

SIPROTEC

Multifunction Paralleling Devices 7VE61 and 7VE63

Communication module

DNP 3.0

Bus mapping / Point lists

Preface

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Liability statement

We have checked the contents of this manual against the described hardware and software. Nevertheless, deviations may occur so that we cannot guarantee the entire harmony with the product.

The contents of this manual will be checked in periodical intervals, corrections will be made in the following editions. We look forward to your suggestions for improvement.

We reserve the right to make technical improvements without notice.

1.01.00

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Preface

Aim of This Manual The manual is divided 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
SIPROTEC Multifunction Paralleling Devices 7VE61 and 7VE63	Function, operation, assembly and commissioning of the SIPROTEC® devices 7VE61 and 7VE63	C53000-G1176-C163-1
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 7VE61 and 7VE63 with
 - firmware version 4.0 or higher and
 - DNP communication module version 02.00.01 or higher.

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

Additional Support

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

Training Courses

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

Instructions and Warnings

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

The following terms are used:

DANGER

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

Warning

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

Caution

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

Note

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



Warning!

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

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

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

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

QUALIFIED PERSONNEL

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

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

Typographic and Symbol Conventions

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

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

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

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

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

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Notes to SIPROTEC[®] objects

1

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

1.1	Binary Inputs / Annunciations	1-2
1.2	Binary Outputs / Commands	1-3
1.3	Analog Inputs / Measured values	1-3



Note

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

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

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 ADC", "Failure Sampling", "Error A/D converter"
- "Alarm adjustm.", "Error Relay R1", "Error Relay R2"
- "Sync Fail Ch U1", "Sync Fail Ch U2", "Sync Seq. U1 fail", "Sync Seq. U1 fail", "Sync FG-Error", "Sync Fail. Conf."
- "Sy1 ParErr", "Sy2 ParErr", "Sy3 ParErr", "Sy4 ParErr", "Sy5 ParErr", "Sy6 ParErr", "Sy7 ParErr", "Sy8 ParErr"
- "Error Board 0", "Error Board 1", "Error Board 2", "Error Board 3", "Error Board 4", "Error Board 5", "Error Board 6", "Error Board 7"

Reference ref to chap. 3.1.1

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:

- "Failure Battery"
- "Clock Sync Error"
- "Error Offset"

- Sync Fail Error™

Reference ret. to chap. 3.1.1

1.2 Binary Outputs / Commands



Note

The allocation of the output relays to the switching devices and to the output channels is defined during parametrization of the SIPROTEC® devices.

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

1.2.1 Single Commands

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

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

Reference ref. to chap. 3.2.3

1.2.2 Changing the setting group

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

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

Reference ref. to chap. 3.2.2

1.3 Analog Inputs / Measured values



Note

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

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

Measurement: Full Scale Voltage (parameter address 1103):

- >100 ... 1000 kV



Note

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

DNP V3.0 Device Profile

2

2.1	Implementation Table	2-2
2.2	Device Profile Document	2-4

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, qualifiers 17 or 28 are always responded.

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

OBJECTS			REQUEST		RESPONSE	
Object	Variation	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
1	0	Binary Input - Any Variations	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qty) 17, 28 (index)		
1	2	Binary Input with Status	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qty) 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 qty)		
2	2	Binary Input Change with Time	1 (read)	06 (no range) 07, 08 (limited qty)	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 qty) 17, 28 (index)		
10	2	Binary Output with Status	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qty) 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 qty) 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 qty) 17, 28 (index)		
20	1	32-Bit Binary Counter (with Flag)	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qty) 17, 28 (index)		
22	0	Counter Change Event - Any Variations	1 (read)	06 (no range) 07, 08 (limited qty)		
22	1	32-Bit Counter Change Event without Time	1 (read)	06 (no range) 07, 08 (limited qty)		

OBJECTS			REQUEST		RESPONSE	
Object	Variation	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
30	0	16-Bit Analog Input - Any Variations	1 (read)	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

<h1 style="margin: 0;">DNP V3.0</h1> <h2 style="margin: 0;">DEVICE PROFILE DOCUMENT</h2>	
Vendor Name: SIEMENS AG	
Device Name: 7VE61 and 7VE63	
Highest DNP Level Supported: For Requests DNP-L2 For Responses DNP-L2	Device Function: <input type="checkbox"/> Master <input checked="" type="checkbox"/> 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 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): Transmitted <u> 292 </u> Received <u> 292 </u>	Maximum Application Fragment Size (octets): Transmitted <u> Configurable up to 2048 </u> Received <u> 2048 </u>
Maximum Data Link Re-tries: <input checked="" type="checkbox"/> None <input type="checkbox"/> Fixed at <input type="checkbox"/> Configurable, range <u> 0 </u> to <u> 255 </u>	Maximum Application Layer Re-tries: <input checked="" type="checkbox"/> None <input type="checkbox"/> Configurable, range <u> </u> to <u> </u> (Fixed is not permitted)
Requires Data Link Layer Confirmation: <input type="checkbox"/> Never <input type="checkbox"/> Always <input type="checkbox"/> Sometimes If 'Sometimes', when? _____ <input checked="" type="checkbox"/> Configurable If 'Configurable', how? by the protection data processing program DIGSI® 4	

Requires Application Layer Confirmation:

- Never
- Always (not recommended)
- When reporting Event Data (Slave devices only)
- When sending multi-fragment responses (Slave devices only)
- Sometimes If 'Sometimes', when? _____
- Configurable If 'Configurable', how? by the protection data processing program DIGSI® 4

Timeouts while waiting for:

- | | | | | |
|-------------------------|--|---|-----------------------------------|--|
| Data Link Confirm | <input type="checkbox"/> None | <input type="checkbox"/> Fixed at _____ | <input type="checkbox"/> Variable | <input checked="" type="checkbox"/> Configurable |
| Complete Appl. Fragment | <input checked="" type="checkbox"/> None | <input type="checkbox"/> Fixed at _____ | <input type="checkbox"/> Variable | <input type="checkbox"/> Configurable |
| Application Confirm | <input type="checkbox"/> None | <input type="checkbox"/> Fixed at _____ | <input type="checkbox"/> Variable | <input checked="" type="checkbox"/> Configurable |
| Complete Appl. Response | <input checked="" type="checkbox"/> None | <input type="checkbox"/> Fixed at _____ | <input type="checkbox"/> Variable | <input type="checkbox"/> Configurable |

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

Sends/Executes Control Operations:

- | | | | | |
|-------------------------|---|--|------------------------------------|---------------------------------------|
| WRITE Binary Outputs | <input checked="" type="checkbox"/> Never | <input type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| SELECT/OPERATE | <input type="checkbox"/> Never | <input checked="" type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| DIRECT OPERATE | <input type="checkbox"/> Never | <input checked="" type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| DIRECT OPERATE - NO ACK | <input type="checkbox"/> Never | <input checked="" type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Count > 1 | <input checked="" type="checkbox"/> Never | <input type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Pulse On | <input type="checkbox"/> Never | <input checked="" type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Pulse Off | <input checked="" type="checkbox"/> Never | <input type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Latch On | <input type="checkbox"/> Never | <input checked="" type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Latch Off | <input type="checkbox"/> Never | <input checked="" type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Queue | <input checked="" type="checkbox"/> Never | <input type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Clear Queue | <input checked="" type="checkbox"/> Never | <input type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> 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

<p>Reports Binary Input Change Events when no specific variation requested:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input checked="" type="checkbox"/> Only time-tagged <input type="checkbox"/> Only non-time-tagged <input type="checkbox"/> Configurable to send both, one or the other (attach explanation) 	<p>Reports time-tagged Binary Input Change Events when no specific variation requested:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input checked="" type="checkbox"/> Binary Input Change With Time <input type="checkbox"/> Binary Input Change With Relative Time <input type="checkbox"/> Configurable (attach explanation)
<p>Sends Unsolicited Responses:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input checked="" type="checkbox"/> Configurable (Unsolicited data response mode are switched on/off via the configuration tool) <input type="checkbox"/> Only certain objects <input type="checkbox"/> Sometimes (attach explanation) <input checked="" type="checkbox"/> ENABLE/DISABLE UNSOLICITED Function codes supported 	<p>Sends Static Data in Unsolicited Responses:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Never <input type="checkbox"/> When Device Restarts <input type="checkbox"/> When Status Flags Change <p>No other options are permitted.</p>
<p>Default Counter Object/Variation:</p> <ul style="list-style-type: none"> <input type="checkbox"/> No Counters Reported <input type="checkbox"/> Configurable (attach explanation) <input checked="" type="checkbox"/> Default Object <u> 20 </u> Default Variation <u> 01 </u> <input type="checkbox"/> Point-by-point list attached <p>Sends 32-Bit counters.</p>	<p>Counters Roll Over at:</p> <ul style="list-style-type: none"> <input type="checkbox"/> No Counters Reported <input type="checkbox"/> Configurable (attach explanation) <input type="checkbox"/> 16 Bits <input checked="" type="checkbox"/> 32 Bits <input type="checkbox"/> Other Value _____ <input type="checkbox"/> Point-by-point list attached
<p>Sends Multi-Fragment Responses: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>	

Point lists

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3.2	Control Relay Output Blocks/Binary Output Status	3-7
3.3	Analog Inputs	3-10

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 Diagnosis / General alarms			
0	Device OK	Device is operational and protecting; ON=1, OFF=0	1
1	ProtActive	At least one protection funct. is active; ON=1, OFF=0	2
2	Error Sum Alarm	Error with a summary alarm; ON=1, OFF=0 (ref. to chap. 1.1.1)	2
3	Alarm Sum Event	Alarm Summary Event; ON=1, OFF=0 (ref. to chap. 1.1.2)	2
4	Relay PICKUP	Relay PICKUP; ON=1, OFF=0	1
5	Relay TRIP	Relay GENERAL TRIP command; ON=1, OFF=0	1
3.1.2 Error Synchronizing			
6	25 Mon Time Exc	25 Monitoring time exceeded; ON=1, OFF=0	3
7	25 FG-Error	25 Multible selection of func-groups; ON=1, OFF=0	3
8	25 Fail. Conf	25 Failure in Configuration; ON=1, OFF=0	2
9	25 sup. asym.	25-supervision V1, V2 asymmetrical; ON=1, OFF=0	2
10	25 sup alpha	25- supervision Alpha>; ON=1, OFF=0	2
11	25-1 PaErr	25-group 1: Parameter not plausible; ON=1, OFF=0	2
12	25-2 PaErr	25-group 2: Parameter not plausible; ON=1, OFF=0	2
13	25-3 PaErr	25-group 3: Parameter not plausible; ON=1, OFF=0	2
14	25-4 PaErr	25-group 4: Parameter not plausible; ON=1, OFF=0	2
15	25-5 PaErr	25-group 5: Parameter not plausible; ON=1, OFF=0	2
16	25-6 PaErr	25-group 6: Parameter not plausible; ON=1, OFF=0	2
17	25-7 PaErr	25-group 7: Parameter not plausible; ON=1, OFF=0	2
18	25-8 PaErr	25-group 8: Parameter not plausible; ON=1, OFF=0	2
3.1.3 Synchronizing			
19	25-1 activ	25 Function group 1 is activ; ON=1, OFF=0	2
20	25-2 activ	25 Function group 2 is activ; ON=1, OFF=0	2
21	25-3 activ	25 Function group 3 is activ; ON=1, OFF=0	2
22	25-4 activ	25 Function group 4 is activ; ON=1, OFF=0	2
23	25-5 activ	25 Function group 5 is activ; ON=1, OFF=0	2
24	25-6 activ	25 Function group 6 is activ; ON=1, OFF=0	2
25	25-7 activ	25 Function group 7 is activ; ON=1, OFF=0	2
26	25-8 activ	25 Function group 8 is activ; ON=1, OFF=0	2
27	25-1 meas.	25-group 1: measurement in progressv; 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
28	25-2 meas.	25-group 2: measurement in progressv; ON=1, OFF=0	2
29	25-3 meas.	25-group 3: measurement in progressv; ON=1, OFF=0	2
30	25-4 meas.	25-group 4: measurement in progressv; ON=1, OFF=0	2
31	25-5 meas.	25-group 5: measurement in progressv; ON=1, OFF=0	2
32	25-6 meas.	25-group 6: measurement in progressv; ON=1, OFF=0	2
33	25-7 meas.	25-group 7: measurement in progressv; ON=1, OFF=0	2
34	25-8 meas.	25-group 8: measurement in progressv; ON=1, OFF=0	2
35	25-1 BLOCK	25-group 1 is BLOCKED; ON=1, OFF=0	2
36	25-2 BLOCK	25-group 2 is BLOCKED; ON=1, OFF=0	2
37	25-3 BLOCK	25-group 3 is BLOCKED; ON=1, OFF=0	2
38	25-4 BLOCK	25-group 4 is BLOCKED; ON=1, OFF=0	2
39	25-5 BLOCK	25-group 5 is BLOCKED; ON=1, OFF=0	2
40	25-6 BLOCK	25-group 6 is BLOCKED; ON=1, OFF=0	2
41	25-7 BLOCK	25-group 7 is BLOCKED; ON=1, OFF=0	2
42	25-8 BLOCK	25-group 8 is BLOCKED; ON=1, OFF=0	2
43	25 V1> V2<	25 Condition V1>V2< fulfilled; ON=1, OFF=0	3
44	25 V1< V2>	25 Condition V1<V2> fulfilled; ON=1, OFF=0	3
45	25 V1< V2<	25 Condition V1<V2< fulfilled; ON=1, OFF=0	3
46	25 Vdiff ok	25 Voltage difference (Vdiff) okay; ON=1, OFF=0	3
47	25 fdiff ok	25 Frequency difference (fdiff) okay; ON=1, OFF=0	3
48	25 α diff ok	25 Angle difference (α diff) okay; ON=1, OFF=0	2
49	25 f1>>	25 Frequency f1 > fmax permissible; ON=1, OFF=0	2
50	25 f1<<	25 Frequency f1 < fmin permissible; ON=1, OFF=0	2
51	25 f2>>	25 Frequency f2 > fmax permissible; ON=1, OFF=0	2
52	25 f2<<	25 Frequency f2 < fmin permissible; ON=1, OFF=0	2
53	25 V1>>	25 Voltage V1 > Vmax permissible; ON=1, OFF=0	2
54	25 V1<<	25 Voltage V1 < Vmin permissible; ON=1, OFF=0	2
55	25 V2>>	25 Voltage V2 > Vmax permissible; ON=1, OFF=0	2
56	25 V2<<	25 Voltage V2 < Vmin permissible; ON=1, OFF=0	2
57	25 V2>V1	25 Vdiff too large (V2>V1); ON=1, OFF=0	2
58	25 V2<V1	25 Vdiff too large (V2<V1); ON=1, OFF=0	2
59	25 f2>f1	25 fdiff too large (f2>f1); ON=1, OFF=0	2
60	25 f2<f1	25 fdiff too large (f2<f1); ON=1, OFF=0	2
61	25 α 2> α 1	25 α diff too large (α 2> α 1); 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
62	25 $\alpha 2 < \alpha 1$	25 α diff too large ($\alpha 2 < \alpha 1$); ON=1, OFF=0	2
63	25 synchron 1	25 Synchronisation condition 1 okay; ON=1, OFF=0	2
64	25 synchron 2	25 Synchronisation condition 2 okay; ON=1, OFF=0	2
65	25 Close Rel 1-1	25 Release of Close command 1-1; ON=1, OFF=0	2
66	25 Close Rel 2-1	25 Release of Close command 2-1; ON=1, OFF=0	2
67	25 Close Rel 1-2	25 Release of Close command 1-2; ON=1, OFF=0	2
68	25 Close Rel 2-2	25 Release of Close command 2-2; ON=1, OFF=0	2
69	25 Close Rel 1-3	25 Release of Close command 1-3; ON=1, OFF=0	2
70	25 Close Rel 2-3	25 Release of Close command 2-3; ON=1, OFF=0	2
71	25 Close Rel 1-4	25 Release of Close command 1-4; ON=1, OFF=0	2
72	25 Close Rel 2-4	25 Release of Close command 2-4; ON=1, OFF=0	2
73	25 Close Rel 1-5	25 Release of Close command 1-5; ON=1, OFF=0	2
74	25 Close Rel 2-5	25 Release of Close command 2-5; ON=1, OFF=0	2
75	25 Close Rel 1-6	25 Release of Close command 1-6; ON=1, OFF=0	2
76	25 Close Rel 2-6	25 Release of Close command 2-6; ON=1, OFF=0	2
77	25 Close Rel 1-7	25 Release of Close command 1-7; ON=1, OFF=0	2
78	25 Close Rel 2-7	25 Release of Close command 2-7; ON=1, OFF=0	2
79	25 Close Rel 1-8	25 Release of Close command 1-8; ON=1, OFF=0	2
80	25 Close Rel 2-8	25 Release of Close command 2-8; ON=1, OFF=0	2
81	25 V2 down	25 decrease voltage V2; ON=1, OFF=0	2
82	25 V2 up	25 increase voltage V2; ON=1, OFF=0	2
83	25 f2 down	25 decrease frequency f2; ON=1, OFF=0	2
84	25 f2 up	25 increase frequency f2; ON=1, OFF=0	2
3.1.4 Setting group			
85	Group A	Setting Group A; ON=1, OFF=0	1
86	Group B	Setting Group B; ON=1, OFF=0	1
87	Group C	Setting Group C; ON=1, OFF=0	1
88	Group D	Setting Group D; ON=1, OFF=0	1
3.1.5 Double commands - checkback signals and status			
89	Switch 1	Input state of Switch 1; 0 = open, 1 = close	1
90	Switch 1 status	Switch 1 failure status; 0 = switch position is open or close, 1 = switch is in an intermediate position or position state is incorrect.	1
91	Switch 2	Input state of Switch 2; 0 = open, 1 = close	1
92	Switch 2 status	Switch 2 failure status; 0 = switch position is open or close, 1 = switch 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
3.1.6 User-allocated single-point indications			
93	<unnamed>	User input 1	2
94	<unnamed>	User input 2	2
95	<unnamed>	User input 3	2
96	<unnamed>	User input 4	2
97	<unnamed>	User input 5	2
98	<unnamed>	User input 6	2
99	<unnamed>	User input 7	2
100	<unnamed>	User input 8	2
101	<unnamed>	User input 9	2
102	<unnamed>	User input 10	2
103	<unnamed>	User input 11	2
104	<unnamed>	User input 12	2
105	<unnamed>	User input 13	2
106	<unnamed>	User input 14	2
107	<unnamed>	User input 15	2
108	<unnamed>	User input 16	2
109	<unnamed>	User input 17	2
110	<unnamed>	User input 18	2
111	<unnamed>	User input 19	2
112	<unnamed>	User input 20	2
113	<unnamed>	User input 21	2
114	<unnamed>	User input 22	2
115	<unnamed>	User input 23	2
116	<unnamed>	User input 24	2
117	<unnamed>	User input 25	2
118	<unnamed>	User input 26	2
119	<unnamed>	User input 27	2
120	<unnamed>	User input 28	2
121	<unnamed>	User input 29	2
122	<unnamed>	User input 30	2
123	<unnamed>	User input 31	2
124	<unnamed>	User input 32	2
125	<unnamed>	User input 33	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
126	<unnamed>	User input 34	2
127	<unnamed>	User input 35	2
128	<unnamed>	User input 36	2
129	<unnamed>	User input 37	2
130	<unnamed>	User input 38	2
131	<unnamed>	User input 39	2
132	<unnamed>	User input 40	2
133	<unnamed>	User input 41	2
134	<unnamed>	User input 42	2
135	<unnamed>	User input 43	2
136	<unnamed>	User input 44	2
137	<unnamed>	User input 45	2
138	<unnamed>	User input 46	2
139	<unnamed>	User input 47	2
140	<unnamed>	User input 48	2
141	<unnamed>	User input 49	2
142	<unnamed>	User input 50	2

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

3.2 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)			
3.2.1 External commands (Double commands)			
0	Switch 1	Trip Switch 1	Trip, Pulse On (On-Time Fixed*)
1	Switch 1	Close Switch 1	Close, Pulse On (On-Time Fixed)
2	Switch 2	Trip Switch 2	Trip, Pulse On (On-Time Fixed)
3	Switch 2	Close Switch 2	Close, Pulse On (On-Time Fixed)
3.2.2 Internal commands			
4	Group A	Select setting group A and deactivate setting group B,C,D (ref. to chap. 1.2.2)	Latch On
5	Group B	Select setting group B and deactivate setting group A,C,D	Latch On
6	Group C	Select setting group C and deactivate setting group A,B,D	Latch On
7	Group D	Select setting group D and deactivate setting group A,B,C	Latch On
3.2.3 User-allocated single commands			
Please ref. to chap. 1.2.1 for additional notes.			
8	<unnamed> [†]	User output 1	Latch On, Latch Off
9	<unnamed>	User output 2	Latch On, Latch Off
10	<unnamed>	User output 3	Latch On, Latch Off
11	<unnamed>	User output 4	Latch On, Latch Off
12	<unnamed>	User output 5	Latch On, Latch Off
13	<unnamed>	User output 6	Latch On, Latch Off
14	<unnamed>	User output 7	Latch On, Latch Off
15	<unnamed>	User output 8	Latch On, Latch Off
16	<unnamed>	User output 9	Latch On, Latch Off
17	<unnamed>	User output 10	Latch On, Latch Off
18	<unnamed>	User output 11	Latch On, Latch Off
19	<unnamed>	User output 12	Latch On, Latch Off
20	<unnamed>	User output 13	Latch On, Latch Off

Binary Output Status Points

Object Number: **10**

Request Function Codes supported: **1 (Read)**

Default Variation reported when variation 0 requested: **2 (Binary Output Status)**

Control Relay Output Blocks/Binary Output Status

Object Number: **12**

Request Function Codes supported: **3 (select), 4 (operate), 5 (direct operate), 6 (direct operate, no ack)**

Point Index	Name	Description	Supported Control Relay Output Block Fields
21	<unnamed>	User output 14	Latch On, Latch Off
22	<unnamed>	User output 15	Latch On, Latch Off
23	<unnamed>	User output 16	Latch On, Latch Off
24	<unnamed>	User output 17	Latch On, Latch Off
25	<unnamed>	User output 18	Latch On, Latch Off
26	<unnamed>	User output 19	Latch On, Latch Off
27	<unnamed>	User output 20	Latch On, Latch Off
28	<unnamed>	User output 21	Latch On, Latch Off
29	<unnamed>	User output 22	Latch On, Latch Off
30	<unnamed>	User output 23	Latch On, Latch Off
31	<unnamed>	User output 24	Latch On, Latch Off
32	<unnamed>	User output 25	Latch On, Latch Off
33	<unnamed>	User output 26	Latch On, Latch Off
34	<unnamed>	User output 27	Latch On, Latch Off
35	<unnamed>	User output 28	Latch On, Latch Off
36	<unnamed>	User output 29	Latch On, Latch Off
37	<unnamed>	User output 30	Latch On, Latch Off
38	<unnamed>	User output 31	Latch On, Latch Off
39	<unnamed>	User output 32	Latch On, Latch Off
40	<unnamed>	User output 33	Latch On, Latch Off
41	<unnamed>	User output 34	Latch On, Latch Off
42	<unnamed>	User output 35	Latch On, Latch Off
43	<unnamed>	User output 36	Latch On, Latch Off
44	<unnamed>	User output 37	Latch On, Latch Off
45	<unnamed>	User output 38	Latch On, Latch Off
46	<unnamed>	User output 39	Latch On, Latch Off
47	<unnamed>	User output 40	Latch On, Latch Off
48	<unnamed>	User output 41	Latch On, Latch Off
49	<unnamed>	User output 42	Latch On, Latch Off
50	<unnamed>	User output 43	Latch On, Latch Off
51	<unnamed>	User output 44	Latch On, Latch Off

Binary Output Status PointsObject 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
52	<unnamed>	User output 45	Latch On, Latch Off
53	<unnamed>	User output 46	Latch On, Latch Off
54	<unnamed>	User output 47	Latch On, Latch Off
55	<unnamed>	User output 48	Latch On, Latch Off
56	<unnamed>	User output 49	Latch On, Latch Off
57	<unnamed>	User output 50	Latch On, Latch Off

*The On-Time is fixed within the SIPROTEC® parameter package for each common object.
The Control Relay Output Block information on-time will be ignored.

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

3.3 Analog Inputs

Point Index	Name	Description	Scaling(32767 corresponds to ...)	Default Change Event assigned Class
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)				
3.3.1 Recorded measured values				
0	V1 =	Voltage V1	3276.7 V	1
1	V2 =	Voltage V2	3276.7 V	1
2	f1 =	Frequency f1	327.67 Hz	1
3	f2 =	Frequency f2	327.67 Hz	1
4	dV =	Voltage difference dV	3276,7 V	1
5	df =	Frequency difference df	327,67 Hz	1
6	d α =	Phase angle difference d α	3276,7 ⁰	1
7	<unnamed>	User input 1		2
8	<unnamed>	User input 2		2
9	<unnamed>	User input 3		2
10	<unnamed>	User input 4		2
11	<unnamed>	User input 5		2
12	<unnamed>	User input 6		2
3.3.2 Min/Max values				
13	<user-defined>	not pre-allocated		3
14	<user-defined>	not pre-allocated		3
15	<user-defined>	not pre-allocated		3
16	<user-defined>	not pre-allocated		3
If Object 30 Variation 01 (32-Bit Analog Input) requesten, additional:				
3.3.3 Statistic values				
17	<user-defined>	not pre-allocated		3
18	<user-defined>	not pre-allocated		3

Glossary

AME	A synchronous interface m odule with (e lectrical) isolated RS485 interface for the SIPROTEC devices from Siemens.
AMO	A synchronous interface m odule with o ptical interface for the SIPROTEC devices from Siemens.
AR	A utomatic R ecloser
CFC	C ontinuous F unction C hart
DC	D ouble C ommand
DIGSI	Parameterization system for SIPROTEC devices
DNP	D istributed N etwork P rotocol
DP	D ouble- p oint Indication
Input data/ input direction	Data from the DNP slave to the DNP master .
Mapping	Allocation of the SIPROTEC data objects to the DNP point index.
Output data/ output direction	Data from the DNP master to the DNP slave .
RTU	R emote T erminal U nit
SC	S ingle C ommand
SP	S ingle- p oint Indication



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