Relion® 620 series

Advanced Recloser Protection and Control RER620
IEC 60870-5-101/104 Point List Manual

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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 directive, and with the product standards EN 60255-6 and EN 60255-27 for the directive. The protective relay is designed in accordance with the international standards of the IEC 60255 series and ANSI C37.90

Section 1 Introduction

1.1 This manual

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

1.2 Intended audience

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

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

1.3 Product documentation

1.3.1 Product documentation set

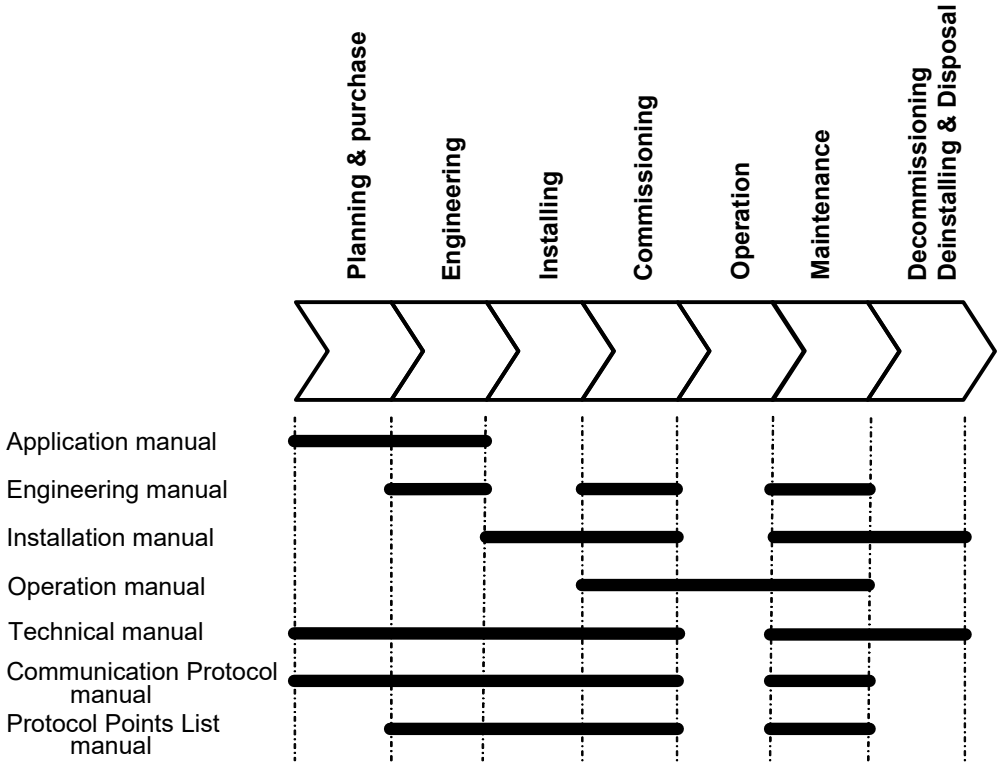

Figure 1: The intended use of manuals in different lifecycles

The engineering manual contains instructions on how to engineer the protective relay using the different tools in PCM600. The manual provides instructions on how to set up a PCM600 project and insert protective relays in the project structure. The manual also recommends a sequence for engineering of protection and control functions, LHMI functions, and communication engineering for IEC 61850 and DNP3.

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

The operation manual contains instructions on how to operate the protective relay once it has been commissioned. The manual provides instructions for monitoring, controlling and setting the protective relay. 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 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 manuals describe the communication protocols supported by the protective relay. Each manual concentrates on vendor-specific implementations. The point list manual describes the outlook and properties of the data points specific to the protective relay. The manual should be used in conjunction with the corresponding communication protocol manual.

1.3.2 Document revision history

Document revision/date	Product version	History
A/11/23/2010	1.0	First release
B/10/31/2011	1.1	Content updated to correspond to the product series version
C/07/20/2017	1.3	Content updated to correspond to the product series 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
IEC 60870-5-101/104 Communication Protocol Manual	1MAC306892-MB

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 protective relay 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 "Enabled" and "Disabled".
- Protective relay input/output messages and monitored data names are shown in Courier font, for example:

  When the function picks up, the `PICKUP` output is set to TRUE.
- Dimensions are provided both in inches and mm. If it is not specifically mentioned then the dimension is in mm.

1.4.3 Functions, codes and symbols

Table 1: RER620 functions, codes and symbols

Function	IEC61850	IEC60617	ANSI/C37.2
Current Protection			
Single-phase non-directional time overcurrent protection with 1-ph trip option, low stage	SPHLPTOC1	3I>(1)	51P
Single-phase non-directional time overcurrent protection with 1-ph trip option, high stage 1	SPHLPTOC2	3I>(2)	50P-1
Single-phase non-directional time overcurrent protection with 1-ph trip option, high stage 2	SPHHPTOC1	3I>>(1)	50P-2
Single-phase non-directional instantaneous overcurrent protection with 1-ph trip option	SPHIPTOC1	3I>>>(1)	50P-3
Non-directional time overcurrent ground-fault protection, low stage	XEFLPTOC2	Io>(2)	51N
Non-directional time overcurrent ground-fault protection, high stage 1	XEFLPTOC3	Io>(3)	50N-1
Non-directional time overcurrent ground-fault protection, high stage 2	XEFHPTOC3	Io>>(3)	50N-2
Non-directional instantaneous time overcurrent ground-fault protection	XEFIPTOC2	Io>>>(2)	50N-3
Non-directional sensitive earth-fault	EFLPTOC3	Io>(3)	50SEF
Negative sequence non-directional time overcurrent protection 1	XNSPTOC1	I2 >(1)	46-1
Negative sequence non-directional time overcurrent protection 2	XNSPTOC2	I2 >(2)	46-2
Phase discontinuity protection	PDNSPTOC1	I2/I1>	46PD
Three-phase inrush detector	INPHAR	3I2f >	INR
Directional Protection			
Single-phase directional overcurrent protection, low stage 1	SDPHLPDOC1	3I >->(1)	67/51P-1
Single-phase directional overcurrent protection, low stage 2	SDPHLPDOC2	3I >->(2)	67/51P-2
Directional ground-fault protection, low stage 1	XDEFLPDEF1	Io>->(1)	67/51N-1
Directional ground-fault protection, low stage 2	XDEFLPDEF2	Io>->(2)	67/51N-2
Cold Load Timers			
Cold load timer 1 Phase A (in seconds)	TPSGAPC1	TPS(1)	62CLD-1
Cold load timer 2 Phase A (in minutes)	TPMGAPC1	TPM(1)	62CLD-2
Cold load timer 1 Phase B (in seconds)	TPSGAPC2	TPS(2)	62CLD-3
Cold load timer 2 Phase B (in minutes)	TPMGAPC2	TPM(2)	62CLD-4
Cold load timer 1 Phase C (in seconds)	TPSGAPC3	TPS(3)	62CLD-5
Cold load timer 2 Phase C (in minutes)	TPMGAPC3	TPM(3)	62CLD-6
Voltage Protection			
Single-phase overvoltage 1, source 1 low stage	SPHPTOV1	3U >(1)	59-1
Single-phase overvoltage 2, source 1 high stage	SPHPTOV2	3U >(2)	59-2
Single-phase overvoltage 3, source 2 low stage	SPHPTOV3	3U >(3)	59-3
Single-phase undervoltage 1, source 1 low stage	SPHPTUV1	3U <(1)	27-1
Single-phase undervoltage 2, source 1 high stage	SPHPTUV2	3U <(2)	27-2
Single-phase undervoltage 3, source 2 low stage	SPHPTUV3	3U <(3)	27-3
Positive sequence overvoltage protection, source1	PSPTOV1	U1>(1)	59PS-1
Positive sequence overvoltage protection, source 2	PSPTOV2	U1>(2)	59PS-2
Negative sequence overvoltage protection, source1	NSPTOV1	U2>(1)	47
Negative sequence overvoltage protection, source 2	NSPTOV2	U2>(2)	47-2
Zero sequence overvoltage protection, source1	ROVPTOV1	Uo>(1)	59N-1

Function	IEC61850	IEC60617	ANSI/C37.2
Zero sequence overvoltage protection, source 2	ROVPTOV2	Uo>(2)	59N-2
Frequency Protection			
Underfrequency, Overfrequency, Frequency rate of change, Source 1, Stage 1	FRPFRQ1	f</f>,df/dt(1)	81-1
Underfrequency, Overfrequency, Frequency rate of change, Source 1, Stage 2	FRPFRQ2	f</f>,df/dt(2)	81-2
Load Shed & Restoration, Source 1, Stage 1	LSHDPFRQ1	UFLS/R(1)	81S-1
Load Shed & Restoration, Source 1, Stage 2	LSHDPFRQ2	UFLS/R(2)	81S-2
Other Protection			
High Impedance Fault Detector	PHIZ1	PHIZ1	HIZ
Circuit breaker failure protection	SCCBRBRF1	3I>/Io>BF	50BFT
Circuit breaker close failure protection	SCCBRBCF1	SCCBRBCF1	50BFC
Directional positive sequence power protection	DPSRDIR1	P>->	32P
Directional negative/zero sequence power protection	DNZSRDIR1	Q>->	32N
Control			
Autoreclosing, 1ph and/or 3ph	SDARREC1	O -> I	79
Synch-check/voltage check (Source 1 is defined as bus, Source 2 as line)	SECRSYN1	SYNC	25
Circuit Breaker 1 (3 state inputs / 3 control outputs)	SCBXCBR1	I<->O CB	52
Loop control	DLCM	LCM	LCM
Supervision and Monitoring			
CB condition monitoring	SPSCBR1	CBCM	52CM
Fuse failure supervision, Source 1	SEQRFUF1	FUSEF	60
Measurement			
Three-phase current	CMMXU1	3I	IA,IB,IC
Demand metering, Max/Min metering	CSMTA1		
Sequence current	CSMSQI1	I1,I2,I0	I1, I2, I0
Ground current	RESCMMXU1	Io	IG
Three-phase voltage, Source 1	VMMXU1	3U	VA,VB,VC
Three-phase voltage, Source 2	VMMXU2	3U(B)	VA,VB,VC(2)
Sequence voltages, Source 1	VSMSQI1	U1,U2,U0	V1,V2,V0
Sequence voltages, Source 2	VSMSQI2	U1,U2,U0(B)	V1,V2,V0(2)
Single and Three-phase power, Power factor and three phase energy, Source 1	APEMMXU1	P,SP,E	P,SP,E
Frequency, Source 1	FMMXU1	f	f
Recorders			
Digital fault recorder (DFR)	RDRE1	DR	DFR
Sequence of Events (SER)	SER	SER	SER
Fault Recorder	FLTMSTA	FLTMSTA	FLTMSTA
Fault Locator (FLOC)	DRFLO1	FLO	FLO
Other Functions			
Battery voltage, current. Test the battery	ZBAT1	UPS	UPS
Universal Power Drive	XGGIO115	X115(UPD)	X115(UPD)
Programmable buttons (16 buttons)	FKEYGGIO1	FKEYGGIO1	FKEYGGIO1
Move function block (8 outputs)	MVGAPC1	MVGAPC1	MVGAPC1

Function	IEC61850	IEC60617	ANSI/C37.2
Move function block (8 outputs)	MVGAPC2	MVGAPC2	MVGAPC2
Pulse timer (8 timers)	PTGAPC1	PTGAPC1	PTGAPC1
Pulse timer (8 timers)	PTGAPC2	PTGAPC2	PTGAPC2
Generic control points (16 outputs)	SPCGGIO1	SPCGGIO1	SPCGGIO1
Generic control points (16 outputs)	SPCGGIO2	SPCGGIO2	SPCGGIO2
Set reset flip flops (8 outputs)	SRGAPC1	SRGAPC1	SRGAPC1
Set reset flip flops (8 outputs)	SRGAPC2	SRGAPC2	SRGAPC2
Time delay off timers (8 timers)	TOFGAPC1	TOFGAPC1	TOFGAPC1
Time delay off timers (8 timers)	TOFGAPC2	TOFGAPC2	TOFGAPC2
Time delay on timers (8 timers)	TONGAPC1	TONGAPC1	TONGAPC1
Time delay on timers (8 timers)	TONGAPC2	TONGAPC2	TONGAPC2
Multipurpose generic up-down counter	UDFCNT1	UDFCNT1	UDFCNT1
Multipurpose generic up-down counter	UDFCNT2	UDFCNT2	UDFCNT2
Multipurpose generic up-down counter	UDFCNT3	UDFCNT3	UDFCNT3
Multipurpose generic up-down counter	UDFCNT4	UDFCNT4	UDFCNT4
Multipurpose generic up-down counter	UDFCNT5	UDFCNT5	UDFCNT5
Multipurpose generic up-down counter	UDFCNT6	UDFCNT6	UDFCNT6
Multipurpose generic up-down counter	UDFCNT7	UDFCNT7	UDFCNT7
Multipurpose generic up-down counter	UDFCNT8	UDFCNT8	UDFCNT8
Multipurpose generic up-down counter	UDFCNT9	UDFCNT9	UDFCNT9
Multipurpose generic up-down counter	UDFCNT10	UDFCNT10	UDFCNT10
Multipurpose generic up-down counter	UDFCNT11	UDFCNT11	UDFCNT11
Multipurpose generic up-down counter	UDFCNT12	UDFCNT12	UDFCNT12

Section 2 IEC 60870-5-101/104 data mappings

2.1 Overview

This document describes the IEC 60870-5-101/104 data points and structures available in RER620 Ver. 1.3.

The point tables show all the available IEC 60870-5-101/104 data points in this protective relay. The points are grouped into four tables: Analog Values, Binary Controls, Indications, and Integrated Totals. Within each group the data objects are listed in order based on the objects' Information Object Address (IOA). The IEC 60870-5-101/104 points can be freely added, removed, reorganized and reconfigured using PCM600.

This list represents the superset of IEC 60870-5-101/104 points. The actual set of available points is determined by the protective relay’s ordercode. An asterisk (*) in a No Events column indicates that no events are enabled by default for that point. The word “Disabled” in Disabled column indicates that the point is not active by default. Inactive points can be made active through PCM600.

2.2 Point list for RER620 Ver. 1.3

Table 2: Analog values

No events	61850 Path	IOA	Disabled	Description	Multiplier	Interrogation
	CMMXU1.A.phsA.cVal.mag.f	8000		"IA,IB,IC:phase A amplitude"		Yes
	CMMXU1.A.phsB.cVal.mag.f	8003		"IA,IB,IC:phase B amplitude"		Yes
	CMMXU1.A.phsC.cVal.mag.f	8006		"IA,IB,IC:phase C amplitude"		Yes
	CSMSQI1.SeqA.c1.cVal.mag.f	8012		"I1,I2,I0:amplitude"		Yes
	CSMSQI1.SeqA.c2.cVal.mag.f	8015		"I1,I2,I0:amplitude"		Yes
	CSMSQI1.SeqA.c3.cVal.mag.f	8018		"I1,I2,I0:amplitude"		Yes
	FLTMSTA1.OpCnt.stVal	8024		FLTMSTA1:OpCnt status		Yes
	FMMXU1.Hz.mag.f	8025		f:Hz magnitude		Yes
	FRPTRC1.StrDur.mag.f	8026		Freq1:StrDur magnitude		Yes
	FRPTRC2.StrDur.mag.f	8027		Freq2:StrDur magnitude		Yes
	APEMMXU1.TotPF.mag.f	8032		"P,E:TotPF magnitude"		Yes
	APEMMXU1.TotW.mag.f	8033		"P,E:TotW magnitude"		Yes
	APEMMXU1.TotVA.mag.f	8034		"P,E:TotVA magnitude"		Yes
	APEMMXU1.TotVAr.mag.f	8035		"P,E:TotVAr magnitude"		Yes
	RESCMMXU1.A.res.cVal.mag.f	8036		IG:amplitude		Yes
	SDARREC1.OpCnt1.stVal	8041		79:OpCnt1 status		Yes
	SDARREC1.OpCnt2.stVal	8042		79:OpCnt2 status		Yes
	SDARREC1.OpCnt3.stVal	8043		79:OpCnt3 status		Yes
	SDARREC1.OpCnt4.stVal	8044		79:OpCnt4 status		Yes
	SDARREC1.OpCnt5.stVal	8045		79:OpCnt5 status		Yes
	VMMXU1.PhV.phsA.cVal.mag.f	8047		"VA,VB,VC:phase A amplitude"		Yes
	VMMXU1.PhV.phsB.cVal.mag.f	8049		"VA,VB,VC:phase B amplitude"		Yes
	VMMXU1.PhV.phsC.cVal.mag.f	8051		"VA,VB,VC:phase C amplitude"		Yes
	VMMXU1.PPV.phsAB.cVal.mag.f	8052		"VA,VB,VC:phase AB amplitude"		Yes
	VMMXU1.PPV.phsBC.cVal.mag.f	8055		"VA,VB,VC:phase BC amplitude"		Yes
	VMMXU1.PPV.phsCA.cVal.mag.f	8058		"VA,VB,VC:phase CA amplitude"		Yes
	VMMXU2.PhV.phsA.cVal.mag.f	8062		"VA,VB,VC(2):phase A amplitude"		Yes
	VMMXU2.PhV.phsB.cVal.mag.f	8064		"VA,VB,VC(2):phase B amplitude"		Yes
	VMMXU2.PhV.phsC.cVal.mag.f	8066		"VA,VB,VC(2):phase C amplitude"		Yes
	VMMXU2.PPV.phsAB.cVal.mag.f	8067		"VA,VB,VC(2):phase AB amplitude"		Yes
	VMMXU2.PPV.phsBC.cVal.mag.f	8070		"VA,VB,VC(2):phase BC amplitude"		Yes
	VMMXU2.PPV.phsCA.cVal.mag.f	8073		"VA,VB,VC(2):phase CA amplitude"		Yes
	VSMSQI1.SeqV.c1.cVal.mag.f	8076		"V1,V2,V0:amplitude"		Yes
	VSMSQI1.SeqV.c2.cVal.mag.f	8081		"V1,V2,V0:amplitude"		Yes
	VSMSQI1.SeqV.c3.cVal.mag.f	8087		"V1,V2,V0:amplitude"		Yes
	VSMSQI2.SeqV.c1.cVal.mag.f	8091		"V1,V2,V0(2):amplitude"		Yes
	VSMSQI2.SeqV.c2.cVal.mag.f	8097		"V1,V2,V0(2):amplitude"		Yes

No events	61850 Path	IOA	Disabled	Description	Multiplier	Interrogation
	VSMSQI2.SeqV.c3.cVal.mag.f	8102		"V1,V2,V0(2):amplitude"		Yes
	LLN0.Beh.stVal	10000		LLN0:Beh status		Yes
	LLN0.LocRem.stVal	10002		LLN0:LocRem status		Yes
	LPHD1.NumCmpChg.stVal	10003		LPHD1:NumCmpChg status		Yes
	LPHD1.NumPwrUp.stVal	10004		LPHD1:NumPwrUp status		Yes
	LPHD1.PhyHealth.stVal	10005		LPHD1:PhyHealth status		Yes
	LPHD1.PhyHealth1.stVal	10006		LPHD1:PhyHealth1 status		Yes
	LPHD1.PhyHealth2.stVal	10007		LPHD1:PhyHealth2 status		Yes
	LPHD1.WacTrg.stVal	10008		LPHD1:WacTrg status		Yes
	LPHD1.WrmStr.stVal	10009		LPHD1:WrmStr status		Yes
	DNZSRDIR1.OpChrAng.mag.f	10105		32N:OpChrAng magnitude		Yes
	DPSRDIR1.OpChrAng.mag.f	10106		32P:OpChrAng magnitude		Yes
	DRFLO1.FltLoopX.mag.f	10108		FLO:FltLoopX magnitude		Yes
	DRFLO1.FltZ.mag.f	10109		FLO:FltZ magnitude		Yes
	NSPTOV2.StrDur.mag.f	10110		47-2:StrDur magnitude		Yes
	RDRE1.FltNum.stVal	10111		DFR:FltNum status		Yes
	RDRE1.MemUsed.stVal	10112		DFR:MemUsed status		Yes
	SDARREC1.AutoRecSt.stVal	10113		79:AutoRecSt status		Yes
	SDARREC1.ShotPntr.stVal	10114		79:ShotPntr status		Yes
	SPHPTOV1.StrDur.mag.f	10115		59-1:StrDur magnitude		Yes
	SPHPTOV2.StrDur.mag.f	10116		59-2:StrDur magnitude		Yes
	SPHPTOV3.StrDur.mag.f	10117		59-3:StrDur magnitude		Yes
	SPHPTUV1.StrDur.mag.f	10118		27-1:StrDur magnitude		Yes
	SPHPTUV2.StrDur.mag.f	10119		27-2:StrDur magnitude		Yes
	SPHPTUV3.StrDur.mag.f	10120		27-3:StrDur magnitude		Yes
	SPSCBR1.AccAPwrPhA.mag.f	10121		52CM:AccAPwrPhA magnitude		Yes
	SPSCBR1.AccAPwrPhB.mag.f	10122		52CM:AccAPwrPhB magnitude		Yes
	SPSCBR1.AccAPwrPhC.mag.f	10123		52CM:AccAPwrPhC magnitude		Yes
	SPSCBR1.TmmsClsA.mag.f	10124		52CM:TmmsClsA magnitude		Yes
	SPSCBR1.TmmsClsB.mag.f	10125		52CM:TmmsClsB magnitude		Yes
	SPSCBR1.TmmsClsC.mag.f	10126		52CM:TmmsClsC magnitude		Yes
	SPSCBR1.TmmsOpnA.mag.f	10127		52CM:TmmsOpnA magnitude		Yes
	SPSCBR1.TmmsOpnB.mag.f	10128		52CM:TmmsOpnB magnitude		Yes
	SPSCBR1.TmmsOpnC.mag.f	10129		52CM:TmmsOpnC magnitude		Yes
	SPSCBR1.TmsSprCha.mag.f	10130		52CM:TmsSprCha magnitude		Yes
	XGGIO115.Swrev.mag.f	10149		XGGIO115:Swrev magnitude		Yes
	XNSPTOC1.StrDur.mag.f	10150		XNSPTOC1:StrDur magnitude		Yes
	XNSPTOC2.StrDur.mag.f	10151		XNSPTOC2:StrDur magnitude		Yes
	ZBAT1.AcInputVol.mag.f	10152		UPS:AcInputVol magnitude		Yes
	ZBAT1.Amp.mag.f	10153		UPS:Amp magnitude		Yes
	ZBAT1.AuxLoadI.mag.f	10154		UPS:AuxLoadI magnitude		Yes

No events	61850 Path	IOA	Disabled	Description	Multiplier	Interrogation
	ZBAT1.BatTstVol.mag.f	10156		UPS:BatTstVol magnitude		Yes
	ZBAT1.RailVol12V.mag.f	10157		UPS:RailVol12V magnitude		Yes
	ZBAT1.Temp.mag.f	10158		UPS:Temp magnitude		Yes
	ZBAT1.UPSBldrVer.mag.f	10159		UPS:UPSBldrVer magnitude		Yes
	ZBAT1.UPSFwVer.mag.f	10160		UPS:UPSFwVer magnitude		Yes
	ZBAT1.UPSHwVer.mag.f	10161		UPS:UPSHwVer magnitude		Yes
	ZBAT1.Vol.mag.f	10162		UPS:Vol magnitude		Yes
	SECRSYN1.EnSt.stVal	10163		25:EnSt status		Yes
	SCBXCBR1.OpCnt.stVal	10164		52:OpCnt status phsA		Yes
	SCBXCBR2.OpCnt.stVal	10165		52:OpCnt status phsB		Yes
	SCBXCBR3.OpCnt.stVal	10166		52:OpCnt status phsC		Yes
	SPSCBR1.InaTmdCntA.stVal	10167		52CM:InaTmdCntA status		Yes
	SPSCBR1.InaTmdCntB.stVal	10168		52CM:InaTmdCntB status		Yes
	SPSCBR1.InaTmdCntC.stVal	10169		52CM:InaTmdCntC status		Yes
	SPSCBR1.RmnLifPhA.stVal	10170		52CM:RmnLifPhA status		Yes
	SPSCBR1.RmnLifPhB.stVal	10171		52CM:RmnLifPhB status		Yes
	SPSCBR1.RmnLifPhC.stVal	10172		52CM:RmnLifPhC status		Yes
	ZBAT1.Auxinfo.stVal	10173		UPS:Auxinfo status		Yes
	ZBAT1.BstVolVal.stVal	10174		UPS:BstVolVal status		Yes
	ZBAT1.RlVol60V.stVal	10175		UPS:RlVol60V status		Yes
	ZBAT1.UpsTimeDay.stVal	10176		UPS:UpsTimeDay status		Yes
	ZBAT1.UpsTimeHr.stVal	10177		UPS:UpsTimeHr status		Yes
	ZBAT1.UpsTimeMin.stVal	10178		UPS:UpsTimeMin status		Yes
	ZBAT1.UpsTimeSec.stVal	10179		UPS:UpsTimeSec status		Yes
	FLTMSTA1.StrDur.mag.f	12000	Disabled	FLTMSTA1:StrDur magnitude		Yes
	FLTMSTA1.MaxAmpsA.mag.f	12015	Disabled	FLTMSTA1:MaxAmpsA magnitude		Yes
	FLTMSTA1.MaxAmpsB.mag.f	12016	Disabled	FLTMSTA1:MaxAmpsB magnitude		Yes
	FLTMSTA1.MaxAmpsC.mag.f	12017	Disabled	FLTMSTA1:MaxAmpsC magnitude		Yes
	FLTMSTA1.MaxAmpsN.mag.f	12018	Disabled	FLTMSTA1:MaxAmpsN magnitude		Yes
	FLTMSTA1.AmpsA.mag.f	12019	Disabled	FLTMSTA1:AmpsA magnitude		Yes
	FLTMSTA1.AmpsB.mag.f	12020	Disabled	FLTMSTA1:AmpsB magnitude		Yes
	FLTMSTA1.AmpsC.mag.f	12021	Disabled	FLTMSTA1:AmpsC magnitude		Yes
	FLTMSTA1.AmpsN.mag.f	12022	Disabled	FLTMSTA1:AmpsN magnitude		Yes
	FLTMSTA1.AmpsNClc.mag.f	12023	Disabled	FLTMSTA1:AmpsNClc magnitude		Yes
	FLTMSTA1.AmpsPsSeq.mag.f	12024	Disabled	FLTMSTA1:AmpsPsSeq magnitude		Yes
	FLTMSTA1.AmpsNgSeq.mag.f	12025	Disabled	FLTMSTA1:AmpsNgSeq magnitude		Yes
	FLTMSTA1.VoltsA.mag.f	12037	Disabled	FLTMSTA1:VoltsA magnitude		Yes
	FLTMSTA1.VoltsB.mag.f	12038	Disabled	FLTMSTA1:VoltsB magnitude		Yes
	FLTMSTA1.VoltsC.mag.f	12039	Disabled	FLTMSTA1:VoltsC magnitude		Yes
	FLTMSTA1.VoltsAB.mag.f	12040	Disabled	FLTMSTA1:VoltsAB magnitude		Yes
	FLTMSTA1.VoltsBC.mag.f	12041	Disabled	FLTMSTA1:VoltsBC magnitude		Yes

No events	61850 Path	IOA	Disabled	Description	Multiplier	Interrogation
	FLTMSTA1.VoltsCA.mag.f	12042	Disabled	FLTMSTA1:VoltsCA magnitude		Yes
	FLTMSTA1.VoltsN.mag.f	12043	Disabled	FLTMSTA1:VoltsN magnitude		Yes
	FLTMSTA1.VZroSeq.mag.f	12044	Disabled	FLTMSTA1:VZroSeq magnitude		Yes
	FLTMSTA1.VPsSeq.mag.f	12045	Disabled	FLTMSTA1:VPsSeq magnitude		Yes
	FLTMSTA1.VNgSeq.mag.f	12046	Disabled	FLTMSTA1:VNgSeq magnitude		Yes
	FLTMSTA1.PDNS1MxRat.mag.f	12048	Disabled	FLTMSTA1:PDNS1MxRat magnitude		Yes
	FLTMSTA1.DifNAngN.mag.f	12049	Disabled	FLTMSTA1:DifNAngN magnitude		Yes
	FLTMSTA1.DifAAngBC.mag.f	12050	Disabled	FLTMSTA1:DifAAngBC magnitude		Yes
	FLTMSTA1.DifBAngCA.mag.f	12051	Disabled	FLTMSTA1:DifBAngCA magnitude		Yes
	FLTMSTA1.DifCAngAB.mag.f	12052	Disabled	FLTMSTA1:DifCAngAB magnitude		Yes
	FLTMSTA1.Hz.mag.f	12053	Disabled	FLTMSTA1:Hz magnitude		Yes
	FLTMSTA1.HzS.mag.f	12054	Disabled	FLTMSTA1:HzS magnitude		Yes
	PEMMTR1.SupWh.actVal	14000		Reverse active energy Wh		Yes
	PEMMTR1.SupVArh.actVal	14001		Reverse reactive energy VArh		Yes
	PEMMTR1.DmdWh.actVal	14002		Forward active energy Wh		Yes
	PEMMTR1.DmdVArh.actVal	14003		Forward reactive energy VArh		Yes
	I5CGGIO1.ActSG.stVal	40000		Active setting group		Yes

Table 3: Binary controls

No events	61850 Path	IOA	Disabled	Description
*	LLN0.LEDRs1.Oper.ctlVal	20000		LLN0:LEDRs1 control
*	LLN0.LEDRs2.Oper.ctlVal	20001		LLN0:LEDRs2 control
*	RDRE1.RcdTrg.Oper.ctlVal	20007		DFR:RcdTrg control
*	RDRE1.MemClr.Oper.ctlVal	20008		DFR:MemClr control
*	CMSTA1.RecRs.Oper.ctlVal	20009		CMSTA1:RecRs control
*	LPHD1.RsDev.Oper.ctlVal	20013		LPHD1:RsDev control
*	SCBCSWI1.Pos.Oper.ctlVal	21001		CB Control:Pos control
*	SCBCSWI1.PosA.Oper.ctlVal	21002		CB Control:PosA control
*	SCBCSWI1.PosB.Oper.ctlVal	21003		CB Control:PosB control
*	SCBCSWI1.PosC.Oper.ctlVal	21004		CB Control:PosC control
*	SPCGGIO1.SPCSO1.Oper.ctlVal	21114		SPCGGIO1:SPCSO1 control
*	SPCGGIO1.SPCSO10.Oper.ctlVal	21115		SPCGGIO1:SPCSO10 control
*	SPCGGIO1.SPCSO11.Oper.ctlVal	21116		SPCGGIO1:SPCSO11 control
*	SPCGGIO1.SPCSO12.Oper.ctlVal	21117		SPCGGIO1:SPCSO12 control
*	SPCGGIO1.SPCSO13.Oper.ctlVal	21118		SPCGGIO1:SPCSO13 control
*	SPCGGIO1.SPCSO14.Oper.ctlVal	21119		SPCGGIO1:SPCSO14 control
*	SPCGGIO1.SPCSO15.Oper.ctlVal	21120		SPCGGIO1:SPCSO15 control
*	SPCGGIO1.SPCSO16.Oper.ctlVal	21121		SPCGGIO1:SPCSO16 control
*	SPCGGIO1.SPCSO2.Oper.ctlVal	21122		SPCGGIO1:SPCSO2 control
*	SPCGGIO1.SPCSO3.Oper.ctlVal	21123		SPCGGIO1:SPCSO3 control
*	SPCGGIO1.SPCSO4.Oper.ctlVal	21124		SPCGGIO1:SPCSO4 control
*	SPCGGIO1.SPCSO5.Oper.ctlVal	21125		SPCGGIO1:SPCSO5 control
*	SPCGGIO1.SPCSO6.Oper.ctlVal	21126		SPCGGIO1:SPCSO6 control
*	SPCGGIO1.SPCSO7.Oper.ctlVal	21127		SPCGGIO1:SPCSO7 control
*	SPCGGIO1.SPCSO8.Oper.ctlVal	21128		SPCGGIO1:SPCSO8 control
*	SPCGGIO1.SPCSO9.Oper.ctlVal	21129		SPCGGIO1:SPCSO9 control
*	SPCGGIO2.SPCSO1.Oper.ctlVal	21130		SPCGGIO2:SPCSO1 control
*	SPCGGIO2.SPCSO10.Oper.ctlVal	21131		SPCGGIO2:SPCSO10 control
*	SPCGGIO2.SPCSO11.Oper.ctlVal	21132		SPCGGIO2:SPCSO11 control
*	SPCGGIO2.SPCSO12.Oper.ctlVal	21133		SPCGGIO2:SPCSO12 control
*	SPCGGIO2.SPCSO13.Oper.ctlVal	21134		SPCGGIO2:SPCSO13 control
*	SPCGGIO2.SPCSO14.Oper.ctlVal	21135		SPCGGIO2:SPCSO14 control
*	SPCGGIO2.SPCSO15.Oper.ctlVal	21136		SPCGGIO2:SPCSO15 control
*	SPCGGIO2.SPCSO16.Oper.ctlVal	21137		SPCGGIO2:SPCSO16 control
*	SPCGGIO2.SPCSO2.Oper.ctlVal	21138		SPCGGIO2:SPCSO2 control
*	SPCGGIO2.SPCSO3.Oper.ctlVal	21139		SPCGGIO2:SPCSO3 control
*	SPCGGIO2.SPCSO4.Oper.ctlVal	21140		SPCGGIO2:SPCSO4 control
*	SPCGGIO2.SPCSO5.Oper.ctlVal	21141		SPCGGIO2:SPCSO5 control
*	SPCGGIO2.SPCSO6.Oper.ctlVal	21142		SPCGGIO2:SPCSO6 control
*	SPCGGIO2.SPCSO7.Oper.ctlVal	21143		SPCGGIO2:SPCSO7 control

No events	61850 Path	IOA	Disabled	Description
*	SPCGGIO2.SPCSO8.Oper.ctlVal	21144		SPCGGIO2:SPCSO8 control
*	SPCGGIO2.SPCSO9.Oper.ctlVal	21145		SPCGGIO2:SPCSO9 control
*	SPSCBR1.RsAccAPwr.Oper.ctlVal	21152		52CM:RsAccAPwr control
*	SPSCBR1.RsSprChaTm.Oper.ctlVal	21154		52CM:RsSprChaTm control
*	SPSCBR1.RsTrvTm.Oper.ctlVal	21155		52CM:RsTrvTm control
*	SRGAPC1.Rs1.Oper.ctlVal	21157		SRGAPC1:Rs1 control
*	SRGAPC1.Rs2.Oper.ctlVal	21158		SRGAPC1:Rs2 control
*	SRGAPC1.Rs3.Oper.ctlVal	21159		SRGAPC1:Rs3 control
*	SRGAPC1.Rs4.Oper.ctlVal	21160		SRGAPC1:Rs4 control
*	SRGAPC1.Rs5.Oper.ctlVal	21161		SRGAPC1:Rs5 control
*	SRGAPC1.Rs6.Oper.ctlVal	21162		SRGAPC1:Rs6 control
*	SRGAPC1.Rs7.Oper.ctlVal	21163		SRGAPC1:Rs7 control
*	SRGAPC1.Rs8.Oper.ctlVal	21164		SRGAPC1:Rs8 control
*	SRGAPC2.Rs1.Oper.ctlVal	21165		SRGAPC2:Rs1 control
*	SRGAPC2.Rs2.Oper.ctlVal	21166		SRGAPC2:Rs2 control
*	SRGAPC2.Rs3.Oper.ctlVal	21167		SRGAPC2:Rs3 control
*	SRGAPC2.Rs4.Oper.ctlVal	21168		SRGAPC2:Rs4 control
*	SRGAPC2.Rs5.Oper.ctlVal	21169		SRGAPC2:Rs5 control
*	SRGAPC2.Rs6.Oper.ctlVal	21170		SRGAPC2:Rs6 control
*	SRGAPC2.Rs7.Oper.ctlVal	21171		SRGAPC2:Rs7 control
*	SRGAPC2.Rs8.Oper.ctlVal	21172		SRGAPC2:Rs8 control
*	XGGIO100.SPCSO1.Oper.ctlVal	21173		XGGIO100:SPCSO1 control
*	XGGIO100.SPCSO2.Oper.ctlVal	21174		XGGIO100:SPCSO2 control
*	XGGIO100.SPCSO3.Oper.ctlVal	21175		XGGIO100:SPCSO3 control
*	XGGIO100.SPCSO4.Oper.ctlVal	21176		XGGIO100:SPCSO4 control
*	XGGIO100.SPCSO5.Oper.ctlVal	21177		XGGIO100:SPCSO5 control
*	XGGIO100.SPCSO6.Oper.ctlVal	21178		XGGIO100:SPCSO6 control
*	XGGIO105.SPCSO1.Oper.ctlVal	21179		XGGIO105:SPCSO1 control
*	XGGIO105.SPCSO2.Oper.ctlVal	21180		XGGIO105:SPCSO2 control
*	XGGIO105.SPCSO3.Oper.ctlVal	21181		XGGIO105:SPCSO3 control
*	XGGIO105.SPCSO4.Oper.ctlVal	21182		XGGIO105:SPCSO4 control
*	XGGIO110.SPCSO1.Oper.ctlVal	21183		XGGIO110:SPCSO1 control
*	XGGIO110.SPCSO2.Oper.ctlVal	21184		XGGIO110:SPCSO2 control
*	XGGIO110.SPCSO3.Oper.ctlVal	21185		XGGIO110:SPCSO3 control
*	XGGIO110.SPCSO4.Oper.ctlVal	21186		XGGIO110:SPCSO4 control
*	ZBAT1.BatTest.Oper.ctlVal	21189		UPS:BatTest control
*	ZBAT1.ResetUps.Oper.ctlVal	21190		UPS:ResetUps control
*	I5CGGIO1.ActSG1.Oper.ctlVal	41001		Activate setting group 1
*	I5CGGIO1.ActSG2.Oper.ctlVal	41002		Activate setting group 2
*	I5CGGIO1.ActSG3.Oper.ctlVal	41003		Activate setting group 3
*	I5CGGIO1.ActSG4.Oper.ctlVal	41004		Activate setting group 4

No events	61850 Path	IOA	Disabled	Description
*	I5CGGIO1.ActSG5.Oper.ctlVal	41005		Activate setting group 5
*	I5CGGIO1.ActSG6.Oper.ctlVal	41006		Activate setting group 6

Table 4: Indications

No events	61850 Path	IOA	Disabled	Description	Interrogation
	LLN0.Loc.stVal	10		LLN0:Loc status	Yes
	RDRE1.RcdMade.stVal	12		DFR:RcdMade status	Yes
	LLN0.SetSeld.stVal	13		LLN0:SetSeld status	Yes
	LLN0.SetChg.stVal	14		LLN0:SetChg status	Yes
	GSEGGIO1.Alm.stVal	15		GSEGGIO1:Alm status	Yes
	LPHD1.PhyHealth1.stVal	20		Self-supervision / Warning	Yes
	LPHD1.PhyHealth2.stVal	21		Self-supervision / Error	Yes
	LEDPTRC1.Str.general	40		LEDPTRC1:general pickup	Yes
	LEDPTRC1.Str.phsA	41		LEDPTRC1:phase A pickup	Yes
	LEDPTRC1.Str.phsB	42		LEDPTRC1:phase B pickup	Yes
	LEDPTRC1.Str.phsC	43		LEDPTRC1:phase C pickup	Yes
	LEDPTRC1.Str.neut	44		LEDPTRC1:pickup	Yes
	LEDPTRC1.Op.general	45		LEDPTRC1:general trip	
	LEDPTRC1.Op.phsA	46		LEDPTRC1:phase A trip	
	LEDPTRC1.Op.phsB	47		LEDPTRC1:phase B trip	
	LEDPTRC1.Op.phsC	48		LEDPTRC1:phase C trip	
	LEDPTRC1.Op.neut	49		LEDPTRC1:trip	
	LEDGGIO1.SPCSO1.stVal	81		LEDGGIO1:SPCSO1 status	Yes
	LEDGGIO1.SPCSO2.stVal	82		LEDGGIO1:SPCSO2 status	Yes
	LEDGGIO1.SPCSO3.stVal	83		LEDGGIO1:SPCSO3 status	Yes
	LEDGGIO1.SPCSO4.stVal	84		LEDGGIO1:SPCSO4 status	Yes
	LEDGGIO1.SPCSO5.stVal	85		LEDGGIO1:SPCSO5 status	Yes
	LEDGGIO1.SPCSO6.stVal	86		LEDGGIO1:SPCSO6 status	Yes
	LEDGGIO1.SPCSO7.stVal	87		LEDGGIO1:SPCSO7 status	Yes
	LEDGGIO1.SPCSO8.stVal	88		LEDGGIO1:SPCSO8 status	Yes
	LEDGGIO1.SPCSO9.stVal	89		LEDGGIO1:SPCSO9 status	Yes
	LEDGGIO1.SPCSO10.stVal	90		LEDGGIO1:SPCSO10 status	Yes
	LEDGGIO1.SPCSO11.stVal	91		LEDGGIO1:SPCSO11 status	Yes
	FKEYGGIO1.Ind1.stVal	100		FKEYGGIO1:Ind1 status	Yes
	FKEYGGIO1.Ind2.stVal	101		FKEYGGIO1:Ind2 status	Yes
	FKEYGGIO1.Ind3.stVal	102		FKEYGGIO1:Ind3 status	Yes
	FKEYGGIO1.Ind4.stVal	103		FKEYGGIO1:Ind4 status	Yes
	FKEYGGIO1.Ind5.stVal	104		FKEYGGIO1:Ind5 status	Yes
	FKEYGGIO1.Ind6.stVal	105		FKEYGGIO1:Ind6 status	Yes
	FKEYGGIO1.Ind7.stVal	106		FKEYGGIO1:Ind7 status	Yes

No events	61850 Path	IOA	Disabled	Description	Interrogation
	FKEYGGIO1.Ind8.stVal	107		FKEYGGIO1:Ind8 status	Yes
	FKEYGGIO1.Ind9.stVal	108		FKEYGGIO1:Ind9 status	Yes
	FKEYGGIO1.Ind10.stVal	109		FKEYGGIO1:Ind10 status	Yes
	FKEYGGIO1.Ind11.stVal	110		FKEYGGIO1:Ind11 status	Yes
	FKEYGGIO1.Ind12.stVal	111		FKEYGGIO1:Ind12 status	Yes
	FKEYGGIO1.Ind13.stVal	112		FKEYGGIO1:Ind13 status	Yes
	FKEYGGIO1.Ind14.stVal	113		FKEYGGIO1:Ind14 status	Yes
	FKEYGGIO1.Ind15.stVal	114		FKEYGGIO1:Ind15 status	Yes
	FKEYGGIO1.Ind16.stVal	115		FKEYGGIO1:Ind16 status	Yes
	PTGAPC1.In1.stVal	130		PTGAPC1:In1 status	Yes
	PTGAPC1.In2.stVal	131		PTGAPC1:In2 status	Yes
	PTGAPC1.In3.stVal	132		PTGAPC1:In3 status	Yes
	PTGAPC1.In4.stVal	133		PTGAPC1:In4 status	Yes
	PTGAPC1.In5.stVal	134		PTGAPC1:In5 status	Yes
	PTGAPC1.In6.stVal	135		PTGAPC1:In6 status	Yes
	PTGAPC1.In7.stVal	136		PTGAPC1:In7 status	Yes
	PTGAPC1.In8.stVal	137		PTGAPC1:In8 status	Yes
	PTGAPC1.Q1.stVal	138		PTGAPC1:Q1 status	Yes
	PTGAPC1.Q2.stVal	139		PTGAPC1:Q2 status	Yes
	PTGAPC1.Q3.stVal	140		PTGAPC1:Q3 status	Yes
	PTGAPC1.Q4.stVal	141		PTGAPC1:Q4 status	Yes
	PTGAPC1.Q5.stVal	142		PTGAPC1:Q5 status	Yes
	PTGAPC1.Q6.stVal	143		PTGAPC1:Q6 status	Yes
	PTGAPC1.Q7.stVal	144		PTGAPC1:Q7 status	Yes
	PTGAPC1.Q8.stVal	145		PTGAPC1:Q8 status	Yes
	SRGAPC1.Q1.stVal	150		SRGAPC1:Q1 status	Yes
	SRGAPC1.Q2.stVal	151		SRGAPC1:Q2 status	Yes
	SRGAPC1.Q3.stVal	152		SRGAPC1:Q3 status	Yes
	SRGAPC1.Q4.stVal	153		SRGAPC1:Q4 status	Yes
	SRGAPC1.Q5.stVal	154		SRGAPC1:Q5 status	Yes
	SRGAPC1.Q6.stVal	155		SRGAPC1:Q6 status	Yes
	SRGAPC1.Q7.stVal	156		SRGAPC1:Q7 status	Yes
	SRGAPC1.Q8.stVal	157		SRGAPC1:Q8 status	Yes
	SRGAPC1.Set1.stVal	158		SRGAPC1:Set1 status	Yes
	SRGAPC1.Set2.stVal	159		SRGAPC1:Set2 status	Yes
	SRGAPC1.Set3.stVal	160		SRGAPC1:Set3 status	Yes
	SRGAPC1.Set4.stVal	161		SRGAPC1:Set4 status	Yes
	SRGAPC1.Set5.stVal	162		SRGAPC1:Set5 status	Yes
	SRGAPC1.Set6.stVal	163		SRGAPC1:Set6 status	Yes
	SRGAPC1.Set7.stVal	164		SRGAPC1:Set7 status	Yes
	SRGAPC1.Set8.stVal	165		SRGAPC1:Set8 status	Yes

No events	61850 Path	IOA	Disabled	Description	Interrogation
	TOFGAPC1.In1.stVal	170		TOFGAPC1:In1 status	Yes
	TOFGAPC1.In2.stVal	171		TOFGAPC1:In2 status	Yes
	TOFGAPC1.In3.stVal	172		TOFGAPC1:In3 status	Yes
	TOFGAPC1.In4.stVal	173		TOFGAPC1:In4 status	Yes
	TOFGAPC1.In5.stVal	174		TOFGAPC1:In5 status	Yes
	TOFGAPC1.In6.stVal	175		TOFGAPC1:In6 status	Yes
	TOFGAPC1.In7.stVal	176		TOFGAPC1:In7 status	Yes
	TOFGAPC1.In8.stVal	177		TOFGAPC1:In8 status	Yes
	TOFGAPC1.Q1.stVal	178		TOFGAPC1:Q1 status	Yes
	TOFGAPC1.Q2.stVal	179		TOFGAPC1:Q2 status	Yes
	TOFGAPC1.Q3.stVal	180		TOFGAPC1:Q3 status	Yes
	TOFGAPC1.Q4.stVal	181		TOFGAPC1:Q4 status	Yes
	TOFGAPC1.Q5.stVal	182		TOFGAPC1:Q5 status	Yes
	TOFGAPC1.Q6.stVal	183		TOFGAPC1:Q6 status	Yes
	TOFGAPC1.Q7.stVal	184		TOFGAPC1:Q7 status	Yes
	TOFGAPC1.Q8.stVal	185		TOFGAPC1:Q8 status	Yes
	TONGAPC1.In1.stVal	190		TONGAPC1:In1 status	Yes
	TONGAPC1.In2.stVal	191		TONGAPC1:In2 status	Yes
	TONGAPC1.In3.stVal	192		TONGAPC1:In3 status	Yes
	TONGAPC1.In4.stVal	193		TONGAPC1:In4 status	Yes
	TONGAPC1.In5.stVal	194		TONGAPC1:In5 status	Yes
	TONGAPC1.In6.stVal	195		TONGAPC1:In6 status	Yes
	TONGAPC1.In7.stVal	196		TONGAPC1:In7 status	Yes
	TONGAPC1.In8.stVal	197		TONGAPC1:In8 status	Yes
	TONGAPC1.Q1.stVal	198		TONGAPC1:Q1 status	Yes
	TONGAPC1.Q2.stVal	199		TONGAPC1:Q2 status	Yes
	TONGAPC1.Q3.stVal	200		TONGAPC1:Q3 status	Yes
	TONGAPC1.Q4.stVal	201		TONGAPC1:Q4 status	Yes
	TONGAPC1.Q5.stVal	202		TONGAPC1:Q5 status	Yes
	TONGAPC1.Q6.stVal	203		TONGAPC1:Q6 status	Yes
	TONGAPC1.Q7.stVal	204		TONGAPC1:Q7 status	Yes
	TONGAPC1.Q8.stVal	205		TONGAPC1:Q8 status	Yes
	ZBAT1.ACLoss.stVal	210		UPS:ACLoss status	Yes
	ZBAT1.AuxStat.stVal	212		UPS:AuxStat status	Yes
	ZBAT1.AuxVol.stVal	213		UPS:AuxVol status	Yes
	ZBAT1.RelaySt.stVal	218		UPS:RelaySt status	Yes
	MVGAPC1.Q1.stVal	230		MVGAPC1:Open	Yes
	MVGAPC1.Q2.stVal	231		MVGAPC1:Closed	Yes
	MVGAPC1.Q3.stVal	232		MVGAPC1:Phase A Open	Yes
	MVGAPC1.Q4.stVal	233		MVGAPC1:Phase A Closed	Yes
	MVGAPC1.Q5.stVal	234		MVGAPC1:Phase B Open	Yes

No events	61850 Path	IOA	Disabled	Description	Interrogation
	MVGAPC1.Q6.stVal	235		MVGAPC1:Phase B Closed	Yes
	MVGAPC1.Q7.stVal	236		MVGAPC1:Phase C Open	Yes
	MVGAPC1.Q8.stVal	237		MVGAPC1:Phase C Closed	Yes
	MVGAPC2.Q1.stVal	240		MVGAPC2:Q1 status	Yes
	MVGAPC2.Q2.stVal	241		MVGAPC2:Q2 status	Yes
	MVGAPC2.Q3.stVal	242		MVGAPC2:Q3 status	Yes
	MVGAPC2.Q4.stVal	243		MVGAPC2:Q4 status	Yes
	MVGAPC2.Q5.stVal	244		MVGAPC2:Q5 status	Yes
	MVGAPC2.Q6.stVal	245		MVGAPC2:Q6 status	Yes
	MVGAPC2.Q7.stVal	246		MVGAPC2:Q7 status	Yes
	MVGAPC2.Q8.stVal	247		MVGAPC2:Q8 status	Yes
	PTGAPC2.In1.stVal	250		PTGAPC2:In1 status	Yes
	PTGAPC2.In2.stVal	251		PTGAPC2:In2 status	Yes
	PTGAPC2.In3.stVal	252		PTGAPC2:In3 status	Yes
	PTGAPC2.In4.stVal	253		PTGAPC2:In4 status	Yes
	PTGAPC2.In5.stVal	254		PTGAPC2:In5 status	Yes
	PTGAPC2.In6.stVal	255		PTGAPC2:In6 status	Yes
	PTGAPC2.In7.stVal	256		PTGAPC2:In7 status	Yes
	PTGAPC2.In8.stVal	257		PTGAPC2:In8 status	Yes
	PTGAPC2.Q1.stVal	258		PTGAPC2:Q1 status	Yes
	PTGAPC2.Q2.stVal	259		PTGAPC2:Q2 status	Yes
	PTGAPC2.Q3.stVal	260		PTGAPC2:Q3 status	Yes
	PTGAPC2.Q4.stVal	261		PTGAPC2:Q4 status	Yes
	PTGAPC2.Q5.stVal	262		PTGAPC2:Q5 status	Yes
	PTGAPC2.Q6.stVal	263		PTGAPC2:Q6 status	Yes
	PTGAPC2.Q7.stVal	264		PTGAPC2:Q7 status	Yes
	PTGAPC2.Q8.stVal	265		PTGAPC2:Q8 status	Yes
	SRGAPC2.Q1.stVal	270		SRGAPC2:Q1 status	Yes
	SRGAPC2.Q2.stVal	271		SRGAPC2:Q2 status	Yes
	SRGAPC2.Q3.stVal	272		SRGAPC2:Q3 status	Yes
	SRGAPC2.Q4.stVal	273		SRGAPC2:Q4 status	Yes
	SRGAPC2.Q5.stVal	274		SRGAPC2:Q5 status	Yes
	SRGAPC2.Q6.stVal	275		SRGAPC2:Q6 status	Yes
	SRGAPC2.Q7.stVal	276		SRGAPC2:Q7 status	Yes
	SRGAPC2.Q8.stVal	277		SRGAPC2:Q8 status	Yes
	SRGAPC2.Set1.stVal	278		SRGAPC2:Set1 status	Yes
	SRGAPC2.Set2.stVal	279		SRGAPC2:Set2 status	Yes
	SRGAPC2.Set3.stVal	280		SRGAPC2:Set3 status	Yes
	SRGAPC2.Set4.stVal	281		SRGAPC2:Set4 status	Yes
	SRGAPC2.Set5.stVal	282		SRGAPC2:Set5 status	Yes
	SRGAPC2.Set6.stVal	283		SRGAPC2:Set6 status	Yes

No events	61850 Path	IOA	Disabled	Description	Interrogation
	SRGAPC2.Set7.stVal	284		SRGAPC2:Set7 status	Yes
	SRGAPC2.Set8.stVal	285		SRGAPC2:Set8 status	Yes
	TOFGAPC2.In1.stVal	290		TOFGAPC2:In1 status	Yes
	TOFGAPC2.In2.stVal	291		TOFGAPC2:In2 status	Yes
	TOFGAPC2.In3.stVal	292		TOFGAPC2:In3 status	Yes
	TOFGAPC2.In4.stVal	293		TOFGAPC2:In4 status	Yes
	TOFGAPC2.In5.stVal	294		TOFGAPC2:In5 status	Yes
	TOFGAPC2.In6.stVal	295		TOFGAPC2:In6 status	Yes
	TOFGAPC2.In7.stVal	296		TOFGAPC2:In7 status	Yes
	TOFGAPC2.In8.stVal	297		TOFGAPC2:In8 status	Yes
	TOFGAPC2.Q1.stVal	298		TOFGAPC2:Q1 status	Yes
	TOFGAPC2.Q2.stVal	299		TOFGAPC2:Q2 status	Yes
	TOFGAPC2.Q3.stVal	300		TOFGAPC2:Q3 status	Yes
	TOFGAPC2.Q4.stVal	301		TOFGAPC2:Q4 status	Yes
	TOFGAPC2.Q5.stVal	302		TOFGAPC2:Q5 status	Yes
	TOFGAPC2.Q6.stVal	303		TOFGAPC2:Q6 status	Yes
	TOFGAPC2.Q7.stVal	304		TOFGAPC2:Q7 status	Yes
	TONGAPC2.In1.stVal	310		TONGAPC2:In1 status	Yes
	TONGAPC2.In2.stVal	311		TONGAPC2:In2 status	Yes
	TONGAPC2.In3.stVal	312		TONGAPC2:In3 status	Yes
	TONGAPC2.In4.stVal	313		TONGAPC2:In4 status	Yes
	TONGAPC2.In5.stVal	314		TONGAPC2:In5 status	Yes
	TONGAPC2.In6.stVal	315		TONGAPC2:In6 status	Yes
	TONGAPC2.In7.stVal	316		TONGAPC2:In7 status	Yes
	TONGAPC2.In8.stVal	317		TONGAPC2:In8 status	Yes
	TONGAPC2.Q1.stVal	318		TONGAPC2:Q1 status	Yes
	TONGAPC2.Q2.stVal	319		TONGAPC2:Q2 status	Yes
	TONGAPC2.Q3.stVal	320		TONGAPC2:Q3 status	Yes
	TONGAPC2.Q4.stVal	321		TONGAPC2:Q4 status	Yes
	TONGAPC2.Q5.stVal	322		TONGAPC2:Q5 status	Yes
	TONGAPC2.Q6.stVal	323		TONGAPC2:Q6 status	Yes
	TONGAPC2.Q7.stVal	324		TONGAPC2:Q7 status	Yes
	TONGAPC2.Q8.stVal	325		TONGAPC2:Q8 status	Yes
	DLCM1.LCMClose.general	817		LCM:Close general	Yes
	DLCM1.LCMTrip.general	818		LCM:Trip general	Yes
	DLCM1.RstIn.stVal	820		LCM:RstIn status	Yes
	DLCM1.RstOut.stVal	821		LCM:RstOut status	Yes
	DLCM1.S1Status.stVal	822		LCM:S1Status status	Yes
	DLCM1.S2Status.stVal	823		LCM:S2Status status	Yes
	DLCM1.SetGrpSel.stVal	824		LCM:SetGrpSel status	Yes
	DLCM1.Src1Enable.stVal	825		LCM:Src1Enable status	Yes

No events	61850 Path	IOA	Disabled	Description	Interrogation
	DLCM1.Src1EnOut.stVal	826		LCM:Src1EnOut status	Yes
	DLCM1.Src2Enable.stVal	827		LCM:Src2Enable status	Yes
	DLCM1.Src2EnOut.stVal	828		LCM:Src2EnOut status	Yes
	DLCM1.SWOTF.stVal	829		LCM:SWOTF status	Yes
	DNZSRDIR1.Dir.general	830		32N:general	
	DNZSRDIR1.InRcaCtl.stVal	831		32N:InRcaCtl status	
	DPSRDIR1.Dir.general	856		32P:general	Yes
	EFLPTOC3.Op.general	868		50SEF:general trip	
	EFLPTOC3.Str.general	869		50SEF:general pickup	Yes
	FRPTOF1.Op.general	883		FRPTOF1:general trip	
	FRPTOF2.Op.general	884		FRPTOF2:general trip	
	FRPTRC1.Str.general	889		Freq1:general pickup	Yes
	FRPTRC2.Str.general	890		Freq2:general pickup	Yes
	FRPTUF1.Op.general	895		FRPTUF1:general trip	
	FRPTUF2.Op.general	896		FRPTUF2:general trip	
	INRPHAR1.Str.general	903		INRPHAR1:general pickup	Yes
	INRPHAR1.Str.phsA	904		INRPHAR1:phase A pickup	Yes
	INRPHAR1.Str.phsB	905		INRPHAR1:phase B pickup	Yes
	INRPHAR1.Str.phsC	906		INRPHAR1:phase C pickup	Yes
	LSHDPTRC1.Op.general	916		LSHDPTRC1:general trip	
	LSHDPTRC1.RestLodOp.general	917		LSHDPTRC1:general	
	LSHDPTRC1.RestLodStr.general	918		LSHDPTRC1:general	Yes
	LSHDPTRC1.Str.general	919		LSHDPTRC1:general pickup	Yes
	LSHDPTRC2.Op.general	920		LSHDPTRC2:general trip	
	LSHDPTRC2.RestLodOp.general	921		LSHDPTRC2:general	
	LSHDPTRC2.RestLodStr.general	922		LSHDPTRC2:general	Yes
	LSHDPTRC2.Str.general	923		LSHDPTRC2:general pickup	Yes
	NSPTOV1.Op.general	965		47-1:general trip	
	NSPTOV1.Str.general	966		47-1:general pickup	Yes
	NSPTOV2.Op.general	967		47-2:general trip	
	NSPTOV2.Str.general	968		47-2:general pickup	Yes
	PDNSPTOC1.Op.general	973		PDNSPTOC1:general trip	
	PDNSPTOC1.Str.general	974		PDNSPTOC1:general pickup	Yes
	PHIZ1.Op.general	1004		HIZ:general trip	
	PSPTOV1.Op.general	1069		59PS-1:general trip	
	PSPTOV1.Str.general	1070		59PS-1:general pickup	Yes
	PSPTOV2.Op.general	1071		59PS-2:general trip	
	PSPTOV2.Str.general	1072		59PS-2:general pickup	Yes
	ROVPTOV1.Op.general	1085		59N-1:general trip	
	ROVPTOV1.Str.general	1086		59N-1:general pickup	Yes
	ROVPTOV2.Op.general	1087		59N-2:general trip	

No events	61850 Path	IOA	Disabled	Description	Interrogation
	ROVPTOV2.Str.general	1088		59N-2:general pickup	Yes
	SCCBRBCF1.InCBFlt.stVal	1091		50BFC:InCBFlt status	Yes
	SCCBRBCF1.InPosClsA.stVal	1092		50BFC:InPosClsA status	Yes
	SCCBRBCF1.InPosClsB.stVal	1093		50BFC:InPosClsB status	Yes
	SCCBRBCF1.InPosClsC.stVal	1094		50BFC:InPosClsC status	Yes
	SCCBRBCF1.InStr.stVal	1095		50BFC:InStr status	Yes
	SCCBRBCF1.InStrA.stVal	1096		50BFC:InStrA status	Yes
	SCCBRBCF1.InStrB.stVal	1097		50BFC:InStrB status	Yes
	SCCBRBCF1.InStrC.stVal	1098		50BFC:InStrC status	Yes
	SCCBRBCF1.OpCls.general	1099		50BFC:general	Yes
	SCCBRBRF1.InCBFlt.stVal	1100		50BFT:InCBFlt status	Yes
	SCCBRBRF1.InPosClsA.stVal	1101		50BFT:InPosClsA status	Yes
	SCCBRBRF1.InPosClsB.stVal	1102		50BFT:InPosClsB status	Yes
	SCCBRBRF1.InPosClsC.stVal	1103		50BFT:InPosClsC status	Yes
	SCCBRBRF1.InStr.stVal	1104		50BFT:InStr status	Yes
	SCCBRBRF1.InStrA.stVal	1105		50BFT:InStrA status	Yes
	SCCBRBRF1.InStrB.stVal	1106		50BFT:InStrB status	Yes
	SCCBRBRF1.InStrC.stVal	1107		50BFT:InStrC status	Yes
	SCCBRBRF1.OpEx.general	1108		50BFT:general	Yes
	SCCBRBRF1.OpIn.general	1109		50BFT:general	Yes
	SCCBRBRF1.Str.general	1110		50BFT:general pickup	Yes
	LD0.SDAOGGIO1.ActivePhA.stVal	1111		Sdaoggio1 Phase A Active	
	LD0.SDAOGGIO1.ActivePhB.stVal	1112		Sdaoggio1 Phase B Active	
	LD0.SDAOGGIO1.ActivePhC.stVal	1113		Sdaoggio1 Phase C Active	
	LD0.SDAOGGIO1.CbPosA.stVal	1114		Sdaoggio1 Phase A Cb Position	Yes
	LD0.SDAOGGIO1.CbPosB.stVal	1115		Sdaoggio1 Phase B Cb Position	Yes
	LD0.SDAOGGIO1.CbPosC.stVal	1116		Sdaoggio1 Phase C Cb Position	Yes
	SDPHLPTOC1.Op.general	1117		67/51P-1:general trip	
	SDPHLPTOC1.Op.phsA	1118		67/51P-1:phase A trip	
	SDPHLPTOC1.Op.phsB	1119		67/51P-1:phase B trip	
	SDPHLPTOC1.Op.phsC	1120		67/51P-1:phase C trip	
	SDPHLPTOC1.Str.general	1121		67/51P-1:general pickup	Yes
	SDPHLPTOC1.Str.phsA	1122		67/51P-1:phase A pickup	Yes
	SDPHLPTOC1.Str.phsB	1123		67/51P-1:phase B pickup	Yes
	SDPHLPTOC1.Str.phsC	1124		67/51P-1:phase C pickup	Yes
	SDPHLPTOC2.Op.general	1125		67/51P-2:general trip	
	SDPHLPTOC2.Op.phsA	1126		67/51P-2:phase A trip	
	SDPHLPTOC2.Op.phsB	1127		67/51P-2:phase B trip	
	SDPHLPTOC2.Op.phsC	1128		67/51P-2:phase C trip	
	SDPHLPTOC2.Str.general	1129		67/51P-2:general pickup	Yes
	SDPHLPTOC2.Str.phsA	1130		67/51P-2:phase A pickup	Yes

No events	61850 Path	IOA	Disabled	Description	Interrogation
	SDPHLPTOC2.Str.phsB	1131		67/51P-2:phase B pickup	Yes
	SDPHLPTOC2.Str.phsC	1132		67/51P-2:phase C pickup	Yes
	SECRSYN1.FailCmd.stVal	1134		25:FailCmd status	Yes
	SECRSYN1.FailSyn.stVal	1135		25:FailSyn status	Yes
	SECRSYN1.SynPrg.stVal	1136		25:SynPrg status	Yes
	SEQRFUF1.Str.general	1137		60:general pickup	Yes
	SEQRFUF1.Str3Ph.general	1138		60:general	Yes
	SPHHPTOC1.Op.general	1139		SPHHPTOC1:general trip	
	SPHHPTOC1.Op.phsA	1140		SPHHPTOC1:phase A trip	
	SPHHPTOC1.Op.phsB	1141		SPHHPTOC1:phase B trip	
	SPHHPTOC1.Op.phsC	1142		SPHHPTOC1:phase C trip	
	SPHHPTOC1.Str.general	1143		SPHHPTOC1:general pickup	Yes
	SPHHPTOC1.Str.phsA	1144		SPHHPTOC1:phase A pickup	Yes
	SPHHPTOC1.Str.phsB	1145		SPHHPTOC1:phase B pickup	Yes
	SPHHPTOC1.Str.phsC	1146		SPHHPTOC1:phase C pickup	Yes
	SPHIPTOC1.Op.general	1155		SPHIPTOC1:general trip	
	SPHIPTOC1.Op.phsA	1156		SPHIPTOC1:phase A trip	
	SPHIPTOC1.Op.phsB	1157		SPHIPTOC1:phase B trip	
	SPHIPTOC1.Op.phsC	1158		SPHIPTOC1:phase C trip	
	SPHIPTOC1.Str.general	1159		SPHIPTOC1:general pickup	Yes
	SPHIPTOC1.Str.phsA	1160		SPHIPTOC1:phase A pickup	Yes
	SPHIPTOC1.Str.phsB	1161		SPHIPTOC1:phase B pickup	Yes
	SPHIPTOC1.Str.phsC	1162		SPHIPTOC1:phase C pickup	Yes
	SPHLPTOC1.Op.general	1163		51P:general trip	
	SPHLPTOC1.Op.phsA	1164		51P:phase A trip	
	SPHLPTOC1.Op.phsB	1165		51P:phase B trip	
	SPHLPTOC1.Op.phsC	1166		51P:phase C trip	
	SPHLPTOC1.Str.general	1167		51P:general pickup	Yes
	SPHLPTOC1.Str.phsA	1168		51P:phase A pickup	Yes
	SPHLPTOC1.Str.phsB	1169		51P:phase B pickup	Yes
	SPHLPTOC1.Str.phsC	1170		51P:phase C pickup	Yes
	SPHLPTOC2.Op.general	1171		50P-1:general trip	
	SPHLPTOC2.Op.phsA	1172		50P-1:phase A trip	
	SPHLPTOC2.Op.phsB	1173		50P-1:phase B trip	
	SPHLPTOC2.Op.phsC	1174		50P-1:phase C trip	
	SPHLPTOC2.Str.general	1175		50P-1:general pickup	Yes
	SPHLPTOC2.Str.phsA	1176		50P-1:phase A pickup	Yes
	SPHLPTOC2.Str.phsB	1177		50P-1:phase B pickup	Yes
	SPHLPTOC2.Str.phsC	1178		50P-1:phase C pickup	Yes
	SPHPTOV1.Op.general	1179		59-1:general trip	
	SPHPTOV1.Str.general	1180		59-1:general pickup	Yes

No events	61850 Path	IOA	Disabled	Description	Interrogation
	SPHPTOV2.Op.general	1181		59-2:general trip	
	SPHPTOV2.Str.general	1182		59-2:general pickup	Yes
	SPHPTOV3.Op.general	1183		59-3:general trip	
	SPHPTOV3.Str.general	1184		59-3:general pickup	Yes
	SPHPTUV1.Op.general	1185		27-1:general trip	
	SPHPTUV1.Str.general	1186		27-1:general pickup	Yes
	SPHPTUV2.Op.general	1187		27-2:general trip	
	SPHPTUV2.Str.general	1188		27-2:general pickup	Yes
	SPHPTUV3.Op.general	1189		27-3:general trip	
	SPHPTUV3.Str.general	1190		27-3:general pickup	Yes
	TPMGAPC1.Op.general	1214		TPMGAPC1:general trip	
	TPMGAPC1.Str.general	1215		TPMGAPC1:general pickup	Yes
	TPMGAPC2.Op.general	1216		TPMGAPC2:general trip	
	TPMGAPC2.Str.general	1217		TPMGAPC2:general pickup	Yes
	TPMGAPC3.Op.general	1218		TPMGAPC3:general trip	
	TPMGAPC3.Str.general	1219		TPMGAPC3:general pickup	Yes
	TPSGAPC1.Op.general	1220		TPSGAPC1:general trip	
	TPSGAPC1.Str.general	1221		TPSGAPC1:general pickup	Yes
	TPSGAPC2.Op.general	1222		TPSGAPC2:general trip	
	TPSGAPC2.Str.general	1223		TPSGAPC2:general pickup	Yes
	TPSGAPC3.Op.general	1224		TPSGAPC3:general trip	
	TPSGAPC3.Str.general	1225		TPSGAPC3:general pickup	Yes
	XDEFLPTOC1.Op.general	1228		XDEFLPTOC1:general trip	
	XDEFLPTOC1.Str.general	1229		XDEFLPTOC1:general pickup	Yes
	XDEFLPTOC2.Op.general	1230		XDEFLPTOC2:general trip	
	XDEFLPTOC2.Str.general	1231		XDEFLPTOC2:general pickup	Yes
	XEFHPTOC3.Op.general	1232		XEFHPTOC3:general trip	
	XEFHPTOC3.Str.general	1233		XEFHPTOC3:general pickup	Yes
	XEFIPTOC2.Op.general	1236		XEFIPTOC2:general trip	
	XEFIPTOC2.Str.general	1237		XEFIPTOC2:general pickup	Yes
	XEFLPTOC2.Op.general	1238		XEFLPTOC2:general trip	
	XEFLPTOC2.Str.general	1239		XEFLPTOC2:general pickup	Yes
	XEFLPTOC3.Op.general	1240		50N-1:general trip	
	XEFLPTOC3.Str.general	1241		50N-1:general pickup	Yes
	XNSPTOC1.InEnaMult.stVal	1242		XNSPTOC1:InEnaMult status	Yes
	XNSPTOC1.Op.general	1243		XNSPTOC1:general trip	
	XNSPTOC1.Str.general	1244		XNSPTOC1:general pickup	Yes
	XNSPTOC2.InEnaMult.stVal	1245		XNSPTOC2:InEnaMult status	Yes
	XNSPTOC2.Op.general	1246		XNSPTOC2:general trip	
	XNSPTOC2.Str.general	1247		XNSPTOC2:general pickup	Yes
	SDARREC1.PrgRec.stVal	2850		79:PrgRec status	Yes

No events	61850 Path	IOA	Disabled	Description	Interrogation
	SDARREC1.PrgRec1.stVal	2851		79:PrgRec1 status	Yes
	SDARREC1.PrgRec2.stVal	2852		79:PrgRec2 status	Yes
	SDARREC1.PrgRec3.stVal	2853		79:PrgRec3 status	Yes
	SDARREC1.PrgRec4.stVal	2854		79:PrgRec4 status	Yes
	SDARREC1.PrgRec5.stVal	2855		79:PrgRec5 status	Yes
	SDARREC1.SucRec.stVal	2856		79:SucRec status	Yes
	SDARREC1.UnsRec.stVal	2857		79:UnsRec status	Yes
	SDARREC1.RdyRec.stVal	2859		79:RdyRec status	Yes
	SDARREC1.ActRec.stVal	2860		79:ActRec status	Yes
	SDARREC1.PrgDsr.stVal	2861		79:PrgDsr status	Yes
	SDARREC1.PrgCutOut.stVal	2862		79:PrgCutOut status	Yes
	SDARREC1.FrqOpAlm.stVal	2863		79:FrqOpAlm status	Yes
	LD0.SDAOGGIO1.ActivePh3P.stVal	2865		Sdaoggio1 Three Phase Active	Yes
	LD0.SDAOGGIO1.CbPos3P.stVal	2866		Sdaoggio1 Three Phase Cb Position	Yes
	SDARREC1.UnsCBCls.stVal	2867		79:UnsCBCls status	Yes
	SDARREC1.WtMstr.stVal	2868		79:WtMstr status	Yes
	SDARREC1.AROn.stVal	2869		79:AROn status	Yes
	SCBCILO1.EnaCls.stVal	3011		CB interlock:EnaCls status	Yes
	SCBCILO1.EnaOpn.stVal	3012		CB interlock:EnaOpn status	Yes
	SCBCILO1.ItlByPss.stVal	3013		CB interlock:ItlByPss status	Yes
	SCBXCBR1.Loc.stVal	3021		52:Loc status	Yes
	SCBXCBR1.PosCls.stVal	3024		52:PosCls status	Yes
	SCBXCBR1.PosOpn.stVal	3026		52:PosOpn status	Yes
	SPSCBR1.APwrAlm.stVal	3027		52CM:APwrAlm status	Yes
	SPSCBR1.APwrLO.stVal	3028		52CM:APwrLO status	Yes
	SPSCBR1.CBLifAlm.stVal	3029		52CM:CBLifAlm status	Yes
	SPSCBR1.ClsAlm.stVal	3030		52CM:ClsAlm status	Yes
	SPSCBR1.InPosClsA.stVal	3034		52CM:InPosClsA status	Yes
	SPSCBR1.InPosClsB.stVal	3035		52CM:InPosClsB status	Yes
	SPSCBR1.InPosClsC.stVal	3036		52CM:InPosClsC status	Yes
	SPSCBR1.InPosOpnA.stVal	3037		52CM:InPosOpnA status	Yes
	SPSCBR1.InPosOpnB.stVal	3038		52CM:InPosOpnB status	Yes
	SPSCBR1.InPosOpnC.stVal	3039		52CM:InPosOpnC status	Yes
	SPSCBR1.InPresAlm.stVal	3040		52CM:InPresAlm status	Yes
	SPSCBR1.InPresLO.stVal	3041		52CM:InPresLO status	Yes
	SPSCBR1.InSprCha.stVal	3042		52CM:InSprCha status	Yes
	SPSCBR1.InSprChStr.stVal	3043		52CM:InSprChStr status	Yes
	SPSCBR1.LonTmAlm.stVal	3044		52CM:LonTmAlm status	Yes
	SPSCBR1.OpnAlm.stVal	3048		52CM:OpnAlm status	Yes
	SPSCBR1.OpNumAlm.stVal	3049		52CM:OpNumAlm status	Yes

No events	61850 Path	IOA	Disabled	Description	Interrogation
	SPSCBR1.OpNumLO.stVal	3050		52CM:OpNumLO status	Yes
	SPSCBR1.PosClsA.stVal	3051		52CM:PosClsA status	Yes
	SPSCBR1.PosClsB.stVal	3052		52CM:PosClsB status	Yes
	SPSCBR1.PosClsC.stVal	3053		52CM:PosClsC status	Yes
	SPSCBR1.PosIvdA.stVal	3054		52CM:PosIvdA status	Yes
	SPSCBR1.PosIvdB.stVal	3055		52CM:PosIvdB status	Yes
	SPSCBR1.PosIvdC.stVal	3056		52CM:PosIvdC status	Yes
	SPSCBR1.PosOpnA.stVal	3057		52CM:PosOpnA status	Yes
	SPSCBR1.PosOpnB.stVal	3058		52CM:PosOpnB status	Yes
	SPSCBR1.PosOpnC.stVal	3059		52CM:PosOpnC status	Yes
	SPSCBR1.PresAlm.stVal	3060		52CM:PresAlm status	Yes
	SPSCBR1.PresLO.stVal	3061		52CM:PresLO status	Yes
	SPSCBR1.RsAccAPwr.stVal	3065		52CM:RsAccAPwr status	Yes
	SPSCBR1.SprChaAlm.stVal	3066		52CM:SprChaAlm status	Yes
	SCBXCBR1.BlkOpn.stVal	3080		52: phsA BlockOpen status	Yes
	SCBXCBR2.BlkOpn.stVal	3081		52: phsB BlockOpen status	Yes
	SCBXCBR3.BlkOpn.stVal	3082		52: phsC BlockOpen status	Yes
	SCBXCBR1.BlkCls.stVal	3083		52: phsA BlockClose status	Yes
	SCBXCBR2.BlkCls.stVal	3084		52: phsB BlockClose status	Yes
	SCBXCBR3.BlkCls.stVal	3085		52: phsC BlockClose status	Yes
	CMMXU1.HiAlm.stVal	4701		"IA,IB,IC:HiAlm status"	Yes
	CMMXU1.HiWrn.stVal	4702		"IA,IB,IC:HiWrn status"	Yes
	CMMXU1.LoAlm.stVal	4703	Disabled	"IA,IB,IC:LoAlm status"	Yes
	CMMXU1.LoWrn.stVal	4704	Disabled	"IA,IB,IC:LoWrn status"	Yes
	RESCMMXU1.HiAlm.stVal	4709		IG:HiAlm status	Yes
	RESCMMXU1.HiWrn.stVal	4710		IG:HiWrn status	Yes
	VMMXU1.HiAlm.stVal	4715		"VA,VB,VC:HiAlm status"	Yes
	VMMXU1.HiWrn.stVal	4716		"VA,VB,VC:HiWrn status"	Yes
	VMMXU1.LoAlm.stVal	4717		"VA,VB,VC:LoAlm status"	Yes
	VMMXU1.LoWrn.stVal	4718		"VA,VB,VC:LoWrn status"	Yes
	XGGIO120.Ind1.stVal	5010		XGGIO120:Ind1 status	Yes
	XGGIO120.Ind2.stVal	5011		XGGIO120:Ind2 status	Yes
	XGGIO120.Ind3.stVal	5012		XGGIO120:Ind3 status	Yes
	XGGIO120.Ind4.stVal	5013		XGGIO120:Ind4 status	Yes
	XGGIO110.Ind1.stVal	5020		XGGIO110:Ind1 status	Yes
	XGGIO110.Ind2.stVal	5021		XGGIO110:Ind2 status	Yes
	XGGIO110.Ind3.stVal	5022		XGGIO110:Ind3 status	Yes
	XGGIO110.Ind4.stVal	5023		XGGIO110:Ind4 status	Yes
	XGGIO110.Ind5.stVal	5024		XGGIO110:Ind5 status	Yes
	XGGIO110.Ind6.stVal	5025		XGGIO110:Ind6 status	Yes
	XGGIO110.Ind7.stVal	5026		XGGIO110:Ind7 status	Yes

No events	61850 Path	IOA	Disabled	Description	Interrogation
	XGGIO110.Ind8.stVal	5027		XGGIO110:Ind8 status	Yes
	XGGIO110.SPCSO1.stVal	5030		XGGIO110:SPCSO1 status	Yes
	XGGIO110.SPCSO2.stVal	5031		XGGIO110:SPCSO2 status	Yes
	XGGIO110.SPCSO3.stVal	5032		XGGIO110:SPCSO3 status	Yes
	XGGIO110.SPCSO4.stVal	5033		XGGIO110:SPCSO4 status	Yes
	XGGIO100.SPCSO1.stVal	5040		XGGIO100:SPCSO1 status	Yes
	XGGIO100.SPCSO2.stVal	5041		XGGIO100:SPCSO2 status	Yes
	XGGIO100.SPCSO3.stVal	5042		XGGIO100:SPCSO3 status	Yes
	XGGIO100.SPCSO4.stVal	5043		XGGIO100:SPCSO4 status	Yes
	XGGIO100.SPCSO5.stVal	5044		XGGIO100:SPCSO5 status	Yes
	XGGIO100.SPCSO6.stVal	5045		XGGIO100:SPCSO6 status	Yes
	XGGIO105.Ind1.stVal	5070		XGGIO105:Ind1 status	Yes
	XGGIO105.Ind2.stVal	5071		XGGIO105:Ind2 status	Yes
	XGGIO105.Ind3.stVal	5072		XGGIO105:Ind3 status	Yes
	XGGIO105.Ind4.stVal	5073		XGGIO105:Ind4 status	Yes
	XGGIO105.Ind5.stVal	5074		XGGIO105:Ind5 status	Yes
	XGGIO105.Ind6.stVal	5075		XGGIO105:Ind6 status	Yes
	XGGIO105.Ind7.stVal	5076		XGGIO105:Ind7 status	Yes
	XGGIO105.Ind8.stVal	5077		XGGIO105:Ind8 status	Yes
	XGGIO105.SPCSO1.stVal	5080		XGGIO105:SPCSO1 status	Yes
	XGGIO105.SPCSO2.stVal	5081		XGGIO105:SPCSO2 status	Yes
	XGGIO105.SPCSO3.stVal	5082		XGGIO105:SPCSO3 status	Yes
	XGGIO105.SPCSO4.stVal	5083		XGGIO105:SPCSO4 status	Yes
	SPCGGIO1.SPCSO1.stVal	5090		SPCGGIO1:SPCSO1 status	Yes
	SPCGGIO1.SPCSO2.stVal	5091		SPCGGIO1:SPCSO2 status	Yes
	SPCGGIO1.SPCSO3.stVal	5092		SPCGGIO1:SPCSO3 status	Yes
	SPCGGIO1.SPCSO4.stVal	5093		SPCGGIO1:SPCSO4 status	Yes
	SPCGGIO1.SPCSO5.stVal	5094		SPCGGIO1:SPCSO5 status	Yes
	SPCGGIO1.SPCSO6.stVal	5095		SPCGGIO1:SPCSO6 status	Yes
	SPCGGIO1.SPCSO7.stVal	5096		SPCGGIO1:SPCSO7 status	Yes
	SPCGGIO1.SPCSO8.stVal	5097		SPCGGIO1:SPCSO8 status	Yes
	SPCGGIO1.SPCSO9.stVal	5098		SPCGGIO1:SPCSO9 status	Yes
	SPCGGIO1.SPCSO10.stVal	5099		SPCGGIO1:SPCSO10 status	Yes
	SPCGGIO1.SPCSO11.stVal	5100		SPCGGIO1:SPCSO11 status	Yes
	SPCGGIO1.SPCSO12.stVal	5101		SPCGGIO1:SPCSO12 status	Yes
	SPCGGIO1.SPCSO13.stVal	5102		SPCGGIO1:SPCSO13 status	Yes
	SPCGGIO1.SPCSO14.stVal	5103		SPCGGIO1:SPCSO14 status	Yes
	SPCGGIO1.SPCSO15.stVal	5104		SPCGGIO1:SPCSO15 status	Yes
	SPCGGIO1.SPCSO16.stVal	5105		SPCGGIO1:SPCSO16 status	Yes
	FKEYGGIO1.SPCSO1.stVal	5110		FKEYGGIO1:SPCSO1 status	Yes
	FKEYGGIO1.SPCSO2.stVal	5111		FKEYGGIO1:SPCSO2 status	Yes

No events	61850 Path	IOA	Disabled	Description	Interrogation
	FKEYGGIO1.SPCSO3.stVal	5112		FKEYGGIO1:SPCSO3 status	Yes
	FKEYGGIO1.SPCSO4.stVal	5113		FKEYGGIO1:SPCSO4 status	Yes
	FKEYGGIO1.SPCSO5.stVal	5114		FKEYGGIO1:SPCSO5 status	Yes
	FKEYGGIO1.SPCSO6.stVal	5115		FKEYGGIO1:SPCSO6 status	Yes
	FKEYGGIO1.SPCSO7.stVal	5116		FKEYGGIO1:SPCSO7 status	Yes
	FKEYGGIO1.SPCSO8.stVal	5117		FKEYGGIO1:SPCSO8 status	Yes
	FKEYGGIO1.SPCSO9.stVal	5118		FKEYGGIO1:SPCSO9 status	Yes
	FKEYGGIO1.SPCSO10.stVal	5119		FKEYGGIO1:SPCSO10 status	Yes
	FKEYGGIO1.SPCSO11.stVal	5120		FKEYGGIO1:SPCSO11 status	Yes
	FKEYGGIO1.SPCSO12.stVal	5121		FKEYGGIO1:SPCSO12 status	Yes
	FKEYGGIO1.SPCSO13.stVal	5122		FKEYGGIO1:SPCSO13 status	Yes
	FKEYGGIO1.SPCSO14.stVal	5123		FKEYGGIO1:SPCSO14 status	Yes
	FKEYGGIO1.SPCSO15.stVal	5124		FKEYGGIO1:SPCSO15 status	Yes
	FKEYGGIO1.SPCSO16.stVal	5125		FKEYGGIO1:SPCSO16 status	Yes
	XGGIO115.InClsA.stVal	5509		XGGIO115:InClsA status	Yes
	XGGIO115.InClsB.stVal	5510		XGGIO115:InClsB status	Yes
	XGGIO115.InClsC.stVal	5511		XGGIO115:InClsC status	Yes
	XGGIO115.Ind1.stVal	5512		XGGIO115:Ind1 status	Yes
	XGGIO115.Ind2.stVal	5513		XGGIO115:Ind2 status	Yes
	XGGIO115.Ind3.stVal	5514		XGGIO115:Ind3 status	Yes
	XGGIO115.Ind4.stVal	5515		XGGIO115:Ind4 status	Yes
	XGGIO115.Ind5.stVal	5516		XGGIO115:Ind5 status	Yes
	XGGIO115.Ind6.stVal	5517		XGGIO115:Ind6 status	Yes
	XGGIO115.InCls3Ph.stVal	5518		XGGIO115:InCls3Ph status	Yes
	XGGIO115.InOpn3Ph.stVal	5519		XGGIO115:InOpn3Ph status	Yes
	XGGIO115.InOpnA.stVal	5520		XGGIO115:InOpnA status	Yes
	XGGIO115.InOpnB.stVal	5521		XGGIO115:InOpnB status	Yes
	XGGIO115.InOpnC.stVal	5522		XGGIO115:InOpnC status	Yes
	XGGIO115.LstPoleOp.stVal	5523		XGGIO115:LstPoleOp status	Yes
	SCBCSWI1.Pos.stVal	7010		CB Control:Pos status	Yes
	SCBCSWI1.PosA.stVal	7011		CB Control:PosA status	Yes
	SCBCSWI1.PosB.stVal	7012		CB Control:PosB status	Yes
	SCBCSWI1.PosC.stVal	7013		CB Control:PosC status	Yes
	I5CGGIO1.ActSG.stVal	40001		Setting group 1	Yes
	I5CGGIO1.ActSG.stVal	40002		Setting group 2	Yes
	I5CGGIO1.ActSG.stVal	40003		Setting group 3	Yes
	I5CGGIO1.ActSG.stVal	40004		Setting group 4	Yes
	I5CGGIO1.ActSG.stVal	40005		Setting group 5	Yes
	I5CGGIO1.ActSG.stVal	40006		Setting group 6	Yes

Section 3 IEC 60870-5-101/104 protocol implementation

This section describes the specific implementation of the IEC 60870-5-101 protocol within the RER620. The RER620 uses the Triangle MicroWorks, Inc. IEC 60870-5-101 Slave Source Code Library Version 3.

This section and the documents listed below provide complete information on how to communicate with a RER620 via the IEC 60870-5-101 protocol.

- IEC 60870-5-101 = Companion standard for basic telecontrol tasks
- IEC 60870-5-5 = Basic Application Functions
- IEC 60870-5-2 = Link Transmission Procedures
- IEC 60870-5-4 = Definition and Coding of Application Information Elements
- IEC 60870-5-3 = General Structure of Application Data
- IEC 60870-5-1 = Transmission Frame Formats

Please note that the IEC60870-5-104 protocol support shares application level feature of the 101 implementation defined in this section.

The pages in this section have been extracted from the 60870-5-101 © IEC:2003, Section 8. The section numbers below have been purposely retained from that document for reference.

8 Interoperability

This companion standard presents sets of parameters and alternatives from which subsets have to be selected to implement particular telecontrol systems. Certain parameter values, such as the number of octets in the COMMON ADDRESS of ASDUs represent mutually exclusive alternatives. This means that only one value of the defined parameters is admitted per system. Other parameters, such as the listed set of different process information in command and in monitor direction allow the specification of the complete set or subsets, as appropriate for given applications. This Clause summarizes the parameters of the previous Clauses to facilitate a suitable selection for a specific application. If a system is composed of equipment stemming from different manufacturers it is necessary that all partners agree on the selected parameters.

The selected parameters should be marked in the white boxes as follows:

☐	Function or ASDU is not used
X	Function or ASDU is used as standardized (default)
R	Function or ASDU is used in reverse mode
B	Function or ASDU is used in standard and reverse mode

The possible selection (blank, X, R, or B) is specified for each specific Clause or parameter.

NOTE: In addition, the full specification of a system may require individual selection of certain parameters for certain parts of the system, such as the individual selection of scaling factors for individually addressable measured values.

8.1 System or device

(system-specific parameter, indicate the station"s function by marking one of the following with "X")

- [ ] System definition
- [ ] Controlling station definition (master)
- [X] Controlled station definition (slave)

8.2 Network Configuration

(network-specific parameter, all configurations that are used are to be marked "X")

- [X] Point-to-point
- [ ] Multipoint-party line
- [X] Multiple point-to-point
- [ ] Multipoint-star

8.3 Physical Layer

(network-specific parameter, all configurations and data rates that are used are to be marked "X")

Transmission speed (control direction)

Unbalanced interchange Circuit V.24/V.28 Standard	Unbalanced interchange Circuit V.24/V.28 Recommended if >1200 bit/s	Balanced interchange Circuit X.24/X.27	
[ ] 100 bit/s	[X] 2400 bit/s	[X] 2400 bit/s	[ ] 56000 bit/s
[ ] 200 bit/s	[X] 4800 bit/s	[X] 4800 bit/s	[ ] 64000 bit/s
[X] 300 bit/s	[X] 9600 bit/s	[X] 9600 bit/s	
[X] 600 bit/s		[X] 19200 bit/s	
[X] 1200 bit/s		[X] 38400 bit/s	

Transmission speed (monitor direction)

Unbalanced interchange Circuit V.24/V.28 Standard	Unbalanced interchange Circuit V.24/V.28 Recommended if >1200 bit/s	Balanced interchange Circuit X.24/X.27	
[ ] 100 bit/s	[X] 2400 bit/s	[X] 2400 bit/s	[ ] 56000 bit/s
[ ] 200 bit/s	[X] 4800 bit/s	[X] 4800 bit/s	[ ] 64000 bit/s
[X] 300 bit/s	[X] 9600 bit/s	[X] 9600 bit/s	
[X] 600 bit/s		[X] 19200 bit/s	
[X] 1200 bit/s		[X] 38400 bit/s	

8.4 Link Layer

(network-specific parameter, all options that are used are to be marked “X”. Specify the maximum frame length. If a non-standard assignment of class 2 messages is implemented for unbalanced transmission, indicate the Type ID and COT of all messages assigned to class 2.)

Frame format FT 1.2, single character 1 and the fixed time out interval are used exclusively in this companion standard.

Link transmission procedure

- [X] Balanced transmission
- [X] Unbalanced transmission

Address field of link

- [ ] Not present (balanced transmission only)
- [X] One octet
- [X] Two octets
- [X] Structured
- [X] Unstructured

Frame length

- [4095] Maximum length L (control direction)
- [255] Maximum length L (monitor direction)

- [ ] Time during which repetitions are permitted (Trp) or number of repetitions

When using an unbalanced link layer, the following ASDU types are returned in class 2 messages (low priority) with the indicated causes of transmission:

- [ ] The standard assignment of ASDUs to class 2 messages is used as follows:

Type Identification	Cause of Transmission

☐ A special assignment of ASDUs to class 2 messages is used as follows:

Type Identification	Cause of Transmission

Note: In response to a class 2 poll, a controlled station may respond with class 1 data when there is no class 2 data available.

8.5 Application Layer

Transmission mode for application data

Mode 1 (Least significant octet first), as defined in clause 4.10 of IEC 60870-5-4, is used exclusively in this companion standard.

Common address of ASDU

(system-specific parameter, all configurations that are used are to be marked “X”)

☒ One octet ☒ Two octets

Information object address

(system-specific parameter, all configurations that are used are to be marked “X”)

☒ One octet ☒ Structured

☒ Two octets ☒ Unstructured

☒ Three octets

Cause of transmission

(system-specific parameter, all configurations that are used are to be marked “X”)

☒ One octet ☒ Two octets (with originator address). Set to zero in case of no originator address.

Selection of standard ASDUs

Process information in monitor direction

(station-specific parameter, mark each type ID with an “X” if it is only used in the standard direction, “R” if only used in the reverse direction, and “B” if used in both directions)

X	<1>	:= Single-point information	M_SP_NA_1
X	<2>	:= Single-point information with time tag	M_SP_TA_1
X	<3>	:= Double-point information	M_DP_NA_1
X	<4>	:= Double-point information with time tag	M_DP_TA_1
	<5>	:= Step position information	M_ST_NA_1
	<6>	:= Step position information with time tag	M_ST_TA_1
	<7>	:= Bitstring of 32 bit	M_BO_NA_1
	<8>	:= Bitstring of 32 bit with time tag	M_BO_TA_1
X	<9>	:= Measured value, normalized value	M_ME_NA_1
X	<10>	:= Measured value, normalized value with time tag	M_ME_TA_1
X	<11>	:= Measured value, scaled value	M_ME_NB_1
X	<12>	:= Measured value, scaled value with time tag	M_ME_TB_1
X	<13>	:= Measured value, short floating point value	M_ME_NC_I
X	<14>	:= Measured value, short floating point value with time tag	M_ME_TC_1
	<15>	:= Integrated totals	M_IT_NA_1
	<16>	:= Integrated totals with time tag	M_IT_TA_1
	<17>	:= Event of protection equipment with time tag	M_EP_TA_1
	<18>	:= Packed start events of protection equipment with time tag	M_EP_TB_1
	<19>	:= Packed output circuit information of protection equipment with time tag	M_EP_TC_1
	<20>	:= Packed single-point information with status change detection	M_PS_NA_1
X	<21>	:= Measured value, normalized value without quality descriptor	M_ME_ND_1
X	<30>	:= Single-point information with time tag CP56Time2a	M_SP_TB_1
X	<31>	:= Double-point information with time tag CP56Time2A	M_DP_TB_1
	<32>	:= Step position information with time tag CP56Time2A	M_ST_TB_1
	<33>	:= Bitstring of 32 bit with time tag CP56Time2A	M_BO_TB_1
X	<34>	:= Measured value, normalized value with time tag CP56Time2A	M_ME_TD_1
X	<35>	:= Measured value, scaled value with time tag CP56Time2A	M_ME_TE_1
X	<36>	:= Measured value, short floating point value with time tag CP56Time2A	M_ME_TF_1
	<37>	:= Integrated totals with time tag CP56Time2A	M_IT_TB_1
	<38>	:= Event of protection equipment with time tag CP56Time2A	M_EP_TD_1
	<39>	:= Packed start events of protection equipment with time tag CP56time2A	M_EP_TE_1
	<40>	:= Packed output circuit information of protection equipment with time tag CP56Time2a	M_EP_TF_1

Either ASDUs of the set <2>, <4>, <6>, <8>, <10>, <12>, <14> or of the set <30 –40> are used.

Process information in control direction

(station-specific parameter, mark each type ID with an “X” if it is only used in the standard direction, “R” if only used in the reverse direction, and “B” if used in both directions)

X	<45>	:= Single command	C_SC_NA_1
X	<46>	:= Double command	C_DC_NA_1
	<47>	:= Regulating step command	C_RC_NA_1
	<48>	:= Set point command, normalized value	C_SE_NA_1
	<49>	:= Set point command, scaled value	C_SE_NB_1
	<50>	:= Set point command, short floating point value	C_SE_NC_1
	<51>	:= Bitstring of 32 bit	C_BO_NA_1

System information in monitor direction

(station-specific parameter, mark with an “X” if it is only used in the standard direction, “R” if only used in the reverse direction, and “B” if used in both directions)

	<70>	:= End of initialization	M_EI_NA_1

System information in control direction

(station-specific parameter, mark each type ID with an “X” if it is only used in the standard direction, “R” if only used in the reverse direction, and “B” if used in both directions)

X	<100>	:= Interrogation command	C_IC_NA_1
	<101>	:= Counter interrogation command	C_CI_NA_1
	<102>	:= Read command	C_RD_NA_1
X	<103>	:= Clock synchronization command	C_CS_NA_1
	<104>	:= Test command	C_TS_NB_1
	<105>	:= Reset process command	C_RP_NC_1
X	<106>	:= Delay acquisition command	C_CD_NA_1

Parameter in control direction

(station-specific parameter, mark each type ID with an “X” if it is only used in the standard direction, “R” if only used in the reverse direction, and “B” if used in both directions)

	<110>	:= Parameter of measured value, normalized value	P_ME_NA_1
	<111>	:= Parameter of measured value, scaled value	P_ME_NB_1
	<112>	:= Parameter of measured value, short floating point value	P_ME_NC_1
	<113>	:= Parameter activation	P_AC_NA_1

File transfer

(station-specific parameter, mark each type ID with an “X” if it is only used in the standard direction, “R” if only used in the reverse direction, and “B” if used in both directions)

	<120>	:= File ready	F_FR_NA_1
	<121>	:= Section ready	F_SR_NA_1
	<122>	:= Call directory, select file, call file, call section	F_SC_NA_1
	<123>	:= Last section, last segment	F_LS_NA_1
	<124>	:= Ack file, ack section	F_AF_NA_1
	<125>	:= Segment	F_SG_NA_1
	<126>	:= Directory	F_DR_TA_1

Type identification and cause of transmission assignments

(station-specific parameters)

Shaded boxes are not required.
Blank = function or ASDU is not used.
Mark type identification/cause of transmission combinations:
“X” if used only in the standard direction;
“R” if used only in the reverse direction;
“B” if used in both directions.

Type identification		Cause of transmission																		
		periodic, cyclic	background scan	spontaneous	initialized	request or requested	activation	activation confirmation	deactivation	deactivation confirmation	activation termination	return info caused by a remote cmd	return info caused by a local cmd	file transfer	interrogated by group <number>	request by group <n> counter request	unknown type identification	unknown cause of transmission	unknown common address of ASDU	unknown information object address
		1	2	3	4	5	6	7	8	9	10	11	12	13	20 to 36	37 to 41	44	45	46	47
<1>	M_SP_NA_1			X		X									X					
<2>	M_SP_TA_1			X		X														
<3>	M_DP_NA_1			X		X									X					
<4>	M_DP_TA_1			X		X														
<5>	M_ST_NA_1																			
<6>	M_ST_TA_1																			
<7>	M_BO_NA_1																			
<8>	M_BO_TA_1																			
<9>	M_ME_NA_1	X		X		X									X					
<10>	M_ME_TA_1			X		X														
<11>	M_ME_NB_1	X		X		X									X					
<12>	M_ME_TB_1			X		X														
<13>	M_ME_NC_1	X		X		X									X					
<14>	M_ME_TC_1			X		X														
<15>	M_IT_NA_1																			
<16>	M_IT_TA_1																			
<17>	M_EP_TA_1																			
<18>	M_EP_TB_1																			
<19>	M_EP_TC_1																			
<20>	M_PS_NA_1																			
<21>	M_ME_ND_1	X		X		X									X					
<30>	M_SP_TB_1			X		X						X	X							
<31>	M_DP_TB_1			X		X						X	X							
<32>	M_ST_TB_1																			
<33>	M_BO_TB_1																			
<34>	M_ME_TD_1			X		X														
<35>	M_ME_TE_1			X		X														

Type identification		Cause of transmission																		
		periodic, cyclic	background scan	spontaneous	initialized	request or requested	activation	activation confirmation	deactivation	deactivation confirmation	activation termination	return info caused by a remote cmd	return info caused by a local cmd	file transfer	interrogated by group <number>	request by group <n> counter request	unknown type identification	unknown cause of transmission	unknown common address of ASDU	unknown information object address
		1	2	3	4	5	6	7	8	9	10	11	12	13	20 to 36	37 to 41	44	45	46	47
<36>	M_ME_TF_1			X		X														
<37>	M_IT_TB_1			X												X				
<38>	M_EP_TD_1																			
<39>	M_EP_TE_1																			
<40>	M_EP_TF_1																			
<45>	C_SC_NA_1						X	X	X	X	X						X	X	X	X
<46>	C_DC_NA_1						X	X	X	X	X						X	X	X	X
<47>	C_RC_NA_1																			
<48>	C_SE_NA_1																			
<49>	C_SE_NB_1																			
<50>	C_SE_NC_1																			
<51>	C_BO_NA_1																			
<70>	M_EI_NA_1*																			
<100>	C_IC_NA_1						X	X	X	X	X						X	X	X	X
<101>	C_CI_NA_1						X	X			X						X	X	X	X
<102>	C_RD_NA_1																			
<103>	C_CS_NA_1			X			X	X									X	X	X	X
<104>	C_TS_NA_1																			
<105>	C_RP_NA_1																			
<106>	C_CD_NA_1																			
<110>	P_ME_NA_1																			
<111>	P_ME_NB_1																			
<112>	P_ME_NC_1																			
<113>	P_AC_NA_1																			
<120>	F_FR_NA_1																			
<121>	F_SR_NA_1																			
<122>	F_SC_NA_1																			
<123>	F_LS_NA_1																			
<124>	F_AF_NA_1																			
<125>	F_SG_NA_1																			
<126>	F_DR_TA_1*																			

* Blank or X only.

8.6 Basic Application Functions

Station initialization

(station-specific parameter, mark “X” if function is used)

[ ] Remote initialization

Cyclic data transmission

(station-specific parameter, mark “X” if function is only used in the standard direction, “R” if only used in the reverse direction, and”B” if used in both directions)

[X] Cyclic data transmission

Read procedure

(station-specific parameter, mark “X” if function is only used in the standard direction, “R” if only used in the reverse direction, and “B” if used in both directions)

[X] Read procedure

Spontaneous transmission

(station-specific parameter, mark “X” if function is only used in the standard direction, “R” if only used in the reverse direction, and “B” if used in both directions)

[X] Spontaneous

Double transmission of information objects with cause of transmission spontaneous

(station-specific parameter, mark each information type “X” where both a Type ID without time and corresponding Type ID with time are issued in response to a single spontaneous change of a monitored object)

The following type identifications may be transmitted in succession caused by a single status change of an information object. The particular information object addresses for which double transmission is enabled are defined in a project-specific list.

[X] Double-point information M_DP_NA_1, M_DP_TA_1 and M_DP_TB_1

[ ] Step position information M_ST_NA_1, M_ST_TA_1 and M_ST_TB_1

[ ] Bitstring of 32 bit M_BO_NA_1, M_BO_TA_1 and M_BO_TB_1 (if defined for a specific project, see 7.2.1.1)

[X] Measured value, normalized value M_ME_NA_1, M_ME_TA_1, M_ME_ND_1 and M_ME_TD_1

[X] Measured value, scaled value M_ME_NB_1, M_ME_TB_1 and M_ME_TE_1

[X] Measured value, short floating point number M_ME_NC_1, M_ME_TC_1 and M_ME_TF_1

Station interrogation

(station-specific parameter, mark “X” if function is only used in the standard direction, “R” if only used in the reverse direction, and “B” if used in both directions)

X	global				
X	group 1	X	group 7	X	group 13
X	group 2	X	group 8	X	group 14
X	group 3	X	group 9	X	group 15
X	group 4	X	group 10	X	group 16
X	group 5	X	group 11		
X	group 6	X	group 12		

Information object addresses assigned to each group must be show in a separate table

Clock synchronization

(station-specific parameter, mark “X” if function is only used in the standard direction, “R” if only used in the reverse direction, and “B” if used in both directions)

X	Clock synchronization
X	Day of week used
	RES1, GEN (time tag substituted/ not substituted) used
X	SU-bit (summertime) used

Command transmission

(object-specific parameter, mark with an “X” if function is used only in the standard direction, “R” if used only in the reverse direction, and “B” if used in both directions)

X	Direct command transmission	X	Select and execute command
	Direct set point command transmission		Select and execute set point command
		X	C_SE_ACTTERM used

X	No additional definition
X	Short pulse duration (duration determined by a system parameter in the outstation)
X	Long pulse duration (duration determined by a system parameter in the outstation)
X	Persistent output

Transmission of Integrated totals

(station-specific parameter, mark “X” if function is only used in the standard direction, “R” if only used in the reverse direction, and “B” if used in both directions)

- [ ] Mode A: Local freeze with spontaneous
- [ ] Mode B: Local freeze with counter
- [X] Mode C Freeze and transmit by counter interrogation
- [X] Mode C Freeze by counter-interrogation command, frozen values reported

- [X] Counter read
- [X] Counter freeze without reset
- [X] Counter reset

- [X] General request counter
- [X] Request counter group 1
- [X] Request counter group 2
- [X] Request counter group 3
- [X] Request counter group 4

Parameter loading

(station-specific parameter, mark “X” if function is only used in the standard direction, “R” if only used in the reverse direction, and “B” if used in both directions)

- [ ] Threshold value
- [ ] Smoothing factor
- [ ] Low limit for transmission of measured value
- [ ] High limit for transmission of measured value

Parameter activation

(station-specific parameter, mark “X” if function is only used in the standard direction, “R” if only used in the reverse direction, and “B” if used in both directions)

- [ ] Act/deact of persistent cyclic or periodic transmission of the addressed object

Test procedure

(station-specific parameter, mark “X” if function is only used in the standard direction, “R” if only used in the reverse direction, and “B” if used in both directions)

- [ ] Test procedure

File transfer

(station-specific parameter, mark “X” if function is used)

File transfer in monitor direction

- [ ] Transparent file
- [ ] Transmission of disturbance data of protection
- [ ] Transmission of sequences of events
- [ ] Transmission of sequences of recorded analog values

File transfer in control direction

- [ ] Transparent file

Background scan

(station-specific parameter, mark “X” if function is only used in the standard direction, “R” if only used in the reverse direction, and “B” if used in both directions)

- [ ] Background scan

Acquisition of transmission delay

(station-specific parameter, mark “X” if function is only used in the standard direction, “R” if only used in the reverse direction, and “B” if used in both directions)

- [X] Acquisition of transmission delay

Section 4 Glossary

AIM	Analog input module
ANSI	American National Standards Institute
AR	Autoreclosing
BIO	Binary input and output
CB	Circuit breaker
CBB	Cycle building block
CBFP	Circuit-breaker failure protection
CROB	Control relay output block
CTO	Common time of occurrence. The time and date CTO object is an information object that represents the absolute time of day.
CTRL	Control logical device
DFR	Digital fault recorder
DR	Disturbance recorder
EMC	Electromagnetic compatibility
HMI	Human-machine interface
IEC 61850	International standard for substation communication and modeling
LD0	Logical device zero (0)
LED	Light-emitting diode
LHMI	Local human-machine interface
LLN0	Logical node zero (0)
PCM600	Protection and Control protective relay Manager
PSM	Power supply module
SBO	Select-before-operate
stVal	Status value
Val	Value

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