SIEMENS

SIPROTEC

Feeder Automation Controller 7SC80

V4.0

IEC 61850

PIXIT

C53000-G1140-C353-1

Document Release V04.00.02
Edition 12.2011

Siemens Aktiengesellschaft

Order No.: C53000-G1140-C353-1

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 device relevant information to Logical Nodes as part of protocol IEC61850

Target audience

This manual is intended mainly for all persons who configure, parameterize and operate SIPROTEC Devices 7SC80.

Scope of validity of this Manual

SIPROTEC 7SC80, Version 4.0

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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Applications

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This chapter specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface in SIPROTEC 7SC80.

1.1 General

This chapter specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface in SIPROTEC 7SC80.

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 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	6 with IEC 61850 Protocol Update Version EN100 V4.03 and higer 6 with IEC 61850 Protocol Update Version EN100 DNP 3.0 IP V1.00 and higer
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 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;

Description	Value / Clarification
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 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. In that case only the timeout detection will set the data to invalid.
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 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 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 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 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 on the Logical Nodes

2.2.1 Function parameters

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, XCBR1, PTRC1
Logical Device Measurement:	LLN0, LPHD1, MMXU1, MMTR1, MSQI1
Logical Device Control:	LLN0, LPHD1, CALH1

2.2.2 Function parameters SIPROTEC 7SC80

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 7SC80 - Effects of Function parameters to the Logical Nodes

No.	Function	Setting	Logical Nodes
103	Setting Group Change Option		No effect
104	Oscillographic Fault Records	Disabled	-
		Enabled	RDRE1
112	50 (Charac. Phase) Overcurrent Protection	Disabled	-
		Definite Time	PTOC6, PTOC7, PTOC18, PTRC2
113	50N (Charac. Ground) Overcurrent Protection	Disabled	-
		Definite Time	PTOC8, PTOC9, PTRC2
115	67 Directional Overcurrent Protection	Disabled	-
		Definite Time	PTOC10, PTOC11, PTRC3
116	67N Directional Overcurrent Protection	Disabled	-
		Definite Time	PTOC12, PTOC13, PTRC3
122	2nd Harmonic Inrush Restraint		No effect
140	46 Negative Sequence Protection	Disabled	-
		TOC ANSI	PTOC14, PTOC15, PTOC5
		TOC IEC	PTOC14, PTOC15, PTOC5
		Definite Time	PTOC14, PTOC15
150	27, 59 Under/Overvoltage Protection	Disabled	-
		Enabled	PTUV1, PTUV2, PTOV1, PTOV2

Table 2-1 SIPROTEC 7SC80 - Effects of Function parameters to the Logical Nodes (Cont.)

No.	Function	Setting	Logical Nodes
154	81 Over/Underfrequency Protection	Disabled	-
		Enabled	PTOF1 – PTOF4, PTUF1 – PTUF4
170	50BF Breaker Failure Protection	Disabled	-
		Enabled	RBRF1
		enabled w/ 3I0>	RBRF1
		Enabled w/o I>	RBRF1
180	Fault Locator	Disabled	-
		Enabled	RFLO1
181	Line sections for fault locator	1 Section 2 Sections 3 Sections	No effect
350	Battery Charger		No effect
370	27/59 Vx		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 PTRC1	General General device pickup General OFF	Mod, Beh, Health, NamPlt, OpTmh Mod, Beh, Health, NamPlt, Str,Tr,FinTr
XCBR1	52 Breaker Three-pole tripping	Mod, Beh, Health, NamPlt, Loc, OpCnt, Pos BlkOpn, BlkCls, CBOpCap SumSwARs1, SumSwARs2, SumSwARs3
PTOC6 PTOC7 PTOC18 PTRC2	50 (Charac. Phase)	Mod, Beh, Health, NamPlt, Str, Op
PTOC8 PTOC9 PRTC2	50N (Charac. Ground)	Mod, Beh, Health, NamPlt, Str, Op
PTOC10 PTOC11 PTRC3	67	Mod, Beh, Health, NamPlt, Str, Op
PTOC12 PTOC13 PRTC3	67N	Mod, Beh, Health, NamPlt, Str, Op
PTUV1 PTUV2	27 Undervoltage Protection	Mod, Beh, Health, NamPlt, Str, Op
PTOV1 PTOV2	59 Overvoltage Protection	Mod, Beh, Health, NamPlt, Str, Op
PTOC14 PTOC15 PTOC5	46 Negative Sequence Protection	Mod, Beh, Health, NamPlt, Str, Op
PTUF1 PTUF2 PTUF3 PTUF4	81 Underfrequency Protection	Mod, Beh, Health, NamPlt, Str, Op, BlkV

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

LN	Function	DOI
PTOF1 PTOF2 PTOF3 PTOF4	81 Overfrequency Protection	Mod, Beh, Health, NamPlt, Str, Op, BlkV
RFLO1	Fault Locator	Mod, Beh, Health, NamPlt, FltZ, FltDiskm, FltDisPrc
RBRF1	50BF Breaker Failure Protection	Mod, Beh, Health, NamPlt, Str, OpEx, OpIn
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, PPV, PhV, A
MMTR1	Power Metering	Mod, Beh, Health, NamPlt, SupWh, SupVArh, DmdWh, DmdVArh
MSQI1	Measured values, symmetrical components	Mod, Beh, Health, NamPlt, SeqA, SeqV
LPHD1	Device	PhyNam, PhyHealth, Proxy

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	Oscillographic Fault Records	Mod, Beh, Health, NamPlt, RcdMade, RcdStr FltNum, GriFltNum
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
CALH1	Error with a summary alarm and Alarm summary event	Mod, Beh, Health, NamPlt, GrAlm, GrWrn,
LPHD1	Device	PhyNam, PhyHealth, Proxy, CtlNum, DevStr

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, LEDRs, Loc
LPHD1	Device	PhyNam, PhyHealth, Proxy, CtlNum

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.

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	1	1	1	1
	Test mode (Test mode)	x	0	0	1	1
	Stop data transmission (DataStop)	x	0	1	0	1
LLN0.Mod.stVal		**5**	**1**	**2**	**3**	**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

LLN0.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
LLN0.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

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

LLN0.OpTmh

No.	Information	Value	
1020	Counter of operating hours (Op.Hours=)	LLN0.OpTmh.stVal	Operating hours (Absolute value)

2.4.2 Logical Devices MEAS, DR and EXT

LLN0.Mod

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

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

LLN0.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
LLN0.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

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

LLN0.OpTmh

No.	Information	Value	
1020	Counter of operating hours (Op.Hours=)	LLN0.OpTmh.stVal	Operating hours (Absolute value)

2.4.3 Logical Device CTRL

LLN0.Mod

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

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					
55	Reset Device (Reset Device)	1	1	1	1	1
51	Device is Operational and Protecting (Device OK)	1	1	1	1	0
	Test mode (Test mode)	1	1	0	0	0
	Stop data transmission (DataStop)	1	0	1	0	0
LLN0.Beh.stVal		**4**	**3**	**2**	**1**	**5**

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

LLN0.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
LLN0.Health.stVal		**3**	**1**

device annunciation: 1 - ON, 0 - OFF

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

LLN0.OpTmh

No.	Information	Value	
1020	Counter of operating hours (Op.Hours=)	LLN0.OpTmh.stVal	Operating hours (Absolute value)

2.5 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							
	Test mode (Test mode)	x	0	1	0	1	0	1	x
	Stop data transmission (DataStop)	x	0	0	1	1	x	x	x
52	At Least 1 Protection Funct. is Active (ProtActive)	x	1	1	1	1	1	1	0
	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 what consequences non-configured functions have on the Logical Nodes as well as general information about IEC 61850 mapping of information.

3.1 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

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

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

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

3.1.1 Error with a summary alarm and Alarm summary event

CALH1.Mod

No.	Information		
51	Device is Operational and Protecting (Device OK)	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

3.2 Oscillographic Fault Records (RDRE1)

RDRE1.Mod

No.	Information	
55	Reset Device (Reset Device)	x
RDRE1.Mod.stVal		**1**

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

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

3.3 Overcurrent Protection 50, 50N (PTOCx, PTRC2)

3.3.1 Overcurrent Protection 50 PH (PTOC6, PTOC7, PTOC18)

PTOC6.Mod

No.	Information					
1753	50/51 O/C is ACTIVE (50/51 PH ACT)	x	x	x	x	x
1752	50/51 O/C is BLOCKED (50/51 PH BLK)	x	x	x	1	0
1751	50/51 O/C switched OFF (50/51 PH OFF)	1	x	0	0	0
	50-1 PICKUP (P1204) = ∞	x	1	0	0	0
	Frequency range is exceeded	x	x	1	x	0
PTOC6.Mod.stVal		**5**	**5**	**2**	**2**	**1**

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

PTOC6.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOC6.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

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

PTOC6.Str

No.	Information		
1810	50-1 picked up (50-1 picked up)	0	1
PTOC6.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

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

PTOC6.Op

No.	Information		
1815	50-1 TRIP (50-1 TRIP)	0	1
PTOC6.Op.general		**0**	**1**

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

PTOC7.Mod

No.	Information					
1753	50/51 O/C is ACTIVE (50/51 PH ACT)	x	x	x	x	x
1752	50/51 O/C is BLOCKED (50/51 PH BLK)	x	x	x	1	0
1751	50/51 O/C switched OFF (50/51 PH OFF)	1	x	0	0	0
	50-2 PICKUP (P1202) = ∞	x	1	0	0	0
	Frequency range is exceeded	x	x	1	x	0
PTOC7.Mod.stVal		**5**	**5**	**2**	**2**	**1**

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

PTOC7.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOC7.Health.stVal		**3**	**1**

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

PTOC7.Str

No.	Information		
1800	50-2 picked up (50-2 picked up)	0	1
PTOC7.Str.general		**0**	**1**

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

PTOC7.Op

No.	Information		
1805	50-2 TRIP (50-2 TRIP)	0	1
PTOC7.Op.general		**0**	**1**

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

PTOC18.Mod

No.	Information					
1753	50/51 O/C is ACTIVE (50/51 PH ACT)	x	x	x	x	x
1752	50/51 O/C is BLOCKED (50/51 PH BLK)	x	x	x	1	0
1751	50/51 O/C switched OFF (50/51 PH OFF)	1	x	0	0	0
	50-3 PICKUP(P1217) = ∞	x	1	0	0	0
	Frequency range is exceeded	x	x	1	x	0
PTOC18.Mod.stVal		**5**	**5**	**2**	**2**	**1**

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

PTOC18.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOC18.Health.stVal		**3**	**1**

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

PTOC18.Str

No.	Information		
1767	50-3 picked up (50-3 picked up)	0	1
PTOC18.Str.general		**0**	**1**

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

PTOC18.Op

No.	Information		
1769	50-3 TRIP (50-3 TRIP)	0	1
PTOC18.Op.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

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

3.3.2 Overcurrent Protection 50N (PTOC8, PTOC9)

PTOC8.Mod

No.	Information					
7158	50N/51N is ACTIVE (50N/51N ACT)	x	x	x	x	x
7157	50N/51N is BLOCKED (50N/51N BLK)	x	x	x	1	0
7156	50N/51N is OFF (50N/51N OFF)	1	x	0	0	0
	50N-1 PICKUP (P1304) = ∞	x	1	0	0	0
	Frequency range is exceeded	x	x	1	x	0
PTOC8.Mod.stVal		**5**	**5**	**2**	**2**	**1**

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

PTOC8.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOC8.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

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

PTOC8.Str

No.	Information		
1834	50N-1 picked up (50N-1 picked up)	0	1
PTOC8.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

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

PTOC8.Op

No.	Information		
1836	50N-1 TRIP (50N-1 TRIP)	0	1
PTOC8.Op.general		**0**	**1**

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

PTOC9.Mod

No.	Information					
7158	50N/51N is ACTIVE (50N/51N ACT)	x	x	x	x	x
7157	50N/51N is BLOCKED (50N/51N BLK)	x	x	x	1	0
7156	50N/51N is OFF (50N/51N OFF)	1	x	0	0	0
	50N-2 PICKUP (P1302) = ∞	x	1	0	0	0
	Frequency range is exceeded	x	x	1	x	0
PTOC9.Mod.stVal		**5**	**5**	**2**	**2**	**1**

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		
1831	50N-2 picked up (50N-2 picked up)	0	1
PTOC9.Str.general		**0**	**1**

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

PTOC9.Op

No.	Information		
1833	50N-2 TRIP (50N-2 TRIP)	0	1
PTOC9.Op.general		**0**	**1**

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

3.3.3 Overcurrent Protection 50N (PTRC2)

PTRC2.Mod

No.	Information				
1753 1758	50/51 O/C is ACTIVE (50/51 PH ACT) or 50N/51N is ACTIVE (50N/51N ACT)	x	x	x	x
1752 1757	50/51 O/C is BLOCKED (50/51 PH BLK) and 50N/51N is BLOCKED (50N/51N BLK)	x	x	1	0
1751 1756	50/51 O/C switched OFF (50/51 PH OFF) and 50N/51N is OFF (50N/51N OFF)	1	0	0	0
	Frequency range is exceeded	x	1	x	0
PTRC2.Mod.stVal		**5**	**2**	**2**	**1**

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

PTRC2.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTRC2.Health.stVal		**3**	**1**

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

PTRC2.Str

No.	Information		
1761	50(N)/51(N) O/C PICKUP (50(N)/51(N) PU)	0	1
PTRC2.Str.general		**0**	**1**

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

PTRC2.Str.dirGeneral

No.	Information	
PTRC2.Str.dirGeneral		**0**

device annunciation:
IEC Status Str.dirGeneral: 0 - UNKNOWN

PTRC2.Str.phsA

No.	Information		
1762	50/51 Phase A picked up (50/51 Ph A PU)	0	1
PTRC2.Str.phsA		**0**	**1**

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

PTRC2.Str.dirPhsA

No.	Information	
PTRC2.Str.dirPhsA		**0**

device annunciation:
IEC Status Str.dirPhsA: 0 - UNKNOWN

PTRC2.Str.phsB

No.	Information		
1763	50/51 Phase B picked up (50/51 Ph B PU)	0	1
PTRC2.Str.phsB		**0**	**1**

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

PTRC2.Str.dirPhsB

No.	Information	
PTRC2.Str.dirPhsB		**0**

device annunciation: IEC Status Str.dirPhsB: 0 - UNKNOWN

PTRC2.Str.phsC

No.	Information		
1764	50/51 Phase C picked up (50/51 Ph C PU)	0	1
PTRC2.Str.phsC		**0**	**1**

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

PTRC2.Str.dirPhsC

No.	Information	
PTRC2.Str.dirPhsC		**0**

device annunciation: IEC Status Str.dirPhsC: 0 - UNKNOWN

PTRC2.Str.neut

No.	Information		
1765	50N/51N picked up (50N/51NPickedup)	0	1
PTRC2.Str.neut		**0**	**1**

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

PTRC2.Str.dirNeut

No.	Information	
PTRC2.Str.dirNeut		**0**

device annunciation: IEC Status Str.dirPhsC: 0 - UNKNOWN

PTRC2.Op

No.	Information		
1791	50(N)/51(N) TRIP (50(N)/51(N)TRIP)	0	1
PTRC2.Op.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

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

3.4 Directional Overcurrent Protection 67 (PTOCx, PTRC3)

3.4.1 Directional Overcurrent Protection 67 (PTOC10, PTOC11)

PTOC10.Mod

No.	Information					
2653	67/67-TOC is ACTIVE (67 ACTIVE)	x	x	x	x	x
2652	67/67-TOC is BLOCKED (67 BLOCKED)	x	x	x	1	0
2651	67/67-TOC switched OFF (67/67-TOC OFF)	1	x	0	0	0
	67-1 PICKUP (P1504) = ∞	x	1	0	0	0
	Frequency range is exceeded	x	x	1	x	0
PTOC10.Mod.stVal		**5**	**5**	**2**	**2**	**1**

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		
2660	67-1 picked up (67-1 picked up)	0	1
PTOC10.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

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

PTOC10.Op

No.	Information		
2665	67-1 TRIP (67-1 TRIP)	0	1
PTOC10.Op.general		**0**	**1**

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

PTOC11.Mod

No.	Information					
2653	67/67-TOC is ACTIVE (67 ACTIVE)	x	x	x	x	x
2652	67/67-TOC is BLOCKED (67 BLOCKED)	x	x	x	1	0
2651	67/67-TOC switched OFF (67/67-TOC OFF)	1	x	0	0	0
	67-2 PICKUP (P1502) = ∞	x	1	0	0	0
	Frequency range is exceeded	x	x	1	x	0
PTOC11.Mod.stVal		**5**	**5**	**2**	**2**	**1**

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		
2642	67-2 picked up (67-2 picked up)	0	1
PTOC11.Str.general		**0**	**1**

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

PTOC11.Op

No.	Information		
2649	67-2 TRIP (67-2 TRIP)	0	1
PTOC11.Op.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

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

3.4.2 Directional Overcurrent Protection 67N (PTOC12, PTOC13)

PTOC12.Mod

No.	Information					
2658	67N/67N-TOC is ACTIVE (67N ACTIVE)	x	x	x	x	x
2657	67N/67N-TOC is BLOCKED (67N BLOCKED)	x	x	x	1	0
2656	67N/67N-TOC switched OFF (67N OFF)	1	x	0	0	0
	67N-1 PICKUP (P1604) = ∞	x	1	0	0	0
	Frequency range is exceeded	x	x	1	x	0
PTOC12.Mod.stVal		**5**	**5**	**2**	**2**	**1**

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

PTOC12.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOC12.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

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

PTOC12.Str

No.	Information		
2681	67N-1 picked up (67N-1 picked up)	0	1
PTOC12.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

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

PTOC12.Op

No.	Information		
2683	67N-1 TRIP (67N-1 TRIP)	0	1
PTOC12.Op.general		**0**	**1**

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

PTOC13.Mod

No.	Information					
2658	67N/67N-TOC is ACTIVE (67N ACTIVE)	x	x	x	x	x
2657	67N/67N-TOC is BLOCKED (67N BLOCKED)	x	x	x	1	0
2656	67N/67N-TOC switched OFF (67N OFF)	1	x	0	0	0
	67N-2 PICKUP (P1602) = ∞	x	1	0	0	0
	Frequency range is exceeded	x	x	1	x	0
PTOC13.Mod.stVal		**5**	**5**	**2**	**2**	**1**

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

PTOC13.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOC13.Health.stVal		**3**	**1**

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

PTOC13.Str

No.	Information		
2646	67N-2 picked up (67N-2 picked up)	0	1
PTOC13.Str.general		**0**	**1**

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

PTOC13.Op

No.	Information		
2679	67N-2 TRIP (67N-2 TRIP)	0	1
PTOC13.Op.general		**0**	**1**

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

3.4.3 Directional Overcurrent Protection 67N (PTRC3)

PTRC3.Mod

No.	Information				
	67/67-TOC is ACTIVE (67 ACTIVE) (I 2653) or 67N/67N-TOC is ACTIVE (67N ACTIVE) (I 2658)	x	x	x	x
	67/67-TOC is BLOCKED (67 BLOCKED) (I 2652) and 67N/67N-TOC is BLOCKED (67N BLOCKED) (I 2657)	x	x	1	0
	67/67-TOC switched OFF (67/67-TOC OFF) (I 2651) and 67N/67N-TOC switched OFF (67N OFF) (I 2656)	1	0	0	0
	Frequency range is exceeded	x	1	x	0
PTRC3.Mod.stVal		**5**	**2**	**2**	**1**

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		
2691	67/67N picked up (67/67N pickedup)	0	1
PTRC3.Str.general		**0**	**1**

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

PTRC3.Str.dirGeneral

No.	Information					
2691	67/67N picked up (67/67N picked up)	0	1	1	1	1
	Phase A forward (Phase A forward) (I 2628) or Phase B forward (Phase B forward) (I 2629) or Phase C forward (Phase C forward) (I 2630) or Ground forward (Ground forward) (I 2635)	x	0	1	0	1
	Phase A reverse (Phase A reverse) (I 2632) or Phase B reverse (Phase B reverse) (I 2633) or Phase C reverse (Phase C reverse) (I 2634) or Ground reverse (Ground reverse) (I 2636)	x	0	0	1	1
PTRC3.Str.dirGeneral		**0**	**0**	**1**	**2**	**3**

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

PTRC3.Str.phsA

No.	Information		
2692	67/67-TOC Phase A picked up (67 A picked up)	0	1
PTRC3.Str.phsA		**0**	**1**

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

PTRC3.Str.dirPhsA

No.	Information					
2692	67/67-TOC Phase A picked up (67 A picked up)	0	1	1	1	1
2628	Phase A forward (Phase A forward)	x	0	1	0	1
2632	Phase A reverse (Phase A reverse)	x	0	0	1	1
PTRC3.Str.dirPhsA		**0**	**0**	**1**	**2**	**3**

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

IEC Status Str.dirPhsA: 0 - UNKNOWN, 1 - FORWARD, 2 - BACKWARD

PTRC3.Str.phsB

No.	Information		
2693	67/67-TOC Phase B picked up (67 B picked up)	0	1
PTRC3.Str.phsB		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

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

PTRC3.Str.dirPhsB

No.	Information					
2693	67/67-TOC Phase B picked up (67 B picked up)	0	1	1	1	1
2629	Phase B forward (Phase B forward)	x	0	1	0	1
2633	Phase B reverse (Phase B reverse)	x	0	0	1	1
PTRC3.Str.dirPhsB		**0**	**0**	**1**	**2**	**3**

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

IEC Status Str.dirPhsB: 0 - UNKNOWN, 1 - FORWARD, 2 - BACKWARD

PTRC3.Str.phsC

No.	Information		
2694	67/67-TOC Phase C picked up (67 C picked up)	0	1
PTRC3.Str.phsC		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

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

PTRC3.Str.dirPhsC

No.	Information					
2694	67/67-TOC Phase C picked up (67 C picked up)	0	1	1	1	1
2630	Phase C forward (Phase C forward)	x	0	1	0	1
2634	Phase C reverse (Phase C reverse)	x	0	0	1	1
PTRC3.Str.dirPhsC		**0**	**0**	**1**	**2**	**3**

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

IEC Status Str.dirPhsC: 0 - UNKNOWN, 1 - FORWARD, 2 - BACKWARD

PTRC3.Str.neut

No.	Information		
2695	67N/67N-TOC picked up (67N picked up)	0	1
PTRC3.Str.neut		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

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

PTRC3.Str.dirNeut

No.	Information					
2695	67N/67N-TOC picked up (67N picked up)	0	1	1	1	1
2635	Ground forward (Ground forward)	x	0	1	0	1
2636	Ground reverse (Ground reverse)	x	0	0	1	1
PTRC3.Str.dirNeut		**0**	**0**	**1**	**2**	**3**

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

IEC Status Str.dirPhsC: 0 - UNKNOWN, 1 - FORWARD, 2 - BACKWARD

PTRC3.Op

No.	Information		
2696	67/67N TRIP (67/67N TRIP)	0	1
PTRC3.Op.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

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

3.5 Voltage Protection 27, 59 (PTUVx, PTOVx)

3.5.1 Undervoltage Protection 27 (PTUV1)

PTUV1.Mod

No.	Information				
6532	27 Undervoltage protection is ACTIVE (27 ACTIVE)	x	x	x	x
6531	27 Undervoltage protection is BLOCKED (27 BLOCKED)	x	x	1	0
170	VT Fuse Failure (alarm instantaneous) (VT FuseFail)	x	1	x	0
6530	27 Undervoltage protection switched OFF (27 OFF)	1	0	0	0
PTUV1.Mod.stVal		**5**	**2**	**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

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			
6533	27-1 Undervoltage picked up (27-1 picked up)	0	x	1
6534	27-1 Undervoltage PICKUP w/curr. superv (27-1 PU CS)	0	1	x
PTUV1.Str.general		**0**	**1**	**1**

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

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

PTUV1.Op

No.	Information		
6539	27-1 Undervoltage TRIP (27-1 TRIP)	0	1
PTUV1.Op.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

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

3.5.2 Undervoltage Protection 27 (PTUV2)

PTUV2.Mod

No.	Information				
6532	27 Undervoltage protection is ACTIVE (27 ACTIVE)	x	x	x	x
6531	27 Undervoltage protection is BLOCKED (27 BLOCKED)	x	x	1	0
170	VT Fuse Failure (alarm instantaneous) (VT FuseFail)	x	1	x	0
6530	27 Undervoltage protection switched OFF (27 OFF)	1	0	0	0
PTUV2.Mod.stVal		**5**	**2**	**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

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			
6537	27-2 Undervoltage picked up (27-2 picked up)	0	x	1
6538	27-2 Undervoltage PICKUP w/curr. superv (27-2 PU CS)	0	1	x
PTUV2.Str.general		**0**	**1**	**1**

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

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

PTUV2.Op

No.	Information		
6540	27-2 Undervoltage TRIP (27-2 TRIP)	0	1
PTUV2.Op.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

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

3.5.3 Overvoltage Protection 59 (PTOV1)

PTOV1.Mod

No.	Information				
6567	59-Overvoltage protection is ACTIVE (59 ACTIVE)	x	x	x	x
6566	59-Overvoltage protection is BLOCKED (59 BLOCKED)	x	x	1	0
6565	59-Overvoltage protection switched OFF (59 OFF)	1	0	0	0
	Frequency range is exceeded	x	1	x	0
PTOV1.Mod.stVal		**5**	**2**	**2**	**1**

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

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		
6568	59 picked up (59-1 picked up)	0	1
PTOV1.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

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

PTOV1.Op

No.	Information		
6570	59 TRIP (59-1 TRIP)	0	1
PTOV1.Op.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

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

3.5.4 Overvoltage Protection 59 (PTOV2)

PTOV2.Mod

No.	Information				
6567	59-Overvoltage protection is ACTIVE (59 ACTIVE)	x	x	x	x
6566	59-Overvoltage protection is BLOCKED (59 BLOCKED)	x	x	1	0
6565	59-Overvoltage protection switched OFF (59 OFF)	1	0	0	0
	Frequency range is exceeded	x	1	x	0
PTOV2.Mod.stVal		**5**	**2**	**2**	**1**

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

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		
6571	59-2 Overvoltage V>> picked up (59-2 picked up)	0	1
PTOV2.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

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

PTOV2.Op

No.	Information		
6573	59-2 Overvoltage V>> TRIP (59-2 TRIP)	0	1
PTOV2.Op.general		**0**	**1**

device annunciation: 1 - ON 0 - OFF

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

3.6 Negative Sequence Protection 46 (PTOC14, PTOC15, PTOC5)

PTOC14.Mod

No.	Information				
5153	46 is ACTIVE (46 ACTIVE)	x	x	x	x
5152	46 is BLOCKED (46 BLOCKED)	x	x	1	0
5151	46 switched OFF (46 OFF)	1	0	0	0
	Frequency range is exceeded	x	1	x	0
PTOC14.Mod.stVal		**5**	**2**	**2**	**1**

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

PTOC14.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOC14.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

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

PTOC14.Str

No.	Information		
5165	46-1 picked up (46-1 picked up)	0	1
PTOC14.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

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

PTOC14.Op

No.	Information		
	46-1 TRIP (46-1 TRIP)	0	1
PTOC14.Op.general		**0**	**1**

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

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

PTOC15.Mod

No.	Information				
5153	46 is ACTIVE (46 ACTIVE)	x	x	x	x
5152	46 is BLOCKED (46 BLOCKED)	x	x	1	0
5151	46 switched OFF (46 OFF)	1	0	0	0
	Frequency range is exceeded	x	1	x	0
PTOC15.Mod.stVal		**5**	**2**	**2**	**1**

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

PTOC15.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOC15.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

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

PTOC15.Str

No.	Information		
5159	46-2 picked up (46-2 picked up)	0	1
PTOC15.Str.general		**0**	**1**

device annunciation: 1 - ON
0 - OFF

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

PTOC15.Op

No.	Information		
	46-2 TRIP (46-2 TRIP)	0	1
PTOC15.Op.general		**0**	**1**

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

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

PTOC5.Mod

No.	Information				
5153	46 is ACTIVE (46 ACTIVE)	x	x	x	x
5152	46 is BLOCKED (46 BLOCKED)	x	x	1	0
5151	46 switched OFF (46 OFF)	1	0	0	0
	Frequency range is exceeded	x	1	x	0
PTOC5.Mod.stVal		**5**	**2**	**2**	**1**

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

PTOC5.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTOC5.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

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

PTOC5.Str

No.	Information		
5166	46-TOC picked up (46-TOC pickedup)	0	1
PTOC5.Str.general		**0**	**1**

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

PTOC5.Op

No.	Information		
	46-TOC TRIP (46-TOC TRIP)	0	1
PTOC5.Op.general		**0**	**1**

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

3.7 Frequency protection 81 O/U (PTUFx, PTOFx)

3.7.1 Frequency protection 81-1 U (PTUF1)

PTUF1.Mod

No.	Information						
5213	81 ACTIVE (81 ACTIVE)	x	x	x	x	x	x
5212	81 BLOCKED (81 BLOCKED)	x	x	x	x	1	0
5206	>BLOCK 81-1 (>BLOCK 81-1)	x	x	x	1	x	0
5214	81 Under Voltage Block (81 Under V Blk)	x	x	1	x	x	0
5211	81 OFF (81 OFF)	x	1	0	0	0	0
	81-1 PICKUP (P5403/5404) < Rated Frequency (P214)	0	1	1	1	1	1
PTUF1.Mod.stVal		**5**	**5**	**2**	**2**	**2**	**1**

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
	81-1 PICKUP (P5403/5404) < Rated Frequency (P214)	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
	81-1 PICKUP (P5403/5404) < Rated Frequency (P214)	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

PTUF1.BlkV

No.	Information				
5214	81 Under Voltage Block (81 Under V Blk)	0	0	1	1
	81-1 PICKUP (P5403/5404) < Rated Frequency (P214)	0	1	0	1
PTUF1.BlkV.stVal		**0**	**0**	**0**	**1**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status BlkV.stVal: 0 - FALSE
1 - TRUE

3.7.2 Frequency protection 81-2 U (PTUF2)

PTUF2.Mod

No.	Information						
5213	81 ACTIVE (81 ACTIVE)	x	x	x	x	x	x
5212	81 BLOCKED (81 BLOCKED)	x	x	x	x	1	0
5207	>BLOCK 81-2 (>BLOCK 81-2)	x	x	x	1	x	0
5214	81 Under Voltage Block (81 Under V Blk)	x	x	1	x	x	0
5211	81 OFF (81 OFF)	x	1	0	0	0	0
	81-2 PICKUP (P5406/5407) < Rated Frequency (P214)	0	1	1	1	1	1
PTUF2.Mod.stVal		**5**	**5**	**2**	**2**	**2**	**1**

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
	81-2 PICKUP (P5406/5407) < Rated Frequency (P214)	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
	81-2 PICKUP (P5406/5407) < Rated Frequency (P214)	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

PTUF2.BlkV

No.	Information				
5214	81 Under Voltage Block (81 Under V Blk)	0	0	1	1
	81-2 PICKUP (P5406/5407) < Rated Frequency (P214)	0	1	0	1
PTUF2.BlkV.stVal		**0**	**0**	**0**	**1**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status BlkV.stVal: 0 - FALSE
1 - TRUE

3.7.3 Frequency protection 81-3 U (PTUF3)

PTUF3.Mod

No.	Information						
5213	81 ACTIVE (81 ACTIVE)	x	x	x	x	x	x
5212	81 BLOCKED (81 BLOCKED)	x	x	x	x	1	0
5208	>BLOCK 81-3 (>BLOCK 81-3)	x	x	x	1	x	0
5214	81 Under Voltage Block (81 Under V Blk)	x	x	1	x	x	0
5211	81 OFF (81 OFF)	x	1	0	0	0	0
	81-3 PICKUP (P5409/5410) < Rated Frequency (P214)	0	1	1	1	1	1
PTUF3.Mod.stVal		**5**	**5**	**2**	**2**	**2**	**1**

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
	81-3 PICKUP (P5409/5410) < Rated Frequency (P214)	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
	81-3 PICKUP (P5409/5410) < Rated Frequency (P214)	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

PTUF3.BlkV

No.	Information				
5214	81 Under Voltage Block (81 Under V Blk)	0	0	1	1
	81-3 PICKUP (P5409/5410) < Rated Frequency (P214)	0	1	0	1
PTUF3.BlkV.stVal		**0**	**0**	**0**	**1**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status BlkV.stVal: 0 - FALSE
1 - TRUE

3.7.4 Frequency protection 81-4 U (PTUF4)

PTUF4.Mod

No.	Information						
5213	81 ACTIVE (81 ACTIVE)	x	x	x	x	x	x
5212	81 BLOCKED (81 BLOCKED)	x	x	x	x	1	0
5209	>BLOCK 81-4 (>BLOCK 81-4)	x	x	x	1	x	0
5214	81 Under Voltage Block (81 Under V Blk)	x	x	1	x	x	0
5211	81 OFF (81 OFF)	x	1	0	0	0	0
	81-4 PICKUP (P5412/5413) < Rated Frequency (P214)	0	1	1	1	1	1
PTUF4.Mod.stVal		**5**	**5**	**2**	**2**	**2**	**1**

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
	81-4 PICKUP (P5412/5413) < Rated Frequency (P214)	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
	81-4 PICKUP (P5412/5413) < Rated Frequency (P214)	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

PTUF4.BlkV

No.	Information				
5214	81 Under Voltage Block (81 Under V Blk)	0	0	1	1
	81-4 PICKUP (P5412/5413) < Rated Frequency (P214)	0	1	0	1
PTUF4.BlkV.stVal		**0**	**0**	**0**	**1**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status BlkV.stVal: 0 - FALSE
1 - TRUE

3.7.5 Frequency protection 81-1 O (PTOF1)

PTOF1.Mod

No.	Information							
5213	81 ACTIVE (81 ACTIVE)	x	x	x	x	x	x	x
5212	81 BLOCKED (81 BLOCKED)	x	x	x	x	x	1	0
5206	>BLOCK 81-1 (>BLOCK 81-1)	x	x	x	x	1	x	0
5214	81 Under Voltage Block (81 Under V Blk)	x	x	x	1	x	x	0
5211	81 OFF (81 OFF)	x	x	1	0	0	0	0
	81-1 PICKUP (P5403/5404) ≤ Rated Frequency (P214)	x	1	x	0	0	0	0
PTOF1.Mod.stVal		**5**	**5**	**5**	**2**	**2**	**2**	**1**

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
	81-1 PICKUP (P5403/5404) < Rated Frequency (P214)	0	1	0	1
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
	81-1 PICKUP (P5403/5404) < Rated Frequency (P214)	0	1	0	1
PTOF1.Op.general		**0**	**0**	**1**	**0**

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

PTOF1.BlkV

No.	Information				
5214	81 Under Voltage Block (81 Under V Blk)	0	0	1	1
	81-1 PICKUP (P5403/5404) < Rated Frequency (P214)	0	1	0	1
PTOF1.BlkV.stVal		**0**	**0**	**1**	**0**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status BlkV.stVal: 0 - FALSE
1 - TRUE

3.7.6 Frequency protection 81-2 O (PTOF2)

PTOF2.Mod

No.	Information							
5213	81 ACTIVE (81 ACTIVE)	x	x	x	x	x	x	x
5212	81 BLOCKED (81 BLOCKED)	x	x	x	x	x	1	0
5207	>BLOCK 81-2 (>BLOCK 81-2)	x	x	x	x	1	x	0
5214	81 Under Voltage Block (81 Under V Blk)	x	x	x	1	x	x	0
5211	81 OFF (81 OFF)	x	x	1	0	0	0	0
	81-2 PICKUP (P5406/5407) ≤ Rated Frequency (P214)	x	1	x	0	0	0	0
PTOF2.Mod.stVal		**5**	**5**	**5**	**2**	**2**	**2**	**1**

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
	81-2 PICKUP (P5406/5407) < Rated Frequency (P214)	0	1	0	1
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
	81-2 PICKUP (P5406/5407) < Rated Frequency (P214)	0	1	0	1
PTOF2.Op.general		**0**	**0**	**1**	**0**

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

PTOF2.BlkV

No.	Information				
5214	81 Under Voltage Block (81 Under V Blk)	0	0	1	1
	81-2 PICKUP (P5406/5407) < Rated Frequency (P214)	0	1	0	1
PTOF2.BlkV.stVal		**0**	**0**	**1**	**0**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status BlkV.stVal: 0 - FALSE
1 - TRUE

3.7.7 Frequency protection 81-3 O (PTOF3)

PTOF3.Mod

No.	Information							
5213	81 ACTIVE (81 ACTIVE)	x	x	x	x	x	x	x
5212	81 BLOCKED (81 BLOCKED)	x	x	x	x	x	1	0
5208	>BLOCK 81-3 (>BLOCK 81-3)	x	x	x	x	1	x	0
5214	81 Under Voltage Block (81 Under V Blk)	x	x	x	1	x	x	0
5211	81 OFF (81 OFF)	x	x	1	0	0	0	0
	81-3 PICKUP (P5409/5410) ≤ Rated Frequency (P214)	x	1	x	0	0	0	0
PTOF1.Mod.stVal		**5**	**5**	**5**	**2**	**2**	**2**	**1**

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
	81-3 PICKUP (P5409/5410) < Rated Frequency (P214)	0	1	0	1
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
	81-3 PICKUP (P5409/5410) < Rated Frequency (P214)	0	1	0	1
PTOF3.Op.general		**0**	**0**	**1**	**0**

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

PTOF3.BlkV

No.	Information				
5214	81 Under Voltage Block (81 Under V Blk)	0	0	1	1
	81-3 PICKUP (P5409/5410) < Rated Frequency (P214)	0	1	0	1
PTOF3.BlkV.stVal		**0**	**0**	**1**	**0**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status BlkV.stVal: 0 - FALSE
1 - TRUE

3.7.8 Frequency protection 81-4 O (PTOF4)

PTOF4.Mod

No.	Information							
5213	81 ACTIVE (81 ACTIVE)	x	x	x	x	x	x	x
5212	81 BLOCKED (81 BLOCKED)	x	x	x	x	x	1	0
5209	>BLOCK 81-4 (>BLOCK 81-4)	x	x	x	x	1	x	0
5214	81 Under Voltage Block (81 Under V Blk)	x	x	x	1	x	x	0
5211	81 OFF (81 OFF)	x	x	1	0	0	0	0
	81-4 PICKUP (P5412/5413) ≤ Rated Frequency (P214)	x	1	x	0	0	0	0
PTOF4.Mod.stVal		**5**	**5**	**5**	**2**	**2**	**2**	**1**

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
	81-4 PICKUP (P5412/5413) < Rated Frequency (P214)	0	1	0	1
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
	81-4 PICKUP (P5412/5413) < Rated Frequency (P214)	0	1	0	1
PTOF4.Op.general		**0**	**0**	**1**	**0**

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

PTOF4.BlkV

No.	Information				
5214	81 Under Voltage Block (81 Under V Blk)	0	0	1	1
	81-4 PICKUP (P5412/5413) < Rated Frequency (P214)	0	1	0	1
PTOF4.BlkV.stVal		**0**	**0**	**1**	**0**

device annunciation / setting: 1 - ON / TRUE
0 - OFF / FALSE
IEC Status BlkV.stVal: 0 - FALSE
1 - TRUE

3.8 Fault Locator (RFLO1)

RFLO1.Mod

No.	Information	
	Fault Locator (P180) = Enabled	1
RFLO1.Mod.stVal		**1**

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

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

RFLO1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
RFLO1.Health.stVal		**3**	**1**

device annunciation: 1 - ON
0 - OFF

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

RFLO1.FltZ

No.	Information	Value		
	Absolute value of the fault impedance	RFLO1.FltZ.cVal.mag.f	Measured value	Absolute value
		RFLO1.FltZ.units.SIUnit	30	Ω (Ohm)
		RFLO1.FltZ.units.multiplier	0	1
	Angle of the fault impedance	RFLO1.FltZ.cVal.ang.f	Measured value	Angle in °

RFLO1.FltDiskm

No.	Information	Value		
1119 or 1122	Flt Locator: Distance to fault (dist =)	RFLO1.FltDiskm.mag.f	Measured value	Absolute value
		RFLO1.FltDiskm.units.SIUnit	2	Meter
		RFLO1.FltDiskm.units.multiplier	3	Kilo

RFLO1.FltDisPrc

No.	Information	Value		
1120	Flt Locator: Distance [%] to fault (d[%] =)	RFLO1.FltDisPrc.mag.f	Measured value	Absolute value
		RFLO1.FltDisPrc.units.SIUnit	1	NONE
		RFLO1.FltDisPrc.multiplier	0	1

3.9 Circuit breaker failure protection 50BF(RBRF1)

RBRF1.Mod

No.	Information			
1452	Breaker failure is BLOCKED (BkrFail BLOCK)	x	0	1
1451	Breaker failure is switched OFF (BkrFail OFF)	1	0	0
RBRF1.Mod.stVal		**5**	**1**	**2**

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				
1456	50BF (internal) PICKUP (50BF int Pickup)	0	0	1	1
1457	50BF (external) PICKUP (50BF ext Pickup)	0	1	0	1
RBRF1.Str.general		**0**	**1**	**1**	**1**

device annunciation: 1 - ON
0 - OFF

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

RBRF1.OpEx

No.	Information		
1481	50BF (external) TRIP (50BF ext TRIP)	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		
1480	50BF (internal) TRIP (50BF int TRIP)	0	1
RBRF1.OpIn.general		**0**	**1**

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

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

3.10 Three-pole tripping 52 Breaker (XCBR1)

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
x - irrelevant

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		
	Number of TRIPs= (#of 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.CBOpCap

No.	Information	
XCBR1.CBOpCap.stVal		**1**

device annunciation:

IEC Status CBOpCap.stVal: 1 - NONE

XCBR1.SumSwARs1

No.	Information	Value		
1021	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		
1022	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		
1023	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

3.11 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
PTRC1.Str.general		**0**	**1**

device annunciation:
1 - ON
0 - OFF

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

PTRC1.Tr

No.	Information		
511	Relay GENERAL TRIP command (Relay TRIP)	0	1
PTRC1.Tr.general		**0**	**1**

device annunciation: 1 - ON, 0 - OFF

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

3.12 Measurement (MMXU1, MSQI1, MMTR1)

3.12.1 Measures (MMXU1)

MMXU1.Mod

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

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

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		
901	Power Factor (PF =)	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

No.	Information	Value		
604	In (In =)	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

3.12.2 Measured values, symmetrical components (MSQI1)

MSQI1.Mod

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

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

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		
605	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		
606	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		
831	3Io (zero sequence) (3Io =)	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		
629	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	
630	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	
832	Vo (zero sequence) (Vo =)	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

3.12.3 Power Metering (MMTR1)

MMTR1.Mod

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

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

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	6	Mega
		MMTR1.SupWh.pulsQty	3.464200e-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	6	Mega
		MMTR1.SupVArh.pulsQty	3.464200e-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	6	Mega
		MMTR1.DmdWh.pulsQty	3.464200e-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	6	Mega
		MMTR1.DmdVArh.pulsQty	3.464200e-005	VArh / Metered value

Literature

/1/ SIPROTEC 4 Ethernet Module EN 100 IEC 61850 Electrical Interface 100 MBit, Manual
C54000-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 Feeder Automation Controller 7SC80, Manual
E50417-G1140-C486

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