

SIEMENS

SIPROTEC

**Numerical Overhead Con-
tact Line Protection for AC
Traction Power Supply**

7ST6

V4.6

IEC 61850

PIXIT

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We have checked the text of this manual against the hardware and software described. However, deviations from the description cannot be completely ruled out, so that no liability can be accepted for any errors or omissions contained in the information given.

The information given in this document is reviewed regularly and any necessary corrections will be included in subsequent editions. We appreciate any suggestions for improvement.

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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 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 a SIPROTEC Devices 7ST6.

Scope of validity of this Manual

SIPROTEC 7ST6, Version 4.60

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

Contents

This chapter specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface in SIPROTEC 7ST6 V4.6.

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1.1 General

This chapter specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface in SIPROTEC 7ST V4.6.

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
- ☐ Dataset 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
Lost connection detection time range (default range of TCP_KEEPLIVE is 1 – 20 s)	10 s
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 s
<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 Dataset Model

Description	Value / Clarification
Maximum number of data elements in one dataset	Not limited by an internal configuration parameter. It depends on the available memory.
How many persistent datasets can be created by one or more clients?	64 datasets for each LD. It depends on the available memory.
How many non-persistent datasets can be created by one or more clients?	10 datasets. It depends on the available memory.
additional items:	
Maximum number of datasets	Could not be defined, it depends on the available memory space. In principle, this information is 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 be 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 displays 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 IEC 61850-7-2, transmission of entries may be required some times, depending of the number of entries that has 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 transmission strategy of the entries. The number ordered will then be transmitted as long as it exists 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 has 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). All expected data objects will be declared as invalid.
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). All expected data objects will be declared as invalid.
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 the second consecutive 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 $2 \cdot \text{TAL}$).
GOOSE subscriber behavior 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). All expected data objects will be declared as 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 $2 \times \text{TAL}$. 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 discarded: 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 telegram 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 "ClockNotSynchronized" will be set to TRUE after a configured time period.
What is the behavior 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 is 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 <i>SIPROTEC 4 Ethernet Module EN 100 IEC 61850 Electrical Interface 100 MBit, Manual /1/</i>
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 ctrlVal, q and t. The control model associated to those Data is status-only. They are not controllable from an IEC 61850 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://www.tissue.iec61850.com/tissue.msp?issueid=120	Type - Mod.stVal and Mod.ctlVal	-
	146	http://www.tissue.iec61850.com/tissue.msp?issueid=146	CtxInt	-
	173	http://www.tissue.iec61850.com/tissue.msp?issueid=173	Ctl modelling harmonization	-
	234	http://www.tissue.iec61850.com/tissue.msp?issueid=234	New type CtxInt	x
Services	377	http://www.tissue.iec61850.com/tissue.msp?issueid=377	DeleteDataSet response-	-
	276	http://www.tissue.iec61850.com/tissue.msp?issueid=276	File Services Negative Responses	-
	183	http://www.tissue.iec61850.com/tissue.msp?issueid=183	GetNameList error handling	x
	165	http://www.tissue.iec61850.com/tissue.msp?issueid=165	Improper Error Response for GetDataSetValues	x
	116	http://www.tissue.iec61850.com/tissue.msp?issueid=116	GetNameList with empty response?	x
Reporting	474	http://www.tissue.iec61850.com/tissue.msp?issueid=474	GI for URCB	-
	453	http://www.tissue.iec61850.com/tissue.msp?issueid=453	Reporting & Logging model revision	x
	438	http://www.tissue.iec61850.com/tissue.msp?issueid=438	EntryTime base should be GMT	-
	349	http://www.tissue.iec61850.com/tissue.msp?issueid=349	BRCB TimeOfEntry has two definitions	x
	348	http://www.tissue.iec61850.com/tissue.msp?issueid=348	URCB class and report	x

Reporting	344	http://www.tissue.iec61850.com/tissue.msp?issueid=344	TimeOfEntry misspelled	-
	335	http://www.tissue.iec61850.com/tissue.msp?issueid=335	Clearing of BufOvl	x
	332	http://www.tissue.iec61850.com/tissue.msp?issueid=332	Ambiguity in use of trigger options	x
	329	http://www.tissue.iec61850.com/tissue.msp?issueid=329	Reporting and BufOvl	x
	322	http://www.tissue.iec61850.com/tissue.msp?issueid=322	Write Configuration attribute of BRCBs	
	301	http://www.tissue.iec61850.com/tissue.msp?issueid=301	SqNum in Buffered Reports	-
	300	http://www.tissue.iec61850.com/tissue.msp?issueid=300	Attribute Resv in BRCB	x
	298	http://www.tissue.iec61850.com/tissue.msp?issueid=298	Type of SqNum	x
	297	http://www.tissue.iec61850.com/tissue.msp?issueid=297	Sequence number	x
	278	http://www.tissue.iec61850.com/tissue.msp?issueid=278	EntryId not valid for a server	x
	275	http://www.tissue.iec61850.com/tissue.msp?issueid=275	Confusing statement on GI usage	x
	191	http://www.tissue.iec61850.com/tissue.msp?issueid=191	BRCB: Integrity and buffering reports	x
	190	http://www.tissue.iec61850.com/tissue.msp?issueid=190	BRCB: EntryId and TimeOfEntry	x
	177	http://www.tissue.iec61850.com/tissue.msp?issueid=177	Ignoring OptFlds bits for URCB	-
	52	http://www.tissue.iec61850.com/tissue.msp?issueid=52	Ambiguity GOOSE SqNum	x
	49	http://www.tissue.iec61850.com/tissue.msp?issueid=49	BRCB TimeOfEntry?	x
Control Model	46	http://www.tissue.iec61850.com/tissue.msp?issueid=46	Synchro check cancel	x
	44	http://www.tissue.iec61850.com/tissue.msp?issueid=44	AddCause - Object not sel	x
	30	http://www.tissue.iec61850.com/tissue.msp?issueid=30	control parameter T	x

Basics

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

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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/*
- ❑ *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 device and logical nodes will always be available.

Logical Device Protection: LLN0, LPHD1, XCBR1, PTRC1

Logical Device Measurement: LLN0, LPHD1, MMXN1, MMXN2, MMXN4,

Logical Device Disturbance Recorder: LLN0, LPHD1, RDRE1

Logical Device Control: LLN0, LPHD1, CALH1

Logical Device Extended: LLN0, LPHD1

2.2.2 Function parameters SIPROTEC 7ST6

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 7ST6 - Effects of Function parameters to the Logical Nodes

No.	Function	Setting	Logical Nodes
103	Setting Group Change Option		No effect
113	Distance Curve	Quadrilateral (Rated Frequency = 16.7Hz)	PDIS1, PDIS2, PDIS3, PDIS4, PDIS5, PDIS6, PDIS7, PDIS8, PDIS9, PDIS10, PDIS11, PDIS12, PDIS13, PDIS14, PTRC2
		Combined (Rated Frequency = 16.7Hz)	PDIS1, PDIS2, PDIS3, PDIS4, PDIS5, PDIS6, PDIS7, PDIS8, PDIS9, PDIS10, PDIS11, PDIS12, PDIS13, PDIS14, PTRC2
		Quadrilateral (Rated Frequency = 50Hz, 60Hz, 25Hz)	PDIS1, PDIS3, PDIS5, PDIS7, PDIS9, PDIS11, PDIS12, PDIS13, PDIS14, PTRC2

Table 2-1 SIPROTEC 7ST6 - Effects of Function parameters to the Logical Nodes

No.	Function	Setting	Logical Nodes
		Combined (Rated Frequency = 50Hz, 60Hz, 25Hz)	PDIS1, PDIS3, PDIS5, PDIS7, PDIS9, PDIS11, PDIS12, PDIS13, PDIS14, PTRC2
122	2nd Harmonic Inrush Restraint		No effect
124	Instantan. High-Speed O/C Protection	Disabled	-
		Enable	PTOC5
126	Backup overcurrent	Disabled	-
		Enable	PTOC1, PTOC2, PTOC3, PTOC4
127	Emergency Overcurrent Protection	Disabled	-
		Enabled	PTOC6
133	Auto-Reclose Function	Disabled	-
		Enabled	RREC1
135	Synchronism and Voltage Check	Disabled	-
		Enabled	RSYN1
137	Under/Overvoltage Protection	Disabled	-
		Enabled	PTUV1, PTUV2, PTOV1, PTOV2
138	Fault Locator	Disabled	-
		Enabled	RFLO1, RDIR1
139	Breaker Failure Protection	Disabled	-
		Enabled	RBRF1

Table 2-1 SIPROTEC 7ST6 - Effects of Function parameters to the Logical Nodes

No.	Function	Setting	Logical Nodes
140	Trip Circuit Supervision	Disabled	-
		Enabled	ZAXN1
141	It Function (ampere-second)		No effect
142	Thermal Overload Protection	Disabled	-
		Enabled	PTTR1, PTTR2, PTTR3
143	Ambient Temperature Sensing		No effect
144	Defrosting Protection Function	Disabled	-
		Enabled	PDIF1, PTOC7, PTOC8, PTRC3
1250	SigMod	OFF	-
		Signal transmission Z1	PSCH1
		Signal transmission Z2	PSCH1
		Signal transmission Z3	PSCH1

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, OpTmh
PTRC1	General device pickup General OFF	Mod, Beh, Health, NamPlt, Str,Tr,FinTr
XCBR1	CB Breaker	Mod, Beh, Health, NamPlt, Loc, OpCnt, Pos BlkOpn, BlkCls, CBOpCap SumSwARs, CirSpv
PDIS1 PDIS2 PDIS3 PDIS4 PDIS5 PDIS6 PDIS7 PDIS8 PDIS9 PDIS10 PDIS11 PDIS12 PDIS13 PDIS14 PTRC2	Distance Curve	Mod, Beh, Health, NamPlt, Str, Op
PTRC2	Distance protection General Information	Mod, Beh, Health, NamPlt, Str, Op
PTOC5	Instantan. High-Speed O/C Protection	Mod, Beh, Health, NamPlt, Str, Op
PTOC1 PTOC2 PTOC3 PTOC4	Backup overcurrent	Mod, Beh, Health, NamPlt, Str, Op
PTOC6	Emergency Overcurrent Protection	Mod, Beh, Health, NamPlt, Str, Op

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

LN	Function	DOI
RREC1	Auto-Reclose Function	Mod, Beh, Health, NamPlt, Op, AutoRecSt
RSYN1	Synchronism and Voltage Check	Mod, Beh, Health, NamPlt, Rel, VInd, AngInd, HzInd, SynPrg, DifVCic, DiffHzCic, DifAngCic
PTUV1 PTUV2	Undervoltage Protection	Mod, Beh, Health, NamPlt, Str, Op
PTOV1 PTOV2	Overvoltage Protection	Mod, Beh, Health, NamPlt, Str, Op
RFLO1	Fault Locator	Mod, Beh, Health, NamPlt, FltZ, FltDiskm, FltDisPrc
RDIR1	Fault Direction	Mod, Beh, Health, NamPlt, Dir
RBRF1	Breaker Failure Protection	Mod, Beh, Health, NamPlt, Str, OpEx, OpIn
ZAXN1	Trip Circuit Supervision	Mod, Beh, Health, NamPlt, CirSpv
PTTR1 PTTR2 PTTR3	Thermal Overload Protection	Mod, Beh, Health, NamPlt, Str, Op, AlmThm, BlkThm
PDIF1 PTOC7 PTOC8	Defrosting Protection Function	Mod, Beh, Health, NamPlt, Str, Op
PTRC3	Defrosting Protection Function General Information	Mod, Beh, Health, NamPlt, Str, Op
PSCH1	SigMod	Mod, Beh, Health, NamPlt, Str, Op, CarRx, ProRx,
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
MMXN1	Operating Measurement	Mod, Beh, Health, NamPlt, Amp, Vol, Watt, VolAmpr, PwrFact, Hz
MMXN2	Negative Feeder Measurement	Mod, Beh, Health, NamPlt, Amp, Vol
MMXN3	Reference Measurement	Mod, Beh, Health, NamPlt, Vol, Hz
MMXN4	Defrosting Current Measurement	Mod, Beh, Health, NamPlt, Amp
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, ErrBoard1, ErrBoard2, ErrBoard3, ErrBoard4, ErrBoard5, ErrBoard6, ErrBoard7
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
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.

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

2.4.2 Logical Devices MEAS, DR and EXT

LLN0.Mod

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.Mod.stVal		5	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

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

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								
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 IEC 61850. 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.

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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 - toggle 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

3.1.1 Error with a Summary Alarm and Alarm Summary Event

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

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

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

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

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

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

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No.	Information		
188	Error Board 6 (Error Board 6)	1	0
CALH1.ErrBoard6.stVal		1	0

No.	Information		
189	Error Board 7 (Error Board 7)	1	0
CALH1.ErrBoard7.stVal		1	0

51

3.2 Oscillographic Fault Records (RDRE1)

RDRE1.Mod

No.	Information		
55	Reset Device (Reset Device)	1	0
RDRE1.Mod.stVal		1	5

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 Distance Protection (PDIS1-PDIS14, PTRC2)

3.3.1 Distance Protection Zone1 (PDIS1)

PDIS1.Mod

No.	Information						
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1	1
3651	Distance is switched off (Dist. OFF)	x	1	x	x	0	0
3653	Distance is ACTIVE (Dist. ACTIVE)	x	x	x	x	0	1
3915	Dist.: Zone Z1 is active (Dis. Z1 act.)	x	x	0	x	1	1
3663	Distance Z1 is switched OFF (Dist. Z1 OFF)	x	x	x	1	0	0
PDIS1.Mod.stVal		5	5	5	5	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

PDIS1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PDIS1.Health.stVal		3	1

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:

1 - OK
2 - WARNING
3 - ALARM

PDIS1.Str

No.	Information		
3740	Dist.: Fault detection Zone Z1 (Dist. Z1)	0	1
PDIS1.Str.general		0	1

device annunciation: 1 - ON
0 - OFF

IEC Status Str.general:

0 - FALSE
1 - TRUE

No.	Information		
3810	Dist.: Trip in Zone Z1 (Dis.Trip Z1)	0	1
PDIS1.Op.general		0	1

No.	Information						
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1	1
3651	Distance is switched off (Dist. OFF)	x	1	x	x	0	0
3653	Distance is ACTIVE (Dist. ACTIVE)	x	x	x	x	0	1
3916	Dist.: Zone Z1 is active (Dis. Z1 act.)	x	x	0	x	1	1
3663	Distance Z1 is switched OFF (Dist. Z1 OFF)	x	x	x	1	0	0
PDIS2.Mod.stVal		5	5	5	5	2	1

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PDIS2.Health.stVal		3	1

55

No.	Information		
13807	Picked up in Zone Z1Strk (PU Z1Strk)	0	1
PDIS2.Str.general		0	1

PDIS2.Op

No.	Information		
3810	Dist.: Trip in Zone Z1 (Dis.Trip Z1)	0	1
PDIS2.Op.general		0	1

3.3.3 Distance Protection Zone 2K(PDIS3)

No.	Information						
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1	
3651	Distance is switched off (Dist. OFF)	x	1	x	x	0	0
3653	Distance is ACTIVE (Dist. ACTIVE)	x	x	x	x	0	1
3917	Dist.: Zone Z1 is active (Dis. Z2 act.)	x	x	0	x	1	1
3665	Distance Z1 is switched OFF (Dist. Z1 OFF)	x	x	x	1	0	0
PDIS3.Mod.stVal		5	5	5	5	2	1

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PDIS3.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PDIS3.Health.stVal		3	1

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

PDIS3.Str

No.	Information			
3755	Dis. Pickup Z2(Distance Pickup Z2)	0	x	1
3925	Dist.: Flt. detect. Z2 (short circuit) (Dist.Flt.Z2K)	x	0	1
PDIS3.Str.general		0	0	1

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

PDIS3.Op

No.	Information		
3930	Dist.: Trip in zone Z2 (short circuit) (Dis. Trip Z2K)	0	1
PDIS3.Op.general		0	1

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

3.3.4 Distance Protection Zone 2K Strk(PDIS4)

PDIS4.Mod

No.	Information						
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1	1
3651	Distance is switched off (Dist. OFF)	x	1	x	x	0	0
3653	Distance is ACTIVE (Dist. ACTIVE)	x	x	x	x	0	1
3918	Dist.: Zone Z2 is active (Dis. Z2str act.)	x	x	0	x	1	1
3665	Distance Z1 is switched OFF (Dist. Z2 OFF)	x	x	x	1	0	0
PDIS4.Mod.stVal		5	5	5	5	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

PDIS4.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PDIS4.Health.stVal		3	1

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:

1 - OK
2 - WARNING
3 - ALARM

PDIS4.Str

No.	Information		
18360	Dist. Zone Z2Kstr Pickup (PU Z2Kstr)	0	1
PDIS4.Str.general		0	1

device annunciation: 1 - ON
0 - OFF

IEC Status Str.general:

0 - FALSE
1 - TRUE

PDIS4.Op

No.	Information		
3930	Dist.: Trip in zone Z2 (short circuit) (Dis. Trip Z2K)	0	1
PDIS4.Op.general		0	1

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

3.3.5 Distance Protection Zone 2L (PDIS5)**PDIS5.Mod**

No.	Information						
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1	1
3651	Distance is switched off (Dist. OFF)	x	1	x	x	0	0
3653	Distance is ACTIVE (Dist. ACTIVE)	x	x	x	x	0	1
3917	Dis. Z2 is active (Dis. Z2 act.)	x	x	0	x	1	1
3665	Distance Z2 is switched OFF (Dist. Z2 OFF)	x	x	x	1	0	0
PDIS5.Mod.stVal		5	5	5	5	2	1

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

PDIS5.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PDIS5.Health.stVal		3	1

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

PDIS5.Str

No.	Information			
3755	Dis. Pickup Z2(Distance Pickup Z2)	0	x	1
18360	Dist.: Fault detection Z2 (overload) (Dist.Flt.Z2L)	x	0	1
PDIS5.Str.general		0	0	1

device annunciation: 1 - ON
0 - OFF

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

PDIS5.Op

No.	Information		
3931	Dist.: Trip in zone Z2 (short circuit) (Dis. Trip Z2L)	0	1
PDIS5.Op.general		0	1

device annunciation: 1 - ON
0 - OFF

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

3.3.6 Distance Protection Zone 2L Strk(PDIS6)**PDIS6.Mod**

No.	Information						
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1	1
3651	Distance is switched off (Dist. OFF)	x	1	x	x	0	0
3653	Distance is ACTIVE (Dist. ACTIVE)	x	x	x	x	0	1
3918	Dist.: Zone Z2 stroke is active (Dis.Z2str act)	x	x	0	x	1	1
3665	Distance Z2 is switched OFF (Dist. Z2 OFF)	x	x	x	1	0	0
PDIS6.Mod.stVal		5	5	5	5	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

PDIS6.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PDIS6.Health.stVal		3	1

device annunciation:

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

PDIS6.Str

No.	Information		
18361	Dist. Zone Z2Lstr Pickup (PU Z2Lstr)	0	1
PDIS6.Str.general		0	1

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

PDIS6.Op

No.	Information		
3931	Dist.: Trip in zone Z2 (short circuit) (Dis. Trip Z2L)	0	1
PDIS6.Op.general		0	1

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

3.3.7 Distance Protection Zone 3K (PDIS7)

PDIS7.Mod

No.	Information						
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1	1
3651	Distance is switched off (Dist. OFF)	x	1	x	x	0	0
3653	Distance is ACTIVE (Dist. ACTIVE)	x	x	x	x	0	1
3991	Dist.: Zone Z3 is active (Dis.Z3 act)	x	x	0	x	1	1
3666	Distance Z3 is switched OFF (Dist. Z3 OFF)	x	x	x	1	0	0
PDIS7.Mod.stVal		5	5	5	5	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

PDIS7.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PDIS7.Health.stVal		3	1

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:

1 - OK
2 - WARNING
3 - ALARM

PDIS7.Str

No.	Information			
3758	Distance Pickup Z3 (Dis. Pickup Z3)	0	x	
13896	Picked up in Zone Z3K (short-circuit) (Dis PU Z3K)	x	0	1
PDIS7.Str.general		0	0	1

device annunciation: 1 - ON
0 - OFF

IEC Status Str.general:

0 - FALSE
1 - TRUE

No.	Information		
13903	Distance Protection TRIP in Zone Z3K (Dis TRIP Z3K)	0	1
PDIS7.Op.general		0	1

No.	Information						
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1	1
3651	Distance is switched off (Dist. OFF)	x	1	x	x	0	0
3653	Distance is ACTIVE (Dist. ACTIVE)	x	x	x	x	0	1
3992	Dist.: Zone Z3 stroke is active(Dis. Z3str act)	x	x	0	x	1	1
3666	Distance Z3 is switched OFF (Dist. Z3 OFF)	x	x	x	1	0	0
PDIS8.Mod.stVal		5	5	5	5	2	1

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PDIS8.Health.stVal		3	1

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PDIS8.Str

No.	Information		
18362	Picked up in Zone Z3Strk (PU Z3Kstr)	0	1
PDIS8.Str.general		0	1

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

PDIS8.Op

No.	Information		
13903	Distance Protection TRIP in Zone Z3K (Dis TRIP Z3K)	0	1
PDIS8.Op.general		0	1

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

3.3.9 Distance Protection Zone 3L(PDIS9)**PDIS9.Mod**

No.	Information						
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1	1
3651	Distance is switched off (Dist. OFF)	x	1	x	x	0	0
3653	Distance is ACTIVE (Dist. ACTIVE)	x	x	x	x	0	1
3991	Dist.: Zone Z3 is active (Dis.Z3 act)	x	x	0	x	1	1
3666	Distance Z3 is switched OFF (Dist. Z3 OFF)	x	x	x	1	0	0
PDIS9.Mod.stVal		5	5	5	5	2	1

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

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PDIS9.Health.stVal		3	1

No.	Information			
3758	Distance Pickup Z3 (Dis. Pickup Z3)	0	x	1
13897	Picked up in Zone Z3L (overload) (Dis PU Z3L)	x	0	1
PDIS9.Str.general		0	0	1

No.	Information		
13904	Distance Protection TRIP in Zone Z3L (Dis TRIP Z3L)	0	1
PDIS9.Op.general		0	1

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3.3.10 Distance Protection Zone 3L(PDIS10)

PDIS10.Mod

No.	Information						
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1	1
3651	Distance is switched off (Dist. OFF)	x	1	x	x	0	0
3653	Distance is ACTIVE (Dist. ACTIVE)	x	x	x	x	0	1
3992	Dist.: Zone Z3 stroke is active(Dis. Z3str act)	x	x	0	x	1	1
3666	Distance Z3 is switched OFF (Dist. Z3 OFF)	x	x	x	1	0	0
PDIS10.Mod.stVal		5	5	5	5	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

PDIS10.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PDIS10.Health.stVal		3	1

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:

1 - OK
2 - WARNING
3 - ALARM

PDIS10.Str

No.	Information		
18363	Dist. Zone Z3Lstr Pickup (PU Z3Lstr)	0	1
PDIS10.Str.general		0	1

device annunciation: 1 - ON
0 - OFF

IEC Status Str.general:

0 - FALSE
1 - TRUE

No.	Information		
13904	Distance Protection TRIP in Zone Z3L (Dis TRIP Z3L)	0	1
PDIS10.Op.general		0	1

No.	Information						
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1	1
3651	Distance is switched off (Dist. OFF)	x	1	x	x	0	0
3653	Distance is ACTIVE (Dist. ACTIVE)	x	x	x	x	0	1
2781	Auto recloser is switched OFF (Auto recl. OFF)	x	x	1	x	0	0
3664	Distance Z1B is switched OFF (Dist. Z1B OFF)	x	x	x	1	0	0
PDIS11.Mod.stVal		5	5	5	5	2	1

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PDIS11.Health.stVal		3	1

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PDIS11.Str

No.	Information		
13890	Distance Prot. Picked up in Zone Z1B (Dis PU Z1B)	0	1
PDIS11.Str.general		0	1

device annunciation: 1 - ON
0 - OFF

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

PDIS11.Op

No.	Information		
13900	Distance Protection TRIP in Zone Z1B (Dis TRIP Z1B)	0	1
PDIS11.Op.general		0	1

device annunciation: 1 - ON
0 - OFF

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

3.3.12 Distance Protection Zone1L (PDIS12)**PDIS12.Mod**

No.	Information						
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1	1
3651	Distance is switched off (Dist. OFF)	x	1	x	x	0	0
3653	Distance is ACTIVE (Dist. ACTIVE)	x	x	x	x	0	1
2781	Auto recloser is switched OFF (Auto recl. OFF)	x	x	1	x	0	0
18354	Distance Z1L is switched OFF (Dist. Z1L OFF)	x	x	x	1	0	0
PDIS12.Mod.stVal		5	5	5	5	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

PDIS12.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PDIS12.Health.stVal		3	1

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

PDIS12.Str

No.	Information		
13891	Distance Prot. Picked up in Zone Z1L (Dis PU Z1L)	0	1
PDIS12.Str.general		0	1

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

PDIS12.Op

No.	Information		
13901	Distance Protection TRIP in Zone Z1L (Dis.Trip Z1)	0	1
PDIS12.Op.general		0	1

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

3.3.13 Distance Protection Overreach Zone (PDIS13)

PDIS13.Mod

No.	Information						
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1	1
3651	Distance is switched off (Dist. OFF)	x	1	x	x	0	0
3653	Distance is ACTIVE (Dist. ACTIVE)	x	x	x	x	0	1
18359	Zor is selected (ZOR selected)	x	x	0	x	1	1
18355	Distance Overreach is switched OFF (Dist. ZOR OFF)	x	x	x	1	0	0
PDIS13.Mod.stVal		5	5	5	5	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

PDIS13.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PDIS13.Health.stVal		3	1

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:

1 - OK
2 - WARNING
3 - ALARM

PDIS13.Str

No.	Information		
3671	Distance PICKED UP (Dis. PICKUP)	0	1
PDIS13.Str.general		0	1

device annunciation: 1 - ON
0 - OFF

IEC Status Str.general:

0 - FALSE
1 - TRUE

No.	Information		
13906	TRIP Overreach Zone after Man. Close (Dis TRIP MC ZOR)	0	1
PDIS13.Op.general		0	1

No.	Information					
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1
3651	Distance is switched off (Dist. OFF)	x	1	x	0	0
3653	Distance is ACTIVE (Dist. ACTIVE)	x	x	x	0	1
18358	Sotf PU active (SOTF PU Act.)	x	x	0	1	1
PDIS14.Mod.stVal		5	5	5	2	1

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PDIS14.Health.stVal		3	1

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PDIS14.Str

No.	Information		
13905	Dist. Prot. TRIP after PU by Man. Close (Dis TRIP PU MC)	0	1
PDIS14.Str.general		0	1

device annunciation:
1 - ON
0 - OFF

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

PDIS14.Op

No.	Information		
13905	Dist. Prot. TRIP after PU by Man. Close (Dis TRIP PU MC)	0	1
PDIS14.Op.general		0	1

device annunciation:
1 - ON
0 - OFF

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

3.3.15 Distance Protection General Information (PTRC2)**PTRC2.Mod**

No.	Information				
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1
3651	Distance is switched off (Dist. OFF)	x	1	0	0
3653	Distance is ACTIVE (Dist. ACTIVE)	x	x	0	1
PTRC2.Mod.stVal		5	5	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	IEC Status Health.stVal:	1 - OK
0 - OFF		2 - WARNING
		3 - ALARM

PTRC2.Str

No.	Information		
3671	Distance PICKED UP (Dis. PICKUP)	0	1
PTRC2.Str.general		0	1

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

PTRC2.Op

No.	Information		
3801	Distance protection: General trip (Dis.Gen. Trip)	0	1
PTRC2.Op.general		0	1

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

PSCH1.Mod

No.	Information		
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1
17105	Signal transmission is switched OFF (SigMod OFF)	x	0
PSCH1.Mod.stVal		5	1

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

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PSCH1.Health.stVal		3	1

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

No.	Information		
17100	Distance Protection Signal send (Dis Sig. Send)	0	1
PSCH1.ProTx.stVal		0	1

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

No.	Information		
4004	>Dist. teleprotection: Carrier receive (>Dis. Recept)	0	1
PSCH1.ProRx.stVal		0	1

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

No.	Information		
17100	Distance Protection Signal send (Dis Sig. Send)	0	1
PSCH1.Str.general		0	1

No.	Information		
18364	Dist. Teleprotection Trip (Dist. Tel. Trip)	0	1
PSCH1.Op.general		0	1

No.	Information		
4067	Dis. Telep. Transient Blocking (Dis EchoSend)	0	1
PSCH1.Echo.general		0	1

No.	Information		
4005	>Dist. teleprotection: Carrier faulty (>Dis.RecFail)	0	1
PSCH1.LosOfGrd.stVal		0	1

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3.5 Overcurrent Protection (PTOCx)

3.5.1 O/C Ip (PTOC1)

PTOC1.Mod

No.	Information				
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1
7151	Backup O/C is switched OFF (O/C OFF)	x	1	x	0
7157	Backup O/C Ip is switched OFF(O/C Ip OFF)	x	x	1	0
PTOC1.Mod.stVal		5	5	5	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

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		
1820	Ip picked up (Ip picked up)	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		
1825	Ip TRIP (Ip TRIP)	0	1
PTOC1.Op.general		0	1

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

3.5.2 O/C I> (PTOC2)**PTOC2.Mod**

No.	Information				
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1
7151	Backup O/C is switched OFF (O/C OFF)	x	1	x	0
7154	Backup O/C I> is switched OFF(O/C I> OFF)	x	x	1	0
PTOC2.Mod.stVal		5	5	5	1

device annunciation / setting: 1 - ON / TRUE IEC Status Mod.stVal: 1 - ON
0 - OFF / FALSE 2 - BLOCKED
x - irrelevant 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 IEC Status Health.stVal: 1 - OK
0 - OFF 2 - WARNING
3 - ALARM

PTOC2.Str

No.	Information		
7192	Backup O/C Pickup I> (O/C PICKUP I>)	0	1
PTOC2.Str.general		0	1

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

PTOC2.Op

No.	Information		
7222	Backup O/C TRIP I> (O/C TRIP I>)	0	1
PTOC2.Op.general		0	1

device annunciation:
1 - ON
0 - OFF

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

3.5.3 O/C I>> (PTOC3)**PTOC3.Mod**

No.	Information				
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1
7151	Backup O/C is switched OFF (O/C OFF)	x	1	x	0
7155	Backup O/C I>> is switched OFF(O/C I>> OFF)	x	x	1	0
PTOC3.Mod.stVal		5	5	5	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

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	Backup O/C Pickup I>> (O/C PICKUP I>>)	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	Backup O/C TRIP I>> (O/C TRIP I>>)	0	1
PTOC3.Op.general		0	1

device annunciation: 1 - ON
0 - OFF

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

3.5.4 O/C I>>> (PTOC4)**PTOC4.Mod**

No.	Information				
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1
7151	Backup O/C is switched OFF (O/C OFF)	x	1	x	0
7156	Backup O/C I>>> is switched OFF(O/C I>>>OFF)	x	x	1	0
PTOC4.Mod.stVal		5	5	5	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

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	O/C I-STUB Pickup (I-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	O/C I-STUB TRIP (I-STUB TRIP)	0	1
PTOC4.Op.general		0	1

device annunciation:
1 - ON
0 - OFF

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

3.6 High-Speed Overcurrent protection (PTOC5)

PTOC5.Mod

No.	Information				
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1
4271	HS O/C is switched OFF (HS O/C OFF)	x	1	x	0
18350	HS O/C set to ∞ (HS O/C = ∞)	x	x	1	0
PTOC5.Mod.stVal		5	5	5	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		
4281	HS O/C PICKUP (HS O/C PICKUP)	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		
4293	HS O/C TRIPPED (HS O/C TRIP)	0	1
PTOC5.Op.general		0	1

device annunciation:
 1 - ON
 0 - OFF

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

3.7 Emergency Overcurrent protection (PTOC6)

PTOC6.Mod

No.	Information					
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1
2051	Emergency O/C protect. is switched off (Emer. Off)	x	1	x	0	0
2053	Emergency O/C protection is active(Emer. active)	x	x	x	0	1
18351	Emergency Overcurrent set to oo(Emer. O/C = oo)	x	x	1	0	0
PTOC6.Mod.stVal		5	5	5	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		
2061	Emerg. O/C prot.: General fault detect. (Emer.Gen.Flt)	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		
2141	Emerg. O/C protection: General Trip (Emer.Gen.Trip)	0	1
PTOC6.Op.general		0	1

device annunciation:

1 - ON
0 - OFF

IEC Status Op.general:

0 - FALSE
1 - TRUE

3.8 Voltage Protection (PTUVx, PTOVx)

3.8.1 Undervoltage Protection U< (PTUV1)

PTUV1.Mod

No.	Information					
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1
13832	Undervoltage Protection is switched off (UNDER. OFF)	x	1	x	0	0
13953	Measured value failure: Umeas failed (Failure Umeas)	x	x	x	0	1
18352	Undervoltage: Stage U< set to 0 (UNDER U< = 0)	x	x	1	0	0
PTUV1.Mod.stVal		5	5	5	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

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		
13835	Undervolt. U< picked up (UNDER U< PU)	0	1
PTUV1.Str.general		0	1

device annunciation: 1 - ON
0 - OFF

IEC Status Str.general:

0 - FALSE
1 - TRUE

PTUV1.Op

No.	Information		
13837	Undervolt. U< TRIP command (UNDER U< TRIP)	0	1
PTUV1.Op.general		0	1

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

3.8.2 Undervoltage Protection U<< (PTUV2)**PTUV2.Mod**

No.	Information					
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1
13832	Undervoltage Protection is switched off (UNDER. OFF)	x	1	x	0	0
13953	Measured value failure: Umeas failed (Failure Umeas)	x	x	x	0	1
18353	Undervoltage: Stage U<<set to 0(UNDER U<<= 0)	x	x	1	0	0
PTUV2.Mod.stVal		5	5	5	2	1

device annunciation / setting: 1 - ON / TRUE IEC Status Mod.stVal: 1 - ON
0 - OFF / FALSE 2 - BLOCKED
x - irrelevant 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 IEC Status Health.stVal: 1 - OK
0 - OFF 2 - WARNING
3 - ALARM

PTUV2.Str

No.	Information		
13836	Undervolt. U<< picked up (UNDER U<< PU)	0	1
PTUV2.Str.general		0	1

device annunciation: 1 - ON
0 - OFF

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

PTUV2.Op

No.	Information		
13835	Undervolt. U<< TRIP command (UNDER U<< TRIP)	0	1
PTUV2.Op.general		0	1

device annunciation: 1 - ON
0 - OFF

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

3.8.3 Overvoltage Protection U> (PTOV1)**PTOV1.Mod**

No.	Information				
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1
13830	Overvoltage Protection is switched off (OVER. OFF)	x	1	x	0
4325	Overvoltage stage U> is switched off(U> off)	x	x	1	0
PTOV1.Mod.stVal		5	5	5	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

No.	Information		
13836	Overvoltage detection : Stage U> (U> Detection)	0	1
PTOV1.Str.general		0	1

No.	Information		
4335	Overvoltage trip : Stage U> (U> Trip)	0	1
PTOV1.Op.general		0	1

No.	Information				
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1
13830	Overvoltage Protection is switched off (OVER. OFF)	x	1	x	0
4328	Overvoltage stage U>> is switched off(U>> off)	x	x	1	0
PTOV2.Mod.stVal		5	5	5	1

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

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PTOV2.Str

No.	Information		
4332	Overvoltage detection : Stage U>> (U>> Detection)	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		
4336	Overvoltage trip : Stage U>> (U>> Trip)	0	1
PTOV2.Op.general		0	1

device annunciation:
1 - ON
0 - OFF

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

3.9 Tripping Logic of the Entire Device(PTTR1,PTTR2,PTTR3)

3.9.1 Thermal Overload Protection for Cat.1 (PTTR1)

PTTR1.Mod

No.	Information				
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1
1511	Thermal Overload Protection OFF (Th.Overload OFF)	x	1	x	0
6616	First catenary is active (Cat. 1 active)	x	x	0	1
PTTR1.Mod.stVal		5	5	5	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

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.Op

No.	Information		
18365	Thermal Overload Trip/Alarm stage2 (O/L Trip/Alm2)	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	Overload Alarm! Near Thermal Trip (O/L⊖Alarm)	0	1
PTTR1.AlmThm.stVal		0	1

device annunciation: 1 - ON
0 - OFF

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

PTTR1.BlkThm

No.	Information		
13825	O/L Inrush blocking (O/L blocked)	1	0
PTTR1.BlkThm.stVal		0	1

device annunciation: 1 - ON
0 - OFF

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

3.9.2 Thermal Overload Protection for Cat.2 (PTTR2)**PTTR2.Mod**

No.	Information				
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1
1511	Thermal Overload Protection OFF (Th.Overload OFF)	x	1	x	0
6617	Second catenary is active (Cat. 2 active)	x	x	1	0
PTTR2.Mod.stVal		5	5	5	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

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTTR2.Health.stVal		3	1

No.	Information		
18365	Thermal Overload Trip/Alarm stage2 (O/L Trip/Alm2)	0	1
PTTR2.Op.general		0	1

No.	Information		
1516	Overload Alarm! Near Thermal Trip (O/L⊕Alarm)	0	1
PTTR2.AlmThm.stVal		0	1

No.	Information		
13825	O/L Inrush blocking (O/L blocked)	1	0
PTTR2.BIkThm.stVal		0	1

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3.9.3 Thermal Overload Protection for Cat.3 (PTTR3)

PTTR3.Mod

No.	Information				
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1
1511	Thermal Overload Protection OFF (Th.Overload OFF)	x	1	x	0
6617	Second catenary is active (Cat. 3 active)	x	x	1	0
PTTR3.Mod.stVal		5	5	5	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

PTTR3.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
PTTR3.Health.stVal		3	1

device annunciation: 1 - ON
0 - OFF

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

PTTR3.Op

No.	Information		
18365	Thermal Overload Trip/Alarm stage2 (O/L Trip/Alm2)	0	1
PTTR3.Op.general		0	1

device annunciation: 1 - ON
0 - OFF

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

PTTR3.AlmThm

No.	Information		
1516	Overload Alarm! Near Thermal Trip (O/LΘAlarm)	0	1
PTTR3.AlmThm.stVal		0	1

device annunciation: 1 - ON
0 - OFF

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

PTTR3.BIkThm

No.	Information		
13825	O/L Inrush blocking (O/L blocked)	1	0
PTTR3.BIkThm.stVal		0	1

device annunciation:

1 - ON
0 - OFF

IEC Status Mod.stVal:

1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

3.10 Circuit Breaker Failure Protection (RBRF1)

RBRF1.Mod

No.	Information			
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1
1451	Breaker failure is switched OFF (BkrFail OFF)	x	1	0
RBRF1.Mod.stVal		5	5	1

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

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		
1445	Breaker failure : fault detection (B/F fault)	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		
1484	B/F: pick up superordinat.prot.relais (B/F s.ordProt)	0	1
RBRF1.OpEx.general		0	1

device annunciation:
 1 - ON
 0 - OFF

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

RBRF1.OpIn

No.	Information		
1471	reaker failure TRIP (BrkFailure TRIP)	0	1
RBRF1.OpIn.general		0	1

device annunciation:

1 - ON
0 - OFF

IEC Status Op.general:

0 - FALSE
1 - TRUE

3.11 Defrosting Protection (PDIF1, PTOC7, PTOC8, PTRC3)

3.11.1 Diff Protection (PDIF1)

PDIF1.Mod

No.	Information				
52	Reset Device (Reset Device)	0	1	1	1
13964	Defrosting Protection is switched OFF (Defrost OFF)	x	1	0	0
13965	Defrosting Protection is blocked (Defrost blk)	x	x	1	0
PDIF1.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

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		
13974	Differential Protection picked up (Diff PU)	0	1
PDIF1.Str.general		0	1

device annunciation:
 1 - ON
 0 - OFF

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

No.	Information		
13975	Differential Protection TRIP (Diff TRIP)	0	1
PDIF1.Op.general		0	1

No.	Information					
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	
13964	Defrosting Protection is switched OFF (Defrost OFF)	x	1	x	0	
13965	Defrosting Protection is blocked (Defrost blk)	x	x	x	1	
18356	IX> is switched off(IX> OFF)	x	x	1	0	
PTOC7.Mod.stVal		5	5	5	2	

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

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PTOC7.Str

No.	Information		
13971	Defrosting current IX> Pickup (IX> Pickup)	0	1
PTOC7.Str.general		0	1

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

PTOC7.Op

No.	Information		
13973	Defrosting current IX> TRIP command (IX> TRIP)	0	1
PTOC7.Op.general		0	1

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

3.11.3 IX>> (PTOC8)**PTOC8.Mod**

No.	Information					
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1	1
13964	Defrosting Protection is switched OFF (Defrost OFF)	x	1	x	0	0
13965	Defrosting Protection is blocked (Defrost blk)	x	x	x	1	0
18357	IX>> is switched off(IX>> OFF)	x	x	1	0	0
PTOC8.Mod.stVal		5	5	5	2	1

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

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

No.	Information		
13970	Defrosting current IX>> Pickup (IX>> Pickup)	0	1
PTOC8.Str.general		0	1

No.	Information		
13972	Defrosting current IX>> TRIP command (IX>> TRIP)	0	1
PTOC8.Op.general		0	1

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3.11.4 Defrosting Protection General Information(PTRC3)

PTRC3.Mod

No.	Information				
52	At Least 1 Protection Funct. is Active (ProtActive)	0	1	1	1
13964	Defrosting Protection is switched OFF (Defrost OFF)	x	1	0	0
13965	Defrosting Protection is blocked (Defrost blk)	x	x	1	0
PTRC3.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

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		
13966	Defrosting Protection PICKED UP (Defrost PICKUP)	0	1
PTRC3.Str.general		0	1

device annunciation:
 1 - ON
 0 - OFF

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

PTRC3.Op

No.	Information		
13967	Defrosting Protection TRIP (Defrost TRIP)	0	1
PTRC3.Op.general		0	1

device annunciation:
 1 - ON
 0 - OFF

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

3.12 Automatic Reclosure Function (RREC1)

RREC1.Mod

No.	Information					
2782	Auto recloser is switched ON (Auto recl. ON)	x	0	1	1	1
2783	AR: Auto-reclose is blocked (AR is blocked)	x	x	1	x	0
2785	Auto-reclose is dynamically BLOCKED (AR DynBlock)	x	x	x	1	0
2781	Auto recloser is switched OFF (Auto recl. OFF)	1	x	0	0	0
RREC1.Mod.stVal		5	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

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	Auto-reclose Close command (AR Close)	0	1
RREC1.Op.general		0	1

device annunciation:

1 - ON
0 - OFF

IEC Status Op.general:

0 - FALSE
1 - TRUE

3.12 Automatic Reclosure Function (RREC1)

RREC1.AutoRecSt

No.	Information				
2801	Auto-reclose in progress (AR in progress)	1	1	0	0
2862	Auto reclose cycle successful(AR 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

3.13 Synchronism and Voltage Check (RSYN1)

RSYN1.Mod

No.	Information				
52	Auto recloser is switched ON (Auto recl. ON)	0	1	1	1
2932	AR: Auto-reclose is blocked (AR is blocked)	x	x	1	0
2931	Auto-reclose is dynamically BLOCKED (AR DynBlock)	x	1	0	0
RSYN1.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

RSYN1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
RSYN1.Health.stVal		3	1

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

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

RSYN1.Rel

No.	Information		
2951	Synchronism release (to ext. AR) (Sync. release)	0	1
RSYN1.Rel.stVal		0	1

device annunciation: 1 - ON
0 - OFF

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

RSYN1.VInd

No.	Information		
2947	Sync. Voltage diff. greater than limit (Sync. Udiff>)	0	1
RSYN1.VInd.stVal		1	0

device annunciation: 1 - ON
0 - OFF

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

3.13 Synchronism and Voltage Check (RSYN1)

RSYN1.AngInd

No.	Information		
2949	Sync. Angle diff. greater than limit (Sync. φ -diff>)	0	1
RSYN1.AngInd.stVal		1	0

device annunciation: 1 - ON
0 - OFF

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

RSYN1.HzInd

No.	Information		
2948	Sync. Freq. diff. greater than limit (Sync. fdiff>)	0	1
RSYN1.HzInd.stVal		1	0

device annunciation: 1 - ON
0 - OFF

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

RSYN1.SynPrg

No.	Information		
2941	Synchronization is running (Sync. running)	0	1
RSYN1.SynPrg.stVal		1	0

device annunciation: 1 - ON
0 - OFF

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

RSYN1.DifVClc

No.	Information	Value		
636	U - Difference (line - reference) (Udiff =)	RSYN1.DifVClc.mag.f	Measured value	Absolute value
		RSYN1.DifVClc.units.SIUnit	29	V (Volt)
		RSYN1.DifVClc.units.multiplier	3	Kilo

RSYN1.DifHzClc

No.	Information	Value		
647	f - Difference (line-reference) (fdif=)	RSYN1. DifHzClc.mag.f	Measured value	Absolute value
		RSYN1. DifHzClc.units.SIUnit	33	Hz
		RSYN1. DifHzClc.units.multiplier	0	1

RSYN1.DifAngClc

No.	Information	Value		
			Measured value	Absolute value
648	Angle (difference line-bus)(φ -diff=)	RSYN1. DifAngClc.mag.f		
		RSYN1. DifAngClc.units.SIUnit	9	(Degree)
		RSYN1. DifAngClc.units.multiplier	0	1

3.14 Fault Locator (RFLO1)

RFLO1.Mod

No.	Information	
1111	Fault locator active (FL active)	1
RFLO1.Mod.stVal		1

device annunciation / setting: 1 - ON / TRUE IEC Status Mod.stVal: 1 - ON
 0 - OFF / FALSE 2 - BLOCKED
 x - irrelevant 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 / TRUE IEC Status Health.stVal: 1 - OK
 0 - OFF / FALSE 2 - WARNING
 x - irrelevant 3 - ALARM

PTTR3.Op

No.	Information		
18365	Thermal Overload Trip/Alarm stage2 (O/L Trip/Alm2)	0	1
PTTR3.Op.general		0	1

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

RFLO1.FlTZ

No.	Information	Value		
1154	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
1155	Angle of the fault impedance	RFLO1.FlTZ.cVal.ang.f	Measured value	Angle in °

RFLO1.FltDiskm

No.	Information	Value		
1153	Flt Locator: Distance to fault(dist =)	RFLO1.FltZ.cVal.mag.f	Measured value	Absolute value
		RFLO1.FltZ.units.SIUnit	30	Ω (Ohm)
		RFLO1.FltZ.units.multiplier	0	1

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
		RRFLO1. FltDisPrc.units.multiplier	0	1

3.15 Fault Direction (RDIR1)

RDIR1.Mod

No.	Information	
1111	Fault locator active (FL active)	1
RDIR1.Mod.stVal		1

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

RDIR1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
RDIR1.Health.stVal		3	1

device annunciation: 1 - ON / TRUE IEC Status Health.stVal: 1 - OK
 0 - OFF / FALSE 2 - WARNING
 x - irrelevant 3 - ALARM

RDIR1.Dir

No.	Information			
2640	Forward direction (forward dir.)	0	1	0
2641	Reverse direction(reverse dir.)	0	0	1
RDIR1.Dir.general		0	1	1
RDIR1.Dir.dirGeneral		0	1	2

device annunciation: 1 - ON IEC Status Op.general: 0 - FALSE
 0 - OFF 1 - TRUE
 IEC Status Dir.dirGeneral: 0 - UNKNOWN
 1 - FORWARD
 2 - BACKWARD
 3 - BOTH

3.16 Circuit Breaker (XCBR1)

XCBR1.Mod

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

device annunciation / setting: 1 - ON / TRUE IEC Status Mod.stVal: 1 - ON
0 - OFF / FALSE 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 / TRUE IEC Status Health.stVal: 1 - OK
0 - OFF / FALSE 2 - WARNING
x - irrelevant 3 - ALARM

XCBR1.Loc

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

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

XCBR1.OpCnt

No.	Information	Value		
1000	Number of TRIPs= (#of TRIPs=)	XCBR1.OpCnt.stVal	Measured value	Absolute value

XCBR1.Pos

No.	Information				
4601	>Breaker contact (OPEN, if bkr is open) (>Brk Aux NO)	0	1	0	1
4602	>Breaker contact(OPEN, if bkr is closed) (>Brk Aux NC)	0	0	1	1
XCBR1.Pos.stVal - if spontan information		11	10	01	11
XCBR1.Pos.stVal - if command is running		00	10	01	00

device annunciation:
1 - ON
0 - OFF

IEC Status Pos.stVal:

0 - INTERMEDIATE STATE
1 - OFF
2 - ON
3 - 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

No.	Information		
6865	Failure Trip Circuit (FAIL: Trip cir.)	0	1
XCBR1.CirSpv.stVal		0	1

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

No.	Information	Value		
13927	Summation interrupted primary currents ($\Sigma I=$)	XCBR1.SumSwARs.actVal	Measured value	Current value of accumulated interrupted current = actVal X pulsQty
		XCBR1.SumSwARs.units.SIUnit	5	A (Ampere)
		XCBR1.SumSwARs.units.multiplier	3	Kilo
		XCBR1.SumSwARs.pulsQty	1.000000e-001	A / Metered value

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

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		
13990	Relay General pickup (Relay PU)	0	0
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

PTRC1.FinTr

No.	Information		
536	Final Trip(Final Trip)	0	1
PTRC1.FinTr.stVal		0	1

device annunciation:

1 - ON
0 - OFF

IEC Status FinTr.stVal:

0 - FALSE
1 - TRUE

3.18 Tripping Circuit Supervision (ZAXN1)

ZAXN1.Mod

No.	Information			
6861	Trip circuit supervision OFF (TripC OFF)	1	0	0
6866	TripC1 blocked: Binary Input is not set (TripC1 ProgFAIL)	X	1	0
ZAXN1.Mod.stVal		5	2	1

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

ZAXN1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
ZAXN1.Health.stVal		3	1

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

ZAXN1.CirSpv

No.	Information		
6865	Failure Trip Circuit (FAIL: Trip cir.)	0	1
ZAXN1.CirSpv.stVal		0	1

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

3.19 Measurement (MMXN1,MMXN2,MMXN3,MMXN4)

3.19.1 Operating Measurement (MMXN1)

MMXN1.Mod

No.	Information		
51	Device is Operational and Protecting (Device OK)	1	0
MMXN1.Mod.stVal		1	5

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

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

MMXN1.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
MMXN1.Health.stVal		3	1

device annunciation: 1 - ON
0 - OFF

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

MMXN1.Amp

No.	Information	Value		
668	Operational measurement: I =(I =)	MMXN1.Amp.mag.f	Measured value	Absolute value
		MMXN1.Amp.units.SIUnit	5	A (Ampere)
		MMXN1.Amp.units.multiplier	3	1

MMXN1.Vol

No.	Information	Value		
678	Operational measurement: U =(U =)	MMXN1.Vol.mag.f	Measured value	Absolute value
		MMXN1.Vol.units.SIUnit	29	V(Volt)
		MMXN1.Vol.units.multiplier	3	Kilo

MMXN1.Watt

No.	Information	Value		
641	P (active power)(P =)	MMXN1.Watt.mag.f	Measured value	Absolute value
		MMXN1.Watt.units.SIUnit	62	W(Watt)
		MMXN1.Watt.units.multiplier	6	Mega

MMXN1.VolAmpr

No.	Information	Value		
642	Q (reactive power)(Q =)	MMXN1.VolAmpr.mag.f	Measured value	Absolute value
		MMXN1.VolAmpr.units.SIUnit	63	VAr
		MMXN1.VolAmpr.units.multiplier	6	Mega

MMXN1.Hz

No.	Information	Value		
644	Frequency (Freq=)	MMXN1.Hz.mag.f	Measured value	Absolute value
		MMXN1.Hz.units.SIUnit	33	Hz
		MMXN1.Hz.units.multiplier	0	1

3.19.2 Negative Feeder Measurement (MMXN2)**MMXN2.Mod**

No.	Information		
51	Device is Operational and Protecting (Device OK)	1	0
MMXN2.Mod.stVal		1	5

device annunciation / setting:

1 - ON
0 - OFF
x - irrelevant

IEC Status Mod.stVal:

1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
MMXN2.Health.stVal		3	1

No.	Information	Value		
13921	Current IF- is (IF- =)	MMXN2.Amp.mag.f	Measured value	Absolute value
		MMXN2.Amp.units.SIUnit	5	A (Ampere)
		MMXN2.Amp.units.multiplier	0	1

No.	Information	Value		
13920	Voltage UF- is (UF- =)	MMXN2.Vol.mag.f	Measured value	Absolute value
		MMXN2.Vol.units.SIUnit	29	V(Volt)
		MMXN2.Vol.units.multiplier	3	Kilo

No.	Information		
51	Device is Operational and Protecting (Device OK)	1	0
MMXN3.Mod.stVal		1	5

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MMXN3.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
MMXN3.Health.stVal		3	1

device annunciation: 1 - ON
0 - OFF

IEC Status Health.stVal:

1 - OK
2 - WARNING
3 - ALARM

MMXN3.Vol

No.	Information	Value		
13922	Reference voltage (Uref=)	MMXN3.Vol.mag.f	Measured value	Absolute value
		MMXN3.Vol.units.SIUnit	29	V(Volt)
		MMXN3.Vol.units.multiplier	3	Kilo

MMXN3.Hz

No.	Information	Value		
646	f - Reference (fref=)	MMXN3.Hz.mag.f	Measured value	Absolute value
		MMXN3.Hz.units.SIUnit	33	Hz
		MMXN3.Hz.units.multiplier	0	1

3.19.4 Defrosting Current Measurement (MMXN4)**MMXN4.Mod**

No.	Information		
51	Device is Operational and Protecting (Device OK)	1	0
MMXN4.Mod.stVal		1	5

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

IEC Status Mod.stVal:

1 - ON
2 - BLOCKED
3 - TEST
4 - TEST/BLOCKED
5 - OFF

MMXN4.Health

No.	Information		
51	Device is Operational and Protecting (Device OK)	0	1
MMXN4.Health.stVal		3	1

device annunciation:

1 - ON
0 - OFF

IEC Status Health.stVal:

1 - OK
2 - WARNING
3 - ALARM**MMXN4.Amp**

No.	Information	Value		
13923	Defrosting current IX is (IX =)	MMXN4.Amp.mag.f	Measured value	Absolute value
		MMXN4.Amp.units.SIUnit	5	A(Ampere)
		MMXN4.Amp.units.multiplier	0	1

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 Numerical Overhead Contact Line Protection for AC Traction Power Supply
C53000-G1176-C251

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