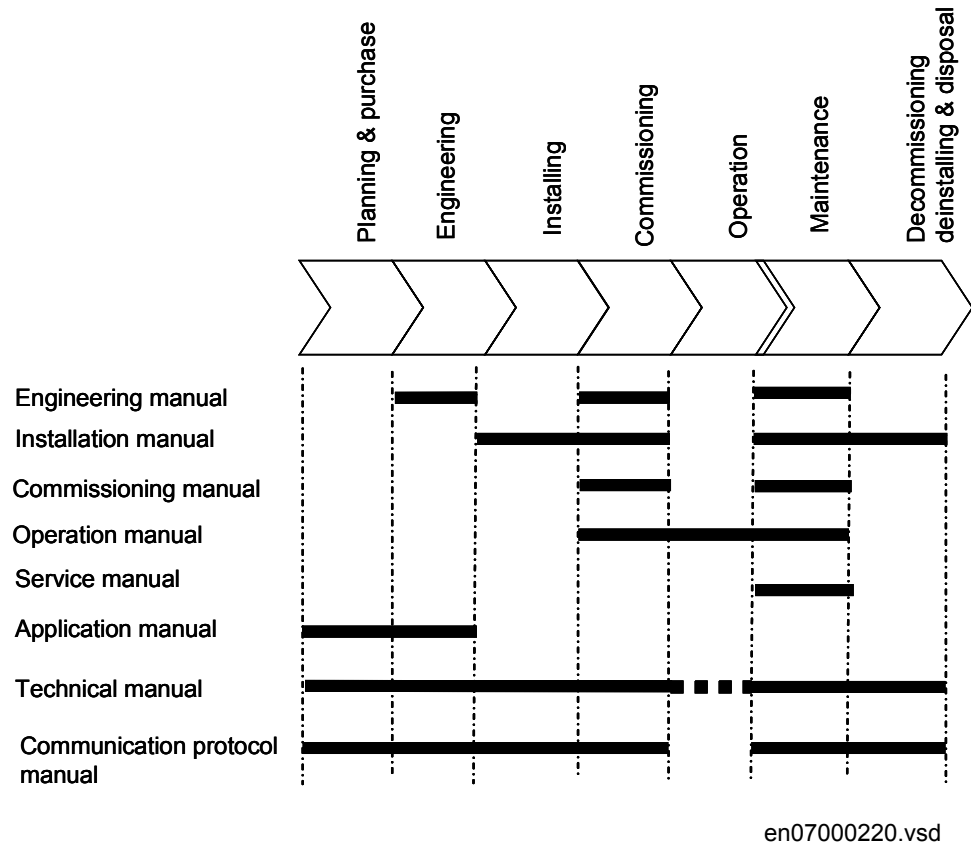


Figure 1: The intended use of manuals in different lifecycles

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/2009-07-03	2.0	First release
B/2010-06-11	3.0	Content updated to correspond to the product version



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

### 1.3.3 Related documentation

Name of the document	Document ID
Modbus Communication Protocol Manual	1MRS756468

## 1.4 Symbols and conventions

### 1.4.1 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:** *REM615 Functions, codes and symbols*

Function	IEC 61850	IEC 60617	IEC-ANSI
<b>Protection</b>			
Three-phase non-directional overcurrent protection, low stage, instance 1	PHLPTOC1	3I> (1)	51P-1 (1)
Three-phase non-directional overcurrent protection, instantaneous stage, instance 1	PHIPTOC1	3I>>> (1)	50P/51P (1)
Non-directional earth-fault protection, low stage, instance 1	EFLPTOC1	Io> (1)	51N-1 (1)
Non-directional earth-fault protection, high stage, instance 1	EFHPTOC1	Io>> (1)	51N-2 (1)
Directional earth-fault protection, low stage, instance 1	DEFLPDEF1	Io> -> (1)	67N-1 (1)
Three-phase undervoltage protection, instance 1	PHPTUV1	3U< (1)	27 (1)
Positive-sequence undervoltage protection, instance 1	PSPTUV1	U1< (1)	47U+ (1)
Negative-sequence overvoltage protection, instance 1	NSPTOV1	U2> (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)
Negative-sequence overcurrent protection for motors, instance 1	MNSPTOC1	I2>M (1)	46M (1)
Negative-sequence overcurrent protection for motors, instance 2	MNSPTOC2	I2>M (2)	46M (2)
Loss of load supervision	LOFLPTUC1	3I<	37
Motor load jam protection	JAMPTOC1	Ist>	51LR
Motor start-up supervision	STTPMSU1	Is2t n<	49,66,48,51LR
Phase reversal protection	PREVPTOC1	I2>>	46R
Thermal overload protection for motors	MPTR1	3Ith>M	49M
Circuit breaker failure protection	CCBRBRF1	3I>/Io>BF	51BF/51NBF
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)
Table continues on next page			

Function	IEC 61850	IEC 60617	IEC-ANSI
Multi-purpose protection, instance 1 <sup>1)</sup>	MAPGAPC1	MAP (1)	MAP (1)
Multi-purpose protection, instance 2 <sup>1)</sup>	MAPGAPC2	MAP (2)	MAP (2)
Multi-purpose protection, instance 3 <sup>1)</sup>	MAPGAPC3	MAP (3)	MAP (3)
<b>Control</b>			
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
Emergency startup	ESMGAPC1	ESTART	ESTART
<b>Condition monitoring</b>			
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	SEQRUF1	FUSEF	60
Runtime counter for machines and devices	MDSOPT1	OPTS	OPTM
<b>Measurement</b>			
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	Io	In
Three-phase voltage measurement	VMMXU1	3U	3U
Residual voltage measurement	RESVMMXU1	Uo	Vn
Sequence voltage measurement	VSMSQI1	U1, U2, U0	U1, U2, U0
Three-phase power and energy measurement, including power factor	PEMMXU1	P, E	P, E
RTD/mA measurement	XRGGIO130	X130 (RTD)	X130 (RTD)
Frequency measurement	FMMXU1	f	f

1) Multi-purpose protection is used for, for example, RTD/mA based protection.

## Section 2 Modbus data mappings

### 2.1 Overview

This document describes the Modbus data points and structures available in REM615 Ver. 3.0. The point lists describe a superset of all data available through the standard configurations A, B and C including the optional functionalities. The names of the standard configurations are ME01, ME02 and ME03 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

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## 2.2 Point list for REM615 Ver.3.0 ME01-03

Table 2: Registers

Addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range (before scaling)
1						User definable registers	
...							
127							
128					Y	System status register SSR1	See Modbus CPM
129					Y	System status register SSR2	See Modbus CPM
130					Y	System status register SSR3	See Modbus CPM
131					Y	System status register SSR4	See Modbus CPM
132					Y	System status register SSR5	See Modbus CPM
133					Y	System status register SSR6	See Modbus CPM
System status registers							
Frequently updated measurands and counters							
134						(reserved)	0
135						(reserved)	0
136						(reserved)	0
137						(reserved)	0
138	u16	1000	LD0.CMMXU1.A.phsA.instCVal.mag	CMMXU1.I_INST_A	Y	Phase current A magnitude	0.00 .... 40.00 [xIn]
139	u16	1000	LD0.CMMXU1.A.phsB.instCVal.mag	CMMXU1.I_INST_B	Y	Phase current B magnitude	0.00 .... 40.00 [xIn]
140	u16	1000	LD0.CMMXU1.A.phsC.instCVal.mag	CMMXU1.I_INST_C	Y	Phase current C magnitude	0.00 .... 40.00 [xIn]
141	u16	1000	LD0.RESCVMMXU1.A.res.instCVal.mag	RESCVMMXU1.I0_INST	Y	Residual current magnitude	0.00 .... 40.00 [xIn]
142	u16	1000	LD0.RESVMMXU1.PhV.res.instCVal.mag	RESCVMMXU1.U0_INST	Y	Residual voltage magnitude	0.00 .... 4.00 [xUn]
143	u16	1000	LD0.CSMSQI1.SeqA.c1.instCVal.mag	CMSQI1.I1_INST	Y	Positive sequence of current magnitude	0.00 .... 40.00 [xIn]
144	u16	1000	LD0.CSMSQI1.SeqA.c2.instCVal.mag	CMSQI1.I2_INST	Y	Negative sequence of current magnitude	0.00 .... 40.00 [xIn]
145	u16	1000	LD0.CSMSQI1.SeqA.c3.instCVal.mag	CMSQI1.I3_INST	Y	Zero sequence of current magnitude	0.00 .... 40.00 [xIn]
Frequency measurement (ME02,ME03)							
146	u16	100	LD0.FMMXU1.Hz.mag	FMMXU1.F_DB	Y	Frequency measurement	35.00...75.00 [Hz]
147	i16	1	LD0.MPTTR1.TmpRl.mag	MPTTR1.Therm_Lev	Y	Thermal level	0.00...9.99
148	i16	1	LD0.MPTTR1.TmpUsed.mag	MPTTR1.TEMP_AMB	N	The ambient temperature used in the calculation	-99...999 [Celsius]
149	i16	10	LD0.MPTTR1.ThrnLevSt	MPTTR1.THERMLEV_ST	N	Thermal level at beginning of motor startup	0.00...9.99
150	i16	10	LD0.MPTTR1.ThrnLevEnd	MPTTR1.THERMLEV_E ND	N	Thermal level at the end of motor startup situation	0.00...9.99
151	u16	1	LD0.MPTTR1.StrInhTms.stVal	MPTTR1.T_ENARESTAR T	N	Estimated time to reset of block restart	0...99999 [s]
152	u16	1000	LD0.VMMXU1.phV.phsA.cVal.mag	VMMXU1.U_DB_A	Y	Phase-to-ground voltage A amplitude	0.00 .... 4.00 [xUn]
153	u16	1000	LD0.VMMXU1.phV.phsB.cVal.mag	VMMXU1.U_DB_B	Y	Phase-to-ground voltage B amplitude	0.00 .... 4.00 [xUn]
154	u16	1000	LD0.VMMXU1.phV.phsC.cVal.mag	VMMXU1.U_DB_C	Y	Phase-to-ground voltage C amplitude	0.00 .... 4.00 [xUn]
155	u16	1000	LD0.VMMXU1.PPV.phsAB.cVal.mag	VMMXU1.U_DB_AB	Y	Phase-to-phase voltage AB amplitude	0.00 .... 4.00 [xUn]
156	u16	1000	LD0.VMMXU1.PPV.phsBC.cVal.mag	VMMXU1.U_DB_BC	Y	Phase-to-phase voltage BC amplitude	0.00 .... 4.00 [xUn]

Table continues on next page

Addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range (before scaling)
157	u16	1000	LD0.VMMXU1.PPV.phsCA.cVal.mag	VMMXU1.U_DB_CA	Y	Phase-to-phase voltage CA amplitude	0.00 .... 4.00 [xUn]
158	u16	1000	LD0.VSMSQI1.SeqA.c1.cVal.mag	VMSQI1.I1_DB	Y	Positive sequence of voltage magnitude	0.00 .... 4.00 [xUn]
159	u16	1000	LD0.VSMSQI1.SeqA.c2.cVal.mag	VMSQI1.I2_DB	Y	Negative sequence of voltage magnitude	0.00 .... 4.00 [xUn]
160	u16	1000	LD0.VSMSQI1.SeqA.c3.cVal.mag	VMSQI1.I3_DB	Y	Zero sequence of voltage magnitude	0.00 .... 4.00 [xUn]
161	i32	1	LD0.PEMMXU1.TotW.instMag	PEMMXU1.P_INST	Y	Total active power P	-999999...999999 (see doc)
162							
163	i32	1	LD0.PEMMXU1.TotVAr.instMag	PEMMXU1.Q_INST	Y	Total reactive power R	-999999...999999 (see doc)
164							
165	i32	1	LD0.PEMMXU1.TotVA.instMag	PEMMXU1.S_INST	Y	Total apparent power S	-999999...999999 (see doc)
166							
167	i16	1000	LD0.PEMMXU1.TotPF.instMag	PEMMXU1.PF_INST	Y	Average power factor (reserved)	-1.00...1.00
168							0
169							0
170							
...							
2000						Indication bits mirrored and packed in registers 170 onwards	See 'Indications' table
Phase current demand values (latest values)							
2001	u16	1000	LD0.CMSTA1.AvAmps1.mag	CMXU1.I_DMD_A	N	Demand value of Phase A current	0.00 .... 40.00 [xIn]
2002	u16	1000	LD0.CMSTA1.AvAmps2.mag	CMXU1.I_DMD_B	N	Demand value of Phase B current	0.00 .... 40.00 [xIn]
2003	u16	1000	LD0.CMSTA1.AvAmps3.mag	CMXU1.I_DMD_C	N	Demand value of Phase C current	0.00 .... 40.00 [xIn]
2004							Time structure (update time)
2005							
2006							
2007							
2008							
Maximum phase current demand values							
2009	u16	1000	LD0.CMSTA1.MaxAmps1.mag	CMXU1.Max demand IL1	N	Max. demand value for Phase A current	0.00 .... 40.00 [xIn]
2010							Time structure (update time)
2011							
2012							
2013							
2014							
2015	u16	1000	LD0.CMSTA1.MaxAmps2.mag	CMXU1.Max demand IL2	N	Max. demand value for Phase B current	0.00 .... 40.00 [xIn]

Table continues on next page

Addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range (before scaling)
2016							Time structure (update time)
2017							
2018							
2019							
2020							
2021	u16	1000	LD0.CMSTA1.MaxAmps3.mag	CMMXU1.Max demand IL3	N	Max. demand value for Phase C current	0.00 .... 40.00 [xIn]
2022							Time structure (update time)
2023							
2024							
2025							
2026							
Operation counters							
2027	u16	1	CTRL.CBCSW1.OpCntRs.stVal	CBXCBR1.Operation counter	N	Circuit breaker operation counter	0 ... 10000
2028	u16	1	LD0.ARCSARC11.FACntRs.stVal	-	N	Fault arc counter 1	0...65535
2029	u16	1	LD0.ARCSARC21.FACntRs.stVal	-	N	Fault arc counter 2	0...65535
2030	u16	1	LD0.ARCSARC31.FACntRs.stVal	-	N	Fault arc counter 3	0...65535
RTD inputs (ME01,ME02)							
2031	i16	1	LD0.XRGGIO130.AnIn1.mag	XRGGIO130_AI_VAL1	Y	RTD input 1	-10000.0...10000.0 [Ohms]
2032	i16	1	LD0.XRGGIO130.AnIn2.mag	XRGGIO130_AI_VAL2	Y	RTD input 2	-10000.0...10000.0 [Ohms]
2033	i16	1	LD0.XRGGIO130.AnIn3.mag	XRGGIO130_AI_VAL3	Y	RTD input 3	-10000.0...10000.0 [Ohms]
2034	i16	1	LD0.XRGGIO130.AnIn4.mag	XRGGIO130_AI_VAL4	Y	RTD input 4	-10000.0...10000.0 [Ohms]
2035	i16	1	LD0.XRGGIO130.AnIn5.mag	XRGGIO130_AI_VAL5	Y	RTD input 5	-10000.0...10000.0 [Ohms]
2036	i16	1	LD0.XRGGIO130.AnIn6.mag	XRGGIO130_AI_VAL6	Y	RTD input 6	-10000.0...10000.0 [Ohms]
2037	i16	1	LD0.XRGGIO130.AnIn7.mag	XRGGIO130_AI_VAL7	Y	RTD input 7	-10000.0...10000.0 [Ohms]
2038	i16	1	LD0.XRGGIO130.AnIn8.mag	XRGGIO130_AI_VAL8	Y	RTD input 8	-10000.0...10000.0 [Ohms]
2039						(reserved)	0
Energy counters							
2040	u32	1	LD0.PEMMTR1.SupWh.actVal	PEMMXU1.EA_RV_ACM	N	Reverse active energy - high word	0...999999999 [kWh]
2041						Reverse active energy - low word	

Table continues on next page

Addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range (before scaling)
2042	u32	1	LD0.PEMMTR1.SupVAth.actVal	PEMMXU1.ER_RV_ACM	N	Reverse reactive energy - high word	0...999999999 [kVAth]
2043						Reverse reactive energy - low word	
2044	u32	1	LD0.PEMMTR1.DemVAth.actVal	PEMMXU1.EA_FWD_AC M	N	Forward active energy - high word	0...999999999 [kWh]
2045						Forward active energy - low word	
2046	u32	1	LD0.PEMMTR1.DemVAth.actVal	PEMMXU1.ER_FWD_AC M	N	Forward reactive energy - high word	0...999999999 [kVAth]
2047						Forward reactive energy - low word	
2048						(reserved)	0
2049						(reserved)	0
Diagnostic values, All variants							
2050	u16	1	LD0.LPHD1.PhyHealth1.stVal	Warning	Y	Physical device Warning code (latest)	Codes: see documentation
2051	u16	1	LD0.LPHD1.PhyHealth2.stVal	Internal Fault	Y	Physical device Internal fault code (latest)	Codes: see documentation
2052	u16	1	DR.RDRE1.FinNum.stVal	-	N	Number of disturbance recordings	0...65535
2053	u16	1	DR.RDRE1.MemUsed.stVal	-	N	Disturbance recorder memory used	0...100 [%]
2054	u16	1	LD0.LPHD1.NumPwrUp.stVal	-	N	Number of device power-ups	0...65535
2055	u16	1	LD0.LPHD1.WrmStr.stVal	-	N	Number of device warm-starts	0...65535
2056	u16	1	LD0.LPHD1.WacTrg.stVal	-	N	Number of watchdog device resets	0...65535
2057	u16	1	LD0.LPHD1.NumCmpChg.stVal	-	N	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	N	Number of days CB has been inactive	0...9999
2061	u16	1	LD0.SSCBR1.TmsOpn.mag	SSCBR1.T_TRV_OP	N	CB travel time opening	0...60000 [ms]
2062	u16	1	LD0.SSCBR1.TmsCls.mag	SSCBR1.T_TRV_CL	N	CB travel time closing	0...60000 [ms]
2063	u16	100	LD0.SSCBR1.TmsSprCha.mag	SSCBR1.T_SPR_CHR	N	Charging time of the CB spring	0.00...99.99 [s]
2064	i16	1	LD0.SSCBR1.RmnlIfPhA.stVal	SSCBR1.CB_LIFE_A	N	CB Remaining life phase A	-9999...9999
2065	i16	1	LD0.SSCBR1.RmnlIfPhB.stVal	SSCBR1.CB_LIFE_B	N	CB Remaining life phase B	-9999...9999
2066	i16	1	LD0.SSCBR1.RmnlIfPhC.stVal	SSCBR1.CB_LIFE_C	N	CB Remaining life phase C	-9999...9999
2067	u16	1	LD0.SSCBR1.AccAPwrPhA.mag	SSCBR1.IPOW_A	N	Accumulated currents power (yrt), phase A	0.00...1000000.00
2068	u16	1	LD0.SSCBR1.AccAPwrPhB.mag	SSCBR1.IPOW_B	N	Accumulated currents power (yrt), phase B	0.00...1000000.00
2069	u16	1	LD0.SSCBR1.AccAPwrPhC.mag	SSCBR1.IPOW_C	N	Accumulated currents power (yrt), phase C	0.00...1000000.00
2070						(reserved)	0
...							
8000							
Control structure 1							

Table continues on next page

Addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range (before scaling)
8001	u16		For information on control structure 1 bit definitions, see Modbus controls table.			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 Struct 1 - Control register	
8005	u16					Control Struct 1 - Confirm register	
Control structure 2							
8006	u16		For information on control structure 2 bit definitions, see Modbus controls table.			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 Struct 2 - Control register	
8010	u16					Control Struct 2 - Confirm register	
Control structure 3							
8011	u16		For information on control structure 3 bit definitions, see Modbus controls table.			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 Struct 3 - Control register	
8015	u16					Control Struct 3 - Confirm register	
Control structure 4							
8016	u16		For information on control structure 4 bit definitions, see Modbus controls table.			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 Struct 4 - Control register	
8020	u16					Control Struct 4 - Confirm register	
Control structure 5							
8021	u16		For information on control structure 5 bit definitions, see Modbus controls table.			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 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)

Table continues on next page

Addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range (before scaling)
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 2 = Watchdog reset 4 = Warm reset
9229						(reserved)	0
9230						(reserved)	0
Active parameter setting group							

Table continues on next page

Addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range (before scaling)
9231	u16		-	-		Setting group in use (reserved)	1...6
...							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)
9340...9350			Event record 9 (11 registers)	-		Event record structure	Event record structure (see Modbus CPM)

Table continues on next page

Section 2  
Modbus data mappings

Addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range (before scaling)
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	10	LD0.FL.TMSTA1.StrDur.mag	-	Y	Fault duration	0.0...100.0 [%]
9410	u16	1	LD0.FL.TMSTA1.ActISG.stVal	-	Y	Active parameter setting group during the fault	1...6
9411						(reserved)	0
9412	u16	1000	LD0.FL.TMSTA1.MaxAmpsA.mag	-	Y	Max phase A current during fault	0.00 ... 50.00 [xIn]
9413	u16	1000	LD0.FL.TMSTA1.MaxAmpsB.mag	-	Y	Max phase B current during fault	0.00 ... 50.00 [xIn]
9414	u16	1000	LD0.FL.TMSTA1.MaxAmpsC.mag	-	Y	Max phase C current during fault	0.00 ... 50.00 [xIn]
9415	u16	1000	LD0.FL.TMSTA1.MaxAmpsN.mag	-	Y	Max residual current during fault	0.00 ... 50.00 [xIn]
9416	u16	1000	LD0.FL.TMSTA1.AmpsA.mag	-	Y	Phase A current at moment of trip	0.00 ... 50.00 [xIn]
9417	u16	1000	LD0.FL.TMSTA1.AmpsB.mag	-	Y	Phase B current at moment of trip	0.00 ... 50.00 [xIn]
9418	u16	1000	LD0.FL.TMSTA1.AmpsC.mag	-	Y	Phase C current at moment of trip	0.00 ... 50.00 [xIn]
9419	u16	1000	LD0.FL.TMSTA1.AmpsN.mag	-	Y	Residual current at moment of trip	0.00 ... 50.00 [xIn]
9420	u16	1000	LD0.FL.TMSTA1.AmpsNCic.mag	-	Y	Residual Cic current at moment of trip	0.00 ... 50.00 [xIn]
9421	u16	1000	LD0.FL.TMSTA1.AmpsPsSeq.mag	-	Y	Positive sequence current at moment of trip	0.00 ... 50.00 [xIn]
9422	u16	1000	LD0.FL.TMSTA1.AmpsNgSeq.mag	-	Y	Negative sequence current at moment of trip	0.00 ... 50.00 [xIn]
9423	u16	100	LD0.FL.TMSTA1.MaxTmpRl.mag	-	Y	Max relative temperature	0.00...99.99 [degrees Celsius]
9424	u16	1000	LD0.FL.TMSTA1.VoltsA.mag	-	Y	Phase A voltage at moment of trip	0...4.00 [xUn]
9425	u16	1000	LD0.FL.TMSTA1.VoltsB.mag	-	Y	Phase B voltage at moment of trip	0...4.00 [xUn]
9426	u16	1000	LD0.FL.TMSTA1.VoltsC.mag	-	Y	Phase C voltage at moment of trip	0...4.00 [xUn]
9427	u16	1000	LD0.FL.TMSTA1.VoltsAB.mag	-	Y	Phase-to-phase voltage AB at moment of trip	0...4.00 [xUn]
9428	u16	1000	LD0.FL.TMSTA1.VoltsBC.mag	-	Y	Phase-to-phase voltage BC at moment of trip	0...4.00 [xUn]
9429	u16	1000	LD0.FL.TMSTA1.VoltsCA.mag	-	Y	Phase-to-phase voltage CA at moment of trip	0...4.00 [xUn]
9430	u16	1000	LD0.FL.TMSTA1.VoltsN.mag	-	Y	Residual voltage at moment of trip	0...4.00 [xUn]
9431	u16	1000	LD0.FL.TMSTA1.VZroSeq.mag	-	Y	Zero sequence voltage at moment of trip	0...4.00 [xUn]

Table continues on next page

Addr	Type	Scale	IEC 61850 name	AFL-Common SA name	Ds	Description	Value range (before scaling)
9432	u16	1000	LD0.FL.TMSTA1.VPSeq.mag	-	Y	Positive sequence voltage at moment of trip	0...4.00 [XUn]
9433	u16	1000	LD0.FL.TMSTA1.VNgSeq.mag	-	Y	Negative sequence voltage at moment of trip	0...4.00 [XUn]
9434	i16	10	LD0.FL.TMSTA1.DifNAngN.mag	-	Y	Residual voltage-residual current angle	-180.0...180.0 [degrees]
9435	i16	10	LD0.FL.TMSTA1.DifAAngBC.mag	-	Y	Phase-to-phase voltage BC - ph current A angle	-180.0...180 [deg]
9436	i16	10	LD0.FL.TMSTA1.DifBAngCA.mag	-	Y	Phase-to-phase voltage CA - ph current B angle	-180.0...180 [deg]
9437	i16	10	LD0.FL.TMSTA1.DifCAngAB.mag	-	Y	Phase-to-phase voltage AB - ph current C angle	-180.0...180 [deg]
9438	u16	100	LD0.FL.TMSTA1.Hz.mag	-	Y	Frequency at moment of trip	30.00...80.00 [Hz]
9439	i16	100	LD0.FL.TMSTA1.HzS.mag	-	Y	Frequency gradient at moment of trip	-10.00...10.00 [Hz/s]

Table 3: Indications

Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Values
2720	170.00	CTRL.LLN0.Loc.stVal	-	Y	Local/Remote state - mom	0 = Local, 1=Remote
2721	170.01	CTRL.LLN0.LocRem.stVal.Station	-	Y	Station - mom	0 = OFF, 1 = ON
2722	170.02	DR.RDRE1.RcdMade.stVal	-		Disturbance recorder file ready - mom	1 = DR file captured
2723	170.03	DR.RDRE1.RcdMade.stVal	-		Disturbance recorder file ready - MCD	
2724	170.04				(reserved)	0
2725	170.05				(reserved)	0
2726	170.06	LD0.LLN0.SetSeld.stVal	-	Y	Parameter setting rights reserved - mom	1=Rights reserved
2727	170.07	LD0.LLN0.SetSeld.stVal	-		Parameter setting rights reserved - MCD	
2728	170.08	LD0.LLN0.SetChg.stVal	-	Y	Parameter settings changed - mom	1=Settings changed
2729	170.09	LD0.LLN0.SetChg.stVal	-		Parameter settings changed - MCD	
2730	170.10				(reserved)	0
2731	170.11				(reserved)	0
2732	170.12				(reserved)	0
2733	170.13				(reserved)	0
2734	170.14				(reserved)	0
2735	170.15				(reserved)	0
Global conditioning						
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)						
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)						
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						
2752	172.00	LD0.CMMXU1.HiAlm.stVal	CMMXU1.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	Values
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 alarm[.stVal] - mom	1=Low alarm
2757	172.05	LD0.CMMXU1.LoWrn.stVal			Low alarm[.stVal] - MCD	
2758	172.06	LD0.CMMXU1.LoAlm.stVal	CMMXU1.LOW_ALARM	Y	Low warning[.stVal] - mom	1=Low warning
2759	172.07	LD0.CMMXU1.LoAlm.stVal			Low warning[.stVal] - MCD	
Residual current value supervision						
2760	172.08	LD0.RESCMMXU1.HiAlm.stVal	RESCMMXU1.HIGH_ALAR M	Y	High alarm[.stVal] - mom	1=High alarm
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 current value supervision						
2764	172.12	LD0.RESVMMXU1.HiAlm.stVal	RESVMMXU1.HIGH_ALAR M	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						
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)						
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)						
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 voltage value limit supervision						
2784	174.00	LD0.VMMXU1.HiAlm.stVal	VMMXU1.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	Values
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 alarm[.stVal] - mom	1=Low alarm
2789	174.05	LD0.VMMXU1.LoWrn.stVal			Low alarm[.stVal] - MCD	
2790	174.06	LD0.VMMXU1.LoAlm.stVal	VMMXU1.LOW_ALARM	Y	Low warning[.stVal] - mom	1=Low warning
2791	174.07	LD0.VMMXU1.LoAlm.stVal			Low warning[.stVal] - MCD	
Disconnecter (1) position						
2792	174.08	CTRL.DCSXSW11.Pos.stVal.Close	DCSXSXW11.POSITION	Y	close mom	1=Close
2793	174.09	CTRL.DCSXSW11.Pos.stVal.Open	-	Y	open mom	1=Open
2794	174.10	CTRL.DCSXSW11.Pos.stVal.Fault	-	Y	error position	1=Faulty or Intermediate
Disconnecter (2) position						
2795	174.11	CTRL.DCSXSW12.Pos.stVal.Close	DCSXSXW12.POSITION	Y	close mom	1=Close
2796	174.12	CTRL.DCSXSW12.Pos.stVal.Open	-	Y	open mom	1=Open
2797	174.13	CTRL.DCSXSW12.Pos.stVal.Fault	-	Y	error position	1=Faulty or Intermediate
Disconnecter (3) position						
2798	174.14	CTRL.DCSXSW13.Pos.stVal.Close	DCSXSXW13.POSITION	Y	close mom	1=Close
2799	174.15	CTRL.DCSXSW13.Pos.stVal.Open	-	Y	open mom	1=Open
2800	175.00	CTRL.DCSXSW13.Pos.stVal.Fault	-	Y	error position	1=Faulty or Intermediate
Earth disconnecter position						
2801	175.01	CTRL.ESSXSW11.Pos.stVal.Close	ESSXSXW11.POSITION	Y	close mom	1=Close
2802	175.02	CTRL.ESSXSW11.Pos.stVal.Open	-	Y	open mom	1=Open
2803	175.03	CTRL.ESSXSW11.Pos.stVal.Fault	-	Y	error position	1=Faulty or Intermediate
Circuit breaker position						
2804	175.04	CTRL.CBCSW11.Pos.stVal.Close	CBXCBR1.POSITION	Y	close mom	1=Close
2805	175.05	CTRL.CBCSW11.Pos.stVal.Open	-	Y	open mom	1=Open
2806	175.06	CTRL.CBCSW11.Pos.stVal.Fault	-	Y	error position	1=Faulty or Intermediate
2807	175.07				(reserved)	0
2808	175.08				(reserved)	0
2809	175.09				(reserved)	0
2810	175.10				(reserved)	0
2811	175.11				(reserved)	0
2812	175.12				(reserved)	0
2813	175.13				(reserved)	0
2814	175.14				(reserved)	0
2815	175.15				(reserved)	0

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Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Values
Circuit breaker position + momentary change detect						
2816	176.00	CTRL.CBCSW11.Pos.stVal	CBXCBR1.POSITION	Y	close mom	1=Close
2817	176.01	CTRL.CBCSW11.Pos.stVal			close MCD	
2818	176.02	CTRL.CBCSW11.Pos.stVal	-		open mom	1=Open
2819	176.03	CTRL.CBCSW11.Pos.stVal		Y	open MCD	
2820	176.04				(reserved)	0
2821	176.05				(reserved)	0
Circuit breaker selected for control operation						
2822	176.06	CTRL.CBCSW11.Pos.stSeld	CBXCBR1.SELECTED	Y	Selected (.stSeld) - mom	1=Selected
2823	176.07	CTRL.CBCSW11.Pos.stSeld			Selected (.stSeld) - MCD	
Circuit breaker control enable signals						
2824	176.08	CTRL.CBCILO1.EnaOpn.stVal	CBXCBR1.ENA_OPEN	Y	Open enabled (.stVal) - mom	1=Open enabled
2825	176.09	CTRL.CBCILO1.EnaCls.stVal	CBXCBR1.ENA_CLOSE	Y	Close enabled (.stVal) - mom	1=Close enabled
2826	176.10				(reserved)	0
2827	176.11				(reserved)	0
Circuit breaker failure detection and -protection						
2828	176.12	CTRL.CCBBRBF1.Str.general	CCBBRBF1.CB_FAULT_AL	Y	Start, timer running[.general] - mom	1=Start,timer running
2829	176.13	CTRL.CCBBRBF1.Str.general			Start, timer running[.general] - MCD	
2830	176.14	CTRL.CCBBRBF1.OpEx.general	CCBBRBF1.TRBU	Y	Failure, external trip [.general] - mom	1=Failure,external trip
2831	176.15	CTRL.CCBBRBF1.OpEx.general			Failure, external trip [.general] - MCD	
2832	177.00	CTRL.CCBBRBF1.Opln.general	CCBBRBF1.TRRET	Y	Operate, internal retrip (general) - mom	1=Operate, internal re-trip
2833	177.01	CTRL.CCBBRBF1.Opln.general			Operate, internal retrip (general) - MCD	
2834	177.02				(reserved)	0
2835	177.03				(reserved)	0
Circuit breaker control blocking signals						
2836	177.04	CTRL.CBXGBR1.BlkOpn.stVal	CBXCBR1.BLK_OPEN	Y	Open blocked [.stVal] - mom	1 = Open blocked
2837	177.05	CTRL.CBXGBR1.BlkOpn.stVal			Open blocked [.stVal] - MCD	
2838	177.06	CTRL.CBXGBR1.BlkCls.stVal	CBXCBR1.BLK_CLOSE	Y	Close blocked [.stVal] - mom	1 = Close blocked
2839	177.07	CTRL.CBXGBR1.BlkCls.stVal			Close blocked [.stVal] - MCD	
2840	177.08	CTRL.CBCILO1.ItlByPss.stVal	CBXCBR1.ITL_BYPASS	Y	Interlocking bypass [.stVal] - mom	1 = Interlocking bypass
2841	177.09	CTRL.CBCILO1.ItlByPss.stVal			Interlocking bypass [.stVal] - MCD	
2842	177.10				(reserved)	0
2843	177.11				(reserved)	0
2844	177.12				(reserved)	0
2845	177.13				(reserved)	0
2846	177.14				(reserved)	0
2847	177.15				(reserved)	0
Circuit breaker condition monitoring						
Table continues on next page						

Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Values
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
2860	178.12				(reserved)	0
2861	178.13				(reserved)	0
2862	178.14				(reserved)	0
2863	178.15				(reserved)	0
Global conditioning, Phase information						
2864	179.00	LD0.LEDPTRC1.Str.phsA	-	Y	Start (.phsA) - mom	1=Start phsA
2865	179.01	LD0.LEDPTRC1.Str.phsA	-		Start (.phsA) - MCD	
2866	179.02	LD0.LEDPTRC1.Str.phsB	-	Y	Start (.phsB) - mom	1=Start phsB
2867	179.03	LD0.LEDPTRC1.Str.phsB	-		Start (.phsB) - MCD	
2868	179.04	LD0.LEDPTRC1.Str.phsC	-	Y	Start (.phsC) - mom	1=Start phsB
2869	179.05	LD0.LEDPTRC1.Str.phsC	-		Start (.phsC) - MCD	
2870	179.06	LD0.LEDPTRC1.Op.phsA	-	Y	Operate (.phsA) - mom	1=Operate phsA
2871	179.07	LD0.LEDPTRC1.Op.phsA	-		Operate (.phsA) - MCD	
2872	179.08	LD0.LEDPTRC1.Op.phsB	-	Y	Operate (.phsB) - mom	1=Operate phsB
2873	179.09	LD0.LEDPTRC1.Op.phsB	-		Operate (.phsB) - MCD	
2874	179.10	LD0.LEDPTRC1.Op.phsC	-	Y	Operate (.phsC) - mom	1=Operate phsB
2875	179.11	LD0.LEDPTRC1.Op.phsC	-		Operate (.phsC) - MCD	
Generic operation time supervision						
2876	179.12	LD0.MDSOPT1.OpTmW/m.stVal	MDSOPT1.WARNING	Y	Accumulated operation time warning [.stVal] - mom	1 = Warning
2877	179.13	LD0.MDSOPT1.OpTmW/m.stVal			Accumulated operation time warning [.stVal] - MCD	
2878	179.14	LD0.MDSOPT1.OpTmAlm.stVal	MDSOPT1.ALARM	Y	Accumulated operation time alarm [.stVal] - mom	1 = Alarm
2879	179.15	LD0.MDSOPT1.OpTmAlm.stVal			Accumulated operation time alarm [.stVal] - MCD	
Phase overcurrent protection signals (2 stages)						

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Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Values
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.PHIPTOC1.Str.general	PHIPTOC1.START	Y	Instantaneous stage Start[.general] - mom	1=Instantaneous stage start
2891	180.11	LD0.PHIPTOC1.Str.general			Instantaneous stage Start[.general] - MCD	
2892	180.12	LD0.PHIPTOC1.Str.phsA	-	Y	Instantaneous stage Start[.phsA] - mom	1=Instantaneous stage phsA start
2893	180.13	LD0.PHIPTOC1.Str.phsA			Instantaneous stage Start[.phsA] - MCD	
2894	180.14	LD0.PHIPTOC1.Str.phsB	-	Y	Instantaneous stage Start[.phsB] - mom	1=Instantaneous stage phsB start
2895	180.15	LD0.PHIPTOC1.Str.phsB			Instantaneous stage Start[.phsB] - MCD	
2896	181.00	LD0.PHIPTOC1.Str.phsC	-	Y	Instantaneous stage Start[.phsC] - mom	1=Instantaneous stage phsC start
2897	181.01	LD0.PHIPTOC1.Str.phsC			Instantaneous stage Start[.phsC] - MCD	
2898	181.02	LD0.PHIPTOC1.Op.general	PHIPTOC1.OPERATE	Y	Instantaneous stage Operate[.general] - mom	1=Instantaneous stage operate
2899	181.03	LD0.PHIPTOC1.Op.general			Instantaneous stage Operate[.general] - MCD	
Directional earthfault protection (DEFLPDEF), 1 stage						
2900	181.04	LD0.DEFLPTOC1.Str.general	DEFLPDEF1.START	Y	Low stage Start[.general] - mom	1=Low stage start
2901	181.05	LD0.DEFLPTOC1.Str.general			Low stage Start[.general] - MCD	
2902	181.06	LD0.DEFLPTOC1.Op.general	DEFLPDEF1.OPERATE	Y	Low stage Operate[.general] - mom	1=Low stage operate
2903	181.07	LD0.DEFLPTOC1.Op.general			Low stage Operate[.general] - MCD	
Negative phase sequence time overcurrent protection, 2 stages						
2904	181.08	LD0.MNSPTOC1.Str.general	MNSPTOC1.START	Y	Stage1 Start[.general] - mom	1=Stage1 start
2905	181.09	LD0.MNSPTOC1.Str.general			Stage1 Start[.general] - MCD	
2906	181.10	LD0.MNSPTOC1.Op.general	MNSPTOC1.OPERATE	Y	Stage1 Operate[.general] - mom	1=Stage1 operate
2907	181.11	LD0.MNSPTOC1.Op.general			Stage1 Operate[.general] - MCD	
2908	181.12	LD0.MNSPTOC2.Str.general	MNSPTOC2.START	Y	Stage2 Start[.general] - mom	1=Stage2 start
2909	181.13	LD0.MNSPTOC2.Str.general			Stage2 Start[.general] - MCD	
2910	181.14	LD0.MNSPTOC2.Op.general	MNSPTOC2.OPERATE	Y	Stage2 Operate[.general] - mom	1=Stage2 operate
2911	181.15	LD0.MNSPTOC2.Op.general			Stage2 Operate[.general] - MCD	
Loss of load protection						
2912	182.00	LD0.LOFLPTUC1.Str.general	LOFLPTUC1.START	Y	Start[.general] - mom	1=Stage start

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Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Values
2913	182.01	LD0.LOFLPTUC1.Str.general			Start[.general] - MCD	
2914	182.02	LD0.LOFLPTUC1.Op.general	LOFLPTUC1.OPERATE	Y	Operate[.general] - mom	1=Stage operate
2915	182.03	LD0.LOFLPTUC1.Op.general			Operate[.general] - MCD	
Motor thermal overload protection						
2916	182.04	LD0.MPTTR1.StrInh.stVal	MPTR1.BLK_RESTART	Y	Restart inhibit [.stVal] - mom	1=Inhibit
2917	182.05	LD0.MPTTR1.StrInh.stVal	-		Restart inhibit [.stVal] - MCD	
Stalled motor protection						
2918	182.06	LD0.JAMPTOC1.Op.general	JAMPTOC1.OPERATE	Y	Operate[.general] - mom	1=Stage operate
2919	182.07	LD0.JAMPTOC1.Op.general			Operate[.general] - MCD	
Motor startup supervision (STTPMSU)						
2920	182.08	LD0.STTPMSS1.Str.general	STTPMSU.MOT_START	Y	Motor startup in progress [.general] - mom	1=Startup in progress
2921	182.09	LD0.STTPMSS1.Str.general			Motor startup in progress [.general] - MCD	
2922	182.10	LD0.STTPMSS1.Op.general	STTPMSU.OPR_IIT	Y	Thermal stress operate [.general] - mom	1=Thermal stress operate
2923	182.11	LD0.STTPMSS1.Op.general			Thermal stress operate [.general] - MCD	
2924	182.12	LD0.STTPMR1.Op.general	STTPMSU.OPR_STALL	Y	Stalling operate [.general] - mom	1=Stalling operate
2925	182.13	LD0.STTPMR1.Op.general			Stalling operate [.general] - MCD	
Phase reversal protection						
2926	182.14	LD0.PREVPTOC1.Str.general	PREVPTOC1.START	Y	Start[.general] - mom	1=Stage start
2927	182.15	LD0.PREVPTOC1.Str.general			Start[.general] - MCD	
2928	183.00	LD0.PREVPTOC1.Op.general	PREVPTOC1.OPERATE	Y	Operate[.general] - mom	1=Stage operate
2929	183.01	LD0.PREVPTOC1.Op.general			Operate[.general] - MCD	
Motor thermal overload protection						
2930	183.02	LD0.MPTTR1.AlmThm.general	MPTR1.ALARM	Y	Alarm[.general] - mom	1=Thermal alarm
2931	183.03	LD0.MPTTR1.AlmThm.general			Alarm[.general] - MCD	
2932	183.04	LD0.MPTTR1.Op.general	MPTR1.OPERATE	Y	Operate[.general] - mom	1=Operate
2933	183.05	LD0.MPTTR1.Op.general			Operate[.general] - MCD	
Emergency start enable						
2934	183.06	LD0.ESMGAPC1.Str.general	ESMGAPC1.ST_EMERG_E	Y	Start[.general] - mom	1=Emergency start enabled
2935	183.07	LD0.ESMGAPC1.Str.general			Start[.general] - MCD	
Current circuit supervision						
2936	183.08	CTRL.CCRDIF1.Op.general	CCRDIF1.FAIL	Y	Fail output [.general] - mom	1=Fail output
2937	183.09	CTRL.CCRDIF1.Op.general			Fail output [.general] - MCD	
2938	183.10	CTRL.CCRDIF1.Alm.stVal	CCRDIF1.ALARM	Y	Alarm output [.general] - mom	1=Alarm output
2939	183.11	CTRL.CCRDIF1.Alm.stVal			Alarm output [.general] - MCD	
Fuse failure supervision						
2940	183.12	LD0.SEQRFUF1.Str.general	SEQRFUF1.FUSEF_U	Y	General start [.general] - mom	1=General start
2941	183.13	LD0.SEQRFUF1.Str.general			General start [.general] - MCD	
2942	183.14	LD0.SEQRFUF1.Str3Ph.general	SEQRFUF1.FUSEF_3PH	Y	Three-phase start [.general] - mom	1=3phase start

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Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Values
2943	183.15	LD0.SECRFUF1.Str.3Ph.general			Three-phase start [general] - MCD	
2944	184.00				(reserved)	0
2945	184.01				(reserved)	0
2946	184.02				(reserved)	0
2947	184.03				(reserved)	0
Positive sequence undervoltage protection, 1 stage						
2948	184.04	LD0.PSPTUV1.Str.general	PSPTUV1.START	Y	Start[general] - mom	1=Stage start
2949	184.05	LD0.PSPTUV1.Str.general			Start[general] - MCD	
2950	184.06	LD0.PSPTUV1.Str.phsA	-	Y	Start (. phsA) - mom	1=Start phsA
2951	184.07	LD0.PSPTUV1.Str.phsA			Start (. phsA) - MCD	
2952	184.08	LD0.PSPTUV1.Str.phsB	-	Y	Start (. phsB) - mom	1=Start phsB
2953	184.09	LD0.PSPTUV1.Str.phsB			Start (. phsB) - MCD	
2954	184.10	LD0.PSPTUV1.Str.phsC	-	Y	Start (. phsC) - mom	1=Start phsB
2955	184.11	LD0.PSPTUV1.Str.phsC			Start (. phsC) - MCD	
2956	184.12	LD0.PSPTUV1.Op.general	PSPTUV1.OPERATE	Y	Operate[general] - mom	1=Stage operate
2957	184.13	LD0.PSPTUV1.Op.general			Operate[general] - MCD	
Three-phase undervoltage protection, 1 stage						
2958	184.14	LD0.PHPTUV1.Str.general	PHPTUV1.START	Y	Start[general] - mom	1=Stage start
2959	184.15	LD0.PHPTUV1.Str.general			Start[general] - MCD	
2960	185.00	LD0.PHPTUV1.Str.phsA	-	Y	Start (. phsA) - mom	1=Start phsA
2961	185.01	LD0.PHPTUV1.Str.phsA			Start (. phsA) - MCD	
2962	185.02	LD0.PHPTUV1.Str.phsB	-	Y	Start (. phsB) - mom	1=Start phsB
2963	185.03	LD0.PHPTUV1.Str.phsB			Start (. phsB) - MCD	
2964	185.04	LD0.PHPTUV1.Str.phsC	-	Y	Start (. phsC) - mom	1=Start phsB
2965	185.05	LD0.PHPTUV1.Str.phsC			Start (. phsC) - MCD	
2966	185.06	LD0.PHPTUV1.Op.general	PHPTUV1.OPERATE	Y	Operate[general] - mom	1=Stage operate
2967	185.07	LD0.PHPTUV1.Op.general			Operate[general] - MCD	
Negative sequence overvoltage protection, 1 stage						
2968	185.08	LD0.NSPTOV1.Str.general	NSPTOV1.START	Y	Start[general] - mom	1=Stage start
2969	185.09	LD0.NSPTOV1.Str.general			Start[general] - MCD	
2970	185.10	LD0.NSPTOV1.Str.phsA	-	Y	Start (. phsA) - mom	1=Start phsA
2971	185.11	LD0.NSPTOV1.Str.phsA			Start (. phsA) - MCD	
2972	185.12	LD0.NSPTOV1.Str.phsB	-	Y	Start (. phsB) - mom	1=Start phsB
2973	185.13	LD0.NSPTOV1.Str.phsB			Start (. phsB) - MCD	
2974	185.14	LD0.NSPTOV1.Str.phsC	-	Y	Start (. phsC) - mom	1=Start phsB
2975	185.15	LD0.NSPTOV1.Str.phsC			Start (. phsC) - MCD	
2976	186.00	LD0.NSPTOV1.Op.general	NSPTOV1.OPERATE	Y	Operate[general] - mom	1=Stage operate
2977	186.01	LD0.NSPTOV1.Op.general			Operate[general] - MCD	
ARC protection signals (3 stages), optional						
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Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Values
2978	186.02	LD0.ARCSARC11.FADet.stVal	ARCSARC1.ARC_FLT_DET	Y	Stage 1 Fault arc detected[.stVal] - mom	1=Stage1 arc detected
2979	186.03	LD0.ARCSARC11.FADet.stVal			Stage 1 Fault arc detected[.stVal] - MCD	
2980	186.04				(reserved)	0
2981	186.05				(reserved)	0
2982	186.06	LD0.ARCPTRC11.Op.general	ARCSARC1.OPERATE	Y	Stage 1 Operate[.general] - mom	1=Stage1 operate
2983	186.07	LD0.ARCPTRC11.Op.general			Stage 1 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				(reserved)	0
2987	186.11				(reserved)	0
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				(reserved)	0
2993	187.01				(reserved)	0
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	
2996	187.04				(reserved)	0
Non-directional earthfault, 2 stages (ME01 only)						
3008	188.00	LD0.EFLPTOC1.Str.general	EFLPTOC1.START	Y	Low stage Start[.general] - mom	1=Low stage start
3009	188.01	LD0.EFLPTOC1.Str.general			Low stage Start[.general] - MCD	
3010	188.02	LD0.EFLPTOC1.Op.general	EFLPTOC1.OPERATE	Y	Low stage Operate[.general] - mom	1=Low stage operate
3011	188.03	LD0.EFLPTOC1.Op.general			Low stage Operate[.general] - MCD	
3012	188.04	LD0.EFHPTOC1.Str.general	EFHPTOC1.START	Y	High stage Start[.general] - mom	1=High stage start
3013	188.05	LD0.EFHPTOC1.Str.general			High stage Start[.general] - MCD	
3014	188.06	LD0.EFHPTOC1.Op.general	EFHPTOC1.OPERATE	Y	High stage Operate[.general] - mom	1=High stage operate
3015	188.07	LD0.EFHPTOC1.Op.general			High stage Operate[.general] - MCD	
3016	188.08				(reserved)	0
3017	188.09				(reserved)	0
3018	188.10				(reserved)	0
3019	188.11				(reserved)	0
3020	188.12				(reserved)	0
3021	188.13				(reserved)	0
3022	188.14				(reserved)	0
3023	188.15				(reserved)	0
Frequency protection, 2 stages (ME02, ME03)						
3024	189.00	LD0.FRPTRC1.Str.general	FRPFRQ1.START	Y	Stage 1 Start[.general] - mom	1 = Stage 1 start
3025	189.01	LD0.FRPTRC1.Str.general			Stage 1 Start[.general] - MCD	

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Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Values
3026	189.02	LD0.FRPTOF1.Op.general	FRPFRQ1.OPR_OFRRQ	Y	Stage 1 Operate signal for overfrequency [general] - mom	1 = Stage 1 operate
3027	189.03	LD0.FRPTOF1.Op.general			Stage 1 Operate signal for overfrequency [general] - MCD	
3028	189.04	LD0.FRPTUF1.Op.general	FRPFRQ1.OPR_UFRQ	Y	Stage 1 Operate signal for underfrequency [general] - mom	1 = Stage 1 operate
3029	189.05	LD0.FRPTUF1.Op.general			Stage 1 Operate signal for underfrequency [general] - MCD	
3030	189.06	LD0.FRPFRC1.Op.general	FRPFRQ1.OPR_FRG	Y	Stage 1 Operate signal for frequency gradient [general] - mom	1 = Stage 1 operate
3031	189.07	LD0.FRPFRC1.Op.general			Stage 1 Operate signal for frequency gradient [general] - MCD	
3032	189.08	LD0.FRPTRC2.Stt.general	FRPFRQ2.START	Y	Stage 2 Start [general] - mom	1 = Stage 2 start
3033	189.09	LD0.FRPTRC2.Stt.general			Stage 2 Start [general] - MCD	
3034	189.10	LD0.FRPTOF2.Op.general	FRPFRQ2.OPR_OFRRQ	Y	Stage 2 Operate signal for overfrequency [general] - mom	1 = Stage 2 operate
3035	189.11	LD0.FRPTOF2.Op.general			Stage 2 Operate signal for overfrequency [general] - MCD	
3036	189.12	LD0.FRPTUF2.Op.general	FRPFRQ2.OPR_UFRQ	Y	Stage 2 Operate signal for underfrequency [general] - mom	1 = Stage 2 operate
3037	189.13	LD0.FRPTUF2.Op.general			Stage 2 Operate signal for underfrequency [general] - MCD	
3038	189.14	LD0.FRPFRC2.Op.general	FRPFRQ2.OPR_FRG	Y	Stage 2 Operate signal for frequency gradient [general] - mom	1 = Stage 2 operate
3039	189.15	LD0.FRPFRC2.Op.general			Stage 2 Operate signal for frequency gradient [general] - MCD	
3040	190.00				(reserved)	0
3041	190.01				(reserved)	0
3042	190.02				(reserved)	0
3043	190.03				(reserved)	0
3044	190.04				(reserved)	0
3045	190.05				(reserved)	0
3046	190.06				(reserved)	0
3047	190.07				(reserved)	0
3048	190.08				(reserved)	0
3049	190.09				(reserved)	0
3050	190.10				(reserved)	0
3051	190.11				(reserved)	0
3052	190.12				(reserved)	0
3053	190.13				(reserved)	0
3054	190.14				(reserved)	0
3055	190.15				(reserved)	0

Multipurpose analog protection functions (3 stages) (ME01,ME02)

Table continues on next page

Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Values
3056	191.00	LD0.MAPGAPC1.Str.general	MAPGAPC1.START	Y	Stage 1 Start [.general] - mom	1 = Stage 1 start
3057	191.01	LD0.MAPGAPC1.Str.general			Stage 1 Start [.general] - MCD	
3058	191.02	LD0.MAPGAPC1.Op.general	MAPGAPC1.OPERATE	Y	Stage 1 Operate [.general] - mom	1 = Stage 1 operate
3059	191.03	LD0.MAPGAPC1.Op.general			Stage 1 Operate [.general] - MCD	
3060	191.04	LD0.MAPGAPC2.Str.general	MAPGAPC2.START	Y	Stage 2 Start [.general] - mom	1 = Stage 2 start
3061	191.05	LD0.MAPGAPC2.Str.general			Stage 2 Start [.general] - MCD	
3062	191.06	LD0.MAPGAPC2.Op.general	MAPGAPC2.OPERATE	Y	Stage 2 Operate [.general] - mom	1 = Stage 2 operate
3063	191.07	LD0.MAPGAPC2.Op.general			Stage 2 Operate [.general] - MCD	
3064	191.08	LD0.MAPGAPC3.Str.general	MAPGAPC3.START	Y	Stage 3 Start [.general] - mom	1 = Stage 3 start
3065	191.09	LD0.MAPGAPC3.Str.general			Stage 3 Start [.general] - MCD	
3066	191.10	LD0.MAPGAPC3.Op.general	MAPGAPC3.OPERATE	Y	Stage 3 Operate [.general] - mom	1 = Stage 3 operate
3067	191.11	LD0.MAPGAPC3.Op.general			Stage 3 Operate [.general] - MCD	
3068	191.12				(reserved)	0
3069	191.13				(reserved)	0
3070	191.14				(reserved)	0
3071	191.15				(reserved)	0
XRGGIO130 Alarm/Warming (ME01,ME02)						
3072	192.00	LD0.XRGGIO130.Alm.stVal	XRGGIO130.ALARM	Y	XRGGIO130 Alarm [.stVal] - mom	1 = Alarm
3073	192.01	LD0.XRGGIO130.Alm.stVal			XRGGIO130 Alarm [.stVal] - MCD	
3074	192.02	LD0.XRGGIO130.Wrn.stVal	XRGGIO130.WARNING	Y	XRGGIO130 Warning [.stVal] - mom	1 = Warning
3075	192.03	LD0.XRGGIO130.Wrn.stVal			XRGGIO130 Warning [.stVal] - MCD	
...	...				(reserved)	0
3183	198.15				(reserved)	0
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	-		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	-		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	-		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	-		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

Table continues on next page

Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Values
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)						
3216	201.00	LD0.XGGIO110.lnd1.stVal	-		X110-Input 1[.stVal] - mom	1=ON, 0=OFF
3217	201.01	LD0.XGGIO110.lnd1.stVal			X110-Input 1[.stVal] - MCD	
3218	201.02	LD0.XGGIO110.lnd2.stVal	-		X110-Input 2[.stVal] - mom	1=ON, 0=OFF
3219	201.03	LD0.XGGIO110.lnd2.stVal			X110-Input 2[.stVal] - MCD	
3220	201.04	LD0.XGGIO110.lnd3.stVal	-		X110-Input 3[.stVal] - mom	1=ON, 0=OFF
3221	201.05	LD0.XGGIO110.lnd3.stVal			X110-Input 3[.stVal] - MCD	
3222	201.06	LD0.XGGIO110.lnd4.stVal	-		X110-Input 4[.stVal] - mom	1=ON, 0=OFF
3223	201.07	LD0.XGGIO110.lnd4.stVal			X110-Input 4[.stVal] - MCD	
3224	201.08	LD0.XGGIO110.lnd5.stVal	-		X110-Input 5[.stVal] - mom	1=ON, 0=OFF
3225	201.09	LD0.XGGIO110.lnd5.stVal			X110-Input 5[.stVal] - MCD	
3226	201.10	LD0.XGGIO110.lnd6.stVal	-		X110-Input 6[.stVal] - mom	1=ON, 0=OFF
3227	201.11	LD0.XGGIO110.lnd6.stVal			X110-Input 6[.stVal] - MCD	
3228	201.12	LD0.XGGIO110.lnd7.stVal	-		X110-Input 7[.stVal] - mom	1=ON, 0=OFF
3229	201.13	LD0.XGGIO110.lnd7.stVal			X110-Input 7[.stVal] - MCD	
3230	201.14	LD0.XGGIO110.lnd8.stVal	-		X110-Input 8[.stVal] - mom	1=ON, 0=OFF
3231	201.15	LD0.XGGIO110.lnd8.stVal			X110-Input 8[.stVal] - MCD	
3232	202.00	LD0.XGGIO110.SPCSO1.stVal	-		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	-		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	-		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	-		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)						
Table continues on next page						

Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Values
3248	203.00	LD0.XGGIO100.SPCSO1.stVal	-		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	-		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	-		X100-Output 3[.stVal] - mom	1=ON, 0=OFF
3253	203.05	LD0.XGGIO100.SPCSO3.stVal	-		X100-Output 3[.stVal] - MCD	
3254	203.06	LD0.XGGIO100.SPCSO4.stVal	-		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	-		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	-		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 (AIM-card XA130)						
3280	205.00	LD0.XAGGIO130.Incl1.stVal	-		XA130-Input 1 - mom	1=ON, 0=OFF
3281	205.01	LD0.XAGGIO130.Incl1.stVal	-		XA130-Input 1[.stVal] - MCD	
3282	205.02	LD0.XAGGIO130.Incl2.stVal	-		XA130-Input 2 - mom	1=ON, 0=OFF
3283	205.03	LD0.XAGGIO130.Incl2.stVal	-		XA130-Input 2[.stVal] - MCD	
3284	205.04	LD0.XAGGIO130.Incl3.stVal	-		XA130-Input 3 - mom	1=ON, 0=OFF
3285	205.05	LD0.XAGGIO130.Incl3.stVal	-		XA130-Input 3[.stVal] - MCD	
3286	205.06	LD0.XAGGIO130.Incl4.stVal	-		XA130-Input 4 - mom	1=ON, 0=OFF
3287	205.07	LD0.XAGGIO130.Incl4.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	

Table continues on next page

Bit addr	Reg.bit	IEC 61850 name	AFL-Common SA name	Ds	Description	Values
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	
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	

Table 4: Controls

Ox addr	Ctrl struct	Ctrl bit	Mode	Identification	Description
2048	1	0	Uns	CTRL.CBCSW11.Pos.ctlVal	CBXCBBR1 - Switch, general - Open
2049		1	Uns		CBXCBBR1 - Switch, general - Close
2050		2	Uns		CBXCBBR1 - Switch, general - Cancel
2051		3	Uns		CBXCBBR1 - Switch, general - Operate
2052		4	Uns		CBXCBBR1 - Switch, general - Direct open
2053		5	Uns		CBXCBBR1 - Switch, general - Direct close
2060	2	0	Uns	LD0.LLNO.LEDRs1.ctlVal	General - Indications and LEDs - 1=Activate
2061		1	Uns	LD0.LLNO.LEDRs2.ctlVal	General - Alarm LEDs - 1=Activate
2062		2	Uns	LD0.LLNO.RecRs.ctlVal	General - All data - 1=Activate
2063					(reserved)
2064					(reserved)
2065		5	Uns	LD0.SSCBBR1.RsAccAPwr.ctlVal	Reset accumulation energy - 1=Activate
2066		6	Uns	LD0.SSCBBR1.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.PEIMMXU1.SuppDmdRs.ctlVal	Reset accumulated energy - 1=Reset
2071		11	Uns	LD0.SCCBBR1.RsTrvTm.ctlVal	Reset travelling time alarm - 1=Reset
2072	12	Uns	LD0.SCCBBR1.RsSprChaTm.ctlVal	Reset spring charge time alarm - 1=Reset	
2073				(reserved)	
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

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## Section 3      Glossary

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





# Contact us

## **ABB Oy**

### **Distribution Automation**

P.O. Box 699

FI-65101 VAASA, Finland

Phone +358 10 22 11

Fax +358 10 22 41094

[www.abb.com/substationautomation](http://www.abb.com/substationautomation)