

SIEMENS

SIPROTEC Multi-Functional Protective Relay with Local Control 7SJ6x

Communication Module
DNP3 IP

Bus Mapping/Point Lists

Preface

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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 communication profile of SIPROTEC 4 Communication Module with DNP3 IP.

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 IP.

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.

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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

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1 DNP3 IP Device Profile

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**Note**

Further information see in the SIPROTEC 4 document Communication Module DNP3 IP - 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 IP implementation of the Multi-Functional Protective Relay with Local Control 7SJ6x 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 IP 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 IP implementation table (cont.)

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)		

1.1 Data Objects Implementation

Table 1-1 DNP3 IP implementation table (cont.)

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 qty)		
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 IP Device Profile Documents

DNP3 IP	
DEVICE PROFILE DOCUMENT	
Vendor Name: SIEMENS AG	
Device Name: 7SJ6x	
Highest DNP Level Supported:	Device Function:
For Requests Level 2	<input type="checkbox"/> Master
For Responses Level 2	<input checked="" type="checkbox"/> Slave
<p>Notable objects, functions, and/or qualifiers supported in addition to the Highest DNP Levels Supported (the complete list is described in the attached table):</p> <p>For static (non-change-event) object requests, request qualifier codes 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.</p> <p>16-bit and 32-bit Analog Change Events without Time may be requested.</p> <p>Sequential file transfer, Object 70, variations 3 through 7, are supported.</p>	
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:
<input checked="" type="checkbox"/> None	<input checked="" type="checkbox"/> None
<input type="checkbox"/> Fixed	<input type="checkbox"/> Configurable
<input type="checkbox"/> Configurable from 0 to 65535	
Requires Data Link Layer Confirmation:	
<input checked="" type="checkbox"/> Never	
<input type="checkbox"/> Always	
<input type="checkbox"/> Sometimes	
Configurable	
Requires Application Layer Confirmation:	
<input type="checkbox"/> Never	
<input type="checkbox"/> Always	
<input checked="" type="checkbox"/> When reporting Event Data (Slave devices only)	
<input checked="" type="checkbox"/> When sending multi-fragment responses (Slave devices only)	
<input type="checkbox"/> Sometimes	
<input type="checkbox"/> Configurable	

DNP3 IP

DEVICE PROFILE DOCUMENT

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 (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)

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:

- Never
- Only time-tagged
- Only non-time-tagged
- Configurable to send one or the other

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

DNP3 IP**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

Sends Multi-Fragment Responses:

- Yes
 No
 Configurable

Sequential File Transfer Support:

- | | | |
|-------------------------------|---|--|
| Append File Mode | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| Custom Status Code Strings | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| Permissions Field | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| File Events Assigned to Class | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| File Events Send Immediately | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| Multiple Blocks in a Fragment | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| Max Number of Files | 1 | |

2 Point Lists

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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
Automatic Reclosure Status			
0	79 ON	79 Auto recloser is switched ON; ON = 1, OFF = 0	2
1	CB is NOT ready	Circuit breaker is NOT ready; ON = 1, OFF = 0	2
2	79 DynBlock	79 – Auto-reclose is dynamically BLOCKED; ON = 1, OFF = 0	3
3	79 in progress	79 – in progress; ON = 1, OFF = 0	2
4	79 Close	79 – Close command; ON = 1	3
5	79 Successful	79 – cycle successful; ON = 1, OFF = 0	3
6	79 Lockout	79 – Lockout; ON = 1, OFF = 0	1
7	79 L_N Sequence	79-A/R single phase reclosing sequence; Program earthfault is running = 1, Program is deactivated = 0	3
8	79 L-L Sequence	79-A/R multi-phase reclosing sequence; ON = 1, OFF = 0	3
Overcurrent Time Protection			
9	50/51 PH ACT	50/51 O/C is ACTIVE; ON = 1, OFF = 0	3
10	50N/51N ACT	50N/51N is ACTIVE; ON = 1, OFF = 0	3
11	50(N) / 51(N) PU	50(N)/51(N) O/C PICKUP; ON = 1, OFF = 0	2
12	50/51 Ph A PU	50/51 Phase A picked up; ON = 1, OFF = 0	2
13	50/51 Ph B PU	50/51 Phase B picked up; ON = 1, OFF = 0	2
14	50/51 Ph C PU	50/51 Phase C picked up; ON = 1, OFF = 0	2
15	50N/51NPickedup	50N/51N picked up; ON = 1, OFF = 0	2
16	50(N)/51(N)TRIP	50(N)/51(N) TRIP; ON = 1	2
InRush Function			
17	PhA InrushBlk	Phase A trip blocked by inrush detection; ON = 1, OFF = 0	3
18	PhB InrushBlk	Phase B trip blocked by inrush detection; ON = 1, OFF = 0	3
19	PhC InrushBlk	Phase C trip blocked by inrush detection; ON = 1, OFF = 0	3
20	INRUSH X-BLK	Cross blk: PhX blocked Phy; ON = 1, OFF = 0	3
Directional Overcurrent Time Protection			
21	67 ACTIVE	67/67-TOC is ACTIVE; ON = 1, OFF = 0	3
22	67N ACTIVE	67N/67N-TOC is ACTIVE; ON = 1, OFF = 0	3
23	67/67N pickedup	67/67N picked up; ON = 1, OFF = 0	2
24	67 A picked up	67/67-TOC Phase A picked up; ON = 1, OFF = 0	2
25	67 B picked up	67/67-TOC Phase B picked up; ON = 1, OFF = 0	2
26	67 C picked up	67/67-TOC Phase C picked up; ON = 1, OFF = 0	2
27	67N picked up	67N/67N-TOC picked up; ON = 1, OFF = 0	2
28	67/67N TRIP	67/67N 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
Unbalanced Load Protection			
29	46 ACTIVE	46 is ACTIVE; ON = 1, OFF = 0	3
30	46-2 picked up	46-2 picked up; ON = 1, OFF = 0	2
31	46-TOC pickedup	46-TOC picked up; ON = 1, OFF = 0	2
32	46 TRIP	46 TRIP picked up; ON = 1, OFF = 0	2
33	46-1 picked up	46-1 picked up; ON = 1, OFF = 0	2
Frequency Protection			
34	81 ACTIVE	81 ACTIVE; ON = 1, OFF = 0	3
35	81-1 picked up	81-1 picked up; ON = 1, OFF = 0	2
36	81-2 picked up	81-2 picked up; ON = 1, OFF = 0	2
37	81-1 TRIP	81-1 TRIP; ON = 1, OFF = 0	2
38	81-2 TRIP	81-2 TRIP; ON = 1, OFF = 0	2
Voltage Protection			
39	27 ACTIVE	27 under voltage protection is ACTIVE; ON = 1, OFF = 0	3
40	27-1 picked up	27-1 under voltage picked up; ON = 1, OFF = 0	2
41	27-1 TRIP	27-1 under voltage TRIP; ON = 1, OFF = 0	2
42	59 ACTIVE	59 over voltage protection is ACTIVE; ON = 1, OFF = 0	3
43	59-1 picked up	59-1 overvoltage V> picked up; ON = 1, OFF = 0	2
44	59-1 TRIP	59-1 overvoltage V> TRIP; ON = 1, OFF = 0	2
Highly Sensitive Earth Fault Protection			
45	50Ns/67Ns ACT	50Ns/67Ns is ACTIVE; ON = 1, OFF = 0	3
46	64 Pickup	64 displacement voltage pick up; ON = 1, OFF = 0	2
47	64 Trip	64 displacement voltage element TRIP; ON = 1, OFF = 0	2
48	50Ns-2 Pickup	50Ns-2 Pickup; ON = 1, OFF = 0	2
49	50Ns-2 TRIP	50Ns-2 TRIP; ON = 1, OFF = 0	2
50	50Ns-1 Pickup	50Ns-1 Pickup; ON = 1, OFF = 0	2
51	50Ns-1 TRIP	50Ns-1 TRIP; ON = 1, OFF = 0	2
52	Sens. Gnd Ph A	Sensitive Ground fault picked up in Ph A; ON = 1, OFF = 0	2
53	Sens. Gnd Ph B	Sensitive Ground fault picked up in Ph B; ON = 1, OFF = 0	2
54	Sens. Gnd Ph C	Sensitive Ground fault picked up in Ph C; ON = 1, OFF = 0	2
55	SensGnd Forward	Sensitive Gnd fault in forward direction; ON = 1, OFF = 0	2
56	SensGnd Reverse	Sensitive Gnd fault in reverse direction; ON = 1, OFF = 0	2
Motor start protection			
57	66 ACTIVE	66 Motor start protection ACTIVE; ON = 1, OFF = 0	3
58	66 TRIP	66 Motor start protection 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
Start-up Supervision			
59	START-SUP ACT	Startup supervision is ACTIVE; ON = 1, OFF = 0	3
60	START-SUP TRIP	Startup supervision TRIP; ON = 1, OFF = 0	2
61	START-SUP pu	Startup supervision Pickup; ON = 1, OFF = 0	2
Trip coil monitor			
62	74TC ACTIVE	74TC Trip circuit supervision is ACTIVE; ON = 1, OFF = 0	3
63	FAIL: Trip cir.	74TC Failure Trip Circuit; ON = 1, OFF = 0	1
Internal Mode Status			
64	Cntrl Auth	Control Authority; LOCAL = 1, REMOTE = 0	3
65	ModeLOCAL	Control mode LOCAL; UNLOCKED = 1, LOCKED = 0	3
66	Device OK	Device is Operational and Protecting; ON = 1, OFF = 0	1
67	Settings Calc.	Setting calculation is running; ON = 1, OFF = 0	3
68	ProtActive	At least one protection function is active; ON = 1, OFF = 0	2
69	Error Sum Alarm	Error with a summary alarm; ON = 1, OFF = 0	2
70	Alarm Sum Event	Alarm Summary Event; ON = 1, OFF = 0	2
71	Relay Pickup	Relay Pickup; ON = 1, OFF = 0	1
72	Relay TRIP	General TRIP of the relay; ON = 1, OFF = 0	1
73	Test mode	Test mode; ON = 1, OFF = 0	3
Control Switches Return Position Indication (from double-point commands)			
74	52 Breaker	input state of Breaker; 0 = open, 1 = close	1
75	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
76	Disc.Swit.	input state of Disconnect Switch; 0 = open, 1 = close	1
77	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
78	GndSwit.	input state of Ground Switch; 0 = open, 1 = close	1
79	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
80	user defined Switch 1	input state of Switch 1; 0 =open, 1=close	1
81	user defined Switch 1 status	Switch 1 failure status; 0 = Switch 1 position is open or close, 1 = switch 1 is in an intermediate position or position state is incorrect.	1
82	user defined Switch 2	input state of Switch 2; 0 = open, 1 =close	1
83	user defined Switch 2 status	Switch 2 failure status; 0 = Switch 2 position is open or close, 1 = Switch 2 is in an intermediate position or position state is incorrect.	1
84	user defined Switch 3	input state of Switch 3; 0 = open, 1 =close	1
85	user defined Switch 3 status	Switch 3 failure status; 0 = Switch 3 position is open or close, 1 = Switch 3 is in an intermediate position or position state is incorrect.	1

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
86	user defined Switch 4	input state of Switch 4; 0 = open, 1 =close	1
87	user defined Switch 4 status	Switch 4 failure status; 0 = Switch 4 position is open or close, 1 = Switch 4 is in an intermediate position or position state is incorrect.	1
88	user defined Switch 5	input state of Switch 5; 0 = open, 1 =close	1
89	user defined Switch 5 status	Switch 5 failure status; 0 = Switch 5 position is open or close, 1 = Switch 5 is in an intermediate position or position state is incorrect.	1
90	user defined Switch 6	input state of Switch 6; 0 = open, 1 =close	1
91	user defined Switch 6 status	Switch 6 failure status; 0 = Switch 6 position is open or close, 1 = Switch 6 is in an intermediate position or position state is incorrect.	1
Internal Controls			
92	P-GrpA act	Setting Group A; 0 = Group A is deactivated, 1 = Group A is activated and Groups B, C, D are deactivated.	1
93	P-GrpB act	Setting Group B; 0 = Group B is deactivated, 1 = Group B is activated and Groups A, C, D are deactivated.	1
94	P-GrpC act	Setting Group C; 0 = Group C is deactivated, 1 = Group C is activated and Groups A, B, D are deactivated.	1
95	P-GrpD act	Setting Group D; 0 = Group D is deactivated, 1 = Group D is activated and Groups A, B, C are deactivated.	1
96	ModeREMOTE	Control mode REMOTE; UNLOCKED = 1, LOCKED = 0	3
User defined single-point Indications			
In the DIGSI Configuration Matrix , further protection indications, single-point indications or taggings can be allocated as "destination system interface" to the "<user defined>" positions.			
97	<user defined>	not pre-allocated	1
98	<user defined>	not pre-allocated	1
99	<user defined>	not pre-allocated	1
100	<user defined>	not pre-allocated	1
101	<user defined>	not pre-allocated	1
102	<user defined>	not pre-allocated	1
103	<user defined>	not pre-allocated	1
104	<user defined>	not pre-allocated	1
105	<user defined>	not pre-allocated	1
106	<user defined>	not pre-allocated	1
107	<user defined>	not pre-allocated	1
108	<user defined>	not pre-allocated	1
109	<user defined>	not pre-allocated	1
110	<user defined>	not pre-allocated	1
111	<user defined>	not pre-allocated	1
112	<user defined>	not pre-allocated	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
113	<user defined>	not pre-allocated	1
114	<user defined>	not pre-allocated	1
115	<user defined>	not pre-allocated	1
116	<user defined>	not pre-allocated	1
117	<user defined>	not pre-allocated	1
118	<user defined>	not pre-allocated	1
119	<user defined>	not pre-allocated	1
120	<user defined>	not pre-allocated	1
121	<user defined>	not pre-allocated	1
122	<user defined>	not pre-allocated	1
123	<user defined>	not pre-allocated	1
124	<user defined>	not pre-allocated	1
125	<user defined>	not pre-allocated	1
126	<user defined>	not pre-allocated	1
127	<user defined>	not pre-allocated	1
128	<user defined>	not pre-allocated	1
129	<user defined>	not pre-allocated	1
130	<user defined>	not pre-allocated	1
131	<user defined>	not pre-allocated	1
132	<user defined>	not pre-allocated	1
133	<user defined>	not pre-allocated	1
134	<user defined>	not pre-allocated	1
135	<user defined>	not pre-allocated	1
136	<user defined>	not pre-allocated	1
137	<user defined>	not pre-allocated	1
138	<user defined>	not pre-allocated	1
139	<user defined>	not pre-allocated	1
140	<user defined>	not pre-allocated	1
141	<user defined>	not pre-allocated	1
142	<user defined>	not pre-allocated	1
143	<user defined>	not pre-allocated	1
144	<user defined>	not pre-allocated	1
145	<user defined>	not pre-allocated	1
146	<user defined>	not pre-allocated	1
147	<user defined>	not pre-allocated	1
148	<user defined>	not pre-allocated	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
149	<user defined>	not pre-allocated	1
150	<user defined>	not pre-allocated	1
151	<user defined>	not pre-allocated	1
152	<user defined>	not pre-allocated	1
153	<user defined>	not pre-allocated	1
154	<user defined>	not pre-allocated	1
155	<user defined>	not pre-allocated	1
156	<user defined>	not pre-allocated	1
157	<user defined>	not pre-allocated	1
158	<user defined>	not pre-allocated	1
159	<user defined>	not pre-allocated	1
160	<user defined>	not pre-allocated	1

2.2 Control Relay Output Blocks/Binary Output Status

Point Index	Name	Description	Supported Control Relay Output Block Fields
Binary Output Status Points			
Object Number: 10			
Request Function Codes supported: 1 (Read)			
Default Variation reported when variation 0 requested: 2 (Binary Output Status)			
Control Relay Output Blocks/Binary Output Status			
Object Number: 12			
Request Function Codes supported: 3 (select), 4 (operate), 5 (direct operate), 6 (direct operate, no ack)			
External Commands (double-point commands)			
0	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)
6	user defined Switch 1	Trip command for Switch 1	Trip, Pulse On (On Time Fixed ¹)
7	user defined Switch 1	Close command for Switch 1	Close, Pulse On (On Time Fixed ¹)
8	user defined Switch 2	Trip command for Switch 2	Trip, Pulse On (On Time Fixed ¹)
9	user defined Switch 2	Close command for Switch 2	Close, Pulse On (On Time Fixed ¹)
10	user defined Switch 3	Trip command for Switch 3	Trip, Pulse On (On Time Fixed ¹)
11	user defined Switch 3	Close command for Switch 3	Close, Pulse On (On Time Fixed ¹)
12	user defined Switch 4	Trip command for Switch 4	Trip, Pulse On (On Time Fixed ¹)
13	user defined Switch 4	Close command for Switch 4	Close, Pulse On (On Time Fixed ¹)
14	user defined Switch 5	Trip command for Switch 5	Trip, Pulse On (On Time Fixed ¹)
15	user defined Switch 5	Close command for Switch 5	Close, Pulse On (On Time Fixed ¹)
16	user defined Switch 6	Trip command for Switch 6	Trip, Pulse On (On Time Fixed ¹)
17	user defined Switch 6	Close command for Switch 6	Close, Pulse On (On Time Fixed ¹)
Internal Commands			
18	P-GrpA act	Select Setting Group A and deactivate Groups B, C, D	Latch On
19	P-GrpB act	Select Setting Group B and deactivate Groups A, C, D	Latch On
20	P-GrpC act	Select Setting Group C and deactivate Groups A, B, D	Latch On

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
21	P-GrpD act	Select Setting Group D and deactivate Groups A, B, C	Latch On
22	ModeREMOTE	Mode REMOTE control; Latch On = UNLOCKED Latch Off = LOCKED	Latch On; Latch Off
User defined single Commands			
In the DIGSI Configuration Matrix , further single commands or taggings can be allocated as "source system interface" to the "<user defined>" positions.			
23	<user defined>	not pre-allocated	Latch On; Latch Off
24	<user defined>	not pre-allocated	Latch On; Latch Off
25	<user defined>	not pre-allocated	Latch On; Latch Off
26	<user defined>	not pre-allocated	Latch On; Latch Off
27	<user defined>	not pre-allocated	Latch On; Latch Off
28	<user defined>	not pre-allocated	Latch On; Latch Off
29	<user defined>	not pre-allocated	Latch On; Latch Off
30	<user defined>	not pre-allocated	Latch On; Latch Off
31	<user defined>	not pre-allocated	Latch On; Latch Off
32	<user defined>	not pre-allocated	Latch On; Latch Off
33	<user defined>	not pre-allocated	Latch On; Latch Off
34	<user defined>	not pre-allocated	Latch On; Latch Off
35	<user defined>	not pre-allocated	Latch On; Latch Off
36	<user defined>	not pre-allocated	Latch On; Latch Off
37	<user defined>	not pre-allocated	Latch On; Latch Off
38	<user defined>	not pre-allocated	Latch On; Latch Off
39	<user defined>	not pre-allocated	Latch On; Latch Off
40	<user defined>	not pre-allocated	Latch On; Latch Off
41	<user defined>	not pre-allocated	Latch On; Latch Off
42	<user defined>	not pre-allocated	Latch On; Latch Off
43	<user defined>	not pre-allocated	Latch On; Latch Off
44	<user defined>	not pre-allocated	Latch On; Latch Off
45	<user defined>	not pre-allocated	Latch On; Latch Off
46	<user defined>	not pre-allocated	Latch On; Latch Off
47	<user defined>	not pre-allocated	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 a setting group simultaneously switches OFF the currently active setting group.

Transmission of the OFF value is insignificant for the switching of the setting group and is rejected by the SIPROTEC device.

Switching the setting group via DNP3 IP is only possible if the parameter **Change to Another Setting Group** (parameter address = 0302) has the value **via 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 IP 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

The scaling factor of the metered values can be determined with the following relationship:

Scaling

The scaling of the metered values derived from measured values refers to the following:

$$60,000 \text{ pulses/h at } V = V_{\text{rated}} \text{ and } I = I_{\text{rated}}$$

V_{rated} = rated operating voltage of the primary installation (parameter address = 1101)

I_{rated} = rated operating current of the primary installation (parameter address = 1102)

Example

Parameterization in the parameter set is:

$$I_{\text{rated}} = 100 \text{ A and } V_{\text{rated}} = 12 \text{ kV}$$

Therefore, 60,000 pulses correspond to:

$$1 \text{ h} * 100 \text{ A} * 12 \text{ kV} * \sqrt{3} = 2078.46 \text{ kWh}$$



NOTE

- The type of restoring (cyclic, with or without deletion) and the restoring interval must be set for the metered values using the DIGSI parameterization software.
- The scaling of the metered values at a binary input (pulse counter) depends on the externally connected pulse generator.

2.4 Analog Inputs

The scaling of measured values can be adapted during parameterization in DIGSI.
Further information for scaling of measured values transmitted as 16-bit Analog Input please ref. to manual „DNP3 IP 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
In the DIGSI Configuration Matrix , further measured values can be allocated as "destination system interface" to the "<user defined>" positions.				
16	<user defined>	not pre-allocated	-	1
17	<user defined>	not pre-allocated	-	1
18	<user defined>	not pre-allocated	-	2
19	<user defined>	not pre-allocated	-	2
20	<user defined>	not pre-allocated	-	2
21	<user defined>	not pre-allocated	-	2
22	<user defined>	not pre-allocated	-	2
23	<user defined>	not pre-allocated	-	2
24	<user defined>	not pre-allocated	-	2
25	<user defined>	not pre-allocated	-	2
26	<user defined>	not pre-allocated	-	2

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
27	<user defined>	not pre-allocated	-	2
Min/Max Values				
28	Ia Min=	Current phase a minimum	3276.7 A	3
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	Va-nMin=	Voltage phase a minimum	32.767 kV	3
35	Va-nMax=	Voltage phase a maximum	32.767 kV	3
36	Vb-nMin=	Voltage phase b minimum	32.767 kV	3
37	Vb-nMax=	Voltage phase b maximum	32.767 kV	3
38	Vc-nMin=	Voltage phase c minimum	32.767 kV	3
39	Vc-nMax=	Voltage phase c maximum	32.767 kV	3
40	Vn Min=	Voltage neutral minimum	32.767 kV	3
41	Vn Max=	Voltage neutral maximum	32.767 kV	3
42	Pmin=	Active power minimum	32767 kW	3
43	Pmax=	Active power maximum	32767 kW	3
44	Qmin=	Reactive power minimum	32767 kVar	3
45	Qmax=	Reactive power maximum	32767 kVar	3
46	Smin=	Apparent power minimum	32767 kVar	3
47	Smax=	Apparent power maximum	32767 kVar	3
48	fmin=	frequency Minimum	327.67 Hz	3
49	fmax=	frequency Maximum	327.67 Hz	3
50	PF min=	Power factor minimum	3.2767	3
51	PF max=	Power factor maximum	3.2767	3
If Object 30 Variation 01 (32-bit Analog Input) requesten, additional:				
Statistic Values				
52	Ia =	Primary fault current Ia	32767 A	1
53	Ib =	Primary fault current Ib	32767 A	1
54	Ic =	Primary fault current Ic	32767 A	1
55	Sum Ia =	Accumulation of interrupted current Ph A	327.67 kA	3
56	Sum Ib =	Accumulation of interrupted current Ph B	327.67 kA	3
57	Sum Ic =	Accumulation of interrupted current Ph C	327.67 kA	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
58	Op. Hours=	Counter of operating hours	32767 h	1
In the DIGSI Configuration Matrix , further statistic values can be allocated as "destination system interface" to the "<user defined>" positions.				
59	<user defined>	not pre-allocated	-	1
60	<user defined>	not pre-allocated	-	1

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