

# SIEMENS

## SIPROTEC Overcurrent Time Protection 7SJ80 and Motor Protection 7SK80

Communication Module  
DNP3 IP

Bus Mapping/Point Lists

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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 bus mapping 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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Phone: +49 (180) 524-7000  
Fax: +49 (180) 524-2471  
Internet: <http://www.siprotec.com>  
e-mail: [support.energy@siemens.com](mailto:support.energy@siemens.com)

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Siemens AG  
Siemens Power Academy TD

Humboldtstr. 59

D-90459 Nuremberg  
Germany

Phone: +49 (911) 433-7415  
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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.

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### **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.

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**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](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 Overcurrent Time Protection 7SJ80 and Motor Protection 7SK80 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)		

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

<b>DNP3 IP</b>	
<b>DEVICE PROFILE DOCUMENT</b>	
Vendor Name: <b>SIEMENS AG</b>	
Device Name: <b>7SJ80</b> and <b>7SK80</b>	
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**

## 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 Indications

Table 2-1 Indications

Point Inex	Name	Type	Class
0	79 ON	single point	2
1	79 is not ready	single point	2
2	79 DynBlock	single point	3
3	79 in progress	single point	2
4	79 close	single point	3
5	79 successful	single point	3
6	79 lockout	single point	1
7	79 L-N sequence	single point	3
8	79 L-L sequence	single point	3
9	50/51 PH ACT	single point	3
10	50N/51N ACT	single point	3
11	50N/51N PU	single point	2
12	50/51 Ph A PU	single point	2
13	50/51 Ph B PU	single point	2
14	50/51 Ph C PU	single point	2
15	50N/51NPickedup	single point	2
16	50 (N)/51(N)TRIP	single point	2
17	PhA InrushBlk	single point	3
18	PhB InrushBlk	single point	3
19	PhC InrushBlk	single point	3
20	INRUSH X-BLK	single point	3
21	67 ACTIVE	single point	3
22	67N ACTIVE	single point	3
23	67/67N pickedup	single point	2

Table 2-1 Indications (cont.)

Point Inex	Name	Type	Class
24	67 A picked up	single point	2
25	67 B picked up	single point	2
26	67 C picked up	single point	2
27	67N picked up	single point	2
28	67/67N TRIP	single point	2
29	46 ACTIVE	single point	3
30	46-2 picked up	single point	2
31	46-TOC pickedup	single point	2
32	46 TRIP	single point	2
33	46-1 picked up	single point	2
34	81 ACTIVE	single point	3
35	81-1 picked up	single point	2
36	81-2 picked up	single point	2
37	81-1 TRIP	single point	3
38	81-2 TRIP	single point	2
39	27 ACTIVE	single point	3
40	27-1 picked up	single point	2
41	27-1 TRIP	single point	2
42	59 ACTIVE	single point	3
43	59-1 picked up	single point	2
44	59-1 TRIP	single point	2
45	50Ns/67Ns ACT	single point	3
46	64 Pickup	single point	2
47	64 Trip	single point	2
48	50Ns-2 Pickup	single point	2
49	50Ns-2 TRIP	single point	2

Table 2-1 Indications (cont.)

Point Inex	Name	Type	Class
50	50Ns-1 Pickup	single point	2
51	50Ns-1 TRIP	single point	2
52	Sens. Gnd Ph A	single point	2
53	Sens. Gnd Ph B	single point	2
54	Sens. Gnd Ph C	single point	2
55	SensGnd Forward	single point	2
56	SensGnd Reverse	single point	2
57	66 ACTIVE	single point	3
58	66 TRIP	single point	2
59	48 START-SUP ACT	single point	3
60	48 START-SUP TRIP	single point	2
61	48 START-SUP pu	single point	2
62	74TC ACTIVE	single point	3
63	FAIL: Trip cir.	single point	1
64	control aut.	single point	1
65	modeLOCAL	single point	1
66	Relay OK	single point	1
67	Running_settings Calc.	single point	3
68	protection act.	single point	1
69	Error Sum Alarm	single point	2
70	Alarm Sum Event	single point	2
71	Relay Pickup	single point	1
72	Relay TRIP	single point	1
73	>Test mode	single point	3
74	52 Breaker	double point	1
76	Switch 1	double point	1

Table 2-1 Indications (cont.)

Point Inex	Name	Type	Class
78	Switch 2	double point	1
80	Switch 3	double point	1
82	Switch 4	double point	1
84	Switch 5	double point	1
86	Switch 6	double point	1
88	Switch 7	double point	1
90	Switch 8	double point	1
92	Group A active	single point	1
93	Group B active	single point	1
94	Group C active	single point	1
95	Group D active	single point	1
96	ModeREMOTE	single point	1
97	>switch 1	single point	1
98	>switch 2	single point	1
99	>switch 3	single point	1
100	>switch 4	single point	1
101	>switch 5	single point	1
102	>switch 6	single point	1
103	>switch 7	single point	1
104	>switch 8	single point	1
105	>switch 9	single point	1
106	>switch 10	single point	1
107	>switch 11	single point	1
108	>switch 12	single point	1
109	>switch 13	single point	1
110	>switch 14	single point	1

Table 2-1 Indications (cont.)

Point Inex	Name	Type	Class
111	>switch 15	single point	1
112	>switch 16	single point	1
113	>switch 17	single point	1
114	>switch 18	single point	1
115	>switch 19	single point	1
116	>switch 20	single point	1
117	>switch 21	single point	1
118	>switch 22	single point	1
119	>switch 23	single point	1
120	>switch 24	single point	1
121	>switch 25	single point	1
122	user defined	single point	1
123	user defined	single point	1
124	user defined	single point	1
125	user defined	single point	1
126	user defined	single point	1
127	user defined	single point	1
128	user defined	single point	1
129	user defined	single point	1
130	user defined	single point	1
131	user defined	single point	1
132	user defined	single point	1
133	user defined	single point	1
134	user defined	single point	1
135	user defined	single point	1
136	user defined	single point	1

Table 2-1 Indications (cont.)

Point Inex	Name	Type	Class
137	user defined	single point	1
138	user defined	single point	1
139	user defined	single point	1
140	user defined	single point	1
141	user defined	single point	1
142	user defined	single point	1
143	user defined	single point	1
144	user defined	single point	1
145	user defined	single point	1
146	user defined	single point	1
147	user defined	single point	1
148	user defined	single point	1
149	user defined	single point	1
150	user defined	single point	1
151	user defined	single point	1
152	user defined	single point	1
153	user defined	single point	1
154	user defined	single point	1
155	user defined	single point	1
156	user defined	single point	1
157	user defined	single point	1
158	user defined	single point	1
159	user defined	single point	1
160	user defined	single point	1

## 2.2 Control

Table 2-2 Control

Point Index	Name	Type
0	52 Breaker	double command
2	user defined	double command
4	user defined	double command
6	Switch 01	double command
8	Switch 02	double command
10	Switch 03	double command
12	Switch 04	double command
14	Switch 05	double command
16	Switch 06	double command
18	Group A	single command
19	Group B	single command
20	Group C	single command
21	Group D	single command
22	ModeREMOTE	single command
23	User Output 1	single command
24	User Output 2	single command
25	User Output 3	single command
26	User Output 4	single command
27	User Output 5	single command
28	User Output 6	single command
29	User Output 7	single command
30	User Output 8	single command
31	User Output 9	single command
32	User Output 10	single command



Table 2-2 Control (cont.)

Point Index	Name	Type
33	User Output 11	single command
34	User Output 12	single command
35	User Output 13	single command
36	User Output 14	single command
37	User Output 15	single command
38	User Output 16	single command
39	User Output 17	single command
40	User Output 18	single command
41	User Output 19	single command
42	User Output 20	single command
43	User Output 21	single command
44	User Output 22	single command
45	User Output 23	single command
46	User Output 24	single command
47	User Output 25	single command

## 2.3 Analog Inputs

### 2.3.1 Measurements

Table 2-3 Measurements

Point Index	Name	Class
0	Ia =	1
1	Ib =	1
2	Ic =	1
3	In =	1
4	Va =	1
5	Vb =	1
6	Vc =	1
7	Va-b =	1
8	Vb-c =	1
9	Va-c =	1
10	VN =	1
11	P =	1
12	Q =	1
13	S =	1
14	Freq =	1
15	PF =	1
16	UsrMW1	1
17	UsrMW2	1
18	UsrMW3	2
19	UsrMW4	2
20	UsrMW5	2
21	UsrMW6	2

Table 2-3 Measurements (cont.)

Point Index	Name	Class
22	UsrMW7	1
23	UsrMW8	1
24	UsrMW9	2
25	UsrMW10	2
26	UsrMW11	2
27	UsrMW12	2
28	Ia Min =	3
29	Ia Max =	3
30	Ib Min =	3
31	Ib Max =	3
32	Ic Min =	3
33	Ic Max =	3
34	Va-n Min =	3
35	Va-n Max =	3
36	Vb-n Min =	3
37	Vb-n Max =	3
38	Vc-n Min =	3
39	Vc-n Max =	3
40	Vn Min =	3
41	Vn Max =	3
42	P Min =	3
43	P Max =	3
44	Q Min =	3
45	Q Max =	3
46	S Min =	3
47	S Max =	3

Table 2-3 Measurements (cont.)

Point Index	Name	Class
48	f Min =	3
49	f Max =	3
50	cos Min =	3
51	cos Max =	3
52	(0)Ia =	1
53	(0)Ib =	1
54	(0)Ic =	1
55	Sum Ia =	1
56	Sum Ib =	1
57	Sum Ic =	1
58	Op. Hours	1
59	<user defined>	1
60	<user defined>	1

### 2.3.2 Counters

Table 2-4 Counters

Point Index	Name	Class
0	Wp+ =	1
1	Wq+ =	1
2	Wp- =	1
3	Wq- =	1
4	Wp(puls) =	1
5	Wq(puls) =	1

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