

# SIEMENS

## SIPROTEC

### Line Differential Protection / Distance Protection Devices

7SD5, 7SD610

7SA6, 7SA522

V4.6

### Breaker Management Relay

7VK61

V4.6

IEC 61850

PIXIT

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**Disclaimer of Liability**

Although we have carefully checked the contents of this publication for conformity with the hardware and software described, we cannot guarantee complete conformity since errors cannot be excluded. The information provided in this manual is checked at regular intervals and any corrections that might become necessary are included in the next releases. Any suggestions for improvement are welcome.

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# Preface

## Purpose of this manual

In this Manual, you will find the

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

## Target audience

This manual is intended mainly for all persons who configure, parameterize and operate a SIPROTEC Device 7SD5, 7SD610, 7SA522, 7SA6 or 7VK61.

## Scope of validity of this Manual

SIPROTEC 7SA6, Version 4.60 and higher  
SIPROTEC 7SA522, Version 4.60 and higher  
SIPROTEC 7SD5, Version 4.60 and higher  
SIPROTEC 7SD610, Version 4.60 and higher  
SIPROTEC 7VK61, Version 4.60 and higher

## 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 7SD / 7SA / 7VK 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 7SD / 7SA / 7VK 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/optical Interface 100 MBit, Manual /1/*.

The following applicable ACSI service models are specified:

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

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

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

## 1.2 Association model

| Description                                                                             | Value / Clarification                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Maximum number of clients that can set-up an association simultaneously                 | 5                                                                                                                                                                                                  |
| 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<br>Session selector Y<br>Presentation selector Y<br>AP Title ANY<br>AE Qualifier ANY<br><br>Where<br>Y means: as defined within the ICD-File<br>ANY means: any value accepted |
| What is the maximum and minimum MMS PDU size ?                                          | Max MMS PDU size 32768<br>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:<br>Y Good,<br>Y Invalid,<br>N Reserved,<br>Y Questionable<br>Y Overflow<br>Y OutofRange<br>N BadReference<br>N Oscillatory<br>Y Failure<br>Y OldData<br>N Inconsistent<br>Y Inaccurate<br><br>Source:<br>Y Process<br>N Substituted<br>Y Test<br>Y OperatorBlocked |
| Which status value (ST) quality bits are supported (can be set by server) ?   | Validity:<br>Y Good,<br>Y Invalid,<br>N Reserved,<br>Y Questionable<br>N BadReference<br>Y Oscillatory<br>Y Failure<br>Y OldData<br>N Inconsistent<br>N Inaccurate<br><br>Source:<br>Y Process<br>Y Substituted<br>Y Test<br>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.                                                                                                         |
| <b>additional items:</b>                                                  |                                                                                                                                                           |
| Maximum number of data sets                                               | Could not be defined, it depends on the available memory space. In principle, this information it not necessary from type conformance testing standpoint. |

## 1.5 Substitution model

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

## 1.6 Setting group control model

| Description                                                                                                 | Value / Clarification                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| What is the number of supported setting groups for each logical device ?                                    | Setting groups available for LLN0 only in LD PROT. The number of supported setting groups is 1 or 4, it depends on the given configuration. Specified in the ICD-File. |
| What is the effect of when and how the non-volatile storage is updated ?<br>(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<br>Y Data change<br>Y Quality change<br>Y Data update<br>Y General Interrogation                                                                                                                                                                                         |
| The supported optional fields are                                                                                                            | Y Sequence-number<br>Y Report-time-stamp<br>Y Reason-for-inclusion<br>Y Data-set-name<br>Y Data-reference<br>N Buffer-overflow<br>N EntryID<br>Y Conf-rev<br>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                                                                                                                                                                                                                                                    |
| <b>additional items:</b>                                                                                                                     |                                                                                                                                                                                                                                                                                      |
| 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 $\geq 1$ 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<br>Y Data change<br>Y Quality change<br>Y Data update<br>Y General Interrogation                                                                                                                                                                                                                                                                                                                                                                                           |
| The supported optional fields are                                                                                                            | Y Sequence-number<br>Y Report-time-stamp<br>Y Reason-for-inclusion<br>Y Data-set-name<br>Y Data-reference<br>Y Buffer-overflow<br>Y EntryID<br>Y Conf-rev<br>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<br>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<br>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.<br>Each BRCB has an extension attribute Memory that display the percentage of those 1 MB that have been reserved/forseen for its own entries.<br>Default amount 1 MB/(2*Number of logical devices)                                                                                                                                                                                                                                         |
| <b>additional items:</b>                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 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.<br>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. |

|                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Configured BRCB reservation after an abort of the client/server association</p> | <p>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).</p> <p>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.</p>                                                                                                                                                                                                                                               |
| <p>Optional use of a flow control for transmitting history of a BRCB</p>           | <p>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.</p> <p>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 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.</p> |

## 1.8 Logging model

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

## 1.9 Generic substation model

| Description                                                                                                                                              | Value / Clarification                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| What is the behavior when one subscribed GOOSE message isn't received or syntactically incorrect ?                                                       | The telegram will be discarded (i.e not forwarded to the application) since it is corrupt or syntactically incorrect and therefore not readable. The data objects will be declared as invalid after a timeout detection since no telegram have been received by the application.                                                                                                                                                         |
| What is the behavior when a subscribed GOOSE message is out-of-order ?                                                                                   | Error message will be stored into the error buffer (could be accessed by EN100 web-server).<br>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).<br>All expected data objects will be declared as invalid.                                                                                                                                                                                                                    |
| <b>additional items:</b>                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 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.<br>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.<br>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?<br>(datSet, goID, confRev, numDatSetEntries, number of allData) | Error message will be stored into the error buffer (could be accessed by EN100 web-server).<br>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.<br>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 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/optical Interface 100 MBit, Manual /1/*).

## 1.11 Control model

| Description                                                                                         | Value / Clarification                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| What control models are supported ?                                                                 | Y Status-only<br>Y Direct-with-normal-security<br>N Sbo-with-normal-security<br>Y Direct-with-enhanced-security<br>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<br>Y Interlock-check                                                                                                                                                                                                                                                                                                                                                |
| What service error types are supported ?                                                            | Y Instance-not-available<br>Y Instance-in-use<br>Y Access-violation<br>Y Access-not-allowed-in-current-state<br>Y Parameter-value-inappropriate<br>Y Parameter-value-inconsistent<br>Y Class-not-supported<br>Y Instance-locked-by-other-client<br>Y Control-must-be-selected<br>Y Type-conflict<br>Y Failed-due-to-communications<br>Y Constraint failed-due-to-server-constraint |

|                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| What additional cause diagnosis are supported ?              | N Blocked-by-switching-hierarchy<br>Y Select-failed<br>Y Invalid-position<br>Y Position-reached<br>Y Parameter-change-in-execution<br>Y Step-limit<br>Y Blocked-by-Mode<br>Y Blocked-by-process<br>Y Blocked-by-interlocking<br>Y Blocked-by-synchrocheck<br>Y Command-already-in-execution<br>N Blocked-by-health<br>Y 1-of-n-control<br>Y Abortion-by-cancel<br>Y Time-limit-over<br>N Abortion-by-trip<br>Y Object-not-selected |
| <b>additional items:</b>                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| What additional cause diagnosis extensions are supported ?   | Y Plausibility_error<br>Y Parameter_setting_invalid<br>Y Hardware_error<br>Y System_overload<br>Y Internal_fault<br>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.<br>The following attributes will not be checked in this case:<br>T (Time)                                                                                                                                                                                                                                        |
| Cancel request could be sent after an operate request.       | Y                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Format of the control time stamp attribute ?                 | TimeStamp instead of EntryTime<br>acc. to the 7-2 Errata List.                                                                                                                                                                                                                                                                                                                                                                     |
| Negative response for select request could be performed only | If test mode is activated or<br>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<br>Y ClockFailure<br>Y ClockNotSynchronized                                                                                                                                                                                                                                                                                      |
| What kind of quality accuracy bits are supported ?                                                        | Y Invalid<br>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. |
| <b>additional items:</b>                                                                                  |                                                                                                                                                                                                                                                                                                                                                     |
| 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 / *;<br>Directory name / LD / *;<br>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.                                                     |
| <b>additional items:</b>                                                                          |                                                                                                                                  |
| 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/optical Interface 100 MBit, Manual /1/</i>                                                                                                                                          |
| <b>additional items:</b>                                                          |                                                                                                                                                                                                                                                                                                                                                                                                         |
| GOOSE Proxy object                                                                | To be able to subscribe Data over GOOSE, Proxy Objects are added into the object directory. Typically, they are Data of GGIO logical nodes: SPCSOxx, DPCSOxx, ISCSOxx. The Data Attributes of those Data are ctlVal, q and t. The control model associated to those Data is status-only. They are not controllable from an IEC61850 client, and their function is only to enable the GOOSE subscribing. |
| What is the type of the attribute actVal in the BCR (Binary Counter Reading) CDC? | The type is integer 32 (INT32).                                                                                                                                                                                                                                                                                                                                                                         |

## 1.15 TISSUES

| Topic            | TISSUE -No. | Link                                                                                                                        | Description                                                         | Impact of Interoper. |
|------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|----------------------|
| Object Directory | 433         | <a href="http://www.tissue.iec61850.com/tissue.aspx?issueid=433">http://www.tissue.iec61850.com/tissue.aspx?issueid=433</a> | Order of attributes in specialized CDCs for control service mapping | -                    |
|                  | 422         | <a href="http://www.tissue.iec61850.com/tissue.aspx?issueid=422">http://www.tissue.iec61850.com/tissue.aspx?issueid=422</a> | Order of extension data objects and data attributes                 | -                    |
|                  | 168         | <a href="http://www.tissue.iec61850.com/tissue.aspx?issueid=168">http://www.tissue.iec61850.com/tissue.aspx?issueid=168</a> | Order of attributes in MMS components                               | -                    |
| Object Model     | 120         | <a href="http://www.tissue.iec61850.com/tissue.aspx?issueid=120">http://www.tissue.iec61850.com/tissue.aspx?issueid=120</a> | Type - Mod.stVal and Mod.ctlVal                                     | -                    |
|                  | 146         | <a href="http://www.tissue.iec61850.com/tissue.aspx?issueid=146">http://www.tissue.iec61850.com/tissue.aspx?issueid=146</a> | CtxInt                                                              | -                    |
|                  | 173         | <a href="http://www.tissue.iec61850.com/tissue.aspx?issueid=173">http://www.tissue.iec61850.com/tissue.aspx?issueid=173</a> | Ctl modelling harmonization                                         | -                    |
|                  | 234         | <a href="http://www.tissue.iec61850.com/tissue.aspx?issueid=234">http://www.tissue.iec61850.com/tissue.aspx?issueid=234</a> | New type CtxInt                                                     | x                    |
| Services         | 377         | <a href="http://www.tissue.iec61850.com/tissue.aspx?issueid=377">http://www.tissue.iec61850.com/tissue.aspx?issueid=377</a> | DeleteDataSet response-                                             | -                    |
|                  | 276         | <a href="http://www.tissue.iec61850.com/tissue.aspx?issueid=276">http://www.tissue.iec61850.com/tissue.aspx?issueid=276</a> | File Services Negative Responses                                    | -                    |
|                  | 183         | <a href="http://www.tissue.iec61850.com/tissue.aspx?issueid=183">http://www.tissue.iec61850.com/tissue.aspx?issueid=183</a> | GetNameList error handling                                          | x                    |
|                  | 165         | <a href="http://www.tissue.iec61850.com/tissue.aspx?issueid=165">http://www.tissue.iec61850.com/tissue.aspx?issueid=165</a> | Improper Error Response for GetDataSetValues                        | x                    |
|                  | 116         | <a href="http://www.tissue.iec61850.com/tissue.aspx?issueid=116">http://www.tissue.iec61850.com/tissue.aspx?issueid=116</a> | GetNameList with empty response?                                    | x                    |
| Reporting        | 474         | <a href="http://www.tissue.iec61850.com/tissue.aspx?issueid=474">http://www.tissue.iec61850.com/tissue.aspx?issueid=474</a> | GI for URCB                                                         | -                    |
|                  | 453         | <a href="http://www.tissue.iec61850.com/tissue.aspx?issueid=453">http://www.tissue.iec61850.com/tissue.aspx?issueid=453</a> | Reporting & Logging model revision                                  | x                    |
|                  | 438         | <a href="http://www.tissue.iec61850.com/tissue.aspx?issueid=438">http://www.tissue.iec61850.com/tissue.aspx?issueid=438</a> | EntryTime base should be GMT                                        | -                    |
|                  | 349         | <a href="http://www.tissue.iec61850.com/tissue.aspx?issueid=349">http://www.tissue.iec61850.com/tissue.aspx?issueid=349</a> | BRCB TimeOfEntry has two definitions                                | x                    |
|                  | 348         | <a href="http://www.tissue.iec61850.com/tissue.aspx?issueid=348">http://www.tissue.iec61850.com/tissue.aspx?issueid=348</a> | URCB class and report                                               | x                    |

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



# Basics

## Contents

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/optical Interface 100 MBit, Manual /1/* and
- ❑ *SIPROTEC 4 System Description /2/*.



### Note

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

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### Logical Devices

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

The following Logical Devices are present:

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

Each LD contains LN LLN0 and LN LPHD1.

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



**Logical Node LN**

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

**Data object instance DOI**

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

**Data attribute instance DAI**

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

**Annunciation types via GOOSE****Generic Object Oriented Substation Event**

A GOOSE report enables high speed trip signals to be issued with a high probability of delivery.

The following types of information can be configured via GOOSE.

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

## 2.2 Effects of Configuration to the Logical Nodes

### 2.2.1 Function parameters general

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

The following Logical Nodes are always available:

|                                      |                                     |
|--------------------------------------|-------------------------------------|
| Logical Device Protection:           | LLN0, LPHD1, PTRC1                  |
| Logical Device Measurement:          | LLN0, LPHD1, MMXU1,<br>MMTR1, MSQ11 |
| Logical Device Disturbance Recorder: | LLN0, LPHD1                         |
| Logical Device Control:              | LLN0, LPHD1, CALH1                  |

## 2.2.2 Function parameters SIPROTEC 7SA6

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 7SA6 - Effects of Function parameters to the Logical Nodes

| No. | Funktion                               | Setting         | Logical Nodes        |
|-----|----------------------------------------|-----------------|----------------------|
| 103 | Setting Group Change Option            |                 | No effect            |
|     | Disturbance Recorder                   | -               | RDRE1                |
| 110 | Trip mode                              | 3pole only      | XCBR1                |
|     |                                        | 1-/3pole        | XCBR2, XCBR3, XCBR4  |
| 114 | Distance protection pickup program     | Disabled        | -                    |
|     |                                        | Z< (quadrilat.) | PDIS1 – PDIS5, PTRC2 |
|     |                                        | I> (overcurr.)  | -                    |
|     |                                        | U/I             | -                    |
|     |                                        | U/I/φ           | -                    |
| 115 | Characteristic of distance zones       |                 | No effect            |
| 120 | Power Swing detection                  | Disabled        | -                    |
|     |                                        | Enabled         | RPSB1 – RPSB6        |
| 121 | Teleprotection for Distance protection | Disabled        | -                    |
|     |                                        | PUTT (Z1B)      | PSCH1                |
|     |                                        | PUTT (Pickup)   | PSCH1                |
|     |                                        | POTT            | PSCH1                |
|     |                                        | Dir.Comp.Pickup | PSCH1                |
|     |                                        | Unblocking      | PSCH1                |
|     |                                        | Blocking        | PSCH1                |
|     |                                        | Rev. Interlock  | PSCH1                |
|     |                                        | Pilot wire comp | PSCH1                |

Table 2-1 SIPROTEC 7SA6 - Effects of Function parameters to the Logical Nodes (Cont.)

| No. | Funktion                                   | Setting        | Logical Nodes |
|-----|--------------------------------------------|----------------|---------------|
| 122 | DTT Direct Transfer Trip                   |                | No effect     |
| 124 | Instantaneous HighSpeed SOTF Overcurrent   |                | No effect     |
| 125 | Weak Infeed (Trip and/or Echo)             |                | No effect     |
| 126 | Backup overcurrent                         | Disabled       | -             |
|     |                                            | TOC IEC        | PTOC1 - PTOC3 |
|     |                                            | TOC IEC /w 3ST | PTOC1- PTOC4  |
|     |                                            | TOC ANSI       | PTOC1- PTOC4  |
| 130 | Sensitive Earth Flt.(comp/ isol. starp.)   | Disabled       | -             |
|     |                                            | Enabled        | PSDE1         |
| 131 | Earth fault overcurrent                    | Disabled       | -             |
|     |                                            | TOC IEC        | PTOC5 – PTOC8 |
|     |                                            | TOC ANSI       | PTOC5 – PTOC8 |
|     |                                            | TOC Logarithm. | PTOC5 – PTOC8 |
|     |                                            | Definite Time  | PTOC5 – PTOC7 |
|     |                                            | U0 invers      | PTOC5 – PTOC8 |
|     |                                            | Sr inverse     | PTOC5 – PTOC8 |
| 132 | Teleprotection for Earth fault overcurrent |                | No effect     |

Table 2-1 SIPROTEC 7SA6 - Effects of Function parameters to the Logical Nodes (Cont.)

| No. | Funktion                         | Setting         | Logical Nodes                    |
|-----|----------------------------------|-----------------|----------------------------------|
| 133 | Auto-Reclose Function            | Disabled        | -                                |
|     |                                  | 1 AR-cycle      | RREC1                            |
|     |                                  | 2 AR-cycles     | RREC1                            |
|     |                                  | 3 AR-cycles     | RREC1                            |
|     |                                  | 4 AR-cycles     | RREC1                            |
|     |                                  | 5 AR-cycles     | RREC1                            |
|     |                                  | 6 AR-cycles     | RREC1                            |
|     |                                  | 7 AR-cycles     | RREC1                            |
|     |                                  | 8 AR-cycles     | RREC1                            |
|     |                                  | ADT             | RREC1                            |
| 134 | Auto-Reclose control mode        |                 | No effect                        |
| 135 | Synchronism and Voltage Check    | Disabled        | -                                |
|     |                                  | Enabled         | RSYN1                            |
| 136 | Over / Underfrequency Protection | Disabled        | -                                |
|     |                                  | Enabled         | PTOF1 – PTOF4,<br>PTUF1 – PTUF4  |
| 137 | Under / Overvoltage Protection   | Disabled        | -                                |
|     |                                  | Enabled         | PTUV1 – PTUV6,<br>PTOV1 – PTOV10 |
|     |                                  | Enabl. w. comp. | PTUV1 –PTUV6,<br>PTOV1 – PTOV10  |
| 138 | Fault Locator                    | Disabled        | -                                |
|     |                                  | Enabled         | RFLO1                            |
|     |                                  | with BCD-output | RFLO1                            |

Table 2-1 SIPROTEC 7SA6 - Effects of Function parameters to the Logical Nodes (Cont.)

| No. | Funktion                        | Setting                                   | Logical Nodes                  |
|-----|---------------------------------|-------------------------------------------|--------------------------------|
| 139 | Breaker Failure Protection      | Disabled                                  | -                              |
|     |                                 | Enabled                                   | RBRF1                          |
|     |                                 | enabled w/ 3I0>                           | RBRF1                          |
| 140 | Trip Circuit Supervision        | Disabled                                  | -                              |
|     |                                 | 1 Trip Circuit                            | XCBR1.CirSpv -<br>XCBR4.CirSpv |
|     |                                 | 2 Trip Circuits                           | XCBR1.CirSpv -<br>XCBR4.CirSpv |
|     |                                 | 3 Trip Circuits                           | XCBR1.CirSpv -<br>XCBR4.CirSpv |
| 142 | Thermal overload protection     | Disabled                                  | -                              |
|     |                                 | Enabled                                   | PTTR1                          |
| 145 | Protection Interface 1 (Port D) | Disabled                                  | -                              |
|     |                                 | Enabled                                   | MMXU2 - MMXU4                  |
| 147 | Number of relays                | 2 relays, Protection Interface 1 disabled | -                              |
|     |                                 | 2 relays, Protection Interface 1 enabled  | MMXU2, MMXU3                   |
|     |                                 | 3 relays                                  | MMXU2, MMXU3, MMXU4            |
| 150 | Analog Output B1 (Port B)       |                                           | No effect                      |
| 151 | Analog Output B2 (Port B)       |                                           | No effect                      |
| 152 | Analog Output D1 (Port D)       |                                           | No effect                      |
| 153 | Analog Output D2 (Port D)       |                                           | No effect                      |

### 2.2.3 Function parameters SIPROTEC 7SA522

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 2-2 SIPROTEC 7SA522 - Effects of Function parameters to the Logical Nodes

| No. | Funktion                                 | Setting         | Logical Nodes        |
|-----|------------------------------------------|-----------------|----------------------|
| 103 | Setting Group Change Option              |                 | No effect            |
|     | Disturbance Recorder                     | -               | RDRE1                |
| 110 | Trip mode                                | 3pole only      | XCBR1                |
|     |                                          | 1-/3pole        | XCBR2, XCBR3, XCBR4  |
| 112 | Phase Distance                           | Disabled        | -                    |
|     |                                          | Quadrilateral   | PDIS1 – PDIS5, PTRC2 |
|     |                                          | MHO             | PDIS1 – PDIS5, PTRC2 |
| 113 | Earth Distance                           | Disabled        | -                    |
|     |                                          | Quadrilateral   | PDIS1 – PDIS5, PTRC2 |
|     |                                          | MHO             | PDIS1 – PDIS5, PTRC2 |
| 120 | Power Swing detection                    | Disabled        | -                    |
|     |                                          | Enabled         | RPSB1 – RPSB6        |
| 121 | Teleprotection for Distance protection   | Disabled        | -                    |
|     |                                          | PUTT (Z1B)      | PSCH1                |
|     |                                          | POTT            | PSCH1                |
|     |                                          | Unblocking      | PSCH1                |
|     |                                          | Blocking        | PSCH1                |
|     |                                          | SIGNALv.ProtInt | PSCH1                |
| 122 | DTT Direct Transfer Trip                 |                 | No effect            |
| 124 | Instantaneous HighSpeed SOTF Overcurrent |                 | No effect            |

Table 2-2 SIPROTEC 7SA522 - Effects of Function parameters to the Logical Nodes (Cont.)

| No. | Funktion                                   | Setting        | Logical Nodes |
|-----|--------------------------------------------|----------------|---------------|
| 125 | Weak Infeed (Trip and/or Echo)             |                | No effect     |
| 126 | Backup overcurrent                         | Disabled       | -             |
|     |                                            | TOC IEC        | PTOC1 – PTOC3 |
|     |                                            | TOC IEC /w 3ST | PTOC1 - PTOC4 |
|     |                                            | TOC ANSI       | PTOC1 - PTOC4 |
| 131 | Earth fault overcurrent                    | Disabled       | -             |
|     |                                            | TOC IEC        | PTOC5 – PTOC8 |
|     |                                            | TOC ANSI       | PTOC5 – PTOC8 |
|     |                                            | TOC Logarithm. | PTOC5 – PTOC8 |
|     |                                            | Definite Time  | PTOC5 – PTOC7 |
|     |                                            | U0 invers      | PTOC5 – PTOC8 |
|     |                                            | Sr inverse     | PTOC5 – PTOC8 |
| 132 | Teleprotection for Earth fault overcurrent |                | No effect     |
| 133 | Auto-Reclose Function                      | Disabled       | -             |
|     |                                            | 1 AR-cycle     | RREC1         |
|     |                                            | 2 AR-cycles    | RREC1         |
|     |                                            | 3 AR-cycles    | RREC1         |
|     |                                            | 4 AR-cycles    | RREC1         |
|     |                                            | 5 AR-cycles    | RREC1         |
|     |                                            | 6 AR-cycles    | RREC1         |
|     |                                            | 7 AR-cycles    | RREC1         |
|     |                                            | 8 AR-cycles    | RREC1         |
|     |                                            | ADT            | RREC1         |
| 134 | Auto-Reclose control mode                  |                | No effect     |



Table 2-2 SIPROTEC 7SA522 - Effects of Function parameters to the Logical Nodes (Cont.)

| No. | Funktion                         | Setting                                | Logical Nodes                    |
|-----|----------------------------------|----------------------------------------|----------------------------------|
| 135 | Synchronism and Voltage Check    | Disabled                               | -                                |
|     |                                  | Enabled                                | RSYN1                            |
| 136 | Over / Underfrequency Protection | Disabled                               | -                                |
|     |                                  | Enabled                                | PTOF1 – PTOF4,<br>PTUF1 – PTUF4  |
| 137 | Under / Overvoltage Protection   | Disabled                               | -                                |
|     |                                  | Enabled                                | PTUV1 – PTUV6,<br>PTOV1 – PTOV10 |
|     |                                  | Enabl. w. comp.                        | PTUV1 –PTUV6,<br>PTOV1 – PTOV10  |
| 138 | Fault Locator                    | Disabled                               | -                                |
|     |                                  | Enabled                                | RFLO1                            |
|     |                                  | with BCD-output                        | RFLO1                            |
| 139 | Breaker Failure Protection       | Disabled                               | -                                |
|     |                                  | Enabled                                | RBRF1                            |
|     |                                  | enabled w/ 3I0>                        | RBRF1                            |
| 140 | Trip Circuit Supervision         | Disabled                               | -                                |
|     |                                  | 1 Trip Circuit                         | XCBR1.CirSpv -<br>XCBR4.CirSpv   |
|     |                                  | 2 Trip Circuits                        | XCBR1.CirSpv -<br>XCBR4.CirSpv   |
|     |                                  | 3 Trip Circuits                        | XCBR1.CirSpv -<br>XCBR4.CirSpv   |
| 145 | Protection Interface 1 (Port D)  | Disabled (Prot.<br>Interf. 2 disabled) | -                                |
|     |                                  | Disabled (Prot.<br>Interf. 2 enabled)  | MMXU2 - MMXU4                    |
|     |                                  | Enabled                                | MMXU2 - MMXU4                    |

Table 2-2 SIPROTEC 7SA522 - Effects of Function parameters to the Logical Nodes (Cont.)

| No. | Funktion                        | Setting                               | Logical Nodes       |
|-----|---------------------------------|---------------------------------------|---------------------|
| 146 | Protection Interface 2 (Port E) | Disabled (Prot. Interf. 1 disabled)   | -                   |
|     |                                 | Disabled (Prot. Interf. 1 enabled)    | MMXU2 - MMXU4       |
|     |                                 | Enabled                               | MMXU2 - MMXU4       |
| 147 | Number of relays                | 2 relays, no Protection Interface     | -                   |
|     |                                 | 2 relays, min. 1 Protection Interface | MMXU2, MMXU3        |
|     |                                 | 3 relays                              | MMXU2, MMXU3, MMXU4 |

## 2.2.4 Function parameters SIPROTEC 7SD5

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 2-3 SIPROTEC 7SD5 - Effects of Function parameters to the Logical Nodes

| No. | Funktion                           | Setting       | Logical Nodes            |
|-----|------------------------------------|---------------|--------------------------|
| 103 | Setting Group Change Option        |               | No effect                |
|     | Disturbance Recorder               | -             | RDRE1                    |
| 110 | Trip mode                          | 3pole only    | XCBR1                    |
|     |                                    | 1-/3pole      | XCBR2, XCBR3, XCBR4      |
| 112 | Differential protection            | Disabled      | -                        |
|     |                                    | Enabled       | PDIF1, PDIF2, PTRC3      |
| 115 | Phase Distance                     | Disabled      | -                        |
|     |                                    | Quadrilateral | PDIS1 – PDIS5, PTRC2     |
|     |                                    | MHO           | PDIS1 – PDIS5, PTRC2     |
| 116 | Earth Distance                     | Disabled      | -                        |
|     |                                    | Quadrilateral | PDIS1 – PDIS5, PTRC2     |
|     |                                    | MHO           | PDIS1 – PDIS5, PTRC2     |
| 117 | Distance protection pickup program |               | No effect                |
| 120 | Power Swing detection              | Disabled      | -                        |
|     |                                    | Enabled       | RPSB1 – RPSB6,<br>RPSB10 |

Table 2-3 SIPROTEC 7SD5 - Effects of Function parameters to the Logical Nodes (Cont.)

| No. | Funktion                                   | Setting         | Logical Nodes                |
|-----|--------------------------------------------|-----------------|------------------------------|
| 121 | Teleprotection for Distance protection     | Disabled        | -                            |
|     |                                            | PUTT (Z1B)      | PSCH1                        |
|     |                                            | PUTT (Pickup)   | PSCH1                        |
|     |                                            | POTT            | PSCH1                        |
|     |                                            | Dir.Comp.Pickup | PSCH1                        |
|     |                                            | Unblocking      | PSCH1                        |
|     |                                            | Blocking        | PSCH1                        |
|     |                                            | Rev. Interlock  | PSCH1                        |
|     |                                            | Pilot wire comp | PSCH1                        |
| 122 | DTT Direct Transfer Trip                   |                 | No effect                    |
| 124 | Instantaneous HighSpeed SOTF Overcurrent   |                 | No effect                    |
| 125 | Weak Infeed (Trip and/or Echo)             |                 | No effect                    |
| 126 | Backup overcurrent                         | Disabled        | -                            |
|     |                                            | TOC IEC         | PTOC1 – PTOC4, PTOC9, PTOC10 |
|     |                                            | TOC ANSI        | PTOC1 – PTOC4, PTOC9, PTOC10 |
| 131 | Earth fault overcurrent                    | Disabled        | -                            |
|     |                                            | TOC IEC         | PTOC5 – PTOC8                |
|     |                                            | TOC ANSI        | PTOC5 – PTOC8                |
|     |                                            | TOC Logarithm.  | PTOC5 – PTOC8                |
|     |                                            | Definite Time   | PTOC5 – PTOC7                |
|     |                                            | U0 invers       | PTOC5 – PTOC8                |
|     |                                            | Sr inverse      | PTOC5 – PTOC8                |
| 132 | Teleprotection for Earth fault overcurrent |                 | No effect                    |

Table 2-3 SIPROTEC 7SD5 - Effects of Function parameters to the Logical Nodes (Cont.)

| No. | Funktion                         | Setting         | Logical Nodes                    |
|-----|----------------------------------|-----------------|----------------------------------|
| 133 | Auto-Reclose Function            | Disabled        | -                                |
|     |                                  | 1 AR-cycle      | RREC1                            |
|     |                                  | 2 AR-cycles     | RREC1                            |
|     |                                  | 3 AR-cycles     | RREC1                            |
|     |                                  | 4 AR-cycles     | RREC1                            |
|     |                                  | 5 AR-cycles     | RREC1                            |
|     |                                  | 6 AR-cycles     | RREC1                            |
|     |                                  | 7 AR-cycles     | RREC1                            |
|     |                                  | 8 AR-cycles     | RREC1                            |
|     |                                  | ADT             | RREC1                            |
| 134 | Auto-Reclose control mode        |                 | No effect                        |
| 135 | Synchronism and Voltage Check    | Disabled        | -                                |
|     |                                  | Enabled         | RSYN1                            |
| 136 | Over / Underfrequency Protection | Disabled        | -                                |
|     |                                  | Enabled         | PTOF1 – PTOF4,<br>PTUF1 – PTUF4  |
| 137 | Under / Overvoltage Protection   | Disabled        | -                                |
|     |                                  | Enabled         | PTUV1 – PTUV6,<br>PTOV1 – PTOV10 |
|     |                                  | Enabl. w. comp. | PTUV1 –PTUV6,<br>PTOV1 – PTOV10  |
| 138 | Fault Locator                    | Disabled        | -                                |
|     |                                  | Enabled         | RFLO1                            |
|     |                                  | with BCD-output | RFLO1                            |

Table 2-3 SIPROTEC 7SD5 - Effects of Function parameters to the Logical Nodes (Cont.)

| No. | Funktion                           | Setting                             | Logical Nodes                  |
|-----|------------------------------------|-------------------------------------|--------------------------------|
| 139 | Breaker Failure Protection         | Disabled                            | -                              |
|     |                                    | Enabled                             | RBRF1                          |
|     |                                    | enabled w/ 3I0>                     | RBRF1                          |
| 140 | Trip Circuit Supervision           | Disabled                            | -                              |
|     |                                    | 1 Trip Circuit                      | XCBR1.CirSpv -<br>XCBR4.CirSpv |
|     |                                    | 2 Trip Circuits                     | XCBR1.CirSpv -<br>XCBR4.CirSpv |
|     |                                    | 3 Trip Circuits                     | XCBR1.CirSpv -<br>XCBR4.CirSpv |
| 141 | Restricted earth fault protection  | Disabled                            | -                              |
|     |                                    | Enabled                             | PDIF3                          |
| 142 | Thermal overload protection        | Disabled                            | -                              |
|     |                                    | Enabled                             | PTTR1                          |
| 143 | Transformer inside protection zone |                                     | No effect                      |
| 144 | Voltage transformers               |                                     | No effect                      |
| 145 | Protection Interface 1 (Port D)    | Disabled (Prot. Interf. 2 disabled) | -                              |
|     |                                    | Disabled (Prot. Interf. 2 enabled)  | MMXU2 - MMXU7                  |
|     |                                    | Enabled                             | MMXU2 - MMXU7                  |
| 146 | Protection Interface 2 (Port E)    | Disabled (Prot. Interf. 1 disabled) | -                              |
|     |                                    | Disabled (Prot. Interf. 1 enabled)  | MMXU2 - MMXU7                  |
|     |                                    | Enabled                             | MMXU2 - MMXU7                  |

Table 2-3 SIPROTEC 7SD5 - Effects of Function parameters to the Logical Nodes (Cont.)

| No. | Funktion                        | Setting                               | Logical Nodes                            |
|-----|---------------------------------|---------------------------------------|------------------------------------------|
| 147 | Number of relays                | 2 relays, no Protection Interface     | -                                        |
|     |                                 | 2 relays, min. 1 Protection Interface | MMXU2, MMXU3                             |
|     |                                 | 3 relays                              | MMXU2, MMXU3, MMXU4                      |
|     |                                 | 4 relays                              | MMXU2, MMXU3, MMXU4, MMXU5               |
|     |                                 | 5 relays                              | MMXU2, MMXU3, MMXU4, MMXU5, MMXU6        |
|     |                                 | 6 relays                              | MMXU2, MMXU3, MMXU4, MMXU5, MMXU6, MMXU7 |
| 148 | GPS synchronization             |                                       | No effect                                |
| 149 | Charging current compensation   |                                       | No effect                                |
| 160 | Line sections for fault locator |                                       | No effect                                |

## 2.2.5 Function parameters SIPROTEC 7SD610

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 2-4 SIPROTEC 7SD610 - Effects of Function parameters to the Logical Nodes

| No. | Funktion                                 | Setting    | Logical Nodes                   |
|-----|------------------------------------------|------------|---------------------------------|
| 103 | Setting Group Change Option              |            | No effect                       |
|     | Disturbance Recorder                     | -          | RDRE1                           |
| 110 | Trip mode                                | 3pole only | XCBR1                           |
|     |                                          | 1-/3pole   | XCBR2, XCBR3, XCBR4             |
| 112 | Differential protection                  | Disabled   | -                               |
|     |                                          | Enabled    | PDIF1, PDIF2, PTRC3             |
| 122 | DTT Direct Transfer Trip                 |            | No effect                       |
| 124 | Instantaneous HighSpeed SOTF Overcurrent |            | No effect                       |
| 126 | Backup overcurrent                       | Disabled   | -                               |
|     |                                          | TOC IEC    | PTOC1 – PTOC4,<br>PTOC9, PTOC10 |
|     |                                          | TOC ANSI   | PTOC1 – PTOC4,<br>PTOC9, PTOC10 |



Table 2-4 SIPROTEC 7SD610 - Effects of Function parameters to the Logical Nodes (Cont.)

| No. | Funktion                         | Setting         | Logical Nodes                    |
|-----|----------------------------------|-----------------|----------------------------------|
| 133 | Auto-Reclose Function            | Disabled        | -                                |
|     |                                  | 1 AR-cycle      | RREC1                            |
|     |                                  | 2 AR-cycles     | RREC1                            |
|     |                                  | 3 AR-cycles     | RREC1                            |
|     |                                  | 4 AR-cycles     | RREC1                            |
|     |                                  | 5 AR-cycles     | RREC1                            |
|     |                                  | 6 AR-cycles     | RREC1                            |
|     |                                  | 7 AR-cycles     | RREC1                            |
|     |                                  | 8 AR-cycles     | RREC1                            |
|     |                                  | ADT             | RREC1                            |
| 134 | Auto-Reclose control mode        |                 | No effect                        |
| 136 | Over / Underfrequency Protection | Disabled        | -                                |
|     |                                  | Enabled         | PTOF1 – PTOF4,<br>PTUF1 – PTUF4  |
| 137 | Under / Overvoltage Protection   | Disabled        | -                                |
|     |                                  | Enabled         | PTUV1 – PTUV6,<br>PTOV1 – PTOV10 |
|     |                                  | Enabl. w. comp. | PTUV1 –PTUV6,<br>PTOV1 – PTOV10  |
| 139 | Breaker Failure Protection       | Disabled        | -                                |
|     |                                  | Enabled         | RBRF1                            |
|     |                                  | enabled w/ 3I0> | RBRF1                            |

Table 2-4 SIPROTEC 7SD610 - Effects of Function parameters to the Logical Nodes (Cont.)

| No. | Funktion                           | Setting         | Logical Nodes                  |
|-----|------------------------------------|-----------------|--------------------------------|
| 140 | Trip Circuit Supervision           | Disabled        | -                              |
|     |                                    | 1 Trip Circuit  | XCBR1.CirSpv -<br>XCBR4.CirSpv |
|     |                                    | 2 Trip Circuits | XCBR1.CirSpv -<br>XCBR4.CirSpv |
|     |                                    | 3 Trip Circuits | XCBR1.CirSpv -<br>XCBR4.CirSpv |
| 141 | Restricted earth fault protection  | Disabled        | -                              |
|     |                                    | Enabled         | PDIF3                          |
| 142 | Thermal overload protection        | Disabled        | -                              |
|     |                                    | Enabled         | PTTR1                          |
| 143 | Transformer inside protection zone |                 | No effect                      |
| 144 | Voltage transformers               |                 | No effect                      |
| 148 | GPS synchronization                |                 | No effect                      |
| -   | Protection Interface (Port D)      |                 | MMXU2, MMXU3                   |

## 2.2.6 Function parameters SIPROTEC 7VK61

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 2-5 SIPROTEC 7VK61 - Effects of Function parameters to the Logical Nodes

| No. | Funktion                       | Setting        | Logical Nodes                                                  |
|-----|--------------------------------|----------------|----------------------------------------------------------------|
| 103 | Setting Group Change Option    |                | No effect                                                      |
|     | Disturbance Recorder           | -              | RDRE1                                                          |
| 106 | Voltage transformer connection | 3phase         | -                                                              |
|     |                                | 1phase         | -                                                              |
|     |                                | No             | LN RSYN1,<br>PTUV1 - PTUV6,<br>PTOV1 - PTOV10<br>not available |
| 107 | Current transformer connection | Yes            |                                                                |
|     |                                | No             | LN PTOC1 - PTOC4<br>not available                              |
| 110 | Trip mode                      | 3pole only     | XCBR1                                                          |
|     |                                | 1-/3pole       | XCBR2, XCBR3, XCBR4                                            |
| 126 | Backup overcurrent             | Disabled       | -                                                              |
|     |                                | TOC IEC        | PTOC1 – PTOC3                                                  |
|     |                                | TOC IEC /w 3ST | PTOC1 - PTOC4                                                  |
|     |                                | TOC ANSI       | PTOC1 - PTOC4                                                  |

Table 2-5 SIPROTEC 7VK61 - Effects of Function parameters to the Logical Nodes (Cont.)

| No. | Funktion                       | Setting         | Logical Nodes                    |
|-----|--------------------------------|-----------------|----------------------------------|
| 133 | Auto-Reclose Function          | Disabled        | -                                |
|     |                                | 1 AR-cycle      | RREC1                            |
|     |                                | 2 AR-cycles     | RREC1                            |
|     |                                | 3 AR-cycles     | RREC1                            |
|     |                                | 4 AR-cycles     | RREC1                            |
|     |                                | 5 AR-cycles     | RREC1                            |
|     |                                | 6 AR-cycles     | RREC1                            |
|     |                                | 7 AR-cycles     | RREC1                            |
|     |                                | 8 AR-cycles     | RREC1                            |
|     |                                | ADT             | RREC1                            |
| 134 | Auto-Reclose control mode      |                 | No effect                        |
| 135 | Synchronism and Voltage Check  | Disabled        | -                                |
|     |                                | Enabled         | RSYN1                            |
| 137 | Under / Overvoltage Protection | Disabled        | -                                |
|     |                                | Enabled         | PTUV1 – PTUV6,<br>PTOV1 – PTOV10 |
| 139 | Breaker Failure Protection     | Disabled        | -                                |
|     |                                | Enabled         | RBRF1                            |
|     |                                | enabled w/ 3I0> | RBRF1                            |
| 140 | Trip Circuit Supervision       | Disabled        | -                                |
|     |                                | 1 Trip Circuit  | XCBR1.CirSpv -<br>XCBR4.CirSpv   |
|     |                                | 2 Trip Circuits | XCBR1.CirSpv -<br>XCBR4.CirSpv   |
|     |                                | 3 Trip Circuits | XCBR1.CirSpv -<br>XCBR4.CirSpv   |



## 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 2-6 LD PROT - Logical Nodes

| LN                                                 | Function                                                                  | DOI                                                                                                                                         |
|----------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| LLN0                                               | General                                                                   | Mod, Beh, Health, NamPlt                                                                                                                    |
| PTRC1                                              | General device pickup<br>Total OFF                                        | Mod, Beh, Health, NamPlt, Str,Tr,FinTr                                                                                                      |
| PDIF1<br>PDIF2                                     | Differential protection                                                   | Mod, Beh, Health, NamPlt, Str, Op                                                                                                           |
| PTRC3                                              | Differential protection<br>General messages                               | Mod, Beh, Health, NamPlt, Str, Op<br>StrA, StrAG, StrB, StrBG, StrC, StrCG, StrAB, StrBC,<br>StrCA, StrABC, StrABG, StrBCG, StrCAG, StrABCG |
| PDIF3                                              | Earth fault overcurrent                                                   | Mod, Beh, Health, NamPlt, Str, Op, DifAClc, RstA                                                                                            |
| PDIS1<br>PDIS10                                    | Distance protection<br>zone 1, zone 1B                                    | Mod, Beh, Health, NamPlt, Str, Op<br>StrAG, StrBG, StrCG, StrAB, StrBC, StrCA                                                               |
| PDIS2<br>PDIS3<br>PDIS4<br>PDIS5                   | Distance protection<br>zone 2, zone3, zone 4, zone 5                      | Mod, Beh, Health, NamPlt, Str, Op                                                                                                           |
| PTRC2                                              | Distance protection<br>General messages                                   | Mod, Beh, Health, NamPlt, Str, Op                                                                                                           |
| PSCH1                                              | Distance protection<br>Teleprotection                                     | Mod, Beh, Health, NamPlt, Str, Op, CarRx, ProRx,<br>LosOfGrd, Echo, WeiOp, RvABlk, GrdRx, ProTx                                             |
| RPSB1<br>RPSB2<br>RPSB3<br>RPSB4<br>RPSB5<br>RPSB1 | Power Swing detection<br>zone1, zone 2, zone3, zone 4,<br>zone 5, zone 1B | Mod, Beh, Health, NamPlt, Str, BlkZn                                                                                                        |
| RPSB6                                              | Power Swing detection<br>Power Swing trip                                 | Mod, Beh, Health, NamPlt, Op                                                                                                                |

Table 2-6 LD PROT - Logical Nodes (Cont.)

| LN                                                                                      | Function                       | DOI                                                                                      |
|-----------------------------------------------------------------------------------------|--------------------------------|------------------------------------------------------------------------------------------|
| PTOC5<br>PTOC6<br>PTOC7<br>PTOC8                                                        | Earth fault overcurrent        | Mod, Beh, Health, NamPlt, Str, Op                                                        |
| PTOC1<br>PTOC2<br>PTOC3<br>PTOC4                                                        | Backup overcurrent             | Mod, Beh, Health, NamPlt, Str, Op                                                        |
| PTOC9<br>PTOC10                                                                         | Backup overcurrent directional | Mod, Beh, Health, NamPlt, Str, Op                                                        |
| RSYN1                                                                                   | Synchronism and Voltage Check  | Mod, Beh, Health, NamPlt, Rel, VInd, AngInd, HzInd, SynPrg, DifVClc, DifHzClc, DifAngClc |
| PTUV1<br>PTUV2<br>PTUV3<br>PTUV4<br>PTUV5<br>PTUV6                                      | Undervoltage Protection        | Mod, Beh, Health, NamPlt, Str, Op                                                        |
| PTOV1<br>PTOV2<br>PTOV3<br>PTOV4<br>PTOV5<br>PTOV6<br>PTOV7<br>PTOV8<br>PTOV9<br>PTOV10 | Overvoltage Protection         | Mod, Beh, Health, NamPlt, Str, Op                                                        |
| PTUF1<br>PTUF2<br>PTUF3<br>PTUF4                                                        | Underfrequency Protection      | Mod, Beh, Health, NamPlt, Str, Op                                                        |
| PTOF1<br>PTOF2<br>PTOF3<br>PTOF4                                                        | Overfrequency Protection       | Mod, Beh, Health, NamPlt, Str, Op                                                        |
| RFLO1                                                                                   | Fault Locator                  | Mod, Beh, Health, NamPlt, FltZ, FltDiskm                                                 |
| RBRF1                                                                                   | Breaker Failure Protection     | Mod, Beh, Health, NamPlt, Str, OpEx, OpIn                                                |
| PTTR1                                                                                   | Thermal overload protection    | Mod, Beh, Health, NamPlt, Str, Op, AlmThm                                                |

Table 2-6 LD PROT - Logical Nodes (Cont.)

| LN                         | Function                          | DOI                                                                                                     |
|----------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------|
| XCBR1                      | Three-pole tripping               | Mod, Beh, Health, NamPlt, Loc, OpCnt, Pos<br>BlkOpn, BlkCls, CBOpCap<br>SumSwARs1, SumSwARs2, SumSwARs3 |
| XCBR2<br>XCBR3<br>XCBR4    | Single-pole / Three-pole tripping | Mod, Beh, Health, NamPlt, Loc, OpCnt, Pos<br>BlkOpn, BlkCls, CBOpCap,<br>SumSwARs                       |
| LPHD1                      | Device                            | PhyNam, PhyHealth,<br>Proxy                                                                             |
| <b>only SIPROTEC 7VK61</b> |                                   |                                                                                                         |
| RREC1                      | Auto-Reclose Function             | Mod, Beh, Health, NamPlt, Op, AutoRecSt                                                                 |

**LD MEAS**

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

Table 2-7 LD MEAS - Logical Nodes

| LN    | Function                                   | DOIs                                                                     |
|-------|--------------------------------------------|--------------------------------------------------------------------------|
| LLN0  | General                                    | Mod, Beh, Health, NamPlt                                                 |
| MMXU1 | Operational measured values                | Mod, Beh, Health, NamPlt,<br>TotW, TotVAr, TotVA, TotPF, Hz, PPV, PhV, A |
| MMXU2 | Measure relay 1                            | Mod, Beh, Health, NamPlt, RelId, A, PhV,                                 |
| MMXU3 | Measure relay 2                            | Mod, Beh, Health, NamPlt, RelId, A, PhV,                                 |
| MMXU4 | Measure relay 3                            | Mod, Beh, Health, NamPlt, RelId, A, PhV,                                 |
| MMXU5 | Measure relay 4                            | Mod, Beh, Health, NamPlt, RelId, A, PhV,                                 |
| MMXU6 | Measure relay 5                            | Mod, Beh, Health, NamPlt, RelId, A, PhV,                                 |
| MMXU7 | Measure relay 6                            | Mod, Beh, Health, NamPlt, RelId, A, PhV,                                 |
| MMTR1 | Energy                                     | Mod, Beh, Health, NamPlt, SupWh, SupVArh,<br>DmdWh, DmdVArh              |
| MSQI1 | Measured values,<br>symmetrical components | Mod, Beh, Health, NamPlt, SeqA, SeqV                                     |
| LPHD1 | Device                                     | PhyNam, PhyHealth Proxy, CtrlNum, DevStr                                 |



**LD DR**

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

Table 2-8 LD DR - Logical Nodes

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

**LD CTRL**

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

Table 2-9 LD CTRL - Logical Nodes

| LN     | Function                                  | DOIs                                                                                                                |
|--------|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| LLN0   | General                                   | Mod, Beh, Health, NamPlt, LEDRs, Loc                                                                                |
| RREC1* | Auto-Reclose Function                     | Mod, Beh, Health, NamPlt, Op, AutoRecSt                                                                             |
| CALH1  | Alarms, warning messages and group alarms | Mod, Beh, Health, NamPlt, GrAlm, GrWrn, ErrBoard1, ErrBoard2, ErrBoard3, ErrBoard4, ErrBoard5, ErrBoard6, ErrBoard7 |
| LPHD1  | Device                                    | PhyNam, PhyHealth, Proxy                                                                                            |

\* **SIPROTEC 7VK61**: RREC1 Part of Logical Device Protection (see Table 2-6 )

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

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

**LD EXT**

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

Table 2-10 LD EXT - Logical Nodes

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

## 2.4 Logical Node LLN0

### 2.4.1 Logical Device PROT

#### LLN0.Mod

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

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        | 1 |
|                       | Test mode (Test mode)                               | x        | 0        | 0        | 1        | 1        | 1 |
|                       | Stop data transmission (DataStop)                   | x        | 0        | 1        | 0        | 1        | 1 |
| <b>LLN0.Beh.stVal</b> |                                                     | <b>5</b> | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> |   |

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

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

## 2.4.2 Logical Devices MEAS, CTRL, DR and EXT

### LLN0.Mod

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

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        | 1 |
|                       | Test mode (Test mode)                            | x        | 0        | 0        | 1        | 1        | 1 |
|                       | Stop data transmission (DataStop)                | x        | 0        | 1        | 0        | 1        | 1 |
| <b>LLN0.Beh.stVal</b> |                                                  | <b>5</b> | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> |   |

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

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

## 2.5 The DOI Behavior

### 2.5.1 Logical Device PROT

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

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

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

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        |  |
| <b>LNx.Beh.stVal</b> |                                   | <b>5</b> | <b>1</b> | <b>3</b> | <b>2</b> | <b>4</b> | <b>2</b> | <b>4</b> |  |

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

IEC Status stVal:

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



# Mapping

## Contents

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

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## 3.1 Differential Protection (PDIFx, PTRCx)

### 3.1.1 I-DIFF> (PDIF1)

#### PDIF1.Mod

| No.                    | Information                                           |          |          |          |          |          |          |          |
|------------------------|-------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|
| 3120                   | Diff: Active (Diff active)                            | x        | 0        | 0        | 1        | 1        | 1        | 1        |
| 3148                   | Diff: Differential protection is blocked (Diff block) | x        | 1        | 0        | 0        | 0        | 0        | 0        |
| 3149                   | Diff: Diff. protection is switched off (Diff OFF)     | 1        | 0        | 0        | 0        | 0        | 0        | 0        |
| 3190                   | Diff: Set Teststate of Diff. protection (Test Diff.)  | x        | x        | x        | 0        | 1        | 0        | 1        |
| 3191                   | Diff: Set Commissioning state of Diff. (Comm. Diff)   | x        | x        | x        | 0        | 0        | 1        | 1        |
| <b>PDIF1.Mod.stVal</b> |                                                       | <b>5</b> | <b>2</b> | <b>5</b> | <b>1</b> | <b>3</b> | <b>4</b> | <b>4</b> |

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

#### PDIF1.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>PDIF1.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

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

#### PDIF1.Str

| No.                      | Information                                     |          |          |
|--------------------------|-------------------------------------------------|----------|----------|
| 3139                     | Diff: Fault detection of I-Diff> (I-Diff> Flt.) | 0        | 1        |
| <b>PDIF1.Str.general</b> |                                                 | <b>0</b> | <b>1</b> |

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



**PDIF1.Op**

| No.                     | Information        |          |          |
|-------------------------|--------------------|----------|----------|
|                         | OFF-command IDiff> | 0        | 1        |
| <b>PDIF1.Op.general</b> |                    | <b>0</b> | <b>1</b> |

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

**3.1.2 I-DIFF>> (PDIF2)**

**PDIF2.Mod**

| No.                    | Information                                           |          |          |          |          |          |          |          |
|------------------------|-------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|
| 3120                   | Diff: Active (Diff active)                            | x        | 0        | 0        | 1        | 1        | 1        | 1        |
| 3148                   | Diff: Differential protection is blocked (Diff block) | x        | 1        | 0        | 0        | 0        | 0        | 0        |
| 3149                   | Diff: Diff. protection is switched off (Diff OFF)     | 1        | 0        | 0        | 0        | 0        | 0        | 0        |
| 3190                   | Diff: Set Teststate of Diff. protection (Test Diff.)  | x        | x        | x        | 0        | 1        | 0        | 1        |
| 3191                   | Diff: Set Commissioning state of Diff. (Comm. Diff)   | x        | x        | x        | 0        | 0        | 1        | 1        |
| <b>PDIF2.Mod.stVal</b> |                                                       | <b>5</b> | <b>2</b> | <b>5</b> | <b>1</b> | <b>3</b> | <b>4</b> | <b>4</b> |

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

**PDIF2.Health**

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>PDIF2.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

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

**PDIF2.Str**

| No.                      | Information                                       |          |          |
|--------------------------|---------------------------------------------------|----------|----------|
| 3137                     | Diff: Fault detection of I-Diff>> (I-Diff>> Flt.) | 0        | 1        |
| <b>PDIF2.Str.general</b> |                                                   | <b>0</b> | <b>1</b> |

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

**PDIF2.Op**

| No.                     | Information          |          |          |
|-------------------------|----------------------|----------|----------|
|                         | OFF-command I-Diff>> | 0        | 1        |
| <b>PDIF2.Op.general</b> |                      | <b>0</b> | <b>1</b> |

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

### 3.1.3 Differential Protection General Information

#### PTRC3.Mod

| No.                    | Information                                           |          |          |          |          |          |          |          |
|------------------------|-------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|
| 3120                   | Diff: Active (Diff active)                            | x        | 0        | 0        | 1        | 1        | 1        | 1        |
| 3148                   | Diff: Differential protection is blocked (Diff block) | x        | 1        | 0        | 0        | 0        | 0        | 0        |
| 3149                   | Diff: Diff. protection is switched off (Diff OFF)     | 1        | 0        | 0        | 0        | 0        | 0        | 0        |
| 3190                   | Diff: Set Teststate of Diff. protection (Test Diff.)  | x        | 0        | 0        | 0        | 1        | 0        | 1        |
| 3191                   | Diff: Set Commissioning state of Diff. (Comm. Diff)   | x        | 0        | 0        | 0        | 0        | 1        | 1        |
| <b>PTRC3.Mod.stVal</b> |                                                       | <b>5</b> | <b>2</b> | <b>5</b> | <b>1</b> | <b>3</b> | <b>4</b> | <b>4</b> |

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

#### PTRC3.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>PTRC3.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

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

#### PTRC3.Str

| No.                      | Information                             |          |          |
|--------------------------|-----------------------------------------|----------|----------|
| 3132                     | Diff: Fault detection (Diff. Gen. Flt.) | 0        | 1        |
| <b>PTRC3.Str.general</b> |                                         | <b>0</b> | <b>1</b> |

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

**PTRC3.Str.dirGeneral**

| No.                         | Information |          |
|-----------------------------|-------------|----------|
| <b>PTRC3.Str.dirGeneral</b> |             | <b>1</b> |

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

**PTRC3.Str.phsA**

| No.                   | Information                                       |          |          |
|-----------------------|---------------------------------------------------|----------|----------|
| 3133                  | Diff: Fault detection in phase L1 (Diff. Flt. L1) | 0        | 1        |
| <b>PTRC3.Str.phsA</b> |                                                   | <b>0</b> | <b>1</b> |

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

**PTRC3.Str.dirPhsA**

| No.                      | Information |          |
|--------------------------|-------------|----------|
| <b>PTRC3.Str.dirPhsA</b> |             | <b>1</b> |

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

**PTRC3.Str.phsB**

| No.                   | Information                                       |          |          |
|-----------------------|---------------------------------------------------|----------|----------|
| 3134                  | Diff: Fault detection in phase L2 (Diff. Flt. L2) | 0        | 1        |
| <b>PTRC3.Str.phsB</b> |                                                   | <b>0</b> | <b>1</b> |

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

**PTRC3.Str.dirPhsB**

| No.                      | Information |          |
|--------------------------|-------------|----------|
| <b>PTRC3.Str.dirPhsB</b> |             | <b>1</b> |

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

**PTRC3.Str.phsC**

| No.                   | Information                                       |          |          |
|-----------------------|---------------------------------------------------|----------|----------|
| 3135                  | Diff: Fault detection in phase L3 (Diff. Flt. L3) | 0        | 1        |
| <b>PTRC3.Str.phsC</b> |                                                   | <b>0</b> | <b>1</b> |

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

**PTRC3.Str.dirPhsC**

| No.                      | Information |          |  |
|--------------------------|-------------|----------|--|
| <b>PTRC3.Str.dirPhsC</b> |             | <b>1</b> |  |

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

**PTRC3.Str.neut**

| No.                   | Information                                |          |          |
|-----------------------|--------------------------------------------|----------|----------|
| 3136                  | Diff: Earth fault detection (Diff. Flt. E) | 0        | 1        |
| <b>PTRC3.Str.neut</b> |                                            | <b>0</b> | <b>1</b> |

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

**PTRC3.Str.dirNeut**

| No.                      | Information |          |  |
|--------------------------|-------------|----------|--|
| <b>PTRC3.Str.dirNeut</b> |             | <b>1</b> |  |

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

**PTRC3.Op**

| No.                     | Information                          |          |          |
|-------------------------|--------------------------------------|----------|----------|
| 3141                    | Diff: General TRIP (Diff. Gen. TRIP) | 0        | 1        |
| <b>PTRC3.Op.general</b> |                                      | <b>0</b> | <b>1</b> |

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

**PTRC3.Op.phsA**

| No.                  | Information                            |          |          |          |
|----------------------|----------------------------------------|----------|----------|----------|
| 3142                 | Diff: TRIP - Only L1 (Diff TRIP 1p L1) | 1        | 0        | 0        |
| 3145                 | Diff: TRIP L123 (Diff TRIP L123)       | 0        | 1        | 0        |
| <b>PTRC3.Op.phsA</b> |                                        | <b>1</b> | <b>1</b> | <b>0</b> |

device annunciation: 1 - ON  
0 - OFF

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

**PTRC3.Op.phsB**

| No.                  | Information                            |          |          |          |
|----------------------|----------------------------------------|----------|----------|----------|
| 3143                 | Diff: TRIP - Only L2 (Diff TRIP 1p L2) | 1        | 0        | 0        |
| 3145                 | Diff: TRIP L123 (Diff TRIP L123)       | 0        | 1        | 0        |
| <b>PTRC3.Op.phsB</b> |                                        | <b>1</b> | <b>1</b> | <b>0</b> |

device annunciation: 1 - ON  
0 - OFF

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

**PTRC3.Op.phsC**

| No.                  | Information                            |          |          |          |
|----------------------|----------------------------------------|----------|----------|----------|
| 3144                 | Diff: TRIP - Only L3 (Diff TRIP 1p L3) | 1        | 0        | 0        |
| 3145                 | Diff: TRIP L123 (Diff TRIP L123)       | 0        | 1        | 0        |
| <b>PTRC3.Op.phsC</b> |                                        | <b>1</b> | <b>1</b> | <b>0</b> |

device annunciation: 1 - ON  
0 - OFF

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

**PTRC3.StrA**

| No.                     | Information                                       |          |          |
|-------------------------|---------------------------------------------------|----------|----------|
| 3176                    | Diff: Fault detection L1 (only) (Diff Flt. 1p.L1) | 1        | 0        |
| <b>PTRC3.StrA.stVal</b> |                                                   | <b>1</b> | <b>0</b> |

device annunciation: 1 - ON  
0 - OFF

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

**PTRC3.StrAG**

| No.                      | Information                               |          |          |
|--------------------------|-------------------------------------------|----------|----------|
| 3177                     | Diff: Fault detection L1E (Diff Flt. L1E) | 1        | 0        |
| <b>PTRC3.StrAG.stVal</b> |                                           | <b>1</b> | <b>0</b> |

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

**PTRC3.StrB**

| No.                     | Information                                       |          |          |
|-------------------------|---------------------------------------------------|----------|----------|
| 3178                    | Diff: Fault detection L2 (only) (Diff Flt. 1p.L2) | 1        | 0        |
| <b>PTRC3.StrB.stVal</b> |                                                   | <b>1</b> | <b>0</b> |

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

**PTRC3.StrBG**

| No.                      | Information                               |          |          |
|--------------------------|-------------------------------------------|----------|----------|
| 3179                     | Diff: Fault detection L2E (Diff Flt. L2E) | 1        | 0        |
| <b>PTRC3.StrBG.stVal</b> |                                           | <b>1</b> | <b>0</b> |

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

**PTRC3.StrC**

| No.                     | Information                                       |          |          |
|-------------------------|---------------------------------------------------|----------|----------|
| 3182                    | Diff: Fault detection L3 (only) (Diff Flt. 1p.L3) | 1        | 0        |
| <b>PTRC3.StrC.stVal</b> |                                                   | <b>1</b> | <b>0</b> |

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

**PTRC3.StrCG**

| No.                      | Information                               |          |          |
|--------------------------|-------------------------------------------|----------|----------|
| 3183                     | Diff: Fault detection L3E (Diff Flt. L3E) | 1        | 0        |
| <b>PTRC3.StrCG.stVal</b> |                                           | <b>1</b> | <b>0</b> |

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

## 3.1 Differential Protection (PDIFx, PTRCx)

**PTRC3.StrAB**

| No.                      | Information                               |          |          |
|--------------------------|-------------------------------------------|----------|----------|
| 3180                     | Diff: Fault detection L12 (Diff Fit. L12) | 1        | 0        |
| <b>PTRC3.StrAB.stVal</b> |                                           | <b>1</b> | <b>0</b> |

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

**PTRC3.StrBC**

| No.                      | Information                               |          |          |
|--------------------------|-------------------------------------------|----------|----------|
| 3186                     | Diff: Fault detection L23 (Diff Fit. L23) | 1        | 0        |
| <b>PTRC3.StrBC.stVal</b> |                                           | <b>1</b> | <b>0</b> |

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

**PTRC3.StrCA**

| No.                      | Information                               |          |          |
|--------------------------|-------------------------------------------|----------|----------|
| 3184                     | Diff: Fault detection L31 (Diff Fit. L31) | 1        | 0        |
| <b>PTRC3.StrCA.stVal</b> |                                           | <b>1</b> | <b>0</b> |

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

**PTRC3.StrABC**

| No.                       | Information                                 |          |          |
|---------------------------|---------------------------------------------|----------|----------|
| 3188                      | Diff: Fault detection L123 (Diff Fit. L123) | 1        | 0        |
| <b>PTRC3.StrABC.stVal</b> |                                             | <b>1</b> | <b>0</b> |

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



**PTRC3.StrABG**

| No.                       | Information                                 |          |          |
|---------------------------|---------------------------------------------|----------|----------|
| 3181                      | Diff: Fault detection L12E (Diff Flt. L12E) | 1        | 0        |
| <b>PTRC3.StrABG.stVal</b> |                                             | <b>1</b> | <b>0</b> |

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

**PTRC3.StrBCG**

| No.                       | Information                                 |          |          |
|---------------------------|---------------------------------------------|----------|----------|
| 3187                      | Diff: Fault detection L23E (Diff Flt. L23E) | 1        | 0        |
| <b>PTRC3.StrBCG.stVal</b> |                                             | <b>1</b> | <b>0</b> |

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

**PTRC3.StrCAG**

| No.                       | Information                                 |          |          |
|---------------------------|---------------------------------------------|----------|----------|
| 3185                      | Diff: Fault detection L31E (Diff Flt. L31E) | 1        | 0        |
| <b>PTRC3.StrCAG.stVal</b> |                                             | <b>1</b> | <b>0</b> |

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

**PTRC3.StrABCG**

| No.                        | Information                                   |          |          |
|----------------------------|-----------------------------------------------|----------|----------|
| 3189                       | Diff: Fault detection L123E (Diff Flt. L123E) | 1        | 0        |
| <b>PTRC3.StrABCG.stVal</b> |                                               | <b>1</b> | <b>0</b> |

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

## 3.2 Distance Protection (PDISx, PTRC2)

### 3.2.1 Distance protection zone 1 (PDIS1)

#### PDIS1.Mod

| No.                    | Information                          |          |          |          |          |          |          |          |   |
|------------------------|--------------------------------------|----------|----------|----------|----------|----------|----------|----------|---|
| 3653                   | Distance is ACTIVE (Dist. ACTIVE)    | 0        | x        | x        | x        | 1        | 1        | 1        | 1 |
| 3652                   | Distance is BLOCKED (Dist. BLOCK)    | x        | x        | x        | 0        | 0        | 1        | 1        |   |
| 3603                   | >BLOCK 21 Distance (>BLOCK 21 Dist.) | x        | x        | x        | 0        | 1        | 0        | 1        |   |
| 3651                   | Distance is switched off (Dist. OFF) | x        | 1        | x        | 0        | 0        | 0        | 0        |   |
|                        | Op. mode Z1 (P1301) = Inactive       | x        | x        | 1        | 0        | 0        | 0        | 0        |   |
| <b>PDIS1.Mod.stVal</b> |                                      | <b>5</b> | <b>5</b> | <b>5</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> |   |

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

#### PDIS1.Health

| No.                       | Information                                            |          |          |          |          |
|---------------------------|--------------------------------------------------------|----------|----------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK)       | 1        | 1        | 0        | 0        |
| 3654                      | Setting error K0(Z1) or Angle K0(Z1) (Dis.ErrorK0(Z1)) | 1        | 0        | 1        | 0        |
| <b>PDIS1.Health.stVal</b> |                                                        | <b>2</b> | <b>1</b> | <b>3</b> | <b>3</b> |

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

**PDIS1.Str**

| No.                      | Information                                |          |          |          |          |          |          |          |
|--------------------------|--------------------------------------------|----------|----------|----------|----------|----------|----------|----------|
|                          |                                            |          |          |          |          |          |          |          |
| 3741                     | Distance Pickup Z1, Loop L1E (Dis. Z1 L1E) | 0        | 1        | x        | x        | x        | x        | x        |
| 3742                     | Distance Pickup Z1, Loop L2E (Dis. Z1 L2E) | 0        | x        | 1        | x        | x        | x        | x        |
| 3743                     | Distance Pickup Z1, Loop L3E (Dis. Z1 L3E) | 0        | x        | x        | 1        | x        | x        | x        |
| 3744                     | Distance Pickup Z1, Loop L12 (Dis. Z1 L12) | 0        | x        | x        | x        | 1        | x        | x        |
| 3745                     | Distance Pickup Z1, Loop L23 (Dis. Z1 L23) | 0        | x        | x        | x        | x        | 1        | x        |
| 3746                     | Distance Pickup Z1, Loop L31 (Dis. Z1 L31) | 0        | x        | x        | x        | x        | x        | 1        |
| <b>PDIS1.Str.general</b> |                                            | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> |

device annunciation:

1 - ON

0 - OFF

x - irrelevant

IEC Status Str.general:

0 - FALSE

1 - TRUE

**PDIS1.Str.dirGeneral**

| No.                         | Information                                |          |          |          |          |          |          |          |          |          |          |          |          |          |  |
|-----------------------------|--------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|
|                             |                                            |          |          |          |          |          |          |          |          |          |          |          |          |          |  |
| 3719                        | Distance Pickup FORWARD (Dis. forward)     | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 3720                        | Distance Pickup REVERSE (Dis. reverse)     | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 1        | 1        | 1        | 1        | 1        | 1        |  |
| 3741                        | Distance Pickup Z1, Loop L1E (Dis. Z1 L1E) | 0        | 1        | x        | x        | x        | x        | x        | 0        | 1        | x        | x        | x        | x        |  |
| 3742                        | Distance Pickup Z1, Loop L2E (Dis. Z1 L2E) | 0        | x        | 1        | x        | x        | x        | x        | 0        | x        | 1        | x        | x        | x        |  |
| 3743                        | Distance Pickup Z1, Loop L3E (Dis. Z1 L3E) | 0        | x        | x        | 1        | x        | x        | x        | 0        | x        | x        | 1        | x        | x        |  |
| 3744                        | Distance Pickup Z1, Loop L12 (Dis. Z1 L12) | 0        | x        | x        | x        | 1        | x        | x        | 0        | x        | x        | x        | 1        | x        |  |
| 3745                        | Distance Pickup Z1, Loop L23 (Dis. Z1 L23) | 0        | x        | x        | x        | x        | 1        | x        | 0        | x        | x        | x        | x        | 1        |  |
| 3746                        | Distance Pickup Z1, Loop L31 (Dis. Z1 L31) | 0        | x        | x        | x        | x        | x        | 1        | 0        | x        | x        | x        | x        | 1        |  |
| <b>PDIS1.Str.dirGeneral</b> |                                            | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>2</b> |  |

| No.                         | Information                                |          |          |          |          |          |          |          |          |          |          |          |          |          |  |
|-----------------------------|--------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|
|                             |                                            |          |          |          |          |          |          |          |          |          |          |          |          |          |  |
| 3719                        | Distance Pickup FORWARD (Dis. forward)     | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        |  |
| 3720                        | Distance Pickup REVERSE (Dis. reverse)     | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 1        | 1        | 1        | 1        | 1        | 1        |  |
| 3741                        | Distance Pickup Z1, Loop L1E (Dis. Z1 L1E) | 0        | 1        | x        | x        | x        | x        | x        | 0        | 1        | x        | x        | x        | x        |  |
| 3742                        | Distance Pickup Z1, Loop L2E (Dis. Z1 L2E) | 0        | x        | 1        | x        | x        | x        | x        | 0        | x        | 1        | x        | x        | x        |  |
| 3743                        | Distance Pickup Z1, Loop L3E (Dis. Z1 L3E) | 0        | x        | x        | 1        | x        | x        | x        | 0        | x        | x        | 1        | x        | x        |  |
| 3744                        | Distance Pickup Z1, Loop L12 (Dis. Z1 L12) | 0        | x        | x        | x        | 1        | x        | x        | 0        | x        | x        | x        | 1        | x        |  |
| 3745                        | Distance Pickup Z1, Loop L23 (Dis. Z1 L23) | 0        | x        | x        | x        | x        | 1        | x        | 0        | x        | x        | x        | x        | 1        |  |
| 3746                        | Distance Pickup Z1, Loop L31 (Dis. Z1 L31) | 0        | x        | x        | x        | x        | x        | 1        | 0        | x        | x        | x        | x        | 1        |  |
| <b>PDIS1.Str.dirGeneral</b> |                                            | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>0</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>3</b> |  |

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

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

**PDIS1.Op**

| No.                     | Information                                                |          |          |          |          |
|-------------------------|------------------------------------------------------------|----------|----------|----------|----------|
| 3811                    | Distance TRIP single-phase Z1 (Dis.TripZ1/1p)              | 0        | 1        | x        | x        |
| 3823                    | DisTRIP 3phase in Z1 with single-ph Flt. (DisTRIP3p. Z1sf) | 0        | x        | 1        | x        |
| 3824                    | DisTRIP 3phase in Z1 with multi-ph Flt. (DisTRIP3p. Z1mf)  | 0        | x        | x        | 1        |
| <b>PDIS1.Op.general</b> |                                                            | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> |

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

**PDIS1.Op.phsA**

| No.                  | Information                                                |          |          |          |          |          |
|----------------------|------------------------------------------------------------|----------|----------|----------|----------|----------|
| 3811                 | Distance TRIP single-phase Z1 (Dis.TripZ1/1p)              | x        | 0        | 1        | 0        | 0        |
| 3823                 | DisTRIP 3phase in Z1 with single-ph Flt. (DisTRIP3p. Z1sf) | x        | 0        | 0        | 1        | 0        |
| 3824                 | DisTRIP 3phase in Z1 with multi-ph Flt. (DisTRIP3p. Z1mf)  | x        | 0        | 0        | 0        | 1        |
| 3802                 | Distance TRIP command - Only Phase L1 (Dis.Trip 1pL1)      | 0        | x        | 1        | 0        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)            | 0        | x        | 0        | 1        | 1        |
| <b>PDIS1.Op.phsA</b> |                                                            | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> |

device annunciation:    1 - ON                    IEC Status Op.phsA:      0 - FALSE  
                                   0 - OFF                    1 - TRUE  
                                   x - irrelevant

**PDIS1.Op.phsB**

| No.                  | Information                                                |          |          |          |          |          |
|----------------------|------------------------------------------------------------|----------|----------|----------|----------|----------|
| 3811                 | Distance TRIP single-phase Z1 (Dis.TripZ1/1p)              | x        | 0        | 1        | 0        | 0        |
| 3823                 | DisTRIP 3phase in Z1 with single-ph Flt. (DisTRIP3p. Z1sf) | x        | 0        | 0        | 1        | 0        |
| 3824                 | DisTRIP 3phase in Z1 with multi-ph Flt. (DisTRIP3p. Z1mf)  | x        | 0        | 0        | 0        | 1        |
| 3803                 | Distance TRIP command - Only Phase L2 (Dis.Trip 1pL2)      | 0        | x        | 1        | 0        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)            | 0        | x        | 0        | 1        | 1        |
| <b>PDIS1.Op.phsB</b> |                                                            | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> |

device annunciation:    1 - ON                    IEC Status Op.phsB:      0 - FALSE  
                                   0 - OFF                    1 - TRUE  
                                   x - irrelevant

**PDIS1.Op.phsC**

| No.                  | Information                                                |          |          |          |          |          |
|----------------------|------------------------------------------------------------|----------|----------|----------|----------|----------|
| 3811                 | Distance TRIP single-phase Z1 (Dis.TripZ1/1p)              | x        | 0        | 1        | 0        | 0        |
| 3823                 | DisTRIP 3phase in Z1 with single-ph Flt. (DisTRIP3p. Z1sf) | x        | 0        | 0        | 1        | 0        |
| 3824                 | DisTRIP 3phase in Z1 with multi-ph Flt. (DisTRIP3p. Z1mf)  | x        | 0        | 0        | 0        | 1        |
| 3804                 | Distance TRIP command - Only Phase L3 (Dis.Trip 1pL3)      | 0        | x        | 1        | 0        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)            | 0        | x        | 0        | 1        | 1        |
| <b>PDIS1.Op.phsC</b> |                                                            | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> |

device annunciation: 1 - ON IEC Status Op.phsC: 0 - FALSE  
0 - OFF 1 - TRUE  
x - irrelevant

**PDIS1.StrAG**

| No.                      | Information                                |          |          |
|--------------------------|--------------------------------------------|----------|----------|
| 3741                     | Distance Pickup Z1, Loop L1E (Dis. Z1 L1E) | 0        | 1        |
| <b>PDIS1.StrAG.stVal</b> |                                            | <b>0</b> | <b>1</b> |

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

**PDIS1.StrBG**

| No.                      | Information                                |          |          |
|--------------------------|--------------------------------------------|----------|----------|
| 3742                     | Distance Pickup Z1, Loop L2E (Dis. Z1 L2E) | 0        | 1        |
| <b>PDIS1.StrBG.stVal</b> |                                            | <b>0</b> | <b>1</b> |

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

**PDIS1.StrCG**

| No.                      | Information                                |          |          |
|--------------------------|--------------------------------------------|----------|----------|
| 3743                     | Distance Pickup Z1, Loop L3E (Dis. Z1 L3E) | 0        | 1        |
| <b>PDIS1.StrCG.stVal</b> |                                            | <b>0</b> | <b>1</b> |

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

**PDIS1.StrAB**

| No.                      | Information                                |          |          |
|--------------------------|--------------------------------------------|----------|----------|
| 3744                     | Distance Pickup Z1, Loop L12 (Dis. Z1 L12) | 0        | 1        |
| <b>PDIS1.StrAB.stVal</b> |                                            | <b>0</b> | <b>1</b> |

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

**PDIS1.StrBC**

| No.                      | Information                                |          |          |
|--------------------------|--------------------------------------------|----------|----------|
| 3745                     | Distance Pickup Z1, Loop L23 (Dis. Z1 L23) | 0        | 1        |
| <b>PDIS1.StrBC.stVal</b> |                                            | <b>0</b> | <b>1</b> |

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

**PDIS1.StrCA**

| No.                      | Information                                |          |          |
|--------------------------|--------------------------------------------|----------|----------|
| 3746                     | Distance Pickup Z1, Loop L31 (Dis. Z1 L31) | 0        | 1        |
| <b>PDIS1.StrCA.stVal</b> |                                            | <b>0</b> | <b>1</b> |

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

### 3.2.2 Distance protection zone 1B (PDIS10)

#### PDIS10.Mod

| No.                     | Information                          |          |          |          |          |          |          |          |
|-------------------------|--------------------------------------|----------|----------|----------|----------|----------|----------|----------|
| 3653                    | Distance is ACTIVE (Dist. ACTIVE)    | 0        | x        | x        | 1        | 1        | 1        | 1        |
| 3652                    | Distance is BLOCKED (Dist. BLOCK)    | x        | x        | x        | 0        | 0        | 1        | 1        |
| 3603                    | >BLOCK 21 Distance (>BLOCK 21 Dist.) | x        | x        | x        | 0        | 1        | 0        | 1        |
| 3651                    | Distance is switched off (Dist. OFF) | x        | 1        | x        | 0        | 0        | 0        | 0        |
|                         | Op. mode Z1B (P1351) = Inactive      | x        | x        | 1        | 0        | 0        | 0        | 0        |
| <b>PDIS10.Mod.stVal</b> |                                      | <b>5</b> | <b>5</b> | <b>5</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> |

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)         | 1        | 1        | 0        | 0        |
| 3655                       | Setting error K0(>Z1) or Angle K0(>Z1) (DisErrorK0(>Z1)) | 1        | 0        | 1        | 0        |
| <b>PDIS10.Health.stVal</b> |                                                          | <b>2</b> | <b>1</b> | <b>3</b> | <b>3</b> |

device annunciation: 1 - ON  
0 - OFF

IEC Status Health.stVal:

1 - OK  
2 - WARNING  
3 - ALARM



**PDIS10.Str**

| No.                       | Information                                  |          |          |          |          |          |          |          |
|---------------------------|----------------------------------------------|----------|----------|----------|----------|----------|----------|----------|
| 3747                      | Distance Pickup Z1B, Loop L1E (Dis. Z1B L1E) | 0        | 1        | x        | x        | x        | x        | x        |
| 3748                      | Distance Pickup Z1B, Loop L2E (Dis. Z1B L2E) | 0        | x        | 1        | x        | x        | x        | x        |
| 3749                      | Distance Pickup Z1B, Loop L3E (Dis. Z1B L3E) | 0        | x        | x        | 1        | x        | x        | x        |
| 3750                      | Distance Pickup Z1B, Loop L12 (Dis. Z1B L12) | 0        | x        | x        | x        | 1        | x        | x        |
| 3751                      | Distance Pickup Z1B, Loop L23 (Dis. Z1B L23) | 0        | x        | x        | x        | x        | 1        | x        |
| 3752                      | Distance Pickup Z1B, Loop L31 (Dis. Z1B L31) | 0        | x        | x        | x        | x        | x        | 1        |
| <b>PDIS10.Str.general</b> |                                              | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> |

device annunciation:

1 - ON

0 - OFF

x - irrelevant

IEC Status Str.general:

0 - FALSE

1 - TRUE

**PDIS10.Str.dirGeneral**

| No.                          | Information                                  |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
|------------------------------|----------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|                              |                                              |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
| 3719                         | Distance Pickup FORWARD (Dis. forward)       | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |
| 3720                         | Distance Pickup REVERSE (Dis. reverse)       | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 1        | 1        | 1        | 1        | 1        | 1        |
| 3747                         | Distance Pickup Z1B, Loop L1E (Dis. Z1B L1E) | 0        | 1        | x        | x        | x        | x        | x        | 0        | 1        | x        | x        | x        | x        | x        |
| 3748                         | Distance Pickup Z1B, Loop L2E (Dis. Z1B L2E) | 0        | x        | 1        | x        | x        | x        | x        | 0        | x        | 1        | x        | x        | x        | x        |
| 3749                         | Distance Pickup Z1B, Loop L3E (Dis. Z1B L3E) | 0        | x        | x        | 1        | x        | x        | x        | 0        | x        | x        | 1        | x        | x        | x        |
| 3750                         | Distance Pickup Z1B, Loop L12 (Dis. Z1B L12) | 0        | x        | x        | x        | 1        | x        | x        | 0        | x        | x        | x        | 1        | x        | x        |
| 3751                         | Distance Pickup Z1B, Loop L23 (Dis. Z1B L23) | 0        | x        | x        | x        | x        | 1        | x        | 0        | x        | x        | x        | x        | 1        | x        |
| 3752                         | Distance Pickup Z1B, Loop L31 (Dis. Z1B L31) | 0        | x        | x        | x        | x        | x        | 1        | 0        | x        | x        | x        | x        | x        | 1        |
| <b>PDIS10.Str.dirGeneral</b> |                                              | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>2</b> |

| No.                          | Information                                  |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
|------------------------------|----------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|                              |                                              |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
| 3719                         | Distance Pickup FORWARD (Dis. forward)       | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        |
| 3720                         | Distance Pickup REVERSE (Dis. reverse)       | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 1        | 1        | 1        | 1        | 1        | 1        |
| 3747                         | Distance Pickup Z1B, Loop L1E (Dis. Z1B L1E) | 0        | 1        | x        | x        | x        | x        | x        | 0        | 1        | x        | x        | x        | x        | x        |
| 3748                         | Distance Pickup Z1B, Loop L2E (Dis. Z1B L2E) | 0        | x        | 1        | x        | x        | x        | x        | 0        | x        | 1        | x        | x        | x        | x        |
| 3749                         | Distance Pickup Z1B, Loop L3E (Dis. Z1B L3E) | 0        | x        | x        | 1        | x        | x        | x        | 0        | x        | x        | 1        | x        | x        | x        |
| 3750                         | Distance Pickup Z1B, Loop L12 (Dis. Z1B L12) | 0        | x        | x        | x        | 1        | x        | x        | 0        | x        | x        | x        | 1        | x        | x        |
| 3751                         | Distance Pickup Z1B, Loop L23 (Dis. Z1B L23) | 0        | x        | x        | x        | x        | 1        | x        | 0        | x        | x        | x        | x        | 1        | x        |
| 3752                         | Distance Pickup Z1B, Loop L31 (Dis. Z1B L31) | 0        | x        | x        | x        | x        | x        | 1        | 0        | x        | x        | x        | x        | x        | 1        |
| <b>PDIS10.Str.dirGeneral</b> |                                              | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>0</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>3</b> |

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

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

**PDIS10.Op**

| No.                      | Information                                                |          |          |          |          |
|--------------------------|------------------------------------------------------------|----------|----------|----------|----------|
| 3813                     | Distance TRIP single-phase Z1B (Dis.TripZ1B1p)             | 0        | 1        | x        | x        |
| 3825                     | DisTRIP 3phase in Z1B with single-ph Flt (DisTRIP3p.Z1Bsf) | 0        | x        | 1        | x        |
| 3826                     | DisTRIP 3phase in Z1B with multi-ph Flt. (DisTRIP3p Z1Bmf) | 0        | x        | x        | 1        |
| <b>PDIS10.Op.general</b> |                                                            | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> |

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

**PDIS10.Op.phsA**

| No.                   | Information                                                |          |          |          |          |          |
|-----------------------|------------------------------------------------------------|----------|----------|----------|----------|----------|
| 3813                  | Distance TRIP single-phase Z1B (Dis.TripZ1B1p)             | x        | 0        | 1        | 0        | 0        |
| 3825                  | DisTRIP 3phase in Z1B with single-ph Flt (DisTRIP3p.Z1Bsf) | x        | 0        | 0        | 1        | 0        |
| 3826                  | DisTRIP 3phase in Z1B with multi-ph Flt. (DisTRIP3p Z1Bmf) | x        | 0        | 0        | 0        | 1        |
| 3802                  | Distance TRIP command - Only Phase L1 (Dis.Trip 1pL1)      | 0        | x        | 1        | 0        | 0        |
| 3805                  | Distance TRIP command Phases L123 (Dis.Trip 3p)            | 0        | x        | 0        | 1        | 1        |
| <b>PDIS10.Op.phsA</b> |                                                            | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> |

device annunciation: 1 - ON IEC Status Op.phsA: 0 - FALSE  
0 - OFF 1 - TRUE  
x - irrelevant

**PDIS10.Op.phsB**

| No.                   | Information                                                |          |          |          |          |          |
|-----------------------|------------------------------------------------------------|----------|----------|----------|----------|----------|
| 3813                  | Distance TRIP single-phase Z1B (Dis.TripZ1B1p)             | x        | 0        | 1        | 0        | 0        |
| 3825                  | DisTRIP 3phase in Z1B with single-ph Flt (DisTRIP3p.Z1Bsf) | x        | 0        | 0        | 1        | 0        |
| 3826                  | DisTRIP 3phase in Z1B with multi-ph Flt. (DisTRIP3p Z1Bmf) | x        | 0        | 0        | 0        | 1        |
| 3803                  | Distance TRIP command - Only Phase L2 (Dis.Trip 1pL2)      | 0        | x        | 1        | 0        | 0        |
| 3805                  | Distance TRIP command Phases L123 (Dis.Trip 3p)            | 0        | x        | 0        | 1        | 1        |
| <b>PDIS10.Op.phsB</b> |                                                            | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> |

device annunciation: 1 - ON IEC Status Op.phsB: 0 - FALSE  
0 - OFF 1 - TRUE  
x - irrelevant

**PDIS10.Op.phsC**

| No.                   | Information                                                |          |          |          |          |          |
|-----------------------|------------------------------------------------------------|----------|----------|----------|----------|----------|
| 3813                  | Distance TRIP single-phase Z1B (Dis.TripZ1B1p)             | x        | 0        | 1        | 0        | 0        |
| 3825                  | DisTRIP 3phase in Z1B with single-ph Flt (DisTRIP3p.Z1Bsf) | x        | 0        | 0        | 1        | 0        |
| 3826                  | DisTRIP 3phase in Z1B with multi-ph Flt. (DisTRIP3p Z1Bmf) | x        | 0        | 0        | 0        | 1        |
| 3804                  | Distance TRIP command - Only Phase L3 (Dis.Trip 1pL3)      | 0        | x        | 1        | 0        | 0        |
| 3805                  | Distance TRIP command Phases L123 (Dis.Trip 3p)            | 0        | x        | 0        | 1        | 1        |
| <b>PDIS10.Op.phsC</b> |                                                            | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> |

device annunciation: 1 - ON IEC Status Op,phsC: 0 - FALSE  
 0 - OFF 1 - TRUE  
 x - irrelevant

**PDIS10.StrAG**

| No.                       | Information                                |          |          |
|---------------------------|--------------------------------------------|----------|----------|
| 3741                      | Distance Pickup Z1, Loop L1E (Dis. Z1 L1E) | 0        | 1        |
| <b>PDIS10.StrAG.stVal</b> |                                            | <b>0</b> | <b>1</b> |

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

**PDIS10.StrBG**

| No.                       | Information                                |          |          |
|---------------------------|--------------------------------------------|----------|----------|
| 3742                      | Distance Pickup Z1, Loop L2E (Dis. Z1 L2E) | 0        | 1        |
| <b>PDIS10.StrBG.stVal</b> |                                            | <b>0</b> | <b>1</b> |

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

**PDIS10.StrCG**

| No.                       | Information                                |          |          |
|---------------------------|--------------------------------------------|----------|----------|
| 3743                      | Distance Pickup Z1, Loop L3E (Dis. Z1 L3E) | 0        | 1        |
| <b>PDIS10.StrCG.stVal</b> |                                            | <b>0</b> | <b>1</b> |

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

**PDIS10.StrAB**

| No.                       | Information                                |          |          |
|---------------------------|--------------------------------------------|----------|----------|
| 3744                      | Distance Pickup Z1, Loop L12 (Dis. Z1 L12) | 0        | 1        |
| <b>PDIS10.StrAB.stVal</b> |                                            | <b>0</b> | <b>1</b> |

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

**PDIS10.StrBC**

| No.                       | Information                                |          |          |
|---------------------------|--------------------------------------------|----------|----------|
| 3745                      | Distance Pickup Z1, Loop L23 (Dis. Z1 L23) | 0        | 1        |
| <b>PDIS10.StrBC.stVal</b> |                                            | <b>0</b> | <b>1</b> |

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

**PDIS10.StrCA**

| No.                       | Information                                |          |          |
|---------------------------|--------------------------------------------|----------|----------|
| 3746                      | Distance Pickup Z1, Loop L31 (Dis. Z1 L31) | 0        | 1        |
| <b>PDIS10.StrCA.stVal</b> |                                            | <b>0</b> | <b>1</b> |

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

### 3.2.3 Distance protection zone 2 (PDIS2)

#### PDIS2.Mod

| No.                    | Information                          |          |          |          |          |          |          |          |   |
|------------------------|--------------------------------------|----------|----------|----------|----------|----------|----------|----------|---|
| 3653                   | Distance is ACTIVE (Dist. ACTIVE)    | 0        | x        | x        | 1        | 1        | 1        | 1        | 1 |
| 3652                   | Distance is BLOCKED (Dist. BLOCK)    | x        | x        | x        | 0        | 0        | 1        | 1        |   |
| 3603                   | >BLOCK 21 Distance (>BLOCK 21 Dist.) | x        | x        | x        | 0        | 1        | 0        | 1        |   |
| 3651                   | Distance is switched off (Dist. OFF) | x        | 1        | x        | 0        | 0        | 0        | 0        |   |
|                        | Op. mode Z2 (P1311) = Inactive       | x        | x        | 1        | 0        | 0        | 0        | 0        |   |
| <b>PDIS2.Mod.stVal</b> |                                      | <b>5</b> | <b>5</b> | <b>5</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> |   |

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

#### PDIS2.Health

| No.                       | Information                                              |          |          |          |          |
|---------------------------|----------------------------------------------------------|----------|----------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK)         | 1        | 1        | 0        | 0        |
| 3655                      | Setting error K0(>Z1) or Angle K0(>Z1) (DisErrorK0(>Z1)) | 1        | 0        | 1        | 0        |
| <b>PDIS2.Health.stVal</b> |                                                          | <b>2</b> | <b>1</b> | <b>3</b> | <b>3</b> |

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

#### PDIS2.Str

| No.                      | Information                         |          |          |
|--------------------------|-------------------------------------|----------|----------|
| 3755                     | Distance Pickup Z2 (Dis. Pickup Z2) | 0        | 1        |
| <b>PDIS2.Str.general</b> |                                     | <b>0</b> | <b>1</b> |

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

## PDIS2.Str.dirGeneral

| No.                         | Information                            |          |          |          |          |          |
|-----------------------------|----------------------------------------|----------|----------|----------|----------|----------|
| 3719                        | Distance Pickup FORWARD (Dis. forward) | x        | 0        | 0        | 1        | 1        |
| 3720                        | Distance Pickup REVERSE (Dis. reverse) | x        | 0        | 1        | 0        | 1        |
| 3755                        | Distance Pickup Z2 (Dis. Pickup Z2)    | 0        | 1        | 1        | 1        | 1        |
| <b>PDIS2.Str.dirGeneral</b> |                                        | <b>0</b> | <b>0</b> | <b>2</b> | <b>1</b> | <b>3</b> |

device annunciation: 1 - ON  
0 - OFF

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

## PDIS2.Op

| No.                     | Information                                   |          |          |          |          |
|-------------------------|-----------------------------------------------|----------|----------|----------|----------|
| 3816                    | Distance TRIP single-phase Z2 (Dis.TripZ2/1p) | 0        | 0        | 1        | 1        |
| 3817                    | Distance TRIP 3phase in Z2 (Dis.TripZ2/3p)    | 0        | 1        | 0        | 1        |
| <b>PDIS2.Op.general</b> |                                               | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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

## PDIS2.Op.phsA

| No.                  | Information                                           |          |          |          |          |
|----------------------|-------------------------------------------------------|----------|----------|----------|----------|
| 3816                 | Distance TRIP single-phase Z2 (Dis.TripZ2/1p)         | 0        | x        | 1        | 0        |
| 3817                 | Distance TRIP 3phase in Z2 (Dis.TripZ2/3p)            | 0        | x        | 0        | 1        |
| 3802                 | Distance TRIP command - Only Phase L1 (Dis.Trip 1pL1) | x        | 0        | 1        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)       | x        | 0        | 0        | 1        |
| <b>PDIS2.Op.phsA</b> |                                                       | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> |

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

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

**PDIS2.Op.phsB**

| No.                  | Information                                           |          |          |          |          |
|----------------------|-------------------------------------------------------|----------|----------|----------|----------|
| 3816                 | Distance TRIP single-phase Z2 (Dis.TripZ2/1p)         | 0        | x        | 1        | 0        |
| 3817                 | Distance TRIP 3phase in Z2 (Dis.TripZ2/3p)            | 0        | x        | 0        | 1        |
| 3803                 | Distance TRIP command - Only Phase L2 (Dis.Trip 1pL2) | x        | 0        | 1        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis. Trip 3p)      | x        | 0        | 0        | 1        |
| <b>PDIS2.Op.phsB</b> |                                                       | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> |

device annunciation: 1 - ON IEC Status Op.phsB: 0 - FALSE  
 0 - OFF 1 - TRUE  
 x - irrelevant

**PDIS2.Op.phsC**

| No.                  | Information                                           |          |          |          |          |
|----------------------|-------------------------------------------------------|----------|----------|----------|----------|
| 3816                 | Distance TRIP single-phase Z2 (Dis.TripZ2/1p)         | 0        | x        | 1        | 0        |
| 3817                 | Distance TRIP 3phase in Z2 (Dis.TripZ2/3p)            | 0        | x        | 0        | 1        |
| 3804                 | Distance TRIP command - Only Phase L3 (Dis.Trip 1pL3) | x        | 0        | 1        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis. Trip 3p)      | x        | 0        | 0        | 1        |
| <b>PDIS2.Op.phsC</b> |                                                       | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> |

device annunciation: 1 - ON IEC Status Op.phsC: 0 - FALSE  
 0 - OFF 1 - TRUE  
 x - irrelevant



### 3.2.4 Distance protection zone 3 (PDIS3)

#### PDIS3.Mod

| No.                    | Information                          |          |          |          |          |          |          |          |  |
|------------------------|--------------------------------------|----------|----------|----------|----------|----------|----------|----------|--|
| 3653                   | Distance is ACTIVE (Dist. ACTIVE)    | 0        | x        | x        | 1        | 1        | 1        | 1        |  |
| 3652                   | Distance is BLOCKED (Dist. BLOCK)    | x        | x        | x        | 0        | 0        | 1        | 1        |  |
| 3603                   | >BLOCK Z1 Distance (>BLOCK Z1 Dist.) | x        | x        | x        | 0        | 1        | 0        | 1        |  |
| 3651                   | Distance is switched off (Dist. OFF) | x        | 1        | x        | 0        | 0        | 0        | 0        |  |
|                        | Op. mode Z3 (P1321) = Inactive       | x        | x        | 1        | 0        | 0        | 0        | 0        |  |
| <b>PDIS3.Mod.stVal</b> |                                      | <b>5</b> | <b>5</b> | <b>5</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> |  |

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

#### PDIS3.Health

| No.                       | Information                                              |          |          |          |          |
|---------------------------|----------------------------------------------------------|----------|----------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK)         | 1        | 1        | 0        | 0        |
| 3655                      | Setting error K0(>Z1) or Angle K0(>Z1) (DisErrorK0(>Z1)) | 1        | 0        | 1        | 0        |
| <b>PDIS3.Health.stVal</b> |                                                          | <b>2</b> | <b>1</b> | <b>3</b> | <b>3</b> |

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

**PDIS3.Str**

| No.                      | Information                         |          |          |
|--------------------------|-------------------------------------|----------|----------|
| 3758                     | Distance Pickup Z3 (Dis. Pickup Z3) | 0        | 1        |
| <b>PDIS3.Str.general</b> |                                     | <b>0</b> | <b>1</b> |

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

**PDIS3.Str.dirGeneral**

| No.                         | Information                            |          |          |          |          |          |
|-----------------------------|----------------------------------------|----------|----------|----------|----------|----------|
| 3719                        | Distance Pickup FORWARD (Dis. forward) | x        | 0        | 0        | 1        | 1        |
| 3720                        | Distance Pickup REVERSE (Dis. reverse) | x        | 0        | 1        | 0        | 1        |
| 3758                        | Distance Pickup Z3 (Dis. Pickup Z3)    | 0        | 1        | 1        | 1        | 1        |
| <b>PDIS3.Str.dirGeneral</b> |                                        | <b>0</b> | <b>0</b> | <b>2</b> | <b>1</b> | <b>3</b> |

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

**PDIS3.Op**

| No.                     | Information                                |          |          |
|-------------------------|--------------------------------------------|----------|----------|
| 3818                    | Distance TRIP 3phase in Z3 (Dis.TripZ3/T3) | 0        | 1        |
| <b>PDIS3.Op.general</b> |                                            | <b>0</b> | <b>1</b> |

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

**PDIS3.Op.phsA**

| No.                  | Information                                           |          |          |          |          |
|----------------------|-------------------------------------------------------|----------|----------|----------|----------|
| 3818                 | Distance TRIP 3phase in Z3 (Dis.TripZ3/T3)            | 0        | 1        | 1        | 1        |
| 3802                 | Distance TRIP command - Only Phase L1 (Dis.Trip 1pL1) | x        | 0        | 1        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)       | x        | 0        | 0        | 1        |
| <b>PDIS3.Op.phsA</b> |                                                       | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> |

device annunciation: 1 - ON IEC Status Op.phsA: 0 - FALSE  
0 - OFF 1 - TRUE  
x - irrelevant

**PDIS3.Op.phsB**

| No.                  | Information                                           |          |          |          |          |
|----------------------|-------------------------------------------------------|----------|----------|----------|----------|
| 3818                 | Distance TRIP 3phase in Z3 (Dis.TripZ3/T3)            | 0        | 1        | 1        | 1        |
| 3803                 | Distance TRIP command - Only Phase L2 (Dis.Trip 1pL2) | x        | 0        | 1        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)       | x        | 0        | 0        | 1        |
| <b>PDIS3.Op.phsB</b> |                                                       | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> |

device annunciation: 1 - ON IEC Status Op.phsB: 0 - FALSE  
0 - OFF 1 - TRUE  
x - irrelevant

**PDIS3.Op.phsC**

| No.                  | Information                                           |          |          |          |          |
|----------------------|-------------------------------------------------------|----------|----------|----------|----------|
| 3818                 | Distance TRIP 3phase in Z3 (Dis.TripZ3/T3)            | 0        | 1        | 1        | 1        |
| 3804                 | Distance TRIP command - Only Phase L3 (Dis.Trip 1pL3) | x        | 0        | 1        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)       | x        | 0        | 0        | 1        |
| <b>PDIS3.Op.phsC</b> |                                                       | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> |

device annunciation: 1 - ON IEC Status Op.phsC: 0 - FALSE  
0 - OFF 1 - TRUE  
x - irrelevant

### 3.2.5 Distance protection zone 4 (PDIS4)

#### PDIS4.Mod

| No.                    | Information                          |          |          |          |          |          |          |          |
|------------------------|--------------------------------------|----------|----------|----------|----------|----------|----------|----------|
| 3653                   | Distance is ACTIVE (Dist. ACTIVE)    | 0        | x        | x        | 1        | 1        | 1        | 1        |
| 3652                   | Distance is BLOCKED (Dist. BLOCK)    | x        | x        | x        | 0        | 0        | 1        | 1        |
| 3603                   | >BLOCK 21 Distance (>BLOCK 21 Dist.) | x        | x        | x        | 0        | 1        | 0        | 1        |
| 3651                   | Distance is switched off (Dist. OFF) | x        | 1        | x        | 0        | 0        | 0        | 0        |
|                        | Op. mode Z4 (P1331) = Inactive       | x        | x        | 1        | 0        | 0        | 0        | 0        |
| <b>PDIS4.Mod.stVal</b> |                                      | <b>5</b> | <b>5</b> | <b>5</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> |

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

#### PDIS4.Health

| No.                       | Information                                              |          |          |          |          |
|---------------------------|----------------------------------------------------------|----------|----------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK)         | 1        | 1        | 0        | 0        |
| 3655                      | Setting error K0(>Z1) or Angle K0(>Z1) (DisErrorK0(>Z1)) | 1        | 0        | 1        | 0        |
| <b>PDIS4.Health.stVal</b> |                                                          | <b>2</b> | <b>1</b> | <b>3</b> | <b>3</b> |

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

#### PDIS4.Str

| No.                      | Information                         |          |          |
|--------------------------|-------------------------------------|----------|----------|
| 3759                     | Distance Pickup Z4 (Dis. Pickup Z4) | 0        | 1        |
| <b>PDIS4.Str.general</b> |                                     | <b>0</b> | <b>1</b> |

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

**PDIS4.Str.dirGeneral**

| No.                         | Information                            |          |          |          |          |          |
|-----------------------------|----------------------------------------|----------|----------|----------|----------|----------|
| 3719                        | Distance Pickup FORWARD (Dis. forward) | x        | 0        | 0        | 1        | 1        |
| 3720                        | Distance Pickup REVERSE (Dis. reverse) | x        | 0        | 1        | 0        | 1        |
| 3759                        | Distance Pickup Z4 (Dis. Pickup Z4)    | 0        | 1        | 1        | 1        | 1        |
| <b>PDIS4.Str.dirGeneral</b> |                                        | <b>0</b> | <b>0</b> | <b>2</b> | <b>1</b> | <b>3</b> |

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

**PDIS4.Op**

| No.                     | Information                                  |          |          |
|-------------------------|----------------------------------------------|----------|----------|
| 3821                    | Distance TRIP 3phase in Z4 (Dis.TRIP 3p. Z4) | 0        | 1        |
| <b>PDIS4.Op.general</b> |                                              | <b>0</b> | <b>1</b> |

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

**PDIS4.Op.phsA**

| No.                  | Information                                           |          |          |          |          |
|----------------------|-------------------------------------------------------|----------|----------|----------|----------|
| 3821                 | Distance TRIP 3phase in Z4 (Dis.TRIP 3p. Z4)          | 0        | 1        | 1        | 1        |
| 3802                 | Distance TRIP command - Only Phase L1 (Dis.Trip 1pL1) | x        | 0        | 1        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)       | x        | 0        | 0        | 1        |
| <b>PDIS4.Op.phsA</b> |                                                       | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> |

device annunciation: 1 - ON IEC Status Op.phsA: 0 - FALSE  
 0 - OFF 1 - TRUE  
 x - irrelevant

**PDIS4.Op.phsB**

| No.                  | Information                                           |          |          |          |          |
|----------------------|-------------------------------------------------------|----------|----------|----------|----------|
| 3821                 | Distance TRIP 3phase in Z4 (Dis.TRIP 3p. Z4)          | 0        | 1        | 1        | 1        |
| 3803                 | Distance TRIP command - Only Phase L2 (Dis.Trip 1pL2) | x        | 0        | 1        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)       | x        | 0        | 0        | 1        |
| <b>PDIS4.Op.phsB</b> |                                                       | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> |

device annunciation: 1 - ON IEC Status Op.phsB: 0 - FALSE  
 0 - OFF 1 - TRUE  
 x - irrelevant

**PDIS4.Op.phsC**

| No.                  | Information                                           |          |          |          |          |
|----------------------|-------------------------------------------------------|----------|----------|----------|----------|
| 3821                 | Distance TRIP 3phase in Z4 (Dis.TRIP 3p. Z4)          | 0        | 1        | 1        | 1        |
| 3804                 | Distance TRIP command - Only Phase L3 (Dis.Trip 1pL3) | x        | 0        | 1        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)       | x        | 0        | 0        | 1        |
| <b>PDIS4.Op.phsC</b> |                                                       | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> |

device annunciation: 1 - ON IEC Status Op.phsC: 0 - FALSE  
 0 - OFF 1 - TRUE  
 x - irrelevant

### 3.2.6 Distance protection zone 5 (PDIS5)

#### PDIS5.Mod

| No.                    | Information                          |          |          |          |          |          |          |          |  |
|------------------------|--------------------------------------|----------|----------|----------|----------|----------|----------|----------|--|
| 3653                   | Distance is ACTIVE (Dist. ACTIVE)    | 0        | x        | x        | 1        | 1        | 1        | 1        |  |
| 3652                   | Distance is BLOCKED (Dist. BLOCK)    | x        | x        | x        | 0        | 0        | 1        | 1        |  |
| 3603                   | >BLOCK Z1 Distance (>BLOCK Z1 Dist.) | x        | x        | x        | 0        | 1        | 0        | 1        |  |
| 3651                   | Distance is switched off (Dist. OFF) | x        | 1        | x        | 0        | 0        | 0        | 0        |  |
|                        | Op. mode Z5 (P1341) = Inactive       | x        | x        | 1        | 0        | 0        | 0        | 0        |  |
| <b>PDIS5.Mod.stVal</b> |                                      | <b>5</b> | <b>5</b> | <b>5</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> |  |

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)         | 1        | 1        | 0        | 0        |
| 3655                      | Setting error K0(>Z1) or Angle K0(>Z1) (DisErrorK0(>Z1)) | 1        | 0        | 1        | 0        |
| <b>PDIS5.Health.stVal</b> |                                                          | <b>2</b> | <b>1</b> | <b>3</b> | <b>3</b> |

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

#### PDIS5.Str

| No.                      | Information                         |          |          |
|--------------------------|-------------------------------------|----------|----------|
| 3760                     | Distance Pickup Z5 (Dis. Pickup Z5) | 0        | 1        |
| <b>PDIS5.Str.general</b> |                                     | <b>0</b> | <b>1</b> |

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

**PDIS5.Str.dirGeneral**

| No.                         | Information                            |          |          |          |          |          |
|-----------------------------|----------------------------------------|----------|----------|----------|----------|----------|
| 3719                        | Distance Pickup FORWARD (Dis. forward) | x        | 0        | 0        | 1        | 1        |
| 3720                        | Distance Pickup REVERSE (Dis. reverse) | x        | 0        | 1        | 0        | 1        |
| 3760                        | Distance Pickup Z5 (Dis. Pickup Z5)    | 0        | 1        | 1        | 1        | 1        |
| <b>PDIS5.Str.dirGeneral</b> |                                        | <b>0</b> | <b>0</b> | <b>2</b> | <b>1</b> | <b>3</b> |

device annunciation: 1 - ON  
0 - OFF

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

**PDIS5.Op**

| No.                     | Information                                  |          |          |
|-------------------------|----------------------------------------------|----------|----------|
| 3822                    | Distance TRIP 3phase in Z5 (Dis.TRIP 3p. Z5) | 0        | 1        |
| <b>PDIS5.Op.general</b> |                                              | <b>0</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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



**PDIS5.Op.phsA**

| No.                  | Information                                           |          |          |          |          |
|----------------------|-------------------------------------------------------|----------|----------|----------|----------|
| 3822                 | Distance TRIP 3phase in Z5 (Dis.TRIP 3p. Z5)          | 0        | 1        | 1        | 1        |
| 3802                 | Distance TRIP command - Only Phase L1 (Dis.Trip 1pL1) | x        | 0        | 1        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)       | x        | 0        | 0        | 1        |
| <b>PDIS5.Op.phsA</b> |                                                       | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> |

device annunciation: 1 - ON IEC Status Op.phsA: 0 - FALSE  
0 - OFF 1 - TRUE  
x - irrelevant

**PDIS5.Op.phsB**

| No.                  | Information                                           |          |          |          |          |
|----------------------|-------------------------------------------------------|----------|----------|----------|----------|
| 3822                 | Distance TRIP 3phase in Z5 (Dis.TRIP 3p. Z5)          | 0        | 1        | 1        | 1        |
| 3803                 | Distance TRIP command - Only Phase L2 (Dis.Trip 1pL2) | x        | 0        | 1        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)       | x        | 0        | 0        | 1        |
| <b>PDIS5.Op.phsB</b> |                                                       | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> |

device annunciation: 1 - ON IEC Status Op.phsB: 0 - FALSE  
0 - OFF 1 - TRUE  
x - irrelevant

**PDIS5.Op.phsC**

| No.                  | Information                                           |          |          |          |          |
|----------------------|-------------------------------------------------------|----------|----------|----------|----------|
| 3822                 | Distance TRIP 3phase in Z5 (Dis.TRIP 3p. Z5)          | 0        | 1        | 1        | 1        |
| 3804                 | Distance TRIP command - Only Phase L3 (Dis.Trip 1pL3) | x        | 0        | 1        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)       | x        | 0        | 0        | 1        |
| <b>PDIS5.Op.phsC</b> |                                                       | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> |

device annunciation: 1 - ON IEC Status Op.phsC: 0 - FALSE  
0 - OFF 1 - TRUE  
x - irrelevant

### 3.2.7 Distance protection general information (PTRC2)

#### PTRC2.Mod

| No.                    | Information                          |          |          |          |          |          |
|------------------------|--------------------------------------|----------|----------|----------|----------|----------|
| 3653                   | Distance is ACTIVE (Dist. ACTIVE)    | 0        | 1        | 0        | 0        | 0        |
| 3652                   | Distance is BLOCKED (Dist. BLOCK)    | x        | 0        | 1        | 0        | 1        |
| 3603                   | >BLOCK 21 Distance (>BLOCK 21 Dist.) | x        | 0        | 0        | 1        | 1        |
| 3651                   | Distance is switched off (Dist. OFF) | 1        | 0        | 0        | 0        | 0        |
| <b>PTRC2.Mod.stVal</b> |                                      | <b>5</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> |

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

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

#### PTRC2.Health

| No.                       | Information                                              |          |          |          |          |          |
|---------------------------|----------------------------------------------------------|----------|----------|----------|----------|----------|
| 3654                      | Setting error K0(Z1) or Angle K0(Z1) (Dis.ErrorK0(Z1))   | x        | 0        | 1        | 0        | 1        |
| 3655                      | Setting error K0(>Z1) or Angle K0(>Z1) (DisErrorK0(>Z1)) | x        | 0        | 0        | 1        | 1        |
| 51                        | Device is Operational and Protecting (Device OK)         | 0        | 1        | 1        | 1        | 1        |
| <b>PTRC2.Health.stVal</b> |                                                          | <b>3</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> |

device annunciation:  
 1 - ON  
 0 - OFF

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

#### PTRC2.Str

| No.                      | Information                      |          |          |
|--------------------------|----------------------------------|----------|----------|
| 3671                     | Distance PICKED UP (Dis. PICKUP) | 0        | 1        |
| <b>PTRC2.Str.general</b> |                                  | <b>0</b> | <b>1</b> |

device annunciation:  
 1 - ON  
 0 - OFF

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



## PTRC2.Str.phsB

| No.                   | Information                        |          |          |
|-----------------------|------------------------------------|----------|----------|
| 3673                  | Distance PICKUP L2 (Dis.Pickup L2) | 0        | 1        |
| <b>PTRC2.Str.phsB</b> |                                    | <b>0</b> | <b>1</b> |

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

## PTRC2.Str.dirPhsB

| No.                      | Information                                          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |
|--------------------------|------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|
| 3702                     | Distance Loop L2E selected forward (Dis.Loop L2-E f) | 1        | x        | x        | 0        | 0        | 0        | 1        | 1        | x        | x        | x        | x        | 0        |  |
| 3704                     | Distance Loop L12 selected forward (Dis.Loop L1-2 f) | x        | 1        | x        | 0        | 0        | 0        | x        | x        | 1        | 1        | x        | x        | 0        |  |
| 3705                     | Distance Loop L23 selected forward (Dis.Loop L2-3 f) | x        | x        | 1        | 0        | 0        | 0        | x        | x        | x        | x        | 1        | 1        | 0        |  |
| 3708                     | Distance Loop L2E selected reverse (Dis.Loop L2-E r) | 0        | 0        | 0        | 1        | x        | x        | 0        | 0        | 1        | x        | 1        | x        | 0        |  |
| 3710                     | Distance Loop L12 selected reverse (Dis.Loop L1-2 r) | 0        | 0        | 0        | x        | 1        | x        | 1        | x        | 0        | 0        | x        | 1        | 0        |  |
| 3711                     | Distance Loop L23 selected reverse (Dis.Loop L2-3 r) | 0        | 0        | 0        | x        | x        | 1        | x        | 1        | x        | 1        | 0        | 0        | 0        |  |
| <b>PTRC2.Str.dirPhsB</b> |                                                      | <b>1</b> | <b>1</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>0</b> |  |

device annunciation: 1 - ON IEC Status Str.dirPhsB: 0 - UNKNOWN  
 0 - OFF 1 - FORWARD  
 x - irrelevant 2 - BACKWARD

**PTRC2.Str.phsC**

| No.                   | Information                        |          |          |
|-----------------------|------------------------------------|----------|----------|
| 3674                  | Distance PICKUP L3 (Dis.Pickup L3) | 0        | 1        |
| <b>PTRC2.Str.phsC</b> |                                    | <b>0</b> | <b>1</b> |

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

**PTRC2.Str.dirPhsC**

| No.                      | Information                                          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |
|--------------------------|------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|
| 3703                     | Distance Loop L3E selected forward (Dis.Loop L3-E f) | 1        | x        | x        | 0        | 0        | 0        | 1        | 1        | x        | x        | x        | x        | 0        |  |
| 3705                     | Distance Loop L23 selected forward (Dis.Loop L2-3 f) | x        | 1        | x        | 0        | 0        | 0        | x        | x        | 1        | 1        | x        | x        | 0        |  |
| 3706                     | Distance Loop L31 selected forward (Dis.Loop L3-1 f) | x        | x        | 1        | 0        | 0        | 0        | x        | x        | x        | x        | 1        | 1        | 0        |  |
| 3709                     | Distance Loop L3E selected reverse (Dis.Loop L3-E r) | 0        | 0        | 0        | 1        | x        | x        | 0        | 0        | 1        | x        | 1        | x        | 0        |  |
| 3711                     | Distance Loop L23 selected reverse (Dis.Loop L2-3 r) | 0        | 0        | 0        | x        | 1        | x        | 1        | x        | 0        | 0        | x        | 1        | 0        |  |
| 3712                     | Distance Loop L31 selected reverse (Dis.Loop L3-1 r) | 0        | 0        | 0        | x        | x        | 1        | x        | 1        | x        | 1        | 0        | 0        | 0        |  |
| <b>PTRC2.Str.dirPhsC</b> |                                                      | <b>1</b> | <b>1</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>0</b> |  |

device annunciation: 1 - ON IEC Status Str.dirPhsC: 0 - UNKNOWN  
0 - OFF 1 - FORWARD  
x - irrelevant 2 - BACKWARD

**PTRC2.Str.neut**

| No.                   | Information                          |          |          |
|-----------------------|--------------------------------------|----------|----------|
| 3675                  | Distance PICKUP Earth (Dis.Pickup E) | 0        | 1        |
| <b>PTRC2.Str.neut</b> |                                      | <b>0</b> | <b>1</b> |

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

**PTRC2.Op**

| No.                     | Information                                       |          |          |
|-------------------------|---------------------------------------------------|----------|----------|
| 3801                    | Distance protection: General trip (Dis.Gen. Trip) | 0        | 1        |
| <b>PTRC2.Op.general</b> |                                                   | <b>0</b> | <b>1</b> |

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

**PTRC2.Op.phsA**

| No.                  | Information                                           |          |          |          |
|----------------------|-------------------------------------------------------|----------|----------|----------|
| 3802                 | Distance TRIP command - Only Phase L1 (Dis.Trip 1pL1) | 1        | 0        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)       | 0        | 1        | 0        |
| <b>PTRC2.Op.phsA</b> |                                                       | <b>1</b> | <b>1</b> | <b>0</b> |

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

**PTRC2.Op.phsB**

| No.                  | Information                                           |          |          |          |
|----------------------|-------------------------------------------------------|----------|----------|----------|
| 3803                 | Distance TRIP command - Only Phase L2 (Dis.Trip 1pL2) | 1        | 0        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)       | 0        | 1        | 0        |
| <b>PTRC2.Op.phsB</b> |                                                       | <b>1</b> | <b>1</b> | <b>0</b> |

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

**PTRC2.Op.phsC**

| No.                  | Information                                           |          |          |          |
|----------------------|-------------------------------------------------------|----------|----------|----------|
| 3804                 | Distance TRIP command - Only Phase L3 (Dis.Trip 1pL3) | 1        | 0        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)       | 0        | 1        | 0        |
| <b>PTRC2.Op.phsC</b> |                                                       | <b>1</b> | <b>1</b> | <b>0</b> |

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



## 3.3 Power swing detection (RPSBx)

## RPSB1.Str.phsA

| No.                   | Information                                                               |          |          |          |
|-----------------------|---------------------------------------------------------------------------|----------|----------|----------|
| 4167                  | Power Swing detected in L1 (Pow. Swing L1)                                | 0        | 1        | x        |
|                       | P/S Op. mode (P2002) = All zones block or Z1/Z1B block or Z1,Z1B,Z2 block | 0        | 0        | 1        |
| <b>RPSB1.Str.phsA</b> |                                                                           | <b>0</b> | <b>1</b> | <b>0</b> |

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

## RPSB1.Str.phsB

| No.                   | Information                                                               |          |          |          |
|-----------------------|---------------------------------------------------------------------------|----------|----------|----------|
| 4168                  | Power Swing detected in L2 (Pow. Swing L2)                                | 0        | 1        | x        |
|                       | P/S Op. mode (P2002) = All zones block or Z1/Z1B block or Z1,Z1B,Z2 block | 0        | 0        | 1        |
| <b>RPSB1.Str.phsB</b> |                                                                           | <b>0</b> | <b>1</b> | <b>0</b> |

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

## RPSB1.Str.phsC

| No.                   | Information                                                               |          |          |          |
|-----------------------|---------------------------------------------------------------------------|----------|----------|----------|
| 4169                  | Power Swing detected in L3 (Pow. Swing L3)                                | 0        | 1        | x        |
|                       | P/S Op. mode (P2002) = All zones block or Z1/Z1B block or Z1,Z1B,Z2 block | 0        | 0        | 1        |
| <b>RPSB1.Str.phsC</b> |                                                                           | <b>0</b> | <b>1</b> | <b>0</b> |

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

## RPSB1.BlkZn

| No.                      | Information                                                               |          |          |          |          |
|--------------------------|---------------------------------------------------------------------------|----------|----------|----------|----------|
| 4164                     | Power Swing detected (Power Swing)                                        | 0        | 1        | 1        | x        |
| 4166                     | Power Swing TRIP command (Pow. Swing TRIP)                                | 0        | 0        | 1        | x        |
|                          | P/S Op. mode (P2002) = All zones block or Z1/Z1B block or Z1,Z1B,Z2 block | 0        | 0        | 0        | 1        |
| <b>RPSB1.BlkZn.stVal</b> |                                                                           | <b>0</b> | <b>1</b> | <b>0</b> | <b>0</b> |

device annunciation / setting: 1 - ON / TRUE    IEC Status BlkZn.stVal: 0 - NOT BLOCKED  
0 - OFF / FALSE                                    1 - BLOCKED







### 3.3.3 Power swing detection zone 2 (RPSB2)

#### RPSB2.Mod

| No.                    | Information                                                                 |          |          |          |          |
|------------------------|-----------------------------------------------------------------------------|----------|----------|----------|----------|
| 4160                   | >BLOCK Power Swing detection (>Pow. Swing BLK)                              | x        | 0        | 1        | x        |
|                        | Power Swing (P 120) = Enabled and Dis. PICKUP (P 114) = Z< (quadrilat.)     | 0        | 1        | 1        | 1        |
|                        | P/S Op. mode (P2002) = All zones block or Z1,Z1B,Z2 block or Z2 to Z5 block | x        | 0        | 0        | 1        |
| <b>RPSB2.Mod.stVal</b> |                                                                             | <b>5</b> | <b>1</b> | <b>2</b> | <b>5</b> |

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

#### RPSB2.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>RPSB2.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

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

#### RPSB2.Str

| No.                      | Information                                                                 |          |          |          |
|--------------------------|-----------------------------------------------------------------------------|----------|----------|----------|
| 4164                     | Power Swing detected (Power Swing)                                          | 0        | 1        | x        |
|                          | P/S Op. mode (P2002) = All zones block or Z1,Z1B,Z2 block or Z2 to Z5 block | 0        | 0        | 1        |
| <b>RPSB1.Str.general</b> |                                                                             | <b>0</b> | <b>1</b> | <b>0</b> |

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

**RPSB2.Str.phsA**

| No.                   | Information                                                                 |          |          |          |
|-----------------------|-----------------------------------------------------------------------------|----------|----------|----------|
| 4167                  | Power Swing detected in L1 (Pow. Swing L1)                                  | 0        | 1        | x        |
|                       | P/S Op. mode (P2002) = All zones block or Z1,Z1B,Z2 block or Z2 to Z5 block | 0        | 0        | 1        |
| <b>RPSB2.Str.phsA</b> |                                                                             | <b>0</b> | <b>1</b> | <b>0</b> |

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

**RPSB2.Str.phsB**

| No.                   | Information                                                                 |          |          |          |
|-----------------------|-----------------------------------------------------------------------------|----------|----------|----------|
| 4168                  | Power Swing detected in L2 (Pow. Swing L2)                                  | 0        | 1        | x        |
|                       | P/S Op. mode (P2002) = All zones block or Z1,Z1B,Z2 block or Z2 to Z5 block | 0        | 0        | 1        |
| <b>RPSB2.Str.phsB</b> |                                                                             | <b>0</b> | <b>1</b> | <b>0</b> |

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

**RPSB2.Str.phsC**

| No.                   | Information                                                                 |          |          |          |
|-----------------------|-----------------------------------------------------------------------------|----------|----------|----------|
| 4169                  | Power Swing detected in L3 (Pow. Swing L3)                                  | 0        | 1        | x        |
|                       | P/S Op. mode (P2002) = All zones block or Z1,Z1B,Z2 block or Z2 to Z5 block | 0        | 0        | 1        |
| <b>RPSB2.Str.phsC</b> |                                                                             | <b>0</b> | <b>1</b> | <b>0</b> |

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

**RPSB2.BlkZn**

| No.                      | Information                                                                 |          |          |          |          |
|--------------------------|-----------------------------------------------------------------------------|----------|----------|----------|----------|
| 4164                     | Power Swing detected (Power Swing)                                          | 0        | 1        | 1        | x        |
| 4166                     | Power Swing TRIP command (Pow. Swing TRIP)                                  | 0        | 0        | 1        | x        |
|                          | P/S Op. mode (P2002) = All zones block or Z1,Z1B,Z2 block or Z2 to Z5 block | 0        | 0        | 0        | 1        |
| <b>RPSB2.BlkZn.stVal</b> |                                                                             | <b>0</b> | <b>1</b> | <b>0</b> | <b>0</b> |

device annunciation / setting: 1 - ON / TRUE IEC Status BlkZn.stVal: 0 - NOT BLOCKED  
0 - OFF / FALSE 1 - BLOCKED



**RPSB3.Str.phsA**

| No.                   | Information                                              |          |          |          |
|-----------------------|----------------------------------------------------------|----------|----------|----------|
| 4167                  | Power Swing detected in L1 (Pow. Swing L1)               | 0        | 1        | x        |
|                       | P/S Op. mode (P2002) = All zones block or Z2 to Z5 block | 0        | 0        | 1        |
| <b>RPSB3.Str.phsA</b> |                                                          | <b>0</b> | <b>1</b> | <b>0</b> |

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

**RPSB3.Str.phsB**

| No.                   | Information                                              |          |          |          |
|-----------------------|----------------------------------------------------------|----------|----------|----------|
| 4168                  | Power Swing detected in L2 (Pow. Swing L2)               | 0        | 1        | x        |
|                       | P/S Op. mode (P2002) = All zones block or Z2 to Z5 block | 0        | 0        | 1        |
| <b>RPSB3.Str.phsB</b> |                                                          | <b>0</b> | <b>1</b> | <b>0</b> |

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

**RPSB3.Str.phsC**

| No.                   | Information                                              |          |          |          |
|-----------------------|----------------------------------------------------------|----------|----------|----------|
| 4169                  | Power Swing detected in L3 (Pow. Swing L3)               | 0        | 1        | x        |
|                       | P/S Op. mode (P2002) = All zones block or Z2 to Z5 block | 0        | 0        | 1        |
| <b>RPSB3.Str.phsC</b> |                                                          | <b>0</b> | <b>1</b> | <b>0</b> |

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

**RPSB3.BlkZn**

| No.                      | Information                                              |          |          |          |          |
|--------------------------|----------------------------------------------------------|----------|----------|----------|----------|
| 4164                     | Power Swing detected (Power Swing)                       | 0        | 1        | 1        | x        |
| 4166                     | Power Swing TRIP command (Pow. Swing TRIP)               | 0        | 0        | 1        | x        |
|                          | P/S Op. mode (P2002) = All zones block or Z2 to Z5 block | 0        | 0        | 0        | 1        |
| <b>RPSB3.BlkZn.stVal</b> |                                                          | <b>0</b> | <b>1</b> | <b>0</b> | <b>0</b> |

device annunciation / setting: 1 - ON / TRUE IEC Status BlkZn.stVal: 0 - NOT BLOCKED  
0 - OFF / FALSE 1 - BLOCKED



**RPSB4.Str.phsA**

| No.                   | Information                                              |          |          |          |
|-----------------------|----------------------------------------------------------|----------|----------|----------|
| 4167                  | Power Swing detected in L1 (Pow. Swing L1)               | 0        | 1        | x        |
|                       | P/S Op. mode (P2002) = All zones block or Z2 to Z5 block | 0        | 0        | 1        |
| <b>RPSB4.Str.phsA</b> |                                                          | <b>0</b> | <b>1</b> | <b>0</b> |

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

**RPSB4.Str.phsB**

| No.                   | Information                                              |          |          |          |
|-----------------------|----------------------------------------------------------|----------|----------|----------|
| 4168                  | Power Swing detected in L2 (Pow. Swing L2)               | 0        | 1        | x        |
|                       | P/S Op. mode (P2002) = All zones block or Z2 to Z5 block | 0        | 0        | 1        |
| <b>RPSB4.Str.phsB</b> |                                                          | <b>0</b> | <b>1</b> | <b>0</b> |

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

**RPSB4.Str.phsC**

| No.                   | Information                                              |          |          |          |
|-----------------------|----------------------------------------------------------|----------|----------|----------|
| 4169                  | Power Swing detected in L3 (Pow. Swing L3)               | 0        | 1        | x        |
|                       | P/S Op. mode (P2002) = All zones block or Z2 to Z5 block | 0        | 0        | 1        |
| <b>RPSB4.Str.phsC</b> |                                                          | <b>0</b> | <b>1</b> | <b>0</b> |

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

**RPSB4.BlkZn**

| No.                      | Information                                              |          |          |          |          |
|--------------------------|----------------------------------------------------------|----------|----------|----------|----------|
| 4164                     | Power Swing detected (Power Swing)                       | 0        | 1        | 1        | x        |
| 4166                     | Power Swing TRIP command (Pow. Swing TRIP)               | 0        | 0        | 1        | x        |
|                          | P/S Op. mode (P2002) = All zones block or Z2 to Z5 block | 0        | 0        | 0        | 1        |
| <b>RPSB4.BlkZn.stVal</b> |                                                          | <b>0</b> | <b>1</b> | <b>0</b> | <b>0</b> |

device annunciation / setting: 1 - ON / TRUE    IEC Status BlkZn.stVal: 0 - NOT BLOCKED  
 0 - OFF / FALSE                                    1 - BLOCKED









## 3.4 Teleprotection for distance protection (PSCH1)

### PSCH1.Mod

| No.                    | Information                                          |          |          |          |          |
|------------------------|------------------------------------------------------|----------|----------|----------|----------|
| 4003                   | >Distance Teleprotection BLOCK (>Dis.Telep. Blk)     | 1        | 1        | 0        | 0        |
| 4052                   | Dis. Teleprotection is switched OFF (Dis.Telep. OFF) | 1        | 0        | 1        | 0        |
| <b>PSCH1.Mod.stVal</b> |                                                      | <b>5</b> | <b>2</b> | <b>5</b> | <b>1</b> |

device annunciation:  
1 - ON  
0 - OFF

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

### PSCH1.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>PSCH1.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

device annunciation:  
1 - ON  
0 - OFF

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

### PSCH1.ProTx

| No.                      | Information                                         |          |          |          |          |          |          |
|--------------------------|-----------------------------------------------------|----------|----------|----------|----------|----------|----------|
| 4057                     | Dis. Telep. Carrier SEND signal, L1 (Dis.T.SEND L1) | 1        | 1        | x        | x        | x        | 0        |
| 4058                     | Dis. Telep. Carrier SEND signal, L2 (Dis.T.SEND L2) | 1        | x        | 1        | x        | x        | 0        |
| 4059                     | Dis. Telep. Carrier SEND signal, L3 (Dis.T.SEND L3) | 1        | x        | x        | 1        | x        | 0        |
| 4056                     | Dis. Telep. Carrier SEND signal (Dis.T.SEND)        | 1        | x        | x        | x        | 1        | 0        |
| <b>PSCH1.ProTx.stVal</b> |                                                     | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>0</b> |

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

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

**PSCH1.ProRx**

| No.                      | Information                                           |          |          |
|--------------------------|-------------------------------------------------------|----------|----------|
| 4054                     | Dis. Telep. Carrier signal received (Dis.T.Carr.rec.) | 0        | 1        |
| <b>PSCH1.ProRx.stVal</b> |                                                       | <b>0</b> | <b>1</b> |

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

**PSCH1.Str**

| No.                      | Information                                         |          |          |          |          |          |          |
|--------------------------|-----------------------------------------------------|----------|----------|----------|----------|----------|----------|
| 4057                     | Dis. Telep. Carrier SEND signal, L1 (Dis.T.SEND L1) | 1        | 1        | x        | x        | x        | 0        |
| 4058                     | Dis. Telep. Carrier SEND signal, L2 (Dis.T.SEND L2) | 1        | x        | 1        | x        | x        | 0        |
| 4059                     | Dis. Telep. Carrier SEND signal, L3 (Dis.T.SEND L3) | 1        | x        | x        | 1        | x        | 0        |
| 4056                     | Dis. Telep. Carrier SEND signal (Dis.T.SEND)        | 1        | x        | x        | x        | 1        | 0        |
| <b>PSCH1.Str.general</b> |                                                     | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>0</b> |

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

**PSCH1.Str.phsA**

| No.                   | Information                                         |          |          |
|-----------------------|-----------------------------------------------------|----------|----------|
| 4057                  | Dis. Telep. Carrier SEND signal, L1 (Dis.T.SEND L1) | 0        | 1        |
| <b>PSCH1.Str.phsA</b> |                                                     | <b>0</b> | <b>1</b> |

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

**PSCH1.Str.phsB**

| No.                   | Information                                         |          |          |
|-----------------------|-----------------------------------------------------|----------|----------|
| 4058                  | Dis. Telep. Carrier SEND signal, L2 (Dis.T.SEND L2) | 0        | 1        |
| <b>PSCH1.Str.phsB</b> |                                                     | <b>0</b> | <b>1</b> |

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



**PSCH1.Op.phsA**

| No.                  | Information                                              |          |          |          |          |          |          |
|----------------------|----------------------------------------------------------|----------|----------|----------|----------|----------|----------|
| 3850                 | DisTRIP Z1B with Teleprotection scheme (DisTRIP Z1B Tel) | 1        | 1        | 1        | 0        | 0        | 0        |
| 3802                 | Distance TRIP command - Only Phase L1 (Dis.Trip 1pL1)    | 1        | 1        | x        | 1        | x        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)          | 1        | x        | 1        | x        | 1        | 0        |
| <b>PSCH1.Op.phsA</b> |                                                          | <b>1</b> | <b>1</b> | <b>1</b> | <b>0</b> | <b>0</b> | <b>0</b> |

device annunciation: 1 - ON IEC Status Op.phsA: 0 - FALSE  
0 - OFF 1 - TRUE  
x - irrelevant

**PSCH1.Op.phsB**

| No.                  | Information                                              |          |          |          |          |          |          |
|----------------------|----------------------------------------------------------|----------|----------|----------|----------|----------|----------|
| 3850                 | DisTRIP Z1B with Teleprotection scheme (DisTRIP Z1B Tel) | 1        | 1        | 1        | 0        | 0        | 0        |
| 3803                 | Distance TRIP command - Only Phase L2 (Dis.Trip 1pL2)    | 1        | 1        | x        | 1        | x        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)          | 1        | x        | 1        | x        | 1        | 0        |
| <b>PSCH1.Op.phsB</b> |                                                          | <b>1</b> | <b>1</b> | <b>1</b> | <b>0</b> | <b>0</b> | <b>0</b> |

device annunciation: 1 - ON IEC Status Op.phsB: 0 - FALSE  
0 - OFF 1 - TRUE  
x - irrelevant

**PSCH1.Op.phsC**

| No.                  | Information                                              |          |          |          |          |          |          |
|----------------------|----------------------------------------------------------|----------|----------|----------|----------|----------|----------|
| 3850                 | DisTRIP Z1B with Teleprotection scheme (DisTRIP Z1B Tel) | 1        | 1        | 1        | 0        | 0        | 0        |
| 3804                 | Distance TRIP command - Only Phase L3 (Dis.Trip 1pL3)    | 1        | 1        | x        | 1        | x        | 0        |
| 3805                 | Distance TRIP command Phases L123 (Dis.Trip 3p)          | 1        | x        | 1        | x        | 1        | 0        |
| <b>PSCH1.Op.phsC</b> |                                                          | <b>1</b> | <b>1</b> | <b>1</b> | <b>0</b> | <b>0</b> | <b>0</b> |

device annunciation: 1 - ON IEC Status OP.phsC: 0 - FALSE  
0 - OFF 1 - TRUE  
x - irrelevant

**PSCH1.CarRx**

| No.                        | Information                                                |          |          |          |          |          |          |          |
|----------------------------|------------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|
| 4030                       | >Dis.Tele. Unblocking: UNBLOCK Channel 1 (>Dis.T.UB ub 1)  | 1        | 1        | x        | x        | x        | x        | 0        |
| 4035                       | >Dis.Tele. Unblocking: UNBLOCK Channel 2 (>Dis.T.UB ub 2)  | 1        | x        | 1        | x        | x        | x        | 0        |
| 4032                       | >Dis.Tele. Unblocking: UNBLOCK Ch. 1, L1 (>Dis.T.UB ub1L1) | 1        | x        | x        | 1        | x        | x        | 0        |
| 4033                       | >Dis.Tele. Unblocking: UNBLOCK Ch. 1, L2 (>Dis.T.UB ub1L2) | 1        | x        | x        | x        | 1        | x        | 0        |
| 4034                       | >Dis.Tele. Unblocking: UNBLOCK Ch. 1, L3 (>Dis.T.UB ub1L3) | 1        | x        | x        | x        | x        | 1        | 0        |
| <b>PSCH1.CarRx.general</b> |                                                            | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>0</b> |

device annunciation: 1 - ON IEC Status CarRx.general: 0 - FALSE  
0 - OFF 1 - TRUE  
x - irrelevant

**PSCH1.LosOfGrd**

| No.                         | Information                                              |          |          |          |          |
|-----------------------------|----------------------------------------------------------|----------|----------|----------|----------|
| 4055                        | Dis. Telep. Carrier CHANNEL FAILURE (Dis.T.Carr.Fail)    | 1        | x        | x        | 0        |
| 4080                        | Dis. Tele.Unblocking: FAILURE Channel 1 (Dis.T.UB Fail1) | 1        | 1        | x        | 0        |
| 4081                        | Dis. Tele.Unblocking: FAILURE Channel 2 (Dis.T.UB Fail2) | 1        | x        | 1        | 0        |
| <b>PSCH1.LosOfGrd.stVal</b> |                                                          | <b>1</b> | <b>1</b> | <b>1</b> | <b>0</b> |

device annunciation: 1 - ON IEC Status LosOfGrd.stVal: 0 - FALSE  
0 - OFF 1 - TRUE  
x - irrelevant

**PSCH1.Echo**

| No.                     | Information                    |          |          |
|-------------------------|--------------------------------|----------|----------|
| 4246                    | ECHO Send SIGNAL (ECHO SIGNAL) | 0        | 1        |
| <b>PSCH1.Echo.stVal</b> |                                | <b>0</b> | <b>1</b> |

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





## 3.4 Teleprotection for distance protection (PSCH1)

## PSCH1.RvABlk

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 4068                      | Dis. Telep. Transient Blocking (Dis.T.Trans.Blk) | 0        | 1        |
| <b>PSCH1.RvABlk.stVal</b> |                                                  | <b>0</b> | <b>1</b> |

device annunciation:    1 - ON                    IEC Status RvABlk.stVal:    0 - FALSE  
                             0 - OFF                                         1 - TRUE  
                             x - irrelevant

## PSCH1.Grdrx

| No.                      | Information                                             |          |          |          |
|--------------------------|---------------------------------------------------------|----------|----------|----------|
| 4031                     | >Dis.Tele. Unblocking: BLOCK Channel 1 (>Dis.T.UB bl 1) | 1        | x        | 0        |
| 4036                     | >Dis.Tele. Unblocking: BLOCK Channel 2 (>Dis.T.UB bl 2) | x        | 1        | 0        |
| <b>PSCH1.Grdrx.stVal</b> |                                                         | <b>1</b> | <b>1</b> | <b>0</b> |

device annunciation:    1 - ON                    IEC Status Grdrx.stVal:    0 - FALSE  
                             0 - OFF                                         1 - TRUE  
                             x - irrelevant



**PTOC5.Str.dirGeneral**

| No.                         | Information                         |          |          |          |          |          |
|-----------------------------|-------------------------------------|----------|----------|----------|----------|----------|
| 1358                        | E/F picked up FORWARD (EF forward)  | x        | 1        | 1        | 0        | 0        |
| 1359                        | E/F picked up REVERSE (EF reverse)  | x        | 1        | 0        | 1        | 0        |
| 1356                        | E/F 3I0> PICKED UP (EF 3I0> Pickup) | 0        | 1        | 1        | 1        | 1        |
| <b>PTOC5.Str.dirGeneral</b> |                                     | <b>0</b> | <b>3</b> | <b>1</b> | <b>2</b> | <b>0</b> |

device annunciation: 1 - ON  
0 - OFF

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

**PTOC5.Op**

| No.                     | Information                  |          |          |
|-------------------------|------------------------------|----------|----------|
| 1368                    | E/F 3I0> TRIP (EF 3I0> TRIP) | 0        | 1        |
| <b>PTOC5.Op.general</b> |                              | <b>0</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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

3.5.2 Earth fault 3I0 >> (PTOC6)

PTOC6.Mod

| No.                    | Information                                            |          |          |          |          |          |          |
|------------------------|--------------------------------------------------------|----------|----------|----------|----------|----------|----------|
| 1333                   | Earth fault protection is ACTIVE (E/F ACTIVE)          | x        | x        | 0        | 1        | 1        | 1        |
| 1332                   | Earth fault protection is BLOCKED (E/F BLOCK)          | x        | x        | x        | 0        | 1        | 1        |
| 1307                   | >Earth Fault O/C Block 3I0>> (>EF BLOCK 3I0>>)         | x        | x        | x        | 1        | 0        | 1        |
| 1331                   | Earth fault protection is switched OFF (E/F Prot. OFF) | 1        | x        | x        | 0        | 0        | 0        |
|                        | Op. mode 3I0>> (P3120) = Inactive                      | x        | 1        | x        | 0        | 0        | 0        |
| <b>PTOC6.Mod.stVal</b> |                                                        | <b>5</b> | <b>5</b> | <b>5</b> | <b>2</b> | <b>2</b> | <b>2</b> |

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

PTOC6.Health

| No.                       | Information                                      |            |
|---------------------------|--------------------------------------------------|------------|
| 51                        | Device is Operational and Protecting (Device OK) | 0 1        |
| <b>PTOC6.Health.stVal</b> |                                                  | <b>3 1</b> |

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

PTOC6.Str

| No.                      | Information                           |            |
|--------------------------|---------------------------------------|------------|
| 1355                     | E/F 3I0>> PICKED UP (EF 3I0>> Pickup) | 0 1        |
| <b>PTOC6.Str.general</b> |                                       | <b>0 1</b> |

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

**PTOC6.Str.dirGeneral**

| No.                         | Information                           |          |          |          |          |          |
|-----------------------------|---------------------------------------|----------|----------|----------|----------|----------|
| 1358                        | E/F picked up FORWARD (EF forward)    | x        | 1        | 1        | 0        | 0        |
| 1359                        | E/F picked up REVERSE (EF reverse)    | x        | 1        | 0        | 1        | 0        |
| 1355                        | E/F 3I0>> PICKED UP (EF 3I0>> Pickup) | 0        | 1        | 1        | 1        | 1        |
| <b>PTOC6.Str.dirGeneral</b> |                                       | <b>0</b> | <b>3</b> | <b>1</b> | <b>2</b> | <b>0</b> |

device annunciation: 1 - ON  
0 - OFF

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

**PTOC6.Op**

| No.                     | Information                    |          |          |
|-------------------------|--------------------------------|----------|----------|
| 1367                    | E/F 3I0>> TRIP (EF 3I0>> TRIP) | 0        | 1        |
| <b>PTOC6.Op.general</b> |                                | <b>0</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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



**PTOC7.Str.dirGeneral**

| No.                         | Information                            |          |          |          |          |          |
|-----------------------------|----------------------------------------|----------|----------|----------|----------|----------|
| 1358                        | E/F picked up FORWARD (EF forward)     | x        | 1        | 1        | 0        | 0        |
| 1359                        | E/F picked up REVERSE (EF reverse)     | x        | 1        | 0        | 1        | 0        |
| 1354                        | E/F 3I0>>> PICKED UP (EF 3I0>>>Pickup) | 0        | 1        | 1        | 1        | 1        |
| <b>PTOC7.Str.dirGeneral</b> |                                        | <b>0</b> | <b>3</b> | <b>1</b> | <b>2</b> | <b>0</b> |

device annunciation: 1 - ON  
0 - OFF

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

**PTOC7.Op**

| No.                     | Information                      |          |          |
|-------------------------|----------------------------------|----------|----------|
| 1366                    | E/F 3I0>>> TRIP (EF 3I0>>> TRIP) | 0        | 1        |
| <b>PTOC7.Op.general</b> |                                  | <b>0</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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



### 3.5.4 Earth fault 3I0p (PTOC8)

#### PTOC8.Mod

| No.                    | Information                                            |          |          |          |          |          |          |
|------------------------|--------------------------------------------------------|----------|----------|----------|----------|----------|----------|
| 1332                   | Earth fault protection is BLOCKED (E/F BLOCK)          | x        | x        | 1        | 1        | 0        | 0        |
| 1309                   | >Earth Fault O/C Block 3I0p (>EF BLOCK 3I0p)           | x        | x        | 1        | 0        | 1        | 0        |
| 1331                   | Earth fault protection is switched OFF (E/F Prot. OFF) | 1        | x        | 0        | 0        | 0        | 0        |
|                        | Op. mode 3I0p (P3140) = Inactive                       | x        | 1        | 0        | 0        | 0        | 0        |
| <b>PTOC8.Mod.stVal</b> |                                                        | <b>5</b> | <b>5</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>1</b> |

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

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        |
| <b>PTOC8.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

IEC Status Health.stVal:

1 - OK  
2 - WARNING  
3 - ALARM

#### PTOC8.Str

| No.                      | Information                         |          |          |
|--------------------------|-------------------------------------|----------|----------|
| 1357                     | E/F 3I0p PICKED UP (EF 3I0p Pickup) | 0        | 1        |
| <b>PTOC8.Str.general</b> |                                     | <b>0</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

IEC Status Str.general:

0 - FALSE  
1 - TRUE

**PTOC8.Str.dirGeneral**

| No.                         | Information                         |          |          |          |          |          |
|-----------------------------|-------------------------------------|----------|----------|----------|----------|----------|
| 1358                        | E/F picked up FORWARD (EF forward)  | x        | 0        | 1        | 1        | 0        |
| 1359                        | E/F picked up REVERSE (EF reverse)  | x        | 0        | 0        | 1        | 1        |
| 1357                        | E/F 3I0p PICKED UP (EF 3I0p Pickup) | 0        | 1        | 1        | 1        | 1        |
| <b>PTOC8.Str.dirGeneral</b> |                                     | <b>0</b> | <b>0</b> | <b>1</b> | <b>3</b> | <b>2</b> |

device annunciation: 1 - ON  
0 - OFF

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

**PTOC8.Op**

| No.                     | Information                  |          |          |
|-------------------------|------------------------------|----------|----------|
| 1369                    | E/F 3I0p TRIP (EF 3I0p TRIP) | 0        | 1        |
| <b>PTOC8.Op.general</b> |                              | <b>0</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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

## 3.6 Earth fault detection in non-earthed systems (PSDE1)

### PSDE1.Mod

| No.                    | Information                                          |          |          |          |          |          |          |          |          |
|------------------------|------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1263                   | Sensitive E/F detection is ACTIVE (SenseF ACTIVE)    | 1        | 1        | 1        | 1        | 0        | 0        | 0        | 0        |
| 1262                   | Sensitive E/F detection is BLOCKED (SenseF BLOCK)    | 1        | 1        | 0        | 0        | 1        | 1        | 0        | 0        |
| 1261                   | Sensitive E/F detection is switched OFF (SenseF OFF) | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0        |
| <b>PSDE1.Mod.stVal</b> |                                                      | <b>5</b> | <b>2</b> | <b>5</b> | <b>1</b> | <b>5</b> | <b>5</b> | <b>5</b> | <b>5</b> |

device annunciation: 1 - ON  
0 - OFF

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

### PSDE1.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>PSDE1.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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

### PSDE1.Str

| No.                      | Information                                       |          |          |
|--------------------------|---------------------------------------------------|----------|----------|
| 1271                     | Sensitive E/F detection picked up (SenseF Pickup) | 0        | 1        |
| <b>PSDE1.Str.general</b> |                                                   | <b>0</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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

## 3.6 Earth fault detection in non-earthed systems (PSDE1)

## PSDE1.Str.dirGeneral

| No.                         | Information                                                 |          |          |          |          |          |          |          |          |
|-----------------------------|-------------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1276                        | Sensitive E/F detection Forward (SenseEF Forward)           | 1        | 1        | 1        | 1        | 0        | 0        | 0        | 0        |
| 1277                        | Sensitive E/F detection Reverse (SenseEF Reverse)           | 1        | 1        | 0        | 0        | 1        | 1        | 0        | 0        |
| 1278                        | Sensitive E/F detection Undef. Direction (SenseEF undefDir) | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0        |
| <b>PSDE1.Mod.dirGeneral</b> |                                                             | <b>0</b> | <b>3</b> | <b>0</b> | <b>1</b> | <b>0</b> | <b>2</b> | <b>0</b> | <b>0</b> |

device annunciation: 1 - ON  
0 - OFF

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

## PSDE1.Str.phsA

| No.                   | Information                                         |          |          |
|-----------------------|-----------------------------------------------------|----------|----------|
| 1272                  | Sensitive E/F detection Phase L1 (SenseEF Phase L1) | 0        | 1        |
| <b>PSDE1.Str.phsA</b> |                                                     | <b>0</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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

## PSDE1.Str.dirPhsA

| No.                      | Information                                                 |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |
|--------------------------|-------------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|
| 1276                     | Sensitive E/F detection Forward (SenseEF Forward)           | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1277                     | Sensitive E/F detection Reverse (SenseEF Reverse)           | 1        | 1        | 1        | 1        | 0        | 0        | 0        | 0        | 1        | 1        | 1        | 1        | 0        | 0        | 0        |  |
| 1278                     | Sensitive E/F detection Undef. Direction (SenseEF undefDir) | 1        | 1        | 0        | 0        | 1        | 1        | 0        | 0        | 1        | 1        | 0        | 0        | 1        | 1        | 0        |  |
| 1272                     | Sensitive E/F detection Phase L1 (SenseEF Phase L1)         | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0        | 1        |  |
| <b>PSDE1.Str.dirPhsA</b> |                                                             | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>1</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>2</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> |  |

device annunciation: 1 - ON  
0 - OFF

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

**PSDE1.Str.phsB**

| No.                   | Information                                        |          |          |
|-----------------------|----------------------------------------------------|----------|----------|
| 1273                  | Sensitive E/F detection Phase L2 (SensEF Phase L2) | 0        | 1        |
| <b>PSDE1.Str.phsB</b> |                                                    | <b>0</b> | <b>1</b> |

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

**PSDE1.Str.dirPhsB**

| No.                      | Information                                                |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |   |
|--------------------------|------------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|---|
| 1276                     | Sensitive E/F detection Forward (SensEF Forward)           | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0 |
| 1277                     | Sensitive E/F detection Reverse (SensEF Reverse)           | 1        | 1        | 1        | 1        | 0        | 0        | 0        | 0        | 0        | 1        | 1        | 1        | 0        | 0        | 0        | 0 |
| 1278                     | Sensitive E/F detection Undef. Direction (SensEF undefDir) | 1        | 1        | 0        | 0        | 1        | 1        | 0        | 0        | 1        | 1        | 0        | 0        | 1        | 1        | 0        | 0 |
| 1273                     | Sensitive E/F detection Phase L2 (SensEF Phase L2)         | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0 |
| <b>PSDE1.Str.dirPhsB</b> |                                                            | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>1</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>2</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> |   |

device annunciation: 1 - ON IEC Status Str.dirPhsB: 0 - UNKNOWN  
0 - OFF 1 - FORWARD  
2 - BACKWARD

**PSDE1.Str.phsC**

| No.                   | Information                                        |          |          |
|-----------------------|----------------------------------------------------|----------|----------|
| 1274                  | Sensitive E/F detection Phase L3 (SensEF Phase L3) | 0        | 1        |
| <b>PSDE1.Str.phsC</b> |                                                    | <b>0</b> | <b>1</b> |

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

**PSDE1.Str.dirPhsC**

| No.                      | Information                                                |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |   |
|--------------------------|------------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|---|
| 1276                     | Sensitive E/F detection Forward (SenseF Forward)           | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0 |
| 1277                     | Sensitive E/F detection Reverse (SenseF Reverse)           | 1        | 1        | 1        | 1        | 0        | 0        | 0        | 0        | 1        | 1        | 1        | 1        | 0        | 0        | 0        | 0 |
| 1278                     | Sensitive E/F detection Undef. Direction (SenseF undefDir) | 1        | 1        | 0        | 0        | 1        | 1        | 0        | 0        | 1        | 1        | 0        | 0        | 1        | 1        | 0        | 0 |
| 1274                     | Sensitive E/F detection Phase L3 (SenseF Phase L3)         | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0 |
| <b>PSDE1.Str.dirPhsC</b> |                                                            | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>1</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>2</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> |   |

device annunciation:  
1 - ON  
0 - OFF  
t

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

**PSDE1.Op**

| No.                     | Information                                        |          |          |
|-------------------------|----------------------------------------------------|----------|----------|
| 1281                    | Sensitive E/F detection TRIP command (SenseF TRIP) | 0        | 1        |
| <b>PSDE1.Op.general</b> |                                                    | <b>0</b> | <b>1</b> |

device annunciation:  
1 - ON  
0 - OFF

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

## 3.7 Restricted earth fault protection (PDIF3)

### PDIF3.Mod

| No.                    | Information                                              |          |          |          |          |          |          |          |
|------------------------|----------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|
| 5813                   | Restricted earth fault is ACTIVE (REF ACTIVE)            | x        | 0        | 1        | 1        | 1        | 1        | 1        |
| 5812                   | Restricted earth fault is BLOCKED (REF BLOCKED)          | x        | x        | 0        | 1        | x        | x        | x        |
| 5811                   | Restricted earth fault is switched OFF (REF OFF)         | 1        | 0        | 0        | 0        | 0        | 0        | 0        |
| 290                    | Alarm: Broken current-wire detected L1 (Broken Iwire L1) | x        | x        | 0        | 0        | 1        | x        | x        |
| 291                    | Alarm: Broken current-wire detected L2 (Broken Iwire L2) | x        | x        | 0        | 0        | x        | 1        | x        |
| 292                    | Alarm: Broken current-wire detected L3 (Broken Iwire L3) | x        | x        | 0        | 0        | x        | x        | 1        |
| <b>PDIF3.Mod.stVal</b> |                                                          | <b>5</b> | <b>5</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>2</b> |

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

IEC Status Mod.stVal:

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

### PDIF3.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>PDIF3.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

device annunciation:

1 - ON  
0 - OFF

IEC Status Health.stVal:

1 - OK  
2 - WARNING  
3 - ALARM

## 3.7 Restricted earth fault protection (PDIF3)

## PDIF3.Str

| No.                      | Information                                  |          |          |
|--------------------------|----------------------------------------------|----------|----------|
| 5817                     | Restr. earth flt.: picked up (REF picked up) | 0        | 1        |
| <b>PDIF3.Str.general</b> |                                              | <b>0</b> | <b>1</b> |

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

## PDIF3.Str.dirGeneral

| No.                         | Information |          |
|-----------------------------|-------------|----------|
| <b>PDIF3.Str.dirGeneral</b> |             | <b>1</b> |

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

## PDIF3.Op

| No.                     | Information                        |          |          |
|-------------------------|------------------------------------|----------|----------|
| 5821                    | Restr. earth flt.: TRIP (REF TRIP) | 0        | 1        |
| <b>PDIF3.Op.general</b> |                                    | <b>0</b> | <b>1</b> |

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

## PDIF3.DifAClc

| No.   | Information                                          | Value                          |                |                |
|-------|------------------------------------------------------|--------------------------------|----------------|----------------|
| 30654 | ldiff REF(% Operational nominal current) (ldiffREF=) | PDIF3.DifAClc.cVal.mag.f       | Measured value | Absolute value |
|       |                                                      | PDIF3.DifAClc.units.SIUnit     |                |                |
|       |                                                      | PDIF3.DifAClc.units.multiplier |                |                |

## PDIF3.RstA

| No.   | Information                                          | Value                       |                |                |
|-------|------------------------------------------------------|-----------------------------|----------------|----------------|
| 30655 | Irest REF(% Operational nominal current) (IrestREF=) | PDIF3.RstA.cVal.mag.f       | Measured value | Absolute value |
|       |                                                      | PDIF3.RstA.units.SIUnit     |                |                |
|       |                                                      | PDIF3.RstA.units.multiplier |                |                |





## 3.8 Overcurrent protection (PTOCx)

## PTOC1.Op

| No.                     | Information                      |          |          |
|-------------------------|----------------------------------|----------|----------|
| 7223                    | Backup O/C TRIP Ip (O/C TRIP Ip) | 0        | 1        |
| <b>PTOC1.Op.general</b> |                                  | <b>0</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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

## 3.8.2 O/C I&gt; (PTOC2)

## PTOC2.Mod

| No.                    | Information                                                       |          |          |          |          |          |          |          |          |          |  |
|------------------------|-------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|
| 7153                   | Backup O/C is ACTIVE (O/C ACTIVE)                                 | x        | x        | 0        | 0        | 0        | 1        | 1        | 1        | 1        |  |
| 7152                   | Backup O/C is BLOCKED (O/C BLOCK)                                 | x        | x        | 0        | 1        | 1        | 0        | 0        | 1        | 1        |  |
| 7105                   | >BLOCK Backup OverCurrent I> (>BLOCK O/C I>)                      | x        | x        | 1        | 0        | 1        | 0        | 1        | 0        | 1        |  |
| 7151                   | Backup O/C is switched OFF (O/C OFF)                              | 1        | x        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
|                        | Operating Mode (P2601) = OFF or Iph> (P2620) and 3I0> (P2622) = ∞ | x        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| <b>PTOC2.Mod.stVal</b> |                                                                   | <b>5</b> | <b>5</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> |  |

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

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

## PTOC2.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>PTOC2.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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





### 3.8.4 O/C I>>> (PTOC4)

#### PTOC4.Mod

| No.                    | Information                                                                     |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
|------------------------|---------------------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 7153                   | Backup O/C is ACTIVE (O/C ACTIVE)                                               | x        | x        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 1        | 1        | 1        | 1        | 1        | 1        | 1        |
| 7152                   | Backup O/C is BLOCKED (O/C BLOCK)                                               | x        | x        | 0        | 0        | 1        | 1        | 1        | 1        | 0        | 0        | 0        | 0        | 1        | 1        | 1        | 1        |
| 7130                   | >BLOCK I-STUB (>BLOCK I-STUB)                                                   | x        | x        | 1        | 1        | 0        | 0        | 1        | 1        | 0        | 0        | 1        | 1        | 0        | 0        | 1        | 1        |
| 7131                   | >Enable I-STUB-Bus function (>I-STUB ENABLE)                                    | x        | x        | 0        | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0        | 1        | 0        | 1        |
| 7151                   | Backup O/C is switched OFF (O/C OFF)                                            | 1        | x        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |
|                        | Operating Mode (P2601) = OFF or<br>Iph>>> (P2630) and 3I0>>> PICKUP (P2632) = ∞ | x        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |
| <b>PTOC4.Mod.stVal</b> |                                                                                 | <b>5</b> | <b>5</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>2</b> |

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        |
| <b>PTOC4.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

IEC Status Health.stVal:

1 - OK  
2 - WARNING  
3 - ALARM





## 3.8 Overcurrent protection (PTOCx)

## PTOC9.Str

| No.                      | Information                                        |          |          |
|--------------------------|----------------------------------------------------|----------|----------|
| 7203                     | Backup O/C Pickup Ip directional (O/C PICK. IpDir) | 0        | 1        |
| <b>PTOC9.Str.general</b> |                                                    | <b>0</b> | <b>1</b> |

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

## PTOC9.Str.dirGeneral

| No.                         | Information                                        |          |          |          |          |          |
|-----------------------------|----------------------------------------------------|----------|----------|----------|----------|----------|
| 7203                        | Backup O/C Pickup Ip directional (O/C PICK. IpDir) | 0        | 1        | 1        | 1        | 1        |
| 7248                        | Backup O/C forward direction (O/C Dir.forward)     | x        | 0        | 0        | 1        | 1        |
| 7249                        | Backup O/C reverse direction (O/C Dir.reverse)     | x        | 0        | 1        | 0        | 1        |
| <b>PTOC9.Str.dirGeneral</b> |                                                    | <b>0</b> | <b>0</b> | <b>2</b> | <b>1</b> | <b>3</b> |

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

## PTOC9.Op

| No.                     | Information                                        |          |          |
|-------------------------|----------------------------------------------------|----------|----------|
| 7237                    | Backup O/C Pickup Ip directional (O/C TRIP IpDir.) | 0        | 1        |
| <b>PTOC9.Op.general</b> |                                                    | <b>0</b> | <b>1</b> |

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



### 3.8.6 Directional O/C I> (PTOC10)

#### PTOC10.Mod

| No.                     | Information                                                                         |          |          |          |          |          |          |
|-------------------------|-------------------------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|
| 7153                    | Backup O/C is ACTIVE (O/C ACTIVE)                                                   | x        | x        | 0        | 0        | 1        | 1        |
| 7152                    | Backup O/C is BLOCKED (O/C BLOCK)                                                   | x        | x        | 0        | 1        | 0        | 1        |
| 7151                    | Backup O/C is switched OFF (O/C OFF)                                                | x        | 1        | 0        | 0        | 0        | 0        |
| 7158                    | Operating Mode (P2601) = OFF or<br>Iph> ger (P2630) and 3I0> ger PICKUP (P2632) = ∞ | 1        | x        | 0        | 0        | 0        | 0        |
| <b>PTOC10.Mod.stVal</b> |                                                                                     | <b>5</b> | <b>5</b> | <b>5</b> | <b>2</b> | <b>1</b> | <b>2</b> |

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        |
| <b>PTOC10.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

IEC Status Health.stVal:

1 - OK  
2 - WARNING  
3 - ALARM

**PTOC10.Str**

| No.                       | Information                                        |          |          |
|---------------------------|----------------------------------------------------|----------|----------|
| 7202                      | Backup O/C Pickup I> directional (O/C PICK. I>Dir) | 0        | 1        |
| <b>PTOC10.Str.general</b> |                                                    | <b>0</b> | <b>1</b> |

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

**PTOC10.Str.dirGeneral**

| No.                          | Information                                        |          |          |          |          |          |
|------------------------------|----------------------------------------------------|----------|----------|----------|----------|----------|
| 7202                         | Backup O/C Pickup I> directional (O/C PICK. I>Dir) | 0        | 1        | 1        | 1        | 1        |
| 7248                         | Backup O/C forward direction (O/C Dir.forward)     | x        | 0        | 0        | 1        | 1        |
| 7249                         | Backup O/C reverse direction (O/C Dir.reverse)     | x        | 0        | 1        | 0        | 1        |
| <b>PTOC10.Str.dirGeneral</b> |                                                    | <b>0</b> | <b>0</b> | <b>2</b> | <b>1</b> | <b>3</b> |

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

**PTOC10.Op**

| No.                      | Information                                      |          |          |
|--------------------------|--------------------------------------------------|----------|----------|
| 7236                     | Backup O/C TRIP I> directional (O/C TRIP I>Dir.) | 0        | 1        |
| <b>PTOC10.Op.general</b> |                                                  | <b>0</b> | <b>1</b> |

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

### 3.9 Automatic reclosure function (RREC1)

#### RREC1.Mod

| No.                    | Information                                 |          |          |          |          |
|------------------------|---------------------------------------------|----------|----------|----------|----------|
| 2782                   | AR: Auto-reclose is switched on (AR on)     | x        | 0        | 1        | 1        |
| 2783                   | AR: Auto-reclose is blocked (AR is blocked) | x        | x        | 1        | 0        |
| 2781                   | AR: Auto-reclose is switched off (AR off)   | 1        | 0        | 0        | 0        |
| <b>RREC1.Mod.stVal</b> |                                             | <b>5</b> | <b>5</b> | <b>2</b> | <b>1</b> |

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

#### RREC1.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>RREC1.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

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



### 3.10 Synchronism and voltage check (RSYN1)

#### RSYN1.Mod

| No.                    | Information                               |          |          |          |          |
|------------------------|-------------------------------------------|----------|----------|----------|----------|
| 2932                   | Synchro-check is BLOCKED (Sync. BLOCK)    | 1        | 1        | 0        | 0        |
| 2931                   | Synchro-check is switched OFF (Sync. OFF) | 1        | 0        | 1        | 0        |
| <b>RSYN1.Mod.stVal</b> |                                           | <b>5</b> | <b>2</b> | <b>5</b> | <b>1</b> |

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

#### RSYN1.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>RSYN1.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

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

#### RSYN1.Rel

| No.                    | Information                                      |          |          |
|------------------------|--------------------------------------------------|----------|----------|
| 2951                   | Synchronism release (to ext. AR) (Sync. release) | 0        | 1        |
| <b>RSYN1.Rel.stVal</b> |                                                  | <b>0</b> | <b>1</b> |

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



**RSYN1.DifVClc**

| No. | Information                 |                                | Value          |                |
|-----|-----------------------------|--------------------------------|----------------|----------------|
| 636 | U-diff (line-bus) (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 | Frequency (difference line-bus) (F-diff=) | 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          |                |
|-----|-------------------------------------------------|----------------------------------|----------------|----------------|
| 648 | Angle (difference line-bus) ( $\varphi$ -diff=) | RSYN1.DifAngClc.mag.f            | Measured value | Absolute value |
|     |                                                 | RSYN1.DifAngClc.units.SIUnit     | 9              | ° (Degree)     |
|     |                                                 | RSYN1.DifAngClc.units.multiplier | 0              | 1              |







### 3.11.2 Undervoltage protection Uph-e<< (PTUV2)

#### PTUV2.Mod

| No.                    | Information                                     |          |          |          |
|------------------------|-------------------------------------------------|----------|----------|----------|
| 10226                  | Uph-e<(<) Undervolt. is BLOCKED (Uph-e<(<) BLK) | 0        | 0        | 1        |
|                        | Uph-e<(<) (P3751) = OFF or Uph-e<< (P3754) = 0  | 0        | 1        | 0        |
| <b>PTUV2.Mod.stVal</b> |                                                 | <b>1</b> | <b>5</b> | <b>2</b> |

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

#### PTUV2.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>PTUV2.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

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

#### PTUV2.Str

| No.                      | Information                       |          |          |          |          |          |
|--------------------------|-----------------------------------|----------|----------|----------|----------|----------|
| 10311                    | Uph-e<< Pickup (Uph-e<< Pickup)   | 0        | 1        | 1        | 1        | 1        |
| 10321                    | Uph-e<< Pickup L1 (Uph-e<< PU L1) | 0        | x        | 1        | x        | x        |
| 10322                    | Uph-e<< Pickup L2 (Uph-e<< PU L2) | 0        | x        | x        | 1        | x        |
| 10323                    | Uph-e<< Pickup L3 (Uph-e<< PU L3) | 0        | x        | x        | x        | 1        |
| <b>PTUV2.Str.general</b> |                                   | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> |

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





**PTUV3.Str.phsA**

| No.                   | Information                              |          |          |          |          |
|-----------------------|------------------------------------------|----------|----------|----------|----------|
| 10327                 | Uphph<(<) Pickup L1-L2 (Uphph<(<)PU L12) | 0        | 0        | 1        | 1        |
| 10329                 | Uphph<(<) Pickup L3-L1 (Uphph<(<)PU L31) | 0        | 1        | 0        | 1        |
| <b>PTUV3.Str.phsA</b> |                                          | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> |

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

**PTUV3.Str.phsB**

| No.                   | Information                              |          |          |          |          |
|-----------------------|------------------------------------------|----------|----------|----------|----------|
| 10327                 | Uphph<(<) Pickup L1-L2 (Uphph<(<)PU L12) | 0        | 0        | 1        | 1        |
| 10328                 | Uphph<(<) Pickup L2-L3 (Uphph<(<)PU L23) | 0        | 1        | 0        | 1        |
| <b>PTUV3.Str.phsB</b> |                                          | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> |

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

**PTUV3.Str.phsC**

| No.                   | Information                              |          |          |          |          |
|-----------------------|------------------------------------------|----------|----------|----------|----------|
| 10328                 | Uphph<(<) Pickup L2-L3 (Uphph<(<)PU L23) | 0        | 0        | 1        | 1        |
| 10329                 | Uphph<(<) Pickup L3-L1 (Uphph<(<)PU L31) | 0        | 1        | 0        | 1        |
| <b>PTUV3.Str.phsC</b> |                                          | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> |

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

**PTUV3.Op**

| No.                     | Information                             |          |          |          |          |
|-------------------------|-----------------------------------------|----------|----------|----------|----------|
| 10332                   | Uphph<(<) TRIP command (Uphph<(<) TRIP) | 0        | 0        | 1        | 1        |
| 10330                   | Uphph< TimeOut (Uphph< TimeOut)         | 0        | 1        | 0        | 1        |
| <b>PTUV3.Op.general</b> |                                         | <b>0</b> | <b>0</b> | <b>0</b> | <b>1</b> |

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

















**PTOV2.Str.phsA**

| No.                   | Information                           |          |          |
|-----------------------|---------------------------------------|----------|----------|
| 10242                 | Uph-e>(>) Pickup L1 (Uph-e>(>) PU L1) | 0        | 1        |
| <b>PTOV2.Str.phsA</b> |                                       | <b>0</b> | <b>1</b> |

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

**PTOV2.Str.phsB**

| No.                   | Information                           |          |          |
|-----------------------|---------------------------------------|----------|----------|
| 10243                 | Uph-e>(>) Pickup L2 (Uph-e>(>) PU L2) | 0        | 1        |
| <b>PTOV2.Str.phsB</b> |                                       | <b>0</b> | <b>1</b> |

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

**PTOV2.Str.phsC**

| No.                   | Information                           |          |          |
|-----------------------|---------------------------------------|----------|----------|
| 10244                 | Uph-e>(>) Pickup L3 (Uph-e>(>) PU L3) | 0        | 1        |
| <b>PTOV2.Str.phsC</b> |                                       | <b>0</b> | <b>1</b> |

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

**PTOV2.Op**

| No.                     | Information                             |          |          |          |          |
|-------------------------|-----------------------------------------|----------|----------|----------|----------|
| 10247                   | Uph-e>(>) TRIP command (Uph-e>(>) TRIP) | 0        | 0        | 1        | 1        |
| 10246                   | Uph-e>>> TimeOut (Uph-e>>> TimeOut)     | 0        | 1        | 0        | 1        |
| <b>PTOV2.Op.general</b> |                                         | <b>0</b> | <b>0</b> | <b>0</b> | <b>1</b> |

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



**PTOV3.Str.phsA**

| No.                   | Information                               |          |          |          |          |
|-----------------------|-------------------------------------------|----------|----------|----------|----------|
| 10257                 | Uph-ph>(>) Pickup L1-L2 (Uphph>(>)PU L12) | 0        | 0        | 1        | 1        |
| 10259                 | Uph-ph>(>) Pickup L3-L1 (Uphph>(>)PU L31) | 0        | 1        | 0        | 1        |
| <b>PTOV3.Str.phsA</b> |                                           | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> |

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

**PTOV3.Str.phsB**

| No.                   | Information                               |          |          |          |          |
|-----------------------|-------------------------------------------|----------|----------|----------|----------|
| 10257                 | Uph-ph>(>) Pickup L1-L2 (Uphph>(>)PU L12) | 0        | 0        | 1        | 1        |
| 10258                 | Uph-ph>(>) Pickup L2-L3 (Uphph>(>)PU L23) | 0        | 1        | 0        | 1        |
| <b>PTOV3.Str.phsB</b> |                                           | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> |

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

**PTOV3.Str.phsC**

| No.                   | Information                               |          |          |          |          |
|-----------------------|-------------------------------------------|----------|----------|----------|----------|
| 10258                 | Uph-ph>(>) Pickup L2-L3 (Uphph>(>)PU L23) | 0        | 0        | 1        | 1        |
| 10259                 | Uph-ph>(>) Pickup L3-L1 (Uphph>(>)PU L31) | 0        | 1        | 0        | 1        |
| <b>PTOV3.Str.phsC</b> |                                           | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> |

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

**PTOV3.Op**

| No.                     | Information                              |          |          |          |          |
|-------------------------|------------------------------------------|----------|----------|----------|----------|
| 10262                   | Uph-ph>(>) TRIP command (Uphph>(>) TRIP) | 0        | 0        | 1        | 1        |
| 10260                   | Uph-ph> TimeOut (Uphph> TimeOut)         | 0        | 1        | 0        | 1        |
| <b>PTOV3.Op.general</b> |                                          | <b>0</b> | <b>0</b> | <b>0</b> | <b>1</b> |

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

























### 3.12.2 Underfrequency protection FQS stage f2 (PTUF2)

#### PTUF2.Mod

| No.                    | Information                                                                   |          |          |          |          |          |          |
|------------------------|-------------------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|
| 5212                   | Frequency protection is BLOCKED (Freq. BLOCKED)                               | x        | x        | 0        | 1        | x        | x        |
| 5207                   | >BLOCK frequency protection stage f2 (>BLOCK f2)                              | x        | x        | 0        | x        | 1        | x        |
| 5215                   | Frequency protection undervoltage Blk (Freq UnderV Blk)                       | x        | x        | 0        | x        | x        | 1        |
|                        | O/U FREQ. f2 (P3611) = ON and f2 PICKUP (P3612/3613) < Rated Frequency (P230) | x        | 0        | 1        | 1        | 1        | 1        |
|                        | O/U FREQ. f2 (P3611) = OFF or f2 PICKUP (P3612/3613) = Rated Frequency (P230) | 1        | 0        | 0        | 0        | 0        | 0        |
| <b>PTUF2.Mod.stVal</b> |                                                                               | <b>5</b> | <b>5</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> |

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

#### PTUF2.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>PTUF2.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

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



### 3.12.3 Underfrequency protection FQS stage f3 (PTUF3)

#### PTUF3.Mod

| No.                    | Information                                                                   |          |          |          |          |          |          |
|------------------------|-------------------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|
| 5212                   | Frequency protection is BLOCKED (Freq. BLOCKED)                               | x        | x        | 0        | 1        | x        | x        |
| 5208                   | >BLOCK frequency protection stage f3 (>BLOCK f3)                              | x        | x        | 0        | x        | 1        | x        |
| 5215                   | Frequency protection undervoltage Blk (Freq UnderV Blk)                       | x        | x        | 0        | x        | x        | 1        |
|                        | O/U FREQ. f3 (P3621) = ON and f3 PICKUP (P3622/3623) < Rated Frequency (P230) | x        | 0        | 1        | 1        | 1        | 1        |
|                        | O/U FREQ. f3 (P3621) = OFF or f3PICKUP (P3622/3623) = Rated Frequency (P230)  | 1        | 0        | 0        | 0        | 0        | 0        |
| <b>PTUF3.Mod.stVal</b> |                                                                               | <b>5</b> | <b>5</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> |

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

#### PTUF3.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>PTUF3.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

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

**PTUF3.Str**

| No.                      | Information                                                                   |          |          |          |          |
|--------------------------|-------------------------------------------------------------------------------|----------|----------|----------|----------|
| 5234                     | Frequency protection: f3 picked up (f3 picked up)                             | 0        | 0        | 1        | 1        |
|                          | O/U FREQ. f3 (P3621) = ON and f3 PICKUP (P3622/3623) < Rated Frequency (P230) | 0        | 1        | 0        | 1        |
| <b>PTUF3.Str.general</b> |                                                                               | <b>0</b> | <b>0</b> | <b>0</b> | <b>1</b> |

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

**PTUF3.Op**

| No.                     | Information                                                                   |          |          |          |          |
|-------------------------|-------------------------------------------------------------------------------|----------|----------|----------|----------|
| 5238                    | Frequency protection: f3 TRIP (f3 TRIP)                                       | 0        | 0        | 1        | 1        |
|                         | O/U FREQ. f3 (P3621) = ON and f3 PICKUP (P3622/3623) < Rated Frequency (P230) | 0        | 1        | 0        | 1        |
| <b>PTUF3.Op.general</b> |                                                                               | <b>0</b> | <b>0</b> | <b>0</b> | <b>1</b> |

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

### 3.12.4 Underfrequency protection FQS stage f4 (PTUF4)

#### PTUF4.Mod

| No.                    | Information                                                                   |          |          |          |          |          |          |
|------------------------|-------------------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|
| 5212                   | Frequency protection is BLOCKED (Freq. BLOCKED)                               | x        | x        | 0        | 1        | x        | x        |
| 5209                   | >BLOCK frequency protection stage f4 (>BLOCK f4)                              | x        | x        | 0        | x        | 1        | x        |
| 5215                   | Frequency protection undervoltage Blk (Freq UnderV Blk)                       | x        | x        | 0        | x        | x        | 1        |
|                        | O/U FREQ. f4 ON (P3631) and f4 PICKUP (P3632/3633) < Rated Frequency (P230)   | x        | 0        | 1        | 1        | 1        | 1        |
|                        | O/U FREQ. f4 (P3631) = OFF or f4 PICKUP (P3632/3633) = Rated Frequency (P230) | 1        | 0        | 0        | 0        | 0        | 0        |
| <b>PTUF4.Mod.stVal</b> |                                                                               | <b>5</b> | <b>5</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> |

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

#### PTUF4.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>PTUF4.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

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

**PTUF4.Str**

| No.                      | Information                                                                  |          |          |          |          |
|--------------------------|------------------------------------------------------------------------------|----------|----------|----------|----------|
| 5235                     | Frequency protection: f4 picked up (f4 picked up)                            | 0        | 0        | 1        | 1        |
|                          | O/U FREQ. f4 (P3631)= ON and f4 PICKUP (P3632/3633) < Rated Frequency (P230) | 0        | 1        | 0        | 1        |
| <b>PTUF4.Str.general</b> |                                                                              | <b>0</b> | <b>0</b> | <b>0</b> | <b>1</b> |

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

**PTUF4.Op**

| No.                     | Information                                                                   |          |          |          |          |
|-------------------------|-------------------------------------------------------------------------------|----------|----------|----------|----------|
| 5239                    | Frequency protection: f4 TRIP (f4 TRIP)                                       | 0        | 0        | 1        | 1        |
|                         | O/U FREQ. f4 (P3631) = ON and f4 PICKUP (P3632/3633) < Rated Frequency (P230) | 0        | 1        | 0        | 1        |
| <b>PTUF4.Op.general</b> |                                                                               | <b>0</b> | <b>0</b> | <b>0</b> | <b>1</b> |

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

### 3.12.5 Overfrequency protection FQS stage f1 (PTOF1)

#### PTOF1.Mod

| No.                    | Information                                                                   |          |          |          |          |          |          |
|------------------------|-------------------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|
| 5212                   | Frequency protection is BLOCKED (Freq. BLOCKED)                               | x        | x        | 0        | 1        | x        | x        |
| 5206                   | >BLOCK frequency protection stage f1 (>BLOCK f1)                              | x        | x        | 0        | x        | 1        | x        |
| 5215                   | Frequency protection undervoltage Blk (Freq UnderV Blk)                       | x        | x        | 0        | x        | x        | 1        |
|                        | O/U FREQ. f1 (P3601) = ON and f1 PICKUP (P3602/3603) < Rated Frequency (P230) | x        | 1        | 0        | 0        | 0        | 0        |
|                        | O/U FREQ. f1 (P3601) = OFF or f1 PICKUP (P3602/3603) = Rated Frequency (P230) | 1        | 0        | 0        | 0        | 0        | 0        |
| <b>PTOF1.Mod.stVal</b> |                                                                               | <b>5</b> | <b>5</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> |

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

#### PTOF1.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>PTOF1.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

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





### 3.12.6 Overfrequency protection FQS stage f2 (PTOF2)

#### PTOF2.Mod

| No.                    | Information                                                                   |          |          |          |          |          |          |
|------------------------|-------------------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|
| 5212                   | Frequency protection is BLOCKED (Freq. BLOCKED)                               | x        | x        | 0        | 1        | x        | x        |
| 5207                   | >BLOCK frequency protection stage f2 (>BLOCK f2)                              | x        | x        | 0        | x        | 1        | x        |
| 5215                   | Frequency protection undervoltage Blk (Freq UnderV Blk)                       | x        | x        | 0        | x        | x        | 1        |
|                        | O/U FREQ. f2 (P3611) = ON and f2 PICKUP (P3612/3613) < Rated Frequency (P230) | x        | 1        | 0        | 0        | 0        | 0        |
|                        | O/U FREQ. f2 (P3611) = OFF or f2 PICKUP (P3612/3613) = Rated Frequency (P230) | 1        | 0        | 0        | 0        | 0        | 0        |
| <b>PTOF2.Mod.stVal</b> |                                                                               | <b>5</b> | <b>5</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> |

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

#### PTOF2.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>PTOF2.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

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



### 3.12.7 Overfrequency protection FQS stage f3 (PTOF3)

#### PTOF3.Mod

| No.                    | Information                                                                   |          |          |          |          |          |          |
|------------------------|-------------------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|
| 5212                   | Frequency protection is BLOCKED (Freq. BLOCKED)                               | x        | x        | 0        | 1        | x        | x        |
| 5208                   | >BLOCK frequency protection stage f3 (>BLOCK f3)                              | x        | x        | 0        | x        | 1        | x        |
| 5215                   | Frequency protection undervoltage Blk (Freq UnderV Blk)                       | x        | x        | 0        | x        | x        | 1        |
|                        | O/U FREQ. f3 (P3621) = ON and f3 PICKUP (P3622/3623) < Rated Frequency (P230) | x        | 1        | 0        | 0        | 0        | 0        |
|                        | O/U FREQ. f3 (P3621)= OFF or f3 PICKUP (P3622/3623) = Rated Frequency (P230)  | 1        | 0        | 0        | 0        | 0        | 0        |
| <b>PTOF3.Mod.stVal</b> |                                                                               | <b>5</b> | <b>5</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> |

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

#### PTOF3.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>PTOF3.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

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

**PTOF3.Str**

| No.                      | Information                                                                   |          |          |          |          |
|--------------------------|-------------------------------------------------------------------------------|----------|----------|----------|----------|
| 5234                     | Frequency protection: f3 picked up (f3 picked up)                             | 0        | 0        | 1        | 1        |
|                          | O/U FREQ. f3 (P3621) = ON and f3 PICKUP (P3622/3623) > Rated Frequency (P230) | 1        | 0        | 1        | 0        |
| <b>PTOF3.Str.general</b> |                                                                               | <b>0</b> | <b>0</b> | <b>1</b> | <b>0</b> |

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

**PTOF3.Op**

| No.                     | Information                                                                   |          |          |          |          |
|-------------------------|-------------------------------------------------------------------------------|----------|----------|----------|----------|
| 5238                    | Frequency protection: f3 TRIP (f3 TRIP)                                       | 0        | 0        | 1        | 1        |
|                         | O/U FREQ. f3 (P3621) = ON and f3 PICKUP (P3622/3623) > Rated Frequency (P230) | 1        | 0        | 1        | 0        |
| <b>PTOF3.Op.general</b> |                                                                               | <b>0</b> | <b>0</b> | <b>1</b> | <b>0</b> |

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

### 3.12.8 Overfrequency protection FQS stage f4 (PTOF4)

#### PTOF4.Mod

| No.                    | Information                                                                   |          |          |          |          |          |          |
|------------------------|-------------------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|
| 5212                   | Frequency protection is BLOCKED (Freq. BLOCKED)                               | x        | x        | 0        | 1        | x        | x        |
| 5209                   | >BLOCK frequency protection stage f4 (>BLOCK f4)                              | x        | x        | 0        | x        | 1        | x        |
| 5215                   | Frequency protection undervoltage Blk (Freq UnderV Blk)                       | x        | x        | 0        | x        | x        | 1        |
|                        | O/U FREQ. f4 (P3631) = ON and f4 PICKUP (P3632/3633) < Rated Frequency (P230) | x        | 1        | 0        | 0        | 0        | 0        |
|                        | O/U FREQ. f4 (P3631) = OFF or f4 PICKUP (P3632/3633) = Rated Frequency (P230) | 1        | 0        | 0        | 0        | 0        | 0        |
| <b>PTOF4.Mod.stVal</b> |                                                                               | <b>5</b> | <b>5</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> |

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

#### PTOF4.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>PTOF4.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

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

**PTOF4.Str**

| No.                      | Information                                                                   |          |          |          |          |
|--------------------------|-------------------------------------------------------------------------------|----------|----------|----------|----------|
| 5235                     | Frequency protection: f4 picked up (f4 picked up)                             | 0        | 0        | 1        | 1        |
|                          | O/U FREQ. f4 (P3631) = ON and f4 PICKUP (P3632/3633) > Rated Frequency (P230) | 1        | 0        | 1        | 0        |
| <b>PTOF4.Str.general</b> |                                                                               | <b>0</b> | <b>0</b> | <b>1</b> | <b>0</b> |

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

**PTOF4.Op**

| No.                     | Information                                                                   |          |          |          |          |
|-------------------------|-------------------------------------------------------------------------------|----------|----------|----------|----------|
| 5239                    | Frequency protection: f4 TRIP (f4 TRIP)                                       | 0        | 0        | 1        | 1        |
|                         | O/U FREQ. f4 (P3631) = ON and f4 PICKUP (P3632/3633) > Rated Frequency (P230) | 1        | 0        | 1        | 0        |
| <b>PTOF4.Op.general</b> |                                                                               | <b>0</b> | <b>0</b> | <b>1</b> | <b>0</b> |

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





**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<br>or<br>1122 | Flt Locator: Distance to fault (dist =) | RFLO1.FltDiskm.mag.f            | Measured value | Absolute value |
|                    |                                         | RFLO1.FltDiskm.units.SIUnit     | 2              | Meter or miles |
|                    |                                         | 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              |

## 3.14 Circuit breaker failure protection (RBRF1)

### RBRF1.Mod

| No.                    | Information                                   |          |          |          |          |
|------------------------|-----------------------------------------------|----------|----------|----------|----------|
| 1452                   | Breaker failure is BLOCKED (BkrFail BLOCK)    | 0        | 0        | 1        | 1        |
| 1451                   | Breaker failure is switched OFF (BkrFail OFF) | 0        | 1        | 0        | 1        |
| <b>RBRF1.Mod.stVal</b> |                                               | <b>1</b> | <b>5</b> | <b>2</b> | <b>5</b> |

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        |
| <b>RBRF1.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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

### RBRF1.Str

| No.                      | Information                                   |          |          |
|--------------------------|-----------------------------------------------|----------|----------|
| 1461                     | Breaker failure protection started (BF Start) | 0        | 1        |
| <b>RBRF1.Str.general</b> |                                               | <b>0</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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

### RBRF1.OpEx

| No.                       | Information                                |          |          |
|---------------------------|--------------------------------------------|----------|----------|
| 1494                      | BF Trip T2 (busbar trip) (BF T2-TRIP(bus)) | 0        | 1        |
| <b>RBRF1.OpEx.general</b> |                                            | <b>0</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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



## 3.15 Thermal overload protection (PTTR1)

### PTTR1.Mod

| No.                    | Information                                           |          |          |          |          |
|------------------------|-------------------------------------------------------|----------|----------|----------|----------|
| 1513                   | Thermal Overload Protection ACTIVE (Th.O/L ACTIVE)    | x        | 0        | 1        | 1        |
| 1512                   | Thermal Overload Protection BLOCKED (Th.Overload BLK) | x        | x        | 0        | 1        |
| 1511                   | Thermal Overload Protection OFF (Th.Overload OFF)     | 1        | 0        | 0        | 0        |
| <b>PTTR1.Mod.stVal</b> |                                                       | <b>5</b> | <b>5</b> | <b>1</b> | <b>2</b> |

device annunciation: 1 - ON  
0 - OFF

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

### PTTR1.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>PTTR1.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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

### PTTR1.Str

| No.                      | Information                                     |          |          |
|--------------------------|-------------------------------------------------|----------|----------|
| 1517                     | Th. Overload Pickup before trip (Th.O/L Pickup) | 0        | 1        |
| <b>PTTR1.Str.general</b> |                                                 | <b>0</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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

### PTTR1.Op

| No.                     | Information                             |          |          |
|-------------------------|-----------------------------------------|----------|----------|
| 1521                    | Th. Overload TRIP command (Th.O/L TRIP) | 0        | 1        |
| <b>PTTR1.Op.general</b> |                                         | <b>0</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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

**PTTR1.AlmThm**

| No.                         | Information                                            |          |          |
|-----------------------------|--------------------------------------------------------|----------|----------|
| 1516                        | Th. Overload Alarm: Near Thermal Trip (Th.O/L ⊖ Alarm) | 0        | 1        |
| <b>PTTR1.AlmThm.general</b> |                                                        | <b>0</b> | <b>1</b> |

device annunciation:

1 - ON  
0 - OFF

IEC Status AlmThm.general:

0 - FALSE  
1 - TRUE

## 3.16 Single-pole / threepole tripping Circuit Breaker (XCBRx)

### 3.16.1 Threepole tripping (XCBR1)

#### XCBR1.Mod

| No.                    | Information                                         |          |          |
|------------------------|-----------------------------------------------------|----------|----------|
| 52                     | At Least 1 Protection Funct. is Active (ProtActive) | 1        | 0        |
| <b>XCBR1.Mod.stVal</b> |                                                     | <b>1</b> | <b>5</b> |

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        |
| <b>XCBR1.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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

#### XCBR1.Loc

| No.                    | Information                 |          |          |
|------------------------|-----------------------------|----------|----------|
| 55                     | Reset Device (Reset Device) | 1        | 0        |
| <b>XCBR1.Loc.stVal</b> |                             | <b>1</b> | <b>0</b> |

device annunciation: 1 - ON  
0 - OFF

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

#### XCBR1.OpCnt

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

**XCBr1.Pos**

| No.                                             | Information                                    |           |           |           |           |
|-------------------------------------------------|------------------------------------------------|-----------|-----------|-----------|-----------|
| 4601                                            | >52-a contact (OPEN, if bkr is open) (>52-a)   | 0         | 1         | 0         | 1         |
| 4602                                            | >52-b contact (OPEN, if bkr is closed) (>52-b) | 0         | 0         | 1         | 1         |
| <b>XCBr1.Pos.stVal - if spontan information</b> |                                                | <b>11</b> | <b>01</b> | <b>10</b> | <b>11</b> |
| <b>XCBr1.Pos.stVal - if command is running</b>  |                                                | <b>00</b> | <b>01</b> | <b>10</b> | <b>00</b> |

device annunciation: 1 - ON IEC Status Pos.stVal: 00 - INTERMEDIATE STATE  
 0 - OFF 01 - OFF  
 10 - ON  
 11 - BAD STATE

**XCBr1.BlkOpn**

| No.                       | Information                 |          |          |
|---------------------------|-----------------------------|----------|----------|
| 55                        | Reset Device (Reset Device) | 1        | 0        |
| <b>XCBr1.BlkOpn.stVal</b> |                             | <b>0</b> | <b>1</b> |

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

**XCBr1.BlkCls**

| No.                       | Information                 |          |          |
|---------------------------|-----------------------------|----------|----------|
| 55                        | Reset Device (Reset Device) | 1        | 0        |
| <b>XCBr1.BlkCls.stVal</b> |                             | <b>0</b> | <b>1</b> |

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

**XCBr1.CirSpv**

| No.                       | Information                            |          |          |
|---------------------------|----------------------------------------|----------|----------|
| 6865                      | Failure Trip Circuit (FAIL: Trip cir.) | 0        | 1        |
| <b>XCBr1.CirSpv.stVal</b> |                                        | <b>0</b> | <b>1</b> |

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

**XCBR1.SumSwARs1**

| No.  | Information                                               | Value                            |               |                                                                            |
|------|-----------------------------------------------------------|----------------------------------|---------------|----------------------------------------------------------------------------|
| 1027 | Accumulation of interrupted current L1 ( $\Sigma IL1 =$ ) | XCBR1.SumSwARs1.actVal           | Metered value | Current value of accumulated interrupted current = actVal $\times$ pulsQty |
|      |                                                           | XCBR1.SumSwARs1.units.SIUnit     | 5             | A (Ampere)                                                                 |
|      |                                                           | XCBR1.SumSwARs1.units.multiplier | 3             | Kilo                                                                       |
|      |                                                           | XCBR1.SumSwARs1.pulsQty          | 1.000000e-002 | A / Metered value                                                          |

**XCBR1.SumSwARs2**

| No.  | Information                                               | Value                            |               |                                                                            |
|------|-----------------------------------------------------------|----------------------------------|---------------|----------------------------------------------------------------------------|
| 1028 | Accumulation of interrupted current L2 ( $\Sigma IL2 =$ ) | XCBR1.SumSwARs2.actVal           | Metered value | Current value of accumulated interrupted current = actVal $\times$ pulsQty |
|      |                                                           | XCBR1.SumSwARs2.units.SIUnit     | 5             | A (Ampere)                                                                 |
|      |                                                           | XCBR1.SumSwARs2.units.multiplier | 3             | Kilo                                                                       |
|      |                                                           | XCBR1.SumSwARs2.pulsQty          | 1.000000e-002 | A / Metered value                                                          |

**XCBR1.SumSwARs3**

| No.  | Information                                               | Value                            |               |                                                                            |
|------|-----------------------------------------------------------|----------------------------------|---------------|----------------------------------------------------------------------------|
| 1029 | Accumulation of interrupted current L3 ( $\Sigma IL3 =$ ) | XCBR1.SumSwARs3.actVal           | Metered value | Current value of accumulated interrupted current = actVal $\times$ pulsQty |
|      |                                                           | XCBR1.SumSwARs3.units.SIUnit     | 5             | A (Ampere)                                                                 |
|      |                                                           | XCBR1.SumSwARs3.units.multiplier | 3             | Kilo                                                                       |
|      |                                                           | XCBR1.SumSwARs3.pulsQty          | 1.000000e-002 | A / Metered value                                                          |







**XCBR2.SumSwARs**

| No.  | Information                                               | Value                           |               |                                                                     |
|------|-----------------------------------------------------------|---------------------------------|---------------|---------------------------------------------------------------------|
| 1027 | Accumulation of interrupted current L1 ( $\Sigma IL1 =$ ) | XCBR2.SumSwARs.actVal           | Metered value | Current value of accumulated interrupted current = actVal × pulsQty |
|      |                                                           | XCBR2.SumSwARs.units.SIUnit     | 5             | A (Ampere)                                                          |
|      |                                                           | XCBR2.SumSwARs.units.multiplier | 3             | Kilo                                                                |
|      |                                                           | XCBR2.SumSwARs.pulsQty          | 1.000000e-002 | A / Metered value                                                   |

**XCBR3.Mod**

| No.                    | Information                                         |          |          |
|------------------------|-----------------------------------------------------|----------|----------|
| 52                     | At Least 1 Protection Funct. is Active (ProtActive) | 1        | 0        |
| <b>XCBR3.Mod.stVal</b> |                                                     | <b>1</b> | <b>5</b> |

device annunciation: 1 - ON  
0 - OFF

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

**XCBR3.Health**

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>XCBR3.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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

**XCBR3.Loc**

| No.                    | Information                 |          |          |
|------------------------|-----------------------------|----------|----------|
| 55                     | Reset Device (Reset Device) | 1        | 0        |
| <b>XCBR3.Loc.stVal</b> |                             | <b>1</b> | <b>0</b> |

device annunciation: 1 - ON  
0 - OFF

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

## 3.16 Single-pole / threepole tripping Circuit Breaker (XCBRx)

**XCBR3.OpCnt**

| No.  | Information                                     | Value             |               |                |
|------|-------------------------------------------------|-------------------|---------------|----------------|
| 1002 | Number of breaker TRIP commands L2 (TripNo L2=) | XCBR3.OpCnt.stVal | Metered value | Absolute value |

**XCBR3.Pos**

| No.                    | Information                                          |           |           |
|------------------------|------------------------------------------------------|-----------|-----------|
| 352                    | >Circuit breaker aux. contact: Pole L2 (>CB Aux. L2) | 0         | 1         |
| <b>XCBR3.Pos.stVal</b> |                                                      | <b>01</b> | <b>10</b> |

device annunciation: 1 - ON IEC Status Pos.stVal: 00 - INTERMEDIATE STATE  
0 - OFF 01 - OFF  
10 - ON  
11 - BAD STATE

**XCBR3.BlkOpn**

| No.                       | Information                 |          |          |
|---------------------------|-----------------------------|----------|----------|
| 55                        | Reset Device (Reset Device) | 1        | 0        |
| <b>XCBR3.BlkOpn.stVal</b> |                             | <b>0</b> | <b>1</b> |

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

**XCBR3.BlkCls**

| No.                       | Information                 |          |          |
|---------------------------|-----------------------------|----------|----------|
| 55                        | Reset Device (Reset Device) | 1        | 0        |
| <b>XCBR3.BlkCls.stVal</b> |                             | <b>0</b> | <b>1</b> |

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

**XCBR3.CirSpv**

| No.                       | Information                            |          |          |
|---------------------------|----------------------------------------|----------|----------|
| 6865                      | Failure Trip Circuit (FAIL: Trip cir.) | 0        | 1        |
| <b>XCBR3.CirSpv.stVal</b> |                                        | <b>0</b> | <b>1</b> |

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

**XCBR3.SumSwARs**

| No.  | Information                                               | Value                           |               |                                                                     |
|------|-----------------------------------------------------------|---------------------------------|---------------|---------------------------------------------------------------------|
| 1028 | Accumulation of interrupted current L2 ( $\Sigma IL2 =$ ) | XCBR3.SumSwARs.actVal           | Metered value | Current value of accumulated interrupted current = actVal × pulsQty |
|      |                                                           | XCBR3.SumSwARs.units.SIUnit     | 5             | A (Ampere)                                                          |
|      |                                                           | XCBR3.SumSwARs.units.multiplier | 3             | Kilo                                                                |
|      |                                                           | XCBR3.SumSwARs.pulsQty          | 1.000000e-002 | A / Metered value                                                   |

**XCBR4.Mod**

| No.                    | Information                                         |          |          |
|------------------------|-----------------------------------------------------|----------|----------|
| 52                     | At Least 1 Protection Funct. is Active (ProtActive) | 1        | 0        |
| <b>XCBR4.Mod.stVal</b> |                                                     | <b>1</b> | <b>5</b> |

device annunciation: 1 - ON  
0 - OFF

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

**XCBR4.Health**

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>XCBR4.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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

**XCBR4.Loc**

| No.                    | Information                 |          |          |
|------------------------|-----------------------------|----------|----------|
| 55                     | Reset Device (Reset Device) | 1        | 0        |
| <b>XCBR4.Loc.stVal</b> |                             | <b>1</b> | <b>0</b> |

device annunciation: 1 - ON  
0 - OFF

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

**XCBR4.OpCnt**

| No.  | Information                                     | Value             |               |                |
|------|-------------------------------------------------|-------------------|---------------|----------------|
| 1003 | Number of breaker TRIP commands L3 (TripNo L3=) | XCBR4.OpCnt.stVal | Metered value | Absolute value |

**XCBR4.Pos**

| No.                    | Information                                          |           |           |
|------------------------|------------------------------------------------------|-----------|-----------|
| 353                    | >Circuit breaker aux. contact: Pole L3 (>CB Aux. L3) | 0         | 1         |
| <b>XCBR4.Pos.stVal</b> |                                                      | <b>01</b> | <b>10</b> |

device annunciation: 1 - ON      IEC Status Pos.stVal: 00 - INTERMEDIATE STATE  
0 - OFF      01 - OFF  
10 - ON  
11 - BAD STATE

**XCBR4.BlkOpn**

| No.                       | Information                 |          |          |
|---------------------------|-----------------------------|----------|----------|
| 55                        | Reset Device (Reset Device) | 1        | 0        |
| <b>XCBR4.BlkOpn.stVal</b> |                             | <b>0</b> | <b>1</b> |

device annunciation: 1 - ON      IEC Status BlkOpn.stval: 0 - FALSE  
0 - OFF      1 - TRUE

**XCBR4.BlkCls**

| No.                       | Information                 |          |          |
|---------------------------|-----------------------------|----------|----------|
| 55                        | Reset Device (Reset Device) | 1        | 0        |
| <b>XCBR4.BlkCls.stVal</b> |                             | <b>0</b> | <b>1</b> |

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

**XCBR4.CirSpv**

| No.                       | Information                            |          |          |
|---------------------------|----------------------------------------|----------|----------|
| 6865                      | Failure Trip Circuit (FAIL: Trip cir.) | 0        | 1        |
| <b>XCBR4.CirSpv.stVal</b> |                                        | <b>0</b> | <b>1</b> |

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

**XCBR4.SumSwARs**

| No.  | Information                                                  | Value                           |               |                                                                            |
|------|--------------------------------------------------------------|---------------------------------|---------------|----------------------------------------------------------------------------|
| 1029 | Accumulation of interrupted current L3 ( $\Sigma I_{L3} =$ ) | XCBR4.SumSwARs.actVal           | Metered value | Current value of accumulated interrupted current = actVal $\times$ pulsQty |
|      |                                                              | XCBR4.SumSwARs.units.SIUnit     | 5             | A (Ampere)                                                                 |
|      |                                                              | XCBR4.SumSwARs.units.multiplier | 3             | Kilo                                                                       |
|      |                                                              | XCBR4.SumSwARs.pulsQty          | 1.000000e-002 | A / Metered value                                                          |







## 3.17 Tripping Logic of the Entire Device (PTRC1)

**PTRC1.Str.neut**

| No.                   | Information                         |          |          |
|-----------------------|-------------------------------------|----------|----------|
| 506                   | Relay PICKUP Earth (Relay PICKUP E) | 0        | 1        |
| <b>PTRC1.Str.neut</b> |                                     | <b>0</b> | <b>1</b> |

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

**PTRC1.Tr.dirGeneral**

| No.                        | Information                                 |          |          |          |          |          |
|----------------------------|---------------------------------------------|----------|----------|----------|----------|----------|
| 501                        | Relay PICKUP (Relay PICKUP)                 | 0        | 1        | x        | x        | x        |
| 507                        | Relay TRIP command Phase L1 (Relay TRIP L1) | 0        | x        | 1        | x        | x        |
| 508                        | Relay TRIP command Phase L2 (Relay TRIP L2) | 0        | x        | x        | 1        | x        |
| 509                        | Relay TRIP command Phase L3 (Relay TRIP L3) | 0        | x        | x        | x        | 1        |
| <b>PTRC1.Tr.dirGeneral</b> |                                             | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> |

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

**PTRC1.Tr.phsA**

| No.                  | Information                                 |          |          |
|----------------------|---------------------------------------------|----------|----------|
| 507                  | Relay TRIP command Phase L1 (Relay TRIP L1) | 0        | 1        |
| <b>PTRC1.Tr.phsA</b> |                                             | <b>0</b> | <b>1</b> |

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

**PTRC1.Tr.phsB**

| No.                  | Information                                 |          |          |
|----------------------|---------------------------------------------|----------|----------|
| 508                  | Relay TRIP command Phase L2 (Relay TRIP L2) | 0        | 1        |
| <b>PTRC1.Tr.phsB</b> |                                             | <b>0</b> | <b>1</b> |

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



### 3.18 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        |
| <b>LPHD1.DevStr.stVal</b> |                                         | <b>T</b> | <b>2</b> | <b>1</b> | <b>T</b> |

device annunciation: 1 - ON IEC Status DevStr.stVal: 1 - Initial Start  
 0 - OFF 2 - Resume  
 x - irrelevant T - toggle between 1 and 2

#### LPHD1.PhyHealth

| No.                          | Information                                      |          |          |
|------------------------------|--------------------------------------------------|----------|----------|
| 51                           | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>LPHD1.PhyHealth.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

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

#### LPHD1.Proxy

| No.                      | Information                 |          |          |
|--------------------------|-----------------------------|----------|----------|
| 55                       | Reset Device (Reset Device) | 0        | 1        |
| <b>LPHD1.Proxy.stVal</b> |                             | <b>1</b> | <b>0</b> |

device annunciation: 1 - ON IEC Status Proxy.stVal: 0 - DEVICE is not a PROXY  
 0 - OFF 1 - DEVICE is a PROXY

### 3.18.1 Alarm-, Warn- and Group alarms (CALH1)

#### CALH1.Mod

| No.                    | Information                 |          |          |
|------------------------|-----------------------------|----------|----------|
| 55                     | Reset Device (Reset Device) | 1        | 0        |
| <b>CALH1.Mod.stVal</b> |                             | <b>1</b> | <b>5</b> |

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        |
| <b>CALH1.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

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        |
| <b>CALH1.GrAlm.stVal</b> |                                              | <b>1</b> | <b>0</b> |

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        |
| <b>CALH1.GrWrn.stVal</b> |                                       | <b>1</b> | <b>0</b> |

device annunciation: 1 - ON  
0 - OFF

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

The LN CALH1.ErrBoard1 to CALH1.ErrBoard7 are available  
 SIPROTEC 7SA with Firmware V04.65 and higher  
 SIPROTEC 7SD with Firmware V04.61 and higher  
 SIPROTEC 7VK with Firmware V04.60 and higher.

**CALH1.ErrBoard1**

| No.                          | Information                   |          |          |
|------------------------------|-------------------------------|----------|----------|
| 183                          | Error Board 1 (Error Board 1) | 1        | 0        |
| <b>CALH1.ErrBoard1.stVal</b> |                               | <b>1</b> | <b>0</b> |

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

**CALH1.ErrBoard2**

| No.                          | Information                   |          |          |
|------------------------------|-------------------------------|----------|----------|
| 184                          | Error Board 2 (Error Board 2) | 1        | 0        |
| <b>CALH1.ErrBoard2.stVal</b> |                               | <b>1</b> | <b>0</b> |

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

**CALH1.ErrBoard3**

| No.                          | Information                   |          |          |
|------------------------------|-------------------------------|----------|----------|
| 185                          | Error Board 3 (Error Board 3) | 1        | 0        |
| <b>CALH1.ErrBoard3.stVal</b> |                               | <b>1</b> | <b>0</b> |

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

**CALH1.ErrBoard4**

| No.                          | Information                   |          |          |
|------------------------------|-------------------------------|----------|----------|
| 186                          | Error Board 4 (Error Board 4) | 1        | 0        |
| <b>CALH1.ErrBoard4.stVal</b> |                               | <b>1</b> | <b>0</b> |

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







**MMXU1.TotW**

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

**MMXU1.TotVAr**

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

**MMXU1.TotVA**

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

**MMXU1.TotPF**

| No. | Information                                 | Value                        |                |                |
|-----|---------------------------------------------|------------------------------|----------------|----------------|
| 643 | cos PHI (Power factor)<br>( $\cos \phi =$ ) | MMXU1.TotPF.mag.f            | Measured value | Absolute value |
|     |                                             | MMXU1.TotPF.units.SIUnit     | 1              | NONE           |
|     |                                             | MMXU1.TotPF.units.multiplier | 0              | 1              |

**MMXU1.Hz**

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

**MMXU1.A**

| No. | Information  | Value                         |                |                |
|-----|--------------|-------------------------------|----------------|----------------|
| 601 | I L1 (IL1 =) | 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 | I L2 (IL2 =) | 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 | I L3 (IL3 =) | 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 | U L12 (UL12=) | 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 | U L23 (UL23=) | 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 | U L31 (UL31=) | 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 | U L1-E (UL1E=) | 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 | U L2-E (UL2E=) | 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 | U L3-E (UL3E=) | 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 | Uen (Uen =) | 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           |



**MMXU2.A**

| No.  | Information                                      | Value                         |                |                  |
|------|--------------------------------------------------|-------------------------------|----------------|------------------|
| 7762 | IL1(% of Operational nominal current) (IL1_opN=) | MMXU2.A.phsA.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU2.A.phsA.units.SIUnit     | 1              | NONE             |
|      |                                                  | MMXU2.A.phsA.units.multiplier | 0              | 1                |
| 7763 | Angle IL1_rem <-> IL1_loc (ϕI L1=)               | MMXU2.A.phsA.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                         |                |                  |
|------|--------------------------------------------------|-------------------------------|----------------|------------------|
| 7764 | IL2(% of Operational nominal current) (IL2_opN=) | MMXU2.A.phsB.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU2.A.phsB.units.SIUnit     | 1              | NONE             |
|      |                                                  | MMXU2.A.phsB.units.multiplier | 0              | 1                |
| 7765 | Angle IL2_rem <-> IL2_loc (ϕI L2=)               | MMXU2.A.phsB.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                         |                |                  |
|------|--------------------------------------------------|-------------------------------|----------------|------------------|
| 7766 | IL3(% of Operational nominal current) (IL3_opN=) | MMXU2.A.phsC.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU2.A.phsC.units.SIUnit     | 1              | NONE             |
|      |                                                  | MMXU2.A.phsC.units.multiplier | 0              | 1                |
| 7767 | Angle IL3_rem <-> IL3_loc (ϕI L3=)               | MMXU2.A.phsC.cVal.ang.f       | Measured value | Phase angle in ° |

**MMXU2.PhV**

| No.  | Information                                      | Value                            |                |                  |
|------|--------------------------------------------------|----------------------------------|----------------|------------------|
| 7769 | UL1(% of Operational nominal voltage) (UL1_opN=) | MMXU2.PhV.phsA.cVal.mag.f        | Measured value | Absolute value   |
|      |                                                  | MMXU2. PhV.phsA.units.SIUnit     | 29             | V (Volt)         |
|      |                                                  | MMXU2. PhV.phsA.units.multiplier | 3              | Kilo             |
| 7770 | Angle UL1_rem <-> UL1_loc (ΦU L1=)               | MMXU2. PhV.phsA.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                            |                |                  |
|------|--------------------------------------------------|----------------------------------|----------------|------------------|
| 7771 | UL2(% of Operational nominal voltage) (UL2_opN=) | MMXU2.PhV.phsB.cVal.mag.f        | Measured value | Absolute value   |
|      |                                                  | MMXU2. PhV.phsB.units.SIUnit     | 29             | V (Volt)         |
|      |                                                  | MMXU2. PhV.phsB.units.multiplier | 3              | Kilo             |
| 7772 | Angle UL2_rem <-> UL2_loc (ΦU L2=)               | MMXU2. PhV.phsB.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                            |                |                  |
|------|--------------------------------------------------|----------------------------------|----------------|------------------|
| 7773 | UL3(% of Operational nominal voltage) (UL3_opN=) | MMXU2.PhV.phsC.cVal.mag.f        | Measured value | Absolute value   |
|      |                                                  | MMXU2. PhV.phsC.units.SIUnit     | 29             | V (Volt)         |
|      |                                                  | MMXU2. PhV.phsC.units.multiplier | 3              | Kilo             |
| 7774 | Angle UL3_rem <-> UL3_loc (ΦU L3=)               | MMXU2. PhV.phsC.cVal.ang.f       | Measured value | Phase angle in ° |



**MMXU3.A**

| No.  | Information                                      | Value                         |                |                  |
|------|--------------------------------------------------|-------------------------------|----------------|------------------|
| 7782 | IL1(% of Operational nominal current) (IL1_opN=) | MMXU3.A.phsA.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU3.A.phsA.units.SIUnit     | 1              | NONE             |
|      |                                                  | MMXU3.A.phsA.units.multiplier | 0              | 1                |
| 7783 | Angle IL1_rem <-> IL1_loc (Φ1 L1=)               | MMXU3.A.phsA.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                         |                |                  |
|------|--------------------------------------------------|-------------------------------|----------------|------------------|
| 7784 | IL2(% of Operational nominal current) (IL2_opN=) | MMXU3.A.phsB.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU3.A.phsB.units.SIUnit     | 1              | NONE             |
|      |                                                  | MMXU3.A.phsB.units.multiplier | 0              | 1                |
| 7785 | Angle IL2_rem <-> IL2_loc (Φ1 L2=)               | MMXU3.A.phsB.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                         |                |                  |
|------|--------------------------------------------------|-------------------------------|----------------|------------------|
| 7786 | IL3(% of Operational nominal current) (IL3_opN=) | MMXU3.A.phsC.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU3.A.phsC.units.SIUnit     | 1              | NONE             |
|      |                                                  | MMXU3.A.phsC.units.multiplier | 0              | 1                |
| 7787 | Angle IL3_rem <-> IL3_loc (Φ1 L3=)               | MMXU3.A.phsC.cVal.ang.f       | Measured value | Phase angle in ° |



**MMXU3.PhV**

| No.  | Information                                      | Value                            |                |                  |
|------|--------------------------------------------------|----------------------------------|----------------|------------------|
| 7789 | UL1(% of Operational nominal voltage) (UL1_opN=) | MMXU3.PhV.phsA.cVal.mag.f        | Measured value | Absolute value   |
|      |                                                  | MMXU3. PhV.phsA.units.SIUnit     | 29             | V (Volt)         |
|      |                                                  | MMXU3. PhV.phsA.units.multiplier | 3              | Kilo             |
| 7790 | Angle UL1_rem <-> UL1_loc (φU L1=)               | MMXU3. PhV.phsA.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                            |                |                  |
|------|--------------------------------------------------|----------------------------------|----------------|------------------|
| 7791 | UL2(% of Operational nominal voltage) (UL2_opN=) | MMXU3.PhV.phsB.cVal.mag.f        | Measured value | Absolute value   |
|      |                                                  | MMXU3. PhV.phsB.units.SIUnit     | 29             | V (Volt)         |
|      |                                                  | MMXU3. PhV.phsB.units.multiplier | 3              | Kilo             |
| 7792 | Angle UL2_rem <-> UL2_loc (φU L2=)               | MMXU3. PhV.phsB.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                            |                |                  |
|------|--------------------------------------------------|----------------------------------|----------------|------------------|
| 7793 | UL3(% of Operational nominal voltage) (UL3_opN=) | MMXU3.PhV.phsC.cVal.mag.f        | Measured value | Absolute value   |
|      |                                                  | MMXU3. PhV.phsC.units.SIUnit     | 29             | V (Volt)         |
|      |                                                  | MMXU3. PhV.phsC.units.multiplier | 3              | Kilo             |
| 7794 | Angle UL3_rem <-> UL3_loc (φU L3=)               | MMXU3. PhV.phsC.cVal.ang.f       | Measured value | Phase angle in ° |

### 3.19.4 Remote measured values of relay 3 (MMXU4)

#### MMXU4.Mod

| No.                    | Information                         |          |          |
|------------------------|-------------------------------------|----------|----------|
| 3493                   | Relay 3 in Login state (Rel3 Login) | 0        | 1        |
| <b>MMXU4.Mod.stVal</b> |                                     | <b>5</b> | <b>1</b> |

|                      |                   |                       |                                                                  |
|----------------------|-------------------|-----------------------|------------------------------------------------------------------|
| device annunciation: | 1 - ON<br>0 - OFF | IEC Status Mod.stVal: | 1 - ON<br>2 - BLOCKED<br>3 - TEST<br>4 - TEST/BLOCKED<br>5 - OFF |
|----------------------|-------------------|-----------------------|------------------------------------------------------------------|

#### MMXU4.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>MMXU4.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

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

#### MMXU4.RelId

| No.  | Information                     | Value             |                |                |
|------|---------------------------------|-------------------|----------------|----------------|
| 7801 | Relay ID of 3. relay (Relay ID) | MMXU4.RelId.stVal | Parameter 4703 | Device address |

**MMXU4.A**

| No.  | Information                                      | Value                         |                |                  |
|------|--------------------------------------------------|-------------------------------|----------------|------------------|
| 7802 | IL1(% of Operational nominal current) (IL1_opN=) | MMXU4.A.phsA.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU4.A.phsA.units.SIUnit     | 1              | NONE             |
|      |                                                  | MMXU4.A.phsA.units.multiplier | 0              | 1                |
| 7803 | Angle IL1_rem <-> IL1_loc (ΦI L1=)               | MMXU4.A.phsA.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                         |                |                  |
|------|--------------------------------------------------|-------------------------------|----------------|------------------|
| 7804 | IL2(% of Operational nominal current) (IL2_opN=) | MMXU4.A.phsB.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU4.A.phsB.units.SIUnit     | 1              | NONE             |
|      |                                                  | MMXU4.A.phsB.units.multiplier | 0              | 1                |
| 7805 | Angle IL2_rem <-> IL2_loc (ΦI L2=)               | MMXU4.A.phsB.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                         |                |                  |
|------|--------------------------------------------------|-------------------------------|----------------|------------------|
| 7806 | IL3(% of Operational nominal current) (IL3_opN=) | MMXU4.A.phsC.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU4.A.phsC.units.SIUnit     | 1              | NONE             |
|      |                                                  | MMXU4.A.phsC.units.multiplier | 0              | 1                |
| 7807 | Angle IL3_rem <-> IL3_loc (ΦI L3=)               | MMXU4.A.phsC.cVal.ang.f       | Measured value | Phase angle in ° |

**MMXU4.PhV**

| No.  | Information                                      | Value                           |                |                  |
|------|--------------------------------------------------|---------------------------------|----------------|------------------|
| 7809 | UL1(% of Operational nominal voltage) (UL1_opN=) | MMXU4.PhV.phsA.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU4.PhV.phsA.units.SIUnit     | 29             | V (Volt)         |
|      |                                                  | MMXU4.PhV.phsA.units.multiplier | 3              | Kilo             |
| 7810 | Angle UL1_rem <-> UL1_loc (ΦU L1=)               | MMXU4.PhV.phsA.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                           |                |                  |
|------|--------------------------------------------------|---------------------------------|----------------|------------------|
| 7811 | UL2(% of Operational nominal voltage) (UL2_opN=) | MMXU4.PhV.phsB.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU4.PhV.phsB.units.SIUnit     | 29             | V (Volt)         |
|      |                                                  | MMXU4.PhV.phsB.units.multiplier | 3              | Kilo             |
| 7812 | Angle UL2_rem <-> UL2_loc (ΦU L2=)               | MMXU4.PhV.phsB.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                            |                |                  |
|------|--------------------------------------------------|----------------------------------|----------------|------------------|
| 7813 | UL3(% of Operational nominal voltage) (UL3_opN=) | MMXU4.PhV.phsC.cVal.mag.f        | Measured value | Absolute value   |
|      |                                                  | MMXU4.PhV.phsC.units.SIUnit      | 29             | V (Volt)         |
|      |                                                  | MMXU4. PhV.phsC.units.multiplier | 3              | Kilo             |
| 7814 | Angle UL3_rem <-> UL3_loc (ΦU L3=)               | MMXU4. PhV.phsC.cVal.ang.f       | Measured value | Phase angle in ° |



**MMXU5.A**

| No.  | Information                                      | Value                        |                |                  |
|------|--------------------------------------------------|------------------------------|----------------|------------------|
| 7822 | IL1(% of Operational nominal current) (IL1_opN=) | MMXU5A.phsA.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU5A.phsA.units.SIUnit     | 1              | NONE             |
|      |                                                  | MMXU5A.phsA.units.multiplier | 0              | 1                |
| 7823 | Angle IL1_rem <-> IL1_loc (Φ1 L1=)               | MMXU5A.phsA.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                        |                |                  |
|------|--------------------------------------------------|------------------------------|----------------|------------------|
| 7824 | IL2(% of Operational nominal current) (IL2_opN=) | MMXU5A.phsB.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU5A.phsB.units.SIUnit     | 1              | NONE             |
|      |                                                  | MMXU5A.phsB.units.multiplier | 0              | 1                |
| 7825 | Angle IL2_rem <-> IL2_loc (Φ1 L2=)               | MMXU5A.phsB.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                        |                |                  |
|------|--------------------------------------------------|------------------------------|----------------|------------------|
| 7826 | IL3(% of Operational nominal current) (IL3_opN=) | MMXU5A.phsC.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU5A.phsC.units.SIUnit     | 1              | NONE             |
|      |                                                  | MMXU5A.phsC.units.multiplier | 0              | 1                |
| 7827 | Angle IL3_rem <-> IL3_loc (Φ1 L3=)               | MMXU5A.phsC.cVal.ang.f       | Measured value | Phase angle in ° |

**MMXU5.PhV**

| No.  | Information                                      | Value                           |                |                  |
|------|--------------------------------------------------|---------------------------------|----------------|------------------|
| 7829 | UL1(% of Operational nominal voltage) (UL1_opN=) | MMXU5.PhV.phsA.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU5.PhV.phsA.units.SIUnit     | 29             | V (Volt)         |
|      |                                                  | MMXU5.PhV.phsA.units.multiplier | 3              | Kilo             |
| 7830 | Angle UL1_rem <-> UL1_loc (φU L1=)               | MMXU5.PhV.phsA.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                           |                |                  |
|------|--------------------------------------------------|---------------------------------|----------------|------------------|
| 7831 | UL2(% of Operational nominal voltage) (UL2_opN=) | MMXU5.PhV.phsB.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU5.PhV.phsB.units.SIUnit     | 29             | V (Volt)         |
|      |                                                  | MMXU5.PhV.phsB.units.multiplier | 3              | Kilo             |
| 7832 | Angle UL2_rem <-> UL2_loc (φU L2=)               | MMXU5.PhV.phsB.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                            |                |                  |
|------|--------------------------------------------------|----------------------------------|----------------|------------------|
| 7833 | UL3(% of Operational nominal voltage) (UL3_opN=) | MMXU5.PhV.phsC.cVal.mag.f        | Measured value | Absolute value   |
|      |                                                  | MMXU5.PhV.phsC.units.SIUnit      | 29             | V (Volt)         |
|      |                                                  | MMXU5. PhV.phsC.units.multiplier | 3              | Kilo             |
| 7834 | Angle UL3_rem <-> UL3_loc (φU L3=)               | MMXU5. PhV.phsC.cVal.ang.f       | Measured value | Phase angle in ° |





**MMXU6.A**

| No.  | Information                                      | Value                         |                |                  |
|------|--------------------------------------------------|-------------------------------|----------------|------------------|
| 7842 | IL1(% of Operational nominal current) (IL1_opN=) | MMXU6.A.phsA.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU6.A.phsA.units.SIUnit     | 1              | NONE             |
|      |                                                  | MMXU6.A.phsA.units.multiplier | 0              | 1                |
| 7843 | Angle IL1_rem <-> IL1_loc (ΦI L1=)               | MMXU6.A.phsA.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                         |                |                  |
|------|--------------------------------------------------|-------------------------------|----------------|------------------|
| 7844 | IL2(% of Operational nominal current) (IL2_opN=) | MMXU6.A.phsB.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU6.A.phsB.units.SIUnit     | 1              | NONE             |
|      |                                                  | MMXU6.A.phsB.units.multiplier | 0              | 1                |
| 7845 | Angle IL2_rem <-> IL2_loc (ΦI L2=)               | MMXU6.A.phsB.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                         |                |                  |
|------|--------------------------------------------------|-------------------------------|----------------|------------------|
| 7846 | IL3(% of Operational nominal current) (IL3_opN=) | MMXU6.A.phsC.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU6.A.phsC.units.SIUnit     | 1              | NONE             |
|      |                                                  | MMXU6.A.phsC.units.multiplier | 0              | 1                |
| 7847 | Angle IL3_rem <-> IL3_loc (ΦI L3=)               | MMXU6.A.phsC.cVal.ang.f       | Measured value | Phase angle in ° |

**MMXU6.PhV**

| No.  | Information                                      | Value                           |                |                  |
|------|--------------------------------------------------|---------------------------------|----------------|------------------|
| 7849 | UL1(% of Operational nominal voltage) (UL1_opN=) | MMXU6.PhV.phsA.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU6.PhV.phsA.units.SIUnit     | 29             | V (Volt)         |
|      |                                                  | MMXU6.PhV.phsA.units.multiplier | 3              | Kilo             |
| 7850 | Angle UL1_rem <-> UL1_loc (ΦU L1=)               | MMXU6.PhV.phsA.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                           |                |                  |
|------|--------------------------------------------------|---------------------------------|----------------|------------------|
| 7851 | UL2(% of Operational nominal voltage) (UL2_opN=) | MMXU6.PhV.phsB.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU6.PhV.phsB.units.SIUnit     | 29             | V (Volt)         |
|      |                                                  | MMXU6.PhV.phsB.units.multiplier | 3              | Kilo             |
| 7852 | Angle UL2_rem <-> UL2_loc (ΦU L2=)               | MMXU6.PhV.phsB.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                            |                |                  |
|------|--------------------------------------------------|----------------------------------|----------------|------------------|
| 7853 | UL3(% of Operational nominal voltage) (UL3_opN=) | MMXU6.PhV.phsC.cVal.mag.f        | Measured value | Absolute value   |
|      |                                                  | MMXU6.PhV.phsC.units.SIUnit      | 29             | V (Volt)         |
|      |                                                  | MMXU6. PhV.phsC.units.multiplier | 3              | Kilo             |
| 7854 | Angle UL3_rem <-> UL3_loc (ΦU L3=)               | MMXU6. PhV.phsC.cVal.ang.f       | Measured value | Phase angle in ° |



**MMXU7.A**

| No.  | Information                                      | Value                         |                |                  |
|------|--------------------------------------------------|-------------------------------|----------------|------------------|
| 7862 | IL1(% of Operational nominal current) (IL1_opN=) | MMXU7.A.phsA.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU7.A.phsA.units.SIUnit     | 1              | NONE             |
|      |                                                  | MMXU7.A.phsA.units.multiplier | 0              | 1                |
| 7863 | Angle IL1_rem <-> IL1_loc (Φ1 L1=)               | MMXU7.A.phsA.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                         |                |                  |
|------|--------------------------------------------------|-------------------------------|----------------|------------------|
| 7864 | IL2(% of Operational nominal current) (IL2_opN=) | MMXU7.A.phsB.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU7.A.phsB.units.SIUnit     | 1              | NONE             |
|      |                                                  | MMXU7.A.phsB.units.multiplier | 0              | 1                |
| 7865 | Angle IL2_rem <-> IL2_loc (Φ1 L2=)               | MMXU7.A.phsB.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                         |                |                  |
|------|--------------------------------------------------|-------------------------------|----------------|------------------|
| 7866 | IL3(% of Operational nominal current) (IL3_opN=) | MMXU7.A.phsC.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU7.A.phsC.units.SIUnit     | 1              | NONE             |
|      |                                                  | MMXU7.A.phsC.units.multiplier | 0              | 1                |
| 7867 | Angle IL3_rem <-> IL3_loc (Φ1 L3=)               | MMXU7.A.phsC.cVal.ang.f       | Measured value | Phase angle in ° |

**MMXU7.PhV**

| No.  | Information                                      | Value                           |                |                  |
|------|--------------------------------------------------|---------------------------------|----------------|------------------|
| 7869 | UL1(% of Operational nominal voltage) (UL1_opN=) | MMXU7.PhV.phsA.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU7.PhV.phsA.units.SIUnit     | 29             | V (Volt)         |
|      |                                                  | MMXU7.PhV.phsA.units.multiplier | 3              | Kilo             |
| 7870 | Angle UL1_rem <-> UL1_loc (φU L1=)               | MMXU7.PhV.phsA.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                           |                |                  |
|------|--------------------------------------------------|---------------------------------|----------------|------------------|
| 7871 | UL2(% of Operational nominal voltage) (UL2_opN=) | MMXU7.PhV.phsB.cVal.mag.f       | Measured value | Absolute value   |
|      |                                                  | MMXU7.PhV.phsB.units.SIUnit     | 29             | V (Volt)         |
|      |                                                  | MMXU7.PhV.phsB.units.multiplier | 3              | Kilo             |
| 7872 | Angle UL2_rem <-> UL2_loc (φU L2=)               | MMXU7.PhV.phsB.cVal.ang.f       | Measured value | Phase angle in ° |

| No.  | Information                                      | Value                            |                |                  |
|------|--------------------------------------------------|----------------------------------|----------------|------------------|
| 7873 | UL3(% of Operational nominal voltage) (UL3_opN=) | MMXU7.PhV.phsC.cVal.mag.f        | Measured value | Absolute value   |
|      |                                                  | MMXU7.PhV.phsC.units.SIUnit      | 29             | V (Volt)         |
|      |                                                  | MMXU7. PhV.phsC.units.multiplier | 3              | Kilo             |
| 7874 | Angle UL3_rem <-> UL3_loc (φU L3=)               | MMXU7. PhV.phsC.cVal.ang.f       | Measured value | Phase angle in ° |

### 3.19.8 Measured values, symmetrical components (MSQI1)

#### MSQI1.Mod

| No.                    | Information                                      |          |          |
|------------------------|--------------------------------------------------|----------|----------|
| 51                     | Device is Operational and Protecting (Device OK) | 1        | 0        |
| <b>MSQI1.Mod.stVal</b> |                                                  | <b>1</b> | <b>5</b> |

device annunciation: 1 - ON  
0 - OFF

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

#### MSQI1.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>MSQI1.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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

**MSQ11.SeqA**

| No. | Information                   | Value                          |                |                |
|-----|-------------------------------|--------------------------------|----------------|----------------|
| 619 | I1 (positive sequence) (I1 =) | MSQ11.SeqA.c1.cVal.mag.f       | Measured value | Absolute value |
|     |                               | MSQ11.SeqA.c1.units.SIUnit     | 5              | A (Ampere)     |
|     |                               | MSQ11.SeqA.c1.units.multiplier | 0              | 1              |

| No. | Information                   | Value                          |                |                |
|-----|-------------------------------|--------------------------------|----------------|----------------|
| 620 | I2 (negative sequence) (I2 =) | MSQ11.SeqA.c2.cVal.mag.f       | Measured value | Absolute value |
|     |                               | MSQ11.SeqA.c2.units.SIUnit     | 5              | A (Ampere)     |
|     |                               | MSQ11.SeqA.c2.units.multiplier | 0              | 1              |

| No. | Information                 | Value                          |                |                |
|-----|-----------------------------|--------------------------------|----------------|----------------|
| 610 | 3I0 (zero sequence) (3I0 =) | MSQ11.SeqA.c3.cVal.mag.f       | Measured value | Absolute value |
|     |                             | MSQ11.SeqA.c3.units.SIUnit     | 5              | A (Ampere)     |
|     |                             | MSQ11.SeqA.c3.units.multiplier | 0              | 1              |

**MSQ11.SeqV**

| No. | Information                   | Value                          |                |                |
|-----|-------------------------------|--------------------------------|----------------|----------------|
| 634 | U1 (positive sequence) (U1 =) | MSQ11.SeqV.c1.cVal.mag.f       | Measured value | Absolute value |
|     |                               | MSQ11.SeqV.c1.units.SIUnit     | 29             | V (Volt)       |
|     |                               | MSQ11.SeqV.c1.units.multiplier | 3              | Kilo           |

| No. | Information                   | Value                          |                |                |
|-----|-------------------------------|--------------------------------|----------------|----------------|
| 635 | U2 (negative sequence) (U2 =) | MSQ11.SeqV.c2.cVal.mag.f       | Measured value | Absolute value |
|     |                               | MSQ11.SeqV.c2.units.SIUnit     | 29             | V (Volt)       |
|     |                               | MSQ11.SeqV.c2.units.multiplier | 3              | Kilo           |

| No. | Information               | Value                          |                |                |
|-----|---------------------------|--------------------------------|----------------|----------------|
| 684 | U0 (zero sequence) (U0 =) | MSQ11.SeqV.c3.cVal.mag.f       | Measured value | Absolute value |
|     |                           | MSQ11.SeqV.c3.units.SIUnit     | 29             | V (Volt)       |
|     |                           | MSQ11.SeqV.c3.units.multiplier | 3              | Kilo           |

### 3.19.9 Power Metering (MMTR1)

#### MMTR1.Mod

| No.                    | Information                                      |          |          |
|------------------------|--------------------------------------------------|----------|----------|
| 51                     | Device is Operational and Protecting (Device OK) | 1        | 0        |
| <b>MMTR1.Mod.stVal</b> |                                                  | <b>1</b> | <b>5</b> |

device annunciation: 1 - ON  
0 - OFF

IEC Status Mod.stVal:

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

#### MMTR1.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>MMTR1.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

IEC Status Health.stVal:

1 - OK  
2 - WARNING  
3 - ALARM

#### MMTR1.SupWh

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



**MMTR1.SupVArh**

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

**MMTR1.DmdWh**

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

**MMTR1.DmdVArh**

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

## 3.20 Oscillographic Fault Records (RDRE1)

### RDRE1.Mod

| No.                    | Information                                      |          |          |
|------------------------|--------------------------------------------------|----------|----------|
| 51                     | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>RDRE1.Mod.stVal</b> |                                                  | <b>5</b> | <b>1</b> |

device annunciation: 1 - ON  
0 - OFF

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

### RDRE1.Health

| No.                       | Information                                      |          |          |
|---------------------------|--------------------------------------------------|----------|----------|
| 51                        | Device is Operational and Protecting (Device OK) | 0        | 1        |
| <b>RDRE1.Health.stVal</b> |                                                  | <b>3</b> | <b>1</b> |

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        |
| <b>RDRE1.RcdMade.stVal</b> |                                              | <b>1</b> | <b>0</b> |

device annunciation: 1 - ON  
0 - OFF

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





## Literature

- /1/ SIPROTEC 4 Ethernet Module EN 100 IEC 61850 Electrical/optical Interface  
100 MBit, Manual  
C53000-G1176-C167
- /2/ SIPROTEC 4 System Description  
E50417-H1176-C151
- /3/ SIPROTEC DIGSI, StartUP  
E50417-G1176-C152
- /4/ DIGSI CFC, Manual  
E50417-H1176-C098
- /5/ SIPROTEC SIGRA 4, Manual  
E50417-H1176-C1100-C070
- /6/ SIPROTEC Distance Protection 7SA6, Manual  
C53000-G1176-C156
- /7/ SIPROTEC Distance Protection 7SA522, Manual  
C53000-G1176-C155
- /8/ SIPROTEC Line Differential Protection with Distance Protection 7SD5, Manual  
C5300-G1176-C169
- /9/ SIPROTEC Differential Protection 7SD610, Manual  
C5300-G1176-C145
- /10/ SIPROTEC Breaker Management Relay 7VK61, Manual  
C5300-G1176-C159



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