SIEMENS

SIPROTEC

Line Differential Protection 7SD80

Communication Module

DNP 3.0

Buss Mapping / Point List

C53000-L2040-C347-1

NOTE

For your own safety, please observe the warnings and safety instructions contained in this document.

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Edition 07.2011

Preface

Purpose 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
Line Differential Protection SIPROTEC 7SD80	Function, operation, assembly and commissioning of the SIPROTEC device 7SD80	C53000-G1140-C474-1
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 7SD80 with
  - firmware version 4.6 and
  - DNP communication module version 02.00.01 or higher.

For device parameterization **DIGSI** 4 **version 4.xx 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 on the System SIPROTEC 4 be desired or should particular problems arise which are not covered sufficiently for the purchaser's purpose, he matter should be referred to the local Siemens representative.

Our Customer Support Center provides a 24-hour service.

Phone: +49 -180 - 5 24 70 00
Fax: +49 -180 - 5 24 24 71
e-mail: support.energy@siemens.com

Training courses

Enquiries regarding individual training courses should be addressed to our

Training Center:

Siemens AG
Power Transmission and Distribution
Power Training Center

Humboldtstr. 59
90459 Nuremberg
Germany

Phone: +49 - (911) - 433 7415
Fax: +49 - (911) - 433 7929
eMail power-academy.energy@siemens.com
Internet: www.siemens.com/energy/power-academy

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.

Contents

1 Notes to SIPROTEC objects

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

The description of the standard mappings / point lists (refer to chapter 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.

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".

Refere to chapter 3.1.8

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 0“
- "Failure Battery empty“, "Alarm Real Time Clock",
- "Failure Phase Sequence", "VT Fuse Failure", "Failure Voltage Balance", "Failure General Voltage Supervision",
- "Failure Current Balance", "Failure Current Summation", "Failure General Current Supervision".

Refere to chapter 3.1.8

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.

Refere to chapter 3.1.9

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.

Refer to chapter 3.2.2

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.

Refer to chapter 3.2.1

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".

Refer to chapter 3.2.1

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)

– >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 (refer 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

2.1 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 colored as 00, 01 (start stop) indicates Subset Level 3 functionality (beyond Subset Level 2), text colored as 07, 08 (limited qty) indicates functionality beyond Subset Level 3.

OBJECTS			REQUEST		RESPONSE	
Object	**Vari-ation**	**Description**	**Function Codes (dec)**	**Qualifier Codes (hex)**	**Function Codes (dec)**	**Qualifier Codes (hex)**
1	0	Binary Input - Any Variations	1 (read)	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 (dir. op. noack)	00, 01 (start-stop) 07, 08 (limited qfy) 17, 28 (index)	129 (response)	echo of response
20	0	Binary Counter - Any Variations	1 (read)	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)		
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)		

OBJECTS			REQUEST		RESPONSE	
Object	**Vari-ation**	**Description**	**Function Codes (dec)**	**Qualifier Codes (hex)**	**Function Codes (dec)**	**Qualifier Codes (hex)**
30	0	16-Bit Analog Input - Any Variations	1 (read)	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)
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) 130 (unsol. resp)	17, 28 (index)
50	1	Time and Date	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)		
60	3	Class 2 Data	1 (read)	06 (no range) 07, 08 (limited qfy)		
60	4	Class 3 Data	1 (read)	06 (no range) 07, 08 (limited qfy)		
80	1	Internal Indications	2 (write)	00 (start-stop) (index must = 7)		

2.2 Device Profile Document

DNP V3.0

DEVICE PROFILE DOCUMENT

Vendor Name: **SIEMENS AG**

Device Name: **7SD80**

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.

16-bit Analog Change Events with Time may be requested.

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

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:

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: ☐ 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	Sends Static Data in Unsolicited Responses: ☒ Never ☐ When Device Restarts ☐ When Status Flags Change No other options are permitted.
Default Counter Object/Variation: ☐ No Counters Reported ☐ Configurable (attach explanation) ☒ Default Object ___20_____ Default Variation ___01_____ ☐ Point-by-point list attached Sends 32-Bit counters.	Counters Roll Over at: ☐ No Counters Reported ☐ Configurable (attach explanation) ☐ 16 Bits ☒ 32 Bits ☐ Other Value _____ ☐ Point-by-point list attached
Sends Multi-Fragment Responses: ☒ Yes ☐ No	

3 Point lists

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 Interface		
29	PI FO Data failure	Prot. Interface 1: Total receipt. failure ; ON=1, OFF=0	3
31	PI Cu Data failure	Prot. Interface 1: Total receipt. failure ; ON=1, OFF=0	3
	3.1.2 Automatic recloser		
34	79 ON	79 Auto recloser is switched ON; ON=1, OFF=0	2
35	79 is blocked	79: Auto recloser is blocked; ON=1, OFF=0	2
36	79 not ready	79: Auto recloser is not ready; ON=1, OFF=0	2
37	CB not ready	79: Circuit breaker 1 not ready; ON=1, OFF=0	2
38	79 T-CBreadyExp	79: CB ready monitoring window expired; ON=1, OFF=0	3
39	79 in progress	79 - in progress; ON=1, OFF=0	2
40	79 T-Start Exp	79: Start-signal monitoring time expired; ON=1, OFF=0	3
41	79 TdeadMax Exp	79: Maximum dead time expired; ON=1, OFF=0	3
42	79 Evolving Flt	79: Evolving fault recognition; ON=1, OFF=0	3
44	79 Td. evol.Flt	79 dead time after evolving fault; ON=1, OFF=0	3
46	79 Tdead 3pTrip	79 dead time after 3pole trip running; ON=1, OFF=0	3
50	79 1stCyc. run.	79 1st cycle running; ON=1, OFF=0	3
51	79 2ndCyc. run.	79 2nd cycle running; ON=1, OFF=0	3
55	79 Close	79 Close command; ON=1, OFF=0	3
57	79 Close1.Cyc3p	79: Close command after 3pole, 1st cycle; ON=1, OFF=0	3
58	79 Close 2.Cyc	79: Close command 2nd cycle; ON=1, OFF=0	3
59	79 T-Recl. run.	79: Reclaim time is running; ON=1, OFF=0	3
60	79 Successful	79 - cycle successful; ON=1, OFF=0	3
63	79 TRIP 3pole	79: TRIP command 3pole; ON=1, OFF=0	2
64	79 1.CycZoneRel	79 1st cycle zone extension release; ON=1, OFF=0	3
65	79 2.CycZoneRel	79 2nd cycle zone extension release; ON=1, OFF=0	3
69	79 Remote Close	79: Remote close signal send; ON=1, OFF=0	3
	3.1.3 Direct Transfer Trip		
70	DTT OFF	Direct Transfer Trip is switched OFF; ON=1, OFF=0	3
71	DTT BLOCK	Direct Transfer Trip is BLOCKED; ON=1, OFF=0	3
75	DTT TRIP øABC	DTT TRIP command Phases ABC; ON=1, OFF=0	2
	3.1.4 Time Overcurrent protection		
77	5X-B BLOCK	50(N)/51(N) Backup O/C is BLOCKED; ON=1, OFF=0	3
78	5X-B ACTIVE	50(N)/51(N) Backup O/C is ACTIVE; ON=1, OFF=0	3
79	5X-B PICKUP	50(N)/51(N) Backup O/C PICKED UP; ON=1, OFF=0	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
80	5X-B Pickup Ph A	50(N)/51(N) Backup O/C PICKUP Phase A; ON=1, OFF=0	3
81	5X-B Pickup Ph B	50(N)/51(N) Backup O/C PICKUP Phase B; ON=1, OFF=0	3
82	5X-B Pickup Ph C	50(N)/51(N) Backup O/C PICKUP Phase C; ON=1, OFF=0	3
83	5X-B Pickup Gnd	50(N)/51(N) Backup O/C PICKUP GROUND; ON=1, OFF=0	3
84	50(N)-B1 PICKUP	50(N)-B1 Pickup; ON=1, OFF=0	3
85	50(N)-B2 PICKUP	50(N)-B2 Pickup; ON=1, OFF=0	3
86	51(N)-B PICKUP	51(N)-B Pickup; ON=1, OFF=0	3
87	50-STUB PICKUP	50-STUB Pickup; ON=1, OFF=0	3
88	5X-B TRIP	50(N)/51(N)-B General TRIP command; ON=1, OFF=0	2
93	50(N)-B1 TRIP	50(N)-B1 TRIP command; ON=1, OFF=0	2
94	50(N)-B2 TRIP	50(N)-B2 TRIP command; ON=1, OFF=0	2
95	51(N)-B TRIP	51(N)-B TRIP command; ON=1, OFF=0	2
96	50-STUB TRIP	50-STUB General TRIP command; ON=1, OFF=0	2
	3.1.5 Thermal overload protection		
97	49 O / L OFF	49 Overload Protection is OFF; ON=1, OFF=0	3
98	49 O/L BLOCK	49 Overload Protection is BLOCKED; ON=1, OFF=0	3
99	49 O/L ACTIVE	49 Overload Protection is ACTIVE; ON=1, OFF=0	3
100	49 O/L I Alarm	49 Overload Current Alarm (I alarm) ; ON=1, OFF=0	1
101	49 O/L Θ Alarm	49 Overload Alarm! Near Thermal Trip; ON=1, OFF=0	1
102	49 Winding O/L	49 Winding Overload; ON=1, OFF=0	3
103	49 Th O/L TRIP	49 Thermal Overload TRIP; ON=1, OFF=0	2
	3.1.6 Circuit breaker test		
107	CB1-TESTtripABC	CB1-TEST TRIP command ABC; ON=1, OFF=0	3
108	CB1-TEST close	CB1-TEST CLOSE command; ON=1, OFF=0	3
109	CB-TEST running	CB-TEST is in progress; ON=1, OFF=0	3
	3.1.7 Measurement supervision		
110	Fail I Superv.	Failure: general Current Supervision; ON=1, OFF=0	3
111	Fail I balance	Failure: Current Balance; ON=1, OFF=0	1
112	Fail V Superv.	Failure: general Voltage Supervision; ON=1, OFF=0	1
113	Fail V balance	Failure: Voltage Balance; ON=1, OFF=0	1
114	MeasSup OFF	Measurement Supervision is switched OFF; ON=1, OFF=0	3
116	Broken Iwire L1	Alarm: Broken current-wire detected L1; ON=1, OFF=0	3
117	Broken Iwire L2	Alarm: Broken current-wire detected L2; ON=1, OFF=0	1
118	Broken Iwire L3	Alarm: Broken current-wire detected L3; ON=1, OFF=0	3
	3.1.8 Diagnosis / General alarms		
119	Device OK	Device is operational and protecting; 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
120	ProtActive	At least one protection funct. is active; ON=1, OFF=0	2
121	Settings Calc.	Setting calculation is running; ON=1, OFF=0	3
122	Error Sum Alarm	Error with a summary alarm; ON=1, OFF=0 (ref. to chap. 1.1.1)	2
123	Alarm Sum Event	Alarm Summary Event; ON=1, OFF=0 (ref. to chap. 1.1.2)	2
124	Error A/D conv.	Error A/D converter; ON=1, OFF=0	2
125	Relay PICKUP	Relay PICKUP; ON=1, OFF=0	1
130	Relay TRIP	Relay GENERAL TRIP command; ON=1, OFF=0	1
131	Definitive TRIP	Relay Definitive TRIP; ON=1, OFF=0	1
135	Emer. mode	Energency mode; ON=1, OFF=0	1
	3.1.9 Internal mode status		
136	DataStop	Stop data transmission; ON=1, OFF=0 (ref. to chap. 1.1.3)	3
137	Test mode	Test mode; ON=1, OFF=0	3
138	Chatter ON	Chatter ON; ON=1, OFF=0	3
139	Man.Clos.Detect	Manual close signal detected; ON=1, OFF=0	2
140	LOCKOUT	LOCKOUT is active; ON=1, OFF=0	1
	3.1.10 Setting group		
149	Group A	Setting Group A; ON=1, OFF=0	1
150	Group B	Setting Group B; ON=1, OFF=0	1
151	Group C	Setting Group C; ON=1, OFF=0	1
152	Group D	Setting Group D; ON=1, OFF=0	1
	3.1.11 User-allocated single-point indications		
153	<unnamed>*	User input 1	2
154	<unnamed>	User input 2	2
155	<unnamed>	User input 3	2
156	<unnamed>	User input 4	2
157	<unnamed>	User input 5	2
158	<unnamed>	User input 6	2
159	<unnamed>	User input 7	2
160	<unnamed>	User input 8	2
161	<unnamed>	User input 9	2
162	<unnamed>	User input 10	2
163	<unnamed>	User input 11	2
164	<unnamed>	User input 12	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
165	<unnamed>	User input 13	2
166	<unnamed>	User input 14	2
167	<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 Internal commands		
8	79 ON	Activation / deactivation of Auto-reclosure function	Latch On, Latch Off
9	ProtActive	Protection activation / deactivation	Latch On, Latch Off
10	Group A	Select setting group A and deactivate setting group B,C,D (ref. to chap. 1.2.3)	Latch On
11	Group B	Select setting group B and deactivate setting group A,C,D	Latch On
12	Group C	Select setting group C and deactivate setting group A,B,D	Latch On
13	Group D	Select setting group D and deactivate setting group A,B,C	Latch On
14	Test 87	87 Set test state of 87; ON=1, OFF=0	Latch On; Latch Off
15	Commiss. 87	87 Set commissioning state of 87; ON=1, OFF=0	Latch On; Latch Off
17	ModeREMOTE	Mode remote control; UNLOCKED=1, LOCKED=0 (ref. to chap. 1.2.2)	Latch On; Latch Off
	3.2.2 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

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

3.3 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
	3.3.1 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	Freq=	Frequency	327.67 Hz	1
11	PI FOTD	Prot. Interface FO: Transmission delay	327,67 ms	3
12	PI CuTD	Prot. Interface Cu: Transmission delay	327,67 ms	3
13	PI FO A/m	Prot. Interface FO: Availability per min.	327,67 %	3
14	PI FO A/h	Prot. Interface FO: Availability per hour	327,67 %	3
15	PI Cu A/m	Prot. Interface Cu: Availability per min.	327,67 %	3
16	PICu A/h	Prot. Interface Cu: Availability per hour	327,67 %	3
17	<unnamed>	User input 1		2
18	<unnamed>	User input 2		2
19	<unnamed>	User input 3		2
20	<unnamed>	User input 4		2
21	<unnamed>	User input 5		2
If Object 30 Variation 01 (32-Bit Analog Input) requesten, additional:				
	3.3.2 Statistic values			
22	# TRIPs=	Number of breaker TRIP commands		3
26	Sum Ia =	Accumulation of interrupted current Ph A	327.67 kA	3
27	Sum Ib =	Accumulation of interrupted current Ph B	327.67 kA	3
28	Sum Ic =	Accumulation of interrupted current Ph C	327.67 kA	3

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

Automatic **R**ecloser

CFC

Continuous **F**unction **C**hart

DC

Double **C**ommand

DIGSI

Parameterization system for SIPROTEC devices

DNP

Distributed **N**etwork **P**rotocol

DP

Double-**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

Remote **T**erminal **U**nit

SC

Single **C**ommand

SP

Single-**p**oint Indication

Index