SIEMENS

SIPROTEC
Feeder Automation Controller 7SC80

Communication Module
DNP3 TCP

Bus Mapping/Point Lists

C53000-L2040-C353-2

NOTE

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

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Preface

Purpose of this manual

This manual describes the bus mapping of SIPROTEC 4 Communication Module with DNP3 TCP.

Target group

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.

Scope of validity of this manual

This manual is valid for SIPROTEC 4 Communication Module with DNP3 TCP.

Further 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.

Hotline

Our Customer Support Center provides around-the-clock support.

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Training courses

If you are interested in our current training program, please contact our training center:

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Notes On Safety

This manual does not constitute a complete catalog of all safety measures required for operating the equipment (module, device) in question, because special operating conditions may require additional measures. However, it does contain notes that must be adhered to for your own personal safety and to avoid damage to property. These notes are highlighted with a warning triangle and different keywords indicating different degrees of danger.

DANGER

DANGER means that death or severe injury **will** occur if the appropriate safety measures are not taken.

✧ Follow all advice instructions to prevent death or severe injury.

WARNING

WARNING means that death or severe injury **can** occur if the appropriate safety measures are not taken.

✧ Follow all advice instructions to prevent death or severe injury.

CAUTION

CAUTION means that minor or moderate injury **can** occur if the appropriate safety measures are not taken.

✧ Follow all advice instructions to prevent minor injury.

NOTICE

NOTICE means that damage to property **can** occur if the appropriate safety measures are not taken.

✧ Follow all advice instructions to prevent damage to property.

NOTE

is important information about the product, the handling of the product, or the part of the documentation in question to which special attention must be paid.

Qualified Personnel

Commissioning and operation of the equipment (module, device) described in this manual must be performed by qualified personnel only. As used in the safety notes contained in this manual, qualified personnel are those persons who are authorized to commission, release, ground and tag devices, systems, and electrical circuits in accordance with safety standards.

Use as Prescribed

The equipment (device, module) must not be used for any other purposes than those described in the Catalog and the Technical Description. If it is used together with third-party devices and components, these must be recommended or approved by Siemens.

Correct and safe operation of the product requires adequate transportation, storage, installation, and mounting as well as appropriate use and maintenance.

During the operation of electrical equipment, it is unavoidable that certain parts of this equipment will carry dangerous voltages. Severe injury or damage to property can occur if the appropriate measures are not taken:

- Before making any connections at all, ground the equipment at the PE terminal.
- Hazardous voltages can be present on all switching components connected to the power supply.
- Even after the supply voltage has been disconnected, hazardous voltages can still be present in the equipment (capacitor storage).
- Equipment with current transformer circuits must not be operated while open.
- The limit values indicated in the manual or the operating instructions must not be exceeded; this also refers to testing and commissioning

Contents

1 DNP3 TCP Device Profile

Note

Further information see in the SIPROTEC 4 document Communication Module DNP3 TCP - Communication Profile, order number C53000-L2040-C354 or in Internet http://siemens.siprotec.de/download_neu/index_e.htm.

1.1 Data Objects Implementation

The following table identifies which object variations, function codes and qualifiers the DNP3 TCP implementation of the Feeder Automation Controller 7SC80 will support in both request messages and in response messages.

For static (non-change-event) 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, qualifiers 17 or 28 are always responded.

Table 1-1 DNP3 TCP implementation table

Objects			Request		Response	
Object No.	**Var. No.**	**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, or all) 07, 08 (limited qfy)		
2	2	Binary Input Change with Time	1 (read)	06 (no range, or all) 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, or all) 07, 08 (limited qfy) 17, 28 (index)		
10	2	Binary Output with Status	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qfy) 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)	17, 28 (index)	129 (response)	echo of response

Table 1-1 DNP3 TCP implementation table (Forts.)

Objects			Request		Response	
Object No.	**Var. No.**	**Description**	**Function Codes (dec)**	**Qualifier Codes (hex)**	**Function Codes (dec)**	**Qualifier Codes (hex)**
20	0	Binary Counter - Any Variations	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qfy) 17, 28 (index)		
20	1	32-bit Binary Counter (with Flag)	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qfy) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
22	0	Counter Change Event - Any Variations	1 (read)	06 (no range, or all) 07, 08 (limited qfy)		
22	1	32-bit Counter Change Event without Time	1 (read)	06 (no range, or all) 07, 08 (limited qfy)	129 (response) 130 (unsol. resp)	17, 28 (index)
30	0	Analog Input - Any Variations (default variation = 2)	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qfy) 17, 28 (index)		
30	1	32-bit Analog Input (used for 32-Bit statistic values)	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qfy) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
30	2	16-bit Analog Input (used for measured values)	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qfy) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
32	0	Analog Change Event - Any Variations (default = 2)	1 (read)	06 (no range, or all) 07, 08 (limited qfy)		
32	1	32-bit Analog Change Event without Time	1 (read)	06 (no range, or all) 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, or all) 07, 08 (limited qfy)	129 (response) 130 (unsol. resp)	17, 28 (index)
50	1	Time and Date	1 (read)	07 (limited qfy = 1)	129 (response)	07 (limited qfy = 1)
			2 (write)	07 (limited qfy = 1)		
60	1	Class 0 Data	1 (read)	06 (no range, or all)		
60	2	Class 1 Data	1 (read)	06 (no range, or all) 07, 08 (limited qfy)		
60	3	Class 2 Data	1 (read)	06 (no range, or all) 07, 08 (limited qfy)		

Table 1-1 DNP3 TCP implementation table (Forts.)

Objects			Request		Response	
Object No.	**Var. No.**	**Description**	**Function Codes (dec)**	**Qualifier Codes (hex)**	**Function Codes (dec)**	**Qualifier Codes (hex)**
60	4	Class 3 Data	1 (read)	06 (no range, or all) 07, 08 (limited qfy)		
70	3	File Command	25 (open)	5b (free format)		
70	4	File Command Status	26 (close) 30 (abort)	5b (free format)	129 (response) 130 (unsol. resp)	5B (free format)
70	5	File Transfer	1 (read)	5b (free format)	129 (response) 130 (unsol. resp)	5B (free format)
70	6	File Transfer Status			129 (response) 130 (unsol. resp)	5B (free format)
70	7	File Descriptor	28 (get file info)	5b (free format)	129 (response) 130 (unsol. resp)	5B (free format)
80	1	Internal Indications	2 (write)	00 (start-stop) (index must = 4 or 7)		

1.2 DNP3 TCP Device Profile Documents

DNP3 TCP

DEVICE PROFILE DOCUMENT

Vendor Name: **SIEMENS AG**

Device Name: **7SC80**

Highest DNP Level Supported:	Device Function:
For Requests Level 2	☐ Master
For Responses Level 2	☒ Slave

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 07 and 08 (limited quantity), and 17 and 28 (index) are supported. Static object requests sent with qualifiers 07, or 08, will be responded with qualifiers 00 or 01.

16-bit and 32-bit Analog Change Events without Time may be requested.

Sequential file transfer, Object 70, variations 3 through 7, are supported.

Maximum Data Link Frame Size (octets):	Maximum Application Fragment Size (octets):
Transmitted: 292	Transmitted: 2048
Received: 292	Received: 2048

Maximum Data Link Re-tries:	Maximum Application Layer Re-tries:
☐ None	☒ None
☒ Fixed to 3	☐ Configurable
☐ Configurable from 0 to 65535	

Requires Data Link Layer Confirmation:

- ☒ Never
- ☐ Always
- ☐ Sometimes
- Configurable

Requires Application Layer Confirmation:

- ☐ Never
- ☐ Always
- ☒ When reporting Event Data (Slave devices only)
- ☒ When sending multi-fragment responses (Slave devices only)
- ☐ Sometimes
- ☐ Configurable

DNP3 TCP

DEVICE PROFILE DOCUMENT

Timeouts while waiting for:

Data Link Confirm	☐	None	☒	Fixed at 2 s	☐	Variable	☐	Configurable
Complete Appl. Fragment	☒	None	☐	Fixed at ____	☐	Variable	☐	Configurable
Application Confirm	☐	None	☐	Fixed at ____	☐	Variable	☒	Configurable (default: 5 s)
Complete Appl. Response	☒	None	☐	Fixed at ____	☐	Variable	☐	Configurable

Others:

Transmission Delay:no intentional delay

Select/Operate Timeout:configurable (default: 3 s)

Need Time Interval:fixed to 60 s

Unsolicited Notification Delay:configurable (default: 5 s)

Unsolicited Response Retry Delay:configurable (default: 10 s)

Unsolicited Response Trigger Conditions:

Number of Class 1 events: Configurable, range 1 to 1 000 (default 5)

Number of Class 2 events: Configurable, range 1 to 1 000 (default 5)

Number of Class 3 events: Configurable, range 1 to 1 000 (default 5)

Hold time after Class 1 Events: : Configurable, range 1 ms to 36 000 ms (default 5 000 ms)

Hold time after Class 2 Events: : Configurable, range 1 ms to 36 000 ms (default 5 000 ms)

Hold time after Class 3 Events: : Configurable, range 1 ms to 36 000 ms (default 5 000 ms)

Time Synchronisation:

Maximum Time Base Drift ((milliseconds per minute):	10ms
Maximum Internal Time Reference Error when set via DNP:	10ms
Maximum Delay Measurement Error:	10 ms
Maximum Response Time:	20 ms
Maximum Event Time-tag error:	5 ms

When does outstation set IIN1.4: - Assorted at start up until first Time Synchronisation request received
- Periodically, every 60 s

DNP3 TCP

DEVICE PROFILE DOCUMENT

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.

Reports Binary Input Change Events when no specific variation requested:	Reports time-tagged Binary Input Change Events when no specific variation requested:
☐ Never	☐ Never
☒ Only time-tagged	☒ Binary Input Change With Time
☐ Only non-time-tagged	☐ Binary Input Change With Relative Time
☐ Configurable to send one or the other	☐ Configurable

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DEVICE PROFILE DOCUMENT

Sends Unsolicited Responses: ☐ Never ☒ Configurable ☐ 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 ☒ Default Object 20 Default Variation 01 ☐ Point-by-point list attached	Counters Roll Over at: ☐ No Counters Reported ☐ Configurable (attach explanation) ☐ 16 Bits ☒ 32 Bits ☐ Other Value _____ ☐ Point-by-point list attached
Analog Inputs How Deadbands are set ☐ Global Fixed ☐ Configurable through DNP ☒ Configurable via DIGSI Analog Deadband Algorithm ☒ Simple ☒ Integrating ☐ Other	

DNP3 TCP

DEVICE PROFILE DOCUMENT

Sends Multi-Fragment Responses:

- ☒ Yes
- ☐ No
- ☐ Configurable

DNP3 Source Address Validation	☐ Yes	☒ No
Support Collision Avoidance	☐ Yes	☒ No
Support multi-drop physical layers	☐ Yes	☒ No

Sequential File Transfer Support:

Append File Mode	☐ Yes	☒ No
Custom Status Code Strings	☐ Yes	☒ No
Permissions Field	☒ Yes	☐ No
File Events Assigned to Class	☐ Yes	☒ No
File Events Send Immediately	☐ Yes	☒ No
Multiple Blocks in a Fragment	☐ Yes	☒ No
Max Number of Files	1	

2 Point Lists

2.1 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
Overcurrent Time Protection			
0	50/51 PH ACT	50/51 O/C is ACTIVE; ON = 1, OFF = 0	3
1	50N/51N ACT	50N/51N is ACTIVE; ON = 1, OFF = 0	3
2	50(N)/51(N) PU	50(N)/51(N) O/C PICKUP; ON = 1, OFF = 0	2
3	50/51 Ph A PU	50/51 Phase A picked up; ON = 1, OFF = 0	2
4	50/51 Ph B PU	50/51 Phase B picked up; ON = 1, OFF = 0	2
5	50/51 Ph C PU	50/51 Phase C picked up; ON = 1, OFF = 0	2
6	50N/51NPickedup	50N/51N picked up; ON = 1, OFF = 0	2
7	50 (N)/51(N)TRIP	50(N)/51(N) TRIP; ON = 1, OFF = 0	2
Directional Overcurrent Time Protection			
8	67 ACTIVE	67/67-TOC is ACTIVE; ON = 1, OFF = 0	3
9	67N ACTIVE	67N/67N-TOC is ACTIVE; ON = 1, OFF = 0	3
10	67/67N pickedup	67/67N picked up; ON = 1, OFF = 0	2
11	67 A picked up	67/67-TOC Phase A picked up; ON = 1, OFF = 0	2
12	67 B picked up	67/67-TOC Phase B picked up; ON = 1, OFF = 0	2
13	67 C picked up	67/67-TOC Phase C picked up; ON = 1, OFF = 0	2
14	67N picked up	67N/67N-TOC picked up; ON = 1, OFF = 0	2
15	67/67N TRIP	67/67N TRIP; ON = 1, OFF = 0	2
Frequency Protection			
16	81 ACTIVE	81 ACTIVE; ON = 1, OFF = 0	3
17	81-1 picked up	81-1 picked up; ON = 1, OFF = 0	2
18	81-2 picked up	81-2 picked up; ON = 1, OFF = 0	2
19	81-3 picked up	81-3 picked up; ON = 1, OFF = 0	2
20	81-4 picked up	81-4 picked up; ON = 1, OFF = 0	2
21	81-1 TRIP	81-1 TRIP; ON = 1, OFF = 0	2
22	81-2 TRIP	81-2 TRIP; ON = 1, OFF = 0	2
23	81-3 TRIP	81-3 TRIP; ON = 1, OFF = 0	2
24	81-4 TRIP	81-4 TRIP; ON = 1, OFF = 0	2
Voltage Protection			
25	27 ACTIVE	27 under voltage protection is ACTIVE; ON = 1, OFF = 0	3
26	27-1 picked up	27-1 under voltage picked up; ON = 1, OFF = 0	2
27	27-1 TRIP	27-1 under voltage TRIP; ON = 1, OFF = 0	2
28	27-2 picked up	27-2 under voltage 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
29	27-2 TRIP	27-2 under voltage TRIP; ON = 1, OFF = 0	2
30	27 Vx ACTIVE	27 under voltage Vx is ACTIVE; ON = 1, OFF = 0	3
31	27-1 Vx PU	27-1 under voltage Vx PICKUP; ON = 1, OFF = 0	2
32	27-1 Vx TRIP	27-1 under voltage Vx TRIP; ON = 1, OFF = 0	2
33	27-2 Vx PU	27-2 under voltage Vx PICKUP; ON = 1, OFF = 0	2
34	27-2 Vx TRIP	27-2 under voltage Vx TRIP; ON = 1, OFF = 0	2
35	59 ACTIVE	59 over voltage protection is ACTIVE; ON = 1, OFF = 0	3
36	59-1 picked up	59-1 overvoltage V> picked up; ON = 1, OFF = 0	2
37	59-1 TRIP	59-1 overvoltage V> TRIP; ON = 1, OFF = 0	2
38	59-2 picked up	59-2 overvoltage V>> picked up; ON = 1, OFF = 0	2
39	59-2 TRIP	59-2 overvoltage V>> TRIP; ON = 1, OFF = 0	2
40	59 Vx ACTIVE	59 over voltage Vx is ACTIVE; ON = 1, OFF = 0	3
41	59-1 Vx PU	59-1 over voltage Vx PICKUP; ON = 1, OFF = 0	2
42	59-1 Vx TRIP	59-1 over voltage Vx TRIP; ON = 1, OFF = 0	2
43	59-2 Vx PU	59-2 over voltage Vx PICKUP; ON = 1, OFF = 0	2
44	59-2 Vx TRIP	59-2 over voltage Vx TRIP; ON = 1, OFF = 0	2
45	59-1 PhA pickup	59-1 Phase A picked up; ON = 1, OFF = 0	2
46	59-1 PhB pickup	59-1 Phase B picked up; ON = 1, OFF = 0	2
47	59-1 PhC pickup	59-1 Phase C picked up; ON = 1, OFF = 0	2
48	59-1 PhA TRIP	59-1 Phase A TRIP; ON = 1, OFF = 0	2
49	59-1 PhB TRIP	59-1 Phase B TRIP; ON = 1, OFF = 0	2
50	59-1 PhC TRIP	59-1 Phase C TRIP; ON = 1, OFF = 0	2
51	59-2 PhA pickup	59-2 Phase A picked up; ON = 1, OFF = 0	2
52	59-2 PhB pickup	59-2 Phase B picked up; ON = 1, OFF = 0	2
53	59-2 PhC pickup	59-2 Phase C picked up; ON = 1, OFF = 0	2
54	59-2 PhA TRIP	59-2 Phase A TRIP; ON = 1, OFF = 0	2
55	59-2 PhB TRIP	59-2 Phase B TRIP; ON = 1, OFF = 0	2
56	59-2 PhC TRIP	59-2 Phase C TRIP; ON = 1, OFF = 0	2
Breaker failure protection			
57	50BF ACTIVE	50BF is ACTIVE; ON = 1, OFF = 0	3
58	50BF int Pickup	50BF (internal) PICKUP; ON = 1, OFF = 0	2
59	50BF ext Pickup	50BF (external) PICKUP; ON = 1, OFF = 0	2
60	50BF TRIP	50BF TRIP; ON = 1, OFF = 0	2
61	50BF int TRIP	50BF (internal) TRIP; ON = 1, OFF = 0	2
62	50BF ext TRIP	50BF (external) TRIP; 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
Negative sequence protection			
63	46 ACTIVE	46 is ACTIVE; ON = 1, OFF = 0	3
64	46-1 picked up	46-1 picked up; ON = 1, OFF = 0	2
65	46-2 picked up	46-2 picked up; ON = 1, OFF = 0	2
66	46 TRIP	46-2 TRIP; ON = 1, OFF = 0	2
Internal Mode Status			
67	Cntrl Auth	Control Authority; LOCAL = 1, REMOTE = 0	3
68	ModeLOCAL	Control mode LOCAL; UNLOCKED = 1, LOCKED = 0	3
69	Device OK	Device is Operational and Protecting; ON = 1, OFF = 0	1
70	Settings Calc.	Setting calculation is running; ON = 1, OFF = 0	3
71	ProtActive	At least one protection function is active; ON = 1, OFF = 0	2
72	Error Sum Alarm	Error with a summary alarm; ON = 1, OFF = 0	2
73	Alarm Sum Event	Alarm Summary Event; ON = 1, OFF = 0	2
74	Relay Pickup	Relay Pickup; ON = 1, OFF = 0	1
75	Relay TRIP	General TRIP of the relay; ON = 1, OFF = 0	1
76	Test mode	Test mode; ON = 1, OFF = 0	3
77	Fail Battery	Failure: (internal) Battery empty; ON = 1, OFF = 0	2
78	GPS ModuleError	GPS Module Error; ON = 1, OFF = 0	2
79	BATTERY BAD	(external) Battery bad or defect; ON = 1, OFF = 0	2
80	EXT.V.INVALID	Invalid external voltage; ON = 1, OFF = 0	2
81	EXT.VOLT.VALID	Valid external voltage; ON = 1, OFF = 0	2
Control Switches Return Position Indication (double point commands)			
82	52 Breaker	input state of Breaker; 0 = open, 1 = close	1
83	52 Breaker status	Breaker failure status; 0 = switch position is open or close, 1 = switch is in an intermediate position or position state is incorrect.	1
84	Disc.Swit.	input state of Disconnect Switch; 0 = open, 1 = close	1
85	Disc.Swit. status	Disconnect Switch failure status; 0 = switch position is open or close, 1 = switch is in an intermediate position or position state is incorrect.	1
86	GndSwit.	input state of Ground Switch; 0 = open, 1 = close	1
87	GndSwit. status	Ground Switch failure status; 0 = switch position is open or close, 1 = switch is in an intermediate position or position state is incorrect.	1
Internal Controls			
88	P-GrpA act	Setting Group A; 0 = Group A is deactivated, 1 = Group A is activated and Groups B, C, D are deactivated.	1
89	P-GrpB act	Setting Group B; 0 = Group B is deactivated, 1 = Group B is activated and Groups A, C, D are deactivated.	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
90	P-GrpC act	Setting Group C; 0 = Group C is deactivated, 1 = Group C is activated and Groups A, B, D are deactivated.	1
91	P-GrpD act	Setting Group D; 0 = Group D is deactivated, 1 = Group D is activated and Groups A, B, C are deactivated.	1
92	ModeREMOTE	Control mode REMOTE; UNLOCKED = 1, LOCKED = 0	3
HMI			
93	Local ON	Local Mode is active	3
94	Auto ON	Auto Mode is active	3
95	Restore ON	Restoration Mode is active	3
96	Simulation ON	Simulation Mode is active	3
97	HotLineTag ON	Hot Line Tag is active	3
98	MotorInhibit ON	Motor Inhibit is active	3
99	Lockout ON	Lockout is active	3

2.2 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
External Commands (double point commands)			
0	52Breaker	Trip command for Circuit Breaker	Trip, Pulse On (On Time Fixed[1])
1	52Breaker	Close command for Circuit Breaker	Close, Pulse On (On Time Fixed[1])
2	Disc.Swit.	Trip command for Disconnect Switch	Trip, Pulse On (On Time Fixed[1])
3	Disc.Swit.	Close command for Disconnect Switch	Close, Pulse On (On Time Fixed[1])
4	GndSwit.	Trip command for Ground Switch	Trip, Pulse On (On Time Fixed[1])
5	GndSwit.	Close command for Ground Switch	Close, Pulse On (On Time Fixed[1])
Internal Commands			
6	P-GrpA act	Select Setting Group A and deactivate Groups B, C, D	Latch On
7	P-GrpB act	Select Setting Group B and deactivate Groups A, C, D	Latch On
8	P-GrpC act	Select Setting Group C and deactivate Groups A, B, D	Latch On
9	P-GrpD act	Select Setting Group D and deactivate Groups A, B, C	Latch On
10	ModeREMOTE	Mode REMOTE control; Latch On = UNLOCKED Latch Off = LOCKED	Latch On; Latch Off

1 The on-time is fixed within the SIPROTEC 4 parameter package for each command object. The Control Relay Output Block information on-time will be ignored.

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 DNP3 if the parameter **Change to Another Setting Group** (parameter address = 302) has the value "Protocol".

Control Mode REMOTE

Control mode with control authority is REMOTE, option of unlocked control with DNP3.

- Changing the “Control mode REMOTE“ to UNLOCKED permits one unlocked control operation via DNP3. After execution of the command, the “Control mode REMOTE“ in the SIPROTEC 4 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 DNP3 for a period of 5 minutes, then the “Control mode REMOTE“ is automatically reset to LOCKED.

2.3 Counters

For scaling of counters please ref. to manual „DNP3 TCP communication profile“.

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...)**	**Class**
0	Wp+=	Wp Forward (metered measurand derived from measured value)	2^{32}-1 impulses	2
1	Wq+=	Wq Forward (metered measurand derived from measured value)	2^{32}-1 impulses	2
2	Wp-=	Wp Reverse (metered measurand derived from measured value)	2^{32}-1 impulses	2
3	Wq-=	Wq Reverse (metered measurand derived from measured value)	2^{32}-1 impulses	2
4	Wp(puls) =	Pulsed Energy Wp (active) (metering impulses at binary input)	2^{32}-1 impulses	2
5	Wq(puls) =	Pulsed Energy Wq (reactive) (metering impulses at binary input)	2^{32}-1 impulses	2
6	#of TRIPs	Number of TRIPs	2^{32}-1 TRIPs	3

2.4 Analog Inputs

For scaling of measured values transmitted as 16-bit Analog Input please ref. to manual „DNP3 TCP communication profile“

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 ...)	Class
Recorded Measured Values				
0	Ia =	Current phase a	3276.7 A	1
1	Ib =	Current phase b	3276.7 A	1
2	Ic =	Current phase c	3276.7 A	1
3	In =	Current In	3276.7 A	1
4	Va =	Voltage phase a	32.767 kV	1
5	Vb =	Voltage phase b	32.767 kV	1
6	Vc =	Voltage phase c	32.767 kV	1
7	Va-b =	Voltage phase a to phase b	32.767 kV	1
8	Vb-c =	Voltage phase b to phase c	32.767 kV	1
9	Vc-a =	Voltage phase c to phase a	32.767 kV	1
10	VN =	Voltage ground	32.767 kV	1
11	P =	Active power	32767 kW	1
12	Q =	Reactive power	32767 kVar	1
13	S =	Apparent power	32767 kVar	1
14	Freq =	Frequency	327.67 Hz	1
15	PF =	Power factor	3.2767	1
16	Vx =	4th voltage input Vx	32.767 kV	1
17	Vbat =	Battery voltage	3276.7 V	1
18	SysTemp =	System temperature	3276.7 °C / F	1
Min/Max Values				
19	Ia Min=	Current phase a minimum	3276.7 A	3
20	Ia Max=	Current phase a maximum	3276.7 A	3
21	Ib Min=	Current phase b minimum	3276.7 A	3
22	Ib Max=	Current phase b maximum	3276.7 A	3
23	Ic Min=	Current phase c minimum	3276.7 A	3
24	Ic Max=	Current phase c maximum	3276.7 A	3
25	Va-nMin=	Voltage phase a minimum	32.767 kV	3
26	Va-nMax=	Voltage phase a maximum	32.767 kV	3
27	Vb-nMin=	Voltage phase b minimum	32.767 kV	3
28	Vb-nMax=	Voltage phase b maximum	32.767 kV	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 ...)	Class
29	Vc-nMin=	Voltage phase c minimum	32.767 kV	3
30	Vc-nMax=	Voltage phase c maximum	32.767 kV	3
31	Vn Min=	Voltage neutral minimum	32.767 kV	3
32	Vn Max=	Voltage neutral maximum	32.767 kV	3
33	Pmin=	Active power minimum	32767 kW	3
34	Pmax=	Active power maximum	32767 kW	3
35	Qmin=	Reactive power minimum	32767 kVar	3
36	Qmax=	Reactive power maximum	32767 kVar	3
37	Smin=	Apparent power minimum	32767 kVar	3
38	Smax=	Apparent power maximum	32767 kVar	3
39	fmin=	frequency Minimum	327.67 Hz	3
40	fmax=	frequency Maximum	327.67 Hz	3
41	PF min=	Power factor minimum	3.2767	3
42	PF max=	Power factor maximum	3.2767	3
If Object 30 Variation 01 (32-bit Analog Input) requesten, additional:				
Statistic Values				
43	Ia =	Primary fault current Ia	32767 A	1
44	Ib =	Primary fault current Ib	32767 A	1
45	Ic =	Primary fault current Ic	32767 A	1
46	Sum Ia =	Accumulation of interrupted current Ph A	327.67 kA	3
47	Sum Ib =	Accumulation of interrupted current Ph B	327.67 kA	3
48	Sum Ic =	Accumulation of interrupted current Ph C	327.67 kA	3
49	Op. Hours=	Counter of operating hours	32767 h	1
50	Q0 OpCnt=	Circuit Breaker operation counter	32767	3
51	Q1 OpCnt=	Disconnector Switch operation counter	32767	3
52	Q8 OpCnt=	Ground Switch operation counter	32767	3
53	dist =	Fault locator: distance to fault	3276.7 km/miles	3

Fault currents and Fault locator

Always the latest fault currents and fault location is stored.

In the event of a fault, reading out the fault record protocol from the SIPROTEC 4 device is necessary for an exact diagnosis.

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