Relion® Protection and Control

630 series
IEC 61850 Communication Protocol Manual

Power and productivity
for a better world™

ABB

Document ID: 1MRS756793
Issued: 15.09.2009
Revision: A

Copyright

Trademarks

Warranty

Please inquire about the terms of warranty from your nearest ABB representative.

ABB Oy

Distribution Automation

P.O. Box 699

FI-65101 Vaasa, Finland

Telephone: +358 10 2211

Facsimile: +358 10 22 41094

http://www.abb.com/substationautomation

Disclaimer

The data, examples and diagrams in this manual are included solely for the concept or product description and are not to be deemed as a statement of guaranteed properties. All persons responsible for applying the equipment addressed in this manual must satisfy themselves that each intended application is suitable and acceptable, including that any applicable safety or other operational requirements are complied with. In particular, any risks in applications where a system failure and/or product failure would create a risk for harm to property or persons (including but not limited to personal injuries or death) shall be the sole responsibility of the person or entity applying the equipment, and those so responsible are hereby requested to ensure that all measures are taken to exclude or mitigate such risks.

This document has been carefully checked by ABB but deviations cannot be completely ruled out. In case any errors are detected, the reader is kindly requested to notify the manufacturer. Other than under explicit contractual commitments, in no event shall ABB be responsible or liable for any loss or damage resulting from the use of this manual or the application of the equipment.

Conformity

This product complies with the directive of the Council of the European Communities on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive 2004/108/EC) and concerning electrical equipment for use within specified voltage limits (Low-voltage directive 2006/95/EC). This conformity is the result of tests conducted by ABB in accordance with the product standards EN 50263 and EN 60255-26 for the EMC directive, and with the product standards EN 60255-6 and EN 60255-27 for the low voltage directive. The IED is designed in accordance with the international standards of the IEC 60255 series.

Table of contents

Table of contents

Table of contents

Section 1 Introduction

1.1 This manual

The communication protocol manual describes a communication protocol supported by the IED. The manual concentrates on vendor-specific implementations.

1.2 Intended audience

This manual addresses the communication system engineer or system integrator responsible for pre-engineering and engineering for communication setup in a substation from an IED perspective.

The system engineer or system integrator must have a basic knowledge of communication in protection and control systems and thorough knowledge of the specific communication protocol.

1.3 Product documentation

1.3.1 Product documentation set

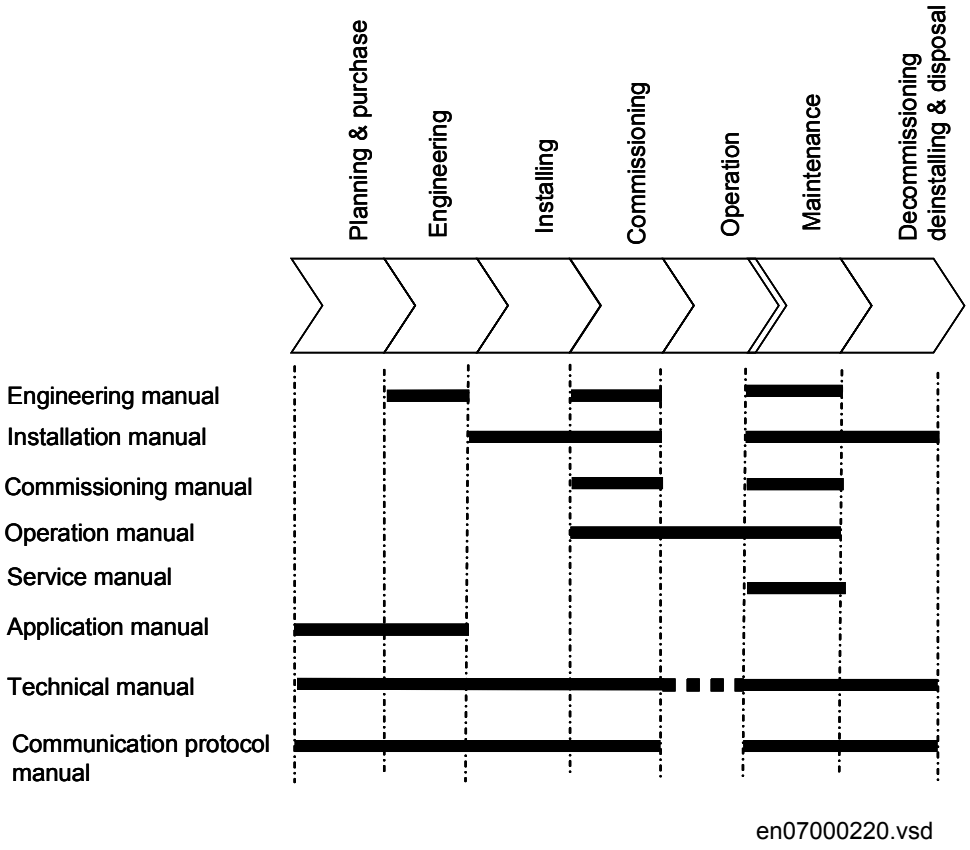

Figure 1: The intended use of manuals in different lifecycles

The engineering manual contains instructions on how to engineer the IEDs using the different tools in PCM600. The manual provides instructions on how to set up a PCM600 project and insert IEDs to the project structure. The manual also recommends a sequence for engineering of protection and control functions, LHMI functions as well as communication engineering for IEC 61850 and DNP3.

The installation manual contains instructions on how to install the IED. The manual provides procedures for mechanical and electrical installation. The chapters are organized in chronological order in which the IED should be installed.

The commissioning manual contains instructions on how to commission the IED. The manual can also be used by system engineers and maintenance personnel for assistance during the testing phase. The manual provides procedures for checking of external circuitry and energizing the IED, parameter setting and configuration as well as verifying settings by secondary injection. The manual describes the process

of testing an IED in a substation which is not in service. The chapters are organized in chronological order in which the IED should be commissioned.

The operation manual contains instructions on how to operate the IED once it has been commissioned. The manual provides instructions for monitoring, controlling and setting the IED. The manual also describes how to identify disturbances and how to view calculated and measured power grid data to determine the cause of a fault.

The service manual contains instructions on how to service and maintain the IED. The manual also provides procedures for de-energizing, de-commissioning and disposal of the IED.

The application manual contains descriptions of preconfigurations. The manual can be used as a reference for configuring control, protection, measurement, recording and LED functions. The manual can also be used when creating configurations according to specific application requirements.

The technical manual contains application and functionality descriptions and lists function blocks, logic diagrams, input and output signals, setting parameters and technical data sorted per function. The manual can be used as a technical reference during the engineering phase, installation and commissioning phase, and during normal service.

The communication protocol manual describes a communication protocol supported by the IED. The manual concentrates on vendor-specific implementations.

The point list manual describes the outlook and properties of the data points specific to the IED. The manual should be used in conjunction with the corresponding communication protocol manual.

The service manual is not available yet.

1.3.2 Document revision history

Document revision/date	Product series version	History
A/2009.09.15	1.0	First release

Download the latest documents from the ABB web site http://www.abb.com/substationautomation.

1.3.3 Related documentation

Product-specific point list manuals and other product series- and product-specific manuals can be downloaded from the ABB web site http://www.abb.com/substationautomation .

1.4 Symbols and conventions

1.4.1 Safety indication symbols

The caution icon indicates important information or warning related to the concept discussed in the text. It might indicate the presence of a hazard which could result in corruption of software or damage to equipment or property.

The information icon alerts the reader to important facts and conditions.

The tip icon indicates advice on, for example, how to design your project or how to use a certain function.

Although warning hazards are related to personal injury, it should be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process performance leading to personal injury or death. Therefore, comply fully with all warning and caution notices.

1.4.2 Manual conventions

Conventions used in IED manuals. A particular convention may not be used in this manual.

- Abbreviations and acronyms in this manual are spelled out in Glossary. Glossary also contains definitions of important terms.
- Push button navigation in the LHMI menu structure is presented by using the push button icons, for example:
  To navigate between the options, use  and  .
- HMI menu paths are presented in bold, for example:
  Select **Main menu/Settings**.
- LHMI messages are shown in Courier font, for example:
  To save the changes in non-volatile memory, select `Yes` and press  .
- Parameter names are shown in italics, for example:

The function can be enabled and disabled with the *Operation* setting.

- The ^ character in front of an input or output signal name in the function block symbol given for a function, indicates that the user can set an own signal name in PCM600.
- The * character after an input or output signal name in the function block symbol given for a function, indicates that the signal must be connected to another function block in the application configuration to achieve a valid application configuration.

1.4.3 Functions, codes and symbols

Table 1: Functions included in 630 series IEDs

Functionality	IEC 61850	IEC 60617	ANSI
Protection			
Three-phase non-directional overcurrent, low stage	PHLPTOC	3I>	51P-1
Three-phase non-directional overcurrent, high stage	PHHPTOC	3I>>	51P-2
Three-phase non-directional overcurrent, instantaneous stage	PHIPTOC	3I>>>	50P/51P
Three-phase directional overcurrent, low stage	DPHLPDOC	3I> →	67-1
Three-phase directional overcurrent, high stage	DPHHPDOC	3I>> →	67-2
Non-directional earth-fault, low stage	EFLPTOC	I_0>	51N-1
Non-directional earth-fault, high stage	EFHPTOC	I_0>>	51N-2
Non-directional earth-fault, instantaneous stage	EFIPTOC	I_0>>>	50N/51N
Directional earth-fault, low stage	DEFLPDEF	I_0> →	67N-1
Directional earth-fault, high stage	DEFHPDEF	I_0>> →	67N-2
Transient/intermittent earth-fault	INTRPTEF	I_0> → IEF	67NIEF
Stabilised restricted earth-fault	LREFPNDF	dI_0Lo>	87NL
High-impedance–based restricted earth-fault	HREFPDIF	dI_0Hi>	87NH
Negative-sequence overcurrent	NSPTOC	I_2>	46
Phase reversal	PREVPTOC	I_2>>	46R
Three-phase thermal overload for feeder	T1PTTR	3Ith>F	49F
Three-phase thermal overload for transformers	T2PTTR	3Ith>T	49T
Three-phase thermal overload for motors	MPTTR	3Ith>M	49M
Loss-of-load supervision	LOFLPTUC	3I<	37
Motor stall protection	JAMPTOC	Ist>	51LR
Emergency start	ESMGAPC	ESTART	ESTART
Motor start-up supervision	STTPMSU	Is2t n<	49,66,48,51LR

Table continues on next page

Functionality	IEC 61850	IEC 60617	ANSI
Negative phase-sequence time overcurrent protection	MNSPTOC	I_2>M	46M
Three-phase overvoltage	PHPTOV	3U>	59
Three-phase undervoltage	PHPTUV	3U<	27
Positive-sequence overvoltage	PSPTOV	U_1>	47O+
Positive-sequence undervoltage	PSPTUV	U_1<	47U+
Negative-sequence overvoltage	NSPTOV	U_2>	47O-
Residual overvoltage	ROVPTOV	U_0>	59G
Frequency gradient	DAPFRC	df/dt>	81R
Overfrequency	DAPTOF	f>	81O
Underfrequency	DAPTUF	f<	81U
Load shedding	LSHDPFRQ	UFLS/R	81LSH
Transformer differential protection for two-winding transformers	TR2PTDF	3dI>T	87T
Fault locator	SCEFRFLO	FLOC	21FL
Distance protection	DSTPDIS	Z<	21, 21P, 21N
Automatic switch-onto-fault logic	CVRSOF	SOTF	SOTF
Phase discontinuity	PDNSPTOC	I_2/I_1>	46PD
Three-phase current inrush detection	INRPHAR	3I2f>	68
Circuit-breaker failure	CCBRBRF	3I>/I_0>BF	51BF/51NBF
Autoreclosing	DARREC	O → I	79
Tripping logic	TRPPTRC	I → O	94/86
Protection-related functions			
Local acceleration logic	DSTPLAL	LAL	LAL
Communication logic for residual overcurrent	RESCPSCH	CLN	85N
Scheme communication logic	DSOCPSCH	CL	85
Current reversal and WEI logic	CRWPSCH	CLCRW	85CRW
Current reversal and WEI logic for residual overcurrent	RCRWPSCH	CLCRWN	85NCRW
Control			
Bay control	QCCBAY	CBAY	CBAY
Interlocking interface	SCILO	3	3
Circuit-breaker/disconnector control	GNRLCSWI	I ↔ O CB/DC	I ↔ O CB/DC
Circuit breaker	DAXCBR	I ↔ O CB	I ↔ O CB
Disconnector	DAXSWI	I ↔ O DC	I ↔ O DC
Local/remote switch interface	LOCREM	R/L	R/L
Synchrocheck	SYNCRSYN	SYNC	25
Supervision and monitoring			
Circuit-breaker condition monitoring	SSCBR	CBCM	CBCM

Table continues on next page

Functionality	IEC 61850	IEC 60617	ANSI
Fuse failure supervision	SEQRFUF	FUSEF	60
Current-circuit supervision	CCRDIF	MCS 3I	MCS 3I
Trip-circuit supervision	TCSSCBR	TCS	TCM
Generic measured values	MVGGIO		
Measured value limit supervision	MVEXP		
Station battery supervision	SPVNZBAT	U<>	U<>
Tap position indication	TPOSSLTC	TPOSM	84M
Energy monitoring	EPDMMTR	E	E
Measurement			
Three-phase current	CMMXU	3I	3I
Three-phase voltage, phase-to-earth voltages (RMS)	VPHMMXU	3Upe	3Upe
Three-phase voltage, phase-to-phase voltages (RMS)	VPPMMXU	3Upp	3Upp
Residual current	RESCMMXU	I_0	I_0
Residual voltage	RESVMMXU	U_0	V_n
Sequence current	CSMSQI	I_1,I_2	I_1,I_2
Sequence voltage	VSMSQI	U_1,U_2	V_1,V_2
Power monitoring with P, Q, S, power factor, frequency	PWRMMXU	PQf	PQf
Metering			
Pulse counter for energy metering	PCGGIO		
Disturbance recorder function			
Disturbance recorder	DRRDRE	DREC	DREC
Analog channels 1-10 (samples)	A1RADR	ACH1	ACH1
Analog channel 11-20 (samples)	A2RADR	ACH2	ACH2
Analog channel 21-30 (samples)	A3RADR	ACH3	ACH3
Analog channel 31-40 (calc. val.)	A4RADR	ACH4	ACH4
Binary channel 1-16	B1RBDR	BCH1	BCH1
Binary channel 17-32	B2RBDR	BCH2	BCH2
Binary channel 33-48	B3RBDR	BCH3	BCH3
Binary channel 49-64	B4RBDR	BCH4	BCH4

Section 2 Introduction to IEC 61850

The IEC 61850 protocol standard for substation enables the integration of all protection, control, measurement and monitoring functions by one common protocol. It provides the means of high-speed substation applications, station wide interlocking and other functions which needs intercommunication between IEDs. The well described data modelling, the specified communication services for the most recent tasks in a station makes the standard to a key element in modern substation systems.

This manual describes mainly how the IEC 61850 standard it is applied in the products of the 630 series IEDs. References and brief descriptions of the IEC 61850 standard are also included. It is assumed that the reader have basic knowledge about the IEC 61850.

To understand the IEC 61850 standard and to be able to find the related information, the following parts of the standard are of importance:

- Station Configuration description Language (SCL) is described in IEC 61850-6. The SCL is an XML based definition of how to describe the parts of a substation. This part of the standard also includes the roles of different tools as well as the engineering concepts.
- Communication profile (IEC 61850 stack) is described in IEC 61850-8-1. This part of the standard includes a number of possible communication profiles, and how the services defined in IEC 61850-7-2 are mapped to the communication profile.
- Communication services are described in IEC 61850-7-2. This part deals mainly with the communication facilities from client and server point of view. It includes the different possibilities of communication functionality.
- Logical node data model. This is described in IEC 61850-7-3 and IEC 61850-7-4.
- Conformance tests and the basis for conformance documents are handled in IEC 61850-10.

To get information and an understanding about the implemented possibilities of IEC 61850 in the IED, the details are described in the IEC 61850 conformance documents.

- MICS, Modeling Information Conformance Statement, contains the declaration of the used logical node types.
- PICS, Protocol Information Conformance Statement, contains the details and what is supported regarding protocol facilities.
- PIXIT, Protocol Extra Information, contains additional information on how the IEC 61850 is implemented and used.
- TICS, Tissue Information Conformance Statement, contains the supported Tissues, which are handled in the Tissues process as defined by UCA, Utility Communication Architecture forum. The Tissues handling is found in http://www.tissue.iec61850.com.

The conformance documents are unique for each product release and refer to each other; the identities included in the related documents refer to a specific version of the 630 series.

The communication profile in IEC 61850 uses the MMSstandard, which uses Ethernet and TCP/IP to handle the information transport within the substation.

The data modelling uses the concept of logical nodes to identify the published information for communication. The standard defines a set of logical nodes, each representing a communication view of a process function with a number of data objects. The standard cannot cover all possible information that is given, for example, by a protection function of vendor A or vendor B or for the variants of a protection function given by the process part which is protected. For example, a transformer differential - or line differential protection, because the standard defines only a differential protection. Therefore, it is possible to adapt the logical node, which is defined in the standard, as a logical node class. The standard defines methods to describe the actual used logical node as an logical node type which is then based upon the logical node class. This allows all partners to interpret the logical node type information because the description is completely given in the standard. The type description of all logical nodes is part of the Data Type Template (DTT) section in the SCL description file of a station or the IED.

Beside the information about the configuration of the communication facilities, this manual contains the full description of all logical nodes available in the 630 series IED. The information about the logical nodes and their data objects may be used to identify which signals are available for the function as described in the technical manual. The link to the technical manual is done in the logical node tables by listing the signal name as given in the function block, as seen in PCM600 and in LHMI.

2.1.1 Related documentation to IEC 61850

Use the latest revision of the documents listed, unless stated otherwise..

Document ID	Title
IEC 61850-5 First edition 2003-07 Ref. number: IEC 61850-5:2003(E)	Communication networks and systems in substations - Part 5: Communication requirements for functions and devices models
IEC 61850-6 First edition 2004-03 Ref. number: IEC 61850-6: 2004(E)	Communication networks and systems in substations - Part 6: Configuration description language for communication in electrical substations related to IEDs
IEC 61850-7-1 First edition 2003-07 Ref. number: IEC 61850-7-1: 2003(E)	Communication networks and systems in substations - Part 7-1: Basic communication structure for substations and feeder equipment - Principles and models
IEC 61850-7-2 First edition 2003-05 Ref. number: IEC 61850-7-2: 2003(E)	Communication networks and systems in substations - Part 7-2: Basic communication structure for substations and feeder equipment - Abstract communication service interface (ACSI)
IEC 61850-7-3 First edition 2003-05 Ref. number: IEC 61850-7-3: 2003(E)	Communication networks and systems in substations - Part 7-3: Basic communication structure for substations and feeder equipment - Common data classes
IEC 61850-7-4 First edition 2003-05 Ref. number: IEC 61850-7-4: 2003(E)	Communication networks and systems in substations - Part 7-4: Basic communication structure for substations and feeder equipment - Compatible logical node classes and data classes
IEC 61850-8-1 First edition 2004-05 Ref. number: IEC 61850-8-1: 2004(E)	Communication networks and systems in substations - Part 8-1: Specific Communication Service Mapping (SCSM) - Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3
IEC 61850-10 First edition 2005-05 Ref. number: IEC 61850-10: 2005(E)	Communication networks and systems in substations - Part 10: Conformance testing
IEC 61850 MICS IED 630 series: 1MRS189-725 2009-05-07	IED 630 series 1.0 - IEC 61850 MICS: Modelling Implementation Conformance Statement
IEC 61850 PICS IED 630 series: 1MRS189-726 2009-05-08	IED 630series 1.0 - IEC 61850 PICS: Protocol Implementation Conformance Statement
IEC 61850 PIXIT IED 630 series: 1MRS189-727 2009-05-11	IED 630 series, 1.0 - IEC 61850 PIXIT: Protocol Implementation Extra Information
IEC 61850 TICS IED 630 series: 1MRS189-728 2009-05-08	IED 630 series, 1.0 – IEC 61850 TICS Tissue Implementation Conformance Statement

Section 3 Substation Configuration description Language (SCL)

The SCL language is based on XML. However, detailed knowledge of the XML contents is not needed.

The SCL XML file (ied.ICD and/or station.SCD) contains five sections, which are specified in IEC 61850–6 clause 9.

- Header
- Substation section describes the functional structure and its relation to primary devices.
- Communication section describes the connection between the IED access points to the respective subnetwork. and includes also the properties (addresses) of the access points.
- IED section contains a description of the supported communication services, the access point(s) and the IEDs logical devices, logical nodes and their attributes.
- Data type template section contains a declaration of all types used in the SCL file, logical nodes type, DO types, attributes and enums.

The substation section and the communication section are tasks to organize the IEDs within the substation and to establish the communication. The system structure is defined by the organization of the plant structure in PCM600. The signal engineering and the signal routing are CCT600 tasks. The IED needs to be configured with PCM600 before the system is configured with CCT600.

The IED section contains the data sets and the control blocks configured by CCT600. The data sets and the control blocks are logically defined as part of the logical nodes (see IEC 61850–7–2 clause 9). CCT600 also needs a correctly configured communication section for GOOSE engineering.

The data type templates section provides the correct content description of each logical node type to all tools and users (clients) of the information. Each IED and vendor may have their own logical node type definitions included in the data type template section together with all other logical node types based on the standard.

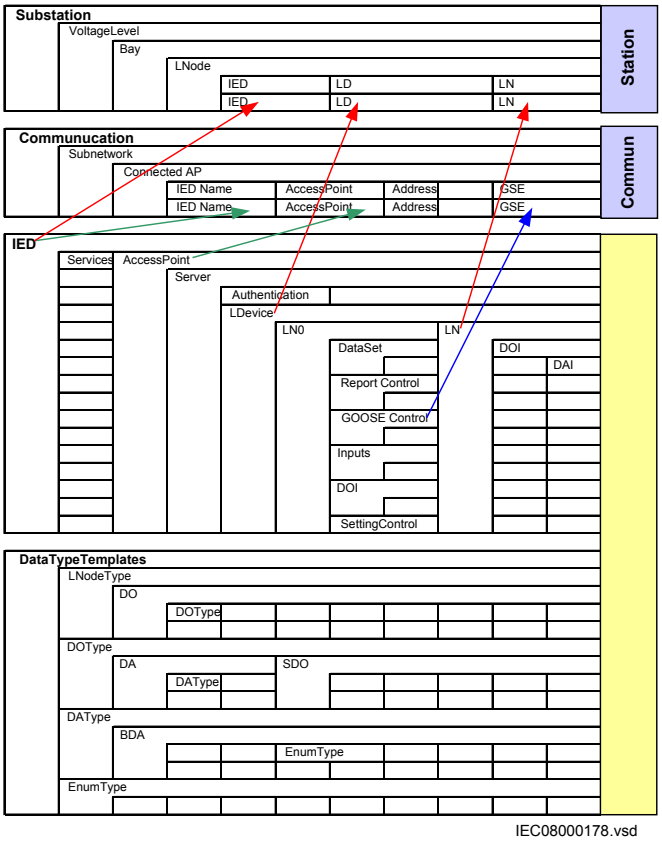

Figure 2: IEC 61850: Principle structure of the SCL XML file

The arrows show the link between the different sections given when an IED is integrated in the substation structure and/or in the communication structure. All needed logical nodes of an IED are linked to the substation section by the SC tool.

A reference to GOOSE Control Blocks (GoCB) is included in the communication section when GoCB is configured.

3.1 The substation section

The substation description in IEC 61850–6 clause 9 describes the organization of the primary equipment on one side. On the other side, it includes the used logical nodes and their relation to the primary equipment.

3.2 The communication section

The organization of the physical IEDs to the communication network is independent of the substation structure. The IEC 61850 standard defines the

communication network with no relation to an existing media and protocol. The mapping to an existing media and protocol is specified in IEC 61850–8–1.

The IEC 61850 standard describes in part 7–2 the ACSI in a media and protocol independent form. Part 8–1 specifies the mapping of this ACSI to the existing MMS.

The communication section describes how information is routed between the IEDs and contains the following parts:

- Subnetworks
- IEDs connected to different subnetworks
- Access points per IED to subnetworks
- Address
- IP address of LAN network (is exceptionally part of the address elements)
- Link to GoCB message in transmission direction (extended during signal engineering and routing)

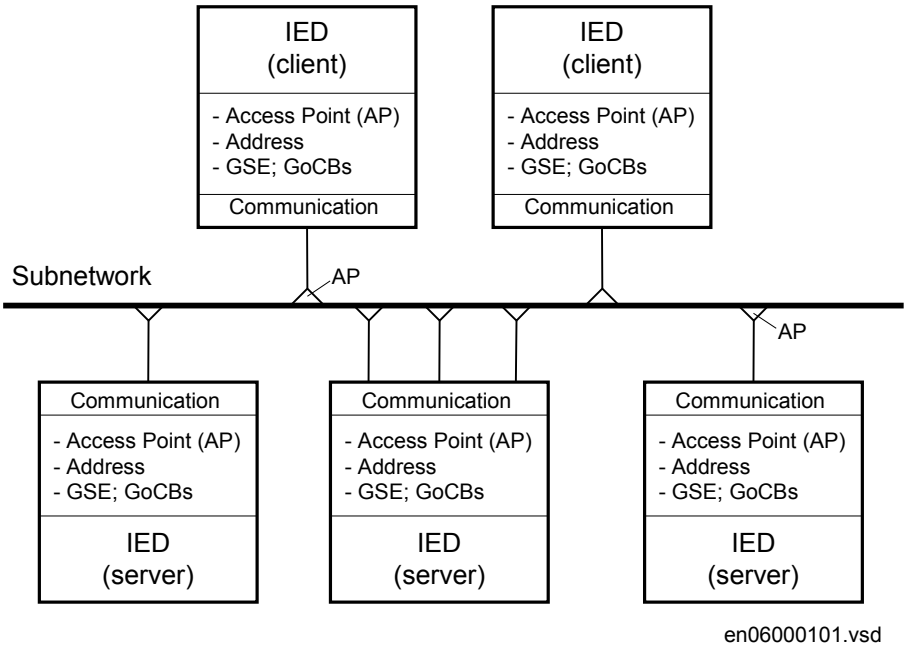

Figure 3: IEC 61850–6: Communication network

Additional information about the server is part of the IED.

3.3 The IED section

The IED section describes the complete IED as it is needed for IEC 61850 communication and signal engineering. The data type template part of an IED may be seen as part of the IED, even when separated in its own section. The IED's ICD

files include the description of the logical nodes, their data type templates and the used or supported services. The structure of the IED section follows the definitions made in the IEC 61850 standard.

Two basic IED types are used in system configuration.

- Station level IEDs
  are located on the station level and are identified as client IEDs when they read or write information from or to the bay IEDs. This functionality is represented by logical nodes of group “Information (I)”. These are the logical nodes (LN) = ITCI, IHMI and ITMI. Client IEDs are the receiver of information in monitoring direction and sender of commands (control). These logical nodes have no data objects. They are only used to link the report control blocks (BRCBs) from the server IEDs. They have to read their information about the signals and the signal configuration from the bay IEDs. This is possible by checking all control blocks for a link to it as a client.
- Bay level IEDs
  are located on the bay level and are identified as server IEDs when they read or write information vertically. When GOOSE messages are received, the bay level IED also has the client role.

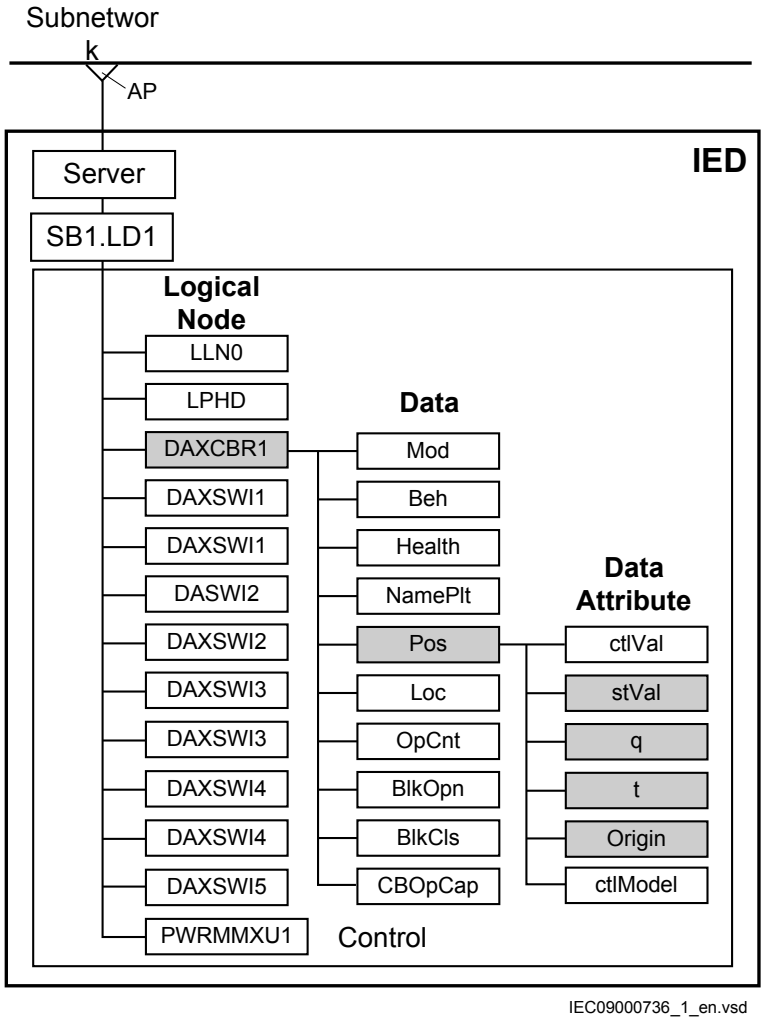

Figure 4: Organization of LDs, LNs, DOs and DAs in an IED

- A server represents the communication interface to the subnetwork (Ethernet).
- One or more logical device(s) (LD) are connected to a server.
- Aset of logical nodes belong to a LD.
- The LN LLN0 is a special logical node per LD and contains for example the data sets, the various control blocks, inputs (from GOOSE messages). In IED 630 series, the data sets and the control blocks shall be located to LD0.
- The LN LPHD is a special logical node per LD and contains data objects that describe the status of the physical device (the IED)
- Each logical node represents a function and contains a number of data objects (DO)
- Each DO includes a number of data attributes (DA)

The data objects represent information signals that may be routed to station level IEDs or to other bay IEDs that are communicating with GOOSE. The signal engineering task is to select the requested signals (DOs) and link them to the client

IEDs as receiver. The control services are not directly engineered. They are included in the data objects, which handle both directions the command (control) and the response (monitoring). When routing the DO in monitoring direction, the control is also known by the clients.

The number of data objects and data attributes per DO is defined by the used LN type in this IED. The content of logical node types and DO types are defined in the DTT. This also means that the definitions in the DTT section have to be unique with an SCD file.

3.4 Tool concept

The IEC 61850-6 defines a number of roles for tools. In the Relion® series, PCM600 is defined as IED tool, and CCT600 is defined as system tool

The sections in SCL contain properties that are to be configured by these tools. There is no relation between one section and one specific tool. The task of the IED tool is to configure all properties for the IED, while the system tool has the task to define the place of the IED in the system and its communication dependencies. For example, the plant structure in PCM600 results in the subsystem section in SCL regarding the subsystem structure down to the IED level. The PCM600 also configures the IED section as a result of the IED configuration. In PCM600, the configuration properties for SCL are handled automatically as a result of the configuration, except for the receiving of GOOSE information that has a dependency with the system tool.

Do 61850 engineering with PCM600 and CCT600.

PCM600:

- When an IED is instantiated, its place in the plant structure creates the corresponding structure in the substation section in SCL. The communication facilities is also created in the communication section.
- The functionality of the IED is configured by using ACT in PCM600. For each function, the corresponding logical device and logical node(s) is created in the IED section together with its type definition in data type template section
- The above forms the IED capabilities from a communication perspective and will then be included in the file exported from PCM600 as SCD, ICD or CID file

(For top down engineering approach, the steps are included in the CID file of a pre-configured IED)

CCT600:

- Open a SCD file or import/merge a SCD, ICD or CID file for the particular IED(s).
- For each IED, the user defines the datasets, the control blocks for reporting (this means unbufffered/buffered reporting and GOOSE) and the properties for each report control block.
- If client definitions (like client. ICD) are required in the system configuration, they are merged into CCT600 and connected to the unbuffered/buffered report control blocks.
- For each IED, the primary/conducting equipment with their relation to the used logical nodes must be defined in the substation section.
- The resulting SCD file is exported from CCT600.

PCM600:

Import the SCD file to PCM600 to receive GOOSE data. For each IED that shall receive GOOSE information, the received data is connected to the applications using SMT in PCM600.

3.5 Engineering concept in IEC 61850-6

- Top-down approach means that the system engineering tool has ICD files available for each IED to be included in the system configuration. The ICD files may be of an template type and represent a pre-configured IED.
- Bottom-up approach means that the configurations are produced by the IED tool, and that are exported as ICD files (or SCD file) to be imported by system tools.

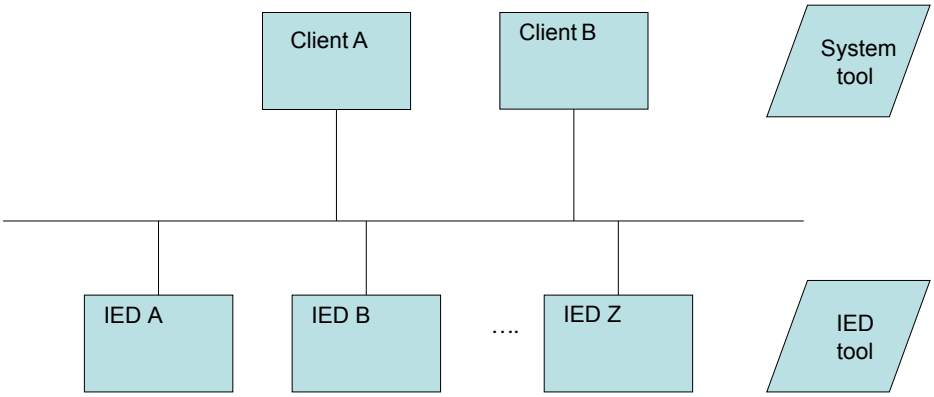

Figure 5: Relation between system and IED tools

Regardless of engineering approach, the idea is that the IED tool provides the CID or ICD file for each IED. These ICD/CID files are then imported into the system tool and merged into a SCD file, representing the complete substation or a part of the substation, like one for each voltage level.

Section 4 Communication profile

The IEC 61850 standard is conceptually written to be independent of an existing communication media and message transmission concept. Out of this, a specific communication profile is decided and is been commonly used. The actual decision is for

- Ethernet as the media
- TCP/IP
- ISO session and presentation layer
- MMS (Manufacturing Message Specification (ISO 9506-1 and ISO 9506-2)

The IEC 61850 standard describes its requested services in ACSI, which is contained in part 7-2 of the standard. The mapping to the MMS for all aspects of services and Ethernet usage is specified in part 8-1 of IEC 61850.

Each device manufacturer, which is a partner of an IEC 61850 based communication network, has to take these two specifications and adapt their respective product to the requirements and definitions given in the standard. To make this profile visible to all other partners, so they can check what they can expect and what they have to support, the PICS document is defined. The PICS contains in a table based form the possibility of a product or product family.

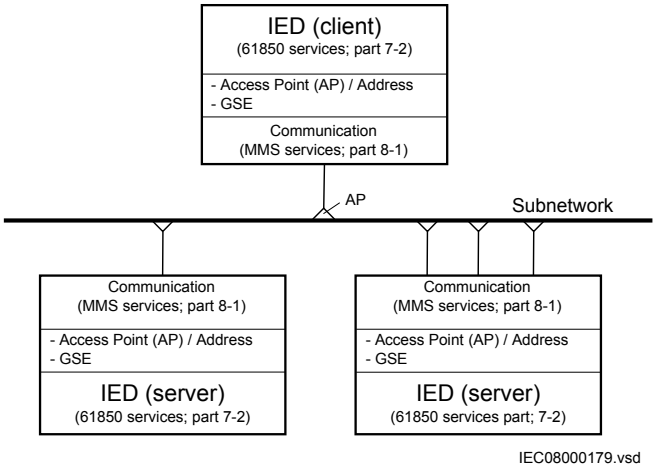

Figure 6: IEC 61850 Protocol: related standards for communication

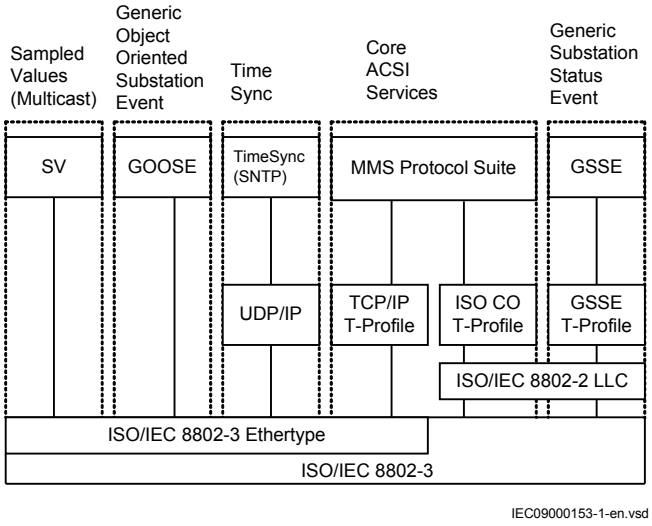

Figure 7: Overview of functionality and profiles according to IEC 61850-8-1

Out of this content, the implementation in the 630 series supports:

- GOOSE
- TimeSync using SNTP
- The peer-to-peer/vertical communication using MMS protocol suite with the T-profile TCP/IP

For each of the above, the resulting underlying protocols as stated in figure 7.

See the PICS and PIXIT for more information.

Section 5 Supported services

IEC 61850-7-2 describes the services in the standard. IEC 61850-8-1 describes how the services are applied in the communication. The conformance documents contain the main description about the supported services in the IED.

Services that are not mentioned in this chapter or in the conformance document are not supported.

Data set

Define data sets by the SCD description.

Create data sets under LD0/LLN0.

Substitution

Substitution is supported for the respective DATA, according to IEC 61850-7-4, that have the substitution attributes defined.

Note that SubID and SubQ are not used.

Setting group control block

Change of setting group is supported, that is the actSG attribute. This attribute is not one of the explicit definitions in SCL, but a consequence of the defined setting group control block according to IEC 61850-6.

There is only one setting group control block, which is located in LD0/LLN0 (Logical Device/Logical Node 0).

Change or edit of setting values as well as reading of setting values is neither supported nor visible in IEC 61850.

Note that the actual number of used setting groups is defined by the parameter *MaxNoSetGRP* in the function *SETGRPS*, which is configured in PST in PCM600.

Report control block

For properties about report control blocks, see PIXIT.

UnBuffered reporting as well as Buffered reporting is supported.

Note that the parameters BufTm and IntPrd shall have the relation BufTm < IntPrd. For best efficiency, the BufTm should have IntPrd as common denominator, like n*BufTm = IntPrd, n is an arbitrary number.

Generic substation event (GOOSE)

The structured GOOSE is supported. This means that the data sets can be defined with FCDA as well as explicit attributes.

When explicit attributes are defined in the data sets, the number of such items in a data set is limited to 150.

The supported data types to be published and received in GOOSE are binary values and double point values together with their quality. On reception of GOOSE message there is one valid signal available for the applications. The valid signal represents all data in the received GOOSE telegram. Invalid means that the correct message is not received within the 1.8*maxTime parameter for the GOOSE Control Block (as defined in IEC 61850-6). An incorrect message includes T=true, NeedsCom, wrong order of attributes or any discrepancy in the GOOSE message layout.

Note that the data sets that are used or referred to by GOOSE control blocks can only include a data attribute once. In other words, there may not be the same data attribute in more than one data set.

Control

Of the different control sequences, the ‘direct-with-normal-security’ and ‘SBO-with-enhanced’ security are supported (defined by the ctlModel parameter, IEC 61850-7-2).

The command model can be changed for some functions by using PCM600 or PST. From communication perspective, in IEC61850 this parameter is read-only.

Check bits; interlock check and synchrocheck check, are only valid for LN types based upon CSWI class.

Verification of Originator Category is supported, see also PIXIT.

Time and time synchronization

For properties about time synchronization, see PIXIT and Time synchronization description in the technical manual and the application manual.

File transfer

See PIXIT.

Section 6 Data sets and control blocks

6.1 Data sets

IEC 61850 has defined data sets and report control blocks for signal transmission in monitoring direction. Data sets are also used for GOOSE messages in horizontal direction. The project defines the data objects or single data attributes that should be collected in a data set. The following figure shows a data set where all position information of the apparatuses of a bay are put into one data set.

The vendor of an IED can define data sets as defaults that are part of the IED and always available. They need to be linked to the client IEDs only when to use them as they are. The vendor has to declare when these data sets can be modified to projects need or not.

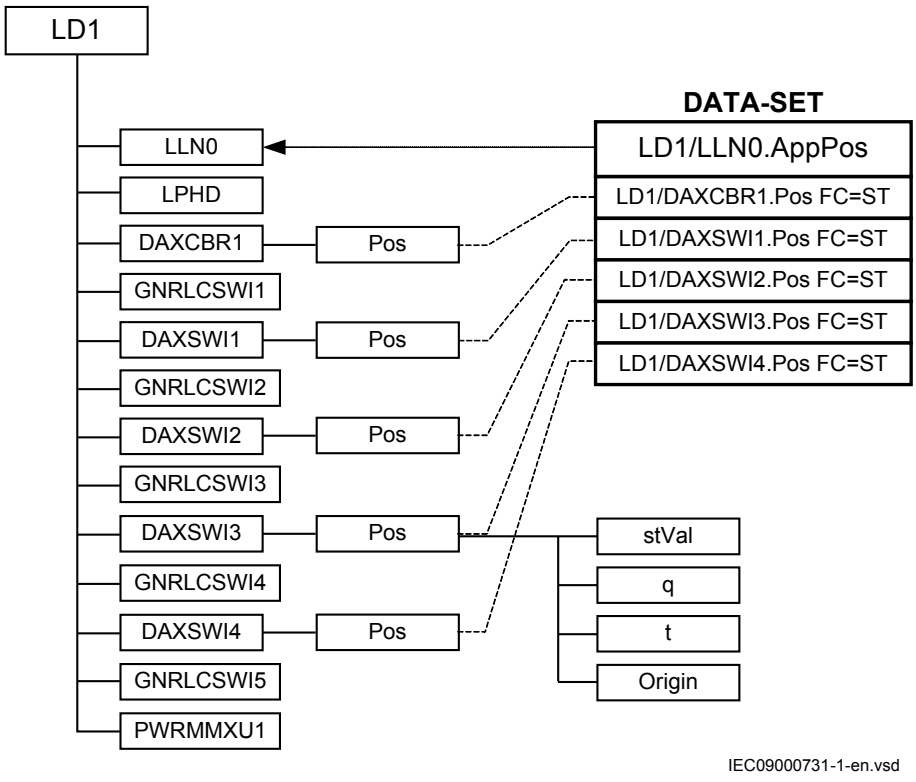

Figure 8: IEC 61850–7–2: Example of a data set

General rules for data set configuration:

- All data objects or their data attributes which are signals in monitoring direction can be selected for a data set.
- Only those data attributes of a data object can/will be selected which have the same function constraint (FC).
- Data objects with different FC can be selected for a data set. For example, DOs with FC = ST and DOs with FC=MX can be member in one data set.
- A single data attribute can be selected when it is specified with a trigger option. For example, the data attribute stVal of the data object Pos can be selected as a member of a data set, because it is specified with the trigger option data change detected (dchg).

The description of the data sets with name and the list of data object members (FCDAs is included in the SCL file in the IED section in the Logical device subsection. As specified in IEC 61850–7–2 clause 9, the data sets are part of a logical node. They are most likely included in the LLN0.

6.2 Report control block (URCB/BRCB)

To be able to transmit the signals configured in a DataSet, a report control block must be configured to handle and specify how the events are transmitted to the clients. There are two types of report control blocks, unbuffered and buffered. The buffered report control block stores the events during a communication interrupt, while the unbuffered is sent upon data change and not stored during interruption.

The content of a BRCB is listed in IEC 61850-7-2 in clause 14. The BRCB contains many attributes which are of interest to handle and secure the communication between the client and the server and may be set once as default in a project. Others are of application interest in the way events are handled in a project.

- Buffer time (valid only for BRCB)
  - This parameter describes how long the report should wait for other expected events before it sends the report to the client. When it is known, that additional events are generated as a follow up, it is useful to wait, for example, 500 ms for additional events stored in the report. This feature reduces the number of telegrams transmitted in case of a burst of changes. But on the other side it increases the overall transaction time for events from IED input to presentation on HSI, which is normally defined to be one second.
- Trigger options
  - The data attributes know three different trigger options (dchg, qchg, dupd). Within the BRCB, the two other can be defined (integrity and general interrogation). The attribute Trigger option is a multiple choice and allows to mask the supported trigger options in this BRCB.
- Integrity period
  - When integrity is selected in the trigger option attribute, it is needed to define an integrity period to force the transmission of all data listed in

the DataSet. This is done by the attribute Integrity period. This feature can be used as a background cycle to ensure that the process image in all partners is the same. Nobody is perfect and someone in the long chain from the contact up to the NCC may have lost an event. The background cycle can repair it.

- General interrogation
  - A general interrogation is only done on request from a client. Not all Data-sets may contain information which is needed for a general update of the client. For example data with T(ransient) = TRUE are not part of a GI. When the BRCB attribute general interrogation is set to TRUE a GI request from the client will be handled. The report handler will transmit all data defined in the Data-set with their actual values. The IEC 61850 standard defines that all buffered events shall be transmitted first before the GI is started. A running GI shall be stopped and a new GI shall be started, when a new GI request is received while a GI is running.
- Purge buffer (valid only for BRCB)
  - This BRCB attribute can be used by a client to clean the event buffer from old events. The events are discarded on request of the client. This feature can be used to delete old events not transmitted to the client due to stopped communication. After the link is reestablished the client can decide to clean the buffer or to receive the history.

Trigger Options

IEC 61850 has defined in total five different TrgOp. Three of them belonging to data attributes and marked per data attribute in the column TrgOp of the CDC tables in part 7–3. The other two belonging to the configuration of control blocks.

- dchg = data-change
  - The classical trigger. Whenever a process value has changed its value either binary or a measurement a transmission is done. The standard does not define how to detect and inform the logical node.
- qchg = quality change
  - Looking to the possibilities of the quality data attribute type (q) any changes in the quality description will be transmitted.
- dupd = data value update
  - This trigger option give the possibility to define that a transmission should be done on a condition which can be controlled by the application.
- integrity
  - This trigger forces the transmission of all process values defined in the data set when a timer value (the integrity period) expires. It can be used for example to update a process signal in the background (for example, every 15 minutes).
- general interrogation

- This trigger is forced by the clients (= station level IED; NCC gateway, station HMI, ...). Normally a GI is asked for, when the client and the server start or restart a session. When the client is able to receive the actual values and when the logical device has scanned all process values at least once, an image of the actual process signal status can be transmitted to the client.

Note that the possible trigger options for each attribute are included and defined in the datatype template section in SCL.

Link BRCB to a client LN

The BRCB has to know to whom the events shall be transmitted. This is the signal routing engineering step. The IEC standard 61850–6 describes that this is given by including the LN of the client IED in the ReportBlockEnabled option.

The selected client IED with the corresponding LN, for example, ITCI is included in the SCL structure of the Report Control description of the IED section.

The description of the BRCB with selected DataSet, configured parameters and selected IEDs is included in the SCL file in the IED section in the LN0 structure for the LD where this LN0 belongs to.

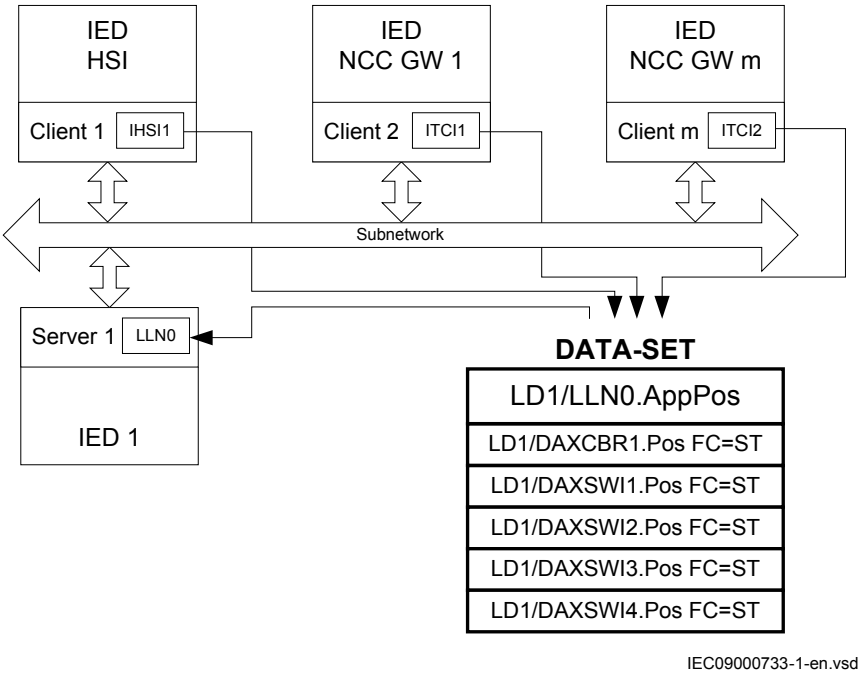

Figure 9: Link BRCB to a client LN

6.3 GOOSE Control Blocks (GoCB)

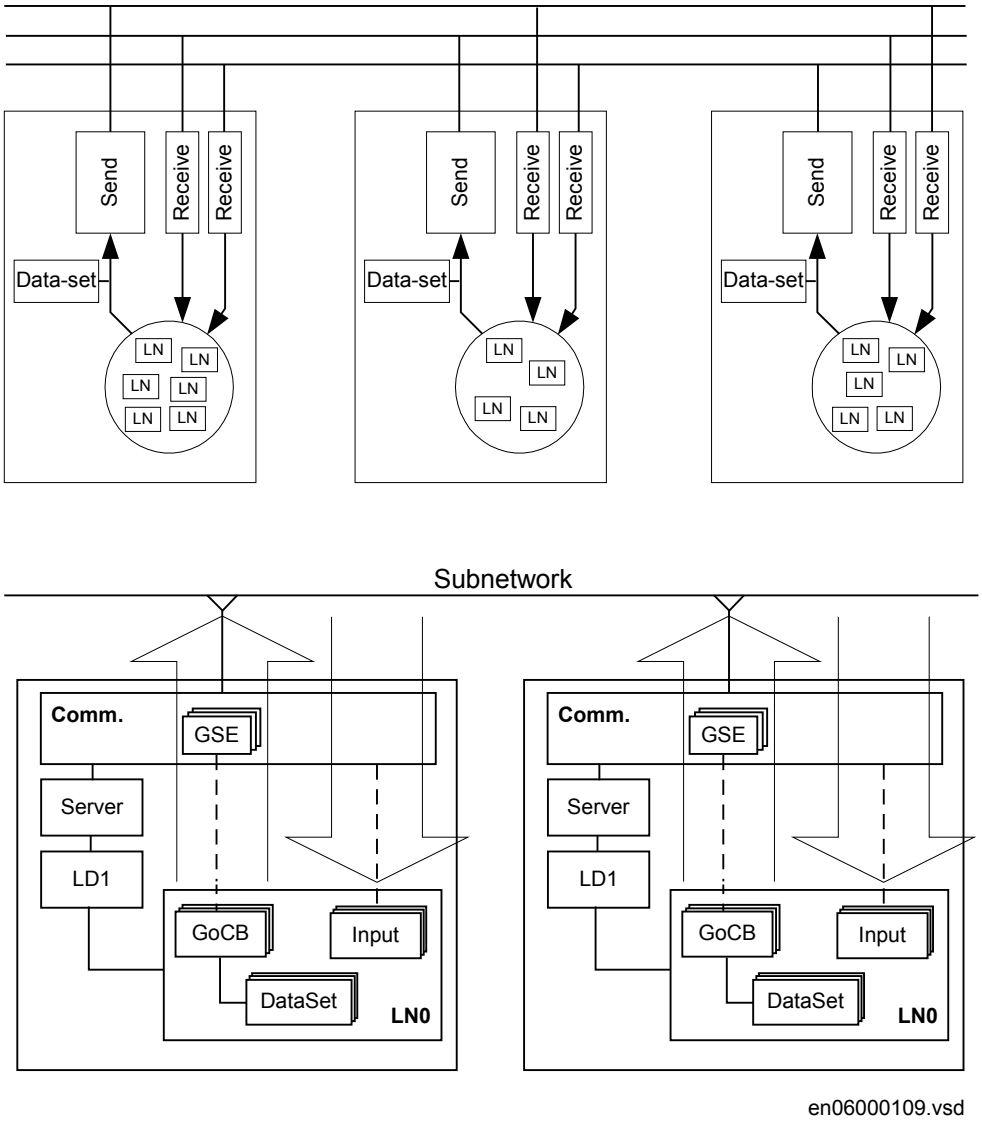

Figure 10: IEC 61850: Principle operation of GOOSE messages

The Generic Object Oriented Substation Event (GOOSE) class model is used to distribute input and output data values between IEDs on bay level (in horizontal direction) through the use of multicast services. GOOSE messages bypass the server and enable fast transmission from a publisher to one or several subscribers (receivers).

GOOSE messages are unidirectional, send only messages which request an application specific method to secure that the sender and the receiver of the message operate safely. This implies that the receiver of the GOOSE message distributes also GOOSE messages and closes the loop for communication (request

— respond on application level). The return message is not a must. It depends on the application in which way a confirmation may be done.

The GOOSE service model of IEC 61850-7-2 provides the possibility for fast and reliable system-wide distribution of input and output data values. This implementation uses a specific scheme of re-transmission to achieve the appropriate level of reliability. When a GOOSE server generates a SendGOOSEMessage request, the current data set values are encoded in a GOOSE message and transmitted on the multicast association. The event that causes the server to invoke a SendGOOSE service is a local application issue as defined in IEC 61850-7-2. Each update may generate a message in order to minimize throughput time.

Additional reliability is achieved by re-transmitting the same data (with gradually increasing SqNum and retransmission time).

T0	retransmission in stable conditions (no event for a long time)
(T0)	retransmission in stable conditions may be shortened by an event
T1	shortest retransmission time after the event
T2, T3	retransmission times until achieving the stable conditions time

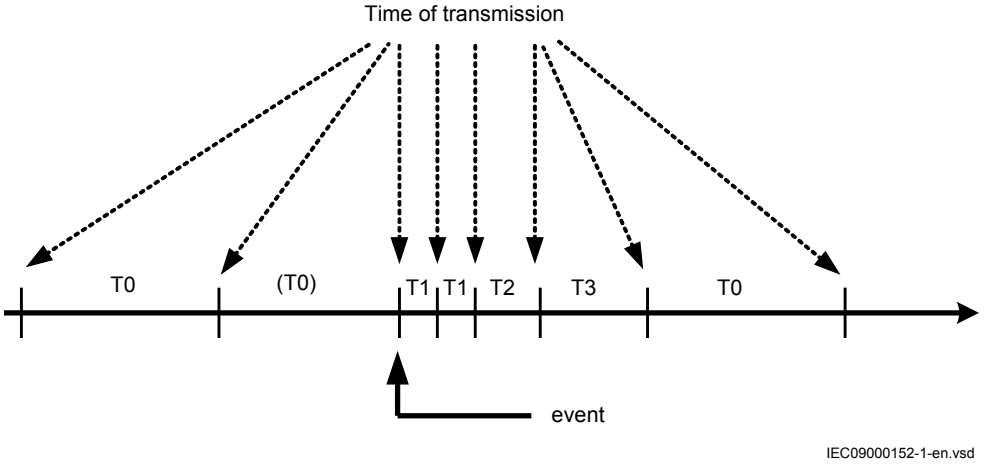

Figure 11: Transmission time for events

Each message in the retransmission sequence carries a timeAllowedToLive parameter that informs the receiver of the maximum time to wait for the next re-transmission. If a new message is not received within that time interval, the receiver assumes that the association is lost. The specific intervals used by any GOOSE publisher are a local issue. The timeAllowedtoLive parameter informs subscribers of how long to wait. In 630 series, the detection time is 1.8*timeAllowedToLive to cope with possible transmission delays.

The GOOSE message concept is used for all application functions where two or more IEDs are involved. Typical example is the station-wide interlocking procedure or breaker failure protection.

Figure 10 shows the GOOSE concept for three IEDs which interchange GOOSE messages between each other.

To send GOOSE messages a GoCB must be defined and a data set is needed that contains the data objects of single data attributes to be send.

A GOOSE message is forced to be transmitted when a trigger change is detected for a data attribute. All members of the data set are copied in the send buffer with their actual value and the message is sent. The subscribers, who knows the address of this GOOSE message, receives the telegram. The GOOSE message includes for example sequence number to verify that all messages are received.

The concept that has to be done in case of for example a lost message is part of the application and not described in the standard.

A GoCB has to be defined per GOOSE-DataSet.

GOOSE messages bypass the server and send direct from the communication part on the Ethernet. This is identified for the communication in the SCL communication section in the GSE element, where the name of the GoCB is listed under the ConnectedAP.

Link GoCB to an IED

The IEDs that should receive the GOOSE message must be known and they have to be informed in the engineering state that they receive GOOSE messages and which one. This is given when the external Reference, the name of the IED and the member of the data set is included in the LN0 under the structure of the LD of the receiving IED. This part is identified as “Inputs”.

Section 7 Logical node data model

The data model used by IEC 61850 is based on logical nodes containing a set of data objects. The data model is defined in the standards.

- IEC 61850-7-4 Compatible logical node classes and data classes
- IEC 61850-7-3 Common data classes

The standard describes only classes of logical nodes and data objects on one side and common data classes for the data object attributes. Also here it is given has the elements in these classes are defined as:

- Mandatory (M)
- Optional (O)
- Conditional optional (Cxxx)
- In addition, the IEC 61850 states rules for adding vendor-specific definitions to the standard, in order to cope with extra functionality.

The possible description of the data model according to the standard allows to adapt a logical node of a LN class to that what the product is supporting or using for this LN. This definition of what parts of a class is used in the actual product and possible addition is called a type, according to IEC 61850-6. There are LN types based upon LN classes. The LN type attributes are called Data Objects (or DATA) and are in of DO types, base upon respective CDC class. This allows all partners in the IEC 61850 project who need this LN to understand the LN in all details for the communication part.

The IEC 61850 standard does not describe the functionality and way of operation. Each supplier has to describe this separately. ABB has described their function blocks that represent a logical node and all other function blocks in the technical manuals. This chapter in the communication protocol manual has two tasks:

- Describe the Logical Node types and their data object attribute types.
- Make the link to the description of the function block.

7.1 Common data objects in each logical node

The IEC 61850 standard describes in part 7-5, a Common Logical Node. The data objects contained in that LN are both mandatory and optional. The mandatory data objects have to be included in each LN. This clause describes the general handling of the data objects within the 630 series products.

The mandatory data objects as defined in IEC 61850-7-4 as part of the Common Logical Node are Mode, Behavior, Health and NamePlate.

Mode

The operation modes ON (enabled) and BLOCKED are supported remotely by a command or locally from the LHMI of the IED. The TEST and the TEST/ BLOCKED mode can be operated locally from the LHMI or by using PCM600.

The state OFF can be set from the LHMI or by using PCM600 for the functions having the setting 'operation'.

Note also that for functions in other Logical devices than LD0, the Mod can only be controlled by communication on LLN0.

Behaviour

The operational mode as given by the Mode control is shown in the data object Beh with the priority rules as described for Beh in clause 6 of IEC 61850-7-4.

The Beh shows the actual state of the function, dependent upon the hierarchy described in IEC 61850-7-4, clause 6.

Health

The 630 series products show always only the state "green" = Ok.

NamePlt

The name of the logical node and its relation to namespace definition are shown in the data object NamePlt as specified for the SCL structure.

7.2 Logical nodes for control

7.2.1 Bay control CBAY

7.2.1.1 Apparatus control QCCBAY

LN type	LN prefix	LN class	Function block name
QCCBAY (revision 0)	QC	CBAY	QCCBAY

Table 2: QCCBAY Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter
		Oper.T	CO	-	-	Cmd	Mode parameter
		Oper.Test	CO	-	-	Cmd	Mode parameter
		Oper.Check	CO	-	-	Cmd	Mode parameter
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	
		q	ST	-	Beh	Mon	
		t	ST	-	Beh	Mon	
Loc	a_dSPS	stVal	ST	-	LOC	Mon	Local operation allowed
		q	ST	-	LOC	Mon	Local operation allowed
		t	ST	-	LOC	Mon	Local operation allowed
LocSwPos	v1_dINS	stVal	ST	-	LR_POS	Mon	Position of the Local/Remote switch
		q	ST	-	LR_POS	Mon	Position of the Local/Remote switch
		t	ST	-	LR_POS	Mon	Position of the Local/Remote switch
BlkCmd	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Special block command value
		Oper.origin.orCat	CO	-	-	Cmd	Special block command value
		Oper.origin.orIdent	CO	-	-	Cmd	Special block command value
		Oper.ctlNum	CO	-	-	Cmd	Special block command value
		Oper.T	CO	-	-	Cmd	Special block command value
		Oper.Test	CO	-	-	Cmd	Special block command value
		Oper.Check	CO	-	-	Cmd	Special block command value
		stVal	ST	-	CMD_BLKD	Mon	Function is blocked for commands
		q	ST	-	CMD_BLKD	Mon	Function is blocked for commands
		t	ST	-	CMD_BLKD	Mon	Function is blocked for commands
BlkUpd	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Special block command value
		Oper.origin.orCat	CO	-	-	Cmd	Special block command value
		Oper.origin.orIdent	CO	-	-	Cmd	Special block command value
		Oper.ctlNum	CO	-	-	Cmd	Special block command value
		Oper.T	CO	-	-	Cmd	Special block command value
		Oper.Test	CO	-	-	Cmd	Special block command value
		Oper.Check	CO	-	-	Cmd	Special block command value

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
BlkUpd	v1_dSPC	stVal	ST	-	UPD_BLKD	Mon	Update of position is blocked
		q	ST	-	UPD_BLKD	Mon	Update of position is blocked
		t	ST	-	UPD_BLKD	Mon	Update of position is blocked
Rem	v1_dSPS	stVal	ST	-	REM	Mon	Remote operation allowed
		q	ST	-	REM	Mon	Remote operation allowed
		t	ST	-	REM	Mon	Remote operation allowed

7.2.2 Interlocking CILO

7.2.2.1 Interlocking SCILO

LN type	LN prefix	LN class	Function block name
SCILO (revision 1)	S	CILO	SCILO

Table 3: SCILO Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter
		Oper.T	CO	-	-	Cmd	Mode parameter
		Oper.Test	CO	-	-	Cmd	Mode parameter
		Oper.Check	CO	-	-	Cmd	Mode parameter
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
EnaCls	a_dSPS	stVal	ST	-	EN_CLOSE	Mon	Close operation at open or intermediate or bad position is enabled
		q	ST	-	EN_CLOSE	Mon	Close operation at open or intermediate or bad position is enabled
		t	ST	-	EN_CLOSE	Mon	Close operation at open or intermediate or bad position is enabled

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
EnaOpn	a_dSPS	stVal	ST	-	EN_OPEN	Mon	Open operation at closed or intermediate or bad position is enabled
		q	ST	-	EN_OPEN	Mon	Open operation at closed or intermediate or bad position is enabled
		t	ST	-	EN_OPEN	Mon	Open operation at closed or intermediate or bad position is enabled

7.2.3 Switch controller CSWI

7.2.3.1 General switch control, both for circuit breaker and disconnector control GNRLCSWI

LN type	LN prefix	LN class	Function block name
GNRLCSWI (revision 0)	GNRL	CSWI	GNRLCSWI

Table 4: GNRLCSWI Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Pos	a_dDPC	Cancel.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Cancel.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		SBOw.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		SBOw.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		SBOw.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Cancel.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Cancel.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		SBOw.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Pos	a_dDPC	SBOw.T	CO	-	-	Cmd	Command parameter for IEC61850
		Cancel.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Cancel.Test	CO	-	-	Cmd	Command parameter for IEC61850
		SBOw.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850
		SBOw.Check	CO	-	-	Cmd	Command parameter for IEC61850
		stVal	ST	-	POSITION	Mon	Position indication
		q	ST	-	POSITION	Mon	Position indication
		t	ST	-	POSITION	Mon	Position indication
		stSeld	ST	-	SELECTED	Mon	The select conditions are fulfilled
		subEna	SV	-	-	-	Substitute enable
		subVal	SV	-	-	-	Substituted double position value
		ctlModel	CF	-	Control model	-	Specifies the type for control model according to IEC 61850
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
OpCls	b_dACT	general	ST	T	EXE_CL	Mon	Execute command for close direction
		q	ST	T	EXE_CL	Mon	Execute command for close direction

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
OpCls	b_dACT	t	ST	T	EXE_CL	Mon	Execute command for close direction
OpOpn	b_dACT	general	ST	T	EXE_OP	Mon	Execute command for open direction
		q	ST	T	EXE_OP	Mon	Execute command for open direction
		t	ST	T	EXE_OP	Mon	Execute command for open direction
BlkCmd	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Special block command value
		Oper.origin.orCat	CO	-	-	Cmd	Special block command value
		Oper.origin.orIdent	CO	-	-	Cmd	Special block command value
		Oper.ctlNum	CO	-	-	Cmd	Special block command value
		Oper.T	CO	-	-	Cmd	Special block command value
		Oper.Test	CO	-	-	Cmd	Special block command value
		Oper.Check	CO	-	-	Cmd	Special block command value
		stVal	ST	-	CMD_BLKD	Mon	Commands are blocked
		q	ST	-	CMD_BLKD	Mon	Commands are blocked
		t	ST	-	CMD_BLKD	Mon	Commands are blocked

7.3 Logical nodes for protection functions

7.3.1 Directional earth fault PDEF

7.3.1.1 Directional earth-fault protetion, high stage DEFHPDEF

LN type	LN prefix	LN class	Function block name
DEFLLN0 instance 1 (revision 0)	-	LLN0	DEFHPDEF
DEFPTOC instance 1 (revision 0)	DEFH	PTOC	DEFHPDEF
DEFRDIR instance 1 (revision 0)	DEFH	RDIR	DEFHPDEF

Table 5: DEFLLN0 Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850

Table 6: DEFPTOC Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE	Mon	Operated
		q	ST	T	OPERATE	Mon	Operated
		t	ST	T	OPERATE	Mon	Operated
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Str	d_dACD	general	ST	-	START	Mon	Started
		dirGeneral	ST	-	FAULT_DIR	Mon	Detected fault direction
		q	ST	-	START	Mon	Started
		t	ST	-	START	Mon	Started
IvdCrv	v1_dSPS	stVal	ST	-	INVAL_CRV	Mon	Invalid curve parameters
		q	ST	-	INVAL_CRV	Mon	Invalid curve parameters
		t	ST	-	INVAL_CRV	Mon	Invalid curve parameters
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Ratio of start time / operate time
		q	MX	-	START_DUR	Mon	Ratio of start time / operate time
		t	MX	-	START_DUR	Mon	Ratio of start time / operate time

Table 7: DEFRDIR Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Dir	b_dACD	dirGeneral	ST	-	DIRECTION	Mon	Direction information

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Dir	b_dACD	q	ST	-	DIRECTION	Mon	Direction information
		t	ST	-	DIRECTION	Mon	Direction information
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
OpAEF	v2_dMV	mag.f	MX	-	I_OPER	Mon	Calculated operating current
		q	MX	-	I_OPER	Mon	Calculated operating current
		t	MX	-	I_OPER	Mon	Calculated operating current
OpPolAng	v2_dMV	mag.f	MX	-	ANGLE	Mon	Angle between polarizing and operating quantity
		q	MX	-	ANGLE	Mon	Angle between polarizing and operating quantity
		t	MX	-	ANGLE	Mon	Angle between polarizing and operating quantity
OpChrAng	v2_dMV	mag.f	MX	-	ANGLE_RCA	Mon	Angle between operating angle and characteristic angle
		q	MX	-	ANGLE_RCA	Mon	Angle between operating angle and characteristic angle
		t	MX	-	ANGLE_RCA	Mon	Angle between operating angle and characteristic angle

7.3.1.2 Directional earth-fault protetion, low stage DEFLPDEF

LN type	LN prefix	LN class	Function block name
DEFLLN0 instance 1 (revision 0)	-	LLN0	DEFLPDEF
DEFPTOC instance 1 (revision 0)	DEFL	PTOC	DEFLPDEF
DEFRDIR instance 1 (revision 0)	DEFL	RDIR	DEFLPDEF

Table 8: DEFLLN0 Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850

Table 9: DEFPTOC Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE	Mon	Operated
		q	ST	T	OPERATE	Mon	Operated
		t	ST	T	OPERATE	Mon	Operated
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Str	d_dACD	general	ST	-	START	Mon	Started
		dirGeneral	ST	-	FAULT_DIR	Mon	Detected fault direction
		q	ST	-	START	Mon	Started
		t	ST	-	START	Mon	Started
IvdCrv	v1_dSPS	stVal	ST	-	INVAL_CRV	Mon	Invalid curve parameters
		q	ST	-	INVAL_CRV	Mon	Invalid curve parameters
		t	ST	-	INVAL_CRV	Mon	Invalid curve parameters
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Ratio of start time / operate time
		q	MX	-	START_DUR	Mon	Ratio of start time / operate time
		t	MX	-	START_DUR	Mon	Ratio of start time / operate time

Table 10: DEFRDIR Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Dir	b_dACD	dirGeneral	ST	-	DIRECTION	Mon	Direction information
		q	ST	-	DIRECTION	Mon	Direction information
		t	ST	-	DIRECTION	Mon	Direction information
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	c_dINC	t	ST	-	-	Mon	Mode status parameter for 61850
OpAEF	v2_dMV	mag.f	MX	-	I_OPER	Mon	Calculated operating current
		q	MX	-	I_OPER	Mon	Calculated operating current
		t	MX	-	I_OPER	Mon	Calculated operating current
OpPolAng	v2_dMV	mag.f	MX	-	ANGLE	Mon	Angle between polarizing and operating quantity
		q	MX	-	ANGLE	Mon	Angle between polarizing and operating quantity
		t	MX	-	ANGLE	Mon	Angle between polarizing and operating quantity
OpChrAng	v2_dMV	mag.f	MX	-	ANGLE_RCA	Mon	Angle between operating angle and characteristic angle
		q	MX	-	ANGLE_RCA	Mon	Angle between operating angle and characteristic angle
		t	MX	-	ANGLE_RCA	Mon	Angle between operating angle and characteristic angle

7.3.2 Differential protection PDIF

7.3.2.1 Restricted EF protection based on high impedance principle HREFPDIF

LN type	LN prefix	LN class	Function block name
HREFPDIF (revision 0)	HREF	PDIF	HREFPDIF

Table 11: HREFPDIF Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE	Mon	High impedance restricted earthfault protection operate
		q	ST	T	OPERATE	Mon	High impedance restricted earthfault protection operate
		t	ST	T	OPERATE	Mon	High impedance restricted earthfault protection operate
Str	d_dACD	general	ST	-	START	Mon	High impedance restricted earthfault protection start
		q	ST	-	START	Mon	High impedance restricted earthfault protection start
		t	ST	-	START	Mon	High impedance restricted earthfault protection start
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time
		q	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time
		t	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time

7.3.3 Distance protection PDIS

7.3.3.1 Distance protection for distribution networks DSTPDIS

LN type	LN prefix	LN class	Function block name
DST1MSTA instance 1 (revision 0)	DST	MSTA	DSTPDIS
DST1MSTA instance 2 (revision 0)	DST	MSTA	DSTPDIS
DST1MSTA instance 3 (revision 0)	DST	MSTA	DSTPDIS
DST1MSTA instance 4 (revision 0)	DST	MSTA	DSTPDIS
DST1MSTA instance 5 (revision 0)	DST	MSTA	DSTPDIS
DSTLLN0 instance 1 (revision 0)	-	LLN0	DSTPDIS
DSTMSTA instance 6 (revision 0)	DST	MSTA	DSTPDIS
DSTMSTA instance 7 (revision 0)	DST	MSTA	DSTPDIS
DSTMSTA instance 8 (revision 0)	DST	MSTA	DSTPDIS
DSTMSTA instance 9 (revision 0)	DST	MSTA	DSTPDIS
DSTMSTA instance 10 (revision 0)	DST	MSTA	DSTPDIS
DSTMSTA instance 11 (revision 0)	DST	MSTA	DSTPDIS
DSTMSTA instance 12 (revision 0)	DST	MSTA	DSTPDIS
DSTMSTA instance 13 (revision 0)	DST	MSTA	DSTPDIS
DSTMSTA instance 14 (revision 0)	DST	MSTA	DSTPDIS
DSTMSTA instance 15 (revision 0)	DST	MSTA	DSTPDIS
DSTPDIS instance 1 (revision 0)	DST	PDIS	DSTPDIS
DSTPDIS instance 2 (revision 0)	DST	PDIS	DSTPDIS

DSTPDIS instance 3 (revision 0)	DST	PDIS	DSTPDIS
DSTPDIS instance 4 (revision 0)	DST	PDIS	DSTPDIS
DSTPDIS instance 5 (revision 0)	DST	PDIS	DSTPDIS
DSTRDIR instance 1 (revision 0)	DST	RDIR	DSTPDIS
GFC1MSTA instance 16 (revision 0)	DST	MSTA	DSTPDIS
GFCMSTA instance 17 (revision 0)	DST	MSTA	DSTPDIS
GFCMSTA instance 18 (revision 0)	DST	MSTA	DSTPDIS
GFCPDIS instance 6 (revision 0)	DST	PDIS	DSTPDIS
GFCRDIR instance 2 (revision 0)	DST	RDIR	DSTPDIS

Table 12: DST1MSTA Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
DirRisZn	v2_dMV	mag.f	MX	-	1 DIR_LOOP_R Z1	Mon	Record data of bank 1 for direction resistance, Zone Z1
		q	MX	-	1 DIR_LOOP_R Z1	Mon	Record data of bank 1 for direction resistance, Zone Z1
		t	MX	-	1 DIR_LOOP_R Z1	Mon	Record data of bank 1 for direction resistance, Zone Z1
DirReactZn	v2_dMV	mag.f	MX	-	1 DIR_LOOP_X Z1	Mon	Record data of bank 1 for direction reactance, Zone Z1
		q	MX	-	1 DIR_LOOP_X Z1	Mon	Record data of bank 1 for direction reactance, Zone Z1
		t	MX	-	1 DIR_LOOP_X Z1	Mon	Record data of bank 1 for direction reactance, Zone Z1
PhLoopRis1	v2_dMV	mag.f	MX	-	1 FLTLOOP_RFST Z1	Mon	Record data of bank 1 for PE-loop resistance (1st), Zone Z1
		q	MX	-	1 FLTLOOP_RFST Z1	Mon	Record data of bank 1 for PE-loop resistance (1st), Zone Z1
		t	MX	-	1 FLTLOOP_RFST Z1	Mon	Record data of bank 1 for PE-loop resistance (1st), Zone Z1
PhLoopRea1	v2_dMV	mag.f	MX	-	1 FLTLOOP_XFST Z1	Mon	Record data of bank 1 for PE-loop reactance (1st), Zone Z1
		q	MX	-	1 FLTLOOP_XFST Z1	Mon	Record data of bank 1 for PE-loop reactance (1st), Zone Z1
		t	MX	-	1 FLTLOOP_XFST Z1	Mon	Record data of bank 1 for PE-loop reactance (1st), Zone Z1
PhLoopRis2	v2_dMV	mag.f	MX	-	1 FLTLOOP_RSND Z1	Mon	Record data of bank 1 for PE-loop resistance (2nd), Zone Z1

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PhLoopRis2	v2_dMV	q	MX	-	1 FLTLOOP_RSND Z1	Mon	Record data of bank 1 for PE-loop resistance (2nd), Zone Z1
		t	MX	-	1 FLTLOOP_RSND Z1	Mon	Record data of bank 1 for PE-loop resistance (2nd), Zone Z1
PhLoopRea2	v2_dMV	mag.f	MX	-	1 FLTLOOP_XSND Z1	Mon	Record data of bank 1 for PE-loop reactance (2nd), Zone Z1
		q	MX	-	1 FLTLOOP_XSND Z1	Mon	Record data of bank 1 for PE-loop reactance (2nd), Zone Z1
		t	MX	-	1 FLTLOOP_XSND Z1	Mon	Record data of bank 1 for PE-loop reactance (2nd), Zone Z1
PPLoopRis	v2_dMV	mag.f	MX	-	1 FLTLOOP_RPP Z1	Mon	Record data of bank 1 for PP-loop resistance, Zone Z1
		q	MX	-	1 FLTLOOP_RPP Z1	Mon	Record data of bank 1 for PP-loop resistance, Zone Z1
		t	MX	-	1 FLTLOOP_RPP Z1	Mon	Record data of bank 1 for PP-loop resistance, Zone Z1
PPLoopReac	v2_dMV	mag.f	MX	-	1 FLTLOOP_XPP Z1	Mon	Record data of bank 1 for PP-loop reactance, Zone Z1
		q	MX	-	1 FLTLOOP_XPP Z1	Mon	Record data of bank 1 for PP-loop reactance, Zone Z1
		t	MX	-	1 FLTLOOP_XPP Z1	Mon	Record data of bank 1 for PP-loop reactance, Zone Z1

Table 13: DST1MSTA Logical node data (instance 2)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
DirRisZn	v2_dMV	mag.f	MX	-	1 DIR_LOOP_R Z2	Mon	Record data of bank 1 for direction resistance, Zone Z2
		q	MX	-	1 DIR_LOOP_R Z2	Mon	Record data of bank 1 for direction resistance, Zone Z2
		t	MX	-	1 DIR_LOOP_R Z2	Mon	Record data of bank 1 for direction resistance, Zone Z2
DirReactZn	v2_dMV	mag.f	MX	-	1 DIR_LOOP_X Z2	Mon	Record data of bank 1 for direction reactance, Zone Z2
		q	MX	-	1 DIR_LOOP_X Z2	Mon	Record data of bank 1 for direction reactance, Zone Z2
		t	MX	-	1 DIR_LOOP_X Z2	Mon	Record data of bank 1 for direction reactance, Zone Z2
PhLoopRis1	v2_dMV	mag.f	MX	-	1 FLTLOOP_RFST Z2	Mon	Record data of bank 1 for PE-loop resistance (1st), Zone Z2

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PhLoopRis1	v2_dMV	q	MX	-	1 FLTLOOP_RFST Z2	Mon	Record data of bank 1 for PE-loop resistance (1st), Zone Z2
		t	MX	-	1 FLTLOOP_RFST Z2	Mon	Record data of bank 1 for PE-loop resistance (1st), Zone Z2
PhLoopRea1	v2_dMV	mag.f	MX	-	1 FLTLOOP_XFST Z2	Mon	Record data of bank 1 for PE-loop reactance (1st), Zone Z2
		q	MX	-	1 FLTLOOP_XFST Z2	Mon	Record data of bank 1 for PE-loop reactance (1st), Zone Z2
		t	MX	-	1 FLTLOOP_XFST Z2	Mon	Record data of bank 1 for PE-loop reactance (1st), Zone Z2
PhLoopRis2	v2_dMV	mag.f	MX	-	1 FLTLOOP_RSND Z2	Mon	Record data of bank 1 for PE-loop resistance (2nd), Zone Z2
		q	MX	-	1 FLTLOOP_RSND Z2	Mon	Record data of bank 1 for PE-loop resistance (2nd), Zone Z2
		t	MX	-	1 FLTLOOP_RSND Z2	Mon	Record data of bank 1 for PE-loop resistance (2nd), Zone Z2
PhLoopRea2	v2_dMV	mag.f	MX	-	1 FLTLOOP_XSND Z2	Mon	Record data of bank 1 for PE-loop reactance (2nd), Zone Z2
		q	MX	-	1 FLTLOOP_XSND Z2	Mon	Record data of bank 1 for PE-loop reactance (2nd), Zone Z2
		t	MX	-	1 FLTLOOP_XSND Z2	Mon	Record data of bank 1 for PE-loop reactance (2nd), Zone Z2
PPLoopRis	v2_dMV	mag.f	MX	-	1 FLTLOOP_RPP Z2	Mon	Record data of bank 1 for PP-loop resistance, Zone Z2
		q	MX	-	1 FLTLOOP_RPP Z2	Mon	Record data of bank 1 for PP-loop resistance, Zone Z2
		t	MX	-	1 FLTLOOP_RPP Z2	Mon	Record data of bank 1 for PP-loop resistance, Zone Z2
PPLoopReac	v2_dMV	mag.f	MX	-	1 FLTLOOP_XPP Z2	Mon	Record data of bank 1 for PP-loop reactance, Zone Z2
		q	MX	-	1 FLTLOOP_XPP Z2	Mon	Record data of bank 1 for PP-loop reactance, Zone Z2
		t	MX	-	1 FLTLOOP_XPP Z2	Mon	Record data of bank 1 for PP-loop reactance, Zone Z2

Table 14: DST1MSTA Logical node data (instance 3)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
DirRisZn	v2_dMV	mag.f	MX	-	1 DIR_LOOP_R Z3	Mon	Record data of bank 1 for direction resistance, Zone Z3

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
DirRisZn	v2_dMV	q	MX	-	1 DIR_LOOP_R Z3	Mon	Record data of bank 1 for direction resistance, Zone Z3
		t	MX	-	1 DIR_LOOP_R Z3	Mon	Record data of bank 1 for direction resistance, Zone Z3
DirReactZn	v2_dMV	mag.f	MX	-	1 DIR_LOOP_X Z3	Mon	Record data of bank 1 for direction reactance, Zone Z3
		q	MX	-	1 DIR_LOOP_X Z3	Mon	Record data of bank 1 for direction reactance, Zone Z3
		t	MX	-	1 DIR_LOOP_X Z3	Mon	Record data of bank 1 for direction reactance, Zone Z3
PhLoopRis1	v2_dMV	mag.f	MX	-	1 FLTLOOP_RFST Z3	Mon	Record data of bank 1 for PE-loop resistance (1st), Zone Z3
		q	MX	-	1 FLTLOOP_RFST Z3	Mon	Record data of bank 1 for PE-loop resistance (1st), Zone Z3
		t	MX	-	1 FLTLOOP_RFST Z3	Mon	Record data of bank 1 for PE-loop resistance (1st), Zone Z3
PhLoopRea1	v2_dMV	mag.f	MX	-	1 FLTLOOP_XFST Z3	Mon	Record data of bank 1 for PE-loop reactance (1st), Zone Z3
		q	MX	-	1 FLTLOOP_XFST Z3	Mon	Record data of bank 1 for PE-loop reactance (1st), Zone Z3
		t	MX	-	1 FLTLOOP_XFST Z3	Mon	Record data of bank 1 for PE-loop reactance (1st), Zone Z3
PhLoopRis2	v2_dMV	mag.f	MX	-	1 FLTLOOP_RSND Z3	Mon	Record data of bank 1 for PE-loop resistance (2nd), Zone Z3
		q	MX	-	1 FLTLOOP_RSND Z3	Mon	Record data of bank 1 for PE-loop resistance (2nd), Zone Z3
		t	MX	-	1 FLTLOOP_RSND Z3	Mon	Record data of bank 1 for PE-loop resistance (2nd), Zone Z3
PhLoopRea2	v2_dMV	mag.f	MX	-	1 FLTLOOP_XSND Z3	Mon	Record data of bank 1 for PE-loop reactance (2nd), Zone Z3
		q	MX	-	1 FLTLOOP_XSND Z3	Mon	Record data of bank 1 for PE-loop reactance (2nd), Zone Z3
		t	MX	-	1 FLTLOOP_XSND Z3	Mon	Record data of bank 1 for PE-loop reactance (2nd), Zone Z3
PPLoopRis	v2_dMV	mag.f	MX	-	1 FLTLOOP_RPP Z3	Mon	Record data of bank 1 for PP-loop resistance, Zone Z3
		q	MX	-	1 FLTLOOP_RPP Z3	Mon	Record data of bank 1 for PP-loop resistance, Zone Z3
		t	MX	-	1 FLTLOOP_RPP Z3	Mon	Record data of bank 1 for PP-loop resistance, Zone Z3
PPLoopReac	v2_dMV	mag.f	MX	-	1 FLTLOOP_XPP Z3	Mon	Record data of bank 1 for PP-loop reactance, Zone Z3
		q	MX	-	1 FLTLOOP_XPP Z3	Mon	Record data of bank 1 for PP-loop reactance, Zone Z3
		t	MX	-	1 FLTLOOP_XPP Z3	Mon	Record data of bank 1 for PP-loop reactance, Zone Z3

Table 15: DST1MSTA Logical node data (instance 4)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
DirRisZn	v2_dMV	mag.f	MX	-	1 DIR_LOOP_R AR1	Mon	Record data of bank 1 for direction resistance, Zone AR1
		q	MX	-	1 DIR_LOOP_R AR1	Mon	Record data of bank 1 for direction resistance, Zone AR1
		t	MX	-	1 DIR_LOOP_R AR1	Mon	Record data of bank 1 for direction resistance, Zone AR1
DirReactZn	v2_dMV	mag.f	MX	-	1 DIR_LOOP_X AR1	Mon	Record data of bank 1 for direction reactance, Zone AR1
		q	MX	-	1 DIR_LOOP_X AR1	Mon	Record data of bank 1 for direction reactance, Zone AR1
		t	MX	-	1 DIR_LOOP_X AR1	Mon	Record data of bank 1 for direction reactance, Zone AR1
PhLoopRis1	v2_dMV	mag.f	MX	-	1 FLTLOOP_RFST AR1	Mon	Record data of bank 1 for PE-loop resistance (1st), Zone AR1
		q	MX	-	1 FLTLOOP_RFST AR1	Mon	Record data of bank 1 for PE-loop resistance (1st), Zone AR1
		t	MX	-	1 FLTLOOP_RFST AR1	Mon	Record data of bank 1 for PE-loop resistance (1st), Zone AR1
PhLoopRea1	v2_dMV	mag.f	MX	-	1 FLTLOOP_XFST AR1	Mon	Record data of bank 1 for PE-loop reactance (1st), Zone AR1
		q	MX	-	1 FLTLOOP_XFST AR1	Mon	Record data of bank 1 for PE-loop reactance (1st), Zone AR1
		t	MX	-	1 FLTLOOP_XFST AR1	Mon	Record data of bank 1 for PE-loop reactance (1st), Zone AR1
PhLoopRis2	v2_dMV	mag.f	MX	-	1 FLTLOOP_RSND AR1	Mon	Record data of bank 1 for PE-loop resistance (2nd), Zone AR1
		q	MX	-	1 FLTLOOP_RSND AR1	Mon	Record data of bank 1 for PE-loop resistance (2nd), Zone AR1
		t	MX	-	1 FLTLOOP_RSND AR1	Mon	Record data of bank 1 for PE-loop resistance (2nd), Zone AR1
PhLoopRea2	v2_dMV	mag.f	MX	-	1 FLTLOOP_XSND AR1	Mon	Record data of bank 1 for PE-loop reactance (2nd), Zone AR1
		q	MX	-	1 FLTLOOP_XSND AR1	Mon	Record data of bank 1 for PE-loop reactance (2nd), Zone AR1
		t	MX	-	1 FLTLOOP_XSND AR1	Mon	Record data of bank 1 for PE-loop reactance (2nd), Zone AR1
PPLoopRis	v2_dMV	mag.f	MX	-	1 FLTLOOP_RPP AR1	Mon	Record data of bank 1 for PP-loop resistance, Zone AR1

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PPLoopRis	v2_dMV	q	MX	-	1 FLTLOOP_RPP AR1	Mon	Record data of bank 1 for PP-loop resistance, Zone AR1
		t	MX	-	1 FLTLOOP_RPP AR1	Mon	Record data of bank 1 for PP-loop resistance, Zone AR1
PPLoopReac	v2_dMV	mag.f	MX	-	1 FLTLOOP_XPP AR1	Mon	Record data of bank 1 for PP-loop reactance, Zone AR1
		q	MX	-	1 FLTLOOP_XPP AR1	Mon	Record data of bank 1 for PP-loop reactance, Zone AR1
		t	MX	-	1 FLTLOOP_XPP AR1	Mon	Record data of bank 1 for PP-loop reactance, Zone AR1

Table 16: DST1MSTA Logical node data (instance 5)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
DirRisZn	v2_dMV	mag.f	MX	-	1 DIR_LOOP_R AR2	Mon	Record data of bank 1 for direction resistance, Zone AR2
		q	MX	-	1 DIR_LOOP_R AR2	Mon	Record data of bank 1 for direction resistance, Zone AR2
		t	MX	-	1 DIR_LOOP_R AR2	Mon	Record data of bank 1 for direction resistance, Zone AR2
DirReactZn	v2_dMV	mag.f	MX	-	1 DIR_LOOP_X AR2	Mon	Record data of bank 1 for direction reactance, Zone AR2
		q	MX	-	1 DIR_LOOP_X AR2	Mon	Record data of bank 1 for direction reactance, Zone AR2
		t	MX	-	1 DIR_LOOP_X AR2	Mon	Record data of bank 1 for direction reactance, Zone AR2
PhLoopRis1	v2_dMV	mag.f	MX	-	1 FLTLOOP_RFST AR2	Mon	Record data of bank 1 for PE-loop resistance (1st), Zone AR2
		q	MX	-	1 FLTLOOP_RFST AR2	Mon	Record data of bank 1 for PE-loop resistance (1st), Zone AR2
		t	MX	-	1 FLTLOOP_RFST AR2	Mon	Record data of bank 1 for PE-loop resistance (1st), Zone AR2
PhLoopRea1	v2_dMV	mag.f	MX	-	1 FLTLOOP_XFST AR2	Mon	Record data of bank 1 for PE-loop reactance (1st), Zone AR2
		q	MX	-	1 FLTLOOP_XFST AR2	Mon	Record data of bank 1 for PE-loop reactance (1st), Zone AR2
		t	MX	-	1 FLTLOOP_XFST AR2	Mon	Record data of bank 1 for PE-loop reactance (1st), Zone AR2
PhLoopRis2	v2_dMV	mag.f	MX	-	1 FLTLOOP_RSND AR2	Mon	Record data of bank 1 for PE-loop resistance (2nd), Zone AR2

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PhLoopRis2	v2_dMV	q	MX	-	1 FLTLOOP_RSND AR2	Mon	Record data of bank 1 for PE-loop resistance (2nd), Zone AR2
		t	MX	-	1 FLTLOOP_RSND AR2	Mon	Record data of bank 1 for PE-loop resistance (2nd), Zone AR2
PhLoopRea2	v2_dMV	mag.f	MX	-	1 FLTLOOP_XSND AR2	Mon	Record data of bank 1 for PE-loop reactance (2nd), Zone AR2
		q	MX	-	1 FLTLOOP_XSND AR2	Mon	Record data of bank 1 for PE-loop reactance (2nd), Zone AR2
		t	MX	-	1 FLTLOOP_XSND AR2	Mon	Record data of bank 1 for PE-loop reactance (2nd), Zone AR2
PPLoopRis	v2_dMV	mag.f	MX	-	1 FLTLOOP_RPP AR2	Mon	Record data of bank 1 for PP-loop resistance, Zone AR2
		q	MX	-	1 FLTLOOP_RPP AR2	Mon	Record data of bank 1 for PP-loop resistance, Zone AR2
		t	MX	-	1 FLTLOOP_RPP AR2	Mon	Record data of bank 1 for PP-loop resistance, Zone AR2
PPLoopReac	v2_dMV	mag.f	MX	-	1 FLTLOOP_XPP AR2	Mon	Record data of bank 1 for PP-loop reactance, Zone AR2
		q	MX	-	1 FLTLOOP_XPP AR2	Mon	Record data of bank 1 for PP-loop reactance, Zone AR2
		t	MX	-	1 FLTLOOP_XPP AR2	Mon	Record data of bank 1 for PP-loop reactance, Zone AR2

Table 17: DSTLLN0 Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Rs	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Rs	v1_dSPC	Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850

Table 18: DSTMSTA Logical node data (instance 7)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
DirRisZn	v2_dMV	mag.f	MX	-	3 DIR_LOOP_R Z1	Mon	Record data of bank 3 for direction resistance, Zone Z1
		q	MX	-	3 DIR_LOOP_R Z1	Mon	Record data of bank 3 for direction resistance, Zone Z1
		t	MX	-	3 DIR_LOOP_R Z1	Mon	Record data of bank 3 for direction resistance, Zone Z1
DirReactZn	v2_dMV	mag.f	MX	-	3 DIR_LOOP_X Z1	Mon	Record data of bank 3 for direction reactance, Zone Z1
		q	MX	-	3 DIR_LOOP_X Z1	Mon	Record data of bank 3 for direction reactance, Zone Z1
		t	MX	-	3 DIR_LOOP_X Z1	Mon	Record data of bank 3 for direction reactance, Zone Z1
PhLoopRis1	v2_dMV	mag.f	MX	-	3 FLTLOOP_RFST Z1	Mon	Record data of bank 3 for PE-loop resistance (1st), Zone Z1
		q	MX	-	3 FLTLOOP_RFST Z1	Mon	Record data of bank 3 for PE-loop resistance (1st), Zone Z1
		t	MX	-	3 FLTLOOP_RFST Z1	Mon	Record data of bank 3 for PE-loop resistance (1st), Zone Z1
PhLoopRea1	v2_dMV	mag.f	MX	-	3 FLTLOOP_XFST Z1	Mon	Record data of bank 3 for PE-loop reactance (1st), Zone Z1
		q	MX	-	3 FLTLOOP_XFST Z1	Mon	Record data of bank 3 for PE-loop reactance (1st), Zone Z1
		t	MX	-	3 FLTLOOP_XFST Z1	Mon	Record data of bank 3 for PE-loop reactance (1st), Zone Z1
PhLoopRis2	v2_dMV	mag.f	MX	-	3 FLTLOOP_RSND Z1	Mon	Record data of bank 3 for PE-loop resistance (2nd), Zone Z1

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PhLoopRis2	v2_dMV	q	MX	-	3 FLTLOOP_RSND Z1	Mon	Record data of bank 3 for PE-loop resistance (2nd), Zone Z1
		t	MX	-	3 FLTLOOP_RSND Z1	Mon	Record data of bank 3 for PE-loop resistance (2nd), Zone Z1
PhLoopRea2	v2_dMV	mag.f	MX	-	3 FLTLOOP_XSND Z1	Mon	Record data of bank 3 for PE-loop reactance (2nd), Zone Z1
		q	MX	-	3 FLTLOOP_XSND Z1	Mon	Record data of bank 3 for PE-loop reactance (2nd), Zone Z1
		t	MX	-	3 FLTLOOP_XSND Z1	Mon	Record data of bank 3 for PE-loop reactance (2nd), Zone Z1
PPLoopRis	v2_dMV	mag.f	MX	-	3 FLTLOOP_RPP Z1	Mon	Record data of bank 3 for PP-loop resistance, Zone Z1
		q	MX	-	3 FLTLOOP_RPP Z1	Mon	Record data of bank 3 for PP-loop resistance, Zone Z1
		t	MX	-	3 FLTLOOP_RPP Z1	Mon	Record data of bank 3 for PP-loop resistance, Zone Z1
PPLoopReac	v2_dMV	mag.f	MX	-	3 FLTLOOP_XPP Z1	Mon	Record data of bank 3 for PP-loop reactance, Zone Z1
		q	MX	-	3 FLTLOOP_XPP Z1	Mon	Record data of bank 3 for PP-loop reactance, Zone Z1
		t	MX	-	3 FLTLOOP_XPP Z1	Mon	Record data of bank 3 for PP-loop reactance, Zone Z1

Table 19: DSTMSTA Logical node data (instance 8)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
DirRisZn	v2_dMV	mag.f	MX	-	2 DIR_LOOP_R Z2	Mon	Record data of bank 2 for direction resistance, Zone Z2
		q	MX	-	2 DIR_LOOP_R Z2	Mon	Record data of bank 2 for direction resistance, Zone Z2
		t	MX	-	2 DIR_LOOP_R Z2	Mon	Record data of bank 2 for direction resistance, Zone Z2
DirReactZn	v2_dMV	mag.f	MX	-	2 DIR_LOOP_X Z2	Mon	Record data of bank 2 for direction reactance, Zone Z2
		q	MX	-	2 DIR_LOOP_X Z2	Mon	Record data of bank 2 for direction reactance, Zone Z2
		t	MX	-	2 DIR_LOOP_X Z2	Mon	Record data of bank 2 for direction reactance, Zone Z2
PhLoopRis1	v2_dMV	mag.f	MX	-	2 FLTLOOP_RFST Z2	Mon	Record data of bank 2 for PE-loop resistance (1st), Zone Z2

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PhLoopRis1	v2_dMV	q	MX	-	2 FLTLOOP_RFST Z2	Mon	Record data of bank 2 for PE-loop resistance (1st), Zone Z2
		t	MX	-	2 FLTLOOP_RFST Z2	Mon	Record data of bank 2 for PE-loop resistance (1st), Zone Z2
PhLoopRea1	v2_dMV	mag.f	MX	-	2 FLTLOOP_XFST Z2	Mon	Record data of bank 2 for PE-loop reactance (1st), Zone Z2
		q	MX	-	2 FLTLOOP_XFST Z2	Mon	Record data of bank 2 for PE-loop reactance (1st), Zone Z2
		t	MX	-	2 FLTLOOP_XFST Z2	Mon	Record data of bank 2 for PE-loop reactance (1st), Zone Z2
PhLoopRis2	v2_dMV	mag.f	MX	-	2 FLTLOOP_RSND Z2	Mon	Record data of bank 2 for PE-loop resistance (2nd), Zone Z2
		q	MX	-	2 FLTLOOP_RSND Z2	Mon	Record data of bank 2 for PE-loop resistance (2nd), Zone Z2
		t	MX	-	2 FLTLOOP_RSND Z2	Mon	Record data of bank 2 for PE-loop resistance (2nd), Zone Z2
PhLoopRea2	v2_dMV	mag.f	MX	-	2 FLTLOOP_XSND Z2	Mon	Record data of bank 2 for PE-loop reactance (2nd), Zone Z2
		q	MX	-	2 FLTLOOP_XSND Z2	Mon	Record data of bank 2 for PE-loop reactance (2nd), Zone Z2
		t	MX	-	2 FLTLOOP_XSND Z2	Mon	Record data of bank 2 for PE-loop reactance (2nd), Zone Z2
PPLoopRis	v2_dMV	mag.f	MX	-	2 FLTLOOP_RPP Z2	Mon	Record data of bank 2 for PP-loop resistance, Zone Z2
		q	MX	-	2 FLTLOOP_RPP Z2	Mon	Record data of bank 2 for PP-loop resistance, Zone Z2
		t	MX	-	2 FLTLOOP_RPP Z2	Mon	Record data of bank 2 for PP-loop resistance, Zone Z2
PPLoopReac	v2_dMV	mag.f	MX	-	2 FLTLOOP_XPP Z2	Mon	Record data of bank 2 for PP-loop reactance, Zone Z2
		q	MX	-	2 FLTLOOP_XPP Z2	Mon	Record data of bank 2 for PP-loop reactance, Zone Z2
		t	MX	-	2 FLTLOOP_XPP Z2	Mon	Record data of bank 2 for PP-loop reactance, Zone Z2

Table 20: DSTMSTA Logical node data (instance 9)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
DirRisZn	v2_dMV	mag.f	MX	-	3 DIR_LOOP_R Z2	Mon	Record data of bank 3 for direction resistance, Zone Z2

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
DirRisZn	v2_dMV	q	MX	-	3 DIR_LOOP_R Z2	Mon	Record data of bank 3 for direction resistance, Zone Z2
		t	MX	-	3 DIR_LOOP_R Z2	Mon	Record data of bank 3 for direction resistance, Zone Z2
DirReactZn	v2_dMV	mag.f	MX	-	3 DIR_LOOP_X Z2	Mon	Record data of bank 3 for direction reactance, Zone Z2
		q	MX	-	3 DIR_LOOP_X Z2	Mon	Record data of bank 3 for direction reactance, Zone Z2
		t	MX	-	3 DIR_LOOP_X Z2	Mon	Record data of bank 3 for direction reactance, Zone Z2
PhLoopRis1	v2_dMV	mag.f	MX	-	3 FLTLOOP_RFST Z2	Mon	Record data of bank 3 for PE-loop resistance (1st), Zone Z2
		q	MX	-	3 FLTLOOP_RFST Z2	Mon	Record data of bank 3 for PE-loop resistance (1st), Zone Z2
		t	MX	-	3 FLTLOOP_RFST Z2	Mon	Record data of bank 3 for PE-loop resistance (1st), Zone Z2
PhLoopRea1	v2_dMV	mag.f	MX	-	3 FLTLOOP_XFST Z2	Mon	Record data of bank 3 for PE-loop reactance (1st), Zone Z2
		q	MX	-	3 FLTLOOP_XFST Z2	Mon	Record data of bank 3 for PE-loop reactance (1st), Zone Z2
		t	MX	-	3 FLTLOOP_XFST Z2	Mon	Record data of bank 3 for PE-loop reactance (1st), Zone Z2
PhLoopRis2	v2_dMV	mag.f	MX	-	3 FLTLOOP_RSND Z2	Mon	Record data of bank 3 for PE-loop resistance (2nd), Zone Z2
		q	MX	-	3 FLTLOOP_RSND Z2	Mon	Record data of bank 3 for PE-loop resistance (2nd), Zone Z2
		t	MX	-	3 FLTLOOP_RSND Z2	Mon	Record data of bank 3 for PE-loop resistance (2nd), Zone Z2
PhLoopRea2	v2_dMV	mag.f	MX	-	3 FLTLOOP_XSND Z2	Mon	Record data of bank 3 for PE-loop reactance (2nd), Zone Z2
		q	MX	-	3 FLTLOOP_XSND Z2	Mon	Record data of bank 3 for PE-loop reactance (2nd), Zone Z2
		t	MX	-	3 FLTLOOP_XSND Z2	Mon	Record data of bank 3 for PE-loop reactance (2nd), Zone Z2
PPLoopRis	v2_dMV	mag.f	MX	-	3 FLTLOOP_RPP Z2	Mon	Record data of bank 3 for PP-loop resistance, Zone Z2
		q	MX	-	3 FLTLOOP_RPP Z2	Mon	Record data of bank 3 for PP-loop resistance, Zone Z2
		t	MX	-	3 FLTLOOP_RPP Z2	Mon	Record data of bank 3 for PP-loop resistance, Zone Z2
PPLoopReac	v2_dMV	mag.f	MX	-	3 FLTLOOP_XPP Z2	Mon	Record data of bank 3 for PP-loop reactance, Zone Z2
		q	MX	-	3 FLTLOOP_XPP Z2	Mon	Record data of bank 3 for PP-loop reactance, Zone Z2
		t	MX	-	3 FLTLOOP_XPP Z2	Mon	Record data of bank 3 for PP-loop reactance, Zone Z2

Table 21: DSTMSTA Logical node data (instance 10)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
DirRisZn	v2_dMV	mag.f	MX	-	2 DIR_LOOP_R Z3	Mon	Record data of bank 2 for direction resistance, Zone Z3
		q	MX	-	2 DIR_LOOP_R Z3	Mon	Record data of bank 2 for direction resistance, Zone Z3
		t	MX	-	2 DIR_LOOP_R Z3	Mon	Record data of bank 2 for direction resistance, Zone Z3
DirReactZn	v2_dMV	mag.f	MX	-	2 DIR_LOOP_X Z3	Mon	Record data of bank 2 for direction reactance, Zone Z3
		q	MX	-	2 DIR_LOOP_X Z3	Mon	Record data of bank 2 for direction reactance, Zone Z3
		t	MX	-	2 DIR_LOOP_X Z3	Mon	Record data of bank 2 for direction reactance, Zone Z3
PhLoopRis1	v2_dMV	mag.f	MX	-	2 FLTLOOP_RFST Z3	Mon	Record data of bank 2 for PE-loop resistance (1st), Zone Z3
		q	MX	-	2 FLTLOOP_RFST Z3	Mon	Record data of bank 2 for PE-loop resistance (1st), Zone Z3
		t	MX	-	2 FLTLOOP_RFST Z3	Mon	Record data of bank 2 for PE-loop resistance (1st), Zone Z3
PhLoopRea1	v2_dMV	mag.f	MX	-	2 FLTLOOP_XFST Z3	Mon	Record data of bank 2 for PE-loop reactance (1st), Zone Z3
		q	MX	-	2 FLTLOOP_XFST Z3	Mon	Record data of bank 2 for PE-loop reactance (1st), Zone Z3
		t	MX	-	2 FLTLOOP_XFST Z3	Mon	Record data of bank 2 for PE-loop reactance (1st), Zone Z3
PhLoopRis2	v2_dMV	mag.f	MX	-	2 FLTLOOP_RSND Z3	Mon	Record data of bank 2 for PE-loop resistance (2nd), Zone Z3
		q	MX	-	2 FLTLOOP_RSND Z3	Mon	Record data of bank 2 for PE-loop resistance (2nd), Zone Z3
		t	MX	-	2 FLTLOOP_RSND Z3	Mon	Record data of bank 2 for PE-loop resistance (2nd), Zone Z3
PhLoopRea2	v2_dMV	mag.f	MX	-	2 FLTLOOP_XSND Z3	Mon	Record data of bank 2 for PE-loop reactance (2nd), Zone Z3
		q	MX	-	2 FLTLOOP_XSND Z3	Mon	Record data of bank 2 for PE-loop reactance (2nd), Zone Z3
		t	MX	-	2 FLTLOOP_XSND Z3	Mon	Record data of bank 2 for PE-loop reactance (2nd), Zone Z3
PPLoopRis	v2_dMV	mag.f	MX	-	2 FLTLOOP_RPP Z3	Mon	Record data of bank 2 for PP-loop resistance, Zone Z3

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PPLoopRis	v2_dMV	q	MX	-	2 FLTLOOP_RPP Z3	Mon	Record data of bank 2 for PP-loop resistance, Zone Z3
		t	MX	-	2 FLTLOOP_RPP Z3	Mon	Record data of bank 2 for PP-loop resistance, Zone Z3
PPLoopReac	v2_dMV	mag.f	MX	-	2 FLTLOOP_XPP Z3	Mon	Record data of bank 2 for PP-loop reactance, Zone Z3
		q	MX	-	2 FLTLOOP_XPP Z3	Mon	Record data of bank 2 for PP-loop reactance, Zone Z3
		t	MX	-	2 FLTLOOP_XPP Z3	Mon	Record data of bank 2 for PP-loop reactance, Zone Z3

Table 22: DSTMSTA Logical node data (instance 11)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
DirRisZn	v2_dMV	mag.f	MX	-	3 DIR_LOOP_R Z3	Mon	Record data of bank 3 for direction resistance, Zone Z3
		q	MX	-	3 DIR_LOOP_R Z3	Mon	Record data of bank 3 for direction resistance, Zone Z3
		t	MX	-	3 DIR_LOOP_R Z3	Mon	Record data of bank 3 for direction resistance, Zone Z3
DirReactZn	v2_dMV	mag.f	MX	-	3 DIR_LOOP_X Z3	Mon	Record data of bank 3 for direction reactance, Zone Z3
		q	MX	-	3 DIR_LOOP_X Z3	Mon	Record data of bank 3 for direction reactance, Zone Z3
		t	MX	-	3 DIR_LOOP_X Z3	Mon	Record data of bank 3 for direction reactance, Zone Z3
PhLoopRis1	v2_dMV	mag.f	MX	-	3 FLTLOOP_RFST Z3	Mon	Record data of bank 3 for PE-loop resistance (1st), Zone Z3
		q	MX	-	3 FLTLOOP_RFST Z3	Mon	Record data of bank 3 for PE-loop resistance (1st), Zone Z3
		t	MX	-	3 FLTLOOP_RFST Z3	Mon	Record data of bank 3 for PE-loop resistance (1st), Zone Z3
PhLoopRea1	v2_dMV	mag.f	MX	-	3 FLTLOOP_XFST Z3	Mon	Record data of bank 3 for PE-loop reactance (1st), Zone Z3
		q	MX	-	3 FLTLOOP_XFST Z3	Mon	Record data of bank 3 for PE-loop reactance (1st), Zone Z3
		t	MX	-	3 FLTLOOP_XFST Z3	Mon	Record data of bank 3 for PE-loop reactance (1st), Zone Z3
PhLoopRis2	v2_dMV	mag.f	MX	-	3 FLTLOOP_RSND Z3	Mon	Record data of bank 3 for PE-loop resistance (2nd), Zone Z3

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PhLoopRis2	v2_dMV	q	MX	-	3 FLTLOOP_RSND Z3	Mon	Record data of bank 3 for PE-loop resistance (2nd), Zone Z3
		t	MX	-	3 FLTLOOP_RSND Z3	Mon	Record data of bank 3 for PE-loop resistance (2nd), Zone Z3
PhLoopRea2	v2_dMV	mag.f	MX	-	3 FLTLOOP_XSND Z3	Mon	Record data of bank 3 for PE-loop reactance (2nd), Zone Z3
		q	MX	-	3 FLTLOOP_XSND Z3	Mon	Record data of bank 3 for PE-loop reactance (2nd), Zone Z3
		t	MX	-	3 FLTLOOP_XSND Z3	Mon	Record data of bank 3 for PE-loop reactance (2nd), Zone Z3
PPLoopRis	v2_dMV	mag.f	MX	-	3 FLTLOOP_RPP Z3	Mon	Record data of bank 3 for PP-loop resistance, Zone Z3
		q	MX	-	3 FLTLOOP_RPP Z3	Mon	Record data of bank 3 for PP-loop resistance, Zone Z3
		t	MX	-	3 FLTLOOP_RPP Z3	Mon	Record data of bank 3 for PP-loop resistance, Zone Z3
PPLoopReac	v2_dMV	mag.f	MX	-	3 FLTLOOP_XPP Z3	Mon	Record data of bank 3 for PP-loop reactance, Zone Z3
		q	MX	-	3 FLTLOOP_XPP Z3	Mon	Record data of bank 3 for PP-loop reactance, Zone Z3
		t	MX	-	3 FLTLOOP_XPP Z3	Mon	Record data of bank 3 for PP-loop reactance, Zone Z3

Table 23: DSTMSTA Logical node data (instance 12)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
DirRisZn	v2_dMV	mag.f	MX	-	2 DIR_LOOP_R AR1	Mon	Record data of bank 2 for direction resistance, Zone AR1
		q	MX	-	2 DIR_LOOP_R AR1	Mon	Record data of bank 2 for direction resistance, Zone AR1
		t	MX	-	2 DIR_LOOP_R AR1	Mon	Record data of bank 2 for direction resistance, Zone AR1
DirReactZn	v2_dMV	mag.f	MX	-	2 DIR_LOOP_X AR1	Mon	Record data of bank 2 for direction reactance, Zone AR1
		q	MX	-	2 DIR_LOOP_X AR1	Mon	Record data of bank 2 for direction reactance, Zone AR1
		t	MX	-	2 DIR_LOOP_X AR1	Mon	Record data of bank 2 for direction reactance, Zone AR1
PhLoopRis1	v2_dMV	mag.f	MX	-	2 FLTLOOP_RFST AR1	Mon	Record data of bank 2 for PE-loop resistance (1st), Zone AR1

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PhLoopRis1	v2_dMV	q	MX	-	2 FLTLOOP_RFST AR1	Mon	Record data of bank 2 for PE-loop resistance (1st), Zone AR1
		t	MX	-	2 FLTLOOP_RFST AR1	Mon	Record data of bank 2 for PE-loop resistance (1st), Zone AR1
PhLoopRea1	v2_dMV	mag.f	MX	-	2 FLTLOOP_XFST AR1	Mon	Record data of bank 2 for PE-loop reactance (1st), Zone AR1
		q	MX	-	2 FLTLOOP_XFST AR1	Mon	Record data of bank 2 for PE-loop reactance (1st), Zone AR1
		t	MX	-	2 FLTLOOP_XFST AR1	Mon	Record data of bank 2 for PE-loop reactance (1st), Zone AR1
PhLoopRis2	v2_dMV	mag.f	MX	-	2 FLTLOOP_RSND AR1	Mon	Record data of bank 2 for PE-loop resistance (2nd), Zone AR1
		q	MX	-	2 FLTLOOP_RSND AR1	Mon	Record data of bank 2 for PE-loop resistance (2nd), Zone AR1
		t	MX	-	2 FLTLOOP_RSND AR1	Mon	Record data of bank 2 for PE-loop resistance (2nd), Zone AR1
PhLoopRea2	v2_dMV	mag.f	MX	-	2 FLTLOOP_XSND AR1	Mon	Record data of bank 2 for PE-loop reactance (2nd), Zone AR1
		q	MX	-	2 FLTLOOP_XSND AR1	Mon	Record data of bank 2 for PE-loop reactance (2nd), Zone AR1
		t	MX	-	2 FLTLOOP_XSND AR1	Mon	Record data of bank 2 for PE-loop reactance (2nd), Zone AR1
PPLoopRis	v2_dMV	mag.f	MX	-	2 FLTLOOP_RPP AR1	Mon	Record data of bank 2 for PP-loop resistance, Zone AR1
		q	MX	-	2 FLTLOOP_RPP AR1	Mon	Record data of bank 2 for PP-loop resistance, Zone AR1
		t	MX	-	2 FLTLOOP_RPP AR1	Mon	Record data of bank 2 for PP-loop resistance, Zone AR1
PPLoopReac	v2_dMV	mag.f	MX	-	2 FLTLOOP_XPP AR1	Mon	Record data of bank 2 for PP-loop reactance, Zone AR1
		q	MX	-	2 FLTLOOP_XPP AR1	Mon	Record data of bank 2 for PP-loop reactance, Zone AR1
		t	MX	-	2 FLTLOOP_XPP AR1	Mon	Record data of bank 2 for PP-loop reactance, Zone AR1

Table 24: DSTMSTA Logical node data (instance 13)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
DirRisZn	v2_dMV	mag.f	MX	-	3 DIR_LOOP_R AR1	Mon	Record data of bank 3 for direction resistance, Zone AR1

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
DirRisZn	v2_dMV	q	MX	-	3 DIR_LOOP_R AR1	Mon	Record data of bank 3 for direction resistance, Zone AR1
		t	MX	-	3 DIR_LOOP_R AR1	Mon	Record data of bank 3 for direction resistance, Zone AR1
DirReactZn	v2_dMV	mag.f	MX	-	3 DIR_LOOP_X AR1	Mon	Record data of bank 3 for direction reactance, Zone AR1
		q	MX	-	3 DIR_LOOP_X AR1	Mon	Record data of bank 3 for direction reactance, Zone AR1
		t	MX	-	3 DIR_LOOP_X AR1	Mon	Record data of bank 3 for direction reactance, Zone AR1
PhLoopRis1	v2_dMV	mag.f	MX	-	3 FLTLOOP_RFST AR1	Mon	Record data of bank 3 for PE-loop resistance (1st), Zone AR1
		q	MX	-	3 FLTLOOP_RFST AR1	Mon	Record data of bank 3 for PE-loop resistance (1st), Zone AR1
		t	MX	-	3 FLTLOOP_RFST AR1	Mon	Record data of bank 3 for PE-loop resistance (1st), Zone AR1
PhLoopRea1	v2_dMV	mag.f	MX	-	3 FLTLOOP_XFST AR1	Mon	Record data of bank 3 for PE-loop reactance (1st), Zone AR1
		q	MX	-	3 FLTLOOP_XFST AR1	Mon	Record data of bank 3 for PE-loop reactance (1st), Zone AR1
		t	MX	-	3 FLTLOOP_XFST AR1	Mon	Record data of bank 3 for PE-loop reactance (1st), Zone AR1
PhLoopRis2	v2_dMV	mag.f	MX	-	3 FLTLOOP_RSND AR1	Mon	Record data of bank 3 for PE-loop resistance (2nd), Zone AR1
		q	MX	-	3 FLTLOOP_RSND AR1	Mon	Record data of bank 3 for PE-loop resistance (2nd), Zone AR1
		t	MX	-	3 FLTLOOP_RSND AR1	Mon	Record data of bank 3 for PE-loop resistance (2nd), Zone AR1
PhLoopRea2	v2_dMV	mag.f	MX	-	3 FLTLOOP_XSND AR1	Mon	Record data of bank 3 for PE-loop reactance (2nd), Zone AR1
		q	MX	-	3 FLTLOOP_XSND AR1	Mon	Record data of bank 3 for PE-loop reactance (2nd), Zone AR1
		t	MX	-	3 FLTLOOP_XSND AR1	Mon	Record data of bank 3 for PE-loop reactance (2nd), Zone AR1
PPLoopRis	v2_dMV	mag.f	MX	-	3 FLTLOOP_RPP AR1	Mon	Record data of bank 3 for PP-loop resistance, Zone AR1
		q	MX	-	3 FLTLOOP_RPP AR1	Mon	Record data of bank 3 for PP-loop resistance, Zone AR1
		t	MX	-	3 FLTLOOP_RPP AR1	Mon	Record data of bank 3 for PP-loop resistance, Zone AR1
PPLoopReac	v2_dMV	mag.f	MX	-	3 FLTLOOP_XPP AR1	Mon	Record data of bank 3 for PP-loop reactance, Zone AR1
		q	MX	-	3 FLTLOOP_XPP AR1	Mon	Record data of bank 3 for PP-loop reactance, Zone AR1
		t	MX	-	3 FLTLOOP_XPP AR1	Mon	Record data of bank 3 for PP-loop reactance, Zone AR1

Table 25: DSTMSTA Logical node data (instance 14)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
DirRisZn	v2_dMV	mag.f	MX	-	2 DIR_LOOP_R AR2	Mon	Record data of bank 2 for direction resistance, Zone AR2
		q	MX	-	2 DIR_LOOP_R AR2	Mon	Record data of bank 2 for direction resistance, Zone AR2
		t	MX	-	2 DIR_LOOP_R AR2	Mon	Record data of bank 2 for direction resistance, Zone AR2
DirReactZn	v2_dMV	mag.f	MX	-	2 DIR_LOOP_X AR2	Mon	Record data of bank 2 for direction reactance, Zone AR2
		q	MX	-	2 DIR_LOOP_X AR2	Mon	Record data of bank 2 for direction reactance, Zone AR2
		t	MX	-	2 DIR_LOOP_X AR2	Mon	Record data of bank 2 for direction reactance, Zone AR2
PhLoopRis1	v2_dMV	mag.f	MX	-	2 FLTLOOP_RFST AR2	Mon	Record data of bank 2 for PE-loop resistance (1st), Zone AR1
		q	MX	-	2 FLTLOOP_RFST AR2	Mon	Record data of bank 2 for PE-loop resistance (1st), Zone AR1
		t	MX	-	2 FLTLOOP_RFST AR2	Mon	Record data of bank 2 for PE-loop resistance (1st), Zone AR1
PhLoopRea1	v2_dMV	mag.f	MX	-	2 FLTLOOP_XFST AR2	Mon	Record data of bank 1 for PE-loop reactance (1st), Zone AR2
		q	MX	-	2 FLTLOOP_XFST AR2	Mon	Record data of bank 1 for PE-loop reactance (1st), Zone AR2
		t	MX	-	2 FLTLOOP_XFST AR2	Mon	Record data of bank 1 for PE-loop reactance (1st), Zone AR2
PhLoopRis2	v2_dMV	mag.f	MX	-	2 FLTLOOP_RSND AR2	Mon	Record data of bank 2 for PE-loop resistance (2nd), Zone AR2
		q	MX	-	2 FLTLOOP_RSND AR2	Mon	Record data of bank 2 for PE-loop resistance (2nd), Zone AR2
		t	MX	-	2 FLTLOOP_RSND AR2	Mon	Record data of bank 2 for PE-loop resistance (2nd), Zone AR2
PhLoopRea2	v2_dMV	mag.f	MX	-	2 FLTLOOP_XSND AR2	Mon	Record data of bank 2 for PE-loop reactance (2nd), Zone AR2
		q	MX	-	2 FLTLOOP_XSND AR2	Mon	Record data of bank 2 for PE-loop reactance (2nd), Zone AR2
		t	MX	-	2 FLTLOOP_XSND AR2	Mon	Record data of bank 2 for PE-loop reactance (2nd), Zone AR2
PPLoopRis	v2_dMV	mag.f	MX	-	2 FLTLOOP_RPP AR2	Mon	Record data of bank 2 for PP-loop resistance, Zone AR2

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PPLoopRis	v2_dMV	q	MX	-	2 FLTLOOP_RPP AR2	Mon	Record data of bank 2 for PP-loop resistance, Zone AR2
		t	MX	-	2 FLTLOOP_RPP AR2	Mon	Record data of bank 2 for PP-loop resistance, Zone AR2
PPLoopReac	v2_dMV	mag.f	MX	-	2 FLTLOOP_XPP AR2	Mon	Record data of bank 2 for PP-loop reactance, Zone AR2
		q	MX	-	2 FLTLOOP_XPP AR2	Mon	Record data of bank 2 for PP-loop reactance, Zone AR2
		t	MX	-	2 FLTLOOP_XPP AR2	Mon	Record data of bank 2 for PP-loop reactance, Zone AR2

Table 26: DSTMSTA Logical node data (instance 15)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
DirRisZn	v2_dMV	mag.f	MX	-	3 DIR_LOOP_R AR2	Mon	Record data of bank 3 for direction resistance, Zone AR2
		q	MX	-	3 DIR_LOOP_R AR2	Mon	Record data of bank 3 for direction resistance, Zone AR2
		t	MX	-	3 DIR_LOOP_R AR2	Mon	Record data of bank 3 for direction resistance, Zone AR2
DirReactZn	v2_dMV	mag.f	MX	-	3 DIR_LOOP_X AR2	Mon	Record data of bank 3 for direction reactance, Zone AR2
		q	MX	-	3 DIR_LOOP_X AR2	Mon	Record data of bank 3 for direction reactance, Zone AR2
		t	MX	-	3 DIR_LOOP_X AR2	Mon	Record data of bank 3 for direction reactance, Zone AR2
PhLoopRis1	v2_dMV	mag.f	MX	-	3 FLTLOOP_RFST AR2	Mon	Record data of bank 3 for PE-loop resistance (1st), Zone AR2
		q	MX	-	3 FLTLOOP_RFST AR2	Mon	Record data of bank 3 for PE-loop resistance (1st), Zone AR2
		t	MX	-	3 FLTLOOP_RFST AR2	Mon	Record data of bank 3 for PE-loop resistance (1st), Zone AR2
PhLoopRea1	v2_dMV	mag.f	MX	-	3 FLTLOOP_XFST AR2	Mon	Record data of bank 3 for PE-loop reactance (1st), Zone AR2
		q	MX	-	3 FLTLOOP_XFST AR2	Mon	Record data of bank 3 for PE-loop reactance (1st), Zone AR2
		t	MX	-	3 FLTLOOP_XFST AR2	Mon	Record data of bank 3 for PE-loop reactance (1st), Zone AR2
PhLoopRis2	v2_dMV	mag.f	MX	-	3 FLTLOOP_RSND AR2	Mon	Record data of bank 3 for PE-loop resistance (2nd), Zone AR2

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PhLoopRis2	v2_dMV	q	MX	-	3 FLTLOOP_RSND AR2	Mon	Record data of bank 3 for PE-loop resistance (2nd), Zone AR2
		t	MX	-	3 FLTLOOP_RSND AR2	Mon	Record data of bank 3 for PE-loop resistance (2nd), Zone AR2
PhLoopRea2	v2_dMV	mag.f	MX	-	3 FLTLOOP_XSND AR2	Mon	Record data of bank 3 for PE-loop reactance (2nd), Zone AR2
		q	MX	-	3 FLTLOOP_XSND AR2	Mon	Record data of bank 3 for PE-loop reactance (2nd), Zone AR2
		t	MX	-	3 FLTLOOP_XSND AR2	Mon	Record data of bank 3 for PE-loop reactance (2nd), Zone AR2
PPLoopRis	v2_dMV	mag.f	MX	-	3 FLTLOOP_RPP AR2	Mon	Record data of bank 3 for PP-loop resistance, Zone AR2
		q	MX	-	3 FLTLOOP_RPP AR2	Mon	Record data of bank 3 for PP-loop resistance, Zone AR2
		t	MX	-	3 FLTLOOP_RPP AR2	Mon	Record data of bank 3 for PP-loop resistance, Zone AR2
PPLoopReac	v2_dMV	mag.f	MX	-	3 FLTLOOP_XPP AR2	Mon	Record data of bank 3 for PP-loop reactance, Zone AR2
		q	MX	-	3 FLTLOOP_XPP AR2	Mon	Record data of bank 3 for PP-loop reactance, Zone AR2
		t	MX	-	3 FLTLOOP_XPP AR2	Mon	Record data of bank 3 for PP-loop reactance, Zone AR2

Table 27: DSTMSTA Logical node data (instance 6)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
DirRisZn	v2_dMV	mag.f	MX	-	2 DIR_LOOP_R Z1	Mon	Record data of bank 2 for direction resistance, Zone Z1
		q	MX	-	2 DIR_LOOP_R Z1	Mon	Record data of bank 2 for direction resistance, Zone Z1
		t	MX	-	2 DIR_LOOP_R Z1	Mon	Record data of bank 2 for direction resistance, Zone Z1
DirReactZn	v2_dMV	mag.f	MX	-	2 DIR_LOOP_X Z1	Mon	Record data of bank 2 for direction reactance, Zone Z1
		q	MX	-	2 DIR_LOOP_X Z1	Mon	Record data of bank 2 for direction reactance, Zone Z1
		t	MX	-	2 DIR_LOOP_X Z1	Mon	Record data of bank 2 for direction reactance, Zone Z1
PhLoopRis1	v2_dMV	mag.f	MX	-	2 FLTLOOP_RFST Z1	Mon	Record data of bank 2 for PE-loop resistance (1st), Zone Z1

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PhLoopRis1	v2_dMV	q	MX	-	2 FLTLOOP_RFST Z1	Mon	Record data of bank 2 for PE-loop resistance (1st), Zone Z1
		t	MX	-	2 FLTLOOP_RFST Z1	Mon	Record data of bank 2 for PE-loop resistance (1st), Zone Z1
PhLoopRea1	v2_dMV	mag.f	MX	-	2 FLTLOOP_XFST Z1	Mon	Record data of bank 2 for PE-loop reactance (1st), Zone Z1
		q	MX	-	2 FLTLOOP_XFST Z1	Mon	Record data of bank 2 for PE-loop reactance (1st), Zone Z1
		t	MX	-	2 FLTLOOP_XFST Z1	Mon	Record data of bank 2 for PE-loop reactance (1st), Zone Z1
PhLoopRis2	v2_dMV	mag.f	MX	-	2 FLTLOOP_RSND Z1	Mon	Record data of bank 2 for PE-loop resistance (2nd), Zone Z1
		q	MX	-	2 FLTLOOP_RSND Z1	Mon	Record data of bank 2 for PE-loop resistance (2nd), Zone Z1
		t	MX	-	2 FLTLOOP_RSND Z1	Mon	Record data of bank 2 for PE-loop resistance (2nd), Zone Z1
PhLoopRea2	v2_dMV	mag.f	MX	-	2 FLTLOOP_XSND Z1	Mon	Record data of bank 2 for PE-loop reactance (2nd), Zone Z1
		q	MX	-	2 FLTLOOP_XSND Z1	Mon	Record data of bank 2 for PE-loop reactance (2nd), Zone Z1
		t	MX	-	2 FLTLOOP_XSND Z1	Mon	Record data of bank 2 for PE-loop reactance (2nd), Zone Z1
PPLoopRis	v2_dMV	mag.f	MX	-	2 FLTLOOP_RPP Z1	Mon	Record data of bank 2 for PP-loop resistance, Zone Z1
		q	MX	-	2 FLTLOOP_RPP Z1	Mon	Record data of bank 2 for PP-loop resistance, Zone Z1
		t	MX	-	2 FLTLOOP_RPP Z1	Mon	Record data of bank 2 for PP-loop resistance, Zone Z1
PPLoopReac	v2_dMV	mag.f	MX	-	2 FLTLOOP_XPP Z1	Mon	Record data of bank 2 for PP-loop reactance, Zone Z1
		q	MX	-	2 FLTLOOP_XPP Z1	Mon	Record data of bank 2 for PP-loop reactance, Zone Z1
		t	MX	-	2 FLTLOOP_XPP Z1	Mon	Record data of bank 2 for PP-loop reactance, Zone Z1

Table 28: DSTPDIS Logical node data (instance 5)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE_ZAR2	Mon	Time delayed operate signal, Zone AR2
		q	ST	T	OPERATE_ZAR2	Mon	Time delayed operate signal, Zone AR2

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Op	b_dACT	t	ST	T	OPERATE_ZAR2	Mon	Time delayed operate signal, Zone AR2
Str	c_dACD	general	ST	-	START_ZAR2	Mon	General start-signal, Zone AR2
		dirGeneral	ST	-	-	Mon	Direction of fault or load when START_ZAR2 is active
		phsA	ST	-	-	Mon	Event start phase A, Zone AR2
		dirPhsA	ST	-	-	Mon	Direction of phase A when phase start is active, Zone ZAR2
		phsB	ST	-	-	Mon	Event start phase B, Zone AR2
		dirPhsB	ST	-	-	Mon	Direction of phase B when phase start is active, Zone ZAR2
		phsC	ST	-	-	Mon	Event start phase C, Zone AR2
		dirPhsC	ST	-	-	Mon	Direction of phase C when phase start is active, Zone ZAR2
		q	ST	-	START_ZAR2	Mon	General start-signal, Zone AR2
		t	ST	-	START_ZAR2	Mon	General start-signal, Zone AR2
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
IvdTltAng	v1_dINS	stVal	ST	-	CONFLICT_ZAR2	Mon	Tilt angle validity check, Zone AR2
		q	ST	-	CONFLICT_ZAR2	Mon	Tilt angle validity check, Zone AR2
		t	ST	-	CONFLICT_ZAR2	Mon	Tilt angle validity check, Zone AR2

Table 29: DSTPDIS Logical node data (instance 4)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE_ZAR1	Mon	Time delayed operate signal, Zone AR1
		q	ST	T	OPERATE_ZAR1	Mon	Time delayed operate signal, Zone AR1
		t	ST	T	OPERATE_ZAR1	Mon	Time delayed operate signal, Zone AR1
Str	c_dACD	general	ST	-	START_ZAR1	Mon	General start-signal, Zone AR1
		dirGeneral	ST	-	-	Mon	Direction of fault or load when START_ZAR1 is active
		phsA	ST	-	-	Mon	Event start phase A, Zone AR1
		dirPhsA	ST	-	-	Mon	Direction of phase A when phase start is active, Zone ZAR1
		phsB	ST	-	-	Mon	Event start phase B, Zone AR1

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Str	c_dACD	dirPhsB	ST	-	-	Mon	Direction of phase B when phase start is active, Zone ZAR1
		phsC	ST	-	-	Mon	Event start phase C, Zone AR1
		dirPhsC	ST	-	-	Mon	Direction of phase C when phase start is active, Zone ZAR1
		q	ST	-	START_ZAR1	Mon	General start-signal, Zone AR1
		t	ST	-	START_ZAR1	Mon	General start-signal, Zone AR1
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
IvdTltAng	v1_dINS	stVal	ST	-	CONFLICT_ZAR1	Mon	Tilt angle validity check, Zone AR1
		q	ST	-	CONFLICT_ZAR1	Mon	Tilt angle validity check, Zone AR1
		t	ST	-	CONFLICT_ZAR1	Mon	Tilt angle validity check, Zone AR1

Table 30: DSTPDIS Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE_Z1	Mon	Time delayed operate signal, Zone Z1
		q	ST	T	OPERATE_Z1	Mon	Time delayed operate signal, Zone Z1
		t	ST	T	OPERATE_Z1	Mon	Time delayed operate signal, Zone Z1
Str	c_dACD	general	ST	-	START_Z1	Mon	General start-signal, Zone Z1
		dirGeneral	ST	-	-	Mon	Direction of fault or load when START_Z1 is active
		phsA	ST	-	-	Mon	Event start phase A, Zone Z1
		dirPhsA	ST	-	-	Mon	Direction of phase A when phase start is active, Zone Z1
		phsB	ST	-	-	Mon	Event start phase B, Zone Z1
		dirPhsB	ST	-	-	Mon	Direction of phase B when phase start is active, Zone Z1
		phsC	ST	-	-	Mon	Event start phase C, Zone Z1
		dirPhsC	ST	-	-	Mon	Direction of phase C when phase start is active, Zone Z1
		q	ST	-	START_Z1	Mon	General start-signal, Zone Z1
		t	ST	-	START_Z1	Mon	General start-signal, Zone Z1
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	c_dINC	t	ST	-	-	Mon	Mode status parameter for 61850
IvdTltAng	v1_dINS	stVal	ST	-	CONFLICT_Z1	Mon	Tilt angle validity check, Zone Z1
		q	ST	-	CONFLICT_Z1	Mon	Tilt angle validity check, Zone Z1
		t	ST	-	CONFLICT_Z1	Mon	Tilt angle validity check, Zone Z1

Table 31: DSTPDIS Logical node data (instance 3)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE_Z3	Mon	Time delayed operate signal, Zone Z3
		q	ST	T	OPERATE_Z3	Mon	Time delayed operate signal, Zone Z3
		t	ST	T	OPERATE_Z3	Mon	Time delayed operate signal, Zone Z3
Str	c_dACD	general	ST	-	START_Z3	Mon	General start-signal, Zone Z3
		dirGeneral	ST	-	-	Mon	Direction of fault or load when START_Z3 is active
		phsA	ST	-	-	Mon	Event start phase A, Zone Z3
		dirPhsA	ST	-	-	Mon	Direction of phase A when phase start is active, Zone Z3
		phsB	ST	-	-	Mon	Event start phase B, Zone Z3
		dirPhsB	ST	-	-	Mon	Direction of phase B when phase start is active, Zone Z3
		phsC	ST	-	-	Mon	Event start phase C, Zone Z3
		dirPhsC	ST	-	-	Mon	Direction of phase C when phase start is active, Zone Z3
		q	ST	-	START_Z3	Mon	General start-signal, Zone Z3
		t	ST	-	START_Z3	Mon	General start-signal, Zone Z3
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
IvdTltAng	v1_dINS	stVal	ST	-	CONFLICT_Z3	Mon	Tilt angle validity check, Zone Z3
		q	ST	-	CONFLICT_Z3	Mon	Tilt angle validity check, Zone Z3
		t	ST	-	CONFLICT_Z3	Mon	Tilt angle validity check, Zone Z3

Table 32: DSTPDIS Logical node data (instance 2)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE_Z2	Mon	Time delayed operate signal, Zone Z2
		q	ST	T	OPERATE_Z2	Mon	Time delayed operate signal, Zone Z2
		t	ST	T	OPERATE_Z2	Mon	Time delayed operate signal, Zone Z2
Str	c_dACD	general	ST	-	START_Z2	Mon	General start-signal, Zone Z2
		dirGeneral	ST	-	-	Mon	Direction of fault or load when START_Z2 is active
		phsA	ST	-	-	Mon	Event start phase A, Zone Z2
		dirPhsA	ST	-	-	Mon	Direction of phase A when phase start is active, Zone Z2
		phsB	ST	-	-	Mon	Event start phase B, Zone Z2
		dirPhsB	ST	-	-	Mon	Direction of phase B when phase start is active, Zone Z2
		phsC	ST	-	-	Mon	Event start phase C, Zone Z2
		dirPhsC	ST	-	-	Mon	Direction of phase C when phase start is active, Zone Z2
		q	ST	-	START_Z2	Mon	General start-signal, Zone Z2
		t	ST	-	START_Z2	Mon	General start-signal, Zone Z2
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
IvdTltAng	v1_dINS	stVal	ST	-	CONFLICT_Z2	Mon	Tilt angle validity check, Zone Z2
		q	ST	-	CONFLICT_Z2	Mon	Tilt angle validity check, Zone Z2
		t	ST	-	CONFLICT_Z2	Mon	Tilt angle validity check, Zone Z2

Table 33: DSTRDIR Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Dir	b_dACD	dirGeneral	ST	-	DIRECTION	Mon	Direction of fault or load
		q	ST	-	DIRECTION	Mon	Direction of fault or load
		t	ST	-	DIRECTION	Mon	Direction of fault or load

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850

Table 34: GFC1MSTA Logical node data (instance 16)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Dir	b_dACD	dirGeneral	ST	-	1 DIRECTION	Mon	Record data of bank 1 for direction
		q	ST	-	1 DIRECTION	Mon	Record data of bank 1 for direction
		t	ST	-	1 DIRECTION	Mon	Record data of bank 1 for direction
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
EFDir	v2_dACD	dirGeneral	ST	-	1 DIR_E_FLT GFC	Mon	Record data of bank 1 for EF-direction, GFC
		q	ST	-	1 DIR_E_FLT GFC	Mon	Record data of bank 1 for EF-direction, GFC
		t	ST	-	1 DIR_E_FLT GFC	Mon	Record data of bank 1 for EF-direction, GFC
EFDet	v2_dSPS	stVal	ST	-	1 EARTH_FLT GFC	Mon	Record data of bank 1 for earth-fault, GFC
		q	ST	-	1 EARTH_FLT GFC	Mon	Record data of bank 1 for earth-fault, GFC
		t	ST	-	1 EARTH_FLT GFC	Mon	Record data of bank 1 for earth-fault, GFC
XCDet	v2_dSPS	stVal	ST	-	1 XC_FLT GFC	Mon	Record data of bank 1 for cross country fault, GFC
		q	ST	-	1 XC_FLT GFC	Mon	Record data of bank 1 for cross country fault, GFC
		t	ST	-	1 XC_FLT GFC	Mon	Record data of bank 1 for cross country fault, GFC
RelPhLoop	v4_dINS	stVal	ST	-	1 RELEASE_PE GFC	Mon	Record data of bank 1 for release PE-loops, GFC
		q	ST	-	1 RELEASE_PE GFC	Mon	Record data of bank 1 for release PE-loops, GFC
		t	ST	-	1 RELEASE_PE GFC	Mon	Record data of bank 1 for release PE-loops, GFC
RelPPLoop	v4_dINS	stVal	ST	-	1 RELEASE_PP GFC	Mon	Record data of bank 1 for release PP-loops, GFC
		q	ST	-	1 RELEASE_PP GFC	Mon	Record data of bank 1 for release PP-loops, GFC

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
RelPPLoop	v4_dINS	t	ST	-	1 RELEASE_PP GFC	Mon	Record data of bank 1 for release PP-loops, GFC
ZnOpSt	v4_dINS	stVal	ST	-	1 Zones OPERATE	Mon	Record data of bank 1 for operate signals of all zones
		q	ST	-	1 Zones OPERATE	Mon	Record data of bank 1 for operate signals of all zones
		t	ST	-	1 Zones OPERATE	Mon	Record data of bank 1 for operate signals of all zones

Table 35: GFCMSTA Logical node data (instance 17)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Dir	b_dACD	dirGeneral	ST	-	2 DIRECTION	Mon	Record data of bank 2 for direction
		q	ST	-	2 DIRECTION	Mon	Record data of bank 2 for direction
		t	ST	-	2 DIRECTION	Mon	Record data of bank 2 for direction
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
EFDir	v2_dACD	dirGeneral	ST	-	2 DIR_E_FLT GFC	Mon	Record data of bank 2 for EF-direction, GFC
		q	ST	-	2 DIR_E_FLT GFC	Mon	Record data of bank 2 for EF-direction, GFC
		t	ST	-	2 DIR_E_FLT GFC	Mon	Record data of bank 2 for EF-direction, GFC
EFDet	v2_dSPS	stVal	ST	-	2 EARTH_FLT GFC	Mon	Record data of bank 2 for earth-fault, GFC
		q	ST	-	2 EARTH_FLT GFC	Mon	Record data of bank 2 for earth-fault, GFC
		t	ST	-	2 EARTH_FLT GFC	Mon	Record data of bank 2 for earth-fault, GFC
XCDet	v2_dSPS	stVal	ST	-	2 XC_FLT GFC	Mon	Record data of bank 2 for cross country fault, GFC
		q	ST	-	2 XC_FLT GFC	Mon	Record data of bank 2 for cross country fault, GFC
		t	ST	-	2 XC_FLT GFC	Mon	Record data of bank 2 for cross country fault, GFC
RelPhLoop	v4_dINS	stVal	ST	-	2 RELEASE_PE GFC	Mon	Record data of bank 2 for release PE-loops, GFC
		q	ST	-	2 RELEASE_PE GFC	Mon	Record data of bank 2 for release PE-loops, GFC
		t	ST	-	2 RELEASE_PE GFC	Mon	Record data of bank 2 for release PE-loops, GFC

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
RelPPLoop	v4_dINS	stVal	ST	-	2 RELEASE_PP GFC	Mon	Record data of bank 2 for release PP-loops, GFC
		q	ST	-	2 RELEASE_PP GFC	Mon	Record data of bank 2 for release PP-loops, GFC
		t	ST	-	2 RELEASE_PP GFC	Mon	Record data of bank 2 for release PP-loops, GFC
ZnOpSt	v4_dINS	stVal	ST	-	2 Zones OPERATE	Mon	Record data of bank 2 for operate signals of all zones
		q	ST	-	2 Zones OPERATE	Mon	Record data of bank 2 for operate signals of all zones
		t	ST	-	2 Zones OPERATE	Mon	Record data of bank 2 for operate signals of all zones

Table 36: GFCMSTA Logical node data (instance 18)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Dir	b_dACD	dirGeneral	ST	-	3 DIRECTION	Mon	Record data of bank 3 for direction
		q	ST	-	3 DIRECTION	Mon	Record data of bank 3 for direction
		t	ST	-	3 DIRECTION	Mon	Record data of bank 3 for direction
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
EFDir	v2_dACD	dirGeneral	ST	-	3 DIR_E_FLT GFC	Mon	Record data of bank 3 for EF-direction, GFC
		q	ST	-	3 DIR_E_FLT GFC	Mon	Record data of bank 3 for EF-direction, GFC
		t	ST	-	3 DIR_E_FLT GFC	Mon	Record data of bank 3 for EF-direction, GFC
EFDet	v2_dSPS	stVal	ST	-	3 EARTH_FLT GFC	Mon	Record data of bank 3 for earth-fault, GFC
		q	ST	-	3 EARTH_FLT GFC	Mon	Record data of bank 3 for earth-fault, GFC
		t	ST	-	3 EARTH_FLT GFC	Mon	Record data of bank 3 for earth-fault, GFC
XCDet	v2_dSPS	stVal	ST	-	3 XC_FLT GFC	Mon	Record data of bank 3 for cross country fault, GFC
		q	ST	-	3 XC_FLT GFC	Mon	Record data of bank 3 for cross country fault, GFC
		t	ST	-	3 XC_FLT GFC	Mon	Record data of bank 3 for cross country fault, GFC
RelPhLoop	v4_dINS	stVal	ST	-	3 RELEASE_PE GFC	Mon	Record data of bank 3 for release PE-loops, GFC

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
RelPhLoop	v4_dINS	q	ST	-	3 RELEASE_PE GFC	Mon	Record data of bank 3 for release PE-loops, GFC
		t	ST	-	3 RELEASE_PE GFC	Mon	Record data of bank 3 for release PE-loops, GFC
RelPPLoop	v4_dINS	stVal	ST	-	3 RELEASE_PP GFC	Mon	Record data of bank 3 for release PP-loops, GFC
		q	ST	-	3 RELEASE_PP GFC	Mon	Record data of bank 3 for release PP-loops, GFC
		t	ST	-	3 RELEASE_PP GFC	Mon	Record data of bank 3 for release PP-loops, GFC
ZnOpSt	v4_dINS	stVal	ST	-	3 Zones OPERATE	Mon	Record data of bank 3 for operate signals of all zones
		q	ST	-	3 Zones OPERATE	Mon	Record data of bank 3 for operate signals of all zones
		t	ST	-	3 Zones OPERATE	Mon	Record data of bank 3 for operate signals of all zones

Table 37: GFCPDIS Logical node data (instance 6)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE_GFC	Mon	Time delayed operate-signal, GFC
		q	ST	T	OPERATE_GFC	Mon	Time delayed operate-signal, GFC
		t	ST	T	OPERATE_GFC	Mon	Time delayed operate-signal, GFC
Str	c_dACD	general	ST	-	START_GFC	Mon	General start-signal, GFC
		phsA	ST	-	-	Mon	Event start phase A, GFC
		phsB	ST	-	-	Mon	Event start phase B, GFC
		phsC	ST	-	-	Mon	Event start phase C, GFC
		q	ST	-	START_GFC	Mon	General start-signal, GFC
		t	ST	-	START_GFC	Mon	General start-signal, GFC
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
RelPhsA	v1_dSPS	stVal	ST	-	-	Mon	Event release phase A to earth fault
		q	ST	-	-	Mon	Event release phase A to earth fault
		t	ST	-	-	Mon	Event release phase A to earth fault
RelPhsB	v1_dSPS	stVal	ST	-	-	Mon	Event release phase B to earth fault

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
RelPhsB	v1_dSPS	q	ST	-	-	Mon	Event release phase B to earth fault
		t	ST	-	-	Mon	Event release phase B to earth fault
RelPhsC	v1_dSPS	stVal	ST	-	-	Mon	Event release phase C to earth fault
		q	ST	-	-	Mon	Event release phase C to earth fault
		t	ST	-	-	Mon	Event release phase C to earth fault
RelPhsAB	v1_dSPS	stVal	ST	-	-	Mon	Event release phase A to phase B
		q	ST	-	-	Mon	Event release phase A to phase B
		t	ST	-	-	Mon	Event release phase A to phase B
RelPhsBC	v1_dSPS	stVal	ST	-	-	Mon	Event release phase B to phase C
		q	ST	-	-	Mon	Event release phase B to phase C
		t	ST	-	-	Mon	Event release phase B to phase C
RelPhsCA	v1_dSPS	stVal	ST	-	-	Mon	Event release phase C to phase A
		q	ST	-	-	Mon	Event release phase C to phase A
		t	ST	-	-	Mon	Event release phase C to phase A
Rel3Ph	v1_dSPS	stVal	ST	-	-	Mon	Event release 3-phase fault
		q	ST	-	-	Mon	Event release 3-phase fault
		t	ST	-	-	Mon	Event release 3-phase fault
IvdPhSel	v1_dSPS	stVal	ST	-	CONFLICT_GFC	Mon	Conflict with PSL-function and voltage measuring principle
		q	ST	-	CONFLICT_GFC	Mon	Conflict with PSL-function and voltage measuring principle
		t	ST	-	CONFLICT_GFC	Mon	Conflict with PSL-function and voltage measuring principle
EFDet	v1_dSPS	stVal	ST	-	EARTH_FLT	Mon	Indication of a single phase earth-fault, GFC
		q	ST	-	EARTH_FLT	Mon	Indication of a single phase earth-fault, GFC
		t	ST	-	EARTH_FLT	Mon	Indication of a single phase earth-fault, GFC
XCDet	v1_dSPS	stVal	ST	-	XC_FLT	Mon	Indication of a cross-country-fault (high imp. earthed), GFC
		q	ST	-	XC_FLT	Mon	Indication of a cross-country-fault (high imp. earthed), GFC
		t	ST	-	XC_FLT	Mon	Indication of a cross-country-fault (high imp. earthed), GFC

Table 38: GFCRDIR Logical node data (instance 2)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Dir	b_dACD	dirGeneral	ST	-	DIR_E_FLT	Mon	Earth-fault direction (low imp. earthed), GFC
		q	ST	-	DIR_E_FLT	Mon	Earth-fault direction (low imp. earthed), GFC
		t	ST	-	DIR_E_FLT	Mon	Earth-fault direction (low imp. earthed), GFC
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850

7.3.4 Directional overcurrent PDOC

7.3.4.1 Directional overcurrent protection, high stage DPHHPDOC

LN type	LN prefix	LN class	Function block name
DPHPTOC instance 1 (revision 0)	DOCH	PTOC	DPHHPDOC
DPHRDIR instance 1 (revision 0)	DOCH	RDIR	DPHHPDOC
PHBLLN0 instance 1 (revision 0)	-	LLN0	DPHHPDOC

Table 39: DPHPTOC Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Op	a_dACT	general	ST	T	OPERATE	Mon	Operated
		phsA	ST	T	OPR_A	Mon	Operated phase A
		phsB	ST	T	OPR_B	Mon	Operated phase B
		phsC	ST	T	OPR_C	Mon	Operated phase C
		q	ST	T	OPERATE	Mon	Operated
		t	ST	T	OPERATE	Mon	Operated
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Str	c_dACD	general	ST	-	START	Mon	Started signal
		dirGeneral	ST	-	FAULT_DIR	Mon	Detected fault direction, general
		phsA	ST	-	ST_A	Mon	Started phase A
		dirPhsA	ST	-	FLT_DIR_A	Mon	Detected fault direction, phase A

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Str	c_dACD	phsB	ST	-	ST_B	Mon	Started phase B
		dirPhsB	ST	-	FLT_DIR_B	Mon	Detected fault direction, phase B
		phsC	ST	-	ST_C	Mon	Started phase C
		dirPhsC	ST	-	FLT_DIR_C	Mon	Detected fault direction, phase C
		q	ST	-	START	Mon	Started signal
		t	ST	-	START	Mon	Started signal
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
IvdCrv	v1_dSPS	stVal	ST	-	INVAL_CRV	Mon	Invalid curve parameters
		q	ST	-	INVAL_CRV	Mon	Invalid curve parameters
		t	ST	-	INVAL_CRV	Mon	Invalid curve parameters
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Ratio of start time / operate time
		q	MX	-	START_DUR	Mon	Ratio of start time / operate time
		t	MX	-	START_DUR	Mon	Ratio of start time / operate time

Table 40: DPHRDIR Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Dir	a_dACD	dirGeneral	ST	-	DIRECTION	Mon	Direction information, general
		dirPhsA	ST	-	DIR_A	Mon	Direction information, phase A
		dirPhsB	ST	-	DIR_B	Mon	Direction information, phase B
		dirPhsC	ST	-	DIR_C	Mon	Direction information, phase C
		q	ST	-	DIRECTION	Mon	Direction information, general
		t	ST	-	DIRECTION	Mon	Direction information, general
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850

Table 41: PHBLLN0 Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850

7.3.4.2 Directional overcurrent protection, low stage DPHLPDOC

LN type	LN prefix	LN class	Function block name
DPHPTOC instance 1 (revision 0)	DOCL	PTOC	DPHLPDOC
DPHRDIR instance 1 (revision 0)	DOCL	RDIR	DPHLPDOC
PHBLLN0 instance 1 (revision 0)	-	LLN0	DPHLPDOC

Table 42: DPHPTOC Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Op	a_dACT	general	ST	T	OPERATE	Mon	Operated
		phsA	ST	T	OPR_A	Mon	Operated phase A
		phsB	ST	T	OPR_B	Mon	Operated phase B
		phsC	ST	T	OPR_C	Mon	Operated phase C
		q	ST	T	OPERATE	Mon	Operated
		t	ST	T	OPERATE	Mon	Operated
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Str	c_dACD	general	ST	-	START	Mon	Started signal
		dirGeneral	ST	-	FAULT_DIR	Mon	Detected fault direction, general
		phsA	ST	-	ST_A	Mon	Started phase A
		dirPhsA	ST	-	FLT_DIR_A	Mon	Detected fault direction, phase A
		phsB	ST	-	ST_B	Mon	Started phase B
		dirPhsB	ST	-	FLT_DIR_B	Mon	Detected fault direction, phase B
		phsC	ST	-	ST_C	Mon	Started phase C
		dirPhsC	ST	-	FLT_DIR_C	Mon	Detected fault direction, phase C

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Str	c_dACD	q	ST	-	START	Mon	Started signal
		t	ST	-	START	Mon	Started signal
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
IvdCrv	v1_dSPS	stVal	ST	-	INVAL_CRV	Mon	Invalid curve parameters
		q	ST	-	INVAL_CRV	Mon	Invalid curve parameters
		t	ST	-	INVAL_CRV	Mon	Invalid curve parameters
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Ratio of start time / operate time
		q	MX	-	START_DUR	Mon	Ratio of start time / operate time
		t	MX	-	START_DUR	Mon	Ratio of start time / operate time

Table 43: DPHRDIR Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Dir	a_dACD	dirGeneral	ST	-	DIRECTION	Mon	Direction information, general
		dirPhsA	ST	-	DIR_A	Mon	Direction information, phase A
		dirPhsB	ST	-	DIR_B	Mon	Direction information, phase B
		dirPhsC	ST	-	DIR_C	Mon	Direction information, phase C
		q	ST	-	DIRECTION	Mon	Direction information, general
		t	ST	-	DIRECTION	Mon	Direction information, general
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850

Table 44: PHBLLN0 Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850

7.3.5 Rate of change of frequency PFRC

7.3.5.1 Frequency gradient protection DAPFRC

LN type	LN prefix	LN class	Function block name
DAPFRC (revision 0)	DA	PFRC	DAPFRC

Table 45: DAPFRC Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter
		Oper.T	CO	-	-	Cmd	Mode parameter
		Oper.Test	CO	-	-	Cmd	Mode parameter
		Oper.Check	CO	-	-	Cmd	Mode parameter
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	
		q	ST	-	Beh	Mon	
		t	ST	-	Beh	Mon	
BlkV	a_dSPS	stVal	ST	-	LOWAMPL_BLKD	Mon	Blocking indication due to low amplitude.
		q	ST	-	LOWAMPL_BLKD	Mon	Blocking indication due to low amplitude.
		t	ST	-	LOWAMPL_BLKD	Mon	Blocking indication due to low amplitude.
Op	b_dACT	general	ST	T	OPERATE	Mon	Operate signal for frequency gradient
		q	ST	T	OPERATE	Mon	Operate signal for frequency gradient

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Op	b_dACT	t	ST	T	OPERATE	Mon	Operate signal for frequency gradient
Str	d_dACD	general	ST	-	START	Mon	Start signal for frequency gradient
		q	ST	-	START	Mon	Start signal for frequency gradient
		t	ST	-	START	Mon	Start signal for frequency gradient
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Start duration in percents of the total operation time
		q	MX	-	START_DUR	Mon	Start duration in percents of the total operation time
		t	MX	-	START_DUR	Mon	Start duration in percents of the total operation time

7.3.6 Frequency protection PFRQ

7.3.6.1 Under frequency and df/dt based load shedding LSHDPFRQ

LN type	LN prefix	LN class	Function block name
LSHDLLN0 instance 1 (revision 0)	-	LLN0	LSHDPFRQ
LSHDPFRC instance 1 (revision 0)	LSHD	PFRC	LSHDPFRQ
LSHDPTRC instance 1 (revision 0)	LSHD	PTRC	LSHDPFRQ
LSHDPTUF instance 1 (revision 0)	LSHD	PTUF	LSHDPFRQ

Table 46: LSHDLLN0 Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
BlkV	a_dSPS	stVal	ST	-	LOWAMPL_BLKD	Mon	Signal indicating internal blocking due to low amplitude
		q	ST	-	LOWAMPL_BLKD	Mon	Signal indicating internal blocking due to low amplitude
		t	ST	-	LOWAMPL_BLKD	Mon	Signal indicating internal blocking due to low amplitude

Table 47: LSHDPFRC Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPR_FRG	Mon	Operate signal for high df/dt
		q	ST	T	OPR_FRG	Mon	Operate signal for high df/dt
		t	ST	T	OPR_FRG	Mon	Operate signal for high df/dt
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
Str	d_dACD	general	ST	-	ST_FRG	Mon	Pick-Up signal for high df/dt detection
		q	ST	-	ST_FRG	Mon	Pick-Up signal for high df/dt detection
		t	ST	-	ST_FRG	Mon	Pick-Up signal for high df/dt detection

Table 48: LSHDPTRC Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE	Mon	Operation of load shedding
		q	ST	T	OPERATE	Mon	Operation of load shedding
		t	ST	T	OPERATE	Mon	Operation of load shedding
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	c_dINC	t	ST	-	-	Mon	Mode status value parameter for 61850
Str	d_dACD	general	ST	-	START	Mon	General start. Under frequency or high df/dt detected
		q	ST	-	START	Mon	General start. Under frequency or high df/dt detected
		t	ST	-	START	Mon	General start. Under frequency or high df/dt detected
ManRest	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850
RestLodOp	v2_dACT	general	ST	-	RESTORE	Mon	Restore signal for load restoring purposes
		q	ST	-	RESTORE	Mon	Restore signal for load restoring purposes
		t	ST	-	RESTORE	Mon	Restore signal for load restoring purposes
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Start duration in percents of the total operation time
		q	MX	-	START_DUR	Mon	Start duration in percents of the total operation time
		t	MX	-	START_DUR	Mon	Start duration in percents of the total operation time
RestLodStr	v3_dACD	general	ST	-	ST_REST	Mon	Restore frequency attained and restore timer started
		q	ST	-	ST_REST	Mon	Restore frequency attained and restore timer started
		t	ST	-	ST_REST	Mon	Restore frequency attained and restore timer started

Table 49: LSHDPTUF Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPR_FRQ	Mon	Operate signal for under frequency
		q	ST	T	OPR_FRQ	Mon	Operate signal for under frequency
		t	ST	T	OPR_FRQ	Mon	Operate signal for under frequency
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
Str	d_dACD	general	ST	-	ST_FRQ	Mon	Pick-Up signal for under frequency detection
		q	ST	-	ST_FRQ	Mon	Pick-Up signal for under frequency detection
		t	ST	-	ST_FRQ	Mon	Pick-Up signal for under frequency detection

7.3.7 Harmonic distortion PHAR

7.3.7.1 Three-phase inrush current detector INRPHAR

LN type	LN prefix	LN class	Function block name
INRPHAR (revision 0)	INR	PHAR	INRPHAR

Table 50: INRPHAR Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Str	c_dACD	general	ST	-	BLK2H	Mon	Second harmonic based block
		phsA	ST	-	BLK2H_A	Mon	Second harmonic based block, phase A
		phsB	ST	-	BLK2H_B	Mon	Second harmonic based block, phase B
		phsC	ST	-	BLK2H_C	Mon	Second harmonic based block, phase C
		q	ST	-	BLK2H	Mon	Second harmonic based block
		t	ST	-	BLK2H	Mon	Second harmonic based block

7.3.8 Local acceleration logic PLAL

7.3.8.1 Local acceleration logic DSTPLAL

LN type	LN prefix	LN class	Function block name
DSTPLAL (revision 0)	DST	PLAL	DSTPLAL

Table 51: DSTPLAL Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter
		Oper.T	CO	-	-	Cmd	Mode parameter
		Oper.Test	CO	-	-	Cmd	Mode parameter
		Oper.Check	CO	-	-	Cmd	Mode parameter
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter
		q	ST	-	Beh	Mon	Behaviour parameter
		t	ST	-	Beh	Mon	Behaviour parameter
OpLosLod	b_dACT	general	ST	-	OPR_LOSSLOAD	Mon	Operate by loss of load

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
OpLosLod	b_dACT	q	ST	-	OPR_LOSSLOAD	Mon	Operate by loss of load
		t	ST	-	OPR_LOSSLOAD	Mon	Operate by loss of load
OpZnExd	b_dACT	general	ST	-	OPR_Z_EXTN	Mon	Operate by zone extension
		q	ST	-	OPR_Z_EXTN	Mon	Operate by zone extension
		t	ST	-	OPR_Z_EXTN	Mon	Operate by zone extension

7.3.9 Motor supervision PMSU

7.3.9.1 Motor start-up supervision function STTPMSU

LN type	LN prefix	LN class	Function block name
STTLLN0 instance 1 (revision 0)	-	LLN0	STTPMSU
STTPMRI instance 1 (revision 0)	STTM	PMRI	STTPMSU
STTPMSS instance 1 (revision 0)	STTM	PMSS	STTPMSU

Table 52: STTLLN0 Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850

Table 53: STTPMRI Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
StrInh	a_dSPS	stVal	ST	-	LOCK_START	Mon	Lock out condition for restart of motor.
		q	ST	-	LOCK_START	Mon	Lock out condition for restart of motor.
		t	ST	-	LOCK_START	Mon	Lock out condition for restart of motor.
Op	b_dACT	general	ST	T	OPR_IIT	Mon	Operate/trip signal for thermal stress.
		q	ST	T	OPR_IIT	Mon	Operate/trip signal for thermal stress.
		t	ST	T	OPR_IIT	Mon	Operate/trip signal for thermal stress.
StrInhTmm	b_dINS	stVal	ST	-	T_RST_ENA	Mon	Time left for restart when lockstart is enabled in minutes
		q	ST	-	T_RST_ENA	Mon	Time left for restart when lockstart is enabled in minutes
		t	ST	-	T_RST_ENA	Mon	Time left for restart when lockstart is enabled in minutes
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
StUpCnt	v1_dINS	stVal	ST	-	START_CNT	Mon	Number of motor start-ups occurred
		q	ST	-	START_CNT	Mon	Number of motor start-ups occurred
		t	ST	-	START_CNT	Mon	Number of motor start-ups occurred
TmsCumStUp	v2_dMV	mag.f	MX	-	T_ST_CNT	Mon	Cumulated start-up time in sec
		q	MX	-	T_ST_CNT	Mon	Cumulated start-up time in sec
		t	MX	-	T_ST_CNT	Mon	Cumulated start-up time in sec
TmsStUp	v2_dMV	mag.f	MX	-	START_TIME	Mon	Measured motor latest startup time in sec
		q	MX	-	START_TIME	Mon	Measured motor latest startup time in sec
		t	MX	-	START_TIME	Mon	Measured motor latest startup time in sec

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
ThmStsPct	v2_dMV	mag.f	MX	-	IIT_RL	Mon	Thermal stress relative to set maximum thermal stress
		q	MX	-	IIT_RL	Mon	Thermal stress relative to set maximum thermal stress
		t	MX	-	IIT_RL	Mon	Thermal stress relative to set maximum thermal stress

Table 54: STTPMSS Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPR_STALL	Mon	Operate/trip signal for stalling protection.
		q	ST	T	OPR_STALL	Mon	Operate/trip signal for stalling protection.
		t	ST	T	OPR_STALL	Mon	Operate/trip signal for stalling protection.
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
Str	d_dACD	general	ST	-	MOT_START	Mon	Signal to show that motor startup is in progress
		q	ST	-	MOT_START	Mon	Signal to show that motor startup is in progress
		t	ST	-	MOT_START	Mon	Signal to show that motor startup is in progress
StrDur	v2_dMV	mag.f	MX	-	STALL_RL	Mon	Start time relative to the operate time for stall condition
		q	MX	-	STALL_RL	Mon	Start time relative to the operate time for stall condition
		t	MX	-	STALL_RL	Mon	Start time relative to the operate time for stall condition

7.3.10 Restricted earth fault PNDF

7.3.10.1 Stabilised restricted earth-fault protection (low impedance principle) LREFPNDF

LN type	LN prefix	LN class	Function block name
GNR1PHAR instance 1 (revision 0)	REF	PHAR	LREFPNDF

GNRLLLN0 instance 1 (revision 0)	-	LLN0	LREFPNDF
LREFPDIF instance 1 (revision 0)	REF	PDIF	LREFPNDF

Table 55: GNR1PHAR Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Str	d_dACD	general	ST	-	-	Mon	Signal to indicate that second harmonic has been detected
		q	ST	-	-	Mon	Signal to indicate that second harmonic has been detected
		t	ST	-	-	Mon	Signal to indicate that second harmonic has been detected

Table 56: GNRLLLN0 Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850

Table 57: LREFPDIF Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE	Mon	Low impedance restricted earthfault protection operate
		q	ST	T	OPERATE	Mon	Low impedance restricted earthfault protection operate
		t	ST	T	OPERATE	Mon	Low impedance restricted earthfault protection operate
DifAClc	b_dWYE	cVal.mag.f	MX	-	ID_COSPHI	Mon	Directional differential current Id cosphi
		q	MX	-	ID_COSPHI	Mon	Directional differential current Id cosphi
		t	MX	-	ID_COSPHI	Mon	Directional differential current Id cosphi
RstA	b_dWYE	cVal.mag.f	MX	-	IB	Mon	Bias current
		q	MX	-	IB	Mon	Bias current
		t	MX	-	IB	Mon	Bias current
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Str	d_dACD	general	ST	-	START	Mon	Low impedance restricted earthfault protection start
		q	ST	-	START	Mon	Low impedance restricted earthfault protection start
		t	ST	-	START	Mon	Low impedance restricted earthfault protection start
Blk2HSt	v2_dACT	general	ST	-	BLK2H	Mon	Signal to indicate second harmonic blocking when the second harmonic has been enabled
		q	ST	-	BLK2H	Mon	Signal to indicate second harmonic blocking when the second harmonic has been enabled
		t	ST	-	BLK2H	Mon	Signal to indicate second harmonic blocking when the second harmonic has been enabled
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time
		q	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time
		t	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time

7.3.11 Protection scheme PSCH

7.3.11.1 Current reversal and weak-end infeed logic for distance protection CRWPSCH

LN type	LN prefix	LN class	Function block name
CRWPSCH (revision 0)	CRW	PSCH	CRWPSCH

Table 58: CRWPSCH Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Op	a_dACT	general	ST	T	OPR_WEI	Mon	Operation of WEI logic
		phsA	ST	T	OPR_WEI_A	Mon	Operation of WEI logic in phase A
		phsB	ST	T	OPR_WEI_B	Mon	Operation of WEI logic in phase B
		phsC	ST	T	OPR_WEI_C	Mon	Operation of WEI logic in phase C
		q	ST	T	OPR_WEI	Mon	Operation of WEI logic
		t	ST	T	OPR_WEI	Mon	Operation of WEI logic
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter
		Oper.T	CO	-	-	Cmd	Mode parameter
		Oper.Test	CO	-	-	Cmd	Mode parameter
		Oper.Check	CO	-	-	Cmd	Mode parameter
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
ProRx	a_dSPS	stVal	ST	T	CR	Mon	POR Carrier signal received from remote end
		q	ST	T	CR	Mon	POR Carrier signal received from remote end
		t	ST	T	CR	Mon	POR Carrier signal received from remote end
ProTx	a_dSPS	stVal	ST	T	ECHO	Mon	Carrier send by WEI logic
		q	ST	T	ECHO	Mon	Carrier send by WEI logic
		t	ST	T	ECHO	Mon	Carrier send by WEI logic
Str	b_dACD	general	ST	-	ECHO	Mon	Carrier send by WEI logic
		q	ST	-	ECHO	Mon	Carrier send by WEI logic

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Str	b_dACD	t	ST	-	ECHO	Mon	Carrier send by WEI logic
Echo	b_dACT	general	ST	-	ECHO	Mon	Carrier send by WEI logic
		q	ST	-	ECHO	Mon	Carrier send by WEI logic
		t	ST	-	ECHO	Mon	Carrier send by WEI logic
RvABlk	b_dACT	general	ST	-	OPR_IRV	Mon	Operation of current reversal logic
		q	ST	-	OPR_IRV	Mon	Operation of current reversal logic
		t	ST	-	OPR_IRV	Mon	Operation of current reversal logic
WeiOp	b_dACT	general	ST	-	OPR_WEI	Mon	Operation of WEI logic
		q	ST	-	OPR_WEI	Mon	Operation of WEI logic
		t	ST	-	OPR_WEI	Mon	Operation of WEI logic

7.3.11.2 Scheme communication logic for distance or overcurrent DSOCPSCH

LN type	LN prefix	LN class	Function block name
DSOCPSCH (revision 0)	DSOC	PSCH	DSOCPSCH

Table 59: DSOCPSCH Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter
		Oper.T	CO	-	-	Cmd	Mode parameter
		Oper.Test	CO	-	-	Cmd	Mode parameter
		Oper.Check	CO	-	-	Cmd	Mode parameter
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
LosOfGrd	a_dSPS	stVal	ST	-	LCG	Mon	Loss of carrier guard signal
		q	ST	-	LCG	Mon	Loss of carrier guard signal
		t	ST	-	LCG	Mon	Loss of carrier guard signal
ProRx	a_dSPS	stVal	ST	T	-	Mon	Carrier signal received or missing carrier guard signal
		q	ST	T	-	Mon	Carrier signal received or missing carrier guard signal

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
ProRx	a_dSPS	t	ST	T	-	Mon	Carrier signal received or missing carrier guard signal
ProTx	a_dSPS	stVal	ST	T	-	Mon	Teleprotection signal transmitted for a forward fault
		q	ST	T	-	Mon	Teleprotection signal transmitted for a forward fault
		t	ST	T	-	Mon	Teleprotection signal transmitted for a forward fault
Str	b_dACD	general	ST	-	CS	Mon	Carrier Send signal
		dirGeneral	ST	-	-	Mon	Directional attribute of carrier send signal
		q	ST	-	CS	Mon	Carrier Send signal
		t	ST	-	CS	Mon	Carrier Send signal
CarRx	b_dACT	general	ST	-	CRL	Mon	Carrier signal received or missing carrier guard signal
		q	ST	-	CRL	Mon	Carrier signal received or missing carrier guard signal
		t	ST	-	CRL	Mon	Carrier signal received or missing carrier guard signal
Op	b_dACT	general	ST	T	OPERATE	Mon	Trip output
		q	ST	T	OPERATE	Mon	Trip output
		t	ST	T	OPERATE	Mon	Trip output

7.3.11.3 Current reversal and weak-end infeed logic for residual overcurrent protection RCRWPSCH

LN type	LN prefix	LN class	Function block name
RCRWPSCH (revision 0)	RCRW	PSCH	RCRWPSCH

Table 60: RCRWPSCH Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter
		Oper.T	CO	-	-	Cmd	Mode parameter
		Oper.Test	CO	-	-	Cmd	Mode parameter
		Oper.Check	CO	-	-	Cmd	Mode parameter
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
ProRx	a_dSPS	stVal	ST	T	CR	Mon	POR Carrier signal received from remote end
		q	ST	T	CR	Mon	POR Carrier signal received from remote end
		t	ST	T	CR	Mon	POR Carrier signal received from remote end
ProTx	a_dSPS	stVal	ST	T	ECHO	Mon	Carrier send by WEI logic
		q	ST	T	ECHO	Mon	Carrier send by WEI logic
		t	ST	T	ECHO	Mon	Carrier send by WEI logic
Str	b_dACD	general	ST	-	ECHO	Mon	Carrier send by WEI logic
		q	ST	-	ECHO	Mon	Carrier send by WEI logic
		t	ST	-	ECHO	Mon	Carrier send by WEI logic
Echo	b_dACT	general	ST	-	ECHO	Mon	Carrier send by WEI logic
		q	ST	-	ECHO	Mon	Carrier send by WEI logic
		t	ST	-	ECHO	Mon	Carrier send by WEI logic
Op	b_dACT	general	ST	T	OPR_WEI	Mon	Operation of WEI logic
		q	ST	T	OPR_WEI	Mon	Operation of WEI logic
		t	ST	T	OPR_WEI	Mon	Operation of WEI logic
RvABlk	b_dACT	general	ST	-	OPR_IRV	Mon	Operation of current reversal logic
		q	ST	-	OPR_IRV	Mon	Operation of current reversal logic
		t	ST	-	OPR_IRV	Mon	Operation of current reversal logic
WeiOp	b_dACT	general	ST	-	OPR_WEI	Mon	Operation of WEI logic
		q	ST	-	OPR_WEI	Mon	Operation of WEI logic
		t	ST	-	OPR_WEI	Mon	Operation of WEI logic

7.3.11.4 Scheme communication logic for residual overcurrent RESCPSCH

LN type	LN prefix	LN class	Function block name
RESCPSCH (revision 0)	RESC	PSCH	RESCPSCH

Table 61: RESCPSCH Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter
		Oper.T	CO	-	-	Cmd	Mode parameter
		Oper.Test	CO	-	-	Cmd	Mode parameter
		Oper.Check	CO	-	-	Cmd	Mode parameter
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
LosOfGrd	a_dSPS	stVal	ST	-	LCG	Mon	loss of carrier guard signal
		q	ST	-	LCG	Mon	loss of carrier guard signal
		t	ST	-	LCG	Mon	loss of carrier guard signal
ProRx	a_dSPS	stVal	ST	T	-	Mon	Teleprotection signal received for a forward fault
		q	ST	T	-	Mon	Teleprotection signal received for a forward fault
		t	ST	T	-	Mon	Teleprotection signal received for a forward fault
ProTx	a_dSPS	stVal	ST	T	-	Mon	Teleprotection signal transmitted for a forward fault
		q	ST	T	-	Mon	Teleprotection signal transmitted for a forward fault
		t	ST	T	-	Mon	Teleprotection signal transmitted for a forward fault
Str	b_dACD	general	ST	-	CS	Mon	Carrier Send by Communication Scheme Logic
		dirGeneral	ST	-	-	Mon	Directional attribute of Carrier Send signal
		q	ST	-	CS	Mon	Carrier Send by Communication Scheme Logic
		t	ST	-	CS	Mon	Carrier Send by Communication Scheme Logic
CarRx	b_dACT	general	ST	-	CRL	Mon	Carrier Receive from Communication Scheme Logic
		q	ST	-	CRL	Mon	Carrier Receive from Communication Scheme Logic
		t	ST	-	CRL	Mon	Carrier Receive from Communication Scheme Logic

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Op	b_dACT	general	ST	T	OPERATE	Mon	Trip by Communication Scheme Logic
		q	ST	T	OPERATE	Mon	Trip by Communication Scheme Logic
		t	ST	T	OPERATE	Mon	Trip by Communication Scheme Logic

7.3.12 Transient earth fault PTEF

7.3.12.1 Transient/intermittent earth-fault protection INTRPTEF

LN type	LN prefix	LN class	Function block name
INTRPTEF (revision 0)	INTR	PTEF	INTRPTEF

Table 62: INTRPTEF Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE	Mon	Operate signal
		q	ST	T	OPERATE	Mon	Operate signal
		t	ST	T	OPERATE	Mon	Operate signal
Str	d_dACD	general	ST	-	START	Mon	Start signal
		dirGeneral	ST	-	FAULT_DIR	Mon	Detected fault direction
		q	ST	-	START	Mon	Start signal
		t	ST	-	START	Mon	Start signal
InhEF	v1_dSPS	stVal	ST	-	BLK_EF	Mon	Block signal for EF to indicate opposite direction peaks

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
InhEF	v1_dSPS	q	ST	-	BLK_EF	Mon	Block signal for EF to indicate opposite direction peaks
		t	ST	-	BLK_EF	Mon	Block signal for EF to indicate opposite direction peaks
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Ratio of start time / operate time
		q	MX	-	START_DUR	Mon	Ratio of start time / operate time
		t	MX	-	START_DUR	Mon	Ratio of start time / operate time

7.3.13 Transformer differential PTDF

7.3.13.1 Transformer differential protection for two winding transformers TR2PTDF

LN type	LN prefix	LN class	Function block name
GNR2PHAR instance 1 (revision 0)	TR2D	PHAR	TR2PTDF
GNRLLLN0 instance 1 (revision 0)	-	LLN0	TR2PTDF
TR2PDIF instance 1 (revision 0)	TR2D	PDIF	TR2PTDF
TR5HPHAR instance 2 (revision 0)	TR2D	PHAR	TR2PTDF

Table 63: GNR2PHAR Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Str	c_dACD	general	ST	-	-	Mon	2nd harmonic restraint blocking for PHAR LN, combined
		phsA	ST	-	-	Mon	2nd harmonic restraint blocking for PHAR LN, phase A
		phsB	ST	-	-	Mon	2nd harmonic restraint blocking for PHAR LN, phase B
		phsC	ST	-	-	Mon	2nd harmonic restraint blocking for PHAR LN, phase C
		q	ST	-	-	Mon	2nd harmonic restraint blocking for PHAR LN, combined
		t	ST	-	-	Mon	2nd harmonic restraint blocking for PHAR LN, combined
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850

Table 64: GNRLLLN0 Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850

Table 65: TR2PDIF Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Op	a_dACT	general	ST	T	OPERATE	Mon	Operate signal, combined (all phases, both stages)
		phsA	ST	T	OPR_A	Mon	Operate signal phase A
		phsB	ST	T	OPR_B	Mon	Operate signal phase B
		phsC	ST	T	OPR_C	Mon	Operate signal phase C
		q	ST	T	OPERATE	Mon	Operate signal, combined (all phases, both stages)
		t	ST	T	OPERATE	Mon	Operate signal, combined (all phases, both stages)
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
BlkWavSt	v1_dACT	general	ST	-	BLKDWAV	Mon	Status from waveform blocking, combined
		phsA	ST	-	BLKDWAV_A	Mon	Status from waveform blocking, phase A

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
BlkWavSt	v1_dACT	phsB	ST	-	BLKDWAV_B	Mon	Status from waveform blocking, phase B
		phsC	ST	-	BLKDWAV_C	Mon	Status from waveform blocking, phase C
		q	ST	-	BLKDWAV	Mon	Status from waveform blocking, combined
		t	ST	-	BLKDWAV	Mon	Status from waveform blocking, combined
Blk2HSt	v1_dACT	general	ST	-	BLKD2H	Mon	Status from 2nd harmonic restraint block, combined
		phsA	ST	-	BLKD2H_A	Mon	Status from 2nd harmonic restraint block, phase A
		phsB	ST	-	BLKD2H_B	Mon	Status from 2nd harmonic restraint block, phase B
		phsC	ST	-	BLKD2H_C	Mon	Status from 2nd harmonic restraint block, phase C
		q	ST	-	BLKD2H	Mon	Status from 2nd harmonic restraint block, combined
		t	ST	-	BLKD2H	Mon	Status from 2nd harmonic restraint block, combined
Blk5HSt	v1_dACT	general	ST	-	BLKD5H	Mon	Status from 5th harmonic restraint blocking, combined
		phsA	ST	-	BLKD5H_A	Mon	Status from 5th harmonic restraint blocking, phase A
		phsB	ST	-	BLKD5H_B	Mon	Status from 5th harmonic restraint blocking, phase B
		phsC	ST	-	BLKD5H_C	Mon	Status from 5th harmonic restraint blocking, phase C
		q	ST	-	BLKD5H	Mon	Status from 5th harmonic restraint blocking, combined
		t	ST	-	BLKD5H	Mon	Status from 5th harmonic restraint blocking, combined
OpLoSet	v2_dACT	general	ST	-	OPR_LS	Mon	Operate signal from low set (biased) stage
		q	ST	-	OPR_LS	Mon	Operate signal from low set (biased) stage
		t	ST	-	OPR_LS	Mon	Operate signal from low set (biased) stage
OpHiSet	v2_dACT	general	ST	-	OPR_HS	Mon	Operate signal from high set (instantaneous) stage
		q	ST	-	OPR_HS	Mon	Operate signal from high set (instantaneous) stage
		t	ST	-	OPR_HS	Mon	Operate signal from high set (instantaneous) stage
AngPriAB	v2_dMV	mag.f	MX	-	I_ANGL_A1_B1	Mon	Current phase angle phase A – phase B, winding 1
		q	MX	-	I_ANGL_A1_B1	Mon	Current phase angle phase A – phase B, winding 1

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
AngPriAB	v2_dMV	t	MX	-	I_ANGL_A1_B1	Mon	Current phase angle phase A – phase B, winding 1
AngPriBC	v2_dMV	mag.f	MX	-	I_ANGL_B1_C1	Mon	Current phase angle phase B – phase C, winding 1
		q	MX	-	I_ANGL_B1_C1	Mon	Current phase angle phase B – phase C, winding 1
		t	MX	-	I_ANGL_B1_C1	Mon	Current phase angle phase B – phase C, winding 1
AngPriCA	v2_dMV	mag.f	MX	-	I_ANGL_C1_A1	Mon	Current phase angle phase C – phase A, winding 1
		q	MX	-	I_ANGL_C1_A1	Mon	Current phase angle phase C – phase A, winding 1
		t	MX	-	I_ANGL_C1_A1	Mon	Current phase angle phase C – phase A, winding 1
AngScyAB	v2_dMV	mag.f	MX	-	I_ANGL_A2_B2	Mon	Current phase angle phase A – phase B, winding 2
		q	MX	-	I_ANGL_A2_B2	Mon	Current phase angle phase A – phase B, winding 2
		t	MX	-	I_ANGL_A2_B2	Mon	Current phase angle phase A – phase B, winding 2
AngScyBC	v2_dMV	mag.f	MX	-	I_ANGL_B2_C2	Mon	Current phase angle phase B – phase C, winding 2
		q	MX	-	I_ANGL_B2_C2	Mon	Current phase angle phase B – phase C, winding 2
		t	MX	-	I_ANGL_B2_C2	Mon	Current phase angle phase B – phase C, winding 2
AngScyCA	v2_dMV	mag.f	MX	-	I_ANGL_C2_A2	Mon	Current phase angle phase C – phase A, winding 2
		q	MX	-	I_ANGL_C2_A2	Mon	Current phase angle phase C – phase A, winding 2
		t	MX	-	I_ANGL_C2_A2	Mon	Current phase angle phase C – phase A, winding 2
AngPriScyA	v2_dMV	mag.f	MX	-	I_ANGL_A1_A2	Mon	Current phase angle diff between winding 1 and 2, phase A
		q	MX	-	I_ANGL_A1_A2	Mon	Current phase angle diff between winding 1 and 2, phase A
		t	MX	-	I_ANGL_A1_A2	Mon	Current phase angle diff between winding 1 and 2, phase A
AngPriScyB	v2_dMV	mag.f	MX	-	I_ANGL_B1_B2	Mon	Current phase angle diff between winding 1 and 2, phase B
		q	MX	-	I_ANGL_B1_B2	Mon	Current phase angle diff between winding 1 and 2, phase B
		t	MX	-	I_ANGL_B1_B2	Mon	Current phase angle diff between winding 1 and 2, phase B

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
AngPriScyC	v2_dMV	mag.f	MX	-	I_ANGL_C1_C2	Mon	Current phase angle diff between winding 1 and 2, phase C
		q	MX	-	I_ANGL_C1_C2	Mon	Current phase angle diff between winding 1 and 2, phase C
		t	MX	-	I_ANGL_C1_C2	Mon	Current phase angle diff between winding 1 and 2, phase C

Table 66: TR5HPHAR Logical node data (instance 2)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Str	a_dACD	general	ST	-	-	Mon	5th harmonic restraint blocking for PHAR LN, combined
		phsA	ST	-	-	Mon	5th harmonic restraint blocking for PHAR LN, phase A
		phsB	ST	-	-	Mon	5th harmonic restraint blocking for PHAR LN, phase B
		phsC	ST	-	-	Mon	5th harmonic restraint blocking for PHAR LN, phase C
		q	ST	-	-	Mon	5th harmonic restraint blocking for PHAR LN, combined
		t	ST	-	-	Mon	5th harmonic restraint blocking for PHAR LN, combined
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850

7.3.14 Time over current PTOC

7.3.14.1 Motor run time jam protection JAMPTOC

LN type	LN prefix	LN class	Function block name
JAMPTOC (revision 0)	JAM	PTOC	JAMPTOC

Table 67: JAMPTOC Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Str	b_dACD	general	ST	-	START	Mon	Started signal
		q	ST	-	START	Mon	Started signal
		t	ST	-	START	Mon	Started signal
Op	b_dACT	general	ST	T	OPERATE	Mon	Operated
		q	ST	T	OPERATE	Mon	Operated
		t	ST	T	OPERATE	Mon	Operated
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Ratio of start time / operate time
		q	MX	-	START_DUR	Mon	Ratio of start time / operate time
		t	MX	-	START_DUR	Mon	Ratio of start time / operate time

7.3.14.2 Negative-phase-sequence time overcurrent protection for machines MNSPTOC

LN type	LN prefix	LN class	Function block name
MNSPTOC (revision 0)	MNS	PTOC	MNSPTOC

Table 68: MNSPTOC Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
StrInh	a_dSPS	stVal	ST	-	BLK_RESTART	Mon	Signal for blocking reconnection of an overheated machine
		q	ST	-	BLK_RESTART	Mon	Signal for blocking reconnection of an overheated machine
		t	ST	-	BLK_RESTART	Mon	Signal for blocking reconnection of an overheated machine
Op	b_dACT	general	ST	T	OPERATE	Mon	Operated
		q	ST	T	OPERATE	Mon	Operated
		t	ST	T	OPERATE	Mon	Operated
Str	d_dACD	general	ST	-	START	Mon	Started
		q	ST	-	START	Mon	Started
		t	ST	-	START	Mon	Started
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Ratio of start time / operate time
		q	MX	-	START_DUR	Mon	Ratio of start time / operate time
		t	MX	-	START_DUR	Mon	Ratio of start time / operate time
TmsRecEna	v2_dMV	mag.f	MX	-	T_ENARESTART	Mon	Estimated time to reset of block restart
		q	MX	-	T_ENARESTART	Mon	Estimated time to reset of block restart
		t	MX	-	T_ENARESTART	Mon	Estimated time to reset of block restart

7.3.14.3 Phase reversal protection PREVPTOC

LN type	LN prefix	LN class	Function block name
PREVPTOC (revision 0)	PREV	PTOC	PREVPTOC

Table 69: PREVPTOC Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE	Mon	Operated signal
		q	ST	T	OPERATE	Mon	Operated signal
		t	ST	T	OPERATE	Mon	Operated signal
Str	d_dACD	general	ST	-	START	Mon	Started signal
		q	ST	-	START	Mon	Started signal
		t	ST	-	START	Mon	Started signal
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time
		q	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time
		t	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time

7.3.14.4 Non-directional earth-fault protetion, high stage EFHPTOC

LN type	LN prefix	LN class	Function block name
EFHPTOC (revision 0)	EFH	PTOC	EFHPTOC

Table 70: EFHPTOC Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE	Mon	Operated
		q	ST	T	OPERATE	Mon	Operated
		t	ST	T	OPERATE	Mon	Operated
Str	d_dACD	general	ST	-	START	Mon	Started
		q	ST	-	START	Mon	Started
		t	ST	-	START	Mon	Started
IvdCrv	v1_dSPS	stVal	ST	-	INVAL_CRV	Mon	Invalid curve parameters
		q	ST	-	INVAL_CRV	Mon	Invalid curve parameters
		t	ST	-	INVAL_CRV	Mon	Invalid curve parameters
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Ratio of start time / operate time
		q	MX	-	START_DUR	Mon	Ratio of start time / operate time
		t	MX	-	START_DUR	Mon	Ratio of start time / operate time

7.3.14.5 Non-directional earth-fault protetion, instantaneous stage EFIPTOC

LN type	LN prefix	LN class	Function block name
EFIPTOC (revision 0)	EFI	PTOC	EFIPTOC

Table 71: EFIPTOC Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE	Mon	Operated
		q	ST	T	OPERATE	Mon	Operated
		t	ST	T	OPERATE	Mon	Operated
Str	d_dACD	general	ST	-	START	Mon	Started
		q	ST	-	START	Mon	Started
		t	ST	-	START	Mon	Started
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Ratio of start time / operate time
		q	MX	-	START_DUR	Mon	Ratio of start time / operate time
		t	MX	-	START_DUR	Mon	Ratio of start time / operate time

7.3.14.6 Non-directional earth-fault protetion, low stage EFLPTOC

LN type	LN prefix	LN class	Function block name
EFLPTOC (revision 0)	EFL	PTOC	EFLPTOC

Table 72: EFLPTOC Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE	Mon	Operated
		q	ST	T	OPERATE	Mon	Operated

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Op	b_dACT	t	ST	T	OPERATE	Mon	Operated
Str	d_dACD	general	ST	-	START	Mon	Started
		q	ST	-	START	Mon	Started
		t	ST	-	START	Mon	Started
IvdCrv	v1_dSPS	stVal	ST	-	INVAL_CRV	Mon	Invalid curve parameters
		q	ST	-	INVAL_CRV	Mon	Invalid curve parameters
		t	ST	-	INVAL_CRV	Mon	Invalid curve parameters
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Ratio of start time / operate time
		q	MX	-	START_DUR	Mon	Ratio of start time / operate time
		t	MX	-	START_DUR	Mon	Ratio of start time / operate time

7.3.14.7 Negative-sequence overcurrent protection NSPTOC

LN type	LN prefix	LN class	Function block name
NSPTOC (revision 0)	NS	PTOC	NSPTOC

Table 73: NSPTOC Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE	Mon	Operate Signal
		q	ST	T	OPERATE	Mon	Operate Signal
		t	ST	T	OPERATE	Mon	Operate Signal
Str	d_dACD	general	ST	-	START	Mon	Start Signal
		q	ST	-	START	Mon	Start Signal
		t	ST	-	START	Mon	Start Signal

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Start Duration
		q	MX	-	START_DUR	Mon	Start Duration
		t	MX	-	START_DUR	Mon	Start Duration

7.3.14.8 Phase discontinuity protection, based on pos. and neg. seq. currents PDNSPTOC

LN type	LN prefix	LN class	Function block name
PDNSPTOC (revision 0)	PDNS	PTOC	PDNSPTOC

Table 74: PDNSPTOC Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE	Mon	Phase discontinuity protection operated.
		q	ST	T	OPERATE	Mon	Phase discontinuity protection operated.
		t	ST	T	OPERATE	Mon	Phase discontinuity protection operated.
ImbNgA	b_dMV	mag.f	MX	-	RATIO_I2_I1	Mon	Measured current ratio I2 / I1
		q	MX	-	RATIO_I2_I1	Mon	Measured current ratio I2 / I1
		t	MX	-	RATIO_I2_I1	Mon	Measured current ratio I2 / I1
Str	d_dACD	general	ST	-	START	Mon	Phase discontinuity protection started
		q	ST	-	START	Mon	Phase discontinuity protection started
		t	ST	-	START	Mon	Phase discontinuity protection started

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Ratio of start time / operate time
		q	MX	-	START_DUR	Mon	Ratio of start time / operate time
		t	MX	-	START_DUR	Mon	Ratio of start time / operate time

7.3.14.9 Non-directional overcurrent protection, high stage PHHPTOC

LN type	LN prefix	LN class	Function block name
PHHPTOC (revision 0)	PHH	PTOC	PHHPTOC

Table 75: PHHPTOC Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Op	a_dACT	general	ST	T	OPERATE	Mon	Operated
		phsA	ST	T	OPR_A	Mon	Operated phase A
		phsB	ST	T	OPR_B	Mon	Operated phase B
		phsC	ST	T	OPR_C	Mon	Operated phase C
		q	ST	T	OPERATE	Mon	Operated
		t	ST	T	OPERATE	Mon	Operated
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Str	c_dACD	general	ST	-	START	Mon	Started signal
		phsA	ST	-	ST_A	Mon	Started phase A
		phsB	ST	-	ST_B	Mon	Started phase B
		phsC	ST	-	ST_C	Mon	Started phase C
		q	ST	-	START	Mon	Started signal
		t	ST	-	START	Mon	Started signal
IvdCrv	v1_dSPS	stVal	ST	-	INVAL_CRV	Mon	Invalid curve parameters

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
IvdCrv	v1_dSPS	q	ST	-	INVAL_CRV	Mon	Invalid curve parameters
		t	ST	-	INVAL_CRV	Mon	Invalid curve parameters
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Ratio of start time / operate time
		q	MX	-	START_DUR	Mon	Ratio of start time / operate time
		t	MX	-	START_DUR	Mon	Ratio of start time / operate time

7.3.14.10 Non-directional overcurrent protection, instantaneous stage PHIPTOC

LN type	LN prefix	LN class	Function block name
PHIPTOC (revision 0)	PHI	PTOC	PHIPTOC

Table 76: PHIPTOC Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Op	a_dACT	general	ST	T	OPERATE	Mon	Operated
		phsA	ST	T	OPR_A	Mon	Operated phase A
		phsB	ST	T	OPR_B	Mon	Operated phase B
		phsC	ST	T	OPR_C	Mon	Operated phase C
		q	ST	T	OPERATE	Mon	Operated
		t	ST	T	OPERATE	Mon	Operated
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Str	c_dACD	general	ST	-	START	Mon	Started signal
		phsA	ST	-	ST_A	Mon	Started phase A
		phsB	ST	-	ST_B	Mon	Started phase B
		phsC	ST	-	ST_C	Mon	Started phase C
		q	ST	-	START	Mon	Started signal

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Str	c_dACD	t	ST	-	START	Mon	Started signal
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Ratio of start time / operate time
		q	MX	-	START_DUR	Mon	Ratio of start time / operate time
		t	MX	-	START_DUR	Mon	Ratio of start time / operate time

7.3.14.11 Non-directional overcurrent protection, low stage PHLPTOC

LN type	LN prefix	LN class	Function block name
PHLPTOC (revision 0)	PHL	PTOC	PHLPTOC

Table 77: PHLPTOC Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Op	a_dACT	general	ST	T	OPERATE	Mon	Operated
		phsA	ST	T	OPR_A	Mon	Operated phase A
		phsB	ST	T	OPR_B	Mon	Operated phase B
		phsC	ST	T	OPR_C	Mon	Operated phase C
		q	ST	T	OPERATE	Mon	Operated
		t	ST	T	OPERATE	Mon	Operated
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Str	c_dACD	general	ST	-	START	Mon	Started signal
		phsA	ST	-	ST_A	Mon	Started phase A
		phsB	ST	-	ST_B	Mon	Started phase B
		phsC	ST	-	ST_C	Mon	Started phase C
		q	ST	-	START	Mon	Started signal
		t	ST	-	START	Mon	Started signal

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
IvdCrv	v1_dSPS	stVal	ST	-	INVAL_CRV	Mon	Invalid curve parameters
		q	ST	-	INVAL_CRV	Mon	Invalid curve parameters
		t	ST	-	INVAL_CRV	Mon	Invalid curve parameters
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Ratio of start time / operate time
		q	MX	-	START_DUR	Mon	Ratio of start time / operate time
		t	MX	-	START_DUR	Mon	Ratio of start time / operate time

7.3.15 Overfrequency PTOF

7.3.15.1 Overfrequency protection DAPTOF

LN type	LN prefix	LN class	Function block name
DAPTOF (revision 0)	DA	PTOF	DAPTOF

Table 78: DAPTOF Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter
		Oper.T	CO	-	-	Cmd	Mode parameter
		Oper.Test	CO	-	-	Cmd	Mode parameter
		Oper.Check	CO	-	-	Cmd	Mode parameter
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	
		q	ST	-	Beh	Mon	
		t	ST	-	Beh	Mon	
BlkV	a_dSPS	stVal	ST	-	LOWAMPL_BLKD	Mon	Blocking indication due to low amplitude.
		q	ST	-	LOWAMPL_BLKD	Mon	Blocking indication due to low amplitude.
		t	ST	-	LOWAMPL_BLKD	Mon	Blocking indication due to low amplitude.
Op	b_dACT	general	ST	T	OPERATE	Mon	Operate signal for overfrequency protection
		q	ST	T	OPERATE	Mon	Operate signal for overfrequency protection

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Op	b_dACT	t	ST	T	OPERATE	Mon	Operate signal for overfrequency protection
Str	d_dACD	general	ST	-	START	Mon	Start signal for overfrequency protection
		q	ST	-	START	Mon	Start signal for overfrequency protection
		t	ST	-	START	Mon	Start signal for overfrequency protection
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Start duration in percents of the total operation time.
		q	MX	-	START_DUR	Mon	Start duration in percents of the total operation time.
		t	MX	-	START_DUR	Mon	Start duration in percents of the total operation time.

7.3.16 Overvoltage PTOV

7.3.16.1 Negative-sequence overvoltage protection NSPTOV

LN type	LN prefix	LN class	Function block name
NSPTOV (revision 0)	NS	PTOV	NSPTOV

Table 79: NSPTOV Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE	Mon	Operate signal for Negative Sequence Overvoltage logic
		q	ST	T	OPERATE	Mon	Operate signal for Negative Sequence Overvoltage logic

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Op	b_dACT	t	ST	T	OPERATE	Mon	Operate signal for Negative Sequence Overvoltage logic
Str	d_dACD	general	ST	-	START	Mon	Start signal for Negative Sequence Overvoltage logic
		q	ST	-	START	Mon	Start signal for Negative Sequence Overvoltage logic
		t	ST	-	START	Mon	Start signal for Negative Sequence Overvoltage logic
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time
		q	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time
		t	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time

7.3.16.2 Overvoltage protection PHPTOV

LN type	LN prefix	LN class	Function block name
PHPTOV (revision 0)	PH	PTOV	PHPTOV

Table 80: PHPTOV Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Op	a_dACT	general	ST	T	OPERATE	Mon	Operate signal, combined
		phsA	ST	T	OPR_A	Mon	Operate signal, phase 1
		phsB	ST	T	OPR_B	Mon	Operate signal, phase 2
		phsC	ST	T	OPR_C	Mon	Operate signal, phase 3
		q	ST	T	OPERATE	Mon	Operate signal, combined
		t	ST	T	OPERATE	Mon	Operate signal, combined
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	t	ST	-	Beh	Mon	Behaviour parameter for 61850
Str	c_dACD	general	ST	-	START	Mon	Start signal, combined
		phsA	ST	-	ST_A	Mon	Start signal, phase 1
		phsB	ST	-	ST_B	Mon	Start signal, phase 2
		phsC	ST	-	ST_C	Mon	Start signal, phase 3
		q	ST	-	START	Mon	Start signal, combined
		t	ST	-	START	Mon	Start signal, combined
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Ratio of Start time to Operate time
		q	MX	-	START_DUR	Mon	Ratio of Start time to Operate time
		t	MX	-	START_DUR	Mon	Ratio of Start time to Operate time
VMax	v2_dMV	mag.f	MX	-	U_MAX	Mon	Maximum of the phase or phase-to-phase voltages
		q	MX	-	U_MAX	Mon	Maximum of the phase or phase-to-phase voltages
		t	MX	-	U_MAX	Mon	Maximum of the phase or phase-to-phase voltages
VMaxRat	v2_dMV	mag.f	MX	-	U_RATIO	Mon	Maximum voltage ratio to the Start value
		q	MX	-	U_RATIO	Mon	Maximum voltage ratio to the Start value
		t	MX	-	U_RATIO	Mon	Maximum voltage ratio to the Start value

7.3.16.3 Positive-sequence overvoltage protection PSPTOV

LN type	LN prefix	LN class	Function block name
PSPTOV (revision 0)	PS	PTOV	PSPTOV

Table 81: PSPTOV Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE	Mon	Operate signal for Positive Sequence Overvoltage logic
		q	ST	T	OPERATE	Mon	Operate signal for Positive Sequence Overvoltage logic
		t	ST	T	OPERATE	Mon	Operate signal for Positive Sequence Overvoltage logic
Str	d_dACD	general	ST	-	START	Mon	Start signal for Positive Sequence Overvoltage logic
		q	ST	-	START	Mon	Start signal for Positive Sequence Overvoltage logic
		t	ST	-	START	Mon	Start signal for Positive Sequence Overvoltage logic
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time
		q	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time
		t	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time

7.3.16.4 Residual overvoltage protection ROVPTOV

LN type	LN prefix	LN class	Function block name
ROVPTOV (revision 0)	ROV	PTOV	ROVPTOV

Table 82: ROVPTOV Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE	Mon	Operate signal for residual overvoltage logic
		q	ST	T	OPERATE	Mon	Operate signal for residual overvoltage logic
		t	ST	T	OPERATE	Mon	Operate signal for residual overvoltage logic
Str	d_dACD	general	ST	-	START	Mon	Start signal for residual overvoltage logic
		q	ST	-	START	Mon	Start signal for residual overvoltage logic
		t	ST	-	START	Mon	Start signal for residual overvoltage logic
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time
		q	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time
		t	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time

7.3.17 Protection trip conditioning PTRC

7.3.17.1 Trip conditioning logic TRPPTRC

LN type	LN prefix	LN class	Function block name
TRPPTRC (revision 0)	TRP	PTRC	TRPPTRC

Table 83: TRPPTRC Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter
		Oper.T	CO	-	-	Cmd	Mode parameter
		Oper.Test	CO	-	-	Cmd	Mode parameter
		Oper.Check	CO	-	-	Cmd	Mode parameter
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter
		q	ST	-	Beh	Mon	Behaviour parameter

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	t	ST	-	Beh	Mon	Behaviour parameter
Tr	b_dACT	general	ST	-	TRIP	Mon	General trip output signal
		q	ST	-	TRIP	Mon	General trip output signal
		t	ST	-	TRIP	Mon	General trip output signal
LORs	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850
ClsLO	v1_dSPS	stVal	ST	-	CL_LKOUT	Mon	Circuit breaker lockout output (set until reset)
		q	ST	-	CL_LKOUT	Mon	Circuit breaker lockout output (set until reset)
		t	ST	-	CL_LKOUT	Mon	Circuit breaker lockout output (set until reset)

7.3.18 Thermal overload PTTR

7.3.18.1 Thermal overload protection for motors MPTTR

LN type	LN prefix	LN class	Function block name
MPTTR (revision 0)	M	PTTR	MPTTR

Table 84: MPTTR Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
AlmThm	a_dSPS	stVal	ST	-	ALARM	Mon	Alarm signal when thermal load exceeds alarm setting
		q	ST	-	ALARM	Mon	Alarm signal when thermal load exceeds alarm setting
		t	ST	-	ALARM	Mon	Alarm signal when thermal load exceeds alarm setting
StrInh	a_dSPS	stVal	ST	-	BLK_RESTART	Mon	Thermal overload indicator, to inhibit restart
		q	ST	-	BLK_RESTART	Mon	Thermal overload indicator, to inhibit restart
		t	ST	-	BLK_RESTART	Mon	Thermal overload indicator, to inhibit restart
Op	b_dACT	general	ST	T	OPERATE	Mon	Operate signal when thermal load exceeds operate setting
		q	ST	T	OPERATE	Mon	Operate signal when thermal load exceeds operate setting
		t	ST	T	OPERATE	Mon	Operate signal when thermal load exceeds operate setting
TmsRecEna	v1_dINS	stVal	ST	-	T_ENARESTART	Mon	Estimated time to reset of block restart
		q	ST	-	T_ENARESTART	Mon	Estimated time to reset of block restart
		t	ST	-	T_ENARESTART	Mon	Estimated time to reset of block restart
RsTmp	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
SenFlt	v1_dSPS	stVal	ST	-	-	Mon	Error signal from the temperature sensor
		q	ST	-	-	Mon	Error signal from the temperature sensor
		t	ST	-	-	Mon	Error signal from the temperature sensor
ThmDev	v2_dMV	mag.f	MX	-	THERM_LEVEL	Mon	Calculated thermal level of the device
		q	MX	-	THERM_LEVEL	Mon	Calculated thermal level of the device
		t	MX	-	THERM_LEVEL	Mon	Calculated thermal level of the device
TmpUsed	v2_dMV	mag.f	MX	-	TEMP_AMB	Mon	Ambient temperature used in calculations
		q	MX	-	TEMP_AMB	Mon	Ambient temperature used in calculations
		t	MX	-	TEMP_AMB	Mon	Ambient temperature used in calculations
ThmLevSt	v2_dMV	mag.f	MX	-	THERMLEV_ST	Mon	Thermal level at beginning of motor startup
		q	MX	-	THERMLEV_ST	Mon	Thermal level at beginning of motor startup
		t	MX	-	THERMLEV_ST	Mon	Thermal level at beginning of motor startup
ThmLevEnd	v2_dMV	mag.f	MX	-	THERMLEV_END	Mon	Thermal level at the end of motor startup situation
		q	MX	-	THERMLEV_END	Mon	Thermal level at the end of motor startup situation
		t	MX	-	THERMLEV_END	Mon	Thermal level at the end of motor startup situation

7.3.18.2 Thermal overload protection for transformers T2PTTR

LN type	LN prefix	LN class	Function block name
T2PTTR (revision 0)	T2	PTTR	T2PTTR

Table 85: T2PTTR Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
AlmThm	a_dSPS	stVal	ST	-	ALARM	Mon	The calculated temperature is over Alarm level Temperature limit
		q	ST	-	ALARM	Mon	The calculated temperature is over Alarm level Temperature limit
		t	ST	-	ALARM	Mon	The calculated temperature is over Alarm level Temperature limit
Op	b_dACT	general	ST	T	OPERATE	Mon	Operate signal
		q	ST	T	OPERATE	Mon	Operate signal
		t	ST	T	OPERATE	Mon	Operate signal
Tmp	b_dMV	mag.f	MX	-	TEMP	Mon	The calculated temperature of the protected object
		q	MX	-	TEMP	Mon	The calculated temperature of the protected object
		t	MX	-	TEMP	Mon	The calculated temperature of the protected object
TmpRl	b_dMV	mag.f	MX	-	TEMP_RL	Mon	The calculated temperature of the protected object relative to the operate level
		q	MX	-	TEMP_RL	Mon	The calculated temperature of the protected object relative to the operate level
		t	MX	-	TEMP_RL	Mon	The calculated temperature of the protected object relative to the operate level
Str	d_dACD	general	ST	-	START	Mon	Signal indicating current that will raise temperature above operate level if prolonged
		q	ST	-	START	Mon	Signal indicating current that will raise temperature above operate level if prolonged
		t	ST	-	START	Mon	Signal indicating current that will raise temperature above operate level if prolonged
TmsOp	v1_dINS	stVal	ST	-	T_OPERATE	Mon	Estimated time to operate
		q	ST	-	T_OPERATE	Mon	Estimated time to operate
		t	ST	-	T_OPERATE	Mon	Estimated time to operate

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
TmsRecEna	v1_dINS	stVal	ST	-	T_ENA_CLOSE	Mon	Estimated time to deactivate BLK_CLOSE in seconds
		q	ST	-	T_ENA_CLOSE	Mon	Estimated time to deactivate BLK_CLOSE in seconds
		t	ST	-	T_ENA_CLOSE	Mon	Estimated time to deactivate BLK_CLOSE in seconds
RsTmp	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850
InhRec	v1_dSPS	stVal	ST	-	BLK_CLOSE	Mon	Thermal overload indicator. To inhibite reclose.
		q	ST	-	BLK_CLOSE	Mon	Thermal overload indicator. To inhibite reclose.
		t	ST	-	BLK_CLOSE	Mon	Thermal overload indicator. To inhibite reclose.
SenFlt	v1_dSPS	stVal	ST	-	-	Mon	Error signal from the temperature sensor
		q	ST	-	-	Mon	Error signal from the temperature sensor
		t	ST	-	-	Mon	Error signal from the temperature sensor
TmpUsed	v2_dMV	mag.f	MX	-	TEMP_AMB	Mon	Ambient temperature used in the calculations
		q	MX	-	TEMP_AMB	Mon	Ambient temperature used in the calculations
		t	MX	-	TEMP_AMB	Mon	Ambient temperature used in the calculations

7.3.18.3 Thermal overload protection, one time constant T1PTTR

LN type	LN prefix	LN class	Function block name
T1PTTR (revision 0)	T1	PTTR	T1PTTR

Table 86: T1PTTR Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter
		Oper.T	CO	-	-	Cmd	Mode parameter
		Oper.Test	CO	-	-	Cmd	Mode parameter
		Oper.Check	CO	-	-	Cmd	Mode parameter
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	
		q	ST	-	Beh	Mon	
		t	ST	-	Beh	Mon	
AlmThm	a_dSPS	stVal	ST	-	ALARM	Mon	Alarm signal
		q	ST	-	ALARM	Mon	Alarm signal
		t	ST	-	ALARM	Mon	Alarm signal
Op	b_dACT	general	ST	T	OPERATE	Mon	Operate signal
		q	ST	T	OPERATE	Mon	Operate signal
		t	ST	T	OPERATE	Mon	Operate signal
Tmp	b_dMV	mag.f	MX	-	TEMP	Mon	Calculated temperature of the device
		q	MX	-	TEMP	Mon	Calculated temperature of the device
		t	MX	-	TEMP	Mon	Calculated temperature of the device
TmpRl	b_dMV	mag.f	MX	-	TEMP_RL	Mon	Temperature relative to operate temperature
		q	MX	-	TEMP_RL	Mon	Temperature relative to operate temperature
		t	MX	-	TEMP_RL	Mon	Temperature relative to operate temperature
Str	d_dACD	general	ST	-	START	Mon	Start Signal
		q	ST	-	START	Mon	Start Signal
		t	ST	-	START	Mon	Start Signal
TmmOp	v1_dINS	stVal	ST	-	T_OPERATE	Mon	Estimated time to operate
		q	ST	-	T_OPERATE	Mon	Estimated time to operate
		t	ST	-	T_OPERATE	Mon	Estimated time to operate
TmmRecEna	v1_dINS	stVal	ST	-	T_ENA_CLOSE	Mon	Estimated time to reset of block reclose
		q	ST	-	T_ENA_CLOSE	Mon	Estimated time to reset of block reclose

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
TmmRecEna	v1_dINS	t	ST	-	T_ENA_CLOSE	Mon	Estimated time to reset of block reclose
RsTmp	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850
InhRec	v1_dSPS	stVal	ST	-	BLK_CLOSE	Mon	Thermal overload indicator. To inhibit reclose
		q	ST	-	BLK_CLOSE	Mon	Thermal overload indicator. To inhibit reclose
		t	ST	-	BLK_CLOSE	Mon	Thermal overload indicator. To inhibit reclose
SenFlt	v1_dSPS	stVal	ST	-	-	Mon	Error signal from the temperature sensor
		q	ST	-	-	Mon	Error signal from the temperature sensor
		t	ST	-	-	Mon	Error signal from the temperature sensor
TmpUsed	v2_dMV	mag.f	MX	-	TEMP_AMB	Mon	Ambient temperature used in the calculations
		q	MX	-	TEMP_AMB	Mon	Ambient temperature used in the calculations
		t	MX	-	TEMP_AMB	Mon	Ambient temperature used in the calculations

7.3.19 Time undercurrent PTUC

7.3.19.1 Loss of load protection LOFLPTUC

LN type	LN prefix	LN class	Function block name
LOFLPTUC (revision 0)	LOFL	PTUC	LOFLPTUC

Table 87: LOFLPTUC Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE	Mon	Loss of load protection operated
		q	ST	T	OPERATE	Mon	Loss of load protection operated
		t	ST	T	OPERATE	Mon	Loss of load protection operated
Str	d_dACD	general	ST	-	START	Mon	Loss of load protection started
		q	ST	-	START	Mon	Loss of load protection started
		t	ST	-	START	Mon	Loss of load protection started
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	start time / operate time (in %)
		q	MX	-	START_DUR	Mon	start time / operate time (in %)
		t	MX	-	START_DUR	Mon	start time / operate time (in %)

7.3.20 Undervoltage PTUV

7.3.20.1 Undervoltage protection PHPTUV

LN type	LN prefix	LN class	Function block name
PHPTUV (revision 0)	PH	PTUV	PHPTUV

Table 88: PHPTUV Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Op	a_dACT	general	ST	T	OPERATE	Mon	Operate signal, combined
		phsA	ST	T	OPR_A	Mon	Operate signal, phase 1
		phsB	ST	T	OPR_B	Mon	Operate signal, phase 2
		phsC	ST	T	OPR_C	Mon	Operate signal, phase 3
		q	ST	T	OPERATE	Mon	Operate signal, combined
		t	ST	T	OPERATE	Mon	Operate signal, combined
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Str	c_dACD	general	ST	-	START	Mon	Start signal, combined
		phsA	ST	-	ST_A	Mon	Start signal, phase 1
		phsB	ST	-	ST_B	Mon	Start signal, phase 2
		phsC	ST	-	ST_C	Mon	Start signal, phase 3
		q	ST	-	START	Mon	Start signal, combined
		t	ST	-	START	Mon	Start signal, combined
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Ratio of Start time to Operate time
		q	MX	-	START_DUR	Mon	Ratio of Start time to Operate time
		t	MX	-	START_DUR	Mon	Ratio of Start time to Operate time
VMin	v2_dMV	mag.f	MX	-	U_MIN	Mon	Minimum of the phase or phase-to-phase voltages
		q	MX	-	U_MIN	Mon	Minimum of the phase or phase-to-phase voltages
		t	MX	-	U_MIN	Mon	Minimum of the phase or phase-to-phase voltages
VMinRat	v2_dMV	mag.f	MX	-	U_RATIO	Mon	Minimum voltage ratio to the Start value
		q	MX	-	U_RATIO	Mon	Minimum voltage ratio to the Start value
		t	MX	-	U_RATIO	Mon	Minimum voltage ratio to the Start value

7.3.20.2 Positive-sequence undervoltage protection PSPTUV

LN type	LN prefix	LN class	Function block name
PSPTUV (revision 0)	PS	PTUV	PSPTUV

Table 89: PSPTUV Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	OPERATE	Mon	Operate signal for Positive Sequence Undervoltage protection
		q	ST	T	OPERATE	Mon	Operate signal for Positive Sequence Undervoltage protection
		t	ST	T	OPERATE	Mon	Operate signal for Positive Sequence Undervoltage protection
Str	d_dACD	general	ST	-	START	Mon	Start signal for Positive Sequence Undervoltage logic
		q	ST	-	START	Mon	Start signal for Positive Sequence Undervoltage logic
		t	ST	-	START	Mon	Start signal for Positive Sequence Undervoltage logic
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time
		q	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time
		t	MX	-	START_DUR	Mon	Start duration in percentage of the total operating time

7.3.21 Underfrequency PTUF

7.3.21.1 Underfrequency protection DAPTUF

LN type	LN prefix	LN class	Function block name
DAPTUF (revision 0)	DA	PTUF	DAPTUF

Table 90: DAPTUF Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter
		Oper.T	CO	-	-	Cmd	Mode parameter
		Oper.Test	CO	-	-	Cmd	Mode parameter
		Oper.Check	CO	-	-	Cmd	Mode parameter
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	
		q	ST	-	Beh	Mon	
		t	ST	-	Beh	Mon	
BlkV	a_dSPS	stVal	ST	-	LOWAMPL_BLKD	Mon	Blocking indication due to low amplitude.
		q	ST	-	LOWAMPL_BLKD	Mon	Blocking indication due to low amplitude.
		t	ST	-	LOWAMPL_BLKD	Mon	Blocking indication due to low amplitude.
Op	b_dACT	general	ST	T	OPERATE	Mon	Operate signal for underfrequency protection
		q	ST	T	OPERATE	Mon	Operate signal for underfrequency protection
		t	ST	T	OPERATE	Mon	Operate signal for underfrequency protection
Str	d_dACD	general	ST	-	START	Mon	Start signal for underfrequency protection
		q	ST	-	START	Mon	Start signal for underfrequency protection
		t	ST	-	START	Mon	Start signal for underfrequency protection
RestLodOp	v2_dACT	general	ST	-	RESTORE	Mon	Restore signal for load restoring purposes.

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
RestLodOp	v2_dACT	q	ST	-	RESTORE	Mon	Restore signal for load restoring purposes.
		t	ST	-	RESTORE	Mon	Restore signal for load restoring purposes.
StrDur	v2_dMV	mag.f	MX	-	START_DUR	Mon	Start duration in percents of the total operation time.
		q	MX	-	START_DUR	Mon	Start duration in percents of the total operation time.
		t	MX	-	START_DUR	Mon	Start duration in percents of the total operation time.

7.4 System logical nodes

7.4.1 Physical device information LPHD

7.4.1.1 Production Information PRODINF

LN type	LN prefix	LN class	Function block name
LPHD (revision 1)	-	LPHD	PRODINF

Table 91: LPHD Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PhyNam	a_dDPL	swRev	DC	-	FirmwareVer	-	Firmware version
		serNum	DC	-	SerialNo	-	IED serial number
		model	DC	-	-	-	IED model for IEC61850

7.5 Logical nodes for protection related functions

7.5.1 Breaker failure RBRF

7.5.1.1 Current and contact based breaker failure protection CCBRBRF

LN type	LN prefix	LN class	Function block name
CCBRBRF (revision 0)	CCB	RBRF	CCBRBRF

Table 92: CCBRBRF Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
OpEx	b_dACT	general	ST	T	TRBU	Mon	Backup trip
		q	ST	T	TRBU	Mon	Backup trip
		t	ST	T	TRBU	Mon	Backup trip
OpIn	b_dACT	general	ST	T	TRRET	Mon	Retrip
		q	ST	T	TRRET	Mon	Retrip
		t	ST	T	TRRET	Mon	Retrip
Str	d_dACD	general	ST	-	CB_FAULT_AL	Mon	Delayed CB failure alarm
		q	ST	-	CB_FAULT_AL	Mon	Delayed CB failure alarm
		t	ST	-	CB_FAULT_AL	Mon	Delayed CB failure alarm

7.5.2 Differential supervision RDIF

7.5.2.1 CCRDIF

LN type	LN prefix	LN class	Function block name
CCRDIF (revision 0)	CC	RDIF	CCRDIF

Table 93: CCRDIF Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Alm	a_dSPS	stVal	ST	-	ALARM	Mon	Alarm for current circuit failure
		q	ST	-	ALARM	Mon	Alarm for current circuit failure
		t	ST	-	ALARM	Mon	Alarm for current circuit failure
Op	b_dACT	general	ST	-	FAIL	Mon	Detection of current circuit failure
		q	ST	-	FAIL	Mon	Detection of current circuit failure
		t	ST	-	FAIL	Mon	Detection of current circuit failure

7.5.3 Disturbance recorder RDRE

7.5.3.1 Disturbance report DRRDRE

LN type	LN prefix	LN class	Function block name
DRRDRE (revision 0)	DR	RDRE	DRRDRE

Table 94: DRRDRE Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
FltNum	b_dINS	stVal	ST	-	Fault number	Mon	Disturbance fault number
		q	ST	-	Fault number	Mon	Disturbance fault number
		t	ST	-	Fault number	Mon	Disturbance fault number
MemUsed	b_dINS	stVal	ST	-	Memory used	Mon	Memory usage (0-100%)
		q	ST	-	Memory used	Mon	Memory usage (0-100%)
		t	ST	-	Memory used	Mon	Memory usage (0-100%)
RcdMade	d_dSPS	stVal	ST	-	RECMADE	Mon	Disturbance recording made
		q	ST	-	RECMADE	Mon	Disturbance recording made
		t	ST	-	RECMADE	Mon	Disturbance recording made
RcdStr	d_dSPS	stVal	ST	-	RECSTART	Mon	Disturbance recording started
		q	ST	-	RECSTART	Mon	Disturbance recording started
		t	ST	-	RECSTART	Mon	Disturbance recording started
RcdClr	v2_dSPS	stVal	ST	-	CLEARED	Mon	All disturbances in the disturbance report cleared
		q	ST	-	CLEARED	Mon	All disturbances in the disturbance report cleared
		t	ST	-	CLEARED	Mon	All disturbances in the disturbance report cleared
MemUsedAlm	v2_dSPS	stVal	ST	-	MEMUSED	Mon	More than 80% of memory used
		q	ST	-	MEMUSED	Mon	More than 80% of memory used
		t	ST	-	MEMUSED	Mon	More than 80% of memory used

7.5.4 Fault locator RFLO

7.5.4.1 Fault locator SCEFRFLO

LN type	LN prefix	LN class	Function block name
F1MSTA instance 1 (revision 0)	SCFL	MSTA	SCEFRFLO
RSLLN0 instance 1 (revision 0)	-	LLN0	SCEFRFLO
SCEFRFLO instance 1 (revision 0)	SCFL	RFLO	SCEFRFLO

Table 95: F1MSTA Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Alm	a_dSPS	stVal	ST	-	1 ALARM	Mon	Record data of bank 1 for alarm signal
		q	ST	-	1 ALARM	Mon	Record data of bank 1 for alarm signal
		t	ST	-	1 ALARM	Mon	Record data of bank 1 for alarm signal
FltDiskm	b_dMV	mag.f	MX	-	1 FLT_DISTANCE	Mon	Record data of bank 1 for fault distance
		q	MX	-	1 FLT_DISTANCE	Mon	Record data of bank 1 for fault distance
		t	MX	-	1 FLT_DISTANCE	Mon	Record data of bank 1 for fault distance
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
FltLoop	e_dINS	stVal	ST	-	1 FAULT_LOOP	Mon	Record data of bank 1 for fault loop
		q	ST	-	1 FAULT_LOOP	Mon	Record data of bank 1 for fault loop
		t	ST	-	1 FAULT_LOOP	Mon	Record data of bank 1 for fault loop
FltDisVald	v1_dINS	stVal	ST	-	1 EF_VALIDITY	Mon	Record data of bank 1 for validity of earth fault location
		q	ST	-	1 EF_VALIDITY	Mon	Record data of bank 1 for validity of earth fault location
		t	ST	-	1 EF_VALIDITY	Mon	Record data of bank 1 for validity of earth fault location
FltR	v2_dMV	mag.f	MX	-	1 RF	Mon	Record data of bank 1 for fault resistance
		q	MX	-	1 RF	Mon	Record data of bank 1 for fault resistance
		t	MX	-	1 RF	Mon	Record data of bank 1 for fault resistance
FltLoopR	v2_dMV	mag.f	MX	-	1 RFLOOP	Mon	Record data of bank 1 for fault loop resistance
		q	MX	-	1 RFLOOP	Mon	Record data of bank 1 for fault loop resistance
		t	MX	-	1 RFLOOP	Mon	Record data of bank 1 for fault loop resistance
FltLoopX	v2_dMV	mag.f	MX	-	1 XFLOOP	Mon	Record data of bank 1 for fault loop reactance
		q	MX	-	1 XFLOOP	Mon	Record data of bank 1 for fault loop reactance
		t	MX	-	1 XFLOOP	Mon	Record data of bank 1 for fault loop reactance

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PhGndCapac	v2_dMV	mag.f	MX	-	1 XC0F_CALC	Mon	Record data bank1 feeder phase-to-earth capacitive reactance
		q	MX	-	1 XC0F_CALC	Mon	Record data bank1 feeder phase-to-earth capacitive reactance
		t	MX	-	1 XC0F_CALC	Mon	Record data bank1 feeder phase-to-earth capacitive reactance
EqDisLod	v2_dMV	mag.f	MX	-	1 S_CALC	Mon	Record data of bank 1 for equivalent load distance
		q	MX	-	1 S_CALC	Mon	Record data of bank 1 for equivalent load distance
		t	MX	-	1 S_CALC	Mon	Record data of bank 1 for equivalent load distance
RatFltALod	v2_dMV	mag.f	MX	-	1 IFLT_PER_ILD	Mon	Record data of bank 1 for ratio between fault current and load current
		q	MX	-	1 IFLT_PER_ILD	Mon	Record data of bank 1 for ratio between fault current and load current
		t	MX	-	1 IFLT_PER_ILD	Mon	Record data of bank 1 for ratio between fault current and load current
VPreFltPhA	v2_dMV	mag.f	MX	-	1 PhV Pre value PhA	Mon	Record data of bank 1 for phase A pre-fault voltage amplitude
		q	MX	-	1 PhV Pre value PhA	Mon	Record data of bank 1 for phase A pre-fault voltage amplitude
		t	MX	-	1 PhV Pre value PhA	Mon	Record data of bank 1 for phase A pre-fault voltage amplitude
VPreFltPhB	v2_dMV	mag.f	MX	-	1 PhV Pre value PhB	Mon	Record data of bank 1 for phase B pre-fault voltage amplitude
		q	MX	-	1 PhV Pre value PhB	Mon	Record data of bank 1 for phase B pre-fault voltage amplitude
		t	MX	-	1 PhV Pre value PhB	Mon	Record data of bank 1 for phase B pre-fault voltage amplitude
VPreFltPhC	v2_dMV	mag.f	MX	-	1 PhV Pre value PhC	Mon	Record data of bank 1 for phase C pre-fault voltage amplitude
		q	MX	-	1 PhV Pre value PhC	Mon	Record data of bank 1 for phase C pre-fault voltage amplitude
		t	MX	-	1 PhV Pre value PhC	Mon	Record data of bank 1 for phase C pre-fault voltage amplitude
APreFltPhA	v2_dMV	mag.f	MX	-	1 A Pre value PhA	Mon	Record data of bank 1 for phase A pre-fault current amplitude
		q	MX	-	1 A Pre value PhA	Mon	Record data of bank 1 for phase A pre-fault current amplitude
		t	MX	-	1 A Pre value PhA	Mon	Record data of bank 1 for phase A pre-fault current amplitude
APreFltPhB	v2_dMV	mag.f	MX	-	1 A Pre value PhB	Mon	Record data of bank 1 for phase B pre-fault current amplitude
		q	MX	-	1 A Pre value PhB	Mon	Record data of bank 1 for phase B pre-fault current amplitude

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
APreFltPhB	v2_dMV	t	MX	-	1 A Pre value PhB	Mon	Record data of bank 1 for phase B pre-fault current amplitude
APreFltPhC	v2_dMV	mag.f	MX	-	1 A Pre value PhC	Mon	Record data of bank 1 for phase C pre-fault current amplitude
		q	MX	-	1 A Pre value PhC	Mon	Record data of bank 1 for phase C pre-fault current amplitude
		t	MX	-	1 A Pre value PhC	Mon	Record data of bank 1 for phase C pre-fault current amplitude
VFltPhA	v2_dMV	mag.f	MX	-	1 PhV Flt value PhA	Mon	Record data of bank 1 for phase A voltage amplitude during fault
		q	MX	-	1 PhV Flt value PhA	Mon	Record data of bank 1 for phase A voltage amplitude during fault
		t	MX	-	1 PhV Flt value PhA	Mon	Record data of bank 1 for phase A voltage amplitude during fault
VFltPhB	v2_dMV	mag.f	MX	-	1 PhV Flt value PhB	Mon	Record data of bank 1 for phase B voltage amplitude during fault
		q	MX	-	1 PhV Flt value PhB	Mon	Record data of bank 1 for phase B voltage amplitude during fault
		t	MX	-	1 PhV Flt value PhB	Mon	Record data of bank 1 for phase B voltage amplitude during fault
VFltPhC	v2_dMV	mag.f	MX	-	1 PhV Flt value PhC	Mon	Record data of bank 1 for phase C voltage amplitude during fault
		q	MX	-	1 PhV Flt value PhC	Mon	Record data of bank 1 for phase C voltage amplitude during fault
		t	MX	-	1 PhV Flt value PhC	Mon	Record data of bank 1 for phase C voltage amplitude during fault
AFltPhA	v2_dMV	mag.f	MX	-	1 A Flt value PhA	Mon	Record data of bank 1 for phase A current amplitude during fault
		q	MX	-	1 A Flt value PhA	Mon	Record data of bank 1 for phase A current amplitude during fault
		t	MX	-	1 A Flt value PhA	Mon	Record data of bank 1 for phase A current amplitude during fault
AFltPhB	v2_dMV	mag.f	MX	-	1 A Flt value PhB	Mon	Record data of bank 1 for phase B current amplitude during fault
		q	MX	-	1 A Flt value PhB	Mon	Record data of bank 1 for phase B current amplitude during fault
		t	MX	-	1 A Flt value PhB	Mon	Record data of bank 1 for phase B current amplitude during fault
AFltPhC	v2_dMV	mag.f	MX	-	1 A Flt value PhC	Mon	Record data of bank 1 for phase C current amplitude during fault
		q	MX	-	1 A Flt value PhC	Mon	Record data of bank 1 for phase C current amplitude during fault
		t	MX	-	1 A Flt value PhC	Mon	Record data of bank 1 for phase C current amplitude during fault

Table 96: RSLLN0 Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Rs	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850

Table 97: SCEFRFLO Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
FltZ	c_dCMV	cVal.mag.f	MX	-	RF	Mon	Fault resistance in primary ohms
		q	MX	-	RF	Mon	Fault resistance in primary ohms
		t	MX	-	RF	Mon	Fault resistance in primary ohms
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
FltDiskm	c_dMV	mag.f	MX	-	FLT_DISTANCE	Mon	Fault distance in units selected by the user (pu)
		q	MX	-	FLT_DISTANCE	Mon	Fault distance in units selected by the user (pu)
		t	MX	-	FLT_DISTANCE	Mon	Fault distance in units selected by the user (pu)
FltLoop	e_dINS	stVal	ST	-	FAULT_LOOP	Mon	Fault impedance loop used for distance measurement
		q	ST	-	FAULT_LOOP	Mon	Fault impedance loop used for distance measurement
		t	ST	-	FAULT_LOOP	Mon	Fault impedance loop used for distance measurement
FltDisVald	v1_dINS	stVal	ST	-	EF_VALIDITY	Mon	Validity of earth fault location
		q	ST	-	EF_VALIDITY	Mon	Validity of earth fault location
		t	ST	-	EF_VALIDITY	Mon	Validity of earth fault location
FltAlm	v1_dSPS	stVal	ST	-	ALARM	Mon	Alarm signal indicating that fault is located between set limits
		q	ST	-	ALARM	Mon	Alarm signal indicating that fault is located between set limits
		t	ST	-	ALARM	Mon	Alarm signal indicating that fault is located between set limits
TrgSt	v1_dSPS	stVal	ST	-	TRIGG_OUT	Mon	Signal indicating function triggering
		q	ST	-	TRIGG_OUT	Mon	Signal indicating function triggering
		t	ST	-	TRIGG_OUT	Mon	Signal indicating function triggering
FltLoopR	v2_dMV	mag.f	MX	-	RFLOOP	Mon	Fault loop resistance in primary ohms
		q	MX	-	RFLOOP	Mon	Fault loop resistance in primary ohms
		t	MX	-	RFLOOP	Mon	Fault loop resistance in primary ohms
FltLoopX	v2_dMV	mag.f	MX	-	XFLOOP	Mon	Fault loop reactance in primary ohms
		q	MX	-	XFLOOP	Mon	Fault loop reactance in primary ohms
		t	MX	-	XFLOOP	Mon	Fault loop reactance in primary ohms
PhGndCapac	v2_dMV	mag.f	MX	-	XC0F_CALC	Mon	Estimated phase-to-earth capacitive reactance of the feeder
		q	MX	-	XC0F_CALC	Mon	Estimated phase-to-earth capacitive reactance of the feeder
		t	MX	-	XC0F_CALC	Mon	Estimated phase-to-earth capacitive reactance of the feeder
RatFltALod	v2_dMV	mag.f	MX	-	IFLT_PER_ILD	Mon	Ratio between fault current and load current in case of an earth fault

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
RatFltALod	v2_dMV	q	MX	-	IFLT_PER_ILD	Mon	Ratio between fault current and load current in case of an earth fault
		t	MX	-	IFLT_PER_ILD	Mon	Ratio between fault current and load current in case of an earth fault
EqDisLod	v2_dMV	mag.f	MX	-	S_CALC	Mon	Estimated equivalent load distance
		q	MX	-	S_CALC	Mon	Estimated equivalent load distance
		t	MX	-	S_CALC	Mon	Estimated equivalent load distance

7.5.5 Fuse failure supervision RFUF

7.5.5.1 Fuse failure supervision SEQRFUF

LN type	LN prefix	LN class	Function block name
SEQRFUF (revision 0)	SEQ	RFUF	SEQRFUF

Table 98: SEQRFUF Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Str	d_dACD	general	ST	-	FUSEF_U	Mon	General start of function
		q	ST	-	FUSEF_U	Mon	General start of function
		t	ST	-	FUSEF_U	Mon	General start of function

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Str3Ph	d_dACD	general	ST	-	FUSEF_3PH	Mon	Three-phase start of function
		q	ST	-	FUSEF_3PH	Mon	Three-phase start of function
		t	ST	-	FUSEF_3PH	Mon	Three-phase start of function
StrRst	d_dACD	general	ST	-	FUSEF_Z	Mon	Start of current and voltage controlled function
		q	ST	-	FUSEF_Z	Mon	Start of current and voltage controlled function
		t	ST	-	FUSEF_Z	Mon	Start of current and voltage controlled function

7.5.6 Autoreclosing RREC

7.5.6.1 Autorecloser function for distribution networks DARREC

LN type	LN prefix	LN class	Function block name
DARREC (revision 0)	DA	RREC	DARREC

Table 99: DARREC Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	CLOSE_CB	Mon	Close (reclose) command for circuit breaker
		q	ST	T	CLOSE_CB	Mon	Close (reclose) command for circuit breaker
		t	ST	T	CLOSE_CB	Mon	Close (reclose) command for circuit breaker
OpOpn	b_dACT	general	ST	-	OPEN_CB	Mon	Open command for circuit breaker

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
OpOpn	b_dACT	q	ST	-	OPEN_CB	Mon	Open command for circuit breaker
		t	ST	-	OPEN_CB	Mon	Open command for circuit breaker
OpCntRs	d_dINC	stVal	ST	-	COUNTER	Mon	Resetable operation counter, all shots
		q	ST	-	COUNTER	Mon	Resetable operation counter, all shots
		t	ST	-	COUNTER	Mon	Resetable operation counter, all shots
AutoRecSt	d_dINS	stVal	ST	-	STATUS	Mon	AR status signal for IEC61850
		q	ST	-	STATUS	Mon	AR status signal for IEC61850
		t	ST	-	STATUS	Mon	AR status signal for IEC61850
OpCnt1	j_dINS	stVal	ST	-	CNT_SHOT1	Mon	Resetable operation counter, shot 1
		q	ST	-	CNT_SHOT1	Mon	Resetable operation counter, shot 1
		t	ST	-	CNT_SHOT1	Mon	Resetable operation counter, shot 1
OpCnt2	j_dINS	stVal	ST	-	CNT_SHOT2	Mon	Resetable operation counter, shot 2
		q	ST	-	CNT_SHOT2	Mon	Resetable operation counter, shot 2
		t	ST	-	CNT_SHOT2	Mon	Resetable operation counter, shot 2
OpCnt3	j_dINS	stVal	ST	-	CNT_SHOT3	Mon	Resetable operation counter, shot 3
		q	ST	-	CNT_SHOT3	Mon	Resetable operation counter, shot 3
		t	ST	-	CNT_SHOT3	Mon	Resetable operation counter, shot 3
OpCnt4	j_dINS	stVal	ST	-	CNT_SHOT4	Mon	Resetable operation counter, shot 4
		q	ST	-	CNT_SHOT4	Mon	Resetable operation counter, shot 4
		t	ST	-	CNT_SHOT4	Mon	Resetable operation counter, shot 4
OpCnt5	j_dINS	stVal	ST	-	CNT_SHOT5	Mon	Resetable operation counter, shot5
		q	ST	-	CNT_SHOT5	Mon	Resetable operation counter, shot5
		t	ST	-	CNT_SHOT5	Mon	Resetable operation counter, shot5
ProDsa	v1_dINS	stVal	ST	-	PROT_DISA	Mon	A word type signal for disabling protection functions
		q	ST	-	PROT_DISA	Mon	A word type signal for disabling protection functions
		t	ST	-	PROT_DISA	Mon	A word type signal for disabling protection functions

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
FrqOpCnt	v1_dINS	stVal	ST	-	FRQ_OPR_CNT	Mon	Frequent operation counter
		q	ST	-	FRQ_OPR_CNT	Mon	Frequent operation counter
		t	ST	-	FRQ_OPR_CNT	Mon	Frequent operation counter
ShotPntr	v1_dINS	stVal	ST	-	SHOT_PTR	Mon	Shot pointer value
		q	ST	-	SHOT_PTR	Mon	Shot pointer value
		t	ST	-	SHOT_PTR	Mon	Shot pointer value
RsRec	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850
RsCnt	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850
DsaCnt	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
DsaCnt	v1_dSPC	Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850
LO	v1_dSPS	stVal	ST	-	LOCKED	Mon	Signal indicating that AR is locked out
		q	ST	-	LOCKED	Mon	Signal indicating that AR is locked out
		t	ST	-	LOCKED	Mon	Signal indicating that AR is locked out
SucRec	v1_dSPS	stVal	ST	-	SUC_RECL	Mon	Indicates a successful reclosing sequence
		q	ST	-	SUC_RECL	Mon	Indicates a successful reclosing sequence
		t	ST	-	SUC_RECL	Mon	Indicates a successful reclosing sequence
UnsRec	v1_dSPS	stVal	ST	-	UNSUC_RECL	Mon	Indicates an unsuccessful reclosing sequence
		q	ST	-	UNSUC_RECL	Mon	Indicates an unsuccessful reclosing sequence
		t	ST	-	UNSUC_RECL	Mon	Indicates an unsuccessful reclosing sequence
UnsCBCls	v1_dSPS	stVal	ST	-	UNSUC_CB	Mon	Indicates an unsuccessful CB closing
		q	ST	-	UNSUC_CB	Mon	Indicates an unsuccessful CB closing
		t	ST	-	UNSUC_CB	Mon	Indicates an unsuccessful CB closing
RdyRec	v1_dSPS	stVal	ST	-	READY	Mon	Indicates that the AR is ready for a new sequence
		q	ST	-	READY	Mon	Indicates that the AR is ready for a new sequence
		t	ST	-	READY	Mon	Indicates that the AR is ready for a new sequence
ActRec	v1_dSPS	stVal	ST	-	ACTIVE	Mon	Reclosing sequence is in progress
		q	ST	-	ACTIVE	Mon	Reclosing sequence is in progress
		t	ST	-	ACTIVE	Mon	Reclosing sequence is in progress
PrgRec	v1_dSPS	stVal	ST	-	INPRO	Mon	Reclosing shot in progress, activated during dead time
		q	ST	-	INPRO	Mon	Reclosing shot in progress, activated during dead time
		t	ST	-	INPRO	Mon	Reclosing shot in progress, activated during dead time
PrgRec1	v1_dSPS	stVal	ST	-	INPRO_1	Mon	Reclosing shot in progress, shot 1
		q	ST	-	INPRO_1	Mon	Reclosing shot in progress, shot 1
		t	ST	-	INPRO_1	Mon	Reclosing shot in progress, shot 1
PrgRec2	v1_dSPS	stVal	ST	-	INPRO_2	Mon	Reclosing shot in progress, shot 2
		q	ST	-	INPRO_2	Mon	Reclosing shot in progress, shot 2

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PrgRec2	v1_dSPS	t	ST	-	INPRO_2	Mon	Reclosing shot in progress, shot 2
PrgRec3	v1_dSPS	stVal	ST	-	INPRO_3	Mon	Reclosing shot in progress, shot 3
		q	ST	-	INPRO_3	Mon	Reclosing shot in progress, shot 3
		t	ST	-	INPRO_3	Mon	Reclosing shot in progress, shot 3
PrgRec4	v1_dSPS	stVal	ST	-	INPRO_4	Mon	Reclosing shot in progress, shot 4
		q	ST	-	INPRO_4	Mon	Reclosing shot in progress, shot 4
		t	ST	-	INPRO_4	Mon	Reclosing shot in progress, shot 4
PrgRec5	v1_dSPS	stVal	ST	-	INPRO_5	Mon	Reclosing shot in progress, shot 5
		q	ST	-	INPRO_5	Mon	Reclosing shot in progress, shot 5
		t	ST	-	INPRO_5	Mon	Reclosing shot in progress, shot 5
PrgDsr	v1_dSPS	stVal	ST	-	DISCR_INPRO	Mon	Signal indicating that discrimination time is inprogress
		q	ST	-	DISCR_INPRO	Mon	Signal indicating that discrimination time is inprogress
		t	ST	-	DISCR_INPRO	Mon	Signal indicating that discrimination time is inprogress
PrgCutOut	v1_dSPS	stVal	ST	-	CUTOUT_INPRO	Mon	Signal indicating that cut-out time is in progress
		q	ST	-	CUTOUT_INPRO	Mon	Signal indicating that cut-out time is in progress
		t	ST	-	CUTOUT_INPRO	Mon	Signal indicating that cut-out time is in progress
FrqOpAlm	v1_dSPS	stVal	ST	-	FRQ_OPR_AL	Mon	Frequent operation counter alarm
		q	ST	-	FRQ_OPR_AL	Mon	Frequent operation counter alarm
		t	ST	-	FRQ_OPR_AL	Mon	Frequent operation counter alarm
WtMstr	v1_dSPS	stVal	ST	-	CMD_WAIT	Mon	Wait for master command
		q	ST	-	CMD_WAIT	Mon	Wait for master command
		t	ST	-	CMD_WAIT	Mon	Wait for master command
CBManCls	v1_dSPS	stVal	ST	-	MAN_CB_CL	Mon	Indicates CB manual closing during reclosing sequence
		q	ST	-	MAN_CB_CL	Mon	Indicates CB manual closing during reclosing sequence
		t	ST	-	MAN_CB_CL	Mon	Indicates CB manual closing during reclosing sequence
SOF	v1_dSPS	stVal	ST	-	SOTF	Mon	Switch-onto-fault
		q	ST	-	SOTF	Mon	Switch-onto-fault
		t	ST	-	SOTF	Mon	Switch-onto-fault

7.5.7 Switch onto fault logic RSOF

7.5.7.1 Automatic switch onto fault logic with voltage and current based detect option CVRSOF

LN type	LN prefix	LN class	Function block name
CVRSOF (revision 0)	CV	RSOF	CVRSOF

Table 100: CVRSOF Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
TrFltst	a_dSPS	stVal	ST	-	OPERATE	Mon	Operate
		q	ST	-	OPERATE	Mon	Operate
		t	ST	-	OPERATE	Mon	Operate

7.5.8 Synchronising RSYN

7.5.8.1 Synchrocheck, energizing check and synchronizing, single, 1 1/2 or double CB SYNCRSYN

LN type	LN prefix	LN class	Function block name
AUT2RSYN instance 1 (revision 0)	SYNC	RSYN	SYNCRSYN
MAN2RSYN instance 2 (revision 0)	SYNC	RSYN	SYNCRSYN
RSY2LLN0 instance 1 (revision 0)	-	LLN0	SYNCRSYN
SYN1RSYN instance 3 (revision 0)	SYNC	RSYN	SYNCRSYN

Table 101: AUT2RSYN Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
AngInd	a_dSPS	stVal	ST	-	PH_DIFF_AU	Mon	Phase angle difference out of limit for Auto operation
		q	ST	-	PH_DIFF_AU	Mon	Phase angle difference out of limit for Auto operation
		t	ST	-	PH_DIFF_AU	Mon	Phase angle difference out of limit for Auto operation
Rel	a_dSPS	stVal	ST	-	-	Mon	Automatic release
		q	ST	-	-	Mon	Automatic release
		t	ST	-	-	Mon	Automatic release
VInd	a_dSPS	stVal	ST	-	U_DIFF_SYNC	Mon	Voltage difference out of limit
		q	ST	-	U_DIFF_SYNC	Mon	Voltage difference out of limit
		t	ST	-	U_DIFF_SYNC	Mon	Voltage difference out of limit
HzInd	a_dSPS	stVal	ST	-	FR_DIFF_AU	Mon	Frequency difference out of limit for Auto operation
		q	ST	-	FR_DIFF_AU	Mon	Frequency difference out of limit for Auto operation
		t	ST	-	FR_DIFF_AU	Mon	Frequency difference out of limit for Auto operation
DifAngClc	b_dMV	mag.f	MX	-	PH_DIFF_MEAS	Mon	Calculated difference of phase angle
		q	MX	-	PH_DIFF_MEAS	Mon	Calculated difference of phase angle
		t	MX	-	PH_DIFF_MEAS	Mon	Calculated difference of phase angle
DifHzClc	b_dMV	mag.f	MX	-	FR_DIFF_MEAS	Mon	Calculated difference in frequency
		q	MX	-	FR_DIFF_MEAS	Mon	Calculated difference in frequency
		t	MX	-	FR_DIFF_MEAS	Mon	Calculated difference in frequency
DifVClc	b_dMV	mag.f	MX	-	U_DIFF_MEAS	Mon	Calculated difference in voltage
		q	MX	-	U_DIFF_MEAS	Mon	Calculated difference in voltage
		t	MX	-	U_DIFF_MEAS	Mon	Calculated difference in voltage
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
TestSCOK	v1_dSPS	stVal	ST	-	AU_SYNC_TST	Mon	Auto synchro check OK test output
		q	ST	-	AU_SYNC_TST	Mon	Auto synchro check OK test output
		t	ST	-	AU_SYNC_TST	Mon	Auto synchro check OK test output
EnOK	v1_dSPS	stVal	ST	-	AU_ENERG_OK	Mon	Automatic energizing check OK
		q	ST	-	AU_ENERG_OK	Mon	Automatic energizing check OK
		t	ST	-	AU_ENERG_OK	Mon	Automatic energizing check OK

Table 102: MAN2RSYN Logical node data (instance 2)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Rel	a_dSPS	stVal	ST	-	-	Mon	Manual release
		q	ST	-	-	Mon	Manual release
		t	ST	-	-	Mon	Manual release
VInd	a_dSPS	stVal	ST	-	U_DIFF_SYNC	Mon	Voltage difference out of limit
		q	ST	-	U_DIFF_SYNC	Mon	Voltage difference out of limit
		t	ST	-	U_DIFF_SYNC	Mon	Voltage difference out of limit
AngInd	a_dSPS	stVal	ST	-	PH_DIFF_MAN	Mon	Phase angle difference out of limit for Manual Operation
		q	ST	-	PH_DIFF_MAN	Mon	Phase angle difference out of limit for Manual Operation
		t	ST	-	PH_DIFF_MAN	Mon	Phase angle difference out of limit for Manual Operation
HzInd	a_dSPS	stVal	ST	-	FR_DIFF_MAN	Mon	Frequency difference out of limit for Manual operation
		q	ST	-	FR_DIFF_MAN	Mon	Frequency difference out of limit for Manual operation
		t	ST	-	FR_DIFF_MAN	Mon	Frequency difference out of limit for Manual operation
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
EnOK	v1_dSPS	stVal	ST	-	MAN_ENERG_OK	Mon	Manual energizing check OK
		q	ST	-	MAN_ENERG_OK	Mon	Manual energizing check OK
		t	ST	-	MAN_ENERG_OK	Mon	Manual energizing check OK
TestSCOK	v1_dSPS	stVal	ST	-	MAN_SYNC_TST	Mon	Manual synchro check OK test output
		q	ST	-	MAN_SYNC_TST	Mon	Manual synchro check OK test output
		t	ST	-	MAN_SYNC_TST	Mon	Manual synchro check OK test output

Table 103: RSY2LLN0 Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
VInd	a_dSPS	stVal	ST	-	U_DIFF_SYNC	Mon	Voltage difference out of limit
		q	ST	-	U_DIFF_SYNC	Mon	Voltage difference out of limit
		t	ST	-	U_DIFF_SYNC	Mon	Voltage difference out of limit
Bus1Sel	v1_dSPS	stVal	ST	-	B1_SEL	Mon	Bus1 selected
		q	ST	-	B1_SEL	Mon	Bus1 selected
		t	ST	-	B1_SEL	Mon	Bus1 selected
Bus2Sel	v1_dSPS	stVal	ST	-	B2_SEL	Mon	Bus2 selected
		q	ST	-	B2_SEL	Mon	Bus2 selected
		t	ST	-	B2_SEL	Mon	Bus2 selected
Lin1Sel	v1_dSPS	stVal	ST	-	LN1_SEL	Mon	Line1 selected
		q	ST	-	LN1_SEL	Mon	Line1 selected
		t	ST	-	LN1_SEL	Mon	Line1 selected
Lin2Sel	v1_dSPS	stVal	ST	-	LN2_SEL	Mon	Line2 selected
		q	ST	-	LN2_SEL	Mon	Line2 selected
		t	ST	-	LN2_SEL	Mon	Line2 selected
SelFuFail	v1_dSPS	stVal	ST	-	U_SEL_FAIL	Mon	Selected voltage transformer fuse failed
		q	ST	-	U_SEL_FAIL	Mon	Selected voltage transformer fuse failed
		t	ST	-	U_SEL_FAIL	Mon	Selected voltage transformer fuse failed
TestEnOK	v1_dSPS	stVal	ST	-	ENERG_TST	Mon	Energizing check OK test output
		q	ST	-	ENERG_TST	Mon	Energizing check OK test output
		t	ST	-	ENERG_TST	Mon	Energizing check OK test output
VInBnd	v1_dSPS	stVal	ST	-	U_OK	Mon	Voltage amplitudes above set limits
		q	ST	-	U_OK	Mon	Voltage amplitudes above set limits
		t	ST	-	U_OK	Mon	Voltage amplitudes above set limits

Table 104: SYN1RSYN Logical node data (instance 3)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Rel	a_dSPS	stVal	ST	-	SYN_OK	Mon	Synchronizing OK output
		q	ST	-	SYN_OK	Mon	Synchronizing OK output
		t	ST	-	SYN_OK	Mon	Synchronizing OK output
HzInd	a_dSPS	stVal	ST	-	FR_DIFF_SYN	Mon	Frequency difference out of limit for synchronizing
		q	ST	-	FR_DIFF_SYN	Mon	Frequency difference out of limit for synchronizing
		t	ST	-	FR_DIFF_SYN	Mon	Frequency difference out of limit for synchronizing
VInd	a_dSPS	stVal	ST	-	U_DIFF_SYN	Mon	Voltage difference out of limit for synchronizing
		q	ST	-	U_DIFF_SYN	Mon	Voltage difference out of limit for synchronizing
		t	ST	-	U_DIFF_SYN	Mon	Voltage difference out of limit for synchronizing
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
FailSyn	v1_dSPS	stVal	ST	-	SYN_FAIL	Mon	Synchronizing failed
		q	ST	-	SYN_FAIL	Mon	Synchronizing failed
		t	ST	-	SYN_FAIL	Mon	Synchronizing failed
TestSynOK	v1_dSPS	stVal	ST	-	SYN_TST	Mon	Synchronizing OK test output
		q	ST	-	SYN_TST	Mon	Synchronizing OK test output
		t	ST	-	SYN_TST	Mon	Synchronizing OK test output
HzRCInd	v1_dSPS	stVal	ST	-	FR_DER_SYN	Mon	Frequency derivative out of limit for synchronizing
		q	ST	-	FR_DER_SYN	Mon	Frequency derivative out of limit for synchronizing
		t	ST	-	FR_DER_SYN	Mon	Frequency derivative out of limit for synchronizing
SynWait	v1_dSPS	stVal	ST	-	SYN_INPRO	Mon	Synchronizing in progress
		q	ST	-	SYN_INPRO	Mon	Synchronizing in progress
		t	ST	-	SYN_INPRO	Mon	Synchronizing in progress
HzInBnd	v1_dSPS	stVal	ST	-	FR_OK_SYN	Mon	Frequency difference in band for synchronizing
		q	ST	-	FR_OK_SYN	Mon	Frequency difference in band for synchronizing
		t	ST	-	FR_OK_SYN	Mon	Frequency difference in band for synchronizing

7.6 Logical nodes for generic references

7.6.1 Generic automatic process control GAPC

7.6.1.1 Allow Emergency Start ESMGAPC

LN type	LN prefix	LN class	Function block name
ESMGAPC (revision 0)	ESM	GAPC	ESMGAPC

Table 105: ESMGAPC Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Op	b_dACT	general	ST	T	ST_EMERG_ENA	Mon	Emergency start signal
		q	ST	T	ST_EMERG_ENA	Mon	Emergency start signal
		t	ST	T	ST_EMERG_ENA	Mon	Emergency start signal
Str	d_dACD	general	ST	-	ST_EMERG_ENA	Mon	Emergency start signal
		q	ST	-	ST_EMERG_ENA	Mon	Emergency start signal
		t	ST	-	ST_EMERG_ENA	Mon	Emergency start signal

7.6.2 Generic process I/O GGIO

7.6.2.1 IEC61850 generic communication I/O functions DPGGIO

LN type	LN prefix	LN class	Function block name
DPGGIO (revision 1)	DP	GGIO	DPGGIO

Table 106: DPGGIO Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter
		Oper.T	CO	-	-	Cmd	Mode parameter
		Oper.Test	CO	-	-	Cmd	Mode parameter
		Oper.Check	CO	-	-	Cmd	Mode parameter
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
DPCSO	b_dDPC	stVal	ST	-	POSITION	Mon	Double point indication
		q	ST	-	POSITION	Mon	Double point indication
		t	ST	-	POSITION	Mon	Double point indication

7.6.2.2 Event counter CNTGGIO

LN type	LN prefix	LN class	Function block name
CNTGGIO (revision 1)	CNT	GGIO	CNTGGIO

Table 107: CNTGGIO Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	t	ST	-	Beh	Mon	Behaviour parameter for 61850
Cnt1	v1_dBCR	actVal	ST	-	VALUE1	Mon	Output of counter 1
		q	ST	-	VALUE1	Mon	Output of counter 1
		t	ST	-	VALUE1	Mon	Output of counter 1
Cnt2	v1_dBCR	actVal	ST	-	VALUE2	Mon	Output of counter 2
		q	ST	-	VALUE2	Mon	Output of counter 2
		t	ST	-	VALUE2	Mon	Output of counter 2
Cnt3	v1_dBCR	actVal	ST	-	VALUE3	Mon	Output of counter 3
		q	ST	-	VALUE3	Mon	Output of counter 3
		t	ST	-	VALUE3	Mon	Output of counter 3
Cnt4	v1_dBCR	actVal	ST	-	VALUE4	Mon	Output of counter 4
		q	ST	-	VALUE4	Mon	Output of counter 4
		t	ST	-	VALUE4	Mon	Output of counter 4
Cnt5	v1_dBCR	actVal	ST	-	VALUE5	Mon	Output of counter 5
		q	ST	-	VALUE5	Mon	Output of counter 5
		t	ST	-	VALUE5	Mon	Output of counter 5
Cnt6	v1_dBCR	actVal	ST	-	VALUE6	Mon	Output of counter 6
		q	ST	-	VALUE6	Mon	Output of counter 6
		t	ST	-	VALUE6	Mon	Output of counter 6
RsCnt	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850

7.6.2.3 IEC61850 generic communication I/O functions SPGGIO

LN type	LN prefix	LN class	Function block name
SPGGIO (revision 1)	SP	GGIO	SPGGIO

Table 108: SPGGIO Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter
		Oper.T	CO	-	-	Cmd	Mode parameter
		Oper.Test	CO	-	-	Cmd	Mode parameter
		Oper.Check	CO	-	-	Cmd	Mode parameter
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Ind	c_dSPS	stVal	ST	-	OUT	Mon	Output status
		q	ST	-	OUT	Mon	Output status
		t	ST	-	OUT	Mon	Output status

7.6.2.4 IEC61850 generic communication I/O functions MVGGIO

LN type	LN prefix	LN class	Function block name
MVGGIO (revision 1)	MV	GGIO	MVGGIO

Table 109: MVGGIO Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter
		Oper.T	CO	-	-	Cmd	Mode parameter
		Oper.Test	CO	-	-	Cmd	Mode parameter
		Oper.Check	CO	-	-	Cmd	Mode parameter
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
AnIn	a_dMV	rangeC.hhLim.f	CF	-	MV hhLim	-	High High limit
		rangeC.hLim.f	CF	-	MV hLim	-	High limit
Table continues on next page							

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
AnIn	a_dMV	rangeC.lLim.f	CF	-	MV lLim	-	Low limit
		rangeC.llLim.f	CF	-	MV llLim	-	Low Low limit
		rangeC.max.f	CF	-	MV max	-	Maximum value
		rangeC.min.f	CF	-	MV min	-	Minimum value
		mag.f	MX	-	VALUE	Mon	Magnitude of deadband value
		subMag.f	SV	-	-	-	Substituted value
		range	MX	-	RANGE	Mon	Range
		q	MX	-	VALUE	Mon	Magnitude of deadband value
		t	MX	-	VALUE	Mon	Magnitude of deadband value
		subEna	SV	-	-	-	Enable substitution
		db	CF	-	MV db	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		zeroDb	CF	-	MV zeroDb	-	Zero point clamping in 0,001% of range

7.6.2.5 Pulse counter PCGGIO

LN type	LN prefix	LN class	Function block name
PCGGIO (revision 1)	PC	GGIO	PCGGIO

Table 110: PCGGIO Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter
		Oper.T	CO	-	-	Cmd	Mode parameter
		Oper.Test	CO	-	-	Cmd	Mode parameter
		Oper.Check	CO	-	-	Cmd	Mode parameter
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
AnIn	b_dMV	mag.f	MX	-	SCAL_VAL	Mon	Scaled value with time and status information
		q	MX	-	SCAL_VAL	Mon	Scaled value with time and status information

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
AnIn	b_dMV	t	MX	-	SCAL_VAL	Mon	Scaled value with time and status information
ValUpd	v1_dSPS	stVal	ST	-	NEW_VAL	Mon	A new pulse counter value is generated
		q	ST	-	NEW_VAL	Mon	A new pulse counter value is generated
		t	ST	-	NEW_VAL	Mon	A new pulse counter value is generated
IcpCyc	v1_dSPS	stVal	ST	-	RESTART	Mon	The reported value does not comprise a complete integration cycle
		q	ST	-	RESTART	Mon	The reported value does not comprise a complete integration cycle
		t	ST	-	RESTART	Mon	The reported value does not comprise a complete integration cycle
TotVal	v2_dBCR	actVal	ST	-	CNT_VAL	Mon	Actual pulse counter value
		q	ST	-	CNT_VAL	Mon	Actual pulse counter value
		t	ST	-	CNT_VAL	Mon	Actual pulse counter value

7.6.2.6 Selector mini switch VSGGIO

LN type	LN prefix	LN class	Function block name
VSGGIO (revision 1)	VS	GGIO	VSGGIO

Table 111: VSGGIO Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter
		Oper.T	CO	-	-	Cmd	Mode parameter
		Oper.Test	CO	-	-	Cmd	Mode parameter
		Oper.Check	CO	-	-	Cmd	Mode parameter
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
DPCSO	d_dDPC	Cancel.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Cancel.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		SBOw.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		SBOw.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		SBOw.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Cancel.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Cancel.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		SBOw.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		SBOw.T	CO	-	-	Cmd	Command parameter for IEC61850
		Cancel.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Cancel.Test	CO	-	-	Cmd	Command parameter for IEC61850
		SBOw.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850
		SBOw.Check	CO	-	-	Cmd	Command parameter for IEC61850
		stVal	ST	-	POSITION	Mon	Position indication, integer
		q	ST	-	POSITION	Mon	Position indication, integer
		t	ST	-	POSITION	Mon	Position indication, integer
		stSeld	ST	-	-	Mon	Used by CH
		ctlModel	CF	-	CtlModel	-	Specifies the type for control model according to IEC 61850

7.7 Logical nodes for metering and measurement

7.7.1 Metering MMTR

7.7.1.1 Energy calculation and power demand EPDMMTR

LN type	LN prefix	LN class	Function block name
EPDLLN0 instance 1 (revision 0)	-	LLN0	EPDMMTR
EPDMMTR instance 1 (revision 0)	EPD	MMTR	EPDMMTR
EPDMMXU instance 1 (revision 0)	EPD	MMXU	EPDMMTR

Table 112: EPDLLN0 Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850

Table 113: EPDMMTR Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
DmdVArh	a_dBCR	actVal	ST	-	ERFACM_BCR	Mon	Accumulated forward reactive energy value (BCR)
		q	ST	-	ERFACM_BCR	Mon	Accumulated forward reactive energy value (BCR)
		t	ST	-	ERFACM_BCR	Mon	Accumulated forward reactive energy value (BCR)
		pulsQty	CF	-	Forward VArh Acc Pls	-	Pulse quantity for reactive forward accumulated energy value
DmdWh	a_dBCR	actVal	ST	-	EAFACM_BCR	Mon	Accumulated forward active energy value (BCR)

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
DmdWh	a_dBCR	q	ST	-	EAFACM_BCR	Mon	Accumulated forward active energy value (BCR)
		t	ST	-	EAFACM_BCR	Mon	Accumulated forward active energy value (BCR)
		pulsQty	CF	-	Forward Wh Acc Pls	-	Pulse quantity for active forward accumulated energy value
SupVArh	a_dBCR	actVal	ST	-	ERVACM_BCR	Mon	Accumulated reverse reactive energy value (BCR)
		q	ST	-	ERVACM_BCR	Mon	Accumulated reverse reactive energy value (BCR)
		t	ST	-	ERVACM_BCR	Mon	Accumulated reverse reactive energy value (BCR)
		pulsQty	CF	-	Reverse VArh Acc Pls	-	Pulse quantity for reactive reverse accumulated energy value
SupWh	a_dBCR	actVal	ST	-	EARACM_BCR	Mon	Accumulated reverse active energy value (BCR)
		q	ST	-	EARACM_BCR	Mon	Accumulated reverse active energy value (BCR)
		t	ST	-	EARACM_BCR	Mon	Accumulated reverse active energy value (BCR)
		pulsQty	CF	-	Reverse Wh Acc Pls	-	Pulse quantity for active reverse accumulated energy value
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
DmdWhCnt	v1_dINS	stVal	ST	-	EAFCNT	Mon	Counter for accumulated forward active energy exceed limit
		q	ST	-	EAFCNT	Mon	Counter for accumulated forward active energy exceed limit
		t	ST	-	EAFCNT	Mon	Counter for accumulated forward active energy exceed limit
SupWhCnt	v1_dINS	stVal	ST	-	EARCNT	Mon	Counter for accumulated reverse active energy exceed limit
		q	ST	-	EARCNT	Mon	Counter for accumulated reverse active energy exceed limit
		t	ST	-	EARCNT	Mon	Counter for accumulated reverse active energy exceed limit
DmdVArhCnt	v1_dINS	stVal	ST	-	ERFCNT	Mon	Counter for accumulated forward reactive energy exceed limit
		q	ST	-	ERFCNT	Mon	Counter for accumulated forward reactive energy exceed limit
		t	ST	-	ERFCNT	Mon	Counter for accumulated forward reactive energy exceed limit

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
SupVArhCnt	v1_dINS	stVal	ST	-	ERRCNT	Mon	Counter for accumulated reverse reactive energy exceed limit
		q	ST	-	ERRCNT	Mon	Counter for accumulated reverse reactive energy exceed limit
		t	ST	-	ERRCNT	Mon	Counter for accumulated reverse reactive energy exceed limit
SupDmdRs	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850
StrAcc	v1_dSPS	stVal	ST	-	ACMST	Mon	Start of accumulating energy values.
		q	ST	-	ACMST	Mon	Start of accumulating energy values.
		t	ST	-	ACMST	Mon	Start of accumulating energy values.
WhFwdAlm	v1_dSPS	stVal	ST	-	EAFAL	Mon	Alarm for active forward energy exceed limit in set interval
		q	ST	-	EAFAL	Mon	Alarm for active forward energy exceed limit in set interval
		t	ST	-	EAFAL	Mon	Alarm for active forward energy exceed limit in set interval
WhRvAlm	v1_dSPS	stVal	ST	-	EARAL	Mon	Alarm for active reverse energy exceed limit in set interval
		q	ST	-	EARAL	Mon	Alarm for active reverse energy exceed limit in set interval
		t	ST	-	EARAL	Mon	Alarm for active reverse energy exceed limit in set interval
VArhFwdAlm	v1_dSPS	stVal	ST	-	ERFAL	Mon	Alarm for reactive forward energy exceed limit in set interv
		q	ST	-	ERFAL	Mon	Alarm for reactive forward energy exceed limit in set interv
		t	ST	-	ERFAL	Mon	Alarm for reactive forward energy exceed limit in set interv
VArhRvAlm	v1_dSPS	stVal	ST	-	ERRAL	Mon	Alarm for reactive reverse energy exceed limit in set interv
		q	ST	-	ERRAL	Mon	Alarm for reactive reverse energy exceed limit in set interv

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
VArhRvAlm	v1_dSPS	t	ST	-	ERRAL	Mon	Alarm for reactive reverse energy exceed limit in set interv
WhFwd	v2_dBCR	actVal	ST	-	EAFDMD_BCR	Mon	Last forward active energy value for set interval (BCR)
		q	ST	-	EAFDMD_BCR	Mon	Last forward active energy value for set interval (BCR)
		t	ST	-	EAFDMD_BCR	Mon	Last forward active energy value for set interval (BCR)
		pulsQty	CF	-	Forward Wh Itrv Pls	-	Pulse quantity for active forward energy of set interval
WhRv	v2_dBCR	actVal	ST	-	EARDMD_BCR	Mon	Last reverse active energy value for set interval (BCR)
		q	ST	-	EARDMD_BCR	Mon	Last reverse active energy value for set interval (BCR)
		t	ST	-	EARDMD_BCR	Mon	Last reverse active energy value for set interval (BCR)
		pulsQty	CF	-	Reverse Wh Itrv Pls	-	Pulse quantity for active reverse energy of set interval
VArhFwd	v2_dBCR	actVal	ST	-	ERFDMD_BCR	Mon	Last forward reactive energy value for set interval (BCR)
		q	ST	-	ERFDMD_BCR	Mon	Last forward reactive energy value for set interval (BCR)
		t	ST	-	ERFDMD_BCR	Mon	Last forward reactive energy value for set interval (BCR)
		pulsQty	CF	-	Forward VArh ItrvPls	-	Pulse quantity for reactive forward energy of set interval
VArhRv	v2_dBCR	actVal	ST	-	ERRDMD_BCR	Mon	Last reverse reactive energy value for set interval (BCR)
		q	ST	-	ERRDMD_BCR	Mon	Last reverse reactive energy value for set interval (BCR)
		t	ST	-	ERRDMD_BCR	Mon	Last reverse reactive energy value for set interval (BCR)
		pulsQty	CF	-	Reverse VArh ItrvPls	-	Pulse quantity for reactive reverse energy of set interval

Table 114: EPDMMXU Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
MaxDmdRs	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
MaxDmdRs	v1_dSPC	Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850
WFwdDmd	v2_dMV	mag.f	MX	-	PAFDMD	Mon	Last forward active power demand value for set interval
		q	MX	-	PAFDMD	Mon	Last forward active power demand value for set interval
		t	MX	-	PAFDMD	Mon	Last forward active power demand value for set interval
VArFwdDmd	v2_dMV	mag.f	MX	-	PRFDMD	Mon	Last forward reactive power demand value for set interval
		q	MX	-	PRFDMD	Mon	Last forward reactive power demand value for set interval
		t	MX	-	PRFDMD	Mon	Last forward reactive power demand value for set interval
WRvDmd	v2_dMV	mag.f	MX	-	PARDMD	Mon	Last reverse active power demand value for set interval
		q	MX	-	PARDMD	Mon	Last reverse active power demand value for set interval
		t	MX	-	PARDMD	Mon	Last reverse active power demand value for set interval
VArRvDmd	v2_dMV	mag.f	MX	-	PRRDMD	Mon	Last reverse reactive power demand value for set interval
		q	MX	-	PRRDMD	Mon	Last reverse reactive power demand value for set interval
		t	MX	-	PRRDMD	Mon	Last reverse reactive power demand value for set interval
MaxWFwdDmd	v2_dMV	mag.f	MX	-	MAXPAFDMD	Mon	Maximum forward active power demand value for set interval
		q	MX	-	MAXPAFDMD	Mon	Maximum forward active power demand value for set interval
		t	MX	-	MAXPAFDMD	Mon	Maximum forward active power demand value for set interval
MaxWRvDmd	v2_dMV	mag.f	MX	-	MAXPARDMD	Mon	Maximum reverse active power demand value for set interval
		q	MX	-	MAXPARDMD	Mon	Maximum reverse active power demand value for set interval
		t	MX	-	MAXPARDMD	Mon	Maximum reverse active power demand value for set interval

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
MaxVArFwdD	v2_dMV	mag.f	MX	-	MAXPRFDMD	Mon	Maximum forward reactive power demand value for set interval
		q	MX	-	MAXPRFDMD	Mon	Maximum forward reactive power demand value for set interval
		t	MX	-	MAXPRFDMD	Mon	Maximum forward reactive power demand value for set interval
MaxVArRvDm	v2_dMV	mag.f	MX	-	MAXPRRDMD	Mon	Maximum reverse reactive power demand value for set interval
		q	MX	-	MAXPRRDMD	Mon	Maximum reverse reactive power demand value for set interval
		t	MX	-	MAXPRRDMD	Mon	Maximum reverse reactive power demand value for set interval

7.7.2 Measurement MMXU

7.7.2.1 Phase current measurement CMMXU

LN type	LN prefix	LN class	Function block name
CPHMMXU (revision 0)	CPH	MMXU	CMMXU

Table 115: CPHMMXU Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
A	a_dWYE	rangeC.hhLim.f	CF	-	A Hi high Lim PhA	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	A high limit PhA	-	High limit (physical value)
		rangeC.lLim.f	CF	-	A low limit PhA	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	A low low Lim PhA	-	Low Low limit (physical value)

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
A	a_dWYE	rangeC.max.f	CF	-	A maximum PhA	-	Maximum value
		rangeC.min.f	CF	-	A minimum PhA	-	Minimum value
		cVal.mag.f	MX	-	I_DB_A	Mon	Phase A amplitude, magnitude of reported value
		rangeC.hhLim.f	CF	-	A Hi high Lim PhB	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	A high limit PhB	-	High limit (physical value)
		rangeC.lLim.f	CF	-	A low limit PhB	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	A low low Lim PhB	-	Low Low limit (physical value)
		rangeC.max.f	CF	-	A maximum PhB	-	Maximum value
		rangeC.min.f	CF	-	A minimum PhB	-	Minimum value
		cVal.mag.f	MX	-	I_DB_B	Mon	Phase B amplitude, magnitude of reported value
		subCVal.mag.f	SV	-	-	-	Substituted value
		rangeC.hhLim.f	CF	-	A Hi high Lim PhC	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	A high limit PhC	-	High limit (physical value)
		rangeC.lLim.f	CF	-	A low limit PhC	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	A low low Lim PhC	-	Low Low limit (physical value)
		rangeC.max.f	CF	-	A maximum PhC	-	Maximum value
		rangeC.min.f	CF	-	A minimum PhC	-	Minimum value
		cVal.mag.f	MX	-	I_DB_C	Mon	Phase C amplitude, magnitude of reported value
		subCVal.mag.f	SV	-	-	-	Substituted value
		subCVal.mag.f	SV	-	-	-	Substituted value
		range	MX	-	I_RANGE_C	Mon	Phase C amplitude range
		range	MX	-	I_RANGE_A	Mon	Phase A amplitude range
		range	MX	-	I_RANGE_B	Mon	Phase B amplitude range
		q	MX	-	I_DB_C	Mon	Phase C amplitude, magnitude of reported value
		q	MX	-	I_DB_B	Mon	Phase B amplitude, magnitude of reported value
		q	MX	-	I_DB_A	Mon	Phase A amplitude, magnitude of reported value
		t	MX	-	I_DB_A	Mon	Phase A amplitude, magnitude of reported value
		t	MX	-	I_DB_B	Mon	Phase B amplitude, magnitude of reported value
		t	MX	-	I_DB_C	Mon	Phase C amplitude, magnitude of reported value
		subEna	SV	-	-	-	Enable substitution
		subEna	SV	-	-	-	Enable substitution
		subEna	SV	-	-	-	Enable substitution
		db	CF	-	A deadband PhC	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
A	a_dWYE	db	CF	-	A deadband PhA	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		db	CF	-	A deadband PhB	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		zeroDb	CF	-	A Zer deadband PhA	-	Zero point clamping in 0,001% of range
		zeroDb	CF	-	A Zer deadband PhC	-	Zero point clamping in 0,001% of range
		zeroDb	CF	-	A Zer deadband PhB	-	Zero point clamping in 0,001% of range

7.7.2.2 Power monitoring function with P, Q, S, power factor PWRMMXU

LN type	LN prefix	LN class	Function block name
PWRMMXU (revision 0)	PWR	MMXU	PWRMMXU

Table 116: PWRMMXU Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter
		Oper.T	CO	-	-	Cmd	Mode parameter
		Oper.Test	CO	-	-	Cmd	Mode parameter
		Oper.Check	CO	-	-	Cmd	Mode parameter
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter
		q	ST	-	Beh	Mon	Behaviour parameter
		t	ST	-	Beh	Mon	Behaviour parameter
TotPF	a_dMV	mag.f	MX	-	PF_DB	Mon	Power Factor magnitude of deadband value
		rangeC.hhLim.f	CF	-	Av PF high high Lim	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	Av PF high limit	-	High limit (physical value)
		rangeC.lLim.f	CF	-	Av PF low limit	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	Av PF low low limit	-	Low Low limit (physical value)
		rangeC.min.f	CF	-	Average PF minimum	-	Minimum value
		rangeC.max.f	CF	-	Average PF maximum	-	Maximum value
		subMag.f	SV	-	-	-	Substituted value

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
TotPF	a_dMV	range	MX	-	PF_RANGE	Mon	Power Factor range
		q	MX	-	PF_DB	Mon	Power Factor magnitude of deadband value
		t	MX	-	PF_DB	Mon	Power Factor magnitude of deadband value
		subEna	SV	-	-	-	Enable substitution
		db	CF	-	Av PF deadband	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		zeroDb	CF	-	Av PF zero deadband	-	Zero point clamping in 0,001% of range
TotVA	a_dMV	mag.f	MX	-	S_DB	Mon	Apparent Power magnitude of deadband value
		rangeC.hhLim.f	CF	-	Tot VA high high Lim	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	Tot VA high limit	-	High limit (physical value)
		rangeC.lLim.f	CF	-	Tot VA low limit	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	Tot VA low low limit	-	Low Low limit (physical value)
		rangeC.min.f	CF	-	Tot apparent Pwr Min	-	Minimum value
		rangeC.max.f	CF	-	Tot apparent Pwr Max	-	Maximum value
		subMag.f	SV	-	-	-	Substituted value
		range	MX	-	S_RANGE	Mon	Apparent Power range
		q	MX	-	S_DB	Mon	Apparent Power magnitude of deadband value
		t	MX	-	S_DB	Mon	Apparent Power magnitude of deadband value
		subEna	SV	-	-	-	Enable substitution
		db	CF	-	Tot VA deadband	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		zeroDb	CF	-	Tot VA zero deadband	-	Zero point clamping in 0,001% of range
TotVAr	a_dMV	mag.f	MX	-	Q_DB	Mon	Reactive Power magnitude of deadband value
		rangeC.hhLim.f	CF	-	Tot VAr Hi high Lim	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	Tot VAr high limit	-	High limit (physical value)
		rangeC.lLim.f	CF	-	Tot VAr low limit	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	Tot VAr low low Lim	-	Low Low limit (physical value)
		rangeC.min.f	CF	-	Tot reactive Pwr Min	-	Minimum value
		rangeC.max.f	CF	-	Tot reactive Pwr Max	-	Maximum value
		subMag.f	SV	-	-	-	Substituted value
		range	MX	-	Q_RANGE	Mon	Reactive Power range
		q	MX	-	Q_DB	Mon	Reactive Power magnitude of deadband value
		t	MX	-	Q_DB	Mon	Reactive Power magnitude of deadband value

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
TotVAr	a_dMV	subEna	SV	-	-	-	Enable substitution
		db	CF	-	Tot VAr deadband	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		zeroDb	CF	-	Tot VAr zero Db	-	Zero point clamping in 0,001% of range
TotW	a_dMV	mag.f	MX	-	P_DB	Mon	Active Power magnitude of deadband value
		rangeC.hhLim.f	CF	-	Tot W high high Lim	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	Tot W high limit	-	High limit (physical value)
		rangeC.lLim.f	CF	-	Tot W low limit	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	Tot W low low limit	-	Low Low limit (physical value)
		rangeC.min.f	CF	-	Total real Pwr Min	-	Minimum value
		rangeC.max.f	CF	-	Total real Pwr Max	-	Maximum value
		subMag.f	SV	-	-	-	Substituted value
		range	MX	-	P_RANGE	Mon	Active Power range
		q	MX	-	P_DB	Mon	Active Power magnitude of deadband value
		t	MX	-	P_DB	Mon	Active Power magnitude of deadband value
		subEna	SV	-	-	-	Enable substitution
		db	CF	-	Tot W deadband	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		zeroDb	CF	-	Tot W zero deadband	-	Zero point clamping in 0,001% of range
Hz	a_dMV	mag.f	MX	-	F_DB	Mon	System frequency magnitude of deadband value
		rangeC.hhLim.f	CF	-	Hz high high limit	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	Hz high limit	-	High limit (physical value)
		rangeC.lLim.f	CF	-	Hz low limit	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	Hz low low limit	-	Low Low limit (physical value)
		rangeC.min.f	CF	-	Frequency minimum	-	Minimum value
		rangeC.max.f	CF	-	Frequency maximum	-	Maximum value
		subMag.f	SV	-	-	-	Substituted value
		range	MX	-	F_RANGE	Mon	System frequency range
		q	MX	-	F_DB	Mon	System frequency magnitude of deadband value
		t	MX	-	F_DB	Mon	System frequency magnitude of deadband value
		subEna	SV	-	-	-	Enable substitution
		db	CF	-	Hz deadband	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		zeroDb	CF	-	Hz zero deadband	-	Zero point clamping in 0,001% of range

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
ALd	v1_dSPS	stVal	ST	-	ILEAD	Mon	Current is leading voltage
		q	ST	-	ILEAD	Mon	Current is leading voltage
		t	ST	-	ILEAD	Mon	Current is leading voltage
ALg	v1_dSPS	stVal	ST	-	ILAG	Mon	Current is lagging voltage
		q	ST	-	ILAG	Mon	Current is lagging voltage
		t	ST	-	ILAG	Mon	Current is lagging voltage

7.7.2.3 Residual current measurement RESCMMXU

LN type	LN prefix	LN class	Function block name
RESCMMXU (revision 0)	RESC	MMXU	RESCMMXU

Table 117: RESCMMXU Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
A	d_dWYE	rangeC.hhLim.f	CF	-	A Hi high Lim res	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	A high limit res	-	High limit (physical value)
		rangeC.lLim.f	CF	-	A low limit res	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	A low low Lim res	-	Low Low limit (physical value)
		rangeC.max.f	CF	-	A maximum res	-	Maximum value
		rangeC.min.f	CF	-	A minimum res	-	Minimum value
		cVal.mag.f	MX	-	I0_DB	Mon	Residual current RMS, magnitude of reported value
		subCVal.mag.f	SV	-	-	-	Substituted value
		range	MX	-	I0_RANGE	Mon	Residual current RMS range

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
A	d_dWYE	q	MX	-	I0_DB	Mon	Residual current RMS, magnitude of reported value
		t	MX	-	I0_DB	Mon	Residual current RMS, magnitude of reported value
		subEna	SV	-	-	-	Enable substitution
		db	CF	-	A deadband res	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		zeroDb	CF	-	A Zer deadband res	-	Zero point clamping in 0,001% of range

7.7.2.4 Residual voltage measurement RESVMMXU

LN type	LN prefix	LN class	Function block name
GNRLLLN0 instance 1 (revision 0)	-	LLN0	RESVMMXU
RESVMMXU instance 1 (revision 0)	RESV	MMXU	RESVMMXU
VRESMMXU instance 2 (revision 0)	RESV	MMXU	RESVMMXU

Table 118: GNRLLLN0 Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850

Table 119: RESVMMXU Logical node data (instance 1)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
PhV	d_dWYE	rangeC.hhLim.f	CF	-	V RMS Hi Hi Lim res	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	V RMS high Lim res	-	High limit (physical value)
		rangeC.lLim.f	CF	-	V RMS low limit res	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	V RMS Lo low Lim res	-	Low Low limit (physical value)
		rangeC.max.f	CF	-	V RMS maximum res	-	Maximum value
		rangeC.min.f	CF	-	V RMS minimum res	-	Minimum value
		cVal.mag.f	MX	-	U0_RMS_DB	Mon	U0 RMS, magnitude of reported value
		subCVal.mag.f	SV	-	-	-	Substituted value
		range	MX	-	U0_RMS_RANGE	Mon	U0 RMS range
		q	MX	-	U0_RMS_DB	Mon	U0 RMS, magnitude of reported value
		t	MX	-	U0_RMS_DB	Mon	U0 RMS, magnitude of reported value
		subEna	SV	-	-	-	Enable substitution
		db	CF	-	V RMS deadband res	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		zeroDb	CF	-	V RMS zero db res	-	Zero point clamping in 0,001% of range

Table 120: VRESMMXU Logical node data (instance 2)

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
Mod	c_dINC	stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
PhV	d_dWYE	rangeC.hhLim.f	CF	-	V Mag Hi Hi Lim res	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	V Mag high Lim res	-	High limit (physical value)
		rangeC.lLim.f	CF	-	V Mag low limit res	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	V Mag Lo low Lim res	-	Low Low limit (physical value)
		rangeC.max.f	CF	-	V Mag maximum res	-	Maximum value
		rangeC.min.f	CF	-	V Mag minimum res	-	Minimum value
		cVal.mag.f	MX	-	U0_MAG_DB	Mon	U0 Amplitude, magnitude of reported value
		subCVal.mag.f	SV	-	-	-	Substituted value

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PhV	d_dWYE	range	MX	-	U0_MAG_RANGE	Mon	U0 Amplitude range
		q	MX	-	U0_MAG_DB	Mon	U0 Amplitude, magnitude of reported value
		t	MX	-	U0_MAG_DB	Mon	U0 Amplitude, magnitude of reported value
		subEna	SV	-	-	-	Enable substitution
		db	CF	-	V Mag deadband res	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		zeroDb	CF	-	V Mag zero db res	-	Zero point clamping in 0,001% of range

7.7.2.5 Phase voltage measurement VPHMMXU

LN type	LN prefix	LN class	Function block name
VPHMMXU (revision 0)	VPH	MMXU	VPHMMXU

Table 121: VPHMMXU Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
PhV	a_dWYE	rangeC.hhLim.f	CF	-	V Hi high Lim PhA	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	V high limit PhA	-	High limit (physical value)
		rangeC.lLim.f	CF	-	V low limit PhA	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	V low low Lim PhA	-	Low Low limit (physical value)
		rangeC.max.f	CF	-	V maximum PhA	-	Maximum value
		rangeC.min.f	CF	-	V minimum PhA	-	Minimum value
		cVal.mag.f	MX	-	U_DB_A	Mon	Phase A amplitude, magnitude of reported value

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PhV	a_dWYE	rangeC.hhLim.f	CF	-	V Hi high Lim PhB	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	V high limit PhB	-	High limit (physical value)
		rangeC.lLim.f	CF	-	V low limit PhB	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	V low low Lim PhB	-	Low Low limit (physical value)
		rangeC.max.f	CF	-	V maximum PhB	-	Maximum value
		rangeC.min.f	CF	-	V minimum PhB	-	Minimum value
		cVal.mag.f	MX	-	U_DB_B	Mon	Phase B amplitude, magnitude of reported value
		subCVal.mag.f	SV	-	-	-	Substituted value
		rangeC.hhLim.f	CF	-	V Hi high Lim PhC	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	V high limit PhC	-	High limit (physical value)
		rangeC.lLim.f	CF	-	V low limit PhC	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	V low low Lim PhC	-	Low Low limit (physical value)
		rangeC.max.f	CF	-	V maximum PhC	-	Maximum value
		rangeC.min.f	CF	-	V minimum PhC	-	Minimum value
		cVal.mag.f	MX	-	U_DB_C	Mon	Phase C amplitude, magnitude of reported value
		subCVal.mag.f	SV	-	-	-	Substituted value
		subCVal.mag.f	SV	-	-	-	Substituted value
		range	MX	-	U_RANGE_C	Mon	Phase C amplitude range
		range	MX	-	U_RANGE_A	Mon	Phase A amplitude range
		range	MX	-	U_RANGE_B	Mon	Phase B amplitude range
		q	MX	-	U_DB_C	Mon	Phase C amplitude, magnitude of reported value
		q	MX	-	U_DB_B	Mon	Phase B amplitude, magnitude of reported value
		q	MX	-	U_DB_A	Mon	Phase A amplitude, magnitude of reported value
		t	MX	-	U_DB_A	Mon	Phase A amplitude, magnitude of reported value
		t	MX	-	U_DB_B	Mon	Phase B amplitude, magnitude of reported value
		t	MX	-	U_DB_C	Mon	Phase C amplitude, magnitude of reported value
		subEna	SV	-	-	-	Enable substitution
		subEna	SV	-	-	-	Enable substitution
		subEna	SV	-	-	-	Enable substitution
		db	CF	-	V deadband PhC	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		db	CF	-	V deadband PhA	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		db	CF	-	V deadband PhB	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PhV	a_dWYE	zeroDb	CF	-	V Zer deadband PhA	-	Zero point clamping in 0,001% of range
		zeroDb	CF	-	V Zer deadband PhC	-	Zero point clamping in 0,001% of range
		zeroDb	CF	-	V Zer deadband PhB	-	Zero point clamping in 0,001% of range

7.7.2.6 Phase-to-phase voltage measurement VPPMMXU

LN type	LN prefix	LN class	Function block name
VPPMMXU (revision 0)	VPP	MMXU	VPPMMXU

Table 122: VPPMMXU Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PPV	a_dDEL	rangeC.hhLim.f	CF	-	V Hi high Lim PhAB	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	V high limit PhAB	-	High limit (physical value)
		rangeC.lLim.f	CF	-	V low limit PhAB	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	V low low Lim PhAB	-	Low Low limit (physical value)
		rangeC.max.f	CF	-	V maximum PhAB	-	Maximum value
		rangeC.min.f	CF	-	V minimum PhAB	-	Minimum value
		cVal.mag.f	MX	-	U_DB_AB	Mon	Phase A to B amplitude, magnitude of reported value
		rangeC.hhLim.f	CF	-	V Hi high Lim PhBC	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	V high limit PhBC	-	High limit (physical value)
		rangeC.lLim.f	CF	-	V low limit PhBC	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	V low low Lim PhBC	-	Low Low limit (physical value)
		rangeC.max.f	CF	-	V maximum PhBC	-	Maximum value
		rangeC.min.f	CF	-	V minimum PhBC	-	Minimum value
		cVal.mag.f	MX	-	U_DB_BC	Mon	Phase B to C amplitude, magnitude of reported value
		subCVal.mag.f	SV	-	-	-	Substituted value
		rangeC.hhLim.f	CF	-	V Hi high Lim PhCA	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	V high limit PhCA	-	High limit (physical value)
		rangeC.lLim.f	CF	-	V low limit PhCA	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	V low low Lim PhCA	-	Low Low limit (physical value)
		rangeC.max.f	CF	-	V maximum PhCA	-	Maximum value
		rangeC.min.f	CF	-	V minimum PhCA	-	Minimum value
		cVal.mag.f	MX	-	U_DB_CA	Mon	Phase C to A amplitude, magnitude of reported value
		subCVal.mag.f	SV	-	-	-	Substituted value

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
PPV	a_dDEL	subCVal.mag.f	SV	-	-	-	Substituted value
		range	MX	-	U_RANGE_CA	Mon	Phase C to A amplitude range
		range	MX	-	U_RANGE_AB	Mon	Phase A to B amplitude range
		range	MX	-	U_RANGE_BC	Mon	Phase B to C amplitude range
		q	MX	-	U_DB_CA	Mon	Phase C to A amplitude, magnitude of reported value
		q	MX	-	U_DB_BC	Mon	Phase B to C amplitude, magnitude of reported value
		q	MX	-	U_DB_AB	Mon	Phase A to B amplitude, magnitude of reported value
		t	MX	-	U_DB_AB	Mon	Phase A to B amplitude, magnitude of reported value
		t	MX	-	U_DB_BC	Mon	Phase B to C amplitude, magnitude of reported value
		t	MX	-	U_DB_CA	Mon	Phase C to A amplitude, magnitude of reported value
		subEna	SV	-	-	-	Enable substitution
		subEna	SV	-	-	-	Enable substitution
		subEna	SV	-	-	-	Enable substitution
		db	CF	-	V deadband PhCA	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		db	CF	-	V deadband PhAB	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		db	CF	-	V deadband PhBC	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		zeroDb	CF	-	V Zer deadband PhAB	-	Zero point clamping in 0,001% of range
		zeroDb	CF	-	V Zer deadband PhCA	-	Zero point clamping in 0,001% of range
		zeroDb	CF	-	V Zer deadband PhBC	-	Zero point clamping in 0,001% of range
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850

7.7.3 Sequence and imbalance MSQI

7.7.3.1 Sequence current measurement CSMSQI

LN type	LN prefix	LN class	Function block name
CSMSQI (revision 0)	CS	MSQI	CSMSQI

Table 123: CSMSQI Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
SeqA	c_dSEQ	rangeC.hhLim.f	CF	-	Ps Seq A Hi high Lim	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	Ps Seq A high limit	-	High limit (physical value)
		rangeC.lLim.f	CF	-	Ps Seq A low limit	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	Ps Seq A low low Lim	-	Low Low limit (physical value)
		rangeC.max.f	CF	-	Ps Seq current Max	-	Maximum value
		rangeC.min.f	CF	-	Ps Seq current Min	-	Minimum value
		cVal.mag.f	MX	-	I1_DB	Mon	Positive sequence current amplitude, reported value
		rangeC.hhLim.f	CF	-	Ng Seq A Hi high Lim	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	Ng Seq A high limit	-	High limit (physical value)
		rangeC.lLim.f	CF	-	Ng Seq A low limit	-	Low limit (physical value)

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
SeqA	c_dSEQ	rangeC.llLim.f	CF	-	Ng Seq A low low Lim	-	Low Low limit (physical value)
		rangeC.max.f	CF	-	Ng Seq current Max	-	Maximum value
		rangeC.min.f	CF	-	Ng Seq current Min	-	Minimum value
		cVal.mag.f	MX	-	I2_DB	Mon	Negative sequence current amplitude, reported value
		subCVal.mag.f	SV	-	-	-	Substituted value
		subCVal.mag.f	SV	-	-	-	Substituted value
		range	MX	-	I1_RANGE	Mon	Positive sequence current amplitude range
		range	MX	-	I2_RANGE	Mon	Negative sequence current amplitude range
		q	MX	-	I2_DB	Mon	Negative sequence current amplitude, reported value
		q	MX	-	I1_DB	Mon	Positive sequence current amplitude, reported value
		t	MX	-	I1_DB	Mon	Positive sequence current amplitude, reported value
		t	MX	-	I2_DB	Mon	Negative sequence current amplitude, reported value
		subEna	SV	-	-	-	Enable substitution
		subEna	SV	-	-	-	Enable substitution
		db	CF	-	Ps Seq A deadband	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		db	CF	-	Ng Seq A deadband	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		zeroDb	CF	-	Ps Seq A zero Db	-	Zero point clamping in 0,001% of range
		zeroDb	CF	-	Ng Seq A zero Db	-	Zero point clamping in 0,001% of range

7.7.3.2 Sequence voltage measurement VSMSQI

LN type	LN prefix	LN class	Function block name
VSMSQI (revision 0)	VS	MSQI	VSMSQI

Table 124: VSMSQI Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
SeqV	c_dSEQ	rangeC.hhLim.f	CF	-	Ps Seq V Hi high Lim	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	Ps Seq V high limit	-	High limit (physical value)
		rangeC.lLim.f	CF	-	Ps Seq V low limit	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	Ps Seq V low low Lim	-	Low Low limit (physical value)
		rangeC.max.f	CF	-	Ps Seq voltage Max	-	Maximum value
		rangeC.min.f	CF	-	Ps Seq voltage Min	-	Minimum value
		cVal.mag.f	MX	-	U1_DB	Mon	Positive sequence voltage amplitude, reported value
		rangeC.hhLim.f	CF	-	Ng Seq V Hi high Lim	-	High High limit (physical value)
		rangeC.hLim.f	CF	-	Ng Seq V High limit	-	High limit (physical value)
		rangeC.lLim.f	CF	-	Ng Seq V low limit	-	Low limit (physical value)
		rangeC.llLim.f	CF	-	Ng Seq V low low Lim	-	Low Low limit (physical value)
		rangeC.max.f	CF	-	Ng Seq voltage Max	-	Maximum value
		rangeC.min.f	CF	-	Ng Seq voltage Min	-	Minimum value
		cVal.mag.f	MX	-	U2_DB	Mon	Negative sequence voltage amplitude, reported value
		subCVal.mag.f	SV	-	-	-	Substituted value
		subCVal.mag.f	SV	-	-	-	Substituted value
		range	MX	-	U1 RANGE	Mon	Positive sequence voltage amplitude range
		range	MX	-	U2_RANGE	Mon	Negative sequence voltage amplitude range
		q	MX	-	U2_DB	Mon	Negative sequence voltage amplitude, reported value
		q	MX	-	U1_DB	Mon	Positive sequence voltage amplitude, reported value
		t	MX	-	U1_DB	Mon	Positive sequence voltage amplitude, reported value
		t	MX	-	U2_DB	Mon	Negative sequence voltage amplitude, reported value
		subEna	SV	-	-	-	Enable substitution
		subEna	SV	-	-	-	Enable substitution

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
SeqV	c_dSEQ	db	CF	-	Ps Seq V deadband	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		db	CF	-	Ng Seq V deadband	-	Cycl: Report interval (s), Db: In % of range, Int Db: In %s
		zeroDb	CF	-	Ps Seq V zero Db	-	Zero point clamping in 0,001% of range
		zeroDb	CF	-	Ng Seq V zero Db	-	Zero point clamping in 0,001% of range

7.8 Logical nodes for sensors and monitoring

7.8.1 Circuit breaker monitoring SCBR

7.8.1.1 Circuit breaker condition monitoring SSCBR

LN type	LN prefix	LN class	Function block name
SSCBR (revision 0)	S	SCBR	SSCBR

Table 125: SSCBR Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
InaTmdCnt	v1_dINS	stVal	ST	-	INA_DAYS	Mon	The number of days CB has been inactive
		q	ST	-	INA_DAYS	Mon	The number of days CB has been inactive
		t	ST	-	INA_DAYS	Mon	The number of days CB has been inactive

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
RmnLifPhA	v1_dINS	stVal	ST	-	CB_LIFE_A	Mon	CB Remaining life phase A
		q	ST	-	CB_LIFE_A	Mon	CB Remaining life phase A
		t	ST	-	CB_LIFE_A	Mon	CB Remaining life phase A
RmnLifPhB	v1_dINS	stVal	ST	-	CB_LIFE_B	Mon	CB Remaining life phase B
		q	ST	-	CB_LIFE_B	Mon	CB Remaining life phase B
		t	ST	-	CB_LIFE_B	Mon	CB Remaining life phase B
RmnLifPhC	v1_dINS	stVal	ST	-	CB_LIFE_C	Mon	CB Remaining life phase C
		q	ST	-	CB_LIFE_C	Mon	CB Remaining life phase C
		t	ST	-	CB_LIFE_C	Mon	CB Remaining life phase C
RsAccAPwr	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850
RsCBWear	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850
RsTrvTm	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
RsTrvTm	v1_dSPC	Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850
RsSprChaTm	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orCat	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.origin.orIdent	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.ctlNum	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.T	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Test	CO	-	-	Cmd	Command parameter for IEC61850
		Oper.Check	CO	-	-	Cmd	Command parameter for IEC61850
OpnAlm	v1_dSPS	stVal	ST	-	TRV_T_OP_ALM	Mon	CB open travel time exceeded set value
		q	ST	-	TRV_T_OP_ALM	Mon	CB open travel time exceeded set value
		t	ST	-	TRV_T_OP_ALM	Mon	CB open travel time exceeded set value
ClsAlm	v1_dSPS	stVal	ST	-	TRV_T_CL_ALM	Mon	CB close travel time exceeded set value
		q	ST	-	TRV_T_CL_ALM	Mon	CB close travel time exceeded set value
		t	ST	-	TRV_T_CL_ALM	Mon	CB close travel time exceeded set value
OpNumAlm	v1_dSPS	stVal	ST	-	OPR_ALM	Mon	Number of CB operations exceeds alarm limit
		q	ST	-	OPR_ALM	Mon	Number of CB operations exceeds alarm limit
		t	ST	-	OPR_ALM	Mon	Number of CB operations exceeds alarm limit
OpNumLO	v1_dSPS	stVal	ST	-	OPR_LO	Mon	Number of CB operations exceeds lockout limit
		q	ST	-	OPR_LO	Mon	Number of CB operations exceeds lockout limit
		t	ST	-	OPR_LO	Mon	Number of CB operations exceeds lockout limit
APwrAlm	v1_dSPS	stVal	ST	-	IPOW_ALM	Mon	Accumulated currents power (Iyt),exceeded alarm limit
		q	ST	-	IPOW_ALM	Mon	Accumulated currents power (Iyt),exceeded alarm limit

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
APwrAlm	v1_dSPS	t	ST	-	IPOW_ALM	Mon	Accumulated currents power (Iyt),exceeded alarm limit
APwrLO	v1_dSPS	stVal	ST	-	IPOW_LO	Mon	Accumulated currents power (Iyt),exceeded lockout limit
		q	ST	-	IPOW_LO	Mon	Accumulated currents power (Iyt),exceeded lockout limit
		t	ST	-	IPOW_LO	Mon	Accumulated currents power (Iyt),exceeded lockout limit
LonTmAlm	v1_dSPS	stVal	ST	-	MON_ALM	Mon	CB 'not operated for long time' alarm
		q	ST	-	MON_ALM	Mon	CB 'not operated for long time' alarm
		t	ST	-	MON_ALM	Mon	CB 'not operated for long time' alarm
SprChaAlm	v1_dSPS	stVal	ST	-	SPR_CHR_ALM	Mon	Spring charging time has crossed the set value
		q	ST	-	SPR_CHR_ALM	Mon	Spring charging time has crossed the set value
		t	ST	-	SPR_CHR_ALM	Mon	Spring charging time has crossed the set value
PosOpn	v1_dSPS	stVal	ST	-	OPENPOS	Mon	CB is in open position
		q	ST	-	OPENPOS	Mon	CB is in open position
		t	ST	-	OPENPOS	Mon	CB is in open position
PosIvd	v1_dSPS	stVal	ST	-	INVALIDPOS	Mon	CB is in invalid position (not positively open or closed)
		q	ST	-	INVALIDPOS	Mon	CB is in invalid position (not positively open or closed)
		t	ST	-	INVALIDPOS	Mon	CB is in invalid position (not positively open or closed)
PosCls	v1_dSPS	stVal	ST	-	CLOSEPOS	Mon	CB is in closed position
		q	ST	-	CLOSEPOS	Mon	CB is in closed position
		t	ST	-	CLOSEPOS	Mon	CB is in closed position
CBLifAlm	v1_dSPS	stVal	ST	-	CB_LIFE_ALM	Mon	Remaining life of CB reduced to Life alarm level
		q	ST	-	CB_LIFE_ALM	Mon	Remaining life of CB reduced to Life alarm level
		t	ST	-	CB_LIFE_ALM	Mon	Remaining life of CB reduced to Life alarm level
PresLO	v1_dSPS	stVal	ST	-	PRES_LO	Mon	Pressure below lockout level
		q	ST	-	PRES_LO	Mon	Pressure below lockout level
		t	ST	-	PRES_LO	Mon	Pressure below lockout level
TmmsCls	v2_dMV	mag.f	MX	-	T_TRV_CL	Mon	Travel time of the CB during closing operation
		q	MX	-	T_TRV_CL	Mon	Travel time of the CB during closing operation

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
TmmsCls	v2_dMV	t	MX	-	T_TRV_CL	Mon	Travel time of the CB during closing operation
TmmsOpn	v2_dMV	mag.f	MX	-	T_TRV_OP	Mon	Travel time of the CB during opening operation
		q	MX	-	T_TRV_OP	Mon	Travel time of the CB during opening operation
		t	MX	-	T_TRV_OP	Mon	Travel time of the CB during opening operation
TmsSprCha	v2_dMV	mag.f	MX	-	T_SPR_CHR	Mon	The charging time of the CB spring
		q	MX	-	T_SPR_CHR	Mon	The charging time of the CB spring
		t	MX	-	T_SPR_CHR	Mon	The charging time of the CB spring
AccAPwrPhB	v2_dMV	mag.f	MX	-	IPOW_B	Mon	Accumulated currents power (Iyt), phase B
		q	MX	-	IPOW_B	Mon	Accumulated currents power (Iyt), phase B
		t	MX	-	IPOW_B	Mon	Accumulated currents power (Iyt), phase B
AccAPwrPhC	v2_dMV	mag.f	MX	-	IPOW_C	Mon	Accumulated currents power (Iyt), phase C
		q	MX	-	IPOW_C	Mon	Accumulated currents power (Iyt), phase C
		t	MX	-	IPOW_C	Mon	Accumulated currents power (Iyt), phase C
AccAPwrPhA	v2_dMV	mag.f	MX	-	IPOW_A	Mon	Accumulated currents power (Iyt), phase A
		q	MX	-	IPOW_A	Mon	Accumulated currents power (Iyt), phase A
		t	MX	-	IPOW_A	Mon	Accumulated currents power (Iyt), phase A
PresAlm	v3_dSPS	stVal	ST	-	PRES_ALM	Mon	Pressure below alarm level
		q	ST	-	PRES_ALM	Mon	Pressure below alarm level
		t	ST	-	PRES_ALM	Mon	Pressure below alarm level
OpCnt	v5_dINS	stVal	ST	-	NO_OPR	Mon	Number of CB operation cycle
		q	ST	-	NO_OPR	Mon	Number of CB operation cycle
		t	ST	-	NO_OPR	Mon	Number of CB operation cycle

7.8.1.2 Breaker close/trip circuit supervision TCSSCBR

LN type	LN prefix	LN class	Function block name
TCSSCBR (revision 0)	TCS	SCBR	TCSSCBR

Table 126: TCSSCBR Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
TrCctAlm	a_dSPS	stVal	ST	-	ALARM	Mon	Trip circuit fault indication
		q	ST	-	ALARM	Mon	Trip circuit fault indication
		t	ST	-	ALARM	Mon	Trip circuit fault indication

7.8.2 Tap changer supervision SLTC

7.8.2.1 Tap position indication TPOSSLTC

LN type	LN prefix	LN class	Function block name
TPOSSLTC (revision 0)	TPOS	SLTC	TPOSSLTC

Table 127: TPOSSLTC Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	t	ST	-	-	Mon	Mode status value parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
TapPosIvd	a_dSPS	stVal	ST	-	TAP_POS_IV	Mon	TAP_POS invalidity status
		q	ST	-	TAP_POS_IV	Mon	TAP_POS invalidity status
		t	ST	-	TAP_POS_IV	Mon	TAP_POS invalidity status
TapPos	d_dINC	stVal	ST	-	TAP_POS	Mon	Tap position value as integer
		q	ST	-	TAP_POS	Mon	Tap position value as integer
		t	ST	-	TAP_POS	Mon	Tap position value as integer

7.9 Logical nodes for switchgear

7.9.1 Circuit breaker XCBR

7.9.1.1 Circuit breaker, three phase DAXCBR

LN type	LN prefix	LN class	Function block name
DAXCBR (revision 0)	DA	XCBR	DAXCBR

Table 128: DAXCBR Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status value parameter for 61850
		q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Beh	a_dINS	t	ST	-	Beh	Mon	Behaviour parameter for 61850
BlkCls	a_dSPC	Oper.ctlVal	CO	-	-	Cmd	Special block command value
		Oper.origin.orCat	CO	-	-	Cmd	Special block command value
		Oper.origin.orIdent	CO	-	-	Cmd	Special block command value
		Oper.ctlNum	CO	-	-	Cmd	Special block command value
		Oper.T	CO	-	-	Cmd	Special block command value
		Oper.Test	CO	-	-	Cmd	Special block command value
		Oper.Check	CO	-	-	Cmd	Special block command value
		stVal	ST	-	CL_BLKD	Mon	Indication that the function is blocked for close commands
		q	ST	-	CL_BLKD	Mon	Indication that the function is blocked for close commands
		t	ST	-	CL_BLKD	Mon	Indication that the function is blocked for close commands
BlkOpn	a_dSPC	Oper.ctlVal	CO	-	-	Cmd	Special block command value
		Oper.origin.orCat	CO	-	-	Cmd	Special block command value
		Oper.origin.orIdent	CO	-	-	Cmd	Special block command value
		Oper.ctlNum	CO	-	-	Cmd	Special block command value
		Oper.T	CO	-	-	Cmd	Special block command value
		Oper.Test	CO	-	-	Cmd	Special block command value
		Oper.Check	CO	-	-	Cmd	Special block command value
		stVal	ST	-	OP_BLKD	Mon	Indication that the function is blocked for open commands
		q	ST	-	OP_BLKD	Mon	Indication that the function is blocked for open commands
		t	ST	-	OP_BLKD	Mon	Indication that the function is blocked for open commands
Loc	a_dSPS	stVal	ST	-	-	Mon	Indication that the function is local mode (process level)
		q	ST	-	-	Mon	Indication that the function is local mode (process level)
		t	ST	-	-	Mon	Indication that the function is local mode (process level)
OpCnt	b_dINS	stVal	ST	-	CNT_VAL	Mon	The value of the operation counter
		q	ST	-	CNT_VAL	Mon	The value of the operation counter
		t	ST	-	CNT_VAL	Mon	The value of the operation counter
Pos	c_dDPC	stVal	ST	-	POSITION	Mon	Apparatus position indication
		q	ST	-	POSITION	Mon	Apparatus position indication
		t	ST	-	POSITION	Mon	Apparatus position indication
		subEna	SV	-	-	-	Substitute enable
		subVal	SV	-	-	-	Substituted double position value

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
CBOpCap	h_dINS	stVal	ST	-	-	Mon	Breaker operating capability 1 = None, 2 = O, 3 = CO, 4 = OCO, 5 = COCO, 6+ = More
		q	ST	-	-	Mon	Breaker operating capability 1 = None, 2 = O, 3 = CO, 4 = OCO, 5 = COCO, 6+ = More
		t	ST	-	-	Mon	Breaker operating capability 1 = None, 2 = O, 3 = CO, 4 = OCO, 5 = COCO, 6+ = More
BlkUpd	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Special block command value
		Oper.origin.orCat	CO	-	-	Cmd	Special block command value
		Oper.origin.orIdent	CO	-	-	Cmd	Special block command value
		Oper.ctlNum	CO	-	-	Cmd	Special block command value
		Oper.T	CO	-	-	Cmd	Special block command value
		Oper.Test	CO	-	-	Cmd	Special block command value
		Oper.Check	CO	-	-	Cmd	Special block command value
		stVal	ST	-	UPD_BLKD	Mon	The update of position indication is blocked
		q	ST	-	UPD_BLKD	Mon	The update of position indication is blocked
		t	ST	-	UPD_BLKD	Mon	The update of position indication is blocked

7.9.2 Switch XSWI

7.9.2.1 Disconnector, three phase DAXSWI

LN type	LN prefix	LN class	Function block name
DAXSWI (revision 0)	DA	XSWI	DAXSWI

Table 129: DAXSWI Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status value parameter for 61850

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	q	ST	-	-	Mon	Mode status value parameter for 61850
		t	ST	-	-	Mon	Mode status value parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
BlkCls	a_dSPC	Oper.ctlVal	CO	-	-	Cmd	Special block command value
		Oper.origin.orCat	CO	-	-	Cmd	Special block command value
		Oper.origin.orIdent	CO	-	-	Cmd	Special block command value
		Oper.ctlNum	CO	-	-	Cmd	Special block command value
		Oper.T	CO	-	-	Cmd	Special block command value
		Oper.Test	CO	-	-	Cmd	Special block command value
		Oper.Check	CO	-	-	Cmd	Special block command value
		stVal	ST	-	CL_BLKD	Mon	Indication that the function is blocked for close commands
		q	ST	-	CL_BLKD	Mon	Indication that the function is blocked for close commands
		t	ST	-	CL_BLKD	Mon	Indication that the function is blocked for close commands
BlkOpn	a_dSPC	Oper.ctlVal	CO	-	-	Cmd	Special block command value
		Oper.origin.orCat	CO	-	-	Cmd	Special block command value
		Oper.origin.orIdent	CO	-	-	Cmd	Special block command value
		Oper.ctlNum	CO	-	-	Cmd	Special block command value
		Oper.T	CO	-	-	Cmd	Special block command value
		Oper.Test	CO	-	-	Cmd	Special block command value
		Oper.Check	CO	-	-	Cmd	Special block command value
		stVal	ST	-	OP_BLKD	Mon	Indication that the function is blocked for open commands
		q	ST	-	OP_BLKD	Mon	Indication that the function is blocked for open commands
		t	ST	-	OP_BLKD	Mon	Indication that the function is blocked for open commands
Loc	a_dSPS	stVal	ST	-	-	Mon	Indication that the function is local mode (process level)
		q	ST	-	-	Mon	Indication that the function is local mode (process level)
		t	ST	-	-	Mon	Indication that the function is local mode (process level)
OpCnt	b_dINS	stVal	ST	-	CNT_VAL	Mon	The value of the operation counter
		q	ST	-	CNT_VAL	Mon	The value of the operation counter
		t	ST	-	CNT_VAL	Mon	The value of the operation counter
Pos	c_dDPC	stVal	ST	-	POSITION	Mon	Apparatus position indication

Table continues on next page

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Pos	c_dDPC	q	ST	-	POSITION	Mon	Apparatus position indication
		t	ST	-	POSITION	Mon	Apparatus position indication
		subEna	SV	-	-	-	Substitute enable
		subVal	SV	-	-	-	Substituted double position value
SwOpCap	f_dINS	stVal	ST	-	-	Mon	Switch operating capability 1 = None, 2 = O, 3 = C, 4 = O & C
		q	ST	-	-	Mon	Switch operating capability 1 = None, 2 = O, 3 = C, 4 = O & C
		t	ST	-	-	Mon	Switch operating capability 1 = None, 2 = O, 3 = C, 4 = O & C
SwTyp	g_dINS	stVal	ST	-	-	Mon	1=LoadBreak,2=Disconnector, 3=EarthSw, 4=HighSpeedEarthSw
		q	ST	-	-	Mon	1=LoadBreak,2=Disconnector, 3=EarthSw, 4=HighSpeedEarthSw
		t	ST	-	-	Mon	1=LoadBreak,2=Disconnector, 3=EarthSw, 4=HighSpeedEarthSw
BlkUpd	v1_dSPC	Oper.ctlVal	CO	-	-	Cmd	Special block command value
		Oper.origin.orCat	CO	-	-	Cmd	Special block command value
		Oper.origin.orIdent	CO	-	-	Cmd	Special block command value
		Oper.ctlNum	CO	-	-	Cmd	Special block command value
		Oper.T	CO	-	-	Cmd	Special block command value
		Oper.Test	CO	-	-	Cmd	Special block command value
		Oper.Check	CO	-	-	Cmd	Special block command value
		stVal	ST	-	UPD_BLKD	Mon	The update of position indication is blocked
		q	ST	-	UPD_BLKD	Mon	The update of position indication is blocked
		t	ST	-	UPD_BLKD	Mon	The update of position indication is blocked

7.10 Logical nodes for further power system equipment

7.10.1 Battery ZBAT

7.10.1.1 Station battery supervision SPVNZBAT

LN type	LN prefix	LN class	Function block name
SPVNZBAT (revision 0)	SPVN	ZBAT	SPVNZBAT

Table 130: SPVNZBAT Logical node data

DO name	DO type	DA name	FC	T	Signal	Mon/ Cmd	Description
Mod	a_dINC	Oper.ctlVal	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orCat	CO	-	-	Cmd	Mode parameter for 61850
		Oper.origin.orIdent	CO	-	-	Cmd	Mode parameter for 61850
		Oper.ctlNum	CO	-	-	Cmd	Mode parameter for 61850
		Oper.T	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Test	CO	-	-	Cmd	Mode parameter for 61850
		Oper.Check	CO	-	-	Cmd	Mode parameter for 61850
		stVal	ST	-	-	Mon	Mode status parameter for 61850
		q	ST	-	-	Mon	Mode status parameter for 61850
		t	ST	-	-	Mon	Mode status parameter for 61850
Beh	a_dINS	stVal	ST	-	Beh	Mon	Behaviour parameter for 61850
		q	ST	-	Beh	Mon	Behaviour parameter for 61850
		t	ST	-	Beh	Mon	Behaviour parameter for 61850
BatHi	a_dSPS	stVal	ST	-	ST_UHIGH	Mon	Start signal when battery voltage exceeds upper limit
		q	ST	-	ST_UHIGH	Mon	Start signal when battery voltage exceeds upper limit
		t	ST	-	ST_UHIGH	Mon	Start signal when battery voltage exceeds upper limit
BatLo	a_dSPS	stVal	ST	-	ST_ULOW	Mon	Start signal when battery voltage drops below lower limit
		q	ST	-	ST_ULOW	Mon	Start signal when battery voltage drops below lower limit
		t	ST	-	ST_ULOW	Mon	Start signal when battery voltage drops below lower limit
Vol	b_dMV	mag.f	MX	-	U_BATT	Mon	Service value of the battery terminal voltage
		q	MX	-	U_BATT	Mon	Service value of the battery terminal voltage
		t	MX	-	U_BATT	Mon	Service value of the battery terminal voltage
OpBatLo	v1_dSPS	stVal	ST	-	AL_ULOW	Mon	Alarm when voltage has been below lower limit for a set time
		q	ST	-	AL_ULOW	Mon	Alarm when voltage has been below lower limit for a set time
		t	ST	-	AL_ULOW	Mon	Alarm when voltage has been below lower limit for a set time
OpBatHi	v1_dSPS	stVal	ST	-	AL_UHIGH	Mon	Alarm when voltage has exceeded higher limit for a set time
		q	ST	-	AL_UHIGH	Mon	Alarm when voltage has exceeded higher limit for a set time
		t	ST	-	AL_UHIGH	Mon	Alarm when voltage has exceeded higher limit for a set time

Section 8 Glossary

ACSI	Abstract communication service interface
ANSI	American National Standards Institute
Beh	Behaviour
BRCB	Report control block
CCT600	Communication Configuration Tool
CID	Configured IED description
DA	Data attribute
DNP3	A distributed network protocol originally developed by Westronic. The DNP3 Users Group has the ownership of the protocol and assumes responsibility for its evolution.
DO	Data object
EMC	Electromagnetic compatibility
Ethernet	A standard for connecting a family of frame-based computer networking technologies into a LAN
FC	Functional constraint
FCDA	Functional constraint data attribute
GI	General interrogation
GoCB	GOOSE control block
GOOSE	Generic Object Oriented Substation Event
GSE	Generic substation event
HMI	Human-machine interface
ICD	IED capability description
IEC	International Electrotechnical Commission
IEC 61850	International standard for substation communication and modelling
IEC 61850-8-1	A communication protocol based on the IEC 61850 standard series and a standard for substation modelling
IED	Intelligent electronic device
IP address	A set of four numbers between 0 and 255, separated by periods. Each server connected to the Internet is assigned a unique IP address that specifies the location for the TCP/IP protocol.

ISO	International Standard Organization
LAN	Local area network
LD	Logical device
LD0	Logical device zero (0)
LED	Light-emitting diode
LHMI	Local human-machine interface
LLN0	Logical node zero (0)
LN	Logical node
Logical device	Also known as LD. Representation of a group of functions. Each function is defined as a logical node. A physical device has one or several LDs.
MICS	Model implementation conformance statement
MMS	Manufacturing message specification; Metering management system
NCC	Network control center
PCM600	Protection and Control IED Manager
PICS	Protocol implementation conformance statement
PIXIT	Protocol implementation extra Information for testing
PST	Parameter Setting Tool in PCM600
RMS	Root-mean-square (value)
SBO	Select-before-operate
SCD	Substation configuration description
SCL	Substation configuration language
SMT	Signal Matrix Tool in PCM600
SNTP	Simple Network Time Protocol
SOTF	Switch on to fault
ST	Connector type for glass fibre cable
stVal	Status value
TCP/IP	Transmission Control Protocol/Internet Protocol
TCS	Trip-circuit supervision
WEI	Weak-end infeed logic
XML	Extensible markup language

Contact us

ABB Oy
Distribution Automation
P.O. Box 699
FI-65101 VAASA, Finland
Phone +358 10 22 11
Fax +358 10 22 41094

www.abb.com/substationautomation

Power and productivity
for a better world™