SIEMENS

SIPROTEC

Line Differential Protection 7SD80

V4.6

IEC 61850

PIXIT

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Preface

Purpose of this manual

In this Manual, you will find the

- Specification of the applications of the IEC 61850 interface
- General information about the effects of configuration of your device to the different Logical Nodes and DOIs
- Mapping of the information relevant to the device on the Logical Node of protocol IEC61850.

Target audience

This manual is intended mainly for all persons who configure, parameterize and operate a SIPROTEC Device 7SD80.

Scope of validity of this Manual

SIPROTEC 7SD80, Version 4.6

Standards

This document has been created according to the ISO 9001 quality standards.

Further Support

If you have questions about SIPROTEC IEC 61850 interface, please contact your Siemens sales representative.

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This chapter specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface in SIPROTEC 7SD80.

1.1 General

This chapter specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface in SIPROTEC 7SD80.

It is based on the service subset definition given in the protocol implementation conformance statement (PICS), which is specified within the user manual *SIPROTEC 4 Ethernet Module EN 100 IEC 61850 Electrical/optical Interface 100 MBit, Manual /1/*.

The following applicable ACSI service models are specified:

- Association model
- Server model
- Data set model
- Substitution model
- Setting group control model
- Reporting model
- Logging model
- Generic substitution model
- Transmission of sample values model
- Control model
- Time and time synchronisation model
- File transfer model
- General items

Together with the PICS and the MICS the PIXIT forms the basis for a conformance test according to IEC 61850-10.

The mapping between the IEC 61850 server data model and the SIPROTEC specific data is specified in Chapter 3.

1.2 Association model

Description	Value / Clarification
Maximum number of clients that can set-up an association simultaneously	5 with IEC 61850 Protocol Update Version V04.02 and lower 6 with IEC 61850 Protocol Update Version EN100 V04.03 and higher
Lost connection detection time range (default range of TCP_KEEPALIVE is 1 – 20 seconds)	10 seconds
Is authentication supported	N
What called association parameters are necessary for successful association ?	Transport selector Y Session selector Y Presentation selector Y AP Title ANY AE Qualifier ANY Where Y means: as defined within the ICD-File ANY means: any value accepted
What is the maximum and minimum MMS PDU size ?	Max MMS PDU size 32768 Min MMS PDU size
What is the typical startup time after a power supply interrupt ?	15 SECONDS
<additional items>	

1.3 Server model

Description	Value / Clarification
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 Y OperatorBlocked
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 Y Substituted Y Test Y OperatorBlocked
What is the maximum number of data values in one GetDataValues request ?	Not restricted; depends on the max. MMS PDU size given above.
What is the maximum number of data values in one SetDataValues request ?	Not restricted; depends on the max. MMS PDU size given above. No Data Attribute within our object directory is writable with the service SetDataValues.
<additional items>	

1.4 Data set model

Description	Value / Clarification
Maximum number of data elements in one data set	Not limited by an internal configuration parameter. It depends on the available memory.
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.
How many non-persistent data sets can be created by one or more clients ?	10 data sets. It depends on the available memory.
additional items:	
Maximum number of data sets	Could not be defined, it depends on the available memory space. In principle, this information it not necessary from type conformance testing standpoint.

1.5 Substitution model

This service will not be supported (see also *SIPROTEC 4 Ethernet Module EN 100 IEC 61850 Electrical/optical Interface 100 MBit, Manual /1/*).

1.6 Setting group control model

Description	Value / Clarification
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 1 or 4, it depends on the given configuration. Specified in the ICD-File.
What is the effect of when and how the non-volatile storage is updated ? (compare IEC 61850-8-1 §16.2.4)	Just SelectActiveSG service will supported according to PICS.
<additional items>	

1.7 Reporting model

1.7.1 Unbuffered Report

Description	Value / Clarification
The supported trigger conditions are	Y Integrity Y Data change Y Quality change Y Data update Y General Interrogation
The supported optional fields are	Y Sequence-number Y Report-time-stamp Y Reason-for-inclusion Y Data-set-name Y Data-reference N Buffer-overflow N EntryID Y Conf-rev Y Segmentation
Can the server send segmented reports ?	Y
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 immediately
Multi client URCB approach (Compare IEC 61850-7-2 §14.2.1)	All clients can access all URCB's
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.
Integrity period	Configurable >=1 second;
Dynamic 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 done by the client before. 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 not lost.

1.7.2 Buffered Report

Description	Value / Clarification
The supported trigger conditions are	Y Integrity Y Data change Y Quality change Y Data update Y General Interrogation
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 Y EntryID Y Conf-rev Y Segmentation
Can the server send segmented reports ?	Y
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)	Buffer the Entry Send report if the report is enabled
Multi client BRCB approach (Compare IEC 61850-7-2 $14.2.1)	All clients can access all BRCB's
What is the format of EntryID ?	First 2 Byte : Integer Last 6 Bytes: BTime6 time stamp
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)
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.
Integrity period	Configurable >=1 second;
Dynamic BRCB reservation after an abort of the client/server association	Reservation of the BRCB has been fixed with TISSUE 453. The value of the attribute ResvTms delivers the time interval during which the reservation is still active after the connection has been lost. In case a BRCB is still reserved, and a client connects with the same IP address as the one used during the reservation, then the BRCB attribute can be written by this client without prior setting the ResvTms attribute as long as the reservation timer has not expired.

Configured BRCB reservation after an abort of the client/server association	Reservation of the BRCB is not lost for BRCBs that have been pre-associated to a specific client (pre-association defined with means of the CLientLN element with the BRCB instantiation in the SCD file). Reservation of a BRCB is lost for BRCBs, that have not been pre-associated to a specific client, after the expiration of the reservation timer set with the ResvTms attribute. In case ResvTms is not set (backward compatibility), ResvTms will get a default value for all preconfigured BRCBs that are not pre-associated to a specific client.
Optional use of a flow control for transmitting history of a BRCB	As specified in the IEC61850-7-2, transmission of entries may required some times, depending of the amount of entries that have to be transmitted. Therefore, the SIPROTEC 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. 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.

1.8 Logging model

This service will not be supported (see also *SIPROTEC 4 Ethernet Module EN 100 IEC 61850 Electrical/optical Interface 100 MBit, Manual /1/*).

1.9 Generic substation model

Description	Value / Clarification
What is the behavior when one subscribed GOOSE message isn't received or syntactically incorrect ?	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.
What is the behavior when a subscribed GOOSE message is out-of-order ?	Error message will be stored into the error buffer (could be accessed by EN100 web-server).
What is the behavior when a subscribed GOOSE message is duplicated ?	The sequence number given in the GOOSE-message is out-of-order. Error message will be stored into the error buffer (could be accessed by EN100 web-server).
additional items:	
Maximum number of GOOSE messages which could be sent	<= 16 ; It depends on the available memory.
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 telegram is required to validate the state of this GOOSE association again. However, the IED tolerates a missing telegram as long as the next telegram (expected n, received n+1) is received within the time allowed to live time out detection (the time allowed to live timeout detection occurs after 2*TAL).
GOOSE subscriber behaviour in case of multiple GOOSE messages	If a message is received twice or more, the IED already reports an error after the second reception. Therefore, network configuration error can be more easily tracked.
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 discarted: It has not been subscribed.
What is the behavior when a timeAllowedToLive is 0?	Error message will be stored into the error buffer (could be accessed by EN100 web-server) since the timeAllowedToLive expired. All expected data objects will be declared as invalid.

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 necessary to check the confRev attribute. There is no chance to detect such an out-of-order.
What is the behavior when no telegram is received within a TAL timeout?	To avoid an incorrect timeout detection, the subscriber detects a timeout after a period of 2×TAL. The information is then declared as questionable, oldData.
What is the behavior when a GOOSE header parameter goCBRef is mismatching with the expected one?	Since the goCBRef shall be unique stationwide, the received telegram with the mismatched goCBRef will be discarted: it has not been published. In that case only the timeout detection will set the data to invalid.
What is the behavior when a GOOSE header parameter APPID is mismatching with the expected one?	The APPID is a link layer parameter. It is used as a filter on link layer. If the APPID is mismatching, the tellegram will therefore be discarded on link layer without notifying the application. Only the timeout detection will set the data to invalid.
What is the behavior when a GOOSE header parameter t is not increasing?	The t parameter is not checked. Therefore it doesn't lead to any error detection.
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 forwarded to the application) the data objects are declared invalid.

1.10 Transmission of sample values model

Compare the “Implementation Guidelines for Electrical Current and Voltage Transducers according to IEC 60044-7/8 with Digital Output according to IEC 61850-9-2; Version 1.0; as specified by ABB, Areva, Landis+Gyr, OMICRON and SIEMENS

This service will not be supported (see also *SIPROTEC 4 Ethernet Module EN 100 IEC 61850 Electrical/optical Interface 100 MBit, Manual /1/*).

1.11 Control model

Description	Value / Clarification
What control models are supported ?	Y Status-only Y Direct-with-normal-security N Sbo-with-normal-security Y Direct-with-enhanced-security Y Sbo-with-enhanced-security
Is Time activated operate (operTm) supported	N
What is the behavior when the test attribute is set in the SelectWithValue and/or Operate request ?	Will be acknowledged with negative response. The AddCause attribute will be set to “not supported”
What are the conditions for the time (T) attribute in the SelectWithValue and/or Operate request ?	Time attribute is not relevant.
Is “operate-many” supported ?	N
Is pulse configuration supported ?	N
What check conditions are supported ?	Y Synchrocheck Y Interlock-check
What service error types are supported ?	Y Instance-not-available Y Instance-in-use Y Access-violation Y Access-not-allowed-in-current-state Y Parameter-value-inappropriate Y Parameter-value-inconsistent Y Class-not-supported Y Instance-locked-by-other-client Y Control-must-be-selected Y Type-conflict Y Failed-due-to-communications Y Constraint failed-due-to-server-constraint

What additional cause diagnosis are supported ?	N Blocked-by-switching-hierarchy Y Select-failed Y Invalid-position Y Position-reached Y Parameter-change-in-execution 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
additional items:	
What additional cause diagnosis extensions are supported ?	Y Plausibility_error Y Parameter_setting_invalid Y Hardware_error Y System_overload Y Internal_fault Y Command_sequence_error
Changing the control services by configuration	N
Inconsistency between Select and (Oper or cancel)	Oper or cancel will be acknowledged with negative response if inconsistencies to the select request are detected. The following attributes will not be checked in this case: T (Time)
Cancel request could be sent after an operate request.	Y
Format of the control time stamp attribute ?	TimeStamp instead of EntryTime acc. to the 7-2 Errata List.
Negative response for select request could be performed only	If test mode is activated or If the selection is always done.

1.12 Time and time synchronisation model

Description	Value / Clarification
What kind of quality bits are supported ?	N LeapSecondsKnown Y ClockFailure Y ClockNotSynchronized
What kind of quality accuracy bits are supported ?	Y Invalid N Unspecified
What is the behavior when the time synchronization signal/messages are lost ?	The quality attribute “ClockFailure” will be set to TRUE after a configured time period.
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.
additional items:	
What is the behavior at start up time when a time synchronization via SNTP is configured ?	The “ClockNotSynchronized” attribute is set to TRUE as long as no time synchronization is established.

1.13 File transfer model

Description	Value / Clarification
What is structure of files and directories?	Directory name / COMTRADE / *; Directory name / LD / *; Files according to the comtrade standard.
What is the resulting behavior if no file specification is present in the file directory request?	If no file specification is present in the directory request, all files are returned - not only the files in the root directory.
Is the IETF FTP protocol also implemented ?	N
Directory names are separated from the file name by	“/”
The maximum file name size including path (default 64 chars)	64
Are directory/file name case sensitive	Case sensitive
Maximum file size	Not limited by implementation or configuration. Depends on available memory.
additional items:	
Maximum number of clients that can use the FTP service simultaneously	1
Maximum number of files that can be accessed simultaneously	1

1.14 General items

Description	Value / Clarification
IED behavior when the Logical Device is blocked : LLN0.Mod.stVal = blocked	Unlike the definition of the Data Objects “Mod/Beh” in IEC 61850-7-4, outputs to the process will be generated. Details to this behavior are specified in *SIPROTEC 4 Ethernet Module EN 100 IEC 61850 Electrical/optical Interface 100 MBit, Manual /1/*
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, ISCSOxx. 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 type of the attribute actVal in the BCR (Binary Counter Reading) CDC?	The type is integer 32 (INT32).

1.15 TISSUES

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	-
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
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
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

Reporting	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
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

Basics

Contents

This chapter contains general information about the effects of device configuration on Logical Nodes and DOIs.

2.1 General

The protocol IEC 61850 was developed to define a standard that can be internationally employed for the transmission of power automation system data.

This cross national standard enables an interoperability between automation systems and devices made by different manufacturers.

The devices and high voltage bay control units of the SIPROTEC 4 series can be equipped with an Ethernet module EN100 via which the protocol IEC 61850 is interpreted.

The configuration of the protocol and the integration of the device with redundant IEC 61850 interfaces in your network are performed via the configuration system DIGSI.

For details please refer to the manuals:

- *SIPROTEC 4 Ethernet Module EN 100 IEC 61850 Electrical/optical Interface 100 MBit, Manual /1/* and
- *SIPROTEC 4 System Description /2/*.

Note

The following definitions are taken mainly from standard IEC 61850, Technical Specification IEC TS 61850-2.

Logical Devices

LD Logical Devices represent a functional structuring of the LN Logical Nodes of a SIPROTEC device.

The following Logical Devices are present:

- Logical Device Protection PROT
- Logical Device Measurement MEAS
- Logical Device Disturbance Recorder DR
- Logical Device Control CTRL
- Logical Device Extended EXT

Each LD contains LN LLN0 and LN LPHD1.

The allocation of the Logical Nodes to the Logical Devices is listed in Chapter 2.3.

Logical Node LN

Smallest part of a function that exchanges data. A logical node is an object defined by its data and methods.

Data object instance DOI

A Data object is part of a logical node object representing specific information for example status of measurement. From an object-oriented point of view, a data object is an instance of a data class. Specific data classes carry the semantic within a logical node.

Data attribute instance DAI

A Data attribute defines the name (semantic), format, range of possible values, and representation of values while being communicated.

Annunciation types via GOOSE

Generic Object Oriented Substation Event
A GOOSE report enables high speed trip signals to be issued with a high probability of delivery.

The following types of information can be configured via GOOSE.

- External single point indication O/O
- External single point indication I/O
- External double point indication
- External double point indication, fast
- External operational measured values
- External metered values

2.2 Effects of Configuration to the Logical Nodes

2.2.1 Function parameters general

Depending on the configuration of the function parameters the functions of the SIPROTEC are enabled or disabled. If a function is disabled, the corresponding Logical Node is not available.

The following Logical Nodes are always available:

Logical Device Protection:	LLN0, LPHD1, PTRC1
Logical Device Measurement:	LLN0, LPHD1, MMXU1, MMTR1, MSQI1
Logical Device Control:	LLN0, LPHD1, CALH1

2.2.2 Function parameters SIPROTEC 7SD80

The following table shows which Logical Nodes are available when setting the corresponding function parameter.

The setting (-) implies that no corresponding LN is available.

Table 2-1 SIPROTEC 7SD80 - Effects of Function parameters to the Logical Nodes

No.	Funktion	Setting	Logical Nodes
103	Setting Group Change Option		No effect
	Oscillographic Fault Records	-	RDRE1
112	87 Differential protection	Disabled	-
		Enabled	PDIF1, PDIF3, PTRC3
122	DTT Direct Transfer Trip		No effect
126	50(N)/51(N) Backup overcurrent	Disabled	-
		TOC IEC	PTOC1 – PTOC4, PTOC9, PTOC10
		TOC ANSI	PTOC1 – PTOC4, PTOC9 – PTOC11
133	79 Auto-Reclose Function	Disabled	-
		1 AR-cycle	RREC1
		2 AR-cycles	RREC1
134	Auto-Reclose control mode		No effect
136	81 Over / Underfrequency Protection	Disabled	-
		Enabled	PTOF1 – PTOF4, PTUF1 – PTUF4
137	27, 59 Under / Overvoltage Protection	Disabled	-
		Enabled	PTUV1 – PTUV6, PTOV1 – PTOV10
139	50BF Breaker Failure Protection	Disabled	-
		Enabled	RBRF1
		enabled w/ 3I0>	RBRF1

Table 2-1 SIPROTEC 7SD80 - Effects of Function parameters to the Logical Nodes (Forts.)

No.	Funktion	Setting	Logical Nodes
140	74TC Trip Circuit Supervision	Disabled	-
		1 Trip Circuit	XCBR1.CirSpv
		2 Trip Circuits	XCBR1.CirSpv
		3 Trip Circuits	XCBR1.CirSpv
142	49 Thermal overload protection	Disabled	-
		Enabled	PTTR1
144	Voltage transformers		No effect
617	Port B usage		No effect

2.3 Allocation of Logical Nodes to Logical Devices

All Logical Nodes (LN) are allocated to Logical Devices (LD). The following tables show this allocation and the DOIs available for each LN.

LD PROT

The Logical Device PROT (protection) contains the following LNs:

Table 2-2 LD PROT - Logical Nodes

LN	Function	DOI
LLN0	General	Mod, Beh, Health, NamPlt
PTRC1	General device pickup Total OFF	Mod, Beh, Health, NamPlt, Str,Tr,FinTr Str.dirGeneral, Str.phsA, Str.phsB, Str.phsC, Str.neut
PTRC3	Differential protection PCC	Mod, Beh, Health, NamPlt, Str, Op StrA, StrB, StrC
PDIF1	Differential protection ECD earthed network	Mod, Beh, Health, NamPlt, Str, Op
PDIF3	Differential protection ECD none earthed network	Mod, Beh, Health, NamPlt, Str, Op, RstA
PTOC1 PTOC2 PTOC3 PTOC4	Backup overcurrent	Mod, Beh, Health, NamPlt, Str, Op
PTOC9 PTOC10 PTOC11	Backup overcurrent directional	Mod, Beh, Health, NamPlt, Str, Op
RREC1	Automatic reclosure function 79	Mod, Beh, Health, NamPlt, Str, Op, AutoRecSt
PTUV1 PTUV2 PTUV3 PTUV4 PTUV5 PTUV6	Undervoltage Protection	Mod, Beh, Health, NamPlt, Str, Op

Table 2-2 LD PROT - Logical Nodes (Forts.)

LN	Function	DOI
PTOV1 PTOV2 PTOV3 PTOV4 PTOV5 PTOV6 PTOV7 PTOV8 PTOV9 PTOV10	Overvoltage Protection	Mod, Beh, Health, NamPlt, Str, Op
PTUF1 PTUF2 PTUF3 PTUF4	Underfrequency Protection	Mod, Beh, Health, NamPlt, Str, Op
PTOF1 PTOF2 PTOF3 PTOF4	Overfrequency Protection	Mod, Beh, Health, NamPlt, Str, Op
RBRF1	Breaker Failure Protection	Mod, Beh, Health, NamPlt, Str, OpEx, OpIn
PTTR1	Thermal overload protection	Mod, Beh, Health, NamPlt, Str, Op, AlmThm
XCBR1	Three-pole tripping	Mod, Beh, Health, NamPlt, Loc, OpCnt, Pos BlkOpn, BlkCls, CirSpv SumSwARs1, SumSwARs2, SumSwARs3
LPHD1	Device	PhyNam, PhyHealth, Proxy

LD MEAS

The Logical Device MEAS (measurement) contains the following LNs:

Table 2-3 LD MEAS - Logical Nodes

LN	Function	DOIs
LLN0	General	Mod, Beh, Health, NamPlt
MMXU1	Operational measured values	Mod, Beh, Health, NamPlt, TotW, TotVAr, TotVA, TotPF, Hz, A, PPV, PhV
MMXU2	Measure relay 1	Mod, Beh, Health, NamPlt, Relld, A, PhV,
MMXU3	Measure relay 2	Mod, Beh, Health, NamPlt, Relld, A, PhV,
MMTR1	Energy	Mod, Beh, Health, NamPlt, SupWh, SupVArh, DmdWh, DmdVArh
MSQI1	Measured values, symmetrical components	Mod, Beh, Health, NamPlt, SeqA, SeqV
LPHD1	Device	PhyNam, PhyHealth Proxy, CtrlNum, DevStr

LD DR

The Logical Device DR (Disturbance Recorder) contains the following LNs:

Table 2-4 LD DR - Logical Nodes

LN	Function	DOIs
LLN0	General	Mod, Beh, Health, NamPlt
RDRE1	Fault Record	Mod, Beh, Health, NamPlt, RcdMade, FltNum, GriFltNum, RcdStr
LPHD1	Device	PhyNam, PhyHealth, Proxy

LD CTRL

The Logical Device CTRL (Control) contains the following LNs:

Table 2-5 LD CTRL - Logical Nodes

LN	Function	DOIs
LLN0	General	Mod, Beh, Health, NamPlt, LEDRs, Loc
RREC1	Auto-Reclose Function	Mod, Beh, Health, NamPlt, Op, AutoRecSt
CALH1	Alarms, warning messages and group alarms	Mod, Beh, Health, NamPlt, GrAlm, GrWrn, ErrBoard1, ErrBoard2, ErrBoard3, ErrBoard4, ErrBoard5
LPHD1	Device	PhyNam, PhyHealth, Proxy

The Logical Nodes of the switching (and userdefined) objects will be created by DIGSI during the parameterization of your SIPROTEC device.

MICS, Model Implementation Conformance Statement, shows the assignment of the DOIs; you can use DIGSI to print the MICS.

LD EXT

The Logical Device EXT (Extended) contains the following LNs:

Table 2-6 LD EXT - Logical Nodes

LN	Function	DOIs
LLN0	General	Mod, Beh, Health, NamPlt
LPHD1	Device	PhyNam, PhyHealth, Proxy

2.4 Logical Node LLN0

2.4.1 Logical Device PROT

LLN0.Mod

No.	Information						
52	At Least 1 Protection Funct. is Active (ProtActive)	0	0	1	1	1	1
	Test mode (Test mode)	0	x	0	1	0	1
	Stop data transmission (DataStop)	0	x	1	0	0	1
LLN0.Mod.stVal		**5**	**5**	**2**	**3**	**1**	**4**

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

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

LLN0.Beh

No.	Information					
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1
	Test mode (Test mode)	x	0	0	1	1
	Stop data transmission (DataStop)	x	0	1	0	1
LLN0.Beh.stVal		**5**	**1**	**2**	**3**	**4**

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

IEC Status Beh.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

2.4.2 Logical Devices MEAS, CTRL, DR and EXT

LLN0.Mod

No.	Information						
51	Device is Operational and Protecting (Device OK)	0	0	1	1	1	1
	Test mode (Test mode)	0	x	0	1	0	1
	Stop data transmission (DataStop)	0	x	1	0	0	1
LLN0.Mod.stVal		**5**	**5**	**2**	**3**	**1**	**4**

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

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

LLN0.Beh

No.	Information					
51	Device is Operational and Protecting (Device OK)	0	1	1	1	1
	Test mode (Test mode)	x	0	0	1	1
	Stop data transmission (DataStop)	x	0	1	0	1
LLN0.Beh.stVal		**5**	**1**	**2**	**3**	**4**

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

IEC Status Beh.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

2.5 The DOI Behavior

2.5.1 Logical Device PROT

For the Logical Nodes of the PROT Logical Device, **LNx.Beh.stVal** is formed from **LNx.Mod.stVal** of the Logical Node and the status of the following device messages:

- Test mode (Test mode),
- Stop data transmission and
- At Least 1 Protection Funct. is Active.

No.	Information							
52	At Least 1 Protection Funct. is Active (ProtActive)	x	1	1	1	1	1	1	0
	Test mode (Test mode)	x	0	1	0	1	0	1	x
	Stop data transmission (DataStop)	x	0	0	1	1	x	x	x
	LNx .Mod.stVal	5	1	1	1	1	2	2	x
LNx.Beh.stVal		**5**	**1**	**3**	**2**	**4**	**2**	**4**	**5**

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

IEC Status stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

2.5.2 Logical Devices MEAS, CTRL, DR and EXT

For the Logical Nodes of the MEAS, CTRL, DR and EXT Logical Devices, **LNx.Beh.stVal** is formed from **LNx.Mod.stVal** of the Logical Node and the status of the following device messages:

- Test mode (Test mode),
- Stop data transmission.

No.	Information							
	Test mode (Test mode)	x	0	1	0	1	0	1
	Stop data transmission (DataStop)	x	0	0	1	1	x	x
	LNx .Mod.stVal	5	1	1	1	1	2	2
LNx.Beh.stVal		**5**	**1**	**3**	**2**	**4**	**2**	**4**

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

IEC Status stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

Mapping

Contents

This chapter shows the mapping of the information relevant to the device on the Logical Node of protocol IEC61850. It is structured according to function. In Chapter 2 you can find the available functions of the different devices and what consequences non-configured functions have on the Logical Nodes. You find also general information about IEC 61850 mapping of information.

3.1 Differential Protection 87 (PTRC3, PDIF1, PDIF3)

3.1.1 Differencial Protection PCC-Protection

PTRC3.Mod

No.	Information							
32102	PCC Protection is active (PCC active)	x	0	0	1	1	1	1
32107	PCC Protection is blocked (PCC is blocked)	x	1	0	0	0	0	0
32108	PCC Protection is switched off (PCC is OFF)	1	0	0	0	0	0	0
3190	87 Set test state of 87 (Test 87)	x	0	0	0	1	0	1
3191	87 Set Commissioning state of 87 (Commiss.87)	x	0	0	0	0	1	1
PTRC3.Mod.stVal		**5**	**2**	**5**	**1**	**3**	**4**	**4**

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

IEC Status Mod.stVal: 1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTRC3.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTRC3.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal: 1 - OK
2 - WARNING
3 - ALARM

PTRC3.Str

No.	Information		
32122	Diff: Fault detection (Diff. Gen. Flt.)	0	1
PTRC3.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Str.general: 0 - FALSE
1 - TRUE

PTRC3.Str.A

No.	Information		
32103	PCC Fault detection A (PCC Fault A)	0	1
PTRC3.Str.phsA		**0**	**1**

device annunciation: 1 - ON, 0 - OFF — IEC Status Str.phsA: 0 - FALSE, 1 - TRUE

PTRC3.Str.B

No.	Information		
32104	PCC Fault detection B (PCC Fault B)	0	1
PTRC3.Str.phsB		**0**	**1**

device annunciation: 1 - ON, 0 - OFF — IEC Status Str.phsB: 0 - FALSE, 1 - TRUE

PTRC3.Str.C

No.	Information		
32105	PCC Fault detection C (PCC Fault C)	0	1
PTRC3.Str.phsC		**0**	**1**

device annunciation: 1 - ON, 0 - OFF — IEC Status Str.phsC: 0 - FALSE, 1 - TRUE

PTRC3.Op

No.	Information		
32106	PCC TRIP ABC (PCC TRIP ABC)	0	1
PTRC3.Op.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF — IEC Status Op.general: 0 - FALSE, 1 - TRUE

3.1.2 ECD-Protection in earthed systems (PDIF1)

PDIF1.Mod

No.	Information							
32121	ECD Protection is active (ECD active)	x	0	0	1	1	1	1
32126	ECD: protection is blocked (ECD block)	x	1	0	0	0	0	0
32127	ECD: protection is switched off (ECD OFF)	1	0	0	0	0	0	0
3190	87 Set test state of 87 (Test 87)	x	x	x	0	1	0	1
3191	87 Set Commissioning state of 87 (Commiss.87)	x	x	x	0	0	1	1
PDIF1.Mod.stVal		**5**	**2**	**5**	**1**	**3**	**4**	**4**

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

IEC Status Mod.stVal: 1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PDIF1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PDIF1.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal: 1 - OK
2 - WARNING
3 - ALARM

PDIF1.Str

No.	Information		
32124	ECD: Fault detection of I-Diff> (ECD I> Flt.)	0	1
PDIF1.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Str.general: 0 - FALSE
1 - TRUE

PDIF1.Op

No.	Information		
32125	Diff: General TRIP (Diff. Gen. TRIP)	0	1
PDIF1.Op.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Op.general: 0 - FALSE
1 - TRUE

3.1.3 ECD-Protection in non-earthed systems (PDIF3)

PDIF3.Mod

No.	Information							
32121	ECD Protection is active (ECD active)	x	0	1	1	1	1	1
32126	ECD: protection is blocked (ECD block)	x	x	0	1	x	x	x
32127	ECD: protection is switched off (ECD OFF)	1	0	0	0	0	0	0
PDIF3.Mod.stVal		**5**	**5**	**1**	**2**	**2**	**2**	**2**

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

IEC Status Mod.stVal: 1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PDIF3.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PDIF3.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal: 1 - OK
2 - WARNING
3 - ALARM

PDIF3.Str

No.	Information		
32122	87(N)L Fault detection (87(N)L Gen.Flt.)	0	1
PDIF3.Str.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

IEC Status Str.general: 0 - FALSE, 1 - TRUE

PDIF3.Str.dirGeneral

No.	Information	
PDIF3.Str.dirGeneral		**1**

device annunciation: 1 - ON, 0 - OFF, x - irrelevant

IEC Status Str.dirGeneral: 0 - UNKNOWN, 1 - FORWARD, 2 - BACKWARD, 3 - BOTH

PDIF3.Op

No.	Information		
32125	Diff: General TRIP (Diff. Gen. TRIP)	0	1
PDIF3.Op.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

IEC Status Op.general: 0 - FALSE, 1 - TRUE

3.2 Overcurrent protection 51(N), 50(N), 67(N) (PTOCx)

3.2.1 O/C 51 (N)-B (PTOC1)

PTOC1.Mod

No.	Information									
7153	50(N)/51(N) Backup O/C is ACTIVE (5X-B ACTIVE)	x	x	0	0	0	1	1	1	1
7152	50(N)/51(N) Backup O/C is BLOCKED (5X-B BLOCK)	x	x	0	1	1	0	0	1	1
7106	>BLOCK 51-B Backup OverCurrent (>BLOCK 51-B)	x	x	1	0	1	0	1	0	1
7157	Backup O/C stage 51(N)-B is sw. OFF (51(N)-B OFF)	1	x	0	0	0	0	0	0	0
	Op.Mode 51(N)-B (P2630) = OFF or 51-B PICKUP (P2633) and 51N-B PICKUP (P2638) = ∞	x	1	0	0	0	0	0	0	0
PTOC1.Mod.stVal		**5**	**5**	**5**	**5**	**5**	**1**	**2**	**2**	**2**

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

IEC Status Mod.stVal: 1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOC1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOC1.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal: 1 - OK
2 - WARNING
3 - ALARM

PTOC1.Str

No.	Information		
7193	51(N)-B Pickup (51(N)-B PICKUP)	0	1
PTOC1.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Str.general: 0 - FALSE
1 - TRUE

PTOC1.Op

No.	Information		
7223	51(N)-B TRIP (51(N)-B TRIP)	0	1
PTOC1.Op.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Op.general: 0 - FALSE, 1 - TRUE

3.2.2 O/C 50 (N)-B2 (PTOC2)

PTOC2.Mod

No.	Information								
7153	50(N)/51(N) Backup O/C is ACTIVE (5X-B ACTIVE)	x	x	0	0	0	1	1	1	1
7152	50(N)/51(N) Backup O/C is BLOCKED (5X-B BLOCK)	x	x	0	1	1	0	0	1	1
7105	>BLOCK 50-B2 Backup OverCurrent (>BLOCK 50-B2)	x	x	1	0	1	0	1	0	1
7154	Backup O/C stage 50(N)-B2 is sw. OFF (50(N)-B2 OFF)	1	x	0	0	0	0	0	0	0
	Op.Mode50(N)-B2 (P2620) = OFF or 50-B2 PICKUP (P2623) and 50N-B2 PICKUP (P2626) = ∞	x	1	0	0	0	0	0	0	0
PTOC2.Mod.stVal		**5**	**5**	**5**	**5**	**5**	**1**	**2**	**2**	**2**

device annunciation / setting: 1 - ON / TRUE, 0 - OFF / FALSE, x - irrelevant
IEC Status Mod.stVal: 1 - ON, 2 - BLOCKED, 3 - TEST, 4 - TEST/BLOCKED, 5 - OFF

PTOC2.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOC2.Health.stVal		**3**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Health.stVal: 1 - OK, 2 - WARNING, 3 - ALARM

PTOC2.Str

No.	Information		
7192	50(N)-B2 Pickup (50(N)-B2 PICKUP)	0	1
PTOC2.Str.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Str.general: 0 - FALSE, 1 - TRUE

PTOC2.Op

No.	Information		
7222	50(N)-B2 TRIP (50(N)-B2 TRIP)	0	1
PTOC2.Op.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Op.general: 0 - FALSE, 1 - TRUE

3.2.3 O/C 50 (N)-B1 (PTOC3)

PTOC3.Mod

No.	Information									
7153	50(N)/51(N) Backup O/C is ACTIVE (5X-B ACTIVE)	x	x	0	0	0	1	1	1	1
7152	50(N)/51(N) Backup O/C is BLOCKED (5X-B BLOCK)	x	x	0	1	1	0	0	1	1
7104	>BLOCK 50-B1 Backup OverCurrent (>BLOCK 50-B1)	x	x	1	0	1	0	1	0	1
7155	Backup O/C stage 50(N)-B1 is sw. OFF (50(N)-B1 OFF)	1	x	0	0	0	0	0	0	0
	Op.Mode50(N)-B1 (P2610) = OFF or 50-B1 PICKUP (P2613) and 50N-B1 PICKUP (P2616) = ∞	x	1	0	0	0	0	0	0	0
PTOC3.Mod.stVal		**5**	**5**	**5**	**5**	**5**	**1**	**2**	**2**	**2**

device annunciation / setting: 1 - ON / TRUE, 0 - OFF / FALSE, x - irrelevant
IEC Status Mod.stVal: 1 - ON, 2 - BLOCKED, 3 - TEST, 4 - TEST/BLOCKED, 5 - OFF

PTOC3.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOC3.Health.stVal		**3**	**1**

device annunciation: 1 - ON, 0 - OFF

IEC Status Health.stVal: 1 - OK, 2 - WARNING, 3 - ALARM

PTOC3.Str

No.	Information		
7191	50(N)-B1 Pickup (50(N)-B1 PICKUP)	0	1
PTOC3.Str.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

IEC Status Str.general: 0 - FALSE, 1 - TRUE

PTOC3.Op

No.	Information		
7221	50(N)-B1 TRIP (50(N)-B1 TRIP)	0	1
PTOC3.Op.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

IEC Status Op.general: 0 - FALSE, 1 - TRUE

3.2.4 O/C 50 (N)-STUB (PTOC4)

PTOC4.Mod

No.	Information								
7153	50(N)/51(N) Backup O/C is ACTIVE (5X-B ACTIVE)	x	0	0	0	0	1	1	1	1
7152	50(N)/51(N) Backup O/C is BLOCKED (5X-B BLOCK)	x	0	1	1	1	0	0	1	1
7130	>BLOCK 50-STUB (>BLOCK 50-STUB)	x	1	0	1	1	0	1	0	1
7156	Backup O/C stage 50(N)-STUB is sw. OFF (50(N)-STUB OFF)	1	0	0	0	0	0	0	0	0
	50(N)-STUB OpMo (P2650) = OFF or 50-STUB PICKUP (P2651) and 50N-STUB PICKUP (P2654) = ∞	x	0	0	0	0	0	0	0	0
PTOC4.Mod.stVal		**5**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**2**

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

IEC Status Mod.stVal: 1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOC4.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOC4.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal: 1 - OK
2 - WARNING
3 - ALARM

PTOC4.Str

No.	Information		
7201	50-STUB Pickup (50-STUB PICKUP)	0	1
PTOC4.Str.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Str.general: 0 - FALSE, 1 - TRUE

PTOC4.Op

No.	Information		
7235	50-STUB TRIP (50-STUB TRIP)	0	1
PTOC4.Op.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Op.general: 0 - FALSE, 1 - TRUE

3.2.5 Directional O/C 67 (N) TOC (PTOC9)

PTOC9.Mod

No.	Information						
7241	67(N) Backup O/C is ACTIVE (67(N) ACTIVE)	x	x	0	0	1	1
7240	67(N) Backup O/C is BLOCKED (67(N) BLOCK)	x	x	0	1	0	1
7244	Backup O/C stage 67(N)-TOC is sw. OFF (67(N)-TOC OFF)	x	1	0	0	0	0
	Op.Mode67(N)TOC (P2630) = OFF or 67-TOC PICKUP (P2633) and 67N-TOC PICKUP (P2638) = ∞	1	x	0	0	0	0
PTOC9.Mod.stVal		**5**	**5**	**5**	**2**	**1**	**2**

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

IEC Status Mod.stVal: 1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOC9.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOC9.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal: 1 - OK
2 - WARNING
3 - ALARM

PTOC9.Str

No.	Information		
7252	67(N)-TOC Pickup (67(N)-TOC PICK.)	0	1
PTOC9.Str.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

IEC Status Str.general: 0 - FALSE, 1 - TRUE

PTOC9.Str.dirGeneral

No.	Information					
7203	67(N)-TOC Pickup (67(N)-TOC PICK.)	0	1	1	1	1
7265	67(N) forward (67(N) forward)	x	0	0	1	1
7266	67(N) reverse (67(N) reverse)	x	0	1	0	1
PTOC9.Str.dirGeneral		**0**	**0**	**2**	**1**	**3**

device annunciation: 1 - ON, 0 - OFF, x - irrelevant

IEC Status Str.dirGeneral: 0 - UNKNOWN, 1 - FORWARD, 2 - BACKWARD, 3 - BOTH

PTOC9.Op

No.	Information		
7256	67(N)-TOC TRIP (67(N)-TOC TRIP)	0	1
PTOC9.Op.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

IEC Status Op.general: 0 - FALSE, 1 - TRUE

3.2.6 Directional O/C 67 (N)-B2 (PTOC10)

PTOC10.Mod

No.	Information						
7241	67(N) Backup O/C is ACTIVE (67(N) ACTIVE)	x	x	0	0	1	1
7240	67(N) Backup O/C is BLOCKED (67(N) BLOCK)	x	x	0	1	0	1
7242	Backup O/C stage 67(N)-B2 is sw. OFF (67(N)-B2 OFF)	x	1	0	0	0	0
	Op.Mode67(N)-B2 (P2620) = OFF or 67-B2 PICKUP (P2623) and 67N-B2 PICKUP (P2626) = ∞	1	x	0	0	0	0
PTOC10.Mod.stVal		**5**	**5**	**5**	**2**	**1**	**2**

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

IEC Status Mod.stVal: 1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOC10.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOC10.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal: 1 - OK
2 - WARNING
3 - ALARM

PTOC10.Str

No.	Information		
7251	67(N)-B2 Pickup (67(N)-B2 PICKUP)	0	1
PTOC10.Str.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

IEC Status Str.general: 0 - FALSE, 1 - TRUE

PTOC10.Str.dirGeneral

No.	Information					
7251	67(N)-B2 Pickup (67(N)-B2 PICKUP)	0	1	1	1	1
7265	67(N) forward (67(N) forward)	x	0	0	1	1
7266	67(N) reverse (67(N) reverse)	x	0	1	0	1
PTOC10.Str.dirGeneral		**0**	**0**	**2**	**1**	**3**

device annunciation: 1 - ON, 0 - OFF, x - irrelevant

IEC Status Str.dirGeneral: 0 - UNKNOWN, 1 - FORWARD, 2 - BACKWARD, 3 - BOTH

PTOC10.Op

No.	Information		
7255	67(N)-B2 TRIP (67(N)-B2 TRIP)	0	1
PTOC10.Op.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

IEC Status Op.general: 0 - FALSE, 1 - TRUE

3.2.7 Directional O/C 67 (N)-B1 (PTOC11)

PTOC11.Mod

No.	Information						
7241	67(N) Backup O/C is ACTIVE (67(N) ACTIVE)	x	x	0	0	1	1
7240	67(N) Backup O/C is BLOCKED (67(N) BLOCK)	x	x	0	1	0	1
7250	67(N)-B1 Pickup (67(N)-B1 PICKUP)	x	1	0	0	0	0
	Op.Mode67(N)-B1(P2610) = OFF or 67-B1 PICKUP (P2613) and 67N-B1 PICKUP (P2616) = ∞	1	x	0	0	0	0
PTOC11.Mod.stVal		**5**	**5**	**5**	**2**	**1**	**2**

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

IEC Status Mod.stVal: 1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOC11.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOC11.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal: 1 - OK
2 - WARNING
3 - ALARM

PTOC11.Str

No.	Information		
7250	67(N)-B1 Pickup (67(N)-B1 PICKUP)	0	1
PTOC11.Str.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Str.general: 0 - FALSE, 1 - TRUE

PTOC11.Str.dirGeneral

No.	Information					
7250	67(N)-B1 Pickup (67(N)-B1 PICKUP)	0	1	1	1	1
7265	67(N) forward (67(N) forward)	x	0	0	1	1
7266	67(N) reverse (67(N) reverse)	x	0	1	0	1
PTOC11.Str.dirGeneral		**0**	**0**	**2**	**1**	**3**

device annunciation: 1 - ON, 0 - OFF, x - irrelevant
IEC Status Str.dirGeneral: 0 - UNKNOWN, 1 - FORWARD, 2 - BACKWARD, 3 - BOTH

PTOC11.Op

No.	Information		
7254	67(N)-B1 TRIP (67(N)-B1 TRIP)	0	1
PTOC11.Op.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Op.general: 0 - FALSE, 1 - TRUE

3.3 Automatic reclosure function 79 (RREC1)

RREC1.Mod

No.	Information				
2782	79: Auto recloser is switched ON (79 ON)	x	0	1	1
2783	79: Auto recloser is blocked (79 is blocked)	x	x	1	0
2781	79: Auto recloser is switched OFF (79 OFF)	1	0	0	0
RREC1.Mod.stVal		**5**	**5**	**2**	**1**

device annunciation:
1 - ON
0 - OFF
x - irrelevant

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

RREC1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
RREC1.Health.stVal		**3**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

RREC1.Op

No.	Information		
2851	79 - Close command (79 Close))	0	1
RREC1.Op.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

IEC Status Op.general: 0 - FALSE, 1 - TRUE

RREC1.AutoRecSt

No.	Information				
2801	79 - in progress (79 in progress)	1	1	0	0
2862	79 - cycle successful (79 Successful)	1	0	1	0
RREC1.AutoRecSt.stVal		**3**	**2**	**3**	**1**

device annunciation: 1 - ON, 0 - OFF

IEC Status AutoRecST.stVal: 1 - READY, 2 - IN PROGRESS, 3 - SUCCESSFUL

3.4 Under and overvoltage protection 27, 59 (PTUVx, PTOVx)

3.4.1 Under voltage protection 27-1-Vphg (PTUV1)

PTUV1.Mod

No.	Information			
10226	27-Vphg Undervolt. is BLOCKED (27-Vphg BLK)	0	0	1
	27-Vph-g Mode (P3751) = OFF or 27-1-Vph PICKUP (P3752) = 0	0	1	0
PTUV1.Mod.stVal		**1**	**5**	**2**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Mod.stVal: 1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTUV1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTUV1.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal: 1 - OK
2 - WARNING
3 - ALARM

PTUV1.Str

No.	Information					
10310	27-1-Vphg Pickup (27-1-Vpg Pickup)	0	1	1	1	1
10318	27-1-Vphg Pickup A (27-1-Vpg PU A)	0	x	1	x	x
10319	27-1-Vphg Pickup B (27-1-Vpg PU B)	0	x	x	1	x
10320	27-1-Vphg Pickup C (27-1-Vpg PU C)	0	x	x	x	1
PTUV1.Str.general		**0**	**1**	**1**	**1**	**1**

device annunciation: 1 - ON
0 - OFF
x - irrelevant

IEC Status Str.general: 0 - FALSE
1 - TRUE

PTUV1.Str.phsA

No.	Information		
10318	27-1-Vphg Pickup A (27-1-Vpg PU A)	0	1
PTUV1.Str.phsA		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Str.phsA: 0 - FALSE, 1 - TRUE

PTUV1.Str.phsB

No.	Information		
10319	27-1-Vphg Pickup B (27-1-Vpg PU B)	0	1
PTUV1.Str.phsB		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Str.phsB: 0 - FALSE, 1 - TRUE

PTUV1.Str.phsC

No.	Information		
10320	27-1-Vphg Pickup C (27-1-Vpg PU C)	0	1
PTUV1.Str.phsC		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Str.phsC: 0 - FALSE, 1 - TRUE

PTUV1.Op

No.	Information				
10317	27-Vphg TRIP command (27-Vpg TRIP)	0	0	1	1
10315	27-1-Vphg TimeOut (27-1-VpgTimeOut)	0	1	0	1
PTUV1.Op.general		**0**	**0**	**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Op.general: 0 - FALSE, 1 - TRUE

3.4.2 Undervoltage protection 27-2-Vphg (PTUV2)

PTUV2.Mod

No.	Information			
10226	27-Vphg Undervolt. is BLOCKED (27-Vphg BLK)	0	0	1
	27-Vph-g Mode (P3751) = OFF or 27-2-Vph PICKUP (P3754) = 0	0	1	0
PTUV2.Mod.stVal		**1**	**5**	**2**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTUV2.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTUV2.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

PTUV2.Str

No.	Information					
10311	27-2-Vphg Pickup (27-2-Vpg Pickup)	0	1	1	1	1
10321	27-2-Vphg Pickup A (27-2-Vpg PU A)	0	x	1	x	x
10322	27-2-Vphg Pickup B (27-2-Vpg PU B)	0	x	x	1	x
10323	27-2-Vphg Pickup C (27-2-Vpg PU C)	0	x	x	x	1
PTUV2.Str.general		**0**	**1**	**1**	**1**	**1**

device annunciation: 1 - ON
0 - OFF
X - irrelevant

IEC Status Str.general:
0 - FALSE
1 - TRUE

PTUV2.Str.phsA

No.	Information		
10321	27-2-Vphg Pickup A (27-2-Vpg PU A)	0	1
PTUV2.Str.phsA		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Str.phsA: 0 - FALSE, 1 - TRUE

PTUV2.Str.phsB

No.	Information		
10322	27-2-Vphg Pickup B (27-2-Vpg PU B)	0	1
PTUV2.Str.phsB		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Str.phsB: 0 - FALSE, 1 - TRUE

PTUV2.Str.phsC

No.	Information		
10323	27-2-Vphg Pickup C (27-2-Vpg PU C)	0	1
PTUV2.Str.phsC		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Str.phsC: 0 - FALSE, 1 - TRUE

PTUV2.Op

No.	Information				
10317	27-Vphg TRIP command (27-Vpg TRIP)	0	0	1	1
10316	27-2-Vphg TimeOut (27-2-VpgTimeOut)	0	1	0	1
PTUV2.Op.general		**0**	**0**	**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Op.general: 0 - FALSE, 1 - TRUE

3.4.3 Undervoltage protection 27-1-Vphph (PTUV3)

PTUV3.Mod

No.	Information			
10228	27-Vphph Undervolt. is BLOCKED (27-Vphph BLK)	0	0	1
	27-Vph-ph Mode (P3761) = OFF or 27-1-Vpp PICKUP (P3762) = 0	0	1	0
PTUV3.Mod.stVal		**1**	**5**	**2**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTUV3.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTUV3.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

PTUV3.Str

No.	Information					
10325	27-1-Vphph Pickup (27-1-Vpp Pickup)	0	1	1	1	1
10327	27-Vphph Pickup A-B (27-Vpp PU AB)	0	x	1	x	x
10328	27-Vphph Pickup B-C (27-Vpp PU BC)	0	x	x	1	x
10329	27-Vphph Pickup C-A (27-Vpp PU CA)	0	x	x	x	1
PTUV3.Str.general		**0**	**1**	**1**	**1**	**1**

device annunciation: 1 - ON
0 - OFF
x - irrelevant

IEC Status Str.general:
0 - FALSE
1 - TRUE

PTUV3.Str.phsA

No.	Information				
10327	27-Vphph Pickup A-B (27-Vpp PU AB)	0	0	1	1
10329	27-Vphph Pickup C-A (27-Vpp PU CA)	0	1	0	1
PTUV3.Str.phsA		**0**	**1**	**1**	**1**

device annunciation: 1 - ON 0 - OFF IEC Status Str.phsA: 0 - FALSE 1 - TRUE

PTUV3.Str.phsB

No.	Information				
10327	27-Vphph Pickup A-B (27-Vpp PU AB)	0	0	1	1
10328	27-Vphph Pickup B-C (27-Vpp PU BC)	0	1	0	1
PTUV3.Str.phsB		**0**	**1**	**1**	**1**

device annunciation: 1 - ON 0 - OFF IEC Status Str.phsB: 0 - FALSE 1 - TRUE

PTUV3.Str.phsC

No.	Information				
10328	27-Vphph Pickup B-C (27-Vpp PU BC)	0	0	1	1
10329	27-Vphph Pickup C-A (27-Vpp PU CA)	0	1	0	1
PTUV3.Str.phsC		**0**	**1**	**1**	**1**

device annunciation: 1 - ON 0 - OFF IEC Status Str.phsC: 0 - FALSE 1 - TRUE

PTUV3.Op

No.	Information				
10332	27-Vphph TRIP command (27-Vpp TRIP)	0	0	1	1
10330	27-1-Vphph TimeOut (27-1-VppTimeOut)	0	1	0	1
PTUV3.Op.general		**0**	**0**	**0**	**1**

device annunciation: 1 - ON 0 - OFF IEC Status Op.general: 0 - FALSE 1 - TRUE

3.4.4 Undervoltage protection 27-2-Vphph (PTUV4)

PTUV4.Mod

No.	Information			
10228	27-Vphph Undervolt. is BLOCKED (27-Vphph BLK)	0	0	1
	27-Vph-ph Mode (P3761) = OFF or 27-2-Vpp PICKUP (P3764) = 0	0	1	0
PTUV4.Mod.stVal		**1**	**5**	**2**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTUV4.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTUV4.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

PTUV4.Str

No.	Information					
10326	27-2-Vphph Pickup (27-2-Vpp Pickup)	0	1	1	1	1
10327	27-Vphph Pickup A-B (27-Vpp PU AB)	0	x	1	x	x
10328	27-Vphph Pickup B-C (27-Vpp PU BC)	0	x	x	1	x
10329	27-Vphph Pickup C-A (27-Vpp PU CA)	0	x	x	x	1
PTUV4.Str.general		**0**	**1**	**1**	**1**	**1**

device annunciation: 1 - ON
0 - OFF
x - irrelevant

IEC Status Str.general:
0 - FALSE
1 - TRUE

PTUV4.Str.phsA

No.	Information				
10327	27-Vphph Pickup A-B (27-Vpp PU AB)	0	0	1	1
10329	27-Vphph Pickup C-A (27-Vpp PU CA)	0	1	0	1
PTUV4.Str.phsA		**0**	**1**	**1**	**1**

device annunciation: 1 - ON 0 - OFF
IEC Status Str.phsA: 0 - FALSE 1 - TRUE

PTUV4.Str.phsB

No.	Information				
10327	27-Vphph Pickup A-B (27-Vpp PU AB)	0	0	1	1
10328	27-Vphph Pickup B-C (27-Vpp PU BC)	0	1	0	1
PTUV4.Str.phsB		**0**	**1**	**1**	**1**

device annunciation: 1 - ON 0 - OFF
IEC Status Str.phsB: 0 - FALSE 1 - TRUE

PTUV4.Str.phsC

No.	Information				
10328	27-Vphph Pickup B-C (27-Vpp PU BC)	0	0	1	1
10329	27-Vphph Pickup C-A (27-Vpp PU CA)	0	1	0	1
PTUV4.Str.phsC		**0**	**1**	**1**	**1**

device annunciation: 1 - ON 0 - OFF
IEC Status Str.phsC: 0 - FALSE 1 - TRUE

PTUV4.Op

No.	Information				
10332	27-Vphph TRIP command (27-Vpp TRIP)	0	0	1	1
10331	27-2-Vphph TimeOut (27-2-VppTimeOut)	0	1	0	1
PTUV4.Op.general		**0**	**0**	**0**	**1**

device annunciation: 1 - ON 0 - OFF
IEC Status Op.general: 0 - FALSE 1 - TRUE

3.4.5 Undervoltage protection 27-1-V1 (PTUV5)

PTUV5.Mod

No.	Information			
10230	27-V1 Undervolt. is BLOCKED (27-V1 BLK)	0	0	1
	27-V1 Mode (P3771) = OFF or 27-1-V1 PICKUP (P3772) = 0	0	1	0
PTUV5.Mod.stVal		**1**	**5**	**2**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTUV5.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTUV5.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

PTUV5.Str

No.	Information		
10300	27-1-V1 Pickup (27-1-V1 Pickup)	0	1
PTUV5.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Str.general:
0 - FALSE
1 - TRUE

PTUV5.Op

No.	Information				
10304	27-V1 TRIP command (27-V1 TRIP)	0	0	1	1
10302	27-1-V1TimeOut (27-1-V1TimeOut)	0	1	0	1
PTUV5.Op.general		**0**	**0**	**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Op.general:
0 - FALSE
1 - TRUE

3.4.6 Undervoltage protection 27-2-V1 (PTUV6)

PTUV6.Mod

No.	Information			
10230	27-V1 Undervolt. is BLOCKED (27-V1 BLK)	0	0	1
	27-V1 Mode (P3771) = OFF or 27-2-V1 PICKUP (P3774) = 0	0	1	0
PTUV6.Mod.stVal		**1**	**5**	**2**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTUV6.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTUV6.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

PTUV6.Str

No.	Information		
10301	27-2-V1 Pickup (27-2-V1 Pickup)	0	1
PTUV6.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Str.general:
0 - FALSE
1 - TRUE

PTUV6.Op

No.	Information				
10304	27-V1 TRIP command (27-V1 TRIP)	0	0	1	1
10303	27-2-V1TimeOut (27-2-V1TimeOut)	0	1	0	1
PTUV6.Op.general		**0**	**0**	**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Op.general:
0 - FALSE
1 - TRUE

3.4.7 Overvoltage protection 59-1-Vphg (PTOV1)

PTOV1.Mod

No.	Information			
10216	59-Vphg Overvolt. is BLOCKED (59-Vphg BLK)	0	0	1
	59-Vph-g Mode (P3701) = OFF or 59-1-Vph PICKUP (P3702) = ∞	0	1	0
PTOV1.Mod.stVal		**1**	**5**	**2**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOV1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOV1.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

PTOV1.Str

No.	Information					
10240	59-1-Vphg Pickup (59-1-Vpg Pickup)	0	1	1	1	1
10248	59-1-Vphg Pickup A (59-1-Vpg PU A)	0	x	1	x	x
10249	59-1-Vphg Pickup B (59-1-Vpg PU B)	0	x	x	1	x
10250	59-1-Vphg Pickup C (59-1-Vpg PU C)	0	x	x	x	1
PTOV1.Str.general		**0**	**1**	**1**	**1**	**1**

device annunciation: 1 - ON
0 - OFF
x - irrelevant

IEC Status Str.general:
0 - FALSE
1 - TRUE

PTOV1.Str.phsA

No.	Information		
10248	59-1-Vphg Pickup A (59-1-Vpg PU A)	0	1
PTOV1.Str.phsA		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Str.phsA: 0 - FALSE, 1 - TRUE

PTOV1.Str.phsB

No.	Information		
10249	59-1-Vphg Pickup B (59-1-Vpg PU B)	0	1
PTOV1.Str.phsB		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Str.phsB: 0 - FALSE, 1 - TRUE

PTOV1.Str.phsC

No.	Information		
10250	59-1-Vphg Pickup C (59-1-Vpg PU C)	0	1
PTOV1.Str.phsC		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Str.phsC: 0 - FALSE, 1 - TRUE

PTOV1.Op

No.	Information				
	Voltageprotection Vphg_TRIP	0	0	1	1
10245	59-1-Vphg TimeOut (59-1-VpgTimeOut)	0	1	0	1
PTOV1.Op.general		**0**	**0**	**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Op.general: 0 - FALSE, 1 - TRUE

3.4.8 Overvoltage protection 59-2-Vphg (PTOV2)

PTOV2.Mod

No.	Information			
10216	59-Vphg Overvolt. is BLOCKED (59-Vphg BLK)	0	0	1
	59-Vph-g Mode (P3701) = OFF or 59-2-Vph PICKUP (P3704) = ∞	0	1	0
PTOV2.Mod.stVal		**1**	**5**	**2**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOV2.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOV2.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

PTOV2.Str

No.	Information					
10241	59-2-Vphg Pickup (59-2-Vpg Pickup)	0	1	1	1	1
10242	59-Vphg Pickup A (59-Vpg PU A)	0	x	1	x	x
10243	59-Vphg Pickup B (59-Vpg PU B)	0	x	x	1	x
10244	59-Vphg Pickup C (59-Vpg PU C)	0	x	x	x	1
PTOV2.Str.general		**0**	**1**	**1**	**1**	**1**

device annunciation: 1 - ON
0 - OFF
x - irrelevant

IEC Status Str.general:
0 - FALSE
1 - TRUE

PTOV2.Str.phsA

No.	Information		
10242	59-Vphg Pickup A (59-Vpg PU A)	0	1
PTOV2.Str.phsA		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Str.phsA: 0 - FALSE, 1 - TRUE

PTOV2.Str.phsB

No.	Information		
10243	59-Vphg Pickup B (59-Vpg PU B)	0	1
PTOV2.Str.phsB		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Str.phsB: 0 - FALSE, 1 - TRUE

PTOV2.Str.phsC

No.	Information		
10244	59-Vphg Pickup C (59-Vpg PU C)	0	1
PTOV2.Str.phsC		**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Str.phsC: 0 - FALSE, 1 - TRUE

PTOV2.Op

No.	Information				
10247	59-Vphg TRIP command (59-Vpg TRIP)	0	0	1	1
10246	59-2-Vphg TimeOut (59-2-VpgTimeOut)	0	1	0	1
PTOV2.Op.general		**0**	**0**	**0**	**1**

device annunciation: 1 - ON, 0 - OFF
IEC Status Op.general: 0 - FALSE, 1 - TRUE

3.4.9 Overvoltage protection 59-1-Vphph (PTOV3)

PTOV3.Mod

No.	Information			
10218	59-Vphph Overvolt. is BLOCKED (59-Vphph BLK)	0	0	1
	59-Vph-ph Mode (P3711) = OFF or 59-1-Vpp PICKUP (P3712) = ∞	0	1	0
PTOV3.Mod.stVal		**1**	**5**	**2**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOV3.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOV3.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

PTOV3.Str

No.	Information					
10255	59-1-Vphph Pickup (59-1-Vpp Pickup)	0	1	1	1	1
10257	59-Vphph Pickup A-B (59-Vpp PickupAB)	0	x	1	x	x
10258	59-Vphph Pickup B-C (59-Vpp PickupBC)	0	x	x	1	x
10259	59-Vphph Pickup C-A (59-Vpp PickupCA)	0	x	x	x	1
PTOV3.Str.general		**0**	**1**	**1**	**1**	**1**

device annunciation: 1 - ON
0 - OFF
x - irrelevant

IEC Status Str.general:
0 - FALSE
1 - TRUE

PTOV3.Str.phsA

No.	Information				
10257	59-Vphph Pickup A-B (59-Vpp PickupAB)	0	0	1	1
10259	59-Vphph Pickup C-A (59-Vpp PickupCA)	0	1	0	1
PTOV3.Str.phsA		**0**	**1**	**1**	**1**

device annunciation: 1 - ON 0 - OFF
IEC Status Str.phsA: 0 - FALSE 1 - TRUE

PTOV3.Str.phsB

No.	Information				
10257	59-Vphph Pickup A-B (59-Vpp PickupAB)	0	0	1	1
10258	59-Vphph Pickup B-C (59-Vpp PickupBC)	0	1	0	1
PTOV3.Str.phsB		**0**	**1**	**1**	**1**

device annunciation: 1 - ON 0 - OFF
IEC Status Str.phsB: 0 - FALSE 1 - TRUE

PTOV3.Str.phsC

No.	Information				
10258	59-Vphph Pickup B-C (59-Vpp PickupBC)	0	0	1	1
10259	59-Vphph Pickup C-A (59-Vpp PickupCA)	0	1	0	1
PTOV3.Str.phsC		**0**	**1**	**1**	**1**

device annunciation: 1 - ON 0 - OFF
IEC Status Str.phsC: 0 - FALSE 1 - TRUE

PTOV3.Op

No.	Information				
10262	59-Vphph TRIP command (59-Vpp TRIP)	0	0	1	1
10260	59-1-Vphph TimeOut (59-1-VppTimeOut)	0	1	0	1
PTOV3.Op.general		**0**	**0**	**0**	**1**

device annunciation: 1 - ON 0 - OFF
IEC Status Op.general: 0 - FALSE 1 - TRUE

3.4.10 Overvoltage protection 59-2-Vphph (PTOV4)

PTOV4.Mod

No.	Information			
10218	59-Vphph Overvolt. is BLOCKED (59-Vphph BLK)	0	0	1
	59-Vph-ph Mode (P3711) = OFF or 59-2-Vpp PICKUP (P3714) = ∞	0	1	0
PTOV4.Mod.stVal		**1**	**5**	**2**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOV4.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOV4.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

PTOV4.Str

No.	Information					
10256	59-2-Vphph Pickup (59-2-Vpp Pickup)	0	1	1	1	1
10266	59-2-Vphph Pickup A-B (59-2-Vpp PU AB)	0	x	1	x	x
10267	59-2-Vphph Pickup B-C (59-2-Vpp PU BC)	0	x	x	1	x
10268	59-2-Vphph Pickup C-A (59-2-Vpp PU CA)	0	x	x	x	1
PTOV4.Str.general		**0**	**1**	**1**	**1**	**1**

device annunciation: 1 - ON
0 - OFF
x - irrelevant

IEC Status Str.general:
0 - FALSE
1 - TRUE

PTOV4.Str.phsA

No.	Information				
10266	59-2-Vphph Pickup A-B (59-2-Vpp PU AB)	0	0	1	1
10268	59-2-Vphph Pickup C-A (59-2-Vpp PU CA)	0	1	0	1
PTOV4.Str.phsA		**0**	**1**	**1**	**1**

device annunciation: 1 - ON 0 - OFF IEC Status Str.phsA: 0 - FALSE 1 - TRUE

PTOV4.Str.phsB

No.	Information				
10266	59-2-Vphph Pickup A-B (59-2-Vpp PU AB)	0	0	1	1
10267	59-2-Vphph Pickup B-C (59-2-Vpp PU BC)	0	1	0	1
PTOV4.Str.phsB		**0**	**1**	**1**	**1**

device annunciation: 1 - ON 0 - OFF IEC Status Str.phsB: 0 - FALSE 1 - TRUE

PTOV4.Str.phsC

No.	Information				
10267	59-2-Vphph Pickup B-C (59-2-Vpp PU BC)	0	0	1	1
10268	59-2-Vphph Pickup C-A (59-2-Vpp PU CA)	0	1	0	1
PTOV4.Str.phsC		**0**	**1**	**1**	**1**

device annunciation: 1 - ON 0 - OFF IEC Status Str.phsC: 0 - FALSE 1 - TRUE

PTOV4.Op

No.	Information				
10262	59-Vphph TRIP command (59-Vpp TRIP)	0	0	1	1
10261	59-2-Vphph TimeOut (59-2-VppTimeOut)	0	1	0	1
PTOV4.Op.general		**0**	**0**	**0**	**1**

device annunciation: 1 - ON 0 - OFF IEC Status Op.general: 0 - FALSE 1 - TRUE

3.4.11 Overvoltage protection 59-1-3V0 (PTOV5)

PTOV5.Mod

No.	Information			
10220	59-3V0 Overvolt. is BLOCKED (59-3V0 BLK)	0	0	1
	59G-3V0 (P3721) = OFF or 59G-1-3V0PICKUP (P3722) = ∞	0	1	0
PTOV5.Mod.stVal		**1**	**5**	**2**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOV5.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOV5.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

PTOV5.Str

No.	Information		
10270	59-1-3V0 Pickup (59-1-3V0 Pickup)	0	1
PTOV5.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Str.general:
0 - FALSE
1 - TRUE

PTOV5.Op

No.	Information				
10274	59-3V0 TRIP command (59-3V0 TRIP)	0	0	1	1
10272	59-1-3V0 TimeOut (59-1-3V0TimeOut)	0	1	0	1
PTOV5.Op.general		**0**	**0**	**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Op.general:
0 - FALSE
1 - TRUE

3.4.12 Overvoltage protection 59-2-3V0 (PTOV6)

PTOV6.Mod

No.	Information			
10220	59-3V0 Overvolt. is BLOCKED (59-3V0 BLK)	0	0	1
	59G-3V0 (P3721) = OFF or 59G-2-3V0PICKUP (P3724) = ∞	0	1	0
PTOV6.Mod.stVal		**1**	**5**	**2**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOV6.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOV6.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

PTOV6.Str

No.	Information		
10271	59-2-3V0 Pickup (59-2-3V0 Pickup)	0	1
PTOV6.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Str.general:
0 - FALSE
1 - TRUE

PTOV6.Op

No.	Information				
10274	59-3V0 TRIP command (59-3V0 TRIP)	0	0	1	1
10273	59-2-3V0 TimeOut (59-2-3V0TimeOut)	0	1	0	1
PTOV6.Op.general		**0**	**0**	**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Op.general:
0 - FALSE
1 - TRUE

3.4.13 Overvoltage protection 59-1-V1 (PTOV7)

PTOV7.Mod

No.	Information			
10222	59-V1 Overvolt. is BLOCKED (59-V1 BLK)	0	0	1
	59-V1 Mode (P3731) = OFF or 59-1-V1 PICKUP (P3732) = ∞	0	1	0
PTOV7.Mod.stVal		**1**	**5**	**2**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOV7.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOV7.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

PTOV7.Str

No.	Information		
10280	59-1-V1 Pickup (59-1-V1 Pickup)	0	1
PTOV7.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Str.general:
0 - FALSE
1 - TRUE

PTOV7.Op

No.	Information				
10284	59-V1 TRIP command (59-V1 TRIP)	0	0	1	1
10282	59-1-V1 TimeOut (59-1-V1TimeOut)	0	1	0	1
PTOV7.Op.general		**0**	**0**	**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Op.general:
0 - FALSE
1 - TRUE

3.4.14 Overvoltage protection 59-2-V1 (PTOV8)

PTOV8.Mod

No.	Information			
10222	59-V1 Overvolt. is BLOCKED (59-V1 BLK)	0	0	1
	59-V1 Mode (P3731) = OFF or 59-2-V1 PICKUP (P3734) = ∞	0	1	0
PTOV8.Mod.stVal		**1**	**5**	**2**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOV8.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOV8.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

PTOV8.Str

No.	Information		
10281	59-2-V1 Pickup (59-2-V1 Pickup)	0	1
PTOV8.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Str.general:
0 - FALSE
1 - TRUE

PTOV8.Op

No.	Information				
10284	59-V1 TRIP command (59-V1 TRIP)	0	0	1	1
10283	59-2-V1 TimeOut (59-2-V1TimeOut)	0	1	0	1
PTOV8.Op.general		**0**	**0**	**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Op.general:
0 - FALSE
1 - TRUE

3.4.15 Overvoltage protection 59-1-V2 (PTOV9)

PTOV9.Mod

No.	Information			
10224	59-V2 Overvolt. is BLOCKED (59-V2 BLK)	0	0	1
	59-V2 Mode (P3741) = OFF or 59-1-V2 PICKUP (P3742) = ∞	0	1	0
PTOV9.Mod.stVal		**1**	**5**	**2**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOV9.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOV9.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

PTOV9.Str

No.	Information		
10290	59-1-V2 Pickup (59-1-V2 Pickup)	0	1
PTOV9.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Str.general:
0 - FALSE
1 - TRUE

PTOV9.Op

No.	Information				
10294	59-V2 TRIP command (59-V2 TRIP)	0	0	1	1
10292	59-1-V2 TimeOut (59-1-V2TimeOut)	0	1	0	1
PTOV9.Op.general		**0**	**0**	**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Op.general:
0 - FALSE
1 - TRUE

3.4.16 Overvoltage protection 59-2-V2 (PTOV10)

PTOV10.Mod

No.	Information			
10224	59-V2 Overvolt. is BLOCKED (59-V2 BLK)	0	0	1
	59-V2 Mode (P3741) = OFF or 59-1-V2 PICKUP (P3742) = ∞	0	1	0
PTOV10.Mod.stVal		**1**	**5**	**2**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOV10.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOV10.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

PTOV10.Str

No.	Information		
10291	59-2-V2 Pickup (59-2-V2 Pickup)	0	1
PTOV10.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Str.general:
0 - FALSE
1 - TRUE

PTOV10.Op

No.	Information				
10294	59-V2 TRIP command (59-V2 TRIP)	0	0	1	1
10293	59-2-V2 TimeOut (59-2-V2TimeOut)	0	1	0	1
PTOV10.Op.general		**0**	**0**	**0**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Op.general:
0 - FALSE
1 - TRUE

3.5 Frequency protection 81 (PTUFx, PTOFx)

3.5.1 Underfrequency protection FQS stage 81-1 (PTUF1)

PTUF1.Mod

No.	Information						
5212	81 BLOCKED (81 BLOCKED)	x	x	0	1	x	x
5206	>BLOCK 81-1 (>BLOCK 81-1)	x	x	0	x	1	x
5215	81 Undervoltage Block (81 UnderV Blk)	x	x	0	x	x	1
	81 O/U FREQ. f1 (P3601) = ON and 81-1 PICKUP (P3602/3603) < Rated Frequency (P230)	x	0	1	1	1	1
	81 O/U FREQ. f1 (P3601) =OFF or 81-1 PICKUP (P3602/3603) = Rated Frequency (P230)	1	0	0	0	0	0
PTUF1.Mod.stVal		**5**	**5**	**1**	**2**	**2**	**2**

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

IEC Status Mod.stVal: 1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTUF1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTUF1.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal: 1 - OK
2 - WARNING
3 - ALARM

PTUF1.Str

No.	Information				
5232	81-1 picked up (81-1 picked up)	0	0	1	1
	81 O/U FREQ. f1 (P3601) = ON and 81-1 PICKUP (P3602/3603) < Rated Frequency (P230)	0	1	0	1
PTUF1.Str.general		**0**	**0**	**0**	**1**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status Str.general: 0 - FALSE
1 - TRUE

PTUF1.Op

No.	Information				
5236	81-1 TRIP (81-1 TRIP)	0	0	1	1
	81 O/U FREQ. f1 (P3601) = ON and 81-1 PICKUP (P3602/3603) < Rated Frequency (P230)	0	1	0	1
PTUF1.Op.general		**0**	**0**	**0**	**1**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status Op.general: 0 - FALSE
1 - TRUE

3.5.2 Underfrequency protection FQS stage 81-2 (PTUF2)

PTUF2.Mod

No.	Information						
5212	81 BLOCKED (81 BLOCKED)	x	x	0	1	x	x
5207	>BLOCK 81-2 (>BLOCK 81-2)	x	x	0	x	1	x
5215	81 Undervoltage Block (81 UnderV Blk)	x	x	0	x	x	1
	81 O/U FREQ. f2 (P3611) = ON and 81-2 PICKUP (P3612/3613) < Rated Frequency (P230)	x	0	1	1	1	1
	81 O/U FREQ. f2 (P3611) = OFF or 81-2 PICKUP (P3612/3613) = Rated Frequency (P230)	1	0	0	0	0	0
PTUF2.Mod.stVal		**5**	**5**	**1**	**2**	**2**	**2**

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

IEC Status Mod.stVal: 1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTUF2.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTUF2.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal: 1 - OK
2 - WARNING
3 - ALARM

PTUF2.Str

No.	Information				
5233	81-2 picked up (81-2 picked up)	0	0	1	1
	81 O/U FREQ. f2 (P3611) = ON and 81-2 PICKUP (P3612/3613) < Rated Frequency (P230)	0	1	0	1
PTUF2.Str.general		**0**	**0**	**0**	**1**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status Str.general: 0 - FALSE
1 - TRUE

PTUF2.Op

No.	Information				
5237	81-2 TRIP (81-2 TRIP)	0	0	1	1
	81 O/U FREQ. f2 (P3611) = ON and 81-2 PICKUP (P3612/3613) < Rated Frequency (P230)	0	1	0	1
PTUF2.Op.general		**0**	**0**	**0**	**1**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status Op.general: 0 - FALSE
1 - TRUE

3.5.3 Underfrequency protection FQS stage 81-3 (PTUF3)

PTUF3.Mod

No.	Information						
5212	81 BLOCKED (81 BLOCKED)	x	x	0	1	x	x
5208	>BLOCK 81-3 (>BLOCK 81-3)	x	x	0	x	1	x
5215	81 Undervoltage Block (81 UnderV Blk)	x	x	0	x	x	1
	81 O/U FREQ. f3 (P3621) = ON and 81-3 PICKUP (P3622/3623) < Rated Frequency (P230)	x	0	1	1	1	1
	81 O/U FREQ. f3 (P3621) = OFF or 81-3PICKUP (P3622/3623) = Rated Frequency (P230)	1	0	0	0	0	0
PTUF3.Mod.stVal		**5**	**5**	**1**	**2**	**2**	**2**

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

IEC Status Mod.stVal: 1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTUF3.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTUF3.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal: 1 - OK
2 - WARNING
3 - ALARM

PTUF3.Str

No.	Information				
5234	81-3 picked up (81-3 picked up)	0	0	1	1
	81 O/U FREQ. f3 (P3621) = ON and 81-3 PICKUP (P3622/3623) < Rated Frequency (P230)	0	1	0	1
PTUF3.Str.general		**0**	**0**	**0**	**1**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status Str.general: 0 - FALSE
1 - TRUE

PTUF3.Op

No.	Information				
5238	81-3 TRIP (81-3 TRIP)	0	0	1	1
	81 O/U FREQ. f3 (P3621) = ON and 81-3 PICKUP (P3622/3623) < Rated Frequency (P230)	0	1	0	1
PTUF3.Op.general		**0**	**0**	**0**	**1**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status Op.general: 0 - FALSE
1 - TRUE

3.5.4 Underfrequency protection FQS stage 81-4 (PTUF4)

PTUF4.Mod

No.	Information						
5212	81 BLOCKED (81 BLOCKED)	x	x	0	1	x	x
5209	>BLOCK 81-4 (>BLOCK 81-4)	x	x	0	x	1	x
5215	81 Undervoltage Block (81 UnderV Blk)	x	x	0	x	x	1
	81 O/U FREQ. f4 ON (P3631) and 81-4 PICKUP (P3632/3633) < Rated Frequency (P230)	x	0	1	1	1	1
	81 O/U FREQ. f4 (P3631) = OFF or 81-4 PICKUP (P3632/3633) = Rated Frequency (P230)	1	0	0	0	0	0
PTUF4.Mod.stVal		**5**	**5**	**1**	**2**	**2**	**2**

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

IEC Status Mod.stVal: 1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTUF4.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTUF4.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal: 1 - OK
2 - WARNING
3 - ALARM

PTUF4.Str

No.	Information				
5235	81-4 picked up (81-4 picked up)	0	0	1	1
	81 O/U FREQ. f4 (P3631)= ON and 81-4 PICKUP (P3632/3633) < Rated Frequency (P230)	0	1	0	1
PTUF4.Str.general		**0**	**0**	**0**	**1**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status Str.general: 0 - FALSE
1 - TRUE

PTUF4.Op

No.	Information				
5239	81-4 TRIP (81-4 TRIP)	0	0	1	1
	81 O/U FREQ. f4 (P3631) = ON and 81-4 PICKUP (P3632/3633) < Rated Frequency (P230)	0	1	0	1
PTUF4.Op.general		**0**	**0**	**0**	**1**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status Op.general: 0 - FALSE
1 - TRUE

3.5.5 Overfrequency protection FQS stage 81-1 (PTOF1)

PTOF1.Mod

No.	Information						
5212	81 BLOCKED (81 BLOCKED)	x	x	0	1	x	x
5206	>BLOCK 81-1 (>BLOCK 81-1)	x	x	0	x	1	x
5215	81 Undervoltage Block (81 UnderV Blk)	x	x	0	x	x	1
	81 O/U FREQ. f1 (P3601) = ON and 81-1 PICKUP (P3602/3603) > Rated Frequency (P230)	x	1	0	0	0	0
	81 O/U FREQ. f1 (P3601) = OFF or 81-1 PICKUP (P3602/3603) = Rated Frequency (P230)	1	0	0	0	0	0
PTOF1.Mod.stVal		**5**	**5**	**1**	**2**	**2**	**2**

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

IEC Status Mod.stVal: 1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOF1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOF1.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal: 1 - OK
2 - WARNING
3 - ALARM

PTOF1.Str

No.	Information				
5232	81-1 picked up (81-1 picked up)	0	0	1	1
	81 O/U FREQ. f1 (P3601) = ON and 81-1 PICKUP (P3602/3603) > Rated Frequency (P230)	1	0	1	0
PTOF1.Str.general		**0**	**0**	**1**	**0**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Str.general: 0 - FALSE
1 - TRUE

PTOF1.Op

No.	Information				
5236	81-1 TRIP (81-1 TRIP)	0	0	1	1
	81 O/U FREQ. f1 (P3601) = ON and 81-1 PICKUP (P3602/3603) > Rated Frequency (P230)	1	0	1	0
PTOF1.Op.general		**0**	**0**	**1**	**0**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Op.general: 0 - FALSE
1 - TRUE

3.5.6 Overfrequency protection FQS stage 81-2 (PTOF2)

PTOF2.Mod

No.	Information						
5212	81 BLOCKED (81 BLOCKED)	x	x	0	1	x	x
5207	>BLOCK 81-2 (>BLOCK 81-2)	x	x	0	x	1	x
5215	81 Undervoltage Block (81 UnderV Blk)	x	x	0	x	x	1
	81 O/U FREQ. f2 (P3611) = ON and 81-2 PICKUP (P3612/3613) > Rated Frequency (P230)	x	1	0	0	0	0
	81O/U FREQ. f2 (P3611) = OFF or 81-2 PICKUP (P3612/3613) = Rated Frequency (P230)	1	0	0	0	0	0
PTOF2.Mod.stVal		**5**	**5**	**1**	**2**	**2**	**2**

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

IEC Status Mod.stVal: 1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOF2.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOF2.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal: 1 - OK
2 - WARNING
3 - ALARM

PTOF2.Str

No.	Information				
5233	81-2 picked up (81-2 picked up)	0	0	1	1
	81 O/U FREQ. f2 (P3611)= ON and 81-2 PICKUP (P3612/3613) > Rated Frequency (P230)	1	0	1	0
PTOF2.Str.general		**0**	**0**	**1**	**0**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Str.general: 0 - FALSE
1 - TRUE

PTOF2.Op

No.	Information				
5237	81-2 TRIP (81-2 TRIP)	0	0	1	1
	81 O/U FREQ. f2 (P3611) = ON and 81-2 PICKUP (P3612/3613) > Rated Frequency (P230)	1	0	1	0
PTOF2.Op.general		**0**	**0**	**1**	**0**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE

IEC Status Op.general: 0 - FALSE
1 - TRUE

3.5.7 Overfrequency protection FQS stage 81-3 (PTOF3)

PTOF3.Mod

No.	Information						
5212	81 BLOCKED (81 BLOCKED)	x	x	0	1	x	x
5208	>BLOCK 81-3 (>BLOCK 81-3)	x	x	0	x	1	x
5215	81 Undervoltage Block (81 UnderV Blk)	x	x	0	x	x	1
	81 O/U FREQ. f3 (P3621) = ON and 81-3 PICKUP (P3622/3623) > Rated Frequency (P230)	x	1	0	0	0	0
	81 O/U FREQ. f3 (P3621)= OFF or 81-3 PICKUP (P3622/3623) = Rated Frequency (P230)	1	0	0	0	0	0
PTOF3.Mod.stVal		**5**	**5**	**1**	**2**	**2**	**2**

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

IEC Status Mod.stVal: 1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOF3.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOF3.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal: 1 - OK
2 - WARNING
3 - ALARM

PTOF3.Str

No.	Information				
5234	81-3 picked up (81-3 picked up)	0	0	1	1
	81 O/U FREQ. f3 (P3621) = ON and 81-3 PICKUP (P3622/3623) > Rated Frequency (P230)	1	0	1	0
PTOF3.Str.general		**0**	**0**	**1**	**0**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status Str.general: 0 - FALSE
1 - TRUE

PTOF3.Op

No.	Information				
5238	81-3 TRIP (81-3 TRIP)	0	0	1	1
	81 O/U FREQ. f3 (P3621) = ON and 81-3 PICKUP (P3622/3623) > Rated Frequency (P230)	1	0	1	0
PTOF3.Op.general		**0**	**0**	**1**	**0**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status Op.general: 0 - FALSE
1 - TRUE

3.5.8 Overfrequency protection FQS stage 81-4 (PTOF4)

PTOF4.Mod

No.	Information						
5212	81 BLOCKED (81 BLOCKED)	x	x	0	1	x	x
5209	>BLOCK 81-4 (>BLOCK 81-4)	x	x	0	x	1	x
5215	81 Undervoltage Block (81 UnderV Blk)	x	x	0	x	x	1
	81 O/U FREQ. f4 (P3631) = ON and 81-4 PICKUP (P3632/3633) > Rated Frequency (P230)	x	1	0	0	0	0
	81 O/U FREQ. f4 (P3631) = OFF or 81-4 PICKUP (P3632/3633) = Rated Frequency (P230)	1	0	0	0	0	0
PTOF4.Mod.stVal		**5**	**5**	**1**	**2**	**2**	**2**

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

IEC Status Mod.stVal: 1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTOF4.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOF4.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal: 1 - OK
2 - WARNING
3 - ALARM

PTOF4.Str

No.	Information				
5235	81-4 picked up (81-4 picked up)	0	0	1	1
	81 O/U FREQ. f4 (P3631) = ON and 81-4 PICKUP (P3632/3633) > Rated Frequency (P230)	1	0	1	0
PTOF4.Str.general		**0**	**0**	**1**	**0**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status Str.general: 0 - FALSE
1 - TRUE

PTOF4.Op

No.	Information				
5239	81-4 TRIP (81-4 TRIP)	0	0	1	1
	81 O/U FREQ. f4 (P3631) = ON and 81-4 PICKUP (P3632/3633) > Rated Frequency (P230)	1	0	1	0
PTOF4.Op.general		**0**	**0**	**1**	**0**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status Op.general: 0 - FALSE
1 - TRUE

3.6 Circuit breaker failure protection 50BF (RBRF1)

RBRF1.Mod

No.	Information				
1452	50BF is BLOCKED (50BF BLOCK)	0	0	1	1
1451	50BF is switched OFF (50BF OFF)	0	1	0	1
RBRF1.Mod.stVal		**1**	**5**	**2**	**5**

device annunciation:
1 - ON
0 - OFF

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

RBRF1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
RBRF1.Health.stVal		**3**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

RBRF1.Str

No.	Information		
1461	50BF Breaker failure protection started (50BF Start)	0	1
RBRF1.Str.general		**0**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Str.general:
0 - FALSE
1 - TRUE

RBRF1.OpEx

No.	Information		
1494	50BF Busbar trip (50BF BusTrip)	0	1
RBRF1.OpEx.general		**0**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status OpEx.general:
0 - FALSE
1 - TRUE

RBRF1.OpIn

No.	Information		
1476	50BF Local trip - ABC (50BF LocTripABC)	0	1
RBRF1.OpIn.general		**0**	**1**

device annunciation:
1 - ON
0 - OFF
x - irrelevant

IEC Status OpIn.general:
0 - FALSE
1 - TRUE

3.7 Thermal overload protection 49 (PTTR1)

PTTR1.Mod

No.	Information				
1513	49 Overload Protection is ACTIVE (49 O/L ACTIVE)	x	0	1	1
1512	49 Overload Protection is BLOCKED (49 O/L BLOCK)	x	x	0	1
1511	49 Overload Protection is OFF (49 O / L OFF)	1	0	0	0
PTTR1.Mod.stVal		**5**	**5**	**1**	**2**

device annunciation:
1 - ON
0 - OFF

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTTR1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTTR1.Health.stVal		**3**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

PTTR1.Str

No.	Information		
1517	49 Winding Overload (49 Winding O/L)	0	1
PTTR1.Str.general		**0**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Str.general:
0 - FALSE
1 - TRUE

PTTR1.Op

No.	Information		
1521	49 Thermal Overload TRIP (49 Th O/L TRIP)	0	1
PTTR1.Op.general		**0**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Op.general:
0 - FALSE
1 - TRUE

PTTR1.AlmThm

No.	Information		
1516	49 Overload Alarm! Near Thermal Trip (49 O/L Θ Alarm)	0	1
PTTR1.AlmThm.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

IEC Status AlmThm.general: 0 - FALSE, 1 - TRUE

3.8 Tripping Circuit Breaker (XCBRx)

XCBR1.Mod

No.	Information		
52	At Least 1 Protection Funct. is Active (ProtActive)	1	0
XCBR1.Mod.stVal		**1**	**5**

device annunciation: 1 - ON, 0 - OFF

IEC Status Mod.stVal: 1 - ON, 2 - BLOCKED, 3 - TEST, 4 - TEST/BLOCKED, 5 - OFF

XCBR1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
XCBR1.Health.stVal		**3**	**1**

device annunciation: 1 - ON, 0 - OFF

IEC Status Health.stVal: 1 - OK, 2 - WARNING, 3 - ALARM

XCBR1.Loc

No.	Information		
55	Reset Device (Reset Device)	1	0
XCBR1.Loc.stVal		**1**	**0**

device annunciation: 1 - ON, 0 - OFF

IEC Status Loc.stVal: 0 - FALSE, 1 - TRUE

XCBR1.OpCnt

No.	Information	Value		
1000	Number of breaker TRIP commands (# TRIPs=)	XCBR1.OpCnt.stVal	Metered value	Absolute value

XCBR1.Pos

No.	Information				
4601	>52-a contact (OPEN, if bkr is open) (>52-a)	0	1	0	1
4602	>52-b contact (OPEN, if bkr is closed) (>52-b)	0	0	1	1
XCBR1.Pos.stVal - if spontan information		**11**	**01**	**10**	**11**
XCBR1.Pos.stVal - if command is running		**00**	**01**	**10**	**00**

device annunciation: 1 - ON, 0 - OFF

IEC Status Pos.stVal: 00 - INTERMEDIATE STATE, 01 - OFF, 10 - ON, 11 - BAD STATE

XCBR1.BlkOpn

No.	Information		
55	Reset Device (Reset Device)	1	0
XCBR1.BlkOpn.stVal		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

IEC Status BlkOpn.stVal: 0 - FALSE, 1 - TRUE

XCBR1.BlkCls

No.	Information		
55	Reset Device (Reset Device)	1	0
XCBR1.BlkCls.stVal		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

IEC Status BlkCls.stVal: 0 - FALSE, 1 - TRUE

XCBR1.CirSpv

No.	Information		
6865	74TC Failure Trip Circuit (74TC Trip cir.)	0	1
XCBR1.CirSpv.stVal		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

IEC Status CirSpv.stVal: 0 - FALSE, 1 - TRUE

XCBR1.SumSwARs1

No.	Information	Value		
1027	Accumulation of interrupted current Ph A (Σ Ia =)	XCBR1.SumSwARs1.actVal	Metered value	Current value of acummulated interrupted current = actVal × pulsQty
		XCBR1.SumSwARs1.units.SIUnit	5	A (Ampere)
		XCBR1.SumSwARs1.units.multiplier	3	Kilo
		XCBR1.SumSwARs1.pulsQty	1.000000e-002	A / Metered value

XCBR1.SumSwARs2

No.	Information	Value		
1028	Accumulation of interrupted current Ph B (Σ Ib =)	XCBR1.SumSwARs2.actVal	Metered value	Current value of acummulated interrupted current = actVal × pulsQty
		XCBR1.SumSwARs2.units.SIUnit	5	A (Ampere)
		XCBR1.SumSwARs2.units.multiplier	3	Kilo
		XCBR1.SumSwARs2.pulsQty	1.000000e-002	A / Metered value

XCBR1.SumSwARs3

No.	Information	Value		
1029	Accumulation of interrupted current Ph C (Σ Ic =)	XCBR1.SumSwARs3.actVal	Metered value	Current value of acummulated interrupted current = actVal × pulsQty
		XCBR1.SumSwARs3.units.SIUnit	5	A (Ampere)
		XCBR1.SumSwARs3.units.multiplier	3	Kilo
		XCBR1.SumSwARs3.pulsQty	1.000000e-002	A / Metered value

3.9 Tripping Logic of the Entire Device (PTRC1)

PTRC1.Mod

No.	Information		
52	At Least 1 Protection Funct. is Active (ProtActive)	1	0
PTRC1.Mod.stVal		**1**	**5**

device annunciation:
1 - ON
0 - OFF

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

PTRC1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTRC1.Health.stVal		**3**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

PTRC1.Str

No.	Information						
501	Relay PICKUP (Relay PICKUP)	0	1	x	x	x	x
503	Relay PICKUP Phase A (Relay PICKUP A)	0	x	1	x	x	x
504	Relay PICKUP Phase B (Relay PICKUP B)	0	x	x	1	x	x
505	Relay PICKUP Phase C (Relay PICKUP C)	0	x	x	x	1	x
506	Relay PICKUP GROUND (Relay PICKUP G)	0	x	x	x	x	1
PTRC1.Str.general		**0**	**1**	**1**	**1**	**1**	**1**

device annunciation:
1 - ON
0 - OFF
X - irrelevant

IEC Status Str.general:
0 - FALSE
1 - TRUE

PTRC1.Str.dirGeneral???

No.	Information				
32129	ECD: detection Forward (ECD Forward)	0	1	0	1
32130	ECD: detection Reverse (ECD Reverse)	0	0	1	1
PTRC1.Str.dirGeneral		**0**	**1**	**2**	**3**

device annunciation:
1 - ON
0 - OFF
x - irrelevant

IEC Status Str.dirGeneral:
0 - UNKNOWN
1 - FORWARD
2 - BACKWARD
3 - BOTH

PTRC1.Str.phsA

No.	Information		
503	Relay PICKUP Phase A (Relay PICKUP A1)	0	1
PTRC1.Str.phsA		**0**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Str.phsA:
0 - FALSE
1 - TRUE

PTRC1.Str.phsB

No.	Information		
504	Relay PICKUP Phase B (Relay PICKUP B)	0	1
PTRC1.Str.phsB		**0**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Str.phsB:
0 - FALSE
1 - TRUE

PTRC1.Str.phsC

No.	Information		
505	Relay PICKUP Phase C (Relay PICKUP C)	0	1
PTRC1.Str.phsC		**0**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Str.phsC:
0 - FALSE
1 - TRUE

PTRC1.Str.neut

No.	Information		
506	Relay PICKUP GROUND (Relay PICKUP G)	0	1
PTRC1.Str.neut		**0**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Str.neut:
0 - FALSE
1 - TRUE

PTRC1.Tr.general

No.	Information		
501	Relay PICKUP (Relay PICKUP)	0	1
PTRC1.Tr.general		**0**	**1**

device annunciation:
1 - ON
0 - OFF
x - irrelevant

IEC Status Tr.dirGeneral:
0 - UNKNOWN
1 - FORWARD
2 - BACKWARD
3 - BOTH

PTRC1.FinTr

No.	Information		
536	Relay Definitive TRIP (Definitive TRIP)	0	1
PTRC1.FinTr.stVal		**0**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status FinTr.stVal:
0 - FALSE
1 - TRUE

3.10 Device (LPHD1, CALH1)

LPHD1.DevStr

No.	Information				
56	Initial Start of Device (Initial Start)	0	0	1	1
67	Resume (Resume)	0	1	0	1
LPHD1.DevStr.stVal		**T**	**2**	**1**	**T**

device annunciation:
1 - ON
0 - OFF
x - irrelevant

IEC Status DevStr.stVal:
1 - Initial Start
2 - Resume
T - toggel between 1 and 2

LPHD1.PhyHealth

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
LPHD1.PhyHealth.stVal		**3**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status PhyHealth.stVal:
1 - OK
2 - WARNING
3 - ALARM

LPHD1.Proxy

No.	Information		
55	Reset Device (Reset Device)	0	1
LPHD1.Proxy.stVal		**1**	**0**

device annunciation:
1 - ON
0 - OFF

IEC Status Proxy.stVal:
0 - DEVICE is not a PROXY
1 - DEVICE is a PROXY

3.10.1 Alarm-, Warn- and Group alarms (CALH1)

CALH1.Mod

No.	Information		
55	Reset Device (Reset Device)	1	0
CALH1.Mod.stVal		**1**	**5**

device annunciation:
1 - ON
0 - OFF

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

CALH1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
CALH1.Health.stVal		**3**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

CALH1.GrAlm

No.	Information		
140	Error with a summary alarm (Error Sum Alarm)	1	0
CALH1.GrAlm.stVal		**1**	**0**

device annunciation:
1 - ON
0 - OFF

IEC Status GrAlm.stVal:
0 - FALSE
1 - TRUE

CALH1.GrWrn

No.	Information		
160	Alarm Summary Event (Alarm Sum Event)	1	0
CALH1.GrWrn.stVal		**1**	**0**

device annunciation:
1 - ON
0 - OFF

IEC Status GrWrn.stVal:
0 - FALSE
1 - TRUE

CALH1.ErrBoard1

No.	Information		
183	Error Board 1 (Error Board 1)	1	0
CALH1.ErrBoard1.stVal		**1**	**0**

device annunciation: 1 - ON 0 - OFF IEC Status ErrBoard1.stVal: 0 - FALSE 1 - TRUE

CALH1.ErrBoard2

No.	Information		
184	Error Board 2 (Error Board 2)	1	0
CALH1.ErrBoard2.stVal		**1**	**0**

device annunciation: 1 - ON 0 - OFF IEC Status ErrBoard2.stVal: 0 - FALSE 1 - TRUE

CALH1.ErrBoard3

No.	Information		
185	Error Board 3 (Error Board 3)	1	0
CALH1.ErrBoard3.stVal		**1**	**0**

device annunciation: 1 - ON 0 - OFF IEC Status ErrBoard3.stVal: 0 - FALSE 1 - TRUE

CALH1.ErrBoard4

No.	Information		
186	Error Board 4 (Error Board 4)	1	0
CALH1.ErrBoard4.stVal		**1**	**0**

device annunciation: 1 - ON 0 - OFF IEC Status ErrBoard4.stVal: 0 - FALSE 1 - TRUE

CALH1.ErrBoard5

No.	Information		
187	Error Board 5 (Error Board 5)	1	0
CALH1.ErrBoard5.stVal		**1**	**0**

device annunciation: 1 - ON, 0 - OFF

IEC Status ErrBoard5.stVal: 0 - FALSE, 1 - TRUE

3.11 Measurements (MMXUx, MSQI1, MMTR1)

3.11.1 Measured values of local device (MMXU1)

MMXU1.Mod

No.	Information		
51	Device is Operational and Protecting (Device OK)	1	0
MMXU1.Mod.stVal		**1**	**5**

device annunciation:
1 - ON
0 - OFF

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

MMXU1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
MMXU1.Health.stVal		**3**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

MMXU1.TotW

No.	Information	Value		
641	P (active power) (P =)	MMXU1.TotW.mag.f	Measured value	Absolute value
		MMXU1.TotW.units.SIUnit	62	W (Watt)
		MMXU1.TotW.units.multiplier	6	Mega

MMXU1.TotVAr

No.	Information	Value		
642	Q (reactive power) (Q =)	MMXU1.TotVAr.mag.f	Measured value	Absolute value
		MMXU1.TotVAr.units.SIUnit	63	VAr
		MMXU1.TotVAr.units.multiplier	6	Mega

MMXU1.TotVA

No.	Information	Value		
645	S (apparent power) (S =)	MMXU1.TotVA.mag.f	Measured value	Absolute value
		MMXU1.TotVA.units.SIUnit	61	VA
		MMXU1.TotVA.units.multiplier	6	Mega

MMXU1.TotPF

No.	Information	Value		
643	cos PHI (Power factor) (cos phi =)	MMXU1.TotPF.mag.f	Measured value	Absolute value
		MMXU1.TotPF.units.SIUnit	1	NONE
		MMXU1.TotPF.units.multiplier	0	1

MMXU1.Hz

No.	Information	Value		
644	Frequency (Freq=)	MMXU1.Hz.mag.f	Measured value	Absolute value
		MMXU1.Hz.units.SIUnit	33	Hz
		MMXU1.Hz.units.multiplier	0	1

MMXU1.A

No.	Information	Value		
601	Ia (Ia =)	MMXU1.A.phsA.cVal.mag.f	Measured value	Absolute value
		MMXU1.A.phsA.units.SIUnit	5	A (Ampere)
		MMXU1.A.phsA.units.multiplier	0	1

No.	Information	Value		
602	Ib (Ib =)	MMXU1.A.phsB.cVal.mag.f	Measured value	Absolute value
		MMXU1.A.phsB.units.SIUnit	5	A (Ampere)
		MMXU1.A.phsB.units.multiplier	0	1

No.	Information	Value		
603	Ic (Ic =)	MMXU1.A.phsC.cVal.mag.f	Measured value	Absolute value
		MMXU1.A.phsC.units.SIUnit	5	A (Ampere)
		MMXU1.A.phsC.units.multiplier	0	1

MMXU1.PPV

No.	Information	Value		
624	Va-b (Va-b=)	MMXU1.PPV.phsAB.cVal.mag.f	Measured value	Absolute value
		MMXU1.PPV.phsAB.units.SIUnit	29	V (Volt)
		MMXU1.PPV.phsAB.units.multiplier	3	Kilo

No.	Information	Value		
625	Vb-c (Vb-c=)	MMXU1.PPV.phsBC.cVal.mag.f	Measured value	Absolute value
		MMXU1.PPV.phsBC.units.SIUnit	29	V (Volt)
		MMXU1.PPV.phsBC.units.multiplier	3	Kilo

No.	Information	Value		
626	Vc-a (Vc-a=)	MMXU1.PPV.phsCA.cVal.mag.f	Measured value	Absolute value
		MMXU1.PPV.phsCA.units.SIUnit	29	V (Volt)
		MMXU1.PPV.phsCA.units.multiplier	3	Kilo

MMXU1.PhV

No.	Information	Value		
621	Va (Va =)	MMXU1.PhV.phsA.cVal.mag.f	Measured value	Absolute value
		MMXU1.PhV.phsA.units.SIUnit	29	V (Volt)
		MMXU1.PhV.phsA.units.multiplier	3	Kilo

No.	Information	Value		
622	Vb (Vb =)	MMXU1.PhV.phsB.cVal.mag.f	Measured value	Absolute value
		MMXU1.PhV.phsB.units.SIUnit	29	V (Volt)
		MMXU1.PhV.phsB.units.multiplier	3	Kilo

No.	Information	Value		
623	Vc (Vc =)	MMXU1.PhV.phsC.cVal.mag.f	Measured value	Absolute value
		MMXU1.PhV.phsC.units.SIUnit	29	V (Volt)
		MMXU1.PhV.phsC.units.multiplier	3	Kilo

No.	Information	Value		
627	VN (VN =)	MMXU1.PhV.neut.cVal.mag.f	Measured value	Absolute value
		MMXU1.PhV.neut.units.SIUnit	29	V (Volt)
		MMXU1.PhV.neut.units.multiplier	3	Kilo

3.11.2 Remote measured values of master relay (MMXU2)

MMXU2.Mod

No.	Information		
3491	Master in Login state (Master Login)	0	1
MMXU2.Mod.stVal		**5**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

MMXU2.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
MMXU2.Health.stVal		**3**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

MMXU2.RelId

No.	Information	Value		
7761	Relay ID of 1. relay (Relay ID)	MMXU2.RelId.stVal	Parameter 4701	Device address

MMXU2.A

No.	Information	Value		
7762	I A (% of Operational nominal current) (I A_opN=)	MMXU2.A.phsA.cVal.mag.f	Measured value	Absolute value
		MMXU2.A.phsA.units.SIUnit	1	NONE
		MMXU2.A.phsA.units.multiplier	0	1
7763	Angle I A_remote <-> I A_local (ΦI A=)	MMXU2.A.phsA.cVal.ang.f	Measured value	Phase angle in °

No.	Information	Value		
7764	I B (% of Operational nominal current) (I B_opN=)	MMXU2.A.phsB.cVal.mag.f	Measured value	Absolute value
		MMXU2.A.phsB.units.SIUnit	1	NONE
		MMXU2.A.phsB.units.multiplier	0	1
7765	Angle I B_remote <-> I B_local (ΦI B=)	MMXU2.A.phsB.cVal.ang.f	Measured value	Phase angle in °

No.	Information	Value		
7766	I C (% of Operational nominal current) (I C_opN=)	MMXU2.A.phsC.cVal.mag.f	Measured value	Absolute value
		MMXU2.A.phsC.units.SIUnit	1	NONE
		MMXU2.A.phsC.units.multiplier	0	1
7767	Angle I C_remote <-> I C_local (ΦI C=)	MMXU2.A.phsC.cVal.ang.f	Measured value	Phase angle in °

MMXU2.PhV

No.	Information	Value		
7769	V A (% of Operational nominal voltage) (V A_opN=)	MMXU2.PhV.phsA.cVal.mag.f	Measured value	Absolute value
		MMXU2. PhV.phsA.units.SIUnit	29	V (Volt)
		MMXU2. PhV.phsA.units.multiplier	3	Kilo
7770	Angle V A_remote <-> V A_local (ΦV A=)	MMXU2. PhV.phsA.cVal.ang.f	Measured value	Phase angle in °

No.	Information	Value		
7771	V B (% of Operational nominal voltage) (V B_opN=)	MMXU2.PhV.phsB.cVal.mag.f	Measured value	Absolute value
		MMXU2. PhV.phsB.units.SIUnit	29	V (Volt)
		MMXU2. PhV.phsB.units.multiplier	3	Kilo
7772	Angle V B_remote <-> V B_local (ΦV B=)	MMXU2. PhV.phsB.cVal.ang.f	Measured value	Phase angle in °

No.	Information	Value		
7773	V C (% of Operational nominal voltage) (V C_opN=)	MMXU2.PhV.phsC.cVal.mag.f	Measured value	Absolute value
		MMXU2. PhV.phsC.units.SIUnit	29	V (Volt)
		MMXU2. PhV.phsC.units.multiplier	3	Kilo
7774	Angle V C_remote <-> V C_local (ΦV C=)	MMXU2. PhV.phsC.cVal.ang.f	Measured value	Phase angle in °

3.11.3 Remote measured values of slave relay (MMXU3)

MMXU3.Mod

No.	Information		
3492	Slave in Login state (Slave Login)	0	1
MMXU3.Mod.stVal		**5**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

MMXU3.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
MMXU3.Health.stVal		**3**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

MMXU3.RelId

No.	Information	Value		
7781	Relay ID of 2. relay (Relay ID)	MMXU3.RelId.stVal	Parameter 4702	Device address

MMXU3.A

No.	Information	Value		
7782	I A (% of Operational nominal current) (I A_opN=)	MMXU3.A.phsA.cVal.mag.f	Measured value	Absolute value
		MMXU3.A.phsA.units.SIUnit	1	NONE
		MMXU3.A.phsA.units.multiplier	0	1
7783	Angle I A_remote <-> I A_local (ΦI A=)	MMXU3.A.phsA.cVal.ang.f	Measured value	Phase angle in °

No.	Information	Value		
7784	I B (% of Operational nominal current) (I B_opN=)	MMXU3.A.phsB.cVal.mag.f	Measured value	Absolute value
		MMXU3.A.phsB.units.SIUnit	1	NONE
		MMXU3.A.phsB.units.multiplier	0	1
7785	Angle I B_remote <-> I B_local (ΦI B=)	MMXU3.A.phsB.cVal.ang.f	Measured value	Phase angle in °

No.	Information	Value		
7786	I C (% of Operational nominal current) (I C_opN=)	MMXU3.A.phsC.cVal.mag.f	Measured value	Absolute value
		MMXU3.A.phsC.units.SIUnit	1	NONE
		MMXU3.A.phsC.units.multiplier	0	1
7787	Angle I C_remote <-> I C_local (ΦI C=)	MMXU3.A.phsC.cVal.ang.f	Measured value	Phase angle in °

MMXU3.PhV

No.	Information	Value		
7789	V A (% of Operational nominal voltage) (V A_opN=)	MMXU3.PhV.phsA.cVal.mag.f	Measured value	Absolute value
		MMXU3. PhV.phsA.units.SIUnit	29	V (Volt)
		MMXU3. PhV.phsA.units.multiplier	3	Kilo
7790	Angle V A_remote <-> V A_local (ΦV A=)	MMXU3. PhV.phsA.cVal.ang.f	Measured value	Phase angle in °

No.	Information	Value		
7791	V B (% of Operational nominal voltage) (V B_opN=)	MMXU3.PhV.phsB.cVal.mag.f	Measured value	Absolute value
		MMXU3. PhV.phsB.units.SIUnit	29	V (Volt)
		MMXU3. PhV.phsB.units.multiplier	3	Kilo
7792	Angle V B_remote <-> V B_local (ΦV B=)	MMXU3. PhV.phsB.cVal.ang.f	Measured value	Phase angle in °

No.	Information	Value		
7793	V C (% of Operational nominal voltage) (V C_opN=)	MMXU3.PhV.phsC.cVal.mag.f	Measured value	Absolute value
		MMXU3. PhV.phsC.units.SIUnit	29	V (Volt)
		MMXU3. PhV.phsC.units.multiplier	3	Kilo
7794	Angle V C_remote <-> V C_local (ΦV C=)	MMXU3. PhV.phsC.cVal.ang.f	Measured value	Phase angle in °

3.11.4 Measured values, symmetrical components (MSQI1)

MSQI1.Mod

No.	Information		
51	Device is Operational and Protecting (Device OK)	1	0
MSQI1.Mod.stVal		**1**	**5**

device annunciation:
1 - ON
0 - OFF

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

MSQI1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
MSQI1.Health.stVal		**3**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

MSQI1.SeqA

No.	Information	Value		
619	I1 (positive sequence) (I1 =)	MSQI1.SeqA.c1.cVal.mag.f	Measured value	Absolute value
		MSQI1.SeqA.c1.units.SIUnit	5	A (Ampere)
		MSQI1.SeqA.c1.units.multiplier	0	1

No.	Information	Value		
620	I2 (negative sequence) (I2 =)	MSQI1.SeqA.c2.cVal.mag.f	Measured value	Absolute value
		MSQI1.SeqA.c2.units.SIUnit	5	A (Ampere)
		MSQI1.SeqA.c2.units.multiplier	0	1

No.	Information	Value		
610	3I0 (zero sequence) (3I0 =)	MSQI1.SeqA.c3.cVal.mag.f	Measured value	Absolute value
		MSQI1.SeqA.c3.units.SIUnit	5	A (Ampere)
		MSQI1.SeqA.c3.units.multiplier	0	1

MSQI1.SeqV

No.	Information		Value	
634	V1 (positive sequence) (V1 =)	MSQI1.SeqV.c1.cVal.mag.f	Measured value	Absolute value
		MSQI1.SeqV.c1.units.SIUnit	29	V (Volt)
		MSQI1.SeqV.c1.units.multiplier	3	Kilo

No.	Information		Value	
635	V2 (negative sequence) (V2 =)	MSQI1.SeqV.c2.cVal.mag.f	Measured value	Absolute value
		MSQI1.SeqV.c2.units.SIUnit	29	V (Volt)
		MSQI1.SeqV.c2.units.multiplier	3	Kilo

No.	Information		Value	
684	V0 (zero sequence) (V0 =)	MSQI1.SeqV.c3.cVal.mag.f	Measured value	Absolute value
		MSQI1.SeqV.c3.units.SIUnit	29	V (Volt)
		MSQI1.SeqV.c3.units.multiplier	3	Kilo

3.11.5 Power Metering (MMTR1)

MMTR1.Mod

No.	Information		
51	Device is Operational and Protecting (Device OK)	1	0
MMTR1.Mod.stVal		**1**	**5**

device annunciation:
1 - ON
0 - OFF

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

MMTR1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
MMTR1.Health.stVal		**3**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

MMTR1.SupWh

No.	Information	Value		
924	Wp Forward (Wp+=)	MMTR1.SupWh.actVal	Metered value	Current value of acummulated interrupted current = actVal × pulsQty
		MMTR1.SupWh.units.SIUnit	72	Wh
		MMTR1.SupWh.units.multiplier	9	Giga
		MMTR1.SupWh.pulsQty	1.154700e-005	Wh / Metered value

MMTR1.SupVArh

No.	Information	Value		
925	Wq Forward (Wq+=)	MMTR1.SupVArh.actVal	Metered value	Current value of acummulated interrupted current = actVal × pulsQty
		MMTR1.SupVArh.units.SIUnit	73	VArh
		MMTR1.SupVArh.units.multiplier	9	Giga
		MMTR1.SupVArh.pulsQty	1.154700e-005	VArh / Metered value

MMTR1.DmdWh

No.	Information	Value		
928	Wp Reverse (Wp-=)	MMTR1.DmdWh.actVal	Metered value	Current value of acummulated interrupted current = actVal × pulsQty
		MMTR1.DmdWh.units.SIUnit	72	Wh
		MMTR1.DmdWh.units.multiplier	9	Giga
		MMTR1.DmdWh.pulsQty	1.154700e-005	Wh / Metered value

MMTR1.DmdVArh

No.	Information	Value		
929	Wq Reverse (Wq-=)	MMTR1.DmdVArh.actVal	Metered value	Current value of acummulated interrupted current = actVal × pulsQty
		MMTR1.DmdVArh.units.SIUnit	73	VArh
		MMTR1.DmdVArh.units.multiplier	9	Giga
		MMTR1.DmdVArh.pulsQty	1.154700e-005	VArh / Metered value

3.12 Oscillographic Fault Records (RDRE1)

RDRE1.Mod

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
RDRE1.Mod.stVal		**5**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Mod.stVal:
1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

RDRE1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
RDRE1.Health.stVal		**3**	**1**

device annunciation:
1 - ON
0 - OFF

IEC Status Health.stVal:
1 - OK
2 - WARNING
3 - ALARM

RDRE1.RcdMade

No.	Information		
30053	Fault recording is running (Fault rec. run.)	0	1
RDRE1.RcdMade.stVal		**1**	**0**

device annunciation:
1 - ON
0 - OFF

IEC Status RcdMade.stVal:
0 - FALSE
1 - TRUE
(Recording complete)

RDRE1.FltNum

No.	Information	Value	
302	Fault Event (Fault Event)	RDRE1.FltNum.stVal	Present fault number

RDRE1.GriFltNum

No.	Information	Value	
301	Power System fault (Pow.Sys.Flt.)	RDRE1.GriFltNum.stVal	Network fault number

RDRE1.RcdStr

No.	Information		
30053	Fault recording is running (Fault rec. run.)	0	1
RDRE1.RcdStr.stVal		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

IEC Status RcdStr.stVal: 0 - FALSE, 1 - TRUE

Literature

/1/ SIPROTEC 4 Ethernet Module EN 100 IEC 61850 Electrical/optical Interface 100 MBit, Manual
C53000-G1176-C167

/2/ SIPROTEC 4 System Description
E50417-H1176-C151

/3/ SIPROTEC DIGSI, StartUP
E50417-G1176-C152

/4/ DIGSI CFC, Manual
E50417-H1176-C098

/5/ SIPROTEC SIGRA 4, Manual
E50417-H1176-C1100-C070

/6/ SIPROTEC Differential Protection 7SD80, Manual
C5300-G1176-C474

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