SIPROTEC

Distance Protection 7SA522, 7SA6

Communication module

DNP 3.0

Bus mapping / Point lists

Revision: 1.3

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Preface

Aim of This Manual

The manual is devided into the following topics:

- Notes to SIPROTEC® objects
- DNP V3.0 Device Profile
- Point lists

General information about design, configuration, and operation of SIPROTEC® devices are laid down in the SIPROTEC® 4 system manual, order no. E50417-H1176-C151.

Target Audience

Protection engineers, commissioning engineers, persons who are involved in setting, testing and service of protection, automation, and control devices, as well as operation personnel in electrical plants and power stations.

Additional literature

This manual describes the DNP 3.0 Device Profile of the SIPROTEC® devices.

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

Manual	Contents	Order number
Differential Protection SIPROTEC 7SA522	Function, operation, assembly and commissioning of the SIPROTEC® device 7SA522	C53000-G1176-C119-2
Differential Protection SIPROTEC 7SA6	Function, operation, assembly and commissioning of the SIPROTEC® device 7SA6	C53000-G1176-C133-2
DNP 3.0 Communication Database	DNP communication database of the SIPROTEC® devices	C53000-L1840-A001-03

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

Applicability of this Manual

This manual is valid for

- SIPROTEC® devices 7SA522, 7SA6 with
  - firmware version 4.2 or higher and
  - DNP communication module version 02.00.01 or higher.

For device parameterization **DIGSI®** 4 **version 4.3 or higher** and DNP standard mappings 3-1 to 3-n (n = device type dependent number of standard mappings) have to be used.

Additional Support

Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purpose, the matter should be referred to the local Siemens representative.

Training Courses

Individual course offerings may be found in our Training Catalogue, or questions may be directed to our training center. Please contact your Siemens representative.

Instructions and Warnings

The warnings and notes contained in this manual serve for your own safety and for an appropriate lifetime of the device. Please observe them!

The following terms are used:

DANGER

indicates that death, severe personal injury or substantial property damage will result if proper precautions are not taken.

Warning

indicates that death, severe personal injury or substantial property damage can result if proper precautions are not taken.

Caution

indicates that minor personal injury or property damage can result if proper precautions are not taken. This particularly applies to damage on or in the device itself and consequential damage thereof.

Note

indicates information about the device or respective part of the instruction manual which is essential to highlight.

Warning!

Hazardous voltages are present in this electrical equipment during operation. Non–observance of the safety rules can result in severe personal injury or property damage.

Only qualified personnel shall work on and around this equipment after becoming thoroughly familiar with all warnings and safety notices of this manual as well as with the applicable safety regulations.

The successful and safe operation of this device is dependent on proper handling, installation, operation, and maintenance by qualified personnel under observance of all warnings and hints contained in this manual.

In particular the general erection and safety regulations (e.g. IEC, DIN, VDE, EN or other national and international standards) regarding the correct use of hoisting gear must be observed. Non–observance can result in death, personal injury or substantial property damage.

QUALIFIED PERSONNEL

For the purpose of this instruction manual and product labels, a qualified person is one who is familiar with the installation, construction and operation of the equipment and the hazards involved. In addition, he has the following qualifications:

- Is trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety practices.
- Is trained in the proper care and use of protective equipment in accordance with established safety practices.
- Is trained in rendering first aid.

Typographic and Symbol Conventions

The following text formats are used when literal information from the device or to the device appear in the text flow:

`Parameter names`, i.e. designators of configuration or function parameters which may appear word-for-word in the display of the device or on the screen of a personal computer (with operation software DIGSI® 4), are marked in bold letters of a monospace type style.

`Parameter options`, i.e. possible settings of text parameters, which may appear word-for-word in the display of the device or on the screen of a personal computer (with operation software DIGSI® 4), are written in italic style, additionally.

“`Annunciations`”, i.e. designators for information, which may be output by the relay or required from other devices or from the switch gear, are marked in a monospace type style in quotation marks.

Deviations may be permitted in drawings when the type of designator can be obviously derived from the illustration.

Table of Contents

Notes to SIPROTEC® objects

1

This chapter contains notes for the use and evaluation of certain SIPROTEC® objects which are available via DNP3.0 communication.

Note

The description of the standard mappings / point lists (ref. to chap. 3) contains the pre-allocation of the mapping files at delivery or first assignment of a mapping in DIGSI® 4 to the SIPROTEC® device.

Changes of the allocation and the scaling of the measured values are possible in adaptation to the concrete installation enviroment (ref. to page 3).

1.1 Binary Inputs / Annunciations

Note

Depending on the device composition and the existing protection packages not all of the indicated binary inputs or protection annunciations (and corresponding DNP points) may be available in the SIPROTEC® device

1.1.1 Error with a summary alarm

The "Error with a summary alarm" is ON if at least one of the following internal alarms assumes the value ON:

- "Error 5V", "Error neutral CT", "Error 1A/5A wrong", "Error A/D converter".

Reference ref to chap. 3.1.18

1.1.2 Alarm Summary Event

The "Alarm summary event" is indicated, if at least one of the following internal alarms assumes the ON status:

- “Error Board 1“, “Error Board 2“, "Error Board 3“, "Error Board 4“, "Error Board 5“, “Error Board 6“, "Error Board 7“,
- "Alarm NO calibration“, "Failure Battery“, "Alarm Real Time Clock",
- "Failure Phase Sequence", "VT Fuse Failure", "Failure Voltage Balance", "Failure Voltage Summation Phase – Ground", "Failure General Voltage Supervision",
- "Failure Current Balance", "Failure Current Summation", "Failure General Current Supervision".

Reference ret. to chap. 3.1.18

1.1.3 Stop Data Transmission

The functionality "Stop data transmission" is not supported via DNP communication. If "Stop data transmission" is active nevertheless data via DNP will be transmitted furthermore.

The annunciation "DataStop" signals the activation of "Stop data transmission" however and can be evaluated correspondingly in the DNP master.

Reference ref. to chap. 3.1.19

1.2 Binary Outputs / Commands

Note

The allocation 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 there may be less than indicated output relays (and corresponding DNP message points) available in the SIPROTEC® device.

1.2.1 Single Commands

The command output mode (*pulse output*, *continuous output*) is changeable for the single commands using parametrization software DIGSI® 4.

The switching direction OFF for single commands with *pulse output* is not permitted and is rejected in the SIPROTEC® device.

Reference ref. to chap. 3.2.3

1.2.2 Control mode REMOTE

Control mode with control authority is REMOTE, option of unlocked control with DNP.

- Changing the Control mode REMOTE“ to UNLOCKED permits one unlocked control operation via DNP. After execution of the command, the “Control mode REMOTE“ in the SIPROTEC® device will automatically be reset to LOCKED.
- A programmed test “Switch in position“ for unlocked control operations will always be executed.

If, after changing the “Control mode REMOTE“ to UNLOCKED, no command is received via DNP for a period of 5 minutes, then the “Control mode REMOTE“ is automatically reset to LOCKED.

Reference ref. to chap. 3.2.2

1.2.3 Changing the setting group

Switching on one setting group automatically switches off the current active setting group. Transmission of the value OFF is insignificant for the change of the setting group and is refused by the device.

A change of the setting group is only possible via DNP if the parameter **CHANGE TO ANOTHER SETTING GROUP** (parameter address = 302) has the value "Protocol".

Reference ref. to chap. 3.2.2

1.3 Analog Inputs / Measured values

Note

Depending on the device composition not all of the indicated analog inputs (and corresponding DNP message points) may be available in the SIPROTEC® device.

The given scaling values for the measured values in the standard mapping apply to installations with the following nominal operating values:

Measurement: Full Scale Voltage (parameter address 1103):
– >100 ... 1000 kV

Measurement: Full Scale Current (parameter address 1104):
– >10 ... 1000 A

Product of:
- Transformers – Rated Primary Voltage (parameter address 0203) and
- Ratio factor Vph/Vdelta (parameter address 0211)

– >100 ... 1000 kV

Product of:
- Transformers– CT Rated primary current (parameter address 0205) and
- Ratio factor I4/Iph (parameter address 0221)
- >10 ... 1000 A

Power values:
- Product of Full Scale Voltage and Full Scale Current multiplied by $\sqrt{3}$

– >100 ... 1000 MW (MVAR)

Note

Changes of the scaling of the measured values are possible in adaptation to the concrete installation environment (ref. to manual “DNP 3.0 Communication Database”).

1.4 Metered measurands

Scaling

The scaling of the metered measurands, which are derived from measured values, refers to**:**

60000 impulses per hour for V = Vprim and I = Iprim

V_{prim} = **Full Scale Voltage**
(parameter address = 1103)

I_{prim} = **FULL SCALE CURRENT**
parameter address = 1104)

Example

In the parameter set is configured:

I_{prim} = 1000 A and V_{prim} = 400.0 kV,

60000 impulses correspond so that:

1 h * 1000 A * 400 kV * $\sqrt{3}$ = 692.82 MWh

Note

- The type of the update (cyclic, with or without deletion) and the update interval must be programmed for the metered measurands with the parametrization software DIGSI® 4.
- The scaling of the metered measurands at binary inputs ("Wp(puls)" and "Wq(puls)") depends on the externally connected pulse generator.

DNP V3.0 Device Profile

2

2.1 Implementation Table

The following table gives a list of all objects recognized and returned by the SIPROTEC® device.

For static objects, requests sent with qualifiers 00, 01, 06, 07 or 08 will be responded with qualifiers 00 or 01.

Requests sent with qualifiers 17 or 28 will be responded with qualifiers 17 or 28.

For change-event objects, qualifiers17 or 28 are always responded.

In the table below text shaded 00, 01 (start stop) indicates Subset Level 3 functionality (beyond Subset Level 2), text shaded as 07, 08 (limited qty) indicates functionality beyond Subset Level 3.

1

OBJECTS			REQUEST		RESPONSE	
Object	**Variation**	**Description**	**Function Codes (dec)**	**Qualifier Codes (hex)**	**Function Codes (dec)**	**Qualifier Codes (hex)**
1	0	Binary Input - Any Variations	1 (read) 22 (assign class)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 17, 28 (index)		
1	2	Binary Input with Status	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 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 qfy)		
2	2	Binary Input Change with Time	1 (read)	06 (no range) 07, 08 (limited qfy)	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 qfy) 17, 28 (index)		
10	2	Binary Output with Status	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
12	1	Contol Relay Output Block	3 (select) 4 (operate) 5 (direct op) 6 (direct op noack)	17, 28 (index)	129 (response)	echo of response
20	0	Binary Counter - Any Variations	1 (read) 22 (assign class)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 17, 28 (index)		
20	1	32-Bit Binary Counter (with Flag)	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 17, 28 (index)	129	00, 01 (start-stop) 17, 28 (index)
20	6	16-Bit Binary Counter without Flag	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 17, 28 (index)	129	00, 01 (start-stop) 17, 28 (index)
22	0	Counter Change Event - Any Variations	1 (read)	06 (no range) 07, 08 (limited qfy)		
22	1	32-Bit Counter Change Event without Time	1 (read)	06 (no range) 07, 08 (limited qfy)	129 (response) 130 (unsol. resp)	17, 28 (index)

OBJECTS			REQUEST		RESPONSE	
Object	**Variation**	**Description**	**Function Codes (dec)**	**Qualifier Codes (hex)**	**Function Codes (dec)**	**Qualifier Codes (hex)**
30	0	16-Bit Analog Input - Any Variations	1 (read) 22 (assign class)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 17, 28 (index)		
30	1	32-Bit Analog Input with Status	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
30	2	16-Bit Analog Input with Status	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
30	3	32-Bit Analog Input without Status	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
30	4	16-Bit Analog Input without Status	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 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 qfy)		
32	1	32-Bit Analog Change Event without Time	1 (read)	06 (no range) 07, 08 (limited qfy)	129 (response) 130 (unsol. resp)	17, 28 (index)
32	2	16-Bit Analog Change Event without Time	1 (read)	06 (no range) 07, 08 (limited qfy)	129 (response)	17, 28 (index)
50	1	Time and Date	1 (read)	00, 01 (start-stop) 06 (no range) 07 (limited qfy=1) 08 (limit qfy)	129 (response)	00, 01 (start-stop) 17, 28 (index)
			2 (write)	07 (limited qfy = 1)		
60	1	Class 0 Data	1 (read)	06 (no range)		
60	2	Class 1 Data	1 (read)	06 (no range) 07, 08 (limited qfy)		
			20 (enbl. unsol.) 21 (dab. unsol.) 22 (assign class)	06 (no range)		
60	3	Class 2 Data	1 (read)	06 (no range) 07, 08 (limited qfy)		
			20 (enbl. unsol.) 21 (dab. unsol.) 22 (assign class)	06 (no range)		
60	4	Class 3 Data	1 (read)	06 (no range) 07, 08 (limited qfy)		
			20 (enbl. unsol.) 21 (dab. unsol.) 22 (assign class)	06 (no range)		
80	1	Internal Indications	1 (read)	00,01 (start-stop)		
			2 (write)	00 (start-stop) (index must = 7)		
No Object (function code only)			13 (cold restart)			
No Object (function code only)			14 (warm restart)			

2.2 Device Profile Document

DNP V3.0

DEVICE PROFILE DOCUMENT

Vendor Name: **SIEMENS AG**

Device Name: **7SA522, 7SA6**

Highest DNP Level Supported:	Device Function:
For Requests DNP-L2	☐ Master ☒ Slave
For Responses DNP-L2	

Notable objects, functions, and/or qualifiers supported in addition to the Highest DNP Levels Supported (the complete list is described in the attached table):

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.

The write function code for Object 50 (Time and Date), variation 1, is supported.

The features outlined within this Device Profile have successfully passed DNP Conformance Test of Subset Level 2 outlined in DNP3-2000 IED Certification Procedure.

Maximum Data Link Frame Size (octets):	Maximum Application Fragment Size (octets):
Transmitted____292_____	Transmitted _Configurable up to 2048
Received_____292_____	Received_____2048_____

Maximum Data Link Re-tries:	Maximum Application Layer Re-tries:
☒ None ☐ Fixed at ☐ Configurable, range _0_to _255_	☒ None ☐ 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® 4

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® 4

Timeouts while waiting for:

Data Link Confirm	☐ None	☐ Fixed at _____	☐ Variable	☒ Configurable
Complete Appl. Fragment	☒ None	☐ Fixed at _____	☐ Variable	☐ Configurable
Application Confirm	☐ None	☐ Fixed at _____	☐ Variable	☒ Configurable
Complete Appl. Response	☒ None	☐ Fixed at _____	☐ Variable	☐ Configurable

Others: Default value are configurable by the protection data processing program DIGSI® 4

Sends/Executes Control Operations:

WRITE Binary Outputs	☒ Never	☐ Always	☐ Sometimes	☐ Configurable
SELECT/OPERATE	☐ Never	☒ Always	☐ Sometimes	☐ Configurable
DIRECT OPERATE	☐ Never	☒ Always	☐ Sometimes	☐ Configurable
DIRECT OPERATE - NO ACK	☐ Never	☒ Always	☐ Sometimes	☐ Configurable
Count > 1	☒ Never	☐ Always	☐ Sometimes	☐ Configurable
Pulse On	☐ Never	☒ Always	☐ Sometimes	☐ Configurable
Pulse Off	☒ Never	☐ Always	☐ Sometimes	☐ Configurable
Latch On	☐ Never	☒ Always	☐ Sometimes	☐ Configurable
Latch Off	☐ Never	☒ Always	☐ Sometimes	☐ Configurable
Queue	☒ Never	☐ Always	☐ Sometimes	☐ Configurable
Clear Queue	☒ Never	☐ Always	☐ Sometimes	☐ Configurable

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

TimeSync Information:

a.) TimeSync Period
- ☐ Never
- ☐ Fixed at _____seconds
- ☒ Configurable, range ____1____to __86400_seconds

b.) Maximum time base drift over 10 minute interval: ____30__ms
c.) Maximum Internal Time Reference Error when set via DNP: _____1__ms
d.) Maximum Delay Measurement error: ____20__ms
e.) Maximum response time: ___100__ms
c.) Event data time-tag error – if different than (c):
- Binary Input Change Events _____ms
- Counter Change Events _____ms
- Frozen Counter Change Events _____ms
- Analog Change Events _____ms
- Frozen Analog Change Events _____ms

Reports Binary Input Change Events when no specific variation requested:
- ☐ Never
- ☒ Only time-tagged
- ☐ Only non-time-tagged
- ☐ Configurable to send both, one or the other (attach explanation)

Reports time-tagged Binary Input Change Events when no specific variation requested:
- ☐ Never
- ☒ Binary Input Change With Time
- ☐ Binary Input Change With Relative Time
- ☐ Configurable (attach explanation)

Sends Unsolicited Responses:	Sends Static Data in Unsolicited Responses:
☐ Never ☒ Configurable (Unsolicited data response mode are switched on/off via the configuration tool) ☐ Only certain objects ☐ Sometimes (attach explanation) ☒ ENABLE/DISABLE UNSOLICITED Function codes supported	☒ Never ☐ When Device Restarts ☐ When Status Flags Change No other options are permitted.
Default Counter Object/Variation:	**Counters Roll Over at:**
☐ No Counters Reported ☐ Configurable (attach explanation) ☒ Default Object ___20_____ Default Variation ___01_____ ☐ Point-by-point list attached Sends 32-Bit counters.	☐ No Counters Reported ☐ Configurable (attach explanation) ☐ 16 Bits ☒ 32 Bits ☐ Other Value _____ ☐ Point-by-point list attached
Sends Multi-Fragment Responses: ☒ Yes ☐ No	

Point lists

3

3.1 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	Class
	3.1.1 Weak infeed Trip		
0	WeakInf. OFF	Weak Infeed Trip option is switched OFF; ON=1, OFF=0	3
1	Weak Inf. BLOCK	Weak Infeed Trip option is BLOCKED; ON=1, OFF=0	3
2	Weak Inf ACTIVE	Weak Infeed Trip option is ACTIVE; ON=1, OFF=0	3
3	WeakInf. PICKUP	Weak Infeed Trip option PICKED UP; ON=1, OFF=0	2
4	WeakInfeed TRIP	Weak Infeed TRIP command; ON=1, OFF=0	2
5	Weak TRIP 1p.PhA	Weak Infeed TRIP command - Only Phase A; ON=1, OFF=0	2
6	Weak TRIP 1p.PhB	Weak Infeed TRIP command - Only Phase B; ON=1, OFF=0	2
7	Weak TRIP 1p.PhC	Weak Infeed TRIP command - Only Phase C; ON=1, OFF=0	2
8	Weak TRIP PhABC	Weak Infeed TRIP command Phases ABC; ON=1, OFF=0	2
9	ECHO SIGNAL	ECHO Send SIGNAL; ON=1, OFF=0	3
	3.1.2 High Speed SOTF-O/C		
10	50HS OFF	50HS High Speed SOTF-O/C is switched OFF; ON=1, OFF=0	3
11	50HS BLOCK	50HS High Speed SOTF-O/C is BLOCKED; ON=1, OFF=0	3
12	50HS ACTIVE	50HS High Speed SOTF-O/C is ACTIVE; ON=1, OFF=0	3
13	50HS PICKUP	50HS PICKED UP; ON=1, OFF=0	2
14	50HS Pickup PhA	50HS Pickup Phase A; ON=1, OFF=0	2
15	50HS Pickup PhB	50HS Pickup Phase B; ON=1, OFF=0	2
16	50HS Pickup PhC	50HS Pickup Phase C; ON=1, OFF=0	2
17	50HS TRIP PhABC	50HS High Speed SOTF-O/C TRIP command; ON=1, OFF=0	2
	3.1.3 Distance protection		
18	21 Dist. OFF	21 Distance is switched OFF; ON=1, OFF=0	3
19	21 Dist. BLOCK	21 Distance is BLOCKED; ON=1, OFF=0	3
20	21 Dist. ACTIVE	21 Distance is ACTIVE; ON=1, OFF=0	3
21	21 PICKUP	21 PICKED UP; ON=1, OFF=0	2
22	21 Pickup PhA	21 PICKUP Phase A; ON=1, OFF=0	2
23	21 Pickup PhB	21 PICKUP Phase B; ON=1, OFF=0	2
24	21 Pickup PhC	21 PICKUP Phase C; ON=1, OFF=0	2
25	21 Pickup G	21 PICKUP GROUND; ON=1, OFF=0	3
26	21 Pickup 1p.PhA	21 Pickup Phase A (only) ; ON=1, OFF=0	3
27	21 Pickup AG	21 Pickup AG; ON=1, OFF=0	3
28	21 Pickup 1p.PhB	21 Pickup Phase B (only) ; ON=1, OFF=0	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	Class
29	21 Pickup BG	21 Pickup BG; ON=1, OFF=0	3
30	21 Pickup AB	21 Pickup AB; ON=1, OFF=0	3
31	21 Pickup ABG	21 Pickup ABG; ON=1, OFF=0	3
32	21 Pickup 1p.PhC	21 Pickup Phase C (only) ; ON=1, OFF=0	3
33	21 Pickup CG	21 Pickup CG; ON=1, OFF=0	3
34	21 Pickup CA	21 Pickup CA; ON=1, OFF=0	3
35	21 Pickup CAG	21 Pickup CAG; ON=1, OFF=0	3
36	21 Pickup BC	21 Pickup BC; ON=1, OFF=0	3
37	21 Pickup BCG	21 Pickup BCG; ON=1, OFF=0	3
38	21 Pickup ABC	21 Pickup ABC; ON=1, OFF=0	2
39	21 Pickup ABCG	21 Pickup ABCG; ON=1, OFF=0	3
40	21 PU forward	21 Picked up FORWARD; ON=1, OFF=0	3
41	21 PU reverse	21 Picked up REVERSE; ON=1, OFF=0	3
42	21 Time Out T1	21 Time Out T1; ON=1, OFF=0	3
43	21 Time Out T2	21 Time Out T2; ON=1, OFF=0	3
44	21 Time Out T3	21 Time Out T3; ON=1, OFF=0	3
45	21 Time Out T4	21 Time Out T4; ON=1, OFF=0	3
46	21 Time Out T5	21 Time Out T5; ON=1, OFF=0	3
47	21 TimeOut forw	21 Time Out Forward PICKUP; ON=1, OFF=0	3
48	21 TimeOut rev.	21 Time Out Reverse/Non-dir. PICKUP; ON=1, OFF=0	3
49	21 Time Out T1B	21 Time Out T1B; ON=1, OFF=0	3
50	21 TRIP	21 Distance General TRIP command; ON=1, OFF=0	2
51	21 TRIP 1p. PhA	21 TRIP command - Only Phase A; ON=1, OFF=0	2
52	21 TRIP 1p. PhB	21 TRIP command - Only Phase B; ON=1, OFF=0	2
53	21 TRIP 1p. PhC	21 TRIP command - Only Phase C; ON=1, OFF=0	2
54	21 TRIP PhABC	21 TRIP command Phases ABC; ON=1, OFF=0	2
55	21 TRIP 3p. Z4	21 TRIP 3phase in Z4; ON=1, OFF=0	3
56	21 TRIP 3p. Z5	21 TRIP 3phase in Z5; ON=1, OFF=0	3
57	21 TRIP 1p. Z1	21 TRIP single-phase Z1; ON=1, OFF=0	3
58	21 TRIP 1p. Z1B	21 TRIP single-phase Z1B; ON=1, OFF=0	3
59	21 TRIP 1p. Z2	21 TRIP single-phase Z2; ON=1, OFF=0	3
60	21 TRIP 3p. Z2	21 TRIP 3phase in Z2; ON=1, OFF=0	3
61	21 TRIP 3p. Z3	21 TRIP 3phase in Z3; ON=1, OFF=0	3
62	21 TRIP FD->	21 TRIP by fault detection, forward; ON=1, OFF=0	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	Class
63	21 TRIP <->	21 TRIP by fault detec., rev./non-direct; ON=1, OFF=0	3
64	21 TRIP3p. Z1sf	21 TRIP 3phase in Z1 with single-ph Flt. ; ON=1, OFF=0	3
65	21 TRIP3p. Z1mf	21 TRIP 3phase in Z1 with multi-ph Flt. ; ON=1, OFF=0	3
66	21 TRIP3p.Z1Bsf	21 TRIP 3phase in Z1B with single-ph Flt; ON=1, OFF=0	3
67	21 TRIP3p Z1Bmf	21 TRIP 3phase in Z1B with multi-ph Flt. ; ON=1, OFF=0	3
68	21 TRIP Z1B Pil	21 TRIP Z1B with Pilot Protection scheme; ON=1, OFF=0	3
	3.1.4 Pilot protection distance		
69	Pilot ON	Pilot Prot. is switched ON; ON=1, OFF=0	3
70	85-21 Carr.rec.	85-21 Carrier signal received; ON=1, OFF=0	3
71	85-21 Carr.Fail	85-21 Carrier CHANNEL FAILURE; ON=1, OFF=0	3
72	85-21 SEND	85-21 Carrier SEND signal; ON=1, OFF=0	3
73	85-21 JumpBlock	85-21 Blocking: Send signal with jump; ON=1, OFF=0	3
74	85-21 Trans.Blk	85-21 Transient Blocking; ON=1, OFF=0	3
75	85-21 BL STOP	85-21 Blocking: carrier STOP signal; ON=1, OFF=0	3
76	85-21 UB Fail1	85-21 Unblocking: FAILURE Channel 1; ON=1, OFF=0	3
77	85-21 UB Fail2	85-21 Unblocking: FAILURE Channel 2; ON=1, OFF=0	3
	3.1.5 Power swing		
78	68 Power Swing	68 Power Swing detected; ON=1, OFF=0	2
79	68T Pswing TRIP	68T Power Swing TRIP command; ON=1, OFF=0	2
	3.1.6 Automatic recloser		
80	79 OFF	79 Auto recloser is switched OFF; ON=1, OFF=0	2
81	79 ON	79 Auto recloser is switched ON; ON=1, OFF=0	2
82	79 is blocked	79: Auto recloser is blocked; ON=1, OFF=0	2
83	79 not ready	79: Auto recloser is not ready; ON=1, OFF=0	2
84	CB not ready	79: Circuit breaker 1 not ready; ON=1, OFF=0	2
85	79 T-CBreadyExp	79: CB ready monitoring window expired; ON=1, OFF=0	3
86	79 in progress	79 - in progress; ON=1, OFF=0	2
87	79 Evolving Flt	79: Evolving fault recognition; ON=1, OFF=0	3
88	79 Close	79 - Close command; ON=1, OFF=0	2
89	79 Remote Close	79 Remote close signal send; ON=1, OFF=0	3
90	79 ADT run.	79 cycle is running in ADT mode; ON=1, OFF=0	3
91	79 Program1pole	79 is set to operate after 1p trip only; ON=1, OFF=0	3
92	79 Tdead 1pTrip	79 dead time after 1pole trip running; ON=1, OFF=0	3
93	79 Tdead 3pTrip	79 dead time after 3pole trip running; ON=1, OFF=0	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	Class
94	79 Tdead 1pFlt	79 dead time after 1phase fault running; ON=1, OFF=0	3
95	79 Tdead 2pFlt	79 dead time after 2phase fault running; ON=1, OFF=0	3
96	79 Tdead 3pFlt	79 dead time after 3phase fault running; ON=1, OFF=0	3
97	79 Close1.Cyc1p	79: Close command after 1pole, 1st cycle; ON=1, OFF=0	3
98	79 Close1.Cyc3p	79: Close command after 3pole, 1st cycle; ON=1, OFF=0	3
99	79 Close 2.Cyc	79: Close command 2nd cycle (and higher) ; ON=1, OFF=0	3
100	79 1stCyc. run.	79 1st cycle running; ON=1, OFF=0	3
101	79 2ndCyc. run.	79 2nd cycle running; ON=1, OFF=0	3
102	79 3rdCyc. run.	79 3rd cycle running; ON=1, OFF=0	3
103	79 4thCyc. run.	79 4th or higher cycle running; ON=1, OFF=0	3
104	79 1.CycZoneRel	79 1st cycle zone extension release; ON=1, OFF=0	3
105	79 T-Recl. run.	79: Reclaim time is running; ON=1, OFF=0	3
106	79 Successful	79 - cycle successful; ON=1, OFF=0	3
107	Definitive Trip	Definitive TRIP; ON=1, OFF=0	2
108	79 1p Trip Perm	79: 1pole trip permitted by internal AR; ON=1, OFF=0	3
109	79 Sync.Request	79: Synchronism request; ON=1, OFF=0	3
110	79 2.CycZoneRel	79 2nd cycle zone extension release; ON=1, OFF=0	3
111	79 3.CycZoneRel	79 3rd cycle zone extension release; ON=1, OFF=0	3
112	79 TRIP 3pole	79: TRIP command 3pole; ON=1, OFF=0	2
113	79 4.CycZoneRel	79 4th cycle zone extension release; ON=1, OFF=0	3
114	79 Zone Release	79 zone extension (general) ; ON=1, OFF=0	3
115	79 T-Start Exp	79: Start-signal monitoring time expired; ON=1, OFF=0	3
116	79 TdeadMax Exp	79: Maximum dead time expired; ON=1, OFF=0	3
117	79 Td. evol.Flt	79 dead time after evolving fault; ON=1, OFF=0	3
	3.1.7 Synchronism check		
118	25 Sync. OFF	25 Synchronism check is switched OFF; ON=1, OFF=0	3
119	25 Sync. BLOCK	25 Synchronism check is BLOCKED; ON=1, OFF=0	3
120	25 Sync. faulty	25: Synchro-check function faulty; ON=1, OFF=0	3
121	25 Sy.Tsup.Exp	25: Synchro-check supervision time exp. ; ON=1, OFF=0	3
122	25 Sy. running	25: Synchronization is running; ON=1, OFF=0	3
123	25 Sy. Override	25: Synchro-check override/bypass; ON=1, OFF=0	3
124	25 Synchronism	25: Synchronism detected; ON=1, OFF=0	2
125	25 Vsyn< Vline>	25: Sync. dead bus / live line detected; ON=1, OFF=0	3
126	25 Vsyn> Vline<	25: Sync. live bus / dead line detected; ON=1, OFF=0	3

Binary Input Points
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Change Event Variation reported when variation 0 requested: **2 (Binary Input Change with Time)**

Point Index	Name	Description	Class
127	25 Vsyn< Vline<	25: Sync. dead bus / dead line detected; ON=1, OFF=0	3
128	25 Sync. Vdiff>	25: Sync. Volt. diff. greater than limit; ON=1, OFF=0	3
129	25 Sync. fdiff>	25: Sync. Freq. diff. greater than limit; ON=1, OFF=0	3
130	25 Sync.PHIdiff>	25: Sync. Angle diff. greater than limit; ON=1, OFF=0	3
131	25 Sync.Release	25: Synchronism release (to ext. AR) ; ON=1, OFF=0	2
132	25 Sy. CloseCmd	25: Close command from synchro-check; ON=1, OFF=0	2
	3.1.8 Direct Transfer Trip		
133	DTT OFF	Direct Transfer Trip is switched OFF; ON=1, OFF=0	3
134	DTT BLOCK	Direct Transfer Trip is BLOCKED; ON=1, OFF=0	3
135	DTT TRIP 1p. PhA	DTT TRIP command - Only Phase A; ON=1, OFF=0	2
136	DTT TRIP 1p. PhB	DTT TRIP command - Only Phase B; ON=1, OFF=0	2
137	DTT TRIP 1p. PhC	DTT TRIP command - Only Phase C; ON=1, OFF=0	2
138	DTT TRIP PhABC	DTT TRIP command Phases ABC; ON=1, OFF=0	2
	3.1.9 Time Overcurrent protection		
139	5X-B OFF	50(N)/51(N) Backup O/C is switched OFF; ON=1, OFF=0	3
140	5X-B BLOCK	50(N)/51(N) Backup O/C is BLOCKED; ON=1, OFF=0	3
141	5X-B ACTIVE	50(N)/51(N) Backup O/C is ACTIVE; ON=1, OFF=0	3
142	5X-B PICKUP	50(N)/51(N) Backup O/C PICKED UP; ON=1, OFF=0	2
143	5X-B Pickup PhA	50(N)/51(N) Backup O/C PICKUP Phase A; ON=1, OFF=0	3
144	5X-B Pickup PhB	50(N)/51(N) Backup O/C PICKUP Phase B; ON=1, OFF=0	3
145	5X-B Pickup PhC	50(N)/51(N) Backup O/C PICKUP Phase C; ON=1, OFF=0	3
146	5X-B Pickup Gnd	50(N)/51(N) Backup O/C PICKUP GROUND; ON=1, OFF=0	3
147	5X-B PU only G	50(N)/51(N)-B Pickup - Only GROUND; ON=1, OFF=0	3
148	5X-B PU 1p. PhA	50(N)/51(N)-B Pickup - Only Phase A; ON=1, OFF=0	3
149	5X-B Pickup AG	50(N)/51(N)-B Pickup AG; ON=1, OFF=0	3
150	5X-B PU 1p. PhB	50(N)/51(N)-B Pickup - Only Phase B; ON=1, OFF=0	3
151	5X-B Pickup BG	5X-B Pickup BG; ON=1, OFF=0	3
152	5X-B Pickup AB	50(N)/51(N)-B Pickup AB; ON=1, OFF=0	3
153	5X-B Pickup ABG	50(N)/51(N)-B Pickup ABG; ON=1, OFF=0	3
154	5X-B PU 1p. PhC	50(N)/51(N)-B Pickup - Only Phase C; ON=1, OFF=0	3
155	5X-B Pickup CG	50(N)/51(N)-B Pickup CG; ON=1, OFF=0	3
156	5X-B Pickup CA	50(N)/51(N)-B Pickup CA; ON=1, OFF=0	3
157	5X-B Pickup CAG	50(N)/51(N)-B Pickup CAG; ON=1, OFF=0	3
158	5X-B Pickup BC	50(N)/51(N)-B Pickup BC; ON=1, OFF=0	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	Class
159	5X-B Pickup BCG	50(N)/51(N)-B Pickup BCG; ON=1, OFF=0	3
160	5X-B Pickup ABC	50(N)/51(N)-B Pickup ABC; ON=1, OFF=0	3
161	5X-B PickupABCG	50(N)/51(N)-B Pickup ABCG; ON=1, OFF=0	3
162	50(N)-B1 PICKUP	50(N)-B1 Pickup; ON=1, OFF=0	3
163	50(N)-B2 PICKUP	50(N)-B2 Pickup; ON=1, OFF=0	3
164	51(N)-B PICKUP	51(N)-B Pickup; ON=1, OFF=0	3
165	50-STUB PICKUP	50-STUB Pickup; ON=1, OFF=0	3
166	5X-B TRIP	50(N)/51(N)-B General TRIP command; ON=1, OFF=0	2
167	5X-B TRIP 1p.PhA	50(N)/51(N)-B TRIP - Only Phase A; ON=1, OFF=0	2
168	5X-B TRIP 1p.PhB	50(N)/51(N)-B TRIP - Only Phase B; ON=1, OFF=0	2
169	5X-B TRIP 1p.PhC	50(N)/51(N)-B TRIP - Only Phase C; ON=1, OFF=0	2
170	5X-B TRIP ABC	50(N)/51(N)-B TRIP Phases ABC; ON=1, OFF=0	2
171	50(N)-B1 TRIP	50(N)-B1 TRIP; ON=1, OFF=0	3
172	50(N)-B2 TRIP	50(N)-B2 TRIP; ON=1, OFF=0	3
173	51(N)-B TRIP	51(N)-B TRIP; ON=1, OFF=0	3
174	50-STUB TRIP	50-STUB TRIP; ON=1, OFF=0	3
	3.1.10 Voltage protection		
175	59-Vphg OFF	59-Vphg Overvolt. is switched OFF; ON=1, OFF=0	3
176	59-Vphg BLK	59-Vphg Overvolt. is BLOCKED; ON=1, OFF=0	3
177	59-Vphph OFF	59-Vphph Overvolt. is switched OFF; ON=1, OFF=0	3
178	59-Vphph BLK	59-Vphph Overvolt. is BLOCKED; ON=1, OFF=0	3
179	59-3Vo OFF	59-3Vo Overvolt. is switched OFF; ON=1, OFF=0	3
180	59-3Vo BLK	59-3Vo Overvolt. is BLOCKED; ON=1, OFF=0	3
181	59-V1 OFF	59-V1 Overvolt. is switched OFF; ON=1, OFF=0	3
182	59-V1 BLK	59-V1 Overvolt. is BLOCKED; ON=1, OFF=0	3
183	59-V2 OFF	59-V2 Overvolt. is switched OFF; ON=1, OFF=0	3
184	59-V2 BLK	59-V2 Overvolt. is BLOCKED; ON=1, OFF=0	3
185	27-Vphg OFF	27-Vphg Undervolt. is switched OFF; ON=1, OFF=0	3
186	27-Vphg BLK	27-Vphg Undervolt. is BLOCKED; ON=1, OFF=0	3
187	27-Vphph OFF	27-Vphph Undervolt. is switched OFF; ON=1, OFF=0	3
188	27-Vphph BLK	27-Vphph Undervolt. is BLOCKED; ON=1, OFF=0	3
189	27-V1 OFF	27-V1 Undervolt. is switched OFF; ON=1, OFF=0	3
190	27-V1 BLK	27-V1 Undervolt. is BLOCKED; ON=1, OFF=0	3
191	27/59 ACTIVE	27/59 Voltage protection is ACTIVE; ON=1, OFF=0	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	Class
192	59-1-Vpg Pickup	59-1-Vphg Pickup; ON=1, OFF=0	2
193	59-2-Vpg Pickup	59-2-Vphg Pickup; ON=1, OFF=0	2
194	59-Vpg PU A	59-Vphg Pickup A; ON=1, OFF=0	2
195	59-Vpg PU B	59-Vphg Pickup B; ON=1, OFF=0	2
196	59-Vpg PU C	59-Vphg Pickup C; ON=1, OFF=0	2
197	59-Vpg TRIP	59-Vphg TRIP command; ON=1, OFF=0	2
198	59-1-Vpp Pickup	59-1-Vphph Pickup; ON=1, OFF=0	2
199	59-2-Vpp Pickup	59-2-Vphph Pickup; ON=1, OFF=0	2
200	59-Vpp PickupAB	59-Vphph Pickup A-B; ON=1, OFF=0	3
201	59-Vpp PickupBC	59-Vphph Pickup B-C; ON=1, OFF=0	3
202	59-Vpp PickupCA	59-Vphph Pickup C-A; ON=1, OFF=0	3
203	59-Vpp TRIP	59-Vphph TRIP command; ON=1, OFF=0	2
204	59-1-3Vo Pickup	59-1-3Vo Pickup; ON=1, OFF=0	3
205	59-2-3Vo Pickup	59-2-3Vo Pickup; ON=1, OFF=0	3
206	59-3Vo TRIP	59-3Vo TRIP command; ON=1, OFF=0	2
207	59-1-V1 Pickup	59-1-V1 Pickup; ON=1, OFF=0	3
208	59-2-V1 Pickup	59-2-V1 Pickup; ON=1, OFF=0	3
209	59-V1 TRIP	59-V1 TRIP command; ON=1, OFF=0	2
210	59-1-V2 Pickup	59-1-V2 Pickup; ON=1, OFF=0	3
211	59-2-V2 Pickup	59-2-V2 Pickup; ON=1, OFF=0	3
212	59-V2 TRIP	59-V2 TRIP command; ON=1, OFF=0	2
213	27-1-V1 Pickup	27-1-V1 Pickup; ON=1, OFF=0	3
214	27-2-V1 Pickup	27-2-V1 Pickup; ON=1, OFF=0	3
215	27-V1 TRIP	27-V1 TRIP command; ON=1, OFF=0	2
216	27-1-Vpg Pickup	27-1-Vphg Pickup; ON=1, OFF=0	3
217	27-2-Vpg Pickup	27-2-Vphg Pickup; ON=1, OFF=0	3
218	27-Vpg PU A	27-Vphg Pickup A; ON=1, OFF=0	2
219	27-Vpg PU B	27-Vphg Pickup B; ON=1, OFF=0	3
220	27-Vpg PU C	27-Vphg Pickup C; ON=1, OFF=0	3
221	27-Vpg TRIP	27-Vphg TRIP command; ON=1, OFF=0	2
222	27-1-Vpp Pickup	27-1-Vphph Pickup; ON=1, OFF=0	3
223	27-2-Vpp Pickup	27-2-Vphph Pickup; ON=1, OFF=0	3
224	27-Vpp PU AB	27-Vphph Pickup A-B; ON=1, OFF=0	3
225	27-Vpp PU BC	27-Vphph Pickup B-C; ON=1, OFF=0	3

Binary Input Points
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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	Class
226	27-Vpp PU CA	27-Vphph Pickup C-A; ON=1, OFF=0	3
227	27-Vpp TRIP	27-Vphph TRIP command; ON=1, OFF=0	2
	3.1.11 Sensitive Ground fault protection		
228	SensGnd OFF	Sensitive Gnd. fault is switched OFF; ON=1, OFF=0	3
229	SensGnd BLOCK	Sensitive Ground fault is BLOCKED; ON=1, OFF=0	3
230	SensGnd ACTIVE	Sensitive Ground fault is ACTIVE; ON=1, OFF=0	3
231	Sens. Gnd Ph A	Sensitive Ground fault picked up in Ph A; ON=1, OFF=0	2
232	Sens. Gnd Ph B	Sensitive Ground fault picked up in Ph B; ON=1, OFF=0	2
233	Sens. Gnd Ph C	Sensitive Ground fault picked up in Ph C; ON=1, OFF=0	2
234	SensGnd Forward	Sensitive Gnd fault in forward direction; ON=1, OFF=0	2
235	SensGnd Reverse	Sensitive Gnd fault in reverse direction; ON=1, OFF=0	2
236	SensGnd undef.	Sensitive Gnd fault direction undefined; ON=1, OFF=0	3
237	SensGnd TRIP	Sensitve Gnd fault TRIP command; ON=1, OFF=0	2
	3.1.12 Ground fault protection		
238	50N/51N OFF	50N / 51N Ground O/C is switched OFF; ON=1, OFF=0	3
239	50N/51N BLOCK	50N / 51N Ground O/C is BLOCKED; ON=1, OFF=0	3
240	50N/51N ACTIVE	50N / 51N Ground O/C is ACTIVE; ON=1, OFF=0	3
241	50N/51N Pickup	50N/51N PICKED UP; ON=1, OFF=0	2
242	67N PU forward	67N picked up FORWARD; ON=1, OFF=0	2
243	67N PU reverse	67N picked up REVERSE; ON=1, OFF=0	2
244	50N/51N TRIP	50N/51N General TRIP command; ON=1, OFF=0	2
245	50N-1 TRIP	50N-1 TRIP; ON=1, OFF=0	3
246	50N-2 TRIP	50N-2 TRIP; ON=1, OFF=0	3
247	50N-3 TRIP	50N-3 TRIP; ON=1, OFF=0	3
248	51N TRIP	51N TRIP; ON=1, OFF=0	3
249	50/1N InrushPU	50N/51N Inrush picked up; ON=1, OFF=0	3
250	85-67N OFF	85-67N Pilot Prot. is switched OFF; ON=1, OFF=0	3
251	85-67N SEND	85-67N Carrier SEND signal; ON=1, OFF=0	3
252	85-67N TransBlk	85-67N Transient Blocking; ON=1, OFF=0	3
253	85-67N UB Fail1	85-67N Unblocking: FAILURE Channel 1; ON=1, OFF=0	3
254	85-67N UB Fail2	85-67N Unblocking: FAILURE Channel 2; ON=1, OFF=0	3
255	85-67N BL STOP	85-67N Blocking: carrier STOP signal; ON=1, OFF=0	3
256	85-67N BL Jump	85-67N Blocking: Send signal with jump; ON=1, OFF=0	3
	3.1.13 Breaker failure protection		

Binary Input Points
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Point Index	Name	Description	Class
257	50BF OFF	50BF is switched OFF; ON=1, OFF=0	3
258	50BF BLOCK	50BF is BLOCKED; ON=1, OFF=0	3
259	50BF ACTIVE	50BF is ACTIVE; ON=1, OFF=0	3
260	50BF Start	50BF Breaker failure protection started; ON=1, OFF=0	3
	3.1.14 Thermal overload protection		
261	49 O / L OFF	49 Overload Protection is OFF; ON=1, OFF=0	3
262	49 O/L BLOCK	49 Overload Protection is BLOCKED; ON=1, OFF=0	3
263	49 O/L ACTIVE	49 Overload Protection is ACTIVE; ON=1, OFF=0	3
264	49 O/L I Alarm	49 Overload Current Alarm (I alarm) ; ON=1, OFF=0	1
265	49 O/L Alarm	49 Overload Alarm! Near Thermal Trip; ON=1, OFF=0	1
266	49 Winding O/L	49 Winding Overload; ON=1, OFF=0	3
267	49 Th O/L TRIP	49 Thermal Overload TRIP; ON=1, OFF=0	2
	3.1.15 Circuit breaker test		
268	CB1-TESTtrip PhA	CB1-TEST TRIP command - Only Phase A; ON=1, OFF=0	3
269	CB1-TESTtrip PhB	CB1-TEST TRIP command - Only Phase B; ON=1, OFF=0	3
270	CB1-TESTtrip PhC	CB1-TEST TRIP command - Only Phase C; ON=1, OFF=0	3
271	CB1-TESTtripABC	CB1-TEST TRIP command ABC; ON=1, OFF=0	3
272	CB1-TEST close	CB1-TEST CLOSE command; ON=1, OFF=0	3
273	CB-TEST running	CB-TEST is in progress; ON=1, OFF=0	3
	3.1.16 Set point alarms		
274	SP. IA dmd>	Set Point Phase A dmd>; ON=1, OFF=0	1
275	SP. IB dmd>	Set Point Phase B dmd>; ON=1, OFF=0	1
276	SP. IC dmd>	Set Point Phase C dmd>; ON=1, OFF=0	1
277	SP. I1dmd>	Set Point positive sequence I1dmd>; ON=1, OFF=0	1
278	SP. |Pdmd|>	Set Point |Pdmd|>; ON=1, OFF=0	1
279	SP. |Qdmd|>	Set Point |Qdmd|>; ON=1, OFF=0	1
280	SP. |Sdmd|>	Set Point |Sdmd|>; ON=1, OFF=0	1
281	SP. PF(55)alarm	Set Point 55 Power factor alarm; ON=1, OFF=0	1
	3.1.17 Measurement supervision		
282	Fail I Superv.	Failure: general Current Supervision; ON=1, OFF=0	3
283	Failure Sum I	Failure: Current Summation; ON=1, OFF=0	1
284	Fail I balance	Failure: Current Balance; ON=1, OFF=0	1
285	Fail V Superv.	Failure: general Voltage Supervision; ON=1, OFF=0	1
286	Fail Sum V Ph-G	Failure: Voltage Summation Phase-Ground; ON=1, OFF=0	1

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Point Index	Name	Description	Class
287	Fail V balance	Failure: Voltage Balance; ON=1, OFF=0	1
288	VT FuseFail>10s	VT Fuse Failure (alarm >10s) ; ON=1, OFF=0	1
289	Fail Ph. Seq.	Failure: Phase Sequence; ON=1, OFF=0	3
290	Fail Conductor	Failure: Broken Conductor; ON=1, OFF=0	1
291	Fuse Fail M.OFF	Fuse Fail Monitor is switched OFF; ON=1, OFF=0	3
292	MeasSup OFF	Measurement Supervision is switched OFF; ON=1, OFF=0	3
	3.1.18 Diagnosis / General alarms		
293	Device OK	Device is operational and protecting; ON=1, OFF=0	1
294	ProtActive	At least one protection funct. is active; ON=1, OFF=0	2
295	Settings Calc.	Setting calculation is running; ON=1, OFF=0	3
296	Error Sum Alarm	Error with a summary alarm; ON=1, OFF=0Ñ (ref. to chap. 1.1.1)	2
297	Alarm Sum Event	Alarm Summary Event; ON=1, OFF=0Ñ (ref. to chap. 1.1.2)	2
298	Emer. mode	Emergency mode; ON=1, OFF=0	2
299	Relay PICKUP	Relay PICKUP; ON=1, OFF=0	1
300	Relay PICKUP PhA	Relay PICKUP Phase A; ON=1, OFF=0	1
301	Relay PICKUP PhB	Relay PICKUP Phase B; ON=1, OFF=0	1
302	Relay PICKUP PhC	Relay PICKUP Phase C; ON=1, OFF=0	1
303	Relay PICKUP G	Relay PICKUP GROUND; ON=1, OFF=0	1
304	Relay TRIP	Relay GENERAL TRIP command; ON=1, OFF=0	1
305	Definitive TRIP	Relay Definitive TRIP; ON=1, OFF=0	1
306	Relay TRIP PhA	Relay TRIP command Phase A; ON=1, OFF=0	1
307	Relay TRIP PhB	Relay TRIP command Phase B; ON=1, OFF=0	1
308	Relay TRIP PhC	Relay TRIP command Phase C; ON=1, OFF=0	1
	3.1.19 Internal mode status		
309	DataStop	Stop data transmission; ON=1, OFF=0Ñ (ref. to chap. 1.1.3)	3
310	Test mode	Test mode; ON=1, OFF=0	3
311	Chatter ON	Chatter ON; ON=1, OFF=0	3
312	Man.Clos.Detect	Manual close signal detected; ON=1, OFF=0	2
313	Man.Close Cmd	CB CLOSE command for manual closing; ON=1, OFF=0	2
314	Fan ON/OFF	Fan ON/OFF; ON=1, OFF=0	2
315	LOCKOUT	LOCKOUT is active; ON=1, OFF=0	1
316	>SF6-Loss	Binary input "SF6-Loss"; 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	Class
317	>Door open	Binary input "Cabinet door open"; ON=1, OFF=0	3
318	>CB wait	Binary input "CB waiting for spring charged"; ON=1, OFF=0	3
319	Cntrl Auth	Control Authority; LOCAL=1, REMOTE=0	3
320	ModeLOCAL	Control mode LOCAL; UNLOCKED=1, LOCKED=0	3
321	ModeREMOTE	Control mode REMOTE; UNLOCKED=1, LOCKED=0	3
	3.1.20 Double commands - checkback signals and status		
322	52 Breaker	Input state of circuit breaker; 0 = open, 1 = close	1
323	52 Breaker status	Circuit 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
324	Disconnect switch	Input state of disconnect switch; 0 = open, 1 = close	1
325	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
326	Gnd switch	Input state of ground switch; 0 = open, 1 = close	1
327	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
328	Switch Q2	Input state of switch Q2; 0 = open, 1 = close	1
329	Switch Q2 status	Switch Q2 failure status; 0 = switch Q2 position is open or close, 1 = switch Q2 is in an intermediate position or position state is incorrect.	1
330	Switch Q9	Input state of switch Q9; 0 = open, 1 = close	1
331	Switch Q9 status	Switch Q9 failure status; 0 = switch Q9 position is open or close, 1 = switch Q9 is in an intermediate position or position state is incorrect.	1
	3.1.21 Setting group		
332	Group A	Setting Group A; ON=1, OFF=0	1
333	Group B	Setting Group B; ON=1, OFF=0	1
334	Group C	Setting Group C; ON=1, OFF=0	1
335	Group D	Setting Group D; ON=1, OFF=0	1
	3.1.22 User-allocated single-point indications		
336	<unnamed>*	User input 1	2
337	<unnamed>	User input 2	2
338	<unnamed>	User input 3	2
339	<unnamed>	User input 4	2
340	<unnamed>	User input 5	2
341	<unnamed>	User input 6	2
342	<unnamed>	User input 7	2
343	<unnamed>	User input 8	2
344	<unnamed>	User input 9	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	Class
345	<unnamed>	User input 10	2
346	<unnamed>	User input 11	2
347	<unnamed>	User input 12	2
348	<unnamed>	User input 13	2
349	<unnamed>	User input 14	2
350	<unnamed>	User input 15	2

*The names are defined during indication allocation using parametrization software DIGSI® 4

3.2 Control Relay Output Blocks/Binary Output Status

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)**

Point Index	Name	Description	Supported Control Relay Output Block Fields
	3.2.1 External commands (Double commands)		
0	52 Breaker	Trip Breaker switch	Trip, Pulse On (On-Time Fixed*)
1	52 Breaker	Close Breaker switch	Close, Pulse On (On-Time Fixed)
2	Disconnect	Trip Disconnect switch	Trip, Pulse On (On-Time Fixed)
3	Disconnect	Close Disconnect switch	Close, Pulse On (On-Time Fixed)
4	Gnd switch	Trip Ground switch	Trip, Pulse On (On-Time Fixed)
5	Gnd switch	Close Ground switch	Close, Pulse On (On-Time Fixed)
6	Switch Q2	Trip switch 1	Trip, Pulse On (On-Time Fixed)
7	Switch Q2	Close switch 1	Close, Pulse On (On-Time Fixed)
8	Switch Q9	Trip switch 2	Trip, Pulse On (On-Time Fixed)
9	Switch Q9	Close switch 2	Close, Pulse On (On-Time Fixed)
	3.2.2 Internal commands		
10	79 ON	Activation / deactivation of Auto-reclosure function	Latch On, Latch Off
11	ProtActive	Protection activation / deactivation	Latch On, Latch Off
12	Group A	Select setting group A and deactivate setting group B,C,D (ref. to chap. 1.2.3)	Latch On
13	Group B	Select setting group B and deactivate setting group A,C,D	Latch On
14	Group C	Select setting group C and deactivate setting group A,B,D	Latch On
15	Group D	Select setting group D and deactivate setting group A,B,C	Latch On
16	ModeREMOTE	Mode remote control; UNLOCKED=1, LOCKED=0 (ref. to chap. 1.2.2)	Latch On; Latch Off
17	Pilot ON	Pilot Prot. ON/OFF (via system port)	Latch On; Latch Off

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)**

Point Index	Name	Description	Supported Control Relay Output Block Fields
	3.2.3 User-allocated single commands Please ref. to chap. 1.2.1 for additional notes.		
18	<unnamed>†	User output 1	Latch On, Latch Off
19	<unnamed>	User output 2	Latch On, Latch Off
20	<unnamed>	User output 3	Latch On, Latch Off
21	<unnamed>	User output 4	Latch On, Latch Off
22	<unnamed>	User output 5	Latch On, Latch Off
23	<unnamed>	User output 6	Latch On, Latch Off
24	<unnamed>	User output 7	Latch On, Latch Off
25	<unnamed>	User output 8	Latch On, Latch Off
26	<unnamed>	User output 9	Latch On, Latch Off
27	<unnamed>	User output 10	Latch On, Latch Off
28	<unnamed>	User output 11	Latch On, Latch Off
29	<unnamed>	User output 12	Latch On, Latch Off
30	<unnamed>	User output 13	Latch On, Latch Off
31	<unnamed>	User output 14	Latch On, Latch Off
32	<unnamed>	User output 15	Latch On, Latch Off

*The On-Time is fixed within the SIPROTEC® parameter package for each common object.
The Control Relay Output Block information on-time will be ignored.
†The names are defined during indication allocation using parametrization software DIGSI® 4

3.3 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: **1 (32-Bit Counter with Flag)**
Change Event Variation reported when variation 0 requested: **1 (32-Bit Counter without Time)**

Point Index	Name	Description	Scaling(2^{32}-1 of the unsigned long-value corresponds to...)
0	Wp(puls)	Pulsed Energy Wp (active)(metering impulses at binary input)	2^{32}-1 impulses
1	Wq(puls)	Pulsed Energy Wq (reactive)(metering impulses at binary input)	2^{32}-1 impulses
2	Wp+=	Wp Forward (metered measurand derived from measured value)	2^{32}-1 impulses
3	Wq+=	Wq Forward (metered measurand derived from measured value)	2^{32}-1 impulses
4	Wp-=	Wp Reverse (metered measurand derived from measured value)	2^{32}-1 impulses
5	Wq-=	Wq Reverse (metered measurand derived from measured value)	2^{32}-1 impulses

3.4 Analog Inputs

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(32767 corresponds to ...)	Default Change Event assigned Class
	3.4.1 Recorded measured values			
0	Ia =	Ia	3276.7 A	1
1	Ib =	Ib	3276.7 A	1
2	Ic =	Ic	3276.7 A	1
3	3Io =	3Io (zero sequence)	3276.7 A	2
4	Va =	Va	3276.7 kV	1
5	Vb =	Vb	3276.7 kV	1
6	Vc =	Vc	3276.7 kV	1
7	Va-b=	Va-b	3276.7 kV	1
8	Vb-c=	Vb-c	3276.7 kV	1
9	Vc-a=	Vc-a	3276.7 kV	1
10	3Vo =	3Vo (zero sequence)	3276.7 kV	2
11	Vdiff =	V-diff (line-bus)	3276.7 kV	2
12	Vline =	V-line	3276.7 kV	2
13	Vbus =	V-bus	3276.7 kV	2
14	P =	P (active power)	3276.7 MW	1
15	Q =	Q (reactive power)	3276.7 MVAR	1
16	PF =	Power Factor	3.2767	1
17	Freq=	Frequency	327.67 Hz	1
18	S =	S (apparent power)	3276.7 MVAR	2
19	F-bus =	Frequency (busbar)	327.67 Hz	2
20	F-diff=	Frequency (difference line-bus)	327.67 Hz	2
21	PHI-diff=	Angle (difference line-bus)	3276.6 ^{0}	2
22	F-line=	Frequency (line)	327.67 Hz	2
23	<unnamed>	User input 1		
24	<unnamed>	User input 2		
25	<unnamed>	User input 3		
26	<unnamed>	User input 4		
27	<unnamed>	User input 5		
	3.4.2 Min/Max values			
28	Ia Min=	Current phase a minimum	3276.7 A	3

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(32767 corresponds to ...)	Default Change Event assigned Class
29	Ia Max=	Current phase a maximum	3276.7 A	3
30	Ib Min=	Current phase b minimum	3276.7 A	3
31	Ib Max=	Current phase b maximum	3276.7 A	3
32	Ic Min=	Current phase c minimum	3276.7 A	3
33	Ic Max=	Current phase c maximum	3276.7 A	3
34	I1 Min=	Minimum Strommitsytem I1	3276.7 A	3
35	I1 Max=	Maximum Strommitsystem I1	3276.7 A	3
36	Va-n Min=	Voltage phase a minimum	3276.7 kV	3
37	Va-nMax=	Voltage phase a maximum	3276.7 kV	3
38	Vb-nMin=	Voltage phase b minimum	3276.7 kV	3
39	Vb-nMax=	Voltage phase b maximum	3276.7 kV	3
40	Vc-nMin=	Voltage phase c minimum	3276.7 kV	3
41	Vc-nMax=	Voltage phase c maximum	3276.7 kV	3
42	Va-bMin=	Voltage phase a to phase b minimum	3276.7 kV	3
43	Va-bMax=	Voltage phase a to phase b maximum	3276.7 kV	3
44	Vb-cMin=	Voltage phase b to phase c minimum	3276.7 kV	3
45	Vb-cMax=	Voltage phase b to phase c maximum	3276.7 kV	3
46	Vc-aMin=	Voltage phase c to phase a minimum	3276.7 kV	3
47	Vc-aMax=	Voltage phase c to phase a maximum	3276.7 kV	3
48	V1 Min =	Positive Sequence Voltage Minimum	3276.7 kV	3
49	V1 Max =	Positive Sequence Voltage Maximum	3276.7 kV	3

If Object 30 Variation 01 (32-Bit Analog Input) requesten, additional:

	3.4.3 Fault locator and fault currents			
50	Ia =	Primary fault current Ia	327.67 kA	3
51	Ib =	Primary fault current Ib	327.67 kA	3
52	Ic =	Primary fault current Ic	327.67 kA	3
53	Last Ia =	Last fault current Phase A	327.67 kA	3
54	Last Ib =	Last fault current Phase B	327.67 kA	3
55	Last Ic =	Last fault current Phase C	327.67 kA	3
56	Rpri =	Flt Locator: primary RESISTANCE	327.67 Ω	3
57	Xpri =	Flt Locator: primary REACTANCE	327.67 Ω	3

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(32767 corresponds to ...)	Default Change Event assigned Class
58	Rsec =	Flt Locator: secondary RESISTANCE	327.67 Ω	3
59	Xsec =	Flt Locator: secondary REACTANCE	327.67 Ω	3
60	dist =	Flt Locator: Distance to fault	3276.7 km	3
61	d[%] =	Flt Locator: Distance [%] to fault	3276.1 %	3
62	dist =	Flt Locator: Distance to fault	3276.7 miles	3
	3.4.4 Statistic values			
63	# TRIPs=	Number of breaker TRIP commands		3
64	# TRIPs PhA=	Number of breaker TRIP commands, Ph A		3
65	# TRIPs PhB=	Number of breaker TRIP commands, Ph B		3
66	# TRIPs PhC=	Number of breaker TRIP commands, Ph C		3
67	Sum Ia =	Accumulation of interrupted current Ph A	327.67 kA	3
68	Sum Ib =	Accumulation of interrupted current Ph B	327.67 kA	3
69	Sum Ic =	Accumulation of interrupted current Ph C	327.67 kA	3

Glossary

AME	**A**synchronous interface **m**odule with (**e**lectrical) isolated RS485 interface for the SIPROTEC devices from Siemens.
AMO	**A**synchronous 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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