

SIPROTEC4

Multifunction protection with control 7SJ61 / 7SJ62 / 7SJ63 6MD63

Communication module

DNP 3.0
Communication Database and
Device Profile Document

Bus mapping

Preface

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Non-liability clause

Although we have checked the contents of this publication for conformance with the hardware and software described we cannot guarantee complete conformance since differences cannot be ruled out.

The information in this manual is checked at regular intervals, and necessary corrections are included in the next releases.

Your suggestions are welcome.

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Preface

Contents of this manual

The manual is divided into the following topics:

- Overview
- Parametrization in DIGSI
- DNP V3.00 Device Profile
- Communication-Interfaces

Additional literature

This manual describes the data in the DNP messages standard mapping of the SIPROTEC devices.

The following additional manuals inform you about the function, operation, assembly and commissioning of the SIPROTEC devices:

<i>Manual</i>	<i>Contents</i>	<i>Order number</i>
Overcurrent, overload and motor protection with control SIPROTEC 7SJ61	Function, operation, assembly and commissioning of the SIPROTEC device 7SJ61	C53000-G1140-C118-2
Multifunction protection with control SIPROTEC 7SJ62	Function, operation, assembly and commissioning of the SIPROTEC device 7SJ62	C53000-G1140-C121-2
Multifunction protection with control SIPROTEC 7SJ63	Function, operation, assembly and commissioning of the SIPROTEC device 7SJ63	C53000-G1140-C120-2
Input/output unit with local control SIPROTEC 6MD63	Function, operation, assembly and commissioning of the SIPROTEC device 6MD63	C53000-C1840-C101-2

The DNP V3.0 specification and the structure of the DNP messages are defined in:

- DNP V3.00 Subset Definitions
Edition 2.00, November 1995
DNP Users Group
Document Nr.: P009-OIG.SUB
- DNP V3.00 Data Object Library
Edition 0.02, July 1997
DNP Users Group
Document Nr.: P009-OBL
- DNP V3.00 Data Link Layer
Edition 0.02, May 1997
DNP Users Group
Document Nr.: P009-OPD.DL
- DNP V3.00 Application Layer
Edition 0.03, May 1997
DNP Users Group
Document Nr.: P009-OPD.APP
- DNP V3.00 Transport Functions
Edition 0.01, May 1997
DNP Users Group
Document Nr.: P009-OPD.TF

Notes to this manual

This manual provides you with the following aids to make it easier to locate the information you are looking for:

- At the beginning of this manual you will find a complete table of contents plus separate lists of figures and tables contained in this manual.
- In the individual chapters, you will find information in the left margin of each page which will give you an overview of the contents of that particular paragraph.
- Following the last chapter of this manual, you will find a glossary containing definitions of technical terms and abbreviations used in this manual.
- At the end of this manual, you will find a comprehensive index for fast access to the information you need.

Validity

This manual is valid for

- SIPROTEC devices 7SJ61, 7SJ62, 7SJ63 and 6MD63 with firmware version 4.2 and DNP communication module.

Training courses

See our catalog of courses for a list of available courses or contact our training center in Nuremberg.

Questions

If you have questions to the SIPROTEC devices, contact your Siemens representative.

Revision index

<i>Modified chapters / pages</i>	<i>Edition</i>	<i>Reasons of modification</i>
	1.0	First edition June 8 th , 2000

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Overview

1

Mapping:

This document describes the DNP standard mapping for SIPROTEC4 devices.

- Standard mapping one specifies the analog values for the voltage range of 32.767 kV and two DNP index points for double point commands.
- Standard mapping two specifies the analog values for the voltage range of 327.67 kV and two DNP index points for double point commands.
- Standard mapping three specifies the analog values for the voltage range of 32.767 kV and one DNP index point for double point commands.
- Standard mapping four specifies the analog values for the voltage range of 327.67 kV and one DNP index point for double point commands.



The following functions, described within the instruction book of the 7SJ61/62/63 and 6MD63 for some protocols, are not available via DNP 3.00.

Function	Remedy
Oscillographic wave form capture	Redundant service port via modem or direct connection for DIGSI 4
Remote settings	Redundant service port via modem or direct connection for DIGSI 4
Additional information points	map "User defined channels" via CFC
Additional control command/devices (Be careful: Don't delete or rename the predefined control devices. The user can not recreate control command/devices after deleting or renaming them within the matrix)	If accidentally deleted or renamed, do not save the setting changes or create a new device within the DIGSI manager. You must reprogram the entire relay after creating a new device.
Time synchronization	Use IRIG B input
Block Data Transmission	None
Generate Indications	None

Specifications

The communication database profile in the SIPROTEC-device 7SJ61-63 and 6MD63 with the DNP3.0 protocol is grouped into twelve object types. These are:

- **Binary Input with Status** (object 01, variation 02):
These points represents the state of a digital input-channel or an internal software-information-point. It is used for a general interrogation request by a RTU (after a reset or cyclic during runtime) to synchronize the RTU information-database. They are considered class 1 data (an event with high priority).
- **Binary Input Change with Time** (object 02, variation 02):
These points represents the changed state of a digital input-channel or an internal software-information-point and the time at which the state changed. It is used for spontaneous process-events. They are considered class 1 data (an event with high priority). It is used for spontaneous process-events. They are considered class 1 data (an event with high priority).
- **Binary Output Status** (object 10, variation 02):
These points represents the current status of a controlled digital output-channel. These digital output-channels are controlled by the Control Relay Output Block (object 12).
- **Control Relay Output Block (Direct Operate)** (object 12, variation 01):
These points are used for commands to the process or setting internal functions.
- **32-Bit Binary Counter (with Flag)** (object 20, variation 01):
These points are used to represent a counter for active and reactive Power.
- **32-Bit Counter Change Event without Time** (object 22, variation 01):
These points are used to represent a counter for active and reactive Power reported as an event.
- **16-Bit Analog Input (Measurements)** (object 30, variation 02):
These points are used to represent an actual analog point. This 16-bit signed value could represent a digitized signal or calculated value. It is used for a General Interrogation Functionality within the startup-procedure or for an Measurement snapshot.
- **16-Bit Analog Change Event without Time (Measurements)** (object 32, variation 02):
These points are used to represent a changed analog point. The time of measurement-change is determined from the measurement-filter-method.
- **16-Bit Analog Change Event with Time (Measurements)** (object 32, variation 04):
These points are used to represent current and voltage minimum and maximum values. The time stamp represent the last value updating.

- **Time and Date** (object 50, variation 01):
The time and date object is an information object that represents the absolute time of day and date. This object are used for time-synchronization. The absolute time is recorded as milliseconds since midnight, January 1st, 1970, at zero hours, zero minutes, zero seconds and milliseconds.
- **Class Data** (object 60, variation 01, 02, 03, 04):
This objects specifies different classes of information elements.

Class 0 specifies any information objects not assigned to class 1 until class 3.

Classes 1 to 3 specifies groups of event driven information objects. Class 1 data has higher priority than class 2 , class 3 and static data.
- **Internal Indications** (object 80, variation 01):
This object reflect internal status of device. This are availability of class 1,2,3 date, device trouble and so on.

Response time

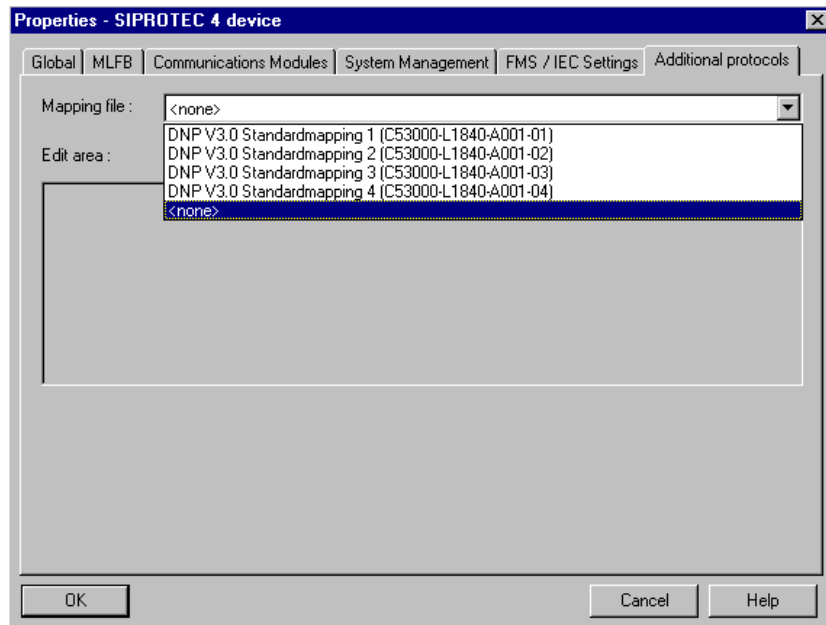
Some approximate response times with different numbers of selected points at 9600 baud are:

1 point → 70 milliseconds
 30 points → 115 milliseconds
 376 points → 670 milliseconds

Parametrization in DIGSI

2

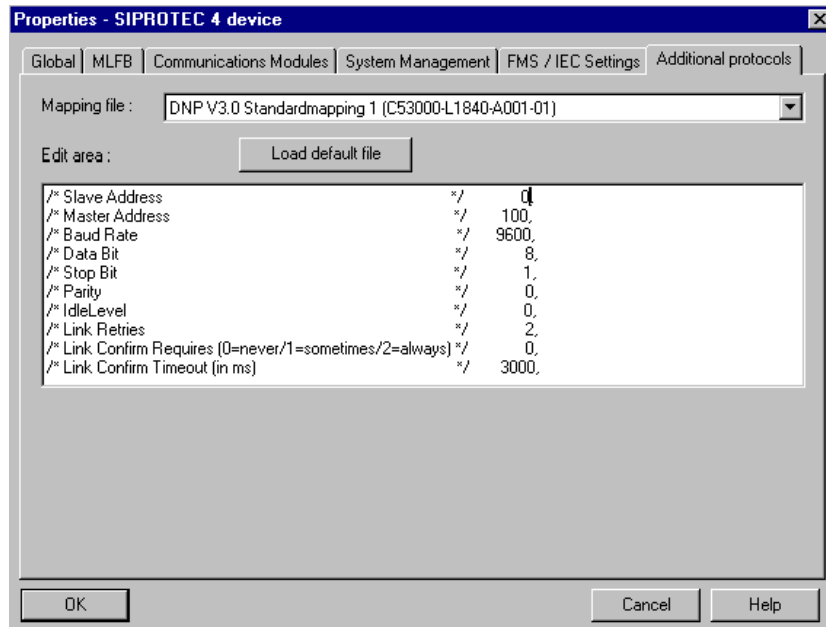
The SIPROTEC-device is designed so that the users can select only the group of data points in which they are interested. Users can select mappings by the protection data processing program DIGSI®. Within the DIGSI Manager → Properties of SIPROTEC 4 device → the user may choose the data mapping of choice.



An Edit area will be active after selecting the mapping file. Device specific data, like “slave address” and DNP specific parameter can be edited.



Edit only the numbers. Editing anything else will cause unexpected problems.



Only those SIPROTEC objects can be transmitted or controlled by DNP which are listed in the DNP V3.00 Device Profile

All these objects are already contained in the standard parameter set and they can be identified by their name or their „Internal object no.“ (not all SIPROTEC objects have an internal object number).

Information points

Control commands can be found within the matrix within the group “Control device” or “Protocol”. “User defined information” can be found within the matrix within the group “Protocol”

For transmission of installation-specific commands and annunciations user-definable objects are available.

Binary outputs and binary inputs of the SIPROTEC device can be assigned to these objects using the DIGSI parameterization software.

CFC-Incoming annunciations and CFC-Output indications can be used to allocate protection annunciations, which are not contained in the standard mapping of DNP

The messages in DNP input direction allow:

- polling of switching devices' status and binary inputs,
- transmission of annunciations, measurands and meter values to the DNP master.

The messages in DNP output direction allow:

- command outputs through the output relays of the SIPROTEC device (external commands),
- manipulation of taggings (internal commands), which can be changed by DNP.



Note

The allocation of the input channels and of the output relays to the switching devices and to the output channels is defined during parametrization of the SIPROTEC devices.

Depending on the device composition and the existing protection packages not all of the indicated binary inputs, protection annunciations and output relays (and corresponding DNP point index) may be available in the SIPROTEC devices.

DNP V3.00 Device Profile

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3.1 Implementation Table

In the table below, text shaded 00, 01 (start stop) indicates Subset Level 3 functionality (beyond Subset Level 2).

In the table below, text shaded as indicates functionality beyond Subset Level 3.

OBJECT			REQUEST		RESPONSE	
Obj	VAR	Description	Func Codes	Qual Codes (hex)	Func Codes	Qual Codes (hex)
1	0	Binary Input - Any Variations	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qty) 17, 28 (index)		
1	2	Binary Input with Status	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qty) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
2	0	Binary Input Change - Any Variations	1 (read)	06, (no range) 07, 08 (limited qty)		
2	2	Binary Input Change with Time	1 (read)	06, (no range) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
10	0	Binary Output - Any Variations	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qty) 17, 28 (index)		
10	2	Binary Output Status	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qty) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
12	1	Control Relay Output Block	3 (select) 4 (operate) 5 (direct op.) 6 (dir. op. noack)	00, 01 (start-stop) 07, 08 (limited qty) 17, 28 (index)	129 (response)	echo of request
20	0	Binary Counter - Any Variations	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qty) 17, 28 (index)		
20	1	32-Bit Binary Counter (with Flag)	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qty)		

OBJECT			REQUEST		RESPONSE	
Obj	VAR	Description	Func Codes	Qual Codes (hex)	Func Codes	Qual Codes (hex)
				17, 28 (index)		
22	0	Counter Change Event - Any Variations	1 (read)	06, (no range) 07, 08 (limited qty)		
22	1	32-Bit Counter Change Event without Time	1 (read)	06 (no range) 07, 08 (limited qty)		
30	0	16-Bit Analog Input - Any Variations	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qty) 17, 28 (index)		
30	2	16-Bit Analog Input (Static)	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qty) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
32	0	Analog Change Event - Any Variations	1 (read)	06, (no range) 07, 08 (limited qty)		
32	2	16-Bit Analog Change Event without Time	1 (read)	06 (no range) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
32	4	16-Bit Analog Change Event with Time	1 (read)	06 (no range) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
50	0	Time and Date – Any Variations				
50	1	Time and Date	2	07 (where quantity = 1)		
60	1	Class 0 Data	1	06		
60	2	Class 1 Data	1	06 (no range) 07, 08 (limited qty)		
60	3	Class 2 Data	1	06 (no range) 07, 08 (limited qty)		
60	4	Class 3 Data	1	06 (no range) 07, 08 (limited qty)		
80	1	Internal Indications	1	00, 01		
			2	00, index=7		

3.2 Device Profile Document

<h1>DNP V3.00</h1> <h2>DEVICE PROFILE DOCUMENT</h2>	
Vendor Name: SIEMENS AG	
Device Name: SIPROTEC 7SJ61, 7SJ62, 7SJ63 & 6MD63	
Highest DNP Level Supported: For Requests DNP-L2 For Responses DNP-L2	Device Function: <input type="checkbox"/> Master <input checked="" type="checkbox"/> Slave
<p>Notable objects, functions, and/or qualifiers supported in addition to the Highest DNP Levels Supported (the complete list is described in the attached table):</p> <p>For static (non-change-event) object requests, request qualifier codes 00 and 01 (start-stop), 07 and 08 (limited quantity), and 17 and 28 (index) are supported in addition to request qualifier code 06 (no range). Static object requests sent with qualifiers 00, 01, 06, 07, or 08, will be responded with qualifiers 00 or 01. Static object requests sent with qualifiers 17 or 28 will be responded with qualifiers 17 or 28. For change-event object requests, qualifiers 17 or 28 are always responded.</p> <p>16-bit Analog Change Events with Time may be requested.</p> <p>The read function code for Object 50 (Time and Date), variation 1, is supported.</p> <p>The features outlined within this Device Profile have successfully passed DNP Conformance Test of Subset Level 2 outlined in DNP3-1999 IED Certification Procedure.</p> <p>Unsolicited Data and Data Link Retries are supported but have not been conformance tested to date.</p>	
Maximum Data Link Frame Size (octets): Transmitted _____ 292 _____ Received _____ 292 _____	Maximum Application Fragment Size (octets): Transmitted _Configurable up to 2048 Received _____ 2048 _____
Maximum Data Link Re-tries: <input checked="" type="checkbox"/> None <input type="checkbox"/> Fixed at <input type="checkbox"/> Configurable, range _0_ to _255_	Maximum Application Layer Re-tries: <input checked="" type="checkbox"/> None <input type="checkbox"/> Configurable, range ____ to ____ (Fixed is not permitted)

Requires Data Link Layer Confirmation:

- Never
- Always
- Sometimes If 'Sometimes', when?

Configurable If 'Configurable', how? by the protection data processing program DIGSI

Requires Application Layer Confirmation:

- Never
- Always (not recommended)
- When reporting Event Data (Slave devices only)
- When sending multi-fragment responses (Slave devices only)

- Sometimes If 'Sometimes', when?

Configurable If 'Configurable', how? by the protection data processing program DIGSI

Timeouts while waiting for:

- | | | | | |
|-------------------------|--|---|-----------------------------------|--|
| Data Link Confirm | <input type="checkbox"/> None | <input type="checkbox"/> Fixed at _____ | <input type="checkbox"/> Variable | <input checked="" type="checkbox"/> Configurable |
| Complete Appl. Fragment | <input checked="" type="checkbox"/> None | <input type="checkbox"/> Fixed at _____ | <input type="checkbox"/> Variable | <input type="checkbox"/> Configurable |
| Application Confirm | <input type="checkbox"/> None | <input type="checkbox"/> Fixed at _____ | <input type="checkbox"/> Variable | <input checked="" type="checkbox"/> Configurable |
| Complete Appl. Response | <input checked="" type="checkbox"/> None | <input type="checkbox"/> Fixed at _____ | <input type="checkbox"/> Variable | <input type="checkbox"/> Configurable |

Others Default value are configurable by the protection data processing program DIGSI

Attach explanation if 'Variable' or 'Configurable' was checked for any timeout

Sends/Executes Control Operations:

- | | | | | |
|-------------------------|---|--|------------------------------------|---------------------------------------|
| WRITE Binary Outputs | <input checked="" type="checkbox"/> Never | <input type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| SELECT/OPERATE | <input type="checkbox"/> Never | <input checked="" type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| DIRECT OPERATE | <input type="checkbox"/> Never | <input checked="" type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| DIRECT OPERATE - NO ACK | <input type="checkbox"/> Never | <input checked="" type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Count > 1 | <input checked="" type="checkbox"/> Never | <input type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Pulse On | <input type="checkbox"/> Never | <input checked="" type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Pulse Off | <input checked="" type="checkbox"/> Never | <input type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Latch On | <input type="checkbox"/> Never | <input checked="" type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Latch Off | <input type="checkbox"/> Never | <input checked="" type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Queue | <input checked="" type="checkbox"/> Never | <input type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Clear Queue | <input checked="" type="checkbox"/> Never | <input type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |

Note: CONTROL RELAY OUTPUT BLOCK parameters (count, on-time, off-time) are ignored.

Attach explanation if 'Sometimes' or 'Configurable' was checked for any operation.

FILL OUT THE FOLLOWING ITEM FOR SLAVE DEVICES ONLY:	
<p>TimeSync Information:</p> <p>a.) TimeSync Period</p> <p><input type="checkbox"/> Never</p> <p><input type="checkbox"/> Fixed at _____seconds</p> <p><input checked="" type="checkbox"/> Configurable, range ____1____to __86400__seconds</p> <p>b.) Maximum time base drift over 10 minute interval: _____30__ms</p> <p>c.) Maximum Internal Time Reference Error when set via DNP: _____1__ms</p> <p>d.) Maximum Delay Measurement error: _____20__ms</p> <p>e.) Maximum response time: _____100__ms</p> <p>f.) Event data time-tag error – if different than (c):</p> <p style="padding-left: 20px;">Binary Input Change Events _____ms</p> <p style="padding-left: 20px;">Counter Change Events _____ms</p> <p style="padding-left: 20px;">Frozen Counter Change Events _____ms</p> <p style="padding-left: 20px;">Analog Change Events _____ms</p> <p style="padding-left: 20px;">Frozen Analog Change Events _____ms</p>	
<p>Reports Binary Input Change Events when no specific variation requested:</p> <p><input type="checkbox"/> Never</p> <p><input checked="" type="checkbox"/> Only time-tagged</p> <p><input type="checkbox"/> Only non-time-tagged</p> <p><input type="checkbox"/> Configurable to send both, one or the other (attach explanation)</p>	<p>Reports time-tagged Binary Input Change Events when no specific variation requested:</p> <p><input type="checkbox"/> Never</p> <p><input checked="" type="checkbox"/> Binary Input Change With Time</p> <p><input type="checkbox"/> Binary Input Change With Relative Time</p> <p><input type="checkbox"/> Configurable (attach explanation)</p>
<p>Sends Unsolicited Responses:</p> <p><input type="checkbox"/> Never</p> <p><input checked="" type="checkbox"/> Configurable (Unsolicited data response mode are switched on/off via the configuration tool)</p> <p><input type="checkbox"/> Only certain objects</p> <p><input type="checkbox"/> Sometimes (attach explanation)</p> <p><input checked="" type="checkbox"/> ENABLE/DISABLE UNSOLICITED Function codes supported</p>	<p>Sends Static Data in Unsolicited Responses:</p> <p><input checked="" type="checkbox"/> Never</p> <p><input type="checkbox"/> When Device Restarts</p> <p><input type="checkbox"/> When Status Flags Change</p> <p>No other options are permitted.</p>
<p>Default Counter Object/Variation:</p> <p><input type="checkbox"/> No Counters Reported</p> <p><input type="checkbox"/> Configurable (attach explanation)</p> <p><input checked="" type="checkbox"/> Default Object _____20_____</p> <p style="padding-left: 20px;">Default Variation _____01_____</p> <p><input type="checkbox"/> Point-by-point list attached</p> <p>Sends 32-Bit counters.</p>	<p>Counters Roll Over at:</p> <p><input type="checkbox"/> No Counters Reported</p> <p><input type="checkbox"/> Configurable (attach explanation)</p> <p><input type="checkbox"/> 16 Bits</p> <p><input checked="" type="checkbox"/> 32 Bits</p> <p><input type="checkbox"/> Other Value _____</p> <p><input type="checkbox"/> Point-by-point list attached</p>
<p>Sends Multi-Fragment Responses: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>	

3.3 Binary Input Points

Binary Input Points Static (Steady-State) Object Number: 1 Change Event Object Number: 2 Request Function Codes supported: 1 (read) Static Variation reported when variation 0 requested: 1 (Binary Input with status) Change Event Variation reported when variation 0 requested: 2 (Binary Input Change with Time)				
Point Index	Name	Description	Int. Object No.	Class
		Automatic reclosure status		
0	>79 ON	>79 ON; Automatic reclosure ON; ON = 1, OFF = 0	2701	3
01	>79 OFF	>79 OFF; ON = 1, OFF = 0	2702	3
02	> BLOCK 79	>BLOCK 79; ON = 1, OFF = 0	2703	3
03	>79 T WAIT	>79-A/R coordination control; ON = 1, OFF = 0	2705	3
04	>79 TRIP 1p	>79 Ext. 1pole TRIP for internal A/R; ON = 1, OFF = 0	2715	3
05	>79 TRIP 3p	>79 Ext. 3pole TRIP for internal A/R; ON = 1, OFF = 0	2716	3
06	>Enable ANSI#-2	>Enable 50/67-(N)-2 (override 79 blk); ON = 1, OFF = 0	2720	3
07	>ZSC ON	>Switch zone sequence coordination ON; ON = 1, OFF = 0	2722	3
08	>ZSC OFF	>Switch zone sequence coordination OFF; ON = 1, OFF = 0	2723	3
09	TRIP Gnd Fault	TRIP Ground Fault; ON = 1, OFF = 0	2869	3
10	TRIP Ph Fault	TRIP Phase Fault; ON = 1, OFF = 0	2870	3
11	ZSC active	Zone Sequencing is active; ON = 1, OFF = 0	2883	3
12	ZSC ON	Zone sequence coordination switched ON; ON = 1, OFF = 0	2884	3
13	ZSC OFF	Zone sequence coordination switched OFF; ON = 1, OFF = 0	2885	3
14	>CB Ready	>Circuit breaker READY for reclosing; ON = 1, OFF = 0	2730	3
15	79 OFF	79 Auto recloser is switched OFF; ON = 1, OFF = 0	2781	2
16	79 ON	79 Auto recloser is switched ON; ON = 1, OFF = 0	2782	2
17	CB is NOT ready	Circuit breaker is NOT ready; ON = 1, OFF = 0	2784	2
18	79 DynBlock	79 – Auto-reclose is dynamically BLOCKED; ON = 1, OFF = 0	2785	3
19	79 in progress	79 – in progress; ON = 1, OFF = 0	2801	2
20	79 Close	79 – Close command; ON = 1	2851	3
21	79 Successful	79 – cycle successful; ON = 1, OFF = 0	2862	3
22	79 Lockout	79 – Lockout; ON = 1, OFF = 0	2863	1
23	79 L-N Sequence	79-A/R single phase reclosing sequence; Program earthfault is running = 1, Program is deactivated = 0	2878	3
24	79 L-L Sequence	79-A/R multi-phase reclosing sequence; ON = 1, OFF = 0	2879	3
		Time Overcurrent protection		
25	>BLOCK 50-2	>BLOCK 50-2; ON = 1, OFF = 0	1721	3
26	>BLOCK 50-1	>BLOCK 50-1; ON = 1, OFF = 0	1722	3
27		>BLOCK 51; ON = 1, OFF = 0	1723	3

Binary Input Points				
Static (Steady-State) Object Number: 1				
Change Event Object Number: 2				
Request Function Codes supported: 1 (read)				
Static Variation reported when variation 0 requested: 1 (Binary Input with status)				
Change Event Variation reported when variation 0 requested: 2 (Binary Input Change with Time)				
Point Index	Name	Description	Int. Object No.	Class
	>BLOCK 51			
28	>BLOCK 50N-2	>BLOCK 50N-2; ON = 1, OFF = 0	1724	3
29	>BLOCK 50N-1	>BLOCK 50N-1; ON = 1, OFF = 0	1725	3
30	>BLOCK 51N	>BLOCK 51N; ON = 1, OFF = 0	1726	3
31	>BLK CLP stpTim	>BLOCK Cold-Load-Pickup stop timer; ON = 1, OFF = 0	1731	3
32	50/51 PH OFF	O/C switched OFF; ON = 1, OFF = 0	1751	3
33	50/51 PH BLK	O/C is BLOCKED; ON = 1, OFF = 0	1752	3
34	50/51 PH ACT	50/51 O/C is ACTIVE; ON = 1, OFF = 0	1753	3
35	50N/51N OFF	50N/51N is OFF; ON = 1, OFF = 0	1756	3
36	50N/51N BLK	50N/51N BLK; ON = 1, OFF = 0	1757	3
37	50N/51N ACT	50N/51N is ACTIVE; ON = 1, OFF = 0	1758	3
38	50 (N) / 51 (N) PU	50(N)/51(N) O/C PICKUP; ON = 1, OFF = 0	1761	2
39	50/51 Ph A PU	50/51 Phase A picked up; ON = 1, OFF = 0	1762	2
40	50/51 Ph B PU	50/51 Phase B picked up; ON = 1, OFF = 0	1763	2
41	50/51 Ph C PU	50/51 Phase C picked up; ON = 1, OFF = 0	1764	2
42	50N/51NPickedup	50N/51N picked up; ON = 1, OFF = 0	1765	2
43	50 (N)/51(N)TRIP	50(N)/51(N) TRIP; ON = 1	1791	2
44	50-1 TRIP	50-1 TRIP; ON = 1	1815	2
45	50-2 TRIP	50-2 TRIP; ON = 1	1805	2
46	50N-1 TRIP	50N-1 TRIP; ON = 1	1836	2
47	50N-2 TRIP	50N-2 TRIP; ON = 1	1833	2
48	50-2 Time Out	50-2 Time Out; ON = 1	1804	3
49	50-1 Time Out	50-1 Time Out; ON = 1	1814	3
50	51 Time Out	51 Time Out; ON = 1	1824	3
51	51 TRIP	51 TRIP; ON = 1, OFF = 0	1825	2
52	50N-2 picked up	50N-2 picked up; ON = 1, OFF = 0	1831	3
53	50N-2 TimeOut	50N-2 Time Out; ON = 1	1832	3
54	50N-1 picked up	50N-1 picked up; ON = 1, OFF = 0	1834	3
55	50N-1 TimeOut	50N-1 Time Out; ON = 1	1835	3
56	51N picked up	51N picked up; ON = 1, OFF = 0	1837	3
57	51N TimeOut	51N Time Out; ON = 1	1838	3
58	51N TRIP	51N TRIP; ON = 1, OFF = 0	1839	3
59	50-2 picked up	50-2 picked up; ON = 1, OFF = 0	1800	3

Binary Input Points				
Static (Steady-State) Object Number: 1				
Change Event Object Number: 2				
Request Function Codes supported: 1 (read)				
Static Variation reported when variation 0 requested: 1 (Binary Input with status)				
Change Event Variation reported when variation 0 requested: 2 (Binary Input Change with Time)				
Point Index	Name	Description	Int. Object No.	Class
60	50-1 picked up	50-1 picked up; ON = 1, OFF = 0	1810	3
61	51 picked up	51 picked up; ON = 1, OFF = 0	1820	3
62	CLP OFF	Cold-Load-Pickup switched OFF; ON = 1, OFF = 0	1994	3
63	CLP BLOCKED	Cold-Load-Pickup is BLOCKED; Blocked = 1, Unblocked = 0	1995	3
64	CLP running	Cold-Load-Pickup is RUNNING; ON = 1, OFF = 0	1996	3
65	Dyn set. ACTIVE	Dynamic settings are ACTIVE; ON = 1, OFF = 0	1997	3
		InRush Function		
66	PhA InrushBlk	Phase A trip blocked by inrush detection; ON = 1, OFF = 0	1840	3
67	PhB InrushBlk	Phase B trip blocked by inrush detection; ON = 1, OFF = 0	1841	3
68	PhC InrushBlk	Phase C trip blocked by inrush detection; ON = 1, OFF = 0	1842	3
69	INRUSH X-BLK	Cross blk: PhX blocked Phy; ON = 1, OFF = 0	1843	3
70	50-1 InRushPU	50-1 InRush picked up; ON = 1, OFF = 0	7551	3
71	50N-1 InRushPU	50N-1 InRush picked up; ON = 1, OFF = 0	7552	3
72	51 InRushPU	51 InRush picked up; ON = 1, OFF = 0	7553	3
73	51N InRushPU	51N InRush picked up; ON = 1, OFF = 0	7554	3
74	67-1 InRushPU	67-1 InRush picked up; ON = 1, OFF = 0	7559	3
75	67N-1 InRushPU	67N-1 InRush picked up; ON = 1, OFF = 0	7560	3
76	67-TOC InRushPU	67-TOC InRush picked up; ON = 1, OFF = 0	7561	3
77	67N-TOC InRushPU	67N-TOC InRush picked up; ON = 1, OFF = 0	7562	3
78	Gnd InRush PU	Ground InRush picked up; ON = 1, OFF = 0	7564	3
79	Ia InRush PU	Phase A InRush picked up; ON = 1, OFF = 0	7565	3
80	Ib InRush PU	Phase B InRush picked up; ON = 1, OFF = 0	7566	3
81	Ic InRush PU	Phase C InRush picked up; ON = 1, OFF = 0	7567	3
82	InRush OFF	InRush OFF; ON = 1, OFF = 0	7556	3
83	InRushPhBLOCKED	InRush Phase BLOCKED; ON = 1, OFF = 0	7557	3
84	InRush Gnd BLK	InRush Ground BLOCKED; ON = 1, OFF = 0	7558	3
		Directional time overcurrent protection		
85	>BLOCK 67-1	>BLOCK 67-1; ON = 1, OFF = 0	2621	3
86	>BLOCK 67-TOC	>BLOCK 67-TOC; ON = 1, OFF = 0	2622	3
87	>BLOCK 67N-1	>BLOCK 67N-1; ON = 1, OFF = 0	2623	3

Binary Input Points				
Static (Steady-State) Object Number: 1				
Change Event Object Number: 2				
Request Function Codes supported: 1 (read)				
Static Variation reported when variation 0 requested: 1 (Binary Input with status)				
Change Event Variation reported when variation 0 requested: 2 (Binary Input Change with Time)				
Point Index	Name	Description	Int. Object No.	Class
88	>BLOCK 67N-TOC	>BLOCK 67N-TOC; ON = 1, OFF = 0	2624	3
89	67/67-TOC OFF	67/67-TOC switched OFF; ON = 1, OFF = 0	2651	3
90	67 BLOCKED	67/67-TOC is BLOCKED; blocked = 1, unblocked = 0	2652	3
91	67 ACTIVE	67/67-TOC is ACTIVE; activate = 1, deactivate = 0	2653	3
92	67N OFF	67N/67N-TOC switched OFF; ON = 1, OFF = 0	2656	3
93	67N BLOCKED	67N/67N-TOC is BLOCKED; blocked = 1, unblocked = 0	2657	3
94	67N ACTIVE	67N/67N-TOC is ACTIVE; activate = 1, deactivate = 0	2658	3
95	67-1 picked up	67-1 picked up; ON = 1, OFF = 0	2660	3
96	67-1 Time Out	67-1 Time Out; ON = 1, OFF = 0	2664	3
97	67-1 TRIP	67-1 TRIP; ON = 1, OFF = 0	2665	3
98	67-TOC pickedup	67-TOC picked up; ON = 1, OFF = 0	2670	3
99	67-TOC Time Out	67-TOC Time Out; ON = 1, OFF = 0	2674	3
100	67-TOC TRIP	67-TOC TRIP; ON = 1, OFF = 0	2675	2
101	67N-1 picked up	67N-1 picked up; ON = 1, OFF = 0	2681	3
102	67N-1 Time Out	67N-1 Time Out; ON = 1, OFF = 0	2682	3
103	67N-1 TRIP	67N-1 TRIP; ON = 1, OFF = 0	2683	2
104	67N-TOC Pickedup	67N-TOC picked up; ON = 1, OFF = 0	2684	2
105	67N-TOC TimeOut	67N-TOC Time Out; ON = 1, OFF = 0	2685	2
106	67N-TOC TRIP	67N-TOC TRIP; ON = 1, OFF = 0	2686	2
107	67/67N pickedup	67/67N picked up; ON = 1, OFF = 0	2691	2
108	67 A picked up	67/67-TOC Phase A picked up; ON = 1, OFF = 0	2692	2
109	67 B picked up	67/67-TOC Phase B picked up; ON = 1, OFF = 0	2693	2
110	67 C picked up	67/67-TOC Phase C picked up; ON = 1, OFF = 0	2694	2
111	67N picked up	67N/67N-TOC picked up; ON = 1, OFF = 0	2695	2
112	67/67N TRIP	67/67N TRIP; ON = 1, OFF = 0	2696	2
113	67N-2 picked up	67N-2 picked up; ON = 1, OFF = 0	2646	3
114	67N-2 Time Out	67N-2 Time Out; ON = 1, OFF = 0	2648	3
115	67N-2 TRIP	67N-2 TRIP; ON = 1, OFF = 0	2679	2
116	67-2 picked up	67-2 picked up; ON = 1, OFF = 0	2642	3
117	67-2 Time Out	67-2 Time Out; ON = 1, OFF = 0	2647	3
118	67-2 TRIP	67-2 TRIP; ON = 1, OFF = 0	2649	2

Binary Input Points				
Static (Steady-State) Object Number: 1				
Change Event Object Number: 2				
Request Function Codes supported: 1 (read)				
Static Variation reported when variation 0 requested: 1 (Binary Input with status)				
Change Event Variation reported when variation 0 requested: 2 (Binary Input Change with Time)				
Point Index	Name	Description	Int. Object No.	Class
119	>BLOCK 67-2	>BLOCK 67-2; ON = 1, OFF = 0	2615	3
120	>BLOCK 67N-2	>BLOCK 67N-2; ON = 1, OFF = 0	2616	3
121	Phase A forward	Phase A forward; ON = 1, OFF = 0	2628	3
122	Phase B forward	Phase B forward; ON = 1, OFF = 0	2629	3
123	Phase C forward	Phase C forward; ON = 1, OFF = 0	2630	3
124	Phase A reverse	Phase A reverse; ON = 1, OFF = 0	2632	3
125	Phase B reverse	Phase B reverse; ON = 1, OFF = 0	2633	3
126	Phase C reverse	Phase C reverse; ON = 1, OFF = 0	2634	3
127	Ground forward	Ground forward; ON = 1, OFF = 0	2635	3
128	Ground reverse	Ground reverse; ON = 1, OFF = 0	2636	3
		Unbalanced load protection		
129	>46 BLOCK	>BLOCK 46; ON = 1, OFF = 0	5143	3
130	46 OFF	46 switched OFF; ON = 1, OFF = 0	5151	3
131	46 BLOCKED	46 is BLOCKED; ON = 1, OFF = 0	5152	3
132	46 ACTIVE	46 is ACTIVE; ON = 1, OFF = 0	5153	3
133	46-2 picked up	46-2 picked up; ON = 1, OFF = 0	5159	2
134	46-TOC pickedup	46-TOC picked up; ON = 1, OFF = 0	5166	2
135	46 TRIP	46 TRIP picked up; ON = 1, OFF = 0	5170	2
136	46-1 picked up	46-1 picked up; ON = 1, OFF = 0	5165	2
		Frequency protection		
137	>BLOCK 81O/U	>BLOCK 81O/U; ON = 1, OFF = 0	5203	3
138	>BLOCK 81-1	>BLOCK 81-1; ON = 1, OFF = 0	5206	3
139	>BLOCK 81-2	>BLOCK 81-2; ON = 1, OFF = 0	5207	3
140	>BLOCK 81-3	>BLOCK 81-3; ON = 1, OFF = 0	5208	3
141	>BLOCK 81-4	>BLOCK 81-4; ON = 1, OFF = 0	5209	3
142	81 OFF	81 OFF; ON = 1, OFF = 0	5211	3
143	81 BLOCKED	81 BLOCKED; ON = 1, OFF = 0	5212	3
144	81 ACTIVE	81 ACTIVE; ON = 1, OFF = 0	5213	3
145	81-1 picked up	81-1 picked up; ON = 1, OFF = 0	5232	2
146	81-2 picked up	81-2 picked up; ON = 1, OFF = 0	5233	2
147	81-3 picked up	81-3 picked up; ON = 1, OFF = 0	5234	2
148	81-4 picked up	81-4 picked up; ON = 1, OFF = 0	5235	2

Binary Input Points				
Static (Steady-State) Object Number: 1				
Change Event Object Number: 2				
Request Function Codes supported: 1 (read)				
Static Variation reported when variation 0 requested: 1 (Binary Input with status)				
Change Event Variation reported when variation 0 requested: 2 (Binary Input Change with Time)				
Point Index	Name	Description	Int. Object No.	Class
149	81-1 TRIP	81-1 TRIP; ON = 1, OFF = 0	5236	2
150	81-2 TRIP	81-2 TRIP; ON = 1, OFF = 0	5237	2
151	81-3 TRIP	81-3 TRIP; ON = 1, OFF = 0	5238	2
152	81-4 TRIP	81-4 TRIP; ON = 1, OFF = 0	5239	2
		Voltage protection		
153	>BLOCK 27	>BLOCK 27 undervoltage protection; ON = 1, OFF = 0	6503	3
154	>27 I SUPRVSN	>27-Switch current supervision ON; ON = 1, OFF = 0	6505	3
155	>BLOCK 27-1	>BLOCK 27-1 undervoltage protection; ON = 1, OFF = 0	6506	3
156	>BLOCK 27-2	>BLOCK 27-2 undervoltage protection; ON = 1, OFF = 0	6508	3
157	>FAIL: FEEDER VT	>Failure: Feeder VT; ON = 1, OFF = 0	6509	3
158	>FAIL: BUS VT	>Failure: Busbar VT; ON = 1, OFF = 0	6510	3
159	>BLCOK 59-1	>BLOCK 59-1 overvoltage protection; ON = 1, OFF = 0	6513	3
160	>59 I SUPRVSN	>59 Switch current supervision ON; ON = 1, OFF = 0	6515	3
161	27 OFF	27 Undervoltage protection switched OFF; ON = 1, OFF = 0	6530	3
162	27 BLOCKED	27 Undervoltage protection is BLOCKED; ON = 1, OFF = 0	6531	3
163	27 ACTIVE	27 Undervoltage protection is ACTIVE; ON = 1, OFF = 0	6532	3
164	27-1 picked up	27-1 Undervoltage picked up; ON = 1, OFF = 0	6533	2
165	27-1 PU CS	27-1 Undervoltage PICKUP w/curr. superv; ON = 1, OFF = 0	6534	3
166	27-2 picked up	27-2 Undervoltage picked up; ON = 1, OFF = 0	6537	2
167	27-2 PU CS	27-2 Undervoltage PICKUP w/curr. superv; ON = 1, OFF = 0	6538	2
168	27-1 TRIP	27-1 Undervoltage TRIP; ON = 1, OFF = 0	6539	2
169	27-2 TRIP	27-2 Undervoltage TRIP; ON = 1, OFF = 0	6540	2
170	59 OFF	59-Overvoltage protection switched OFF; ON = 1, OFF = 0	6565	3
171	59 BLOCKED	59-Overvoltage protection is BLOCKED; ON = 1, OFF = 0	6566	3
172	59 ACTIVE	59-Overvoltage protection is ACTIVE; ON = 1, OFF = 0	6567	3
173	59-1 picked up	59 picked up; ON = 1, OFF = 0	6568	2
174	59-1 PU CS	59 picked up w/curr. supervision; ON = 1, OFF = 0	6569	3
175	59-1 TRIP	59 TRIP; ON = 1, OFF = 0	6570	2
		Command Mode Information		
176	Control auth	Control authority; 0=Remote; 1=Local (Activated for devices 7SJ63/6MD63 only)		1
177	ModeLOCAL	Mode Local; 0=lokal operation with interlocking; 1=lokal		1

Binary Input Points				
Static (Steady-State) Object Number: 1				
Change Event Object Number: 2				
Request Function Codes supported: 1 (read)				
Static Variation reported when variation 0 requested: 1 (Binary Input with status)				
Change Event Variation reported when variation 0 requested: 2 (Binary Input Change with Time)				
Point Index	Name	Description	Int. Object No.	Class
		operation without interlocking; (Activated for devices 7SJ63/6MD63 only)		
178	ModeREMOTE	Mode remote; 0=remote operation with interlocking; 1=remote operation without interlocking (s. additional description in control relay output blocks)		1
179	Control auth	Control authority; 0=Remote; 1=Local (Activated for devices 7SJ61/7SJ62 only)		1
180	ModeLOCAL	Mode Local; 0=lokal operation with interlocking; 1=lokal operation without interlocking; (Activated for devices 7SJ61/7SJ62 only)		1
		Internal Mode Status		
181	>No volt	No Volt; ON = 1, OFF = 0		1
182	>Time Synch	>Synchronize Internal Real Time Clock; ON = 1,	3	3
183	>Trig. Wave.Cap.	>Trigger Waveform Capture; ON = 1, OFF = 0	4	3
184	>Reset LED's	>Reset LED's; ON = 1	5	3
185	>Set Group Bit0	>Setting Group Select Bit 0	7	3
186	>Set Group Bit1	>Setting Group Select Bit 1	8	3
187	>Test mode	>Test mode; ON = 1, OFF = 0		3
188	>DataStop	>Data stop; ON = 1, OFF = 0; The data stop functionality is not active via the DNP-Interface.		3
189	Relay OK	Relay OK; ON = 1, OFF = 0	51	1
190	Initial Start	Initial Start of the Relay; ON = 1	56	3
191	Running	Setting calculation is running; ON = 1, OFF = 0	70	3
192	Event Lost	Event lost; ON = 1	110	3
193	Flag Lost	Flag lost; ON = 1, OFF = 0	113	3
194	Error Sum Alarm	Error with a summary alarm; ON = 1, OFF = 0 This summary alarm is set on ON, if one of the following internal (not available via DNP-interface) events was set to "ON" before: 7SJ61/7SJ62 - I/O-Board error 7SJ63/6MD63 - I/O-Board error (in general) - I/O-Board 1 error - I/O-Board 2 error - I/O-Board 3 error - I/O-Board 4 error - I/O-Board 5 error - I/O-Board 6 error - I/O-Board 7 error Additional for 7SJ631, 7SJ632, 7SJ633, 7SJ635, 7SJ636, 6MD63xx except	140	2

Binary Input Points				
Static (Steady-State) Object Number: 1				
Change Event Object Number: 2				
Request Function Codes supported: 1 (read)				
Static Variation reported when variation 0 requested: 1 (Binary Input with status)				
Change Event Variation reported when variation 0 requested: 2 (Binary Input Change with Time)				
Point Index	Name	Description	Int. Object No.	Class
		6MD63x0 - Error Power supply +5 V - Error Offset monitoring 0V - Error Power supply -5 V		
195	Alarm Sum Event	Alarm Summary Event; ON = 1, OFF = 0 This summary event is set on ON, if one of the following events was set to "ON" before: - Failure \19I - Failure I balance - Failure V balance - Fail Ph. Seq. I - Fail Ph. Seq. V	160	2
196	I Supervision	Failure: Current balance Supervision; ON = 1, OFF = 0	161	3
197	Failure \19I	Failure: Current Summation; ON = 1, OFF = 0	162	1
198	Failure I balance	Failure: Current Balance; ON = 1, OFF = 0	163	1
199	Failure V balance	Failure: Voltage Balance; ON = 1, OFF = 0	167	1
200	Fail Ph. Seq.	Failure: Phase Sequence; ON = 1, OFF = 0	171	3
201	Fail Ph. Seq. I	Failure: Phase Sequence Current; ON = 1, OFF = 0	175	3
202	Fail Ph. Seq. V	Failure: Phase Sequence Voltage; ON = 1, OFF = 0	176	3
203	Wave. deleted	Waveform data deleted; ON = 1	203	3
204	SP. Op Hours>	Setpoint Operation Hours; ON = 1, OFF = 0	272	1
205	SP. I A dmd	Set Point Phase A dmd>; ON = 1, OFF = 0	273	1
206	SP. I B dmd	Set Point Phase B dmd>; ON = 1, OFF = 0	274	1
207	SP. I C dmd	Set Point Phase C dmd>; ON = 1, OFF = 0	275	1
208	SP. I1dmd>	Set Point positive sequence I1dmd>; ON = 1, OFF = 0	276	1
209	SP. Pdmd >	Set Point Pdmd >; ON = 1, OFF = 0	277	1
210	SP. Qdmd >	Set Point Qdmd >; ON = 1, OFF = 0	278	1
211	SP. Sdmd >	Set Point Sdmd >; ON = 1, OFF = 0	279	1
212	37 alarm	37 Undercurrent alarm; ON = 1, OFF = 0	284	1
213	SP. cos\1A alarm	Set point 55 Power factor alarm; ON = 1, OFF = 0	285	1
214	>Manual Close	>Manual close command; ON = 1, OFF = 0	356	2
215	Relay Pickup	Relay Pickup; ON = 1, OFF = 0	501	1
216	Relay TRIP	General TRIP of the relay; ON = 1	511	1
		Highly sensitive earth fault protection		
217	>Start Flt. Loc	>Start Fault Locator; ON = 1, OFF = 0	1106	3
218	>BLOCK 64	>BLOCK 64; ON = 1, OFF = 0	1201	3
219		>BLOCK 50Ns-2; ON = 1, OFF = 0	1202	3

Binary Input Points				
Static (Steady-State) Object Number: 1				
Change Event Object Number: 2				
Request Function Codes supported: 1 (read)				
Static Variation reported when variation 0 requested: 1 (Binary Input with status)				
Change Event Variation reported when variation 0 requested: 2 (Binary Input Change with Time)				
Point Index	Name	Description	Int. Object No.	Class
	>BLOCK 50Ns-2			
220	>BLOCK 50Ns-1	>BLOCK 50Ns-1; ON = 1, OFF = 0	1203	3
221	>BLOCK 51Ns	>BLOCK 51Ns; ON = 1, OFF = 0	1204	3
222	>BLK 50Ns/67Ns	>BLOCK 50Ns/67Ns; ON = 1, OFF = 0	1207	3
223	50Ns/67Ns OFF	50Ns/67Ns is OFF; ON = 1, OFF = 0	1211	3
224	50Ns/67Ns ACT	50Ns/67Ns is ACTIVE; ON = 1, OFF = 0	1212	3
225	64 Pickup	64 displacement voltage pick up; ON = 1, OFF = 0	1215	2
226	64 Trip	64 displacement voltage element TRIP; ON = 1, OFF = 0	1217	2
227	50Ns-2 Pickup	50Ns-2 Pickup; ON = 1, OFF = 0	1221	2
228	50Ns-2 TRIP	50Ns-2 TRIP; ON = 1, OFF = 0	1223	2
229	50Ns-1 Pickup	50Ns-1 Pickup; ON = 1, OFF = 0	1224	2
230	50Ns-1 TRIP	50Ns-1 TRIP; ON = 1, OFF = 0	1226	2
231	51Ns Pickup	51Ns Pickup; ON = 1, OFF = 0	1227	2
232	51Ns TRIP	51Ns TRIP; ON = 1, OFF = 0	1229	2
233	Sens. Gnd block	Sensitive ground fault detection BLOCKED; ON = 1, OFF = 0	1230	3
234	Sens. Gnd Pickup	Sensitive ground fault pick up; ON = 1, OFF = 0	1271	2
235	SensGnd undef.	Sensitive Gnd fault direction undefined; ON = 1, OFF = 0	1278	3
236	Sens. Gnd Ph A	Sensitive Ground fault picked up in Ph A; ON = 1, OFF = 0	1272	2
237	Sens. Gnd Ph B	Sensitive Ground fault picked up in Ph B; ON = 1, OFF = 0	1273	2
238	Sens. Gnd Ph C	Sensitive Ground fault picked up in Ph C; ON = 1, OFF = 0	1274	2
239	SensGnd Forward	Sensitive Gnd fault in forward direction; ON = 1, OFF = 0	1276	2
240	SensGnd Reverse	Sensitive Gnd fault in reverse direction; ON = 1, OFF = 0	1277	2
		Circuit breaker failure protection		
241	>BLOCK 50BF	BLOCK 50BF; ON = 1, OFF = 0	1403	3
242	>50BF ext SRC	50BF initiated externally; ON = 1, OFF = 0	1431	3
243	50BF OFF	50BF is switched OFF; ON = 1, OFF = 0	1451	3
244	50BF BLOCK	50BF is BLOCKED; ON = 1, OFF = 0	1452	3
245	50BF ACTIVE	50BF is ACTIVE; ON = 1, OFF = 0	1453	3
246	50BF int Pickup	50BF (internal) PICKUP; ON = 1, OFF = 0	1456	2
247	50BF ext Pickup	50BF (external) PICKUP; ON = 1, OFF = 0	1457	2
248	50BF TRIP	50BF TRIP; ON = 1	1471	2
249	50BF int TRIP	50BF (internal) TRIP; ON = 1, OFF = 0	1480	2
250	50BF ext TRIP	50BF (external) TRIP; ON = 1, OFF = 0	1481	2

Binary Input Points				
Static (Steady-State) Object Number: 1				
Change Event Object Number: 2				
Request Function Codes supported: 1 (read)				
Static Variation reported when variation 0 requested: 1 (Binary Input with status)				
Change Event Variation reported when variation 0 requested: 2 (Binary Input Change with Time)				
Point Index	Name	Description	Int. Object No.	Class
Thermal overload protection				
251	>49 O/L BLOCK	>BLOCK 49 Overload Protection; ON = 1, OFF = 0	1503	3
252	>EmergencyStart	>Emergency start of motors; ON = 1, OFF = 0	1507	3
253	49 O / L OFF	49 Overload Protection is OFF; ON = 1, OFF = 0	1511	3
254	49 O/L BLOCK	49 Overload Protection is BLOCKED; ON = 1, OFF = 0	1512	3
255	49 O/L ACTIVE	49 Overload Protection is ACTIVE; ON = 1, OFF = 0	1513	3
256	49 O/L I Alarm	Overload Current Alarm (I alarm); ON = 1, OFF = 0	1515	1
257	49 O/L \16 Alarm	49 Overload Alarm! Near Thermal Trip; ON = 1, OFF = 0	1516	1
258	49 Windings O/L	49 Winding Overload; ON = 1, OFF = 0	1517	3
259	49 Th O/L TRIP	49 Thermal Overload TRIP; ON = 1, OFF = 0	1521	2
Monitor start protection				
260	>66 emer. start	>Emergency start; ON = 1, OFF = 0	4823	3
261	66 OFF	66 Motor start protection OFF; ON = 1, OFF = 0	4824	3
262	66 BLOCKED	66 Motor start protection BLOCKED; ON = 1, OFF = 0	4825	3
263	66 ACTIVE	66 Motor start protection ACTIVE; ON = 1, OFF = 0	4826	3
264	66 TRIP	66 Motor start protection TRIP; ON = 1, OFF = 0	4827	2
Start-up supervision				
265	START-SUP OFF	Startup supervision is OFF; ON = 1, OFF = 0	6811	3
266	START-SUP BLK	Startup supervision is BLOCKED; ON = 1, OFF = 0	6812	3
267	START-SUP ACT	Startup supervision is ACTIVE; ON = 1, OFF = 0	6813	3
268	START-SUP TRIP	Startup supervision TRIP; ON = 1, OFF = 0	6821	2
269	Rotor locked	Rotor locked; ON = 1, OFF = 0	6822	1
270	START-SUP pu	Startup supervision Pickup; ON = 1, OFF = 0	6823	2
Trip coil monitor				
271	74TC BLOCKED	74TC Trip circuit supervision is BLOCKED; ON = 1, OFF = 0	6862	3
272	74TC ACTIVE	74TC Trip circuit supervision is ACTIVE; ON = 1, OFF = 0	6863	3
273	>74TC trip rel.	>74TC Trip circuit superv.: trip relay; ON = 1, OFF = 0	6852	3
274	>74TC brk rel.	>74TC Trip circuit superv.: bkr relay; ON = 1, OFF = 0	6853	3
275	74TC OFF	74TC Trip circuit supervision OFF; ON = 1, OFF = 0	6861	3
276	74 ProgFail	74TC blocked. Bin. input is not set; ON = 1, OFF = 0	6864	3
277	FAIL: Trip cir.	74TCFailure Trip Circuit; ON = 1, OFF = 0	6865	1

Binary Input Points				
Static (Steady-State) Object Number: 1				
Change Event Object Number: 2				
Request Function Codes supported: 1 (read)				
Static Variation reported when variation 0 requested: 1 (Binary Input with status)				
Change Event Variation reported when variation 0 requested: 2 (Binary Input Change with Time)				
Point Index	Name	Description	Int. Object No.	Class
		Extension		
278	>Door open	>Door open; ON = 1, OFF = 0		3
279	>CB wait	>Circuit breaker wait; ON = 1, OFF = 0		3
		Control switches return position indication(double point commands)		
280	52 Breaker	input state of switch breaker; 0=open, 1=close	1	1
281	52 Breaker status	switch breaker failure status; 0=switch breaker position is open or close, 1= switch breaker is in an intermediate position or position state is incorrect.		1
282	Disconnect switch	input state of disconnect switch; 0=open, 1=close	2	1
283	Disconnect switch status	disconnect switch failure status; 0= disconnect switch position is open or close, 1= disconnect switch is in an intermediate position or position state is incorrect.		1
284	Gnd switch	input state of ground switch; 0=open, 1=close	3	1
285	Gnd switch status	ground switch failure status; 0= ground switch position is open or close, 1= ground switch is in an intermediate position or position state is incorrect.		1
286	Switch 1	input state of switch 1; 0=open, 1=close		1
287	switch 1 status	switch 1 failure status; 0= switch 1 position is open or close, 1= switch 1 is in an intermediate position or position state is incorrect.		1
288	Switch 2	input state of switch 2; 0=open, 1=close		1
289	switch 2 status	switch 2 failure status; 0= switch 2 position is open or close, 1= switch 2 is in an intermediate position or position state is incorrect.		1
290	Switch 3	input state of switch 3; 0=open, 1=close		1
291	switch 3 status	switch 3 failure status; 0= switch 3 position is open or close, 1= switch 3 is in an intermediate position or position state is incorrect.		1
292	Switch 4	input state of switch 4; 0=open, 1=close		1
293	switch 4 status	switch 4 failure status; 0= switch 4 position is open or close, 1= switch 4 is in an intermediate position or position state is incorrect.		1
294	Switch 5	input state of switch 5; 0=open, 1=close		1
295	switch 5 status	switch 5 failure status; 0= switch 5 position is open or close, 1= switch 5 is in an intermediate position or position state is incorrect.		1
296	Switch 6	input state of switch 6; 0=open, 1=close		1
297	switch 6 status	switch 6 failure status; 0= switch 6 position is open or close, 1= switch 6 is in an intermediate position or position state is incorrect.		1
		Internal controls		
298	auto-recl.ac.			1
299	protection act.	Protection activation	126	1

Binary Input Points				
Static (Steady-State) Object Number: 1				
Change Event Object Number: 2				
Request Function Codes supported: 1 (read)				
Static Variation reported when variation 0 requested: 1 (Binary Input with status)				
Change Event Variation reported when variation 0 requested: 2 (Binary Input Change with Time)				
Point Index	Name	Description	Int. Object No.	Class
300	Group A	Protection Parameter Group A; 0 = Group A is deactivated, 1= Group A is activated and Group B,C,D are deactivated.	53	1
301	Group B	Protection Parameter Group B; 0 = Group B is deactivated, 1= Group B is activated and Group A,C,D are deactivated.	54	1
302	Group C	Protection Parameter Group C; 0 = Group C is deactivated, 1= Group C is activated and Group A,B,D are deactivated.	55	1
303	Group D	Protection Parameter Group D; 0 = Group D is deactivated, 1= Group D is activated and Group A,B,C are deactivated.	56	1
		Output channels return position indication (Single point commands)		
304	>switch 1	0 = Open (off), 1= Close (on)		1
305	>switch 2	0 = Open (off), 1= Close (on)		1
306	>switch 3	0 = Open (off), 1= Close (on)		1
307	>switch 4	0 = Open (off), 1= Close (on)		1
308	>switch 5	0 = Open (off), 1= Close (on)		1
309	>switch 6	0 = Open (off), 1= Close (on)		1
310	>switch 7	0 = Open (off), 1= Close (on)		1
311	>switch 8	0 = Open (off), 1= Close (on)		1
312	>switch 9	0 = Open (off), 1= Close (on)		1
313	>switch 10	0 = Open (off), 1= Close (on)		1
314	>switch 11	0 = Open (off), 1= Close (on)		1
315	>switch 12	0 = Open (off), 1= Close (on)		1
316	>switch 13	0 = Open (off), 1= Close (on)		1
317	>switch 14	0 = Open (off), 1= Close (on)		1
318	>switch 15	0 = Open (off), 1= Close (on)		1
319	>switch 16	0 = Open (off), 1= Close (on)		1
320	>switch 17	0 = Open (off), 1= Close (on)		1
321	>switch 18	0 = Open (off), 1= Close (on)		1
322	>switch 19	0 = Open (off), 1= Close (on)		1
323	>switch 20	0 = Open (off), 1= Close (on)		1
324	>switch 21	0 = Open (off), 1= Close (on)		1
325	>switch 22	0 = Open (off), 1= Close (on)		1
		Input channels		
326	>Input channel 1	User defined binary input; ON = 1, OFF = 0		1
327	>Input channel 2	User defined binary input; ON = 1, OFF = 0		1
328	>Input channel 3	User defined binary input; ON = 1, OFF = 0		1
329	>Input channel 4	User defined binary input; ON = 1, OFF = 0		1
330	>Input channel 5	User defined binary input; ON = 1, OFF = 0		1
331	>Input channel 6	User defined binary input; ON = 1, OFF = 0		1

Binary Input Points				
Static (Steady-State) Object Number: 1				
Change Event Object Number: 2				
Request Function Codes supported: 1 (read)				
Static Variation reported when variation 0 requested: 1 (Binary Input with status)				
Change Event Variation reported when variation 0 requested: 2 (Binary Input Change with Time)				
Point Index	Name	Description	Int. Object No.	Class
332	>Input channel 7	User defined binary input; ON = 1, OFF = 0		1
333	>Input channel 8	User defined binary input; ON = 1, OFF = 0		1
334	>Input channel 9	User defined binary input; ON = 1, OFF = 0		1
335	>Input channel 10	User defined binary input; ON = 1, OFF = 0		1
336	>Input channel 11	User defined binary input; ON = 1, OFF = 0		1
337	>Input channel 12	User defined binary input; ON = 1, OFF = 0		1
338	>Input channel 13	User defined binary input; ON = 1, OFF = 0		1
339	>Input channel 14	User defined binary input; ON = 1, OFF = 0		1
340	>Input channel 15	User defined binary input; ON = 1, OFF = 0		1
341	>Input channel 16	User defined binary input; ON = 1, OFF = 0		1
342	>Input channel 17	User defined binary input; ON = 1, OFF = 0		1
343	>Input channel 18	User defined binary input; ON = 1, OFF = 0		1
344	>Input channel 19	User defined binary input; ON = 1, OFF = 0		1
345	>Input channel 20	User defined binary input; ON = 1, OFF = 0		1
346	>Input channel 21	User defined binary input; ON = 1, OFF = 0		1
347	>Input channel 22	User defined binary input; ON = 1, OFF = 0		1
348	>Input channel 23	User defined binary input; ON = 1, OFF = 0		1
349	>Input channel 24	User defined binary input; ON = 1, OFF = 0		1
350	>Input channel 25	User defined binary input; ON = 1, OFF = 0		1
351	>Input channel 26	User defined binary input; ON = 1, OFF = 0		1
352	>Input channel 27	User defined binary input; ON = 1, OFF = 0		1
353	>Input channel 28	User defined binary input; ON = 1, OFF = 0		1
354	>Input channel 29	User defined binary input; ON = 1, OFF = 0		1
355	>Input channel 30	User defined binary input; ON = 1, OFF = 0		1

Binary Input Points				
Static (Steady-State) Object Number: 1				
Change Event Object Number: 2				
Request Function Codes supported: 1 (read)				
Static Variation reported when variation 0 requested: 1 (Binary Input with status)				
Change Event Variation reported when variation 0 requested: 2 (Binary Input Change with Time)				
Point Index	Name	Description	Int. Object No.	Class
356	>Input channel 31	User defined binary input; ON = 1, OFF = 0		1
357	>Input channel 32	User defined binary input; ON = 1, OFF = 0		1
358	>Input channel 33	User defined binary input; ON = 1, OFF = 0		1
359	>Input channel 34	User defined binary input; ON = 1, OFF = 0		1
360	>Input channel 35	User defined binary input; ON = 1, OFF = 0		1
361	>Input channel 36	User defined binary input; ON = 1, OFF = 0		1
362	>Input channel 37	User defined binary input; ON = 1, OFF = 0		1
		CFC Output		
363	User defined 1	User defined single point information; ON = 1, OFF = 0		1
364	User defined 2	User defined single point information; ON = 1, OFF = 0		1
365	User defined 3	User defined single point information; ON = 1, OFF = 0		1
366	User defined 4	User defined single point information; ON = 1, OFF = 0		1
367	User defined 5	User defined single point information; ON = 1, OFF = 0		1
368	User defined 6	User defined single point information; ON = 1, OFF = 0		1
369	User defined 7	User defined single point information; ON = 1, OFF = 0		1
370	User defined 8	User defined single point information; ON = 1, OFF = 0		1
371	User defined 9	User defined single point information; ON = 1, OFF = 0		1
372	User defined 10	User defined single point information; ON = 1, OFF = 0		1
373	User defined 11	User defined single point information; ON = 1, OFF = 0		1
374	User defined 12	User defined single point information; ON = 1, OFF = 0		1
375	User defined 13	User defined single point information; ON = 1, OFF = 0		1
376	User defined 14	User defined single point information; ON = 1, OFF = 0		1
377	User defined 15	User defined single point information; ON = 1, OFF = 0		1
378	User defined 16	User defined single point information; ON = 1, OFF = 0		1

Note:

Information points, which are marked with the sign ">" are connected directly to an Input channel.

3.4 Control Relay Output Blocks/Binary Output Status(mapping 1 and 2)

Note:

The table below describes the control relay output blocks / binary outputs for the standard mapping 1 and 2.

Point Index	Name	Description	Supported Control Relay Output Block Fields	Int. Object No.
Binary Output Status Points Object Number: 10 Request Function Codes supported: 1 (Read) Default Variation reported when variation 0 requested: 2 (Binary Output Status) Control Relay Output Blocks/Binary Output Status Object Number: 12 Request Function Codes supported: 3 (select), 4 (operate), 5 (direct operate), 6 (direct operate, no ack)				
		External commands (Double point commands)		
0	52 Breaker	Trip Breaker switch	Trip, Pulse On (On Time Fixed ¹)	1
1	52 Breaker	Close Breaker switch	Close, Pulse On (On Time Fixed ¹)	1
2	Disconnect	Trip Disconnect switch	Trip, Pulse On (On Time Fixed ¹)	2
3	Disconnect	Close Disconnect switch	Close, Pulse On (On Time Fixed ¹)	2
4	Gnd switch	Trip Ground switch	Trip, Pulse On (On Time Fixed ¹)	3
5	Gnd switch	Close Ground switch	Close, Pulse On (On Time Fixed ¹)	3
6	Switch 1	Trip switch 1	Trip, Pulse On (On Time Fixed ¹)	
7	Switch 1	Close switch 1	Close, Pulse On (On Time Fixed ¹)	
8	Switch 2	Trip switch 2	Trip, Pulse On (On Time Fixed ¹)	
9	Switch 2	Close switch 2	Close, Pulse On (On Time Fixed ¹)	
10	Switch 3	Trip switch 3	Trip, Pulse On (On Time Fixed ¹)	
11	Switch 3	Close switch 3	Close, Pulse On (On Time Fixed ¹)	
12	Switch 4	Trip switch 4	Trip, Pulse On (On Time Fixed ¹)	
13	Switch 4	Close switch 4	Close, Pulse On (On Time Fixed ¹)	
14	Switch 5	Trip switch 5	Trip, Pulse On (On Time Fixed ¹)	
15	Switch 5	Close switch 5	Close, Pulse On (On Time Fixed ¹)	
16	Switch 6	Trip switch 6	Trip, Pulse On (On Time Fixed ¹)	
17	Switch 6	Close switch 6	Close, Pulse On (On Time Fixed ¹)	

Point Index	Name	Description	Supported Control Relay Output Block Fields	Int. Object No.
Binary Output Status Points Object Number: 10 Request Function Codes supported: 1 (Read) Default Variation reported when variation 0 requested: 2 (Binary Output Status) Control Relay Output Blocks/Binary Output Status Object Number: 12 Request Function Codes supported: 3 (select), 4 (operate), 5 (direct operate), 6 (direct operate, no ack)				
Internal commands				
18	auto-recl.ac.	activation of Auto-reclosure function	Latch On, Latch Off	
19	Protection	Protection activation	Latch On, Latch Off	
20	Reset LEDs	Reset LEDs	Latch On	60
21	Group A	Select parametergroup A and deactivate parametergroup B,C,D	Latch On	
22	Group B	Select parametergroup B and deactivate parametergroup A,C,D	Latch On	
23	Group C	Select parametergroup C and deactivate parametergroup A,B,D	Latch On	
24	Group D	Select parametergroup D and deactivate parametergroup A,B,C	Latch On	
25	ModeREM OTE	Mode remote control; Latch On = the device is switch in an unlocked mode for one unlocked switching only. After that unlocked switching or after a time-out time of 5 minutes the device will be switched in the locked position automatically. If parametrized the "actual-value comparison" will be always active. If the "Control authority mode" is switched to local mode, the "Mode remote control" command latch on is without any impact.	Latch On; Latch Off	
Output channel (user defined single point output commands)				
26	Output 1	Output channel 1	Latch On, Latch Off, Pulse On	
27	Output 2	Output channel 2	Latch On, Latch Off, Pulse On	
28	Output 3	Output channel 3	Latch On, Latch Off, Pulse On	
29	Output 4	Output channel 4	Latch On, Latch Off, Pulse On	
30	Output 5	Output channel 5	Latch On, Latch Off, Pulse On	
31	Output 6	Output channel 6	Latch On, Latch Off, Pulse On	
32	Output 7	Output channel 7	Latch On, Latch Off, Pulse On	
33	Output 8	Output channel 8	Latch On, Latch Off, Pulse On	
34	Output 9	Output channel 9	Latch On, Latch Off, Pulse On	
35	Output 10	Output channel 10	Latch On, Latch Off, Pulse On	

Point Index	Name	Description	Supported Control Relay Output Block Fields	Int. Object No.
Binary Output Status Points				
Object Number: 10				
Request Function Codes supported: 1 (Read)				
Default Variation reported when variation 0 requested: 2 (Binary Output Status)				
Control Relay Output Blocks/Binary Output Status				
Object Number: 12				
Request Function Codes supported: 3 (select), 4 (operate), 5 (direct operate), 6 (direct operate, no ack)				
36	Output 11	Output channel 11	Latch On, Latch Off, Pulse On	
37	Output 12	Output channel 12	Latch On, Latch Off, Pulse On	
38	Output 13	Output channel 13	Latch On, Latch Off, Pulse On	
39	Output 14	Output channel 14	Latch On, Latch Off, Pulse On	
40	Output 15	Output channel 15	Latch On, Latch Off, Pulse On	
41	Output 16	Output channel 16	Latch On, Latch Off, Pulse On	
42	Output 17	Output channel 17	Latch On, Latch Off, Pulse On	
43	Output 18	Output channel 18	Latch On, Latch Off, Pulse On	
44	Output 19	Output channel 19	Latch On, Latch Off, Pulse On	
45	Output 20	Output channel 20	Latch On, Latch Off, Pulse On	
46	Output 21	Output channel 21	Latch On, Latch Off, Pulse On	
47	Output 22	Output channel 22	Latch On, Latch Off, Pulse On	
		CFC Input		
48	Res. 1	User defined channel 1	Latch On, Latch Off, Pulse On	
49	Res. 2	User defined channel 2	Latch On, Latch Off, Pulse On	
50	Res. 3	User defined channel 3	Latch On, Latch Off, Pulse On	
51	Res. 4	User defined channel 4	Latch On, Latch Off, Pulse On	
52	Res. 5	User defined channel 5	Latch On, Latch Off, Pulse On	
53	Res. 6	User defined channel 6	Latch On, Latch Off, Pulse On	
54	Res. 7	User defined channel 7	Latch On, Latch Off, Pulse On	
55	Res. 8	User defined channel 8	Latch On, Latch Off, Pulse On	
56	Res. 9	User defined channel 9	Latch On, Latch Off, Pulse On	
57	Res. 10	User defined channel 10	Latch On, Latch Off, Pulse On	
58	Res. 11	User defined channel 11	Latch On, Latch Off, Pulse On	

Point Index	Name	Description	Supported Control Relay Output Block Fields	Int. Object No.
59	Res. 12	User defined channel 12	Latch On, Latch Off, Pulse On	
60	Res. 13	User defined channel 13	Latch On, Latch Off, Pulse On	
61	Res. 14	User defined channel 14	Latch On, Latch Off, Pulse On	
62	Res. 15	User defined channel 15	Latch On, Latch Off, Pulse On	
63	Res. 16	User defined channel 16	Latch On, Latch Off, Pulse On	

- 1) The On-Time are fixed within the SIPROTEC-Parameter package for each command object. The Control Relay Output Block information *on-time* will be ignored

The internal commands “Auto-reclosure function and protection activation” are reserved for future implementation.

3.5 Control Relay Output Blocks/Binary Output Status(mapping 3 and 4)

Note:

The table below describes the control relay output blocks / binary outputs for the standard mapping 3 and 4.

Point Index	Name	Description	Supported Control Relay Output Block Fields	Int. Object No.
Binary Output Status Points Object Number: 10 Request Function Codes supported: 1 (Read) Default Variation reported when variation 0 requested: 2 (Binary Output Status) Control Relay Output Blocks/Binary Output Status Object Number: 12 Request Function Codes supported: 3 (select), 4 (operate), 5 (direct operate), 6 (direct operate, no ack)				
		External commands (Double point commands)		
0	52 Breaker	Trip / Close Breaker switch	Trip, Close, Pulse On (On Time Fixed ¹)	1
1		Not used		
2	Disconnect	Trip / Close Disconnect switch	Trip, Close, Pulse On (On Time Fixed ¹)	2
3		Not used		
4	Gnd switch	Trip / Close Ground switch	Trip, Close, Pulse On (On Time Fixed ¹)	3
5		Not used		
6	Switch 1	Trip / Close switch 1	Trip, Close, Pulse On (On Time Fixed ¹)	
7		Not used		
8	Switch 2	Trip / Close switch 2	Trip, Close, Pulse On (On Time Fixed ¹)	
9		Not used		
10	Switch 3	Trip / Close switch 3	Trip, Close, Pulse On (On Time Fixed ¹)	
11		Not used		
12	Switch 4	Trip / Close switch 4	Trip, Close, Pulse On (On Time Fixed ¹)	
13		Not used		
14	Switch 5	Trip / Close switch 5	Trip, Close, Pulse On (On Time Fixed ¹)	
15		Not used		
16	Switch 6	Trip / Close switch 6	Trip, Close, Pulse On (On Time Fixed ¹)	
17		Not used		

The following index points are identical chap. 3.4

3.6 Counters

Counters				
Static (Steady-State) Object Number: 20				
Change Event Object Number: 22				
Request Function Codes supported: 1 (read)				
Static Variation reported when variation 0 requested: 01 (32-Bit Counter with Flag)				
Change Event Variation reported when variation 0 requested: 01 (32-Bit Counter without Flag)				
Point Index	Name	Description	Range Value	Int. Object No.
0	+Wp	Active energy forward ²⁾	$0 \dots 2^{32} - 1$	924
1	-Wp	Active energy reverse ²⁾	$0 \dots 2^{32} - 1$	925
2	Wq inductive	Reactive energy inductive ³⁾	$0 \dots 2^{32} - 1$	928
3	Wq capacitive	Reactive energy capacitive ³⁾	$0 \dots 2^{32} - 1$	929
4	Wp pulsed	Active energy pulsed ³⁾	$0 \dots 2^{32} - 1$	888
5	Wq pulsed	Reactive energy pulsed ³⁾	$0 \dots 2^{32} - 1$	889

2) These counter values are connected to an external pulse generator..

3) These counter values are calculated from the corresponding measurements (rated values, which are changeable by DIGSI via the Address-No. 1102 and 1101).

Equation for scaling:

$$60.000 \text{ Impulses} = 1 \text{ h} \times I_{rc} \times V_{rv} \times \text{SQRT}(3)$$

Where:

H = hour

I_{rc} = Rated current;

V_{rv} = Rated Voltage;

For example:

$$h = 1$$

$$I_{rc} = 100 \text{ A};$$

$$V_{rv} = 12 \text{ kV};$$

$$60.000 \text{ Impulses} = 1 \text{ h} \times 100 \text{ A} \times 12 \text{ kV} \times \text{SQRT}(3) = 2078.46 \text{ kWh}$$

3.7 Analog Inputs

Note:

For each measured value in the table below show in the column "Scaling" the scaling values defined in standard mappings 1 to 4, e.g. (for "Va ="):

- 1: 32.767 kV - applies to standard mapping 1
- 2: 327.67 kV - applies to standard mapping 2
- 3: 32.767 kV - applies to standard mapping 3
- 4: 327.67 kV - applies to standard mapping 4

Analog Inputs						
Static (Steady-State) Object Number: 30						
Change Event Object Number: 32						
Request Function Codes supported: 1 (read)						
Static Variation reported when variation 0 requested: 02 (16-Bit Analog Input)						
Change Event Variation reported when variation 0 requested: 02 (Analog Change Event without Time)						
Point Index	Name	Description	Scaling and Units (representation of - 32767 to +32767)	Valid Range	Default Change Event Assigned Class	Int. Obj. No.
0	Ia	Current phase a	3276.7 A	$4 * Irc(Ia)$ ⁴⁾	1	601
1	Ib	Current phase b	3276.7 A	$4 * Irc(Ib)$ ⁴⁾	1	602
2	Ic	Current phase c	3276.7 A	$4 * Irc(Ic)$ ⁴⁾	1	603
3	I0	Current I0	3276.7 A	$4 * Irc(I0)$ ⁴⁾	1	604
4	Va	Voltage phase a	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	$1.93 * Vrv(Va)$ ⁵⁾	1	621
5	Vb	Voltage phase b	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	$1.93 * Vrv(Vb)$ ⁵⁾	1	622
6	Vc	Voltage phase c	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	$1.93 * Vrv(Vc)$ ⁵⁾	1	623
7	Va-b	Voltage phase a to phase b	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	$1.93 * Vrv(Va-b)$ ⁵⁾	1	624
8	Vb-c	Voltage phase b to phase c	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	$1.93 * Vrv(Vb-c)$ ⁵⁾	1	625
9	Vc-a	Voltage phase c to phase a	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	$1.93 * Vrv(Vc-a)$ ⁵⁾	1	626
10	V	Voltage Ground	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	$1.93 * Vrv(V...)$ ⁵⁾	1	627
11	P	Active power	1: 32767 kW 2: 327.67 MW 3: 32767 kW 4: 327.67 MW	$(4*Irc)*$ $(1.93*Vcv) *$ $\cos <phi>$	1	641
12	Q	Reactive power	1: 32767 kVar	$(4*Irc)*$	1	642

Analog Inputs						
Static (Steady-State) Object Number: 30						
Change Event Object Number: 32						
Request Function Codes supported: 1 (read)						
Static Variation reported when variation 0 requested: 02 (16-Bit Analog Input)						
Change Event Variation reported when variation 0 requested: 02 (Analog Change Event without Time)						
Point Index	Name	Description	Scaling and Units (representation of - 32767 to +32767)	Valid Range	Default Change Event Assigned Class	Int. Obj. No.
			2: 327.67 MVar 3: 327.67 kVar 4: 327.67 MVar	$(1.93 * V_{cv}) * \sin \langle \phi \rangle$		
13	S	Apparent power	1: 327.67 kVar 2: 327.67 MVar 3: 327.67 kVar 4: 327.67 MVar	$(4 * I_{rc}) * (1.93 * V_{cv})$	1	645
14	Freq	frequency	327.67 Hz	55Hz – 65Hz (45Hz – 55Hz)	1	644
15	cos $\langle \phi \rangle$	power factor	3.2767	-1 to +1	1	901
16	lee real	earth fault current active	3276.7 A	$1.6 * I_{rc}$ or $4 * I_{rc}$ ⁶⁾	1	701
17	IEE reactive	earth fault current reactive	3276.7 A	$1.6 * I_{rc}$ or $4 * I_{rc}$ ⁶⁾	1	702
18	I1 =	Positive sequence current	3276.7 A	$4 * I_{rc}(I_0)$ ⁴⁾	2	605
19	I2 =	Negative sequence current	3276.7 A	$4 * I_{rc}(I_0)$ ⁴⁾	2	606
20	3I0=	Zero sequence current	3276.7 A	$4 * I_{rc}(I_0)$ ⁴⁾	2	831
21	V1 =	Positive sequence voltage	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	$1.93 * V_{rv}(V_a)$ ⁵⁾	2	629
22	V2 =	Negative sequence voltage	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	$1.93 * V_{rv}(V_a)$ ⁵⁾	2	630
23	3V0	Zero sequence voltage	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	$1.93 * V_{rv}(V_a)$ ⁵⁾	2	832
24	I1dmd	Positive sequence Demand	3276.7 A	$4 * I_{rc}(I_a)$ ⁴⁾	2	833
25	$\langle \Theta \rangle$ Rotor	Temperature of Rotor	3276.7 %	400 %	2	805
26	$\langle \Theta \rangle$ Stator	Temperature of Stator	3276.7 %	400%	2	806
27	Td1	Transducer 1=	32.767 mA		2	996
28	Td2	Transducer 1=	32.767 mA		2	997
29	Ia dmd	Phase A demand	3276.7 A	$4 * I_{rc}(I_a)$ ⁴⁾	2	963
30	Ib dmd	Phase B demand	3276.7 A	$4 * I_{rc}(I_a)$ ⁴⁾	2	964
31	Ic dmd	Phase C demand	3276.7 A	$4 * I_{rc}(I_a)$ ⁴⁾	2	965
32	Pdmd=	Real Power Demand	1: 327.67 kW 2: 327.67 MW 3: 327.67 kW 4: 327.67 MW	$(4 * I_{rc}) * (1.93 * V_{cv}) * \cos \langle \phi \rangle$	2	834
33	Qdmd=	Reactive Power Demand	1: 327.67 kVar 2: 327.67 MVar 3: 327.67 kVar 4: 327.67 MVar	$(4 * I_{rc}) * (1.93 * V_{cv}) * \sin \langle \phi \rangle$	2	835
34	Sdmd=	Apparent Power Demand	1: 327.67 kVar 2: 327.67 MVar 3: 327.67 kVar	$(4 * I_{rc}) * (1.93 * V_{cv})$	2	836

Analog Inputs						
Static (Steady-State) Object Number: 30						
Change Event Object Number: 32						
Request Function Codes supported: 1 (read)						
Static Variation reported when variation 0 requested: 02 (16-Bit Analog Input)						
Change Event Variation reported when variation 0 requested: 02 (Analog Change Event without Time)						
Point Index	Name	Description	Scaling and Units (representation of - 32767 to +32767)	Valid Range	Default Change Event Assigned Class	Int. Obj. No.
			4: 327.67 MVar			
35	79 Step	79-A/R attempt step; Counter of A/R cycles	32767		1	2876
36	(0)Ia=	Trip Current phase a 4)	32767 A		1	533
37	(0)Ib=	Trip Current phase b 4)	32767 A		1	534
38	(0)Ic=	Trip Current phase c 4)	32767 A		1	535
39	(0)Xsec	Fault impedance	3.2767 kOhm		1	1118
40	(0)dist=	Fault location	327.67 Miles		1	1119
41	Ia Min=	Current phase a minimum	3276.7 A	4 * Irc ⁴⁾	3	851
42	Ia Max=	Current phase a maximum	3276.7 A	4 * Irc ⁴⁾	3	852
43	Ib Min=	Current phase b minimum	3276.7 A	4 * Irc ⁴⁾	3	853
44	Ib Max=	Current phase b maximum	3276.7 A	4 * Irc ⁴⁾	3	854
45	Ic Min=	Current phase c minimum	3276.7 A	4 * Irc ⁴⁾	3	855
46	Ic Max=	Current phase c maximum	3276.7 A	4 * Irc ⁴⁾	3	856
47	I1 Min=	Minimum Strommitsytem I1	3276.7 A	4 * Irc ⁴⁾	3	857
48	I1 Max=	Maximum Strommitsystem I1	3276.7 A	4 * Irc ⁴⁾	3	858
49	Va-n Min=	Voltage phase a minimum	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	1.93 * Vrv ⁵⁾	3	859
50	Va-nMax=	Voltage phase a maximum	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	1.93 * Vrv ⁵⁾	3	860
51	Vb-nMin=	Voltage phase b minimum	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	1.93 * Vrv ⁵⁾	3	861
52	Vb-nMax=	Voltage phase b maximum	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	1.93 * Vrv ⁵⁾	3	862
53	Vc-nMin=	Voltage phase c minimum	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	1.93 * Vrv ⁵⁾	3	863
54	Vc-nMax=	Voltage phase c maximum	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	1.93 * Vrv ⁵⁾	3	864
55	Va-bMin=	Voltage phase a to phase b minimum	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	1.93 * Vrv ⁵⁾	3	865
56	Va-bMax=	Voltage phase a to phase b maximum	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	1.93 * Vrv ⁵⁾	3	867
57	Vb-cMin=	Voltage phase b to phase c minimum	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	1.93 * Vrv ⁵⁾	3	868

Analog Inputs						
Static (Steady-State) Object Number: 30						
Change Event Object Number: 32						
Request Function Codes supported: 1 (read)						
Static Variation reported when variation 0 requested: 02 (16-Bit Analog Input)						
Change Event Variation reported when variation 0 requested: 02 (Analog Change Event without Time)						
Point Index	Name	Description	Scaling and Units (representation of - 32767 to +32767)	Valid Range	Default Change Event Assigned Class	Int. Obj. No.
58	Vb-cMax=	Voltage phase b to phase c maximum	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	1.93 * Vrv ⁵⁾	3	869
59	Vc-aMin=	Voltage phase c to phase a minimum	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	1.93 * Vrv ⁵⁾	3	870
60	Vc-aMax=	Voltage phase c to phase a maximum	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	1.93 * Vrv ⁵⁾	3	871
61	Vn Min =	Voltage neutral minimum	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	1.93 * Vrv ⁵⁾	3	872
62	Vn Max =	Voltage neutral maximum	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	1.93 * Vrv ⁵⁾	3	873
63	V1 Min =	Positive Sequence Voltage Minimum	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	1.93 * Vrv ⁵⁾	3	874
64	V1 Max =	Positive Sequence Voltage Maximum	1: 32.767 kV 2: 327.67 kV 3: 32.767 kV 4: 327.67 kV	1.93 * Vrv ⁵⁾	3	875
65	P Min	Active power minimum	1: 32767 kW 2: 327.67 MW 3: 32767 kW 4: 327.67 MW	(4*Irc)* (1.93*Vcv) * cos <phi>	3	876
66	P Max	Active power maximum	1: 32767 kW 2: 327.67 MW 3: 32767 kW 4: 327.67 MW	(4*Irc)* (1.93*Vcv) * cos <phi>	3	877
67	Q Min	Reactive power minimum	1: 32767 kVar 2: 327.67 MVar 3: 32767 kVar 4: 327.67 MVar	(4*Irc)* (1.93*Vcv) * sin <phi>	3	878
68	Q Max	Reactive power maximum	1: 32767 kVar 2: 327.67 MVar 3: 32767 kVar 4: 327.67 MVar	(4*Irc)* (1.93*Vcv) * sin <phi>	3	879
69	S Min	Apparent power minimum	1: 32767 kVar 2: 327.67 MVar 3: 32767 kVar 4: 327.67 MVar	(4*Irc)* (1.93*Vcv)	3	880
70	S Max	Apparent power maximum	1: 32767 kVar 2: 327.67 MVar 3: 32767 kVar 4: 327.67 MVar	(4*Irc)* (1.93*Vcv)	3	881
71	f Min	frequency Minimum	327.67 Hz	55Hz – 65Hz (45Hz – 55Hz)	3	882

Analog Inputs						
Static (Steady-State) Object Number: 30						
Change Event Object Number: 32						
Request Function Codes supported: 1 (read)						
Static Variation reported when variation 0 requested: 02 (16-Bit Analog Input)						
Change Event Variation reported when variation 0 requested: 02 (Analog Change Event without Time)						
Point Index	Name	Description	Scaling and Units (representation of - 32767 to +32767)	Valid Range	Default Change Event Assigned Class	Int. Obj. No.
72	f Max	frequency Maximum	327.67 Hz	55Hz – 65Hz (45Hz – 55Hz)	3	883
73	cos <phi> min	Power factor minimum	3.2767	-1 to +1	3	885
74	cos <phi> max	Power factor maximum	3.2767	-1 to +1	3	884
75	P phase a	Reserved for active power phase a	1: 32767 kW 2: 327.67 MW 3: 32767 kW 4: 327.67 MW	(4*Irc)* (1.93*Vcv) * cos <phi>	2	
76	P phase b	Reserved for active power phase b	1: 32767 kW 2: 327.67 MW 3: 32767 kW 4: 327.67 MW	(4*Irc)* (1.93*Vcv) * cos <phi>	2	
77	P phase c	Reserved for active power phase c	1: 32767 kW 2: 327.67 MW 3: 32767 kW 4: 327.67 MW	(4*Irc)* (1.93*Vcv) * cos <phi>	2	
78	Q phase a	Reserved for reactive power phase a	1: 32767 kVar 2: 327.67 MVar 3: 32767 kVar 4: 327.67 MVar	(4*Irc)* (1.93*Vcv) * sin <phi>	2	
79	Q phase b	Reserved for reactive power phase b	1: 32767 kVar 2: 327.67 MVar 3: 32767 kVar 4: 327.67 MVar	(4*Irc)* (1.93*Vcv) * sin <phi>	2	
80	Q phase c	Reserved for reactive power phase c	1: 32767 kVar 2: 327.67 MVar 3: 32767 kVar 4: 327.67 MVar	(4*Irc)* (1.93*Vcv) * sin <phi>	2	
81	cos <phi> phase a	Reserved for phase angle a	3.2767	-1 to +1	2	
82	cos <phi> phase b	Reserved for phase angle b	3.2767	-1 to +1	2	
83	cos <phi> phase c	Reserved for phase angle c	3.2767	-1 to +1	2	

- 4) Primary rated current (Irc)
5) Primary rated voltage (Vrv)
6) Maximum valid range depends from earth current transformer (e.g. sensitive earth current transformer 1.6 * Irc)

For a detailed fault analysis it is necessary to read the fault recording file and the fault event buffer via DIGSI

The analogue values (from point index 41 to 74) are reserved for future implementation.

Communication-Interfaces

4

There are two communication modules available for the protection devices 7SJ61/62/63 and 6MD63:

- Universal asynchronous interfacemodule with potential isolated RS485 Interface,
- Universal asynchronous interfacemodule with fiber optical link interface.

4.1 Technical Data RS485 modul

Connection	9-pin D-SUB port; signals A, B, RTS, VCC1 and GND1 (s. table below)
Protocol	half-duplex
Maximum Distance of Transmission	3300 ft
Test voltage	500 V _{AC}
Bus termination	integrated activatable terminator 221 Ω between A and B 392 Ω between B and VCC1 or A and GND1 Input resistance ≤ 10 kΩ
Level	Transmitter: Low: -5 V ≤ U _{A-B} ≤ -1.5 V High: +5V ⇒ U _{A-B} ⇒ +1.5V Receiver: Low: U _{A-B} ≤ -0.2V High: U _{A-B} ⇒ +0.2V Transmitter and receiver are surge-proof in case of voltage-range -7V ...+12V between A and GND1 and/or B and GND 1
Maximum of DNP-devices connected to the same bus segment without any repeater	53

PIN-allocation of the 9 pole D-SUB Port:

Pin	RS485-Signal
1	Shield
2	-
3	A
4	RTS (TTL-Level)
5	GND1
6	VCC1 (5V, max. 100mA)
7	-
8	B
9	-

4.2 Technical Data Fiber Optical Link modul

Connection	Optical interface, Rx and Tx, 820nm, BFOC/2.5
Protocol	Half-duplex
Maximum Distance of Transmission	1.25 miles for glass fiber 62.5/125 μm
Optical Link Signal Attenuation	Minimum 8 dB for glass fiber 62.5/125 μm
Character idle state	Factory setting "Light off"

Glossary

AME	asynchronous interface m odule with (e lectrical) isolated RS485 interface for the SIPROTEC devices from Siemens.
AMO	asynchronous interface m odule with o ptical interface for the SIPROTEC devices from Siemens.
AR	A utomatic R ecloser
CFC	C ontinuous F unction C hart
DC	D ouble C ommand
DIGSI	Parameterization system for SIPROTEC devices
DNP	D istributed N etwork P rotocol
DP	D ouble- p oint Indication
Input data/ input direction	Data from the DNP slave to the DNP master .
Mapping	Allocation of the SIPROTEC data objects to the DNP point index.
Output data/ output direction	Data from the DNP master to the DNP slave .
RTU	R emote T erminal U nit
SC	S ingle C ommand
SP	S ingle- p oint Indication

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