7SR158

Voltage and Frequency Relay

IEC 61850 PIXIT, PICS, TICS

Document Release History

This document is issue 2016/09. The list of revisions up to and including this issue is:

2016/09	First issue

Software Revision History

2016/09	2436H80011R4e-2a (7SR158)	First IEC 61850 Release

Contents

1. PROTOCOL IMPLEMENTATION EXTRA INFORMATION FOR TESTING (PIXIT)

1.1 General

The EN100 is widely used within Siprotec 4 and has been chosen as the most cost effective option for adding IEC 61850 functionality to Reyrolle devices. This module offers the following major features:-

1. Peer to peer communications via GOOSE message
2. A standardized browsable interface for discovery of communication functional capability
3. Abstract Communications Service Interface models including
    - Association model
    - Server model
    - Data set model
    - Reporting model
    - Setting Group model
    - GOOSE publish model
    - GOOSE subscribe model
    - Control model
    - Time and time synchronisation model
    - File transfer model
    - General items

1.2 Association model

ID	ED	Description	Value / Clarification
As1	1	Maximum number of clients that can set-up an association simultaneously	6
As2	1, 2	TCP_KEEPALIVE value	1 second to 20 seconds
As3	1, 2	Lost connection detection time range	10 seconds
As4		Authentication is not supported	Not supported
As5	1, 2	What association parameters are necessary for successful association ?	Y Transport selector Y Session selector Y Presentation selector Y AP Title (ANY) Y AE Qualifier (ANY) Where Y means: as defined within the ICD-File ANY means: any value accepted
As6	1, 2	If association parameters are necessary for association, describe the correct values e.g.	Transport selector 0001 Session selector 0001 Presentation selector 00000001
As7	1, 2	What is the maximum and minimum MMS PDU size ?	Max MMS PDU size 32768 Min MMS PDU size 8192
As8	1, 2	What is the maximum startup time after a power supply interrupt ?	60 Seconds

1.3 Server model

ID	ED	Description	Value / Clarification
Sr1	1, 2	Which analogue value (MX) quality bits are supported (can be set by server) ?	Validity: Y Good, Y Invalid, N Reserved, Y Questionable Y Overflow Y OutofRange N BadReference N Oscillatory Y Failure Y OldData N Inconsistent Y Inaccurate Source: Y Process N Substituted Y Test N OperatorBlocked
Sr2	1, 2	Which status value (ST) quality bits are supported (can be set by server) ?	Validity: Y Good, Y Invalid, N Reserved, Y Questionable N BadReference Y Oscillatory Y Failure Y OldData N Inconsistent N Inaccurate Source: Y Process N Substituted Y Test N OperatorBlocked
Sr3		What is the maximum number of data values in one GetDataValues request ?	Not restricted; depends on the max. MMS PDU size given above.
Sr4		What is the maximum number of data values in one SetDataValues request ?	Not restricted; depends on the max. MMS PDU size given above.
Sr5		Which Mode / Behaviour values are supported?	Y On Y (On-)Blocked Y Test Y Test/Blocked Y Off

1.4 Data set model

ID	ED	Description	Value / Clarification
Ds1	1	What is the maximum number of data elements in one data set? (compare ICD setting)	Not limited by an internal configuration parameter. It depends on the available memory and MMS PDU size.
Ds2	1	How many persistent data sets can be created by one or more clients ?	64 data sets for each LD. It depends on the available memory.
Ds3	1	How many non-persistent data sets can be created by one or more clients ?	10 data sets. It depends on the available memory.

1.5 Setting group control model

ID	ED	Description	Value / Clarification
Sg1	1	What is the number of supported setting groups for each logical device?	Setting groups available for LLN0 only in LD PROT. The number of supported setting groups is 4. Specified in the ICD-File.
Sg2	1, 2	What is the effect of when and how the non-volatile storage is updated ? (compare IEC 61850-8-1 $16.2.4)	Not applicable
Sg3	1	Can multiple clients edit the same setting group?	Not applicable
Sg4	1	What happens if the association is lost while editing a setting group?	Not applicable
Sg5	1	Is EditSG value 0 allowed?	Not applicable
Sg6	2	When ResvTms is not present how long is an edit setting group locked?	Not applicable

1.6 Reporting model

ID	ED	Description	Value / Clarification
Rp1	1	The supported trigger conditions are (compare PICS)	Y Integrity Y Data change Y Quality change Y Data update Y General Interrogation
Rp2	1	The supported optional fields are	Y Sequence-number Y Report-time-stamp Y Reason-for-inclusion Y Data-set-name Y Data-reference Y Buffer-overflow - for Buffered report Y EntryID - for Buffered report Y Conf-rev Y Segmentation
Rp3	1, 2	Can the server send segmented reports ?	Y
Rp4	1, 2	Mechanism on second internal data change notification of the same analogue data value within buffer period (Compare IEC 61850-7-2 §14.2.2.9)	Send report immediatly for Buffered Report: Buffer the Entry Send report if the report is enabled
Rp5	1	Multi client URCB approach (Compare IEC 61850-7-2 §14.2.1)	All clients can access all URCB's
Rp6	-	What is the format of EntryID?	First 2 Byte : Integer Last 6 Bytes: BTime6 time stamp
Rp7	1, 2	What is the buffer size for each BRCB or how many reports can be buffered ?	About 1 MB are available for the buffering. Each BRCB has an extension attribute Memory that display the percentage of those 1 MB that have been reserved/forseen for its own entries. Default amount 1 MB/(2*Number of logical devices)
Rp8	-	Pre-configured RCB attributes that cannot be changed online when RptEna = FALSE (see also the ICD report settings)	For Buffered and Unbuffered: All pre-configured RCB attributes can be changed online when RptEna = FALSE
Rp9	1	May the reported data set contain: - structured data objects? - data attributes?	 Y Y
Rp10	1, 2	What is the scan cycle for binary events? Is this fixed, configurable	1 msecond Fixed
Rp11	1	Does the device support to pre-assign a RCB to a specific client in SCL	N
Rp12	2	After restart of the server is the value of ConfRev restored from the original configu-ration or retained prior to restart	Restore from original configuration
additional items:			
		Interrupt of general interrogation	Running GI could not be interrupted. If a new GI request occurs during a running GI, the current GI will be finished first before the second GI request will be processed.

ID	ED	Description	Value / Clarification
		Integrity period	Configurable ≥ 1 second;
		URCB reservation after an abort of the client/server association	Reservation of the URCB is lost. After a re-establishment of the association the URCB reservation has to be renewed by the client. This behavior is implemented to avoid unnecessary memory residuals if temporarily client associations (e.g. for maintenance) are established.
		Configured URCB reservation after an abort of the client/server association	Reservation of the URCB is lost.
		Optional use of a flow control for transmitting history of a BRCB	As specified in the IEC61850-7-2, transmission of entries may require some time, depending of the amount of entries that have to be transmitted. Therefore, the EN100 has an optional flow control feature to accelerate the transmission of the entries: each BRCB has an extended attribute MaxOutReports that can be set from the associated-client to change the transmmision strategy of the entries. Those attributes are located in VMD variables.The number ordered will then be transmitted as long as they exist in the buffer; the server then reset the attribute to 0 and wait for the client to set it again in order to continue the history transmission with MaxOutReports entries. The attribute only influences the flow control of entries while dealing with the history, and not after the history transmission has completed.

1.7 GOOSE publish model

ID	ED	Description	Value / Clarification
Gp1	1, 2	Can the test flag in the published GOOSE be turned on / off	N
Gp2	1	What is the behavior when the GOOSE publish configuration is incorrect	DUT will send GOOSE with NdsCom = TRUE as long as the minimum required configuration is available (dstAddress, dataSet)
Gp3	1, 2	Published FCD supported common data classes are	SPS, DPS, INS, ENS, ACT, ACD, BCR, MV, CMV, WYE, DEL, SEQ, SPC, DPC, INC, ENC, APC, BAC, BSC Arrays are not supported
Gp4	1, 2	What is the slow retransmission time? Is it fixed or configurable?	Configured by SCD file
Gp5	1, 2	What is the fast retransmission scheme? Is it fixed or configurable?	Configured by SCD file
Gp6	-	Can the GOOSE publish be turned on / off by using SetGoCBValues(GoEna)	Deprecated See PICS - SetGoCBValues
Gp7	1, 2	What is the initial GOOSE sqNum after restart	sqNum = 1
Gp8	1	May the GOOSE data set contain: - structured data objects (FCD)? - Timestamp data attributes?	 N Y
additional items:			
		Maximum number of GOOSE messages which could be sent	≤ 16 ; It depends on the available memory.

1.8 GOOSE subscribe model

ID	ED	Description	Value / Clarification
Gs1	1, 2	What elements of a subscribed GOOSE header are checked to decide the message is valid and the allData values are accepted? If yes, describe the conditions. Note: the VLAN tag may be removed by a ethernet switch and should not be checked	N source MAC address Y destinationon MAC address Y Ethertype = 0x88B8 Y[1] APPID Y[1] goCBRef Y timeAllowedtoLive Y[2] datSet Y[2] goID N t Y stNum Y[3] sqNum Y[4] test Y[2] confRev Y[2] ndsCom Y[1] numDatSetEntries 1) stVal is ignored, Data marked as invalid after 2x TAL. 2) stVal is ignored, Data marked as invalid immediately. 3) 1x missing message tolerated, else Data marked as invalid after 2x TAL. 4) stVal is ignored, but TAL Will not expire.
Gs2	1, 2	When is a subscribed GOOSE marked as lost ? (TAL = time allowed to live value from the last received GOOSE message)	When message does not arrive by 2 · TAL
Gs3	1, 2	What is the behavior when one or more subscribed GOOSE message isn't received or syntactically incorrect ? (missing GOOSE)	The telegram will be discarded (i.e not forwarded to the application) since it is corrupt or syntactically incorrect and therefore not readable. The data objects will be declared as invalid after a timeout detection since no telegram have been received by the application.
Gs4	1, 2	What is the behavior when a subscribed GOOSE message is out-of-order ?	When a given state number n, sequence number l is received, only the following telegrams will be accepted: n, l + 1 n, l + 2 n + 1, 0 n + 1, 1 1,0 All other telegramms are ignored
Gs5	1, 2	What is the behavior when a subscribed GOOSE message is duplicated ?	The repetition will be ignored
Gs6	1	Does the device subscribe to GOOSE messages with/without the VLAN tag?	Y with the VLAN tag Y without the VLAN tag
Gs7	1	May the GOOSE data set contain: - structured data objects? - timestamp data attributes?	 N Y
Gs8	1, 2	Subscribed FCD supported common data classes are	SPS, DPS, INS, ENS, ACT, ACD, BCR, MV, CMV, WYE, DEL, SEQ, SPC, DPC, INC, ENC, BSC, ISC, APC, BAC Arrays are not supported
additional items:			
		Maximum number of GOOSE messages which could be received	≤ 128 ; It depends on the available memory.

		Interpretation of GOOSE messages at subscriber side	1. Received GOOSE data objects without assigned quality attribute are interpreted as invalid. 2. Received GOOSE data objects which quality attribute are set to questionable are changed to invalid.
		GOOSE subscriber behavior in case of missing GOOSE messages	After a GOOSE multicast application association has been interrupted, the reception of a valid GOOSE tele- gram is required to validate the state of this GOOSE as- sociation again.
		What is the behavior when a GOOSE header parameter is mismatching with the expected one? (datSet, goID, confRev, numDatSetEntries, number of allData)	Error message will be stored into the error buffer (could be accessed by EN100 web-server). The received telegram with the mismatched attribute will be discarded: It has not been subscribed.
		What is the behavior when there is an out- of-order entry in the allData?	The confRev attribute in the header guarantees that the allData entries are in the correct order. Therefore, it's nec- essary to check the confRev attribute. There is no chance to detect a semantic out-of-order if the types are identical.
		What is the behavior when numDatSetEntries and number of allData are inconsistent?	The telegram is discarded since it is corrupt (not well formed). After the timeout detection (no telegram forward- ed to the application) the data objects are declared invalid.

1.9 Control model

ID	ED	Description	Value / Clarification
Ct1	-	What control models are supported? (compare PICS)	Y Status-only Y Direct-with-normal-security N Sbo-with-normal-security Y Direct-with-enhanced-security Y Sbo-with-enhanced-security
Ct2	1, 2	Is the control model fixed, configurable and/ or online changeable?	Fixed
Ct3	-	Is TimeActivatedOperate supported (compare PICS or SCL)	N
Ct4	-	Is “operate-many” supported (compare sboClass)?	N
Ct5	1	What is the behavior of the DUT when the test attribute is set in the SelectWithValue and/or Operate request	It will be discarded as “not-supported”
Ct6	-	What are the conditions for the time (T) attribute in the SelectWithValue and/or Operate request	Time attribute is not relevant.
Ct7	-	Is pulse configuration supported ?	N
Ct8	1	What is the behavior of the DUT when the check conditions are set Is this behavior fixed, configurable, online changeable?	N Synchrocheck N Interlock-check "The interlock check is always performed irrespective of the Interlock check bit"

ID	ED	Description	Value / Clarification
Ct9	1, 2	What additional cause diagnosis are supported	Y Blocked-by-switching-hierarchy Y Select-failed Y Invalid-position Y Position-reached Y Parameter-change-in-execution (in Ed1 only) Y Step-limit Y Blocked-by-Mode Y Blocked-by-process Y Blocked-by-interlocking Y Blocked-by-synchrocheck Y Command-already-in-execution N Blocked-by-health Y 1-of-n-control Y Abortion-by-cancel Y Time-limit-over N Abortion-by-trip Y Object-not-selected
Ct10	1, 2	How to force a “test-not-ok” respond with SelectWithValue request?	Wrong orCat
Ct11	1, 2	How to force a “test-not-ok” respond with Select request?	When the control object has already been selected
Ct12	1, 2	How to force a “test-not-ok” respond with Operate request?	DOns: Wrong orCat SBOns: na DOes: Wrong orCat SBOes: Wrong orCat
Ct13	1, 2	Which origin categories are supported?	Bay-control, station-control, remote-control, automatic-station, automatic-remote, maintenance, process
Ct14	1, 2	What happens if the orCat value is not supported?	DOns: Operate.Resp- SBOns: na DOes: Operate.Resp-, addCause = not-supported SBOes: SelectWithValue.Resp-, addCause = not-supported
Ct15	1, 2	Does the IED accept a SelectWithValue/Operate with the same ctlVal as the current status value?	DOns: Y SBOns: na DOes: N SBOes: N

ID	ED	Description	Value / Clarification
Ct16	1	Does the IED accept a Select/Operate on the same control object from 2 different clients at the same time?	DOns: Y SBOns: na DOes: N SBOes: N No, if the second request occured when the object is not in unselected state (SBOes), resp. Ready state (DOns, DOes), then it will lead to a negative response
Ct17	1	Does the IED accept a Select/SelectWithValue from the same client when the control object is already selected (tissue 334)	SBOns: na SBOes: N
Ct18	1, 2	Is for SBOes the internal validation performed during the SelectWithValue and/or Operate step?	SelectWithValue and Operate
Ct19	-	Can a control operation be blocked by Mod=Off or Blocked	N
Ct20	1, 2	Does the IED support local / remote operation?	Y
Ct21	1, 2	Does the IED send an InformationReport with LastApplError as part of the Operate response for control with normal security?	SBOns: na DOns: N
Ct22	2	How to force a “parameter-change-in-execution”	SBOns: na SBOes: parameter-change-in-execution is supported in Ed1 only
additional items:			
		Inconsistency between SelectWithValue and (Operate or Cancel)	Operate or Cancel will be acknowledged with negative response if inconsistencies to the SelectWithValue request are detected. The following attributes will not be checked in this case: T (Time) The controlled object returns then in state "unselected"
		Cancel request could be sent after an operate request.	Y
		Format of the control time stamp attribute ?	Time stamp instead of EntryTime acc. to the 7-2 Errata List.
		What is the behavior of the control state machines when the association is lost with the client that issued a successfull control?	For SBOes: If the current state is “Ready”, then the selection ends.

1.10 Time and time synchronisation model

ID	ED	Description	Value / Clarification
Tm1	1, 2	What quality bits are supported (may be set by the IED)?	N LeapSecondsKnown Y ClockFailure Y ClockNotSynchronized
Tm2	1, 2	Describe the behavior when the time synchronization signal/messages are lost	The quality attribute “ClockNotSychronized” will be set to TRUE after a configured time period
Tm3	1, 2	How long does it take to take over the new time from time server	Configurable Default: 10 min
Tm4	1, 2	When is the time quality bit "Clock failure" set?	Clock failure is set when the device internal clock drifts from the external synchonization
Tm5	1, 2	When is the time quality bit "Clock not synchronised” set?	The “ClockNotSynchronized” attribute is set to TRUE as long as no time synchronization is established.
Tm6	-	Is the timestamp of a binary event adjusted to the configured scan cycle?	Deprecated
Tm7	1	Does the device support time zone and daylight saving?	Y
Tm8	1,2	Which attibutes of the SNTP response packet are validated?	N Leap indicator not equal to 3? Y Mode is equal to SERVER Y OriginateTimestamp is equal to value sent by the SNTP client as Transmit Timestamp Y RX/TX timestamp fields are checked for reasonableness Y SNTP version 3 and/or 4 Y Other (describe): Stratum is not KISS OF DEATH Clock of SNTP Server is synchronized Response comes from the server to which the request was sent
Tm9	1, 2	Do the COMTRADE files have local time or UTC time and is this configurable	Local time Not configurable
additional items:			
		What is the behaviour when the time synchronisation messages indicate that the stratum is greater than 3?	A stratum with a value greater than 3 with the SNTP time synchronization messages indicates that the time server has a questionable synchronisation. It might also indicate that no GPS connection are available. Therefore the time quality attribute “ClockNotSynchronized” will be set to TRUE as long as the stratum content is greater than 3.

1.11 File transfer model

ID	ED	Description	Value / Clarification
Ft1	1	What is structure of files and directories? Where are the COMTRADE files stored? Are COMTRADE Files zipped and what files are included in each zip file?	Directory name / COMTRADE / *; Files according to the comtrade standard and not zipped.
Ft2	1, 2	Directory names are separated from the file name by	"/"
Ft3	1	The maximum file name size including path (default 64 chars)	64
Ft4	1, 2	Are directory/file name case sensitive	Case sensitive
Ft5	1, 2	Maximum file size for SetFile	SetFile is not supported
Ft6	1	Is the requested file path included in the file name of the MMS fileDirectory respond?	Y
Ft7	1	Is the wild char supported MMS fileDirectory request?	Y only as *; not as name completion wild card
Ft8	1, 2	Is it allowed that 2 clients get a file at the same time?	N
additional items:			
		Maximum number of clients that can use the File transfer service simultaneously	1
		Maximum number of files that can be access-ed simultaneously	1
		Maximum time the file transfer service is locked for one client	10 min

1.12 General items

Description	Value / Clarification
additional items:	
GOOSE Proxy object	To be able to subscribe Data over GOOSE, Proxy Objects are added into the object directory. Typically, they are Data of GGIO logical nodes: SPCSOxx, DPCSOxx. The Data Attributes of those Data are ctlVal, q and t. The control model associated to those Data is status-only. They are not controllable from an IEC61850 client, and their function is only to enable the GOOSE subscribing.
What is the behaviour of the Device by GetAllDataValues?	GetAllDataValues is not supported without functional constraint indication.

1.13 TICS - Technical Issues Implementation Conformance Statement

1.13.1 TISSUES Edition 1

Topic	TISSUE No.	Link	Description	Impact of Interoper.
Object Directory	433	http://tissue.iec61850.com/tissue.mspx?issueid=433	Order of attributes in specialized CDCs for control service mapping	-
	422	http://tissue.iec61850.com/tissue.mspx?issueid=422	Order of extension data objects and data attributes	-
	168	http://tissue.iec61850.com/tissue.mspx?issueid=168	Order of attributes in MMS components	-
	141	http://tissue.iec61850.com/tissue.mspx?issueid=141	Desc: object reference length extended to 129	x [1)]
Object Model	120	http://tissue.iec61850.com/tissue.mspx?issueid=120	Type - Mod.stVal and Mod.ctlVal	-
	146	http://tissue.iec61850.com/tissue.mspx?issueid=146	CtxInt	-
	173	http://tissue.iec61850.com/tissue.mspx?issueid=173	Ctl modelling harmonization	-
	234	http://tissue.iec61850.com/tissue.mspx?issueid=234	New type CtxInt	x
	75	http://tissue.iec61850.com/tissue.mspx?issueid=75	Desc: Str and Op Data Object in GAPC	-
Services	377	http://tissue.iec61850.com/tissue.mspx?issueid=377	DeleteDataSet response-	-
	276	http://tissue.iec61850.com/tissue.mspx?issueid=276	File Services Negative Responses	-
	183	http://tissue.iec61850.com/tissue.mspx?issueid=183	GetNameList error handling	x
	165	http://tissue.iec61850.com/tissue.mspx?issueid=165	Improper Error Response for GetDataSetValues	x
	116	http://tissue.iec61850.com/tissue.mspx?issueid=116	GetNameList with empty response?	x

Topic	TISSUE No.	Link	Description	Impact of Interoper.
Reporting	474	http://tissue.iec61850.com/tissue.mspx?issueid=474	GI for URCB	-
	453	http://tissue.iec61850.com/tissue.mspx?issueid=453	Reporting & Logging model revision	x
	438	http://tissue.iec61850.com/tissue.mspx?issueid=438	EntryTime base should be GMT	-
	349	http://tissue.iec61850.com/tissue.mspx?issueid=349	BRCB TimeOfEntry has two definitions	x
	348	http://tissue.iec61850.com/tissue.mspx?issueid=348	URCB class and report	x
	344	http://tissue.iec61850.com/tissue.mspx?issueid=344	TimeOfEntry misspelled	-
	335	http://tissue.iec61850.com/tissue.mspx?issueid=335	Clearing of Bufovfl	x
	332	http://tissue.iec61850.com/tissue.mspx?issueid=332	Ambiguity in use of trigger options	x
	329	http://tissue.iec61850.com/tissue.mspx?issueid=329	Reporting and BufOvl	x
	322	http://tissue.iec61850.com/tissue.mspx?issueid=322	Write Configuration attribute of BRCBs	
	301	http://tissue.iec61850.com/tissue.mspx?issueid=301	SqNum in Buffered Reports	-
	300	http://tissue.iec61850.com/tissue.mspx?issueid=300	Attribute Resv in BRCB	x
	298	http://tissue.iec61850.com/tissue.mspx?issueid=298	Type of SqNum	x
	297	http://tissue.iec61850.com/tissue.mspx?issueid=297	Sequence number	x
	278	http://tissue.iec61850.com/tissue.mspx?issueid=278	EntryId not valid for a server	x
	275	http://tissue.iec61850.com/tissue.mspx?issueid=275	Confusing statement on GI usage	x
	191	http://tissue.iec61850.com/tissue.mspx?issueid=191	BRCB: Integrity and buffering reports	x
	190	http://tissue.iec61850.com/tissue.mspx?issueid=190	BRCB: EntryId and TimeOfEntry	x
	177	http://tissue.iec61850.com/tissue.mspx?issueid=177	Ignoring OptFlds bits for URCB	-
	52	http://tissue.iec61850.com/tissue.mspx?issueid=52	Ambiguity GOOSE SqNum	x
	49	http://tissue.iec61850.com/tissue.mspx?issueid=49	BRCB TimeOfEntry?	x

Topic	TISSUE No.	Link	Description	Impact of Interoper.
Control Model	46	http://tissue.iec61850.com/tissue.mspx?issueid=46	Synchro check cancel	x
	44	http://tissue.iec61850.com/tissue.mspx?issueid=44	AddCause - Object not sel	x
	30	http://tissue.iec61850.com/tissue.mspx?issueid=30	control parameter T	x
	520	http://tissue.iec61850.com/tissue.mspx?issueid=520	Desc: control canceling at connection loss	-
Setting Group	593	http://tissue.iec61850.com/tissue.mspx?issueid=593	Desc: Setting Group Can-celing, eding	x
File Transfer	545	http://tissue.iec61850.com/tissue.mspx?issueid=545	Files Directories	x

1) No impact as long as the IED Name and the logical device inst have together a length smaller than 13 char.

1.13.1 TISSUES Edition 2

The following Edition 2 TISSUES have been implemented in the device and are active within the name space of IEC 61850-7-4:2007.

Topic	TISSUE No.	Link	Description	Impact of Interoper.
Object Model	671	http://tissue.iec61850.com/tisue.mspx?issueid=671	Mistake in definition of Mod & Beh	x
	686	http://tissue.iec61850.com/tisue.mspx?issueid=686	Desc: New annex H - enums types in XML	x
	722	http://tissue.iec61850.com/tisue.mspx?issueid=722	Desc: unit enumeration for min and h	x
	742	http://tissue.iec61850.com/tisue.mspx?issueid=742	Desc: GAPC.Str, Op, StrVal are not intanceable	x
	929	http://tissue.iec61850.com/tisue.mspx?issueid=929	AC_SCAV presence con-dition definition	x
Configu-ration	719	http://tissue.iec61850.com/tisue.mspx?issueid=719	ConfDataSet - maxAttributes definition is confusing	x
	823	http://tissue.iec61850.com/tisue.mspx?issueid=823	ValKind for structured data attributes	

2. IEC 61850 CONFORMANCE STATEMENTS

Contents

This chapter describes conformity with IEC 61850. It does not describe the entire standard but only parts in which there is a choice in the services.

2.1 Definitions of the ISO/OSI Reference Model

To achieve stable data exchange, all communication is based on the OSI Reference Model (OSI/IEC 7498-1) for a multi-layer communication function. Fig. 2-1 shows the seven layers defined there.

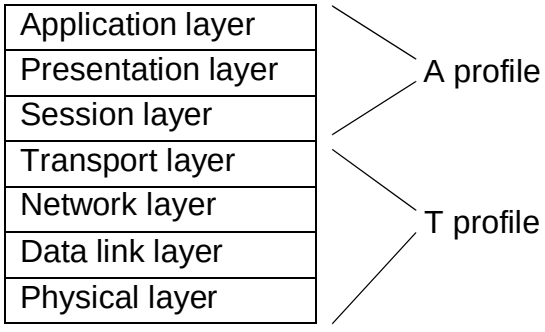

Fig. 2-1 OSI reference model and profiles

This section on using the ISO application (application profile) and transport profiles (T profile) describes the various stack profiles. An ISO application profile is a set of specifications and declarations regarding the top 3 layers of the ISO/OSI reference model (i.e. the application, presentation, and session layers). The T profile is a set of specifications and declarations regarding the lower 4 layers (i.e. transport, network, data link, and physical layers).

A and T profiles can be combined in various ways to form different types of services and information items that can be exchanged. The services specified in Part 7-2 of the IEC 61850 standard are mapped onto 4 different combinations of the profiles. These 4 combinations are used for

- Client/server services,
- GOOSE services,
- Time synchronization,
- Services for sampled measured values.

2.2 Definition of the Communication Services Acc. to Standard (PICS)

The tables in the sections below are specified according to IEC61850 Part 7-2 Annex A.

The descriptions below refer to implementation in the SIPROTEC 4, the SIPROTEC Compact and the Reyrolle IED device range.

The tables give the names stated in the standard.

2.2.1 Profile Compliance

Basic conformance statement

		Client/ Subscriber	Server/ Publisher	Value/Comments
Client-Server roles				
B11	**Server** side (of TWO-PARTY-APPLICATION-ASSOCIATION)	--	Y	
B12	**Client** side (of TWO-PARTY-APPLICATION-ASSOCIATION)	N	--	
SCMSs supported				
B21	**SCSM**: IEC 6185-8-1 used	Y	Y	
B22	**SCSM**: IEC 6185-9-1 used			
B23	**SCSM**: IEC 6185-9-2 used			
B24	**SCSM**: other			
Generic substation event model (GSE)				
B31	**Publisher** side	--	Y	
B32	**Subscriber** side	Y	--	
Transmission of sample value model (SVC)				
B41	**Publisher** side	--	N	
B42	**Subscriber** side	N	--	
Y = supported N or empty = not supported				

ACSI models conformance statement

		Client/ Subscriber	Server/ Publisher	Value/Comments
If **Server or Client** side (B11/12) supported				
M1	**Logical device**		Y	
M2	**Logical node**		Y	
M3	**Data**		Y	
M4	**Data set**		Y	
M5	**Substitution**		N	
M6	**Setting group control**		Y	
	Reporting			
M7	**Buffered report control**		Y	
M7-1	sequence-number		Y	
M7-2	report-time-stamp		Y	
M7-3	reason-for-inclusion		Y	
M7-4	data-set-name		Y	
M7-5	data-reference		Y	
M7-6	buffer-overflow		Y	
M7-7	entryID		Y	
M7-8	BufTim		Y	
M7-9	IntgPd		Y	
M7-10	GI		Y	
M7-11	conf-revision		Y	
M8	**Unbuffered report control**		Y	
M8-1	sequence-number		Y	
M8-2	report-time-stamp		Y	
M8-3	reason-for-inclusion		Y	
M8-4	data-set-name		Y	
M8-5	data-reference		Y	
M8-6	BufTim		Y	
M8-7	IntgPd		Y	
M8-8	GI		Y	
M8-9	conf-revision		Y	
	Logging		N	
M9	**Log control**		N	
M9-1	IntgPd		N	
M10	**Log**		N	
M11	**Control**		Y	

		Client/ Subscriber	Server/ Publisher	Value/Comments
If **GSE** (B31/32) is supported				
M12	**GOOSE**	Y	Y	
M13	**GSSE**	N	N	
If **SVC** (41/42) is supported				
M14	Multicast SVC	N	N	
M15	Unicast SVC	N	N	
If **Server or Client** side (B11/B12) supported				
M16	**Time**	Y	N	
M17	**File Transfer**	N	Y	
Y = supported N or empty = not supported				

ACSI service conformance statement

	Services	AA: TP/MC	Client (C)	Server (S)	
Server					
S1	GetServerDirectory	TP	N	Y	
Application association					
S2	Associate	TP	N	Y	
S3	Abort	TP	N	Y	
S4	Release	TP	N	Y	
Logical device					
S5	GetLogicalDeviceDirectory	TP	N	Y	
Logical Node					
S6	GetLogicalNodeDirectory	TP	N	Y	
S7	GetAllDataValues	TP	N	Y	
Data					
S8	GetDataValues	TP	N	Y	
S9	SetDataValues	TP	N	Y	
S10	GetDataDirectory	TP	N	Y	
S11	GetDataDefinition	TP	N	Y	
Data set					
S12	GetDataSetValues	TP	N	Y	
S13	SetDataSetValues	TP	N	N	
S14	CreateDataSet	TP	N	Y	
S15	DeleteDataSet	TP	N	Y	
S16	GetDataSetDirectory	TP	N	Y	
Substitution					
S17	SetDataValues	TP	N	N	
Setting group control					
S18	SelectActiveSG	TP	N	Y	
S19	SelectEditSG	TP	N	N	
S20	SetSGValues/ SetEditSGValue	TP	N	N	
S21	ConfirmEditSGValues	TP	N	N	
S22	GetSGValues/ GetEditSGValue	TP	N	N	
S23	GetSGCBValues	TP	N	Y	

	Services	AA: TP/MC	Client (C)	Server (S)	
Reporting					
Buffered report control block (BRCB)					
S24	Report	TP	N	Y	
S24-1	data-change (dchg)		N	Y	
S24-2	qchg-change (qchg)		N	Y	
S24-3	data-update (dupd)		N	Y	
S25	GetBRCBValues	TP	N	Y	
S26	SetBRCBValues	TP	N	Y	
Unbuffered report control block (URCB)					
S27	Report	TP	N	Y	
S27-1	data-change (dchg)		N	Y	
S27-2	qchg-change (qchg)		N	Y	
S27-3	data-update (dupd)		N	Y	
S28	GetURCBValues	TP	N	Y	
S29	SetURCBValues	TP	N	Y	
Logging					
Log control block					
S30	GetLCBValues	TP	N	N	
S31	SetLCBValues	TP	N	N	
Log					
S32	QueryLogByTime	TP	N	N	
S33	QueryLogAfter	TP	N	N	
S34	GetLogStatusValues	TP	N	N	
Generic substation event model (GSE)					
GOOSE-CONTROL-BLOCK					
S35	SendGOOSEMessage	MC	Y	Y	
S36	GetReference	TP	N	N	
S37	GetGOOSEElementNumber	TP	N	N	
S38	GetGoCBValues	TP	N	Y	
S39	SetGoCBValues	TP	N	Y	
GSSE-CONTROL-BLOCK					
S40	SendGSSEMessage	MC	N	N	
S41	GetReference	TP	N	N	
S42	GetGSSEElementNumber	TP	N	N	
S43	GetGsCBValues	TP	N	N	
S44	SetGsCBValues	TP	N	N	

	Services	AA: TP/MC	Client (C)	Server (S)	
Transmission of sample value model (SVC)					
Multicast SVC					
S45	SendMSVMessage	MC	N	N	
S46	GetMSVCBValues	TP	N	N	
S47	SetMSVCBValues	TP	N	N	
Unicast SVC					
S48	SendUSVMessage	TP	N	N	
S49	GetUSVCBValues	TP	N	N	
S50	SetUSVCBValues	TP	N	N	
Control					
S51	Select	TP	N	N	
S52	SelectWithValue	TP	N	Y	
S53	Cancel	TP	N	Y	
S54	Operate	TP	N	Y	
S55	Command-Termination	TP	N	Y	
S56	TimeActivated-Operate	TP	N	N	
File transfer					
S57	GetFile	TP	N	Y	
S58	SetFile	TP	N	N	
S59	DeleteFile	TP	N	N	
S60	GetFileAttributeValues	TP	N	Y	
Time					
T1	Time resolution of internal clock			10 (1 ms)	nearest negative power of 2 in seconds
T2	Time accuracy of internal clock				T0
				ClassT1	T1
					T2
					T3
					T4
					T5
T3	Supported TimeStamp resolution	-		10 (approx. 0.9 ms)	nearest negative power of 2 in seconds
Y = supported N or empty = not supported					

2.3 Model Implementation Conformance Statement (MICS)

Content of the statement

This statement contains the description of all objects that are provided by a device and is especially important if devices are connected to a central system that supplies data to certain applications via the objects provided by the device.

This document depends on the device type and is provided in separate MICS documents. It shows the assignment lists of the device to IEC 61850 and vice versa. The whole document is shown in a hyperlinked table of contents. The MICS is a readable form of the current mapping of a device on IEC 61850.

3. FUNCTION PARAMETERS 7SR158

The following is a combined list of functions for all 7SR158 devices, the actual functionality available is dependent on device variant.

Function	Element	LD	LN	DOI
		PROT	LLN0	
3.1 Phase U/O Voltage	27/59-1	PROT	A2759PTOV1	Mod, Beh, Health, NamPlt, Str, Op
	27/59-2	PROT	A2759PTOV2	Mod, Beh, Health, NamPlt, Str, Op
	27/59-3	PROT	A2759PTOV3	Mod, Beh, Health, NamPlt, Str, Op
	27/59-4	PROT	A2759PTOV4	Mod, Beh, Health, NamPlt, Str, Op
	27/59-1	PROT	A2759PTUV1	Mod, Beh, Health, NamPlt, Str, Op
	27/59-2	PROT	A2759PTUV2	Mod, Beh, Health, NamPlt, Str, Op
	27/59-3	PROT	A2759PTUV3	Mod, Beh, Health, NamPlt, Str, Op
	27/59-4	PROT	A2759PTUV4	Mod, Beh, Health, NamPlt, Str, Op
3.2 NPS Over Voltage	47-1	PROT	A47PTOV1	Mod, Beh, Health, NamPlt, Str, Op
	47-2	PROT	A47PTOV2	Mod, Beh, Health, NamPlt, Str, Op
3.3 Neutral Over Voltage	59NIT	PROT	A59nItPTOV1	Mod, Beh, Health, NamPlt, Str, Op
	59NDT	PROT	A59nDtPTOV1	Mod, Beh, Health, NamPlt, Str, Op

Function	Element	LD	LN	DOI
3.4 U/O Frequency	81-1	PROT	A81PTOF1	Mod, Beh, Health, NamPlt, Str, Op
	81-2	PROT	A81PTOF2	Mod, Beh, Health, NamPlt, Str, Op
	81-3	PROT	A81PTOF3	Mod, Beh, Health, NamPlt, Str, Op
	81-4	PROT	A81PTOF4	Mod, Beh, Health, NamPlt, Str, Op
	81-5	PROT	A81PTOF5	Mod, Beh, Health, NamPlt, Str, Op
	81-6	PROT	A81PTOF6	Mod, Beh, Health, NamPlt, Str, Op
	81-1	PROT	A81PTUF1	Mod, Beh, Health, NamPlt, Str, Op
	81-2	PROT	A81PTUF2	Mod, Beh, Health, NamPlt, Str, Op
	81-3	PROT	A81PTUF3	Mod, Beh, Health, NamPlt, Str, Op
	81-4	PROT	A81PTUF4	Mod, Beh, Health, NamPlt, Str, Op
	81-5	PROT	A81PTUF5	Mod, Beh, Health, NamPlt, Str, Op
	81-6	PROT	A81PTUF6	Mod, Beh, Health, NamPlt, Str, Op
3.5 Vector Shift	78-1	PROT	A78PPAM1	Mod, Beh, Health, NamPlt, Op
	78-2	PROT	A81PPAM2	Mod, Beh, Health, NamPlt, Op

Function	Element	LD	LN	DOI
3.6 ROCOF	81R-1	PROT	A81rPFRC1	Mod, Beh, Health, NamPlt, Str, Op
	81R-2	PROT	A81rPFRC2	Mod, Beh, Health, NamPlt, Str, Op
	81R-3	PROT	A81rPFRC3	Mod, Beh, Health, NamPlt, Str, Op
	81R-4	PROT	A81rPFRC4	Mod, Beh, Health, NamPlt, Str, Op
	81R-5	PROT	A81rPFRC5	Mod, Beh, Health, NamPlt, Str, Op
	81R-6	PROT	A81rPFRC6	Mod, Beh, Health, NamPlt, Str, Op
3.7 Voltage Measurements	Vab	MEAS	MMXU1	PPV
	Vbc	MEAS	MMXU1	PPV
	Vca	MEAS	MMXU1	PPV
	Va	MEAS	MMXU1	PhV
	Vb	MEAS	MMXU1	PhV
	Vc	MEAS	MMXU1	PhV
	Vn	MEAS	MMXU1	PhV
3.8 Frequency Measurement	Frequency	MEAS	MMXU1	Hz
3.9 Voltage Sequence Components Measurements	V0	MEAS	V_MSQI1	SeqV
	V1	MEAS	V_MSQI1	SeqV
	V2	MEAS	V_MSQI1	SeqV

Function	Element	LD	LN	DOI
3.10 Rate Of Change Of Frequency Measurement	ROCOF	MEAS	MMXN1	Hz
3.11 Demand Measurements				
	Min Vab	MEAS	MinMMXU1	PPV.phsAB
	Min Vbc	MEAS	MinMMXU1	PPV.phsBC
	Min Vca	MEAS	MinMMXU1	PPV.phsCA
	Min Frequency	MEAS	MinMMXU1	Hz
	Max Vab	MEAS	MaxMMXU1	PPV.phsAB
	Max Vbc	MEAS	MaxMMXU1	PPV.phsBC
	Max Vca	MEAS	MaxMMXU1	PPV.phsCA
	Max Frequency	MEAS	MaxMMXU1	Hz
	Mean Vab	MEAS	MeanMMXU1	PPV.phsAB
	Mean Vbc	MEAS	MeanMMXU1	PPV.phsBC
	Mean Vca	MEAS	MeanMMXU1	PPV.phsCA
	Mean Frequency	MEAS	MeanMMXU1	Hz
3.12 Circuit Breaker Counters	CB Delta Trip Count	CTRL	CntDelGGIO1	ISCSO1
	CB Delta Trip Count Target	CTRL	CntDelGGIO1	ISCSO2
	CB Delta Trip Count Target Reached	CTRL	CntDelGGIO1	SPCSO
3.13 Circuit Breaker	CB Control Close Blocked	CTRL	Q0XCBR1	BlkCls
	CB Control Open Blocked	CTRL	Q0XCBR1	BlkOpn
	CB Status Open	CTRL	Q0XCBR1	Pos
	CB Status Closed	CTRL	Q0XCBR1	Pos
	CB Operations Counter	CTRL	Q0XCBR1	OpCnt
	CB Wear PhA	CTRL	Q0XCBR1	SumSwARs1
	CB Wear PhB	CTRL	Q0XCBR1	SumSwARs2
	CB Wear PhC	CTRL	Q0XCBR1	SumSwARs3
	CB Control Close	CTRL	Q0CSWI1	Pos
	CB Control Open	CTRL	Q0CSWI1	Pos
	Local Mode	CTRL	Q0CSWI1	Loc
	Enable Control Open	CTRL	Q0CILO	EnOpn
	Enable Control Close	CTRL	Q0CILO	EnCls

Function	Element	LD	LN	DOI
3.14 User Single Point I/P Values	SPi64GGIO	CTRL	SPi64GGIO1	Mod, Beh, Health, NamPlt, SPCSO1 SPCSO2 SPCSO3 SPCSO4 SPCSO5 SPCSO6 SPCSO7 SPCSO8 SPCSO9 SPCSO10 SPCSO11 SPCSO12 SPCSO13 SPCSO14 SPCSO15 SPCSO16 SPCSO17 SPCSO18 SPCSO19 SPCSO20 SPCSO21 SPCSO22 SPCSO23 SPCSO24 SPCSO25 SPCSO26 SPCSO27 SPCSO28 SPCSO29 SPCSO30 SPCSO31 SPCSO32 SPCSO33 SPCSO34 SPCSO35 SPCSO36 SPCSO37 SPCSO38 SPCSO39 SPCSO40 SPCSO41 SPCSO42 SPCSO43 SPCSO44 SPCSO45 SPCSO46 SPCSO47 SPCSO48 SPCSO49 SPCSO50 SPCSO51 SPCSO52 SPCSO53 SPCSO54 SPCSO55 SPCSO56 SPCSO57 SPCSO58 SPCSO59 SPCSO60 SPCSO61 SPCSO62 SPCSO63

Function	Element	LD	LN	DOI
				SPCSO64
3.15 User Single Point O/P Values	SPo32GGIO	CTRL	SPo32GGIO1	Mod, Beh, Health, NamPlt, Ind1 Ind2 Ind3 Ind4 Ind5 Ind6 Ind7 Ind8 Ind9 Ind10 Ind11 Ind12 Ind13 Ind14 Ind15 Ind16 Ind17 Ind18 Ind19 Ind20 Ind21 Ind22 Ind23 Ind24 Ind25 Ind26 Ind27 Ind28 Ind29 Ind30 Ind31 Ind32
3.16 User Double Point I/P Values	DPi8GGIO1	CTRL	DPi8GGIO1	Mod, Beh, Health, NamPlt, DPCSO1 DPCSO2 DPCSO3 DPCSO4 DPCSO5 DPCSO6 DPCSO7 DPCSO8
	DPi8GGIO2	CTRL	DPi8GGIO2	Mod, Beh, Health, NamPlt, DPCSO1 DPCSO2 DPCSO3 DPCSO4 DPCSO5 DPCSO6 DPCSO7 DPCSO8

Function	Element	LD	LN	DOI
3.17 User Double Point O/P Values	DPo8GGIO1	CTRL	DPo8GGIO1	Mod, Beh, Health, NamPlt, DPCSO1 DPCSO2 DPCSO3 DPCSO4 DPCSO5 DPCSO6 DPCSO7 DPCSO8
	DPo8GGIO2	CTRL	DPo8GGIO2	Mod, Beh, Health, NamPlt, DPCSO1 DPCSO2 DPCSO3 DPCSO4 DPCSO5 DPCSO6 DPCSO7 DPCSO8
3.18 User Single Point Control Values	SPDOns 1	CTRL	SPDOnsGGIO1	Mod, Beh, Health, NamPlt, SPCSO
	SPDOns 2	CTRL	SPDOnsGGIO2	Mod, Beh, Health, NamPlt, SPCSO
	SPDOns 3	CTRL	SPDOnsGGIO3	Mod, Beh, Health, NamPlt, SPCSO
	SPDOns 4	CTRL	SPDOnsGGIO4	Mod, Beh, Health, NamPlt, SPCSO
	SPDOes 1	CTRL	SPDOesGGIO1	Mod, Beh, Health, NamPlt, SPCSO
	SPDOes 2	CTRL	SPDOesGGIO2	Mod, Beh, Health, NamPlt, SPCSO
	SPDOes 3	CTRL	SPDOesGGIO3	Mod, Beh, Health, NamPlt, SPCSO
	SPDOes 4	CTRL	SPDOesGGIO4	Mod, Beh, Health, NamPlt, SPCSO
3.19 User Double Point Control Values	DPDOns 1	CTRL	DPDOnsGGIO1	Mod, Beh, Health, NamPlt, DPCSO
	DPDOns 2	CTRL	DPDOnsGGIO2	Mod, Beh,

Function	Element	LD	LN	DOI
				Health, NamPlt, DPCSO
	DPDOns 3	CTRL	DPDOnsGGIO3	Mod, Beh, Health, NamPlt, DPCSO
	DPDOns 4	CTRL	DPDOnsGGIO4	Mod, Beh, Health, NamPlt, DPCSO
	DPDOes 1	CTRL	DPDOesGGIO1	Mod, Beh, Health, NamPlt, DPCSO
	DPDOes 2	CTRL	DPDOesGGIO2	Mod, Beh, Health, NamPlt, DPCSO
	DPDOes 3	CTRL	DPDOesGGIO3	Mod, Beh, Health, NamPlt, DPCSO
	DPDOes 4	CTRL	DPDOesGGIO4	Mod, Beh, Health, NamPlt, DPCSO
3.20 Binary I/P Status Values	BI6GGIO	CTRL	BI6GGIO1	Mod, Beh, Health, NamPlt, Ind1 Ind2 Ind3 Ind4 Ind5 Ind6
3.21 Binary O/P Status Values	BO8GGIO	CTRL	BO8GGIO1	Mod, Beh, Health, NamPlt, Ind1 Ind2 Ind3 Ind4 Ind5 Ind6 Ind7 Ind8
3.22 Quick Logic Equation Status Values	E4GGIO	CTRL	E4GGIO1	Mod, Beh, Health, NamPlt, Ind1 Ind2 Ind3 Ind4

Function	Element	LD	LN	DOI
3.23 LED Status Values	L9GGIO	CTRL	L9GGIO1	Mod, Beh, Health, NamPlt, Ind1 Ind2 Ind3 Ind4 Ind5 Ind6 Ind7 Ind8 Ind9
3.24 Virtuals Status Values	V8GGIO	CTRL	V8GGIO1	Mod, Beh, Health, NamPlt, Ind1 Ind2 Ind3 Ind4 Ind5 Ind6 Ind7 Ind8

4. MAPPING

This section shows the mapping of the information relevant to the device to the Logical Node of protocol IEC61850. It is structured according to function. General information about IEC61850 mapping can be found in Chapter 3.

4.1 Device (LPHD1)

LPHD1.Proxy

No	Information		
	Reset Device	0	1
PTOC*.Health.stVal		**1**	**0**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – DEVICE is not a PROXY
1 – DEVICE is a PROXY

LPHD1.Health

No	Information		
	Protection Healthy	0	1
PTOC*.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 – ALARM

4.2 Protection Trip Conditioning (PTRC1)

PTRC1.Mod

No	Information		
	Device Ready	0	1
PTRC1.Mod.stVal		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 – OFF

PTRC1.Health

No	Information		
	Device Ready	0	1
PTRC1.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 – ALARM

PTRC1.Str

No	Information		
	Trip picked up	0	1
PTRC1.Str.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 – TRUE

PTRC1.Op

No	Information		
	Overcurrent protection element operated	0	1
PTRC1.Op.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 – TRUE

PTRC1.Tr

No	Information		
	Trip operated	0	1
PTRC1.Tr.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

PTRC1.OpCntRs

No	Information	Value		
	Resettable operations counter	PTRC1.OpCntRs.stVal	Measured Value	Value

4.3 Control LLN0 (CTRL/LLN0)

LLN0.Mod

No	Information			
	Device ready	0	1	1
	Out Of Service Mode	x	1	0
LLN0.Mod.stVal		**5**	**3**	**1**

device annunciation:
1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value:
1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 – OFF

LLN0.Health

No	Information		
	Protection Healthy	0	1
LLN0.Health.stVal		**3**	**1**

device annunciation:
1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value:
1 – OK
2 – WARNING
3 – ALARM

LLN0.Loc

No	Information		
	Not Remote Mode	0	1
LLN0.Loc.stVal		**1**	**0**

device annunciation:
1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value:
0 – FALSE
1 - TRUE

LLN0.LEDRs

No	Information		
	Reset LEDs	1	-
LLN0.LEDRs.ctlVal		**1**	**0**

device annunciation:
1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value:
0 – FALSE
1 – TRUE

4.4 Protection LLN0 (PROT/LLN0)

LLN0.Mod

No	Information			
	Device ready	0	1	1
	Out Of Service Mode	x	1	0
LLN0.Mod.stVal		**5**	**3**	**1**

device annunciation:
1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value:
1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 – OFF

LLN0.Health

No	Information		
	Protection Healthy	0	1
LLN0.Health.stVal		**3**	**1**

device annunciation:
1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value:
1 – OK
2 – WARNING
3 – ALARM

LLN0.SGCB

No	Information	
	Active SettingGroup	Group 1-4
LLN0.SGCB.ActSG		**Value**

4.5 Phase Over Voltage Protection 27/59-1, 27/59-2, 27/59-3, 27/59-4 (A2759PTOV1, A2759PTOV2, A2759PTOV3, A2759PTOV4)

A2759PTOV*.Mod

No	Information				
	Phase U/O Voltage Enabled (Function Config)	x	0	x	1
	Element Disabled	1	0	0	0
	Element Inhibited	x	x	1	0
A2759PTOV*.Mod.stVal		**5**	**2**	**2**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 – OFF

A2759PTOV*.Health

No	Information		
	Protection Healthy	0	1
A2759PTOV*.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 – ALARM

A2759PTOV*.Str

No	Information		
	Element Phase A picked up or Element Phase B picked up or Element Phase C picked up	0	1
A2759PTOV*.Str.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

No	Information		
	Element Phase A picked up	0	1
A2759PTOV*.Str.phsA		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

No	Information		
	Element Phase B picked up	0	1
A2759PTOV*.Str.phsB		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

No	Information		
	Element Phase C picked up	0	1
A2759PTOV*.Str.phsC		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
IEC61850 Value: 0 – FALSE
1 - TRUE

A2759PTOV*.Op

No	Information		
	Element Operated	0	1
A2759PTOV*.Op.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
IEC61850 Value: 0 – FALSE
1 – TRUE

4.6 Phase Under Voltage Protection 27/59-1, 27/59-2, 27/59-3 & 27/59-4 (A2759PTUV1, A2759PTUV2, A2759PTUV3, A2759PTUV4)

A2759PTUV*.Mod

No	Information				
	Phase U/O Voltage Enabled (Function Config)	x	0	x	1
	Element Disabled	1	0	0	0
	Element Inhibited	x	x	1	0
A2759PTUV*.Mod.stVal		**5**	**2**	**2**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 – OFF

A2759PTUV*.Health

No	Information		
	Protection Healthy	0	1
A2759PTUV*.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 – ALARM

A2759PTUV*.Str

No	Information		
	Element Phase A picked up or Element Phase B picked up or Element Phase C picked up	0	1
A2759PTUV*.Str.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

No	Information		
	Element Phase A picked up	0	1
A2759PTUV*.Str.phsA		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

No	Information		
	Element Phase B picked up	0	1
A2759PTUV*.Str.phsB		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

No	Information		
	Element Phase C picked up	0	1
A2759PTUV*.Str.phsC		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 – TRUE

A2759PTUV*.Op

No	Information		
	Element Operated	0	1
A2759PTUV*.Op.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

4.7 Negative Sequence Voltage 47-1 & 47-2 (A47PTOV1, A47PTOV2)

A47PTOV*.Mod

No	Information				
	NPS Over Voltage Enabled (Function Config)	x	0	x	1
	Element Disabled	1	0	0	0
	Element Inhibited	x	x	1	0
A47PTOV*.Mod.stVal		**5**	**2**	**2**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

A47PTOV*.Health

No	Information		
	Protection Healthy	0	1
A47PTOV*.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

A47PTOV*.Str

No	Information		
	Element Picked up	0	1
A37SefPTOV*.Str.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

A47PTOV*.Op

No	Information		
	Element Operated	0	1
A37SefPTOV*.Op.general		**0**	**1**

device annunciation: 1 – ON/TRUE 0 – OFF/FALSE IEC61850 Value: 0 – FALSE 1 - TRUE

4.8 Neutral Overvoltage 59NIT & 59NDT (A59nItPTOV1, A59nDtPTOV1)

A59nItPTOV*.Mod

No	Information				
	Neutral Overvoltage Enabled (Function Config)	x	0	x	1
	Element Disabled	1	0	0	0
	Element Inhibited	x	x	1	0
A59nItPTOV*.Mod.stVal		**5**	**2**	**2**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

A59nItPTOV*.Health

No	Information		
	Protection Healthy	0	1
A59nItPTOV*.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

A59nItPTOV*.Str

No	Information		
	Element Picked up	0	1
A59nItPTOV*.Str.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

A59nItPTOV*.Op

No	Information		
	Element Operated	0	1
A59nItPTOV*.Op.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

A59nDtPTOV*.Mod

No	Information				
	Neutral Overvoltage Enabled (Function Config)	x	0	x	1
	Element Disabled	1	0	0	0
	Element Inhibited	x	x	1	0
A59nDtPTOV*.Mod.stVal		**5**	**2**	**2**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

A59nDtPTOV*.Health

No	Information		
	Protection Healthy	0	1
A59nDtPTOV*.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

A59nDtPTOV*.Str

No	Information		
	Element Picked up	0	1
A59nDtPTOV*.Str.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

A59nDtPTOV*.Op

No	Information		
	Element Operated	0	1
A59nDtPTOV*.Op.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

4.9 Under Frequency 81-1, 81-2, 81-3, 81-4, 81-5 & 81-6 (A81PTUF1, A81PTUF2, A81PTUF3, A81PTUF4, A81PTUF5 & A81PTUF6)

A81PTUF*.Mod

No	Information				
	U/O Frequency Enabled (Function Config)	x	0	x	1
	Element Disabled	1	0	0	0
	Element Inhibited	x	x	1	0
A81PTUF*.Mod.stVal		**5**	**2**	**2**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

A81PTUF*.Health

No	Information		
	Protection Healthy	0	1
A81PTUF*.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

A81PTUF*.Str

No	Information		
	Element Picked up	0	1
A81PTUF*.Str.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

A81PTUF*.Op

No	Information		
	Element Operated	0	1
A81PTUF*.Op.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

4.10 Over Frequency 81-1, 81-2, 81-3, 81-4, 81-5 & 81-6 (A81PTOF1, A81PTOF2, A81PTOF3, A81PTOF4, A81PTOF5 & A81PTOF6)

A81PTOF*.Mod

No	Information				
	U/O Frequency Enabled (Function Config)	x	0	x	1
	Element Disabled	1	0	0	0
	Element Inhibited	x	x	1	0
A81PTOF*.Mod.stVal		**5**	**2**	**2**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

A81PTOF*.Health

No	Information		
	Protection Healthy	0	1
A81PTOF*.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

A81PTOF*.Str

No	Information		
	Element Picked up	0	1
A81PTOF*.Str.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

A81PTOF*.Op

No	Information		
	Element Operated	0	1
A81PTOF*.Op.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

4.11 ROCOF 81R-1, 81R-2, 81R-3, 81R-4, 81R-5 & 81R-6 (A81rPFRC1, A81rPFRC2, A81rPFRC3, A81rPFRC4, A81rPFRC5 & A81rPFRC6)

A81rPFRC*.Mod

No	Information				
	Rocof Enabled (Function Config)	x	0	x	1
	Element Disabled	1	0	0	0
	Element Inhibited	x	x	1	0
A81rPFRC*.Mod.stVal		**5**	**5**	**2**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

A81rPFRC *.Health

No	Information		
	Protection Healthy	0	1
A81rPFRC*.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

A81rPFRC *.Str

No	Information		
	Element Picked up	0	1
A81rPFRC*.Str.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

A81rPFRC *.Op

No	Information		
	Element Operated	0	1
A81rPFRC*.Op.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

4.12 Vector Shift 78-1, 78-2 (A78PPAM1, A78PPAM2)

A78PPAM*.Mod

No	Information				
	Vector Shift Enabled (Function Config)	x	0	x	1
	Element Disabled	1	0	0	0
	Element Inhibited	x	x	1	0
A78PPAM*.Mod.stVal		**5**	**5**	**2**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

A78PPAM *.Health

No	Information		
	Protection Healthy	0	1
A78PPAM*.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

A78PPAM *.Op

No	Information		
	Element Operated	0	1
A78PPAM*.Op.general		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

4.13 Measurement (MMXU1)

MMXU1.Mod

No	Information	
	Reset Device	x
MMXU1.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x - irrelevant

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

MMXU.Health

No	Information		
	Protection Healthy	0	1
MMXU1.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

MMXU1.Hz

No	Information	Value		
	Frequency (Freq =)	MMXU1.Hz.mag.f	Measured Value	Value
		MMXU1.Hz.units.SIunit	33	Hz
		MMXU1.Hz.units.multiplier	0	1

MMXU1.PPV

No	Information	Value		
	Va-b (Vab =)	MMXU1.PPV.phsAB.cVal.mag.f	Measured Value	Value
		MMXU1.PPV.phsAB.units.SIunit	29	V
		MMXU1.PPV.phsAB.units.multiplier	0	1

No	Information	Value		
	Vb-c (Vbc =)	MMXU1.PPV.phsBC.cVal.mag.f	Measured Value	Value
		MMXU1.PPV.phsBC.units.SIunit	29	V
		MMXU1.PPV.phsBC.units.multiplier	0	1

No	Information	Value		
	Vc-a (Vca =)	MMXU1.PPV.phsCA.cVal.mag.f	Measured Value	Value
		MMXU1.PPV.phsCA.units.SIunit	29	V
		MMXU1.PPV.phsCA.units.multiplier	0	1

MMXU1.PhV

No	Information	Value		
	Va (Va =)	MMXU1.PhV.phsA.cVal.mag.f	Measured Value	Value
		MMXU1.PhV.phsA.cVal.ang.f	Measured Value	Value
		MMXU1.PhV.phsA.units.SIunit	29	V
		MMXU1.PhV.phsA.units.multiplier	0	1

No	Information	Value		
	Vb (Vb =)	MMXU1.PhV.phsB.cVal.mag.f	Measured Value	Value
		MMXU1.PhV.phsB.cVal.ang.f	Measured Value	Value
		MMXU1.PhV.phsB.units.SIunit	29	V
		MMXU1.PhV.phsB.units.multiplier	0	1

No	Information	Value		
	Vc (Vc =)	MMXU1.PhV.phsC.cVal.mag.f	Measured Value	Value
		MMXU1.PhV.phsC.cVal.ang.f	Measured Value	Value
		MMXU1.PhV.phsC.units.SIunit	29	V
		MMXU1.PhV.phsC.units.multiplier	0	1

No	Information	Value		
	Vneut (Vneut =)	MMXU1.PhV.neut.cVal.mag.f	Measured Value	Value
		MMXU1.PhV.neut.cVal.ang.f	Measured Value	Value
		MMXU1.PhV.neut.units.SIunit	29	V
		MMXU1.PhV.neut.units.multiplier	0	1

No	Information	Value		
	Vres (Vres =)	MMXU1.PhV.res.cVal.mag.f	Measured Value	Value
		MMXU1.PhV.res.cVal.ang.f	Measured Value	Value
		MMXU1.PhV.res.units.SIunit	29	V
		MMXU1.PhV.res.units.multiplier	0	1

4.14 Demand Measurement (MeanMMXU1, MaxMMXU1, MinMMXU1)

MeanMMXU1.Mod

No	Information	
	Reset Device	x
MeanMMXU1.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE IEC61850 Value: 1 – OK
0 – OFF/FALSE 2 – WARNING
x - irrelevant 3 - ALARM

MeanMMXU1.Health

No	Information		
	Protection Healthy	0	1
MeanMMXU1.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE IEC61850 Value: 1 – OK
0 – OFF/FALSE 2 – WARNING
3 - ALARM

MeanMMXU1.PPV

No	Information	Value		
	Va-b (Vab =)	MeanMMXU1.PPV.phsAB.cVal.mag.f	Measured Value	Value
		MeanMMXU1.PPV.phsAB.units.SIunit	29	V
		MeanMMXU1.PPV.phsAB.units.multiplier	0	1

No	Information	Value		
	Vb-c (Vbc =)	MeanMMXU1.PPV.phsBC.cVal.mag.f	Measured Value	Value
		MeanMMXU1.PPV.phsBC.units.SIunit	29	V
		MeanMMXU1.PPV.phsBC.units.multiplier	0	1

No	Information	Value		
	Vc-a (Vca =)	MeanMMXU1.PPV.phsCA.cVal.mag.f	Measured Value	Value
		MeanMMXU1.PPV.phsCA.units.SIunit	29	V
		MeanMMXU1.PPV.phsCA.units.multiplier	0	1

MeanMMXU1.Hz

No	Information	Value		
	Frequency	MeanMMXU1.Hz.mag.f	Measured Value	Value

MaxMMXU1.Mod

No	Information	
	Reset Device	x
MaxMMXU1.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE IEC61850 Value: 1 – OK
0 – OFF/FALSE 2 – WARNING
x - irrelevant 3 - ALARM

MaxMMXU1.Health

No	Information		
	Protection Healthy	0	1
MaxMMXU1.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE IEC61850 Value: 1 – OK
0 – OFF/FALSE 2 – WARNING
3 - ALARM

MaxMMXU1.PPV

No	Information	Value		
	Va-b (Vab =)	MaxMMXU1.PPV.phsAB.cVal.mag.f	Measured Value	Value
		MaxMMXU1.PPV.phsAB.units.SIunit	29	V
		MaxMMXU1.PPV.phsAB.units.multiplier	0	1

No	Information	Value		
	Vb-c (Vbc =)	MaxMMXU1.PPV.phsBC.cVal.mag.f	Measured Value	Value
		MaxMMXU1.PPV.phsBC.units.SIunit	29	V
		MaxMMXU1.PPV.phsBC.units.multiplier	0	1

No	Information	Value		
	Vc-a (Vca =)	MaxMMXU1.PPV.phsCA.cVal.mag.f	Measured Value	Value
		MaxMMXU1.PPV.phsCA.units.SIunit	29	V
		MaxMMXU1.PPV.phsCA.units.multiplier	0	1

MaxMMXU1.Hz

No	Information	Value		
	Frequency	MaxMMXU1.Hz.mag.f	Measured Value	Value

MinMMXU1.Mod

No	Information	
	Reset Device	x
MinMMXU1.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE IEC61850 Value: 1 – OK
0 – OFF/FALSE 2 – WARNING
x - irrelevant 3 - ALARM

MinMMXU1.Health

No	Information		
	Protection Healthy	0	1
MinMMXU1.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE IEC61850 Value: 1 – OK
0 – OFF/FALSE 2 – WARNING
3 - ALARM

MinMMXU1.PPV

No	Information	Value		
	Va-b (Vab =)	MinMMXU1.PPV.phsAB.cVal.mag.f	Measured Value	Value

		MinMMXU1.PPV.phsAB.units.SIunit	29	V
		MinMMXU1.PPV.phsAB.units.multiplier	0	1

No	Information	Value		
	Vb-c (Vbc =)	MinMMXU1.PPV.phsBC.cVal.mag.f	Measured Value	Value
		MinMMXU1.PPV.phsBC.units.SIunit	29	V
		MinMMXU1.PPV.phsBC.units.multiplier	0	1

No	Information	Value		
	Vc-a (Vca =)	MinMMXU1.PPV.phsCA.cVal.mag.f	Measured Value	Value
		MinMMXU1.PPV.phsCA.units.SIunit	29	V
		MinMMXU1.PPV.phsCA.units.multiplier	0	1

MinMMXU1.Hz

No	Information	Value		
	Frequency	MinMMXU1.Hz.mag.f	Measured Value	Value

4.15 ROCOF Measurement (MMXN1)

MMXN1.Mod

No	Information	
	Reset Device	x
MMXN1.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x - irrelevant

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

MMXN.Health

No	Information		
	Protection Healthy	0	1
MMXN.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

MMXU1.Hz

No	Information	Value		
	ROCOF	MMXN1.Hz.mag.f	Measured Value	Value
		MMXN1.Hz.units.SIunit	33	Hz
		MMXN1.Hz.units.multiplier	0	1

4.16 Interlocking (Q0CILO)

Q0CILO1

Q0CILO1.Mod

No	Information	
	Reset Device	x
Q0CILO1.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x - irrelevant

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

Q0CILO1.Health

No	Information		
	Protection Healthy	0	1
Q0CILO1.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 – ALARM

Q0CILO1.EnaCls

No	Information		
	NOT CB Control Close Block	0	1
Q0CILO1.EnaCls.stVal		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 - TRUE

Q0CILO1.EnaOpn

No	Information		
	NOT CB Control Close Open	0	1
Q0CILO1.EnaOpn.stVal		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – FALSE
1 – TRUE

4.17 Switch controller (Q0CSWI)

Q0CSWI1

Q0CSWI1.Mod

No	Information	
	Reset Device	x
Q0CSWI1.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x - irrelevant

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

Q0CSWI1.Health

No	Information		
	Protection Healthy	0	1
Q0CSWI1.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 – ALARM

Q0CSWI1.Pos

No	Information				
	CB Open	0	1	0	1
	CB Close	0	0	1	1
Q0CSWI1.Pos.stVal		**00**	**01**	**10**	**11**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 00 – INTERMEDIATE STATE
01 – OFF
10 – ON
11 – INVALID STATE

4.18 Circuit Breaker (Q0XCBR1)

Q0XCBR1.Mod

No	Information	
	Reset Device	x
Q0XCBR1.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE IEC61850 Value: 1 – OK
0 – OFF/FALSE 2 – WARNING
x - irrelevant 3 - ALARM

Q0XCBR1.Health

No	Information		
	Protection Healthy	0	1
Q0XCBR1.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE IEC61850 Value: 1 – OK
0 – OFF/FALSE 2 – WARNING
3 – ALARM

Q0XCBR1.BlkCls

No	Information		
	CB Control Close Block	0	1
Q0XCBR1.BlkCls.stVal		**0**	**1**

device annunciation: 1 – ON/TRUE IEC61850 Value: 0 – FALSE
0 – OFF/FALSE 1 - TRUE

Q0XCBR1.BlkOpn

No	Information		
	CB Control Open Block	0	1
Q0XCBR1.BlkOpn.stVal		**0**	**1**

device annunciation: 1 – ON/TRUE IEC61850 Value: 0 – FALSE
0 – OFF/FALSE 1 - TRUE

Q0XCBR1.BlkOpCnt

No	Information	Measurand	Value
	CB Operations Counter	Q0XCBR1.OpCnt.stVal	0-10000

Q0XCBR1.Pos

No	Information				
	CB Status Open	0	1	0	1
	CB Status Closed	0	0	1	1
Q0XCBR1.Pos.stVal		**00**	**01**	**10**	**11**

device annunciation: 1 – ON/TRUE IEC61850 Value: 00 – INTERMEDIATE STATE
0 – OFF/FALSE 01 – OFF
10 – ON
11 – INVALID STATE

Q0XCBR1.SumSwARs1

No	Information	Measurand	Value
	CB Wear PhA	Q0XCBR1. SumSwARs1.stVal	0-10000

Q0XCBR1.SumSwARs2

No	Information	Measurand	Value
	CB Wear PhB	Q0XCBR1. SumSwARs2.stVal	0-10000

Q0XCBR1.SumSwARs3

No	Information	Measurand	Value
	CB Wear PhC	Q0XCBR1. SumSwARs3.stVal	0-10000

4.19 Circuit Breaker Counters (CntDelGGIO1)

CntDelGGIO1.Mod

No	Information	
	Reset Device	x
CntDelGGIO1.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE IEC61850 Value: 1 – OK
0 – OFF/FALSE 2 – WARNING
x - irrelevant 3 - ALARM

CntDelGGIO1.Health

No	Information		
	Protection Healthy	0	1
CntDelGGIO1.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE IEC61850 Value: 1 – OK
0 – OFF/FALSE 2 – WARNING
3 – ALARM

CntDelGGIO1.ISCSO1

No	Information	Measurand	Value
	CB Delta Trip Count	CntDelGGIO1.ISCSO1.stVal	0-10000

No	Information	
	CB Delta Trip Count	Value (0-10000)
CntDelGGIO1.ISCSO1.Oper.ctlVal		**Value (0–10000)**

CntDelGGIO1.ISCSO2

No	Information	Measurand	Value
	CB Delta Trip Count Target	CntDelGGIO1.ISCSO2.stVal	0-10000

No	Information	
	CB Delta Trip Count Target	Value (0-10000)
CntDelGGIO1.ISCSO2.Oper.ctlVal		**Value (0–10000)**

CntDelGGIO1.SPCSO

No	Information		
	CB Delta Trip Count Target Reached	0	1
CntDelGGIO1.SPCSO		**0**	**1**

device annunciation: 1 – ON/TRUE IEC61850 Value: 0 – FALSE
0 – OFF/FALSE 1 - TRUE

4.20 User Single Point GGIO Inputs (SPi64GGIO1)

SPi64GGIO1.Mod

No	Information	
	Reset Device	x
SPi64GGIO1.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

SPi64GGIO1.Health

No	Information		
	Protection Healthy	0	1
SPi64GGIO64.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

SPi64GGIO1.SPCSO*

No	Information		
	SPi64GGIO1 SPCSO*	0	1
SPi64GGIO64.SPCSO*.ctlVal		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
** Values of 1 to 64*

IEC61850 Value: 0 – OFF
1 - ON

4.21 User Single Point GGIO Outputs (SPo32GGIO1)

SPo32GGIO1.Mod

No	Information	
	Reset Device	x
SPo32GGIO1.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

SPo32GGIO32.Health

No	Information		
	Protection Healthy	0	1
SPo32GGIO1.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

SPo32GGIO1.Ind*

No	Information		
	SPo32GGIO1 Ind*	0	1
SPo32GGIO1.Ind*.stVal		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
** Values of 1 to 32*

IEC61850 Value: 0 – OFF
1 - ON

4.22 User Single Point GGIO Control Elements (Normal Security) (SPDOnsGGIO1, SPDOnsGGIO2, SPDOnsGGIO3, SPDOnsGGIO4)

SPDOnsGGIO*.Mod

No	Information	
	Reset Device	x
SPDOnsGGIO*.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

SPDOnsGGIO*.Health

No	Information		
	Protection Healthy	0	1
SPDOnsGGIO*.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

SPDOnsGGIO*.SPCSO

No	Information		
	SPDOns (OFF/OPEN)	1	-
	SPDOns (ON/CLOSE)	-	1
SPDOnsGGIO*.SPCSO.ctlVal		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – OFF
1 - ON

No	Information		
	SPDOns Status (ON/CLOSED)	0	1
SPDOnsGGIO*.SPCSO.stVal		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
** Values of 1 to 4*

IEC61850 Value: 0 – OFF
1 - ON

4.23 User Single Point GGIO Control Elements (Enhanced Security) (SPDOesGGIO1, SPDOesGGIO2, SPDOesGGIO3, SPDOesGGIO4)

SPDOesGGIO*.Mod

No	Information	
	Reset Device	x
SPDOesGGIO*.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

SPDOesGGIO*.Health

No	Information		
	Protection Healthy	0	1
SPDOesGGIO*.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

SPDOesGGIO*.SPCSO

No	Information		
	SPDOes (OFF/OPEN)	1	-
	SPDOes (ON/CLOSE)	-	1
SPDOesGGIO*.SPCSO.ctlVal		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – OFF
1 - ON

No	Information		
	SPDOes Status (ON/CLOSED)	0	1
SPDOesGGIO*.SPCSO.stVal		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
** Values of 1 to 4*

IEC61850 Value: 0 – OFF
1 - ON

4.24 User Double Point GGIO Control Elements (Normal Security) (DPDOnsGGIO1, DPDOnsGGIO2, DPDOnsGGIO3, DPDOnsGGIO4)

DPDOnsGGIO*.Mod

No	Information	
	Reset Device	x
DPDOnsGGIO*.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

DPDOnsGGIO*.Health

No	Information		
	Protection Healthy	0	1
DPDOnsGGIO*.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

DPDOnsGGIO*.DPCSO

No	Information		
	DPDOns (OFF/OPEN)	1	-
	DPDOns (ON/CLOSE)	-	1
DPDOnsGGIO*.DPCSO.ctlVal		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – OFF
1 - ON

No	Information				
	DPDOns Status (OFF/OPEN)	0	1	0	1
	DPDOns Status (ON/CLOSED)	0	0	1	1
DPDOnsGGIO*.DPCSO.stVal		**00**	**01**	**10**	**11**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 00 - INTERMEDIATE STATE
01 – OFF
10 – ON
11 - INVALID STATE (DBI)

** Values of 1 to 4*

4.25 User Double Point GGIO Control Elements (Enhanced Security) (DPDOesGGIO1, DPDOesGGIO2, DPDOesGGIO3, DPDOesGGIO4)

DPDOesGGIO*.Mod

No	Information	
	Reset Device	x
DPDOesGGIO*.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

DPDOesGGIO*.Health

No	Information		
	Protection Healthy	0	1
DPDOesGGIO*.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

DPDOesGGIO*.DPCSO

No	Information		
	DPDOes (OFF/OPEN)	1	-
	DPDOes (ON/CLOSE)	-	1
DPDOesGGIO*.DPCSO.ctlVal		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 0 – OFF
1 - ON

No	Information				
	DPDOes Status (OFF/OPEN)	0	1	0	1
	DPDOes Status (ON/CLOSED)	0	0	1	1
DPDOesGGIO*.DPCSO.stVal		**00**	**01**	**10**	**11**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 00 - INTERMEDIATE STATE
01 – OFF
10 – ON
11 - INVALID STATE (DBI)

** Values of 1 to 4*

4.26 User Double Point GGIO Input (DPi8GGIO1, DPi8GGIO2)

DPi8GGIO1.Mod

No	Information	
	Reset Device	x
DPi8GGIO*.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

DPi8GGIO1.Health

No	Information		
	Protection Healthy	0	1
DPi8GGIO*.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

DPi8GGIO1.DPCSO

	Information		
	DPI8GGIO1 DPCSO* (OFF/OPEN)	1	-
	DPI8GGIO1 DPCSO* (ON/CLOSE)	-	1
DPi8GGIO*.DPCSO.ctlVal		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
** Values of 1 to 8*

IEC61850 Value: 0 – OFF
1 - ON

4.27 User Double Point GGIO Output (DPo8GGIO1, DPo8GGIO2)

DPo8GGIO1.Mod

No	Information	
	Reset Device	x
GGIO*.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

DPoGGIO1.Health

No	Information		
	Protection Healthy	0	1
GGIO*.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

DPoGGIO1.DPCSO

No	Information				
	DPo8GGIO1 DPCSO* (OFF/OPEN)	0	1	0	1
	DPo8GGIO1 DPCSO* (ON/CLOSED)	0	0	1	1
GGIO*.DPCSO.stVal		**00**	**01**	**10**	**11**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 00 - INTERMEDIATE STATE
01 – OFF
10 – ON
11 - INVALID STATE (DBI)

** Values of 1 to 8*

4.28 Binary Input Status (BI6GGIO1)

BI6GGIO1.Mod

No	Information	
	Reset Device	x
BI6GGIO1.Mod.stVal		**1**

device annunciation:
1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value:
1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

BI6GGIO1.Health

No	Information		
	Protection Healthy	0	1
BI6GGIO1.Health.stVal		**3**	**1**

device annunciation:
1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value:
1 – OK
2 – WARNING
3 - ALARM

BI6GGIO1.Ind*

No	Information		
	Binary I/P* Status	0	1
BI6GGIO1.Ind*.stVal		**0**	**1**

device annunciation:
1 – ON/TRUE
0 – OFF/FALSE
** Values of 1 to 6*

IEC61850 Value:
0 – OFF
1 - ON

4.29 Binary Output Status (BO8GGIO1)

BO8GGIO1.Mod

No	Information	
	Reset Device	x
BO8GGIO1.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

BO8GGIO1.Health

No	Information		
	Protection Healthy	0	1
BO8GGIO1.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

BO8GGIO1.Ind*

No	Information		
	Binary O/P* Status	0	1
BO8GGIO1.Ind*.stVal		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
** Values of 1 to 8*

IEC61850 Value: 0 – OFF
1 - ON

4.30 LED Status (L9GGIO1)

L9GGIO1.Mod

No	Information	
	Reset Device	x
L9GGIO1.Mod.stVal		**1**

device annunciation:
1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value:
1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

L9GGIO1.Health

No	Information		
	Protection Healthy	0	1
L9GGIO1.Health.stVal		**3**	**1**

device annunciation:
1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value:
1 – OK
2 – WARNING
3 - ALARM

L9GGIO1.Ind*

No	Information		
	LED* Status	0	1
L9GGIO1.Ind*.stVal		**0**	**1**

device annunciation:
1 – ON/TRUE
0 – OFF/FALSE
** Values of 1 to 9*

IEC61850 Value:
0 – OFF
1 - ON

4.31 Quick Logic Equation Status (E4GGIO1)

E4GGIO1.Mod

No	Information	
	Reset Device	x
E4GGIO1.Mod.stVal		**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value: 1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

E4GGIO1.Health

No	Information		
	Protection Healthy	0	1
E4GGIO1.Health.stVal		**3**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value: 1 – OK
2 – WARNING
3 - ALARM

E4GGIO1.Ind*

No	Information		
	Equation* Status	0	1
E4GGIO1.Ind*.stVal		**0**	**1**

device annunciation: 1 – ON/TRUE
0 – OFF/FALSE
** Values of 1 to 4*

IEC61850 Value: 0 – OFF
1 - ON

4.32 Virtuals Status (V8GGIO1)

V8GGIO1.Mod

No	Information	
	Reset Device	x
V8GGIO1.Mod.stVal		**1**

device annunciation:
1 – ON/TRUE
0 – OFF/FALSE
x – Irrelevant

IEC61850 Value:
1 – ON
2 – BLOCKED
3 – TEST
4 - TEST/BLOCKED
5 - OFF

V8GGIO1.Health

No	Information		
	Protection Healthy	0	1
V8GGIO1.Health.stVal		**3**	**1**

device annunciation:
1 – ON/TRUE
0 – OFF/FALSE

IEC61850 Value:
1 – OK
2 – WARNING
3 - ALARM

V8GGIO1.Ind*

No	Information		
	Virtual* Status	0	1
V8GGIO1.Ind*.stVal		**0**	**1**

device annunciation:
1 – ON/TRUE
0 – OFF/FALSE
** Values of 1 to 8*

IEC61850 Value:
0 – OFF
1 - ON