SIPROTEC

High Speed but safe motor Busbar Transfer 7VU683

Communication module

DNP 3.0

Bus mapping / Point lists

Revision: 1.0

Edition: April 2014

C53000-L2040-C559-1

Siemens Aktiengesellschaft Buch-Nr. C53000-L2040-C559-1

Preface

Aim of This Manual

The manual is devided into the following topics:

- Notes to SIPROTEC® objects
- DNP V3.0 Device Profile
- Point lists

General information about design, configuration, and operation of SIPROTEC® devices are laid down in the SIPROTEC® 4 system manual, order no. E50417-H1176-C151.

Target Audience

Protection engineers, commissioning engineers, persons who are involved in setting, testing and service of protection, automation, and control devices, as well as operation personnel in electrical plants and power stations.

Additional literature

This manual describes the DNP 3.0 Device Profile of the SIPROTEC® devices.

The following additional manuals inform you about the DNP point lists and the function, operation, assembly and commissioning of the SIPROTEC® devices:

Manual	Contents	Order number
High Speed Busbar Transfer(HSBT) SIPROTEC 7VU683 V4.70	Function, operation, assembly and commissioning of the SIPROTEC® device 7VU683	C53000-G1176 -C369-2
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 7VU683 with
  - firmware version 4.70 or higher and
  - DNP communication module version 02.00.01 or higher.

For device parameterization **DIGSI® 4 version 4.8 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.

Table of Contents

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.

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 enviroment (ref. to page 3).

1.1 Binary Inputs / Annunciations

Note

Depending on the device composition and the existing protection packages not all of the indicated binary inputs or protection annunciations (and corresponding DNP points) may be available in the SIPROTEC® device

1.1.1 Error with a summary alarm

The "Error with a summary alarm" is ON if at least one of the following internal alarms assumes the value ON:

- "Error 5V", "Error 0V", "Error -5V", "Failure Battery empty", "Error Power Supply"
- "Error I/O Board", "Error Board 1", "Error Board 2", "Error Board 3", "Error Board 4", "Error Board 5", "Error Board 6", "Error Board 7"
- "Error Offset", "Calibration data fault"

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 Current Balance", "Failure Current Summation", "Voltage Balance".
- "Failure Phase Sequence Current", "Failure Phase Sequence Voltage ".

1.1.3 Stop Data Transmission

The functionality "Stop data transmission" is not supported via DNP communication. If "Stop data transmission" is active nevertheless data via DNP will be transmitted furthermore.

The annunciation "DataStop" signals the activation of "Stop data transmission" however and can be evaluated correspondingly in the DNP master.

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. 3.2.2

1.2.2 Control mode REMOTE

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

- Changing the Control mode REMOTE“ to UNLOCKED permits one unlocked control operation via DNP. After execution of the command, the “Control mode REMOTE“ in the SIPROTEC® device will automatically be reset to LOCKED.
- A programmed test “Switch in position“ for unlocked control operations will always be executed.

If, after changing the “Control mode REMOTE“ to UNLOCKED, no command is received via DNP for a period of 5 minutes, then the “Control mode REMOTE“ is automatically reset to LOCKED.

1.2.3 Changing the setting group

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

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

Reference ref. to chap. 3.2.1

1.3 Analog Inputs / Measured values

Note

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

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

Product of:

- VT Rated Primary Voltage Line1 (parameter address 0231)
- VT Rated Primary Voltage Line2 (parameter address 0233)
- VT Rated Primary Voltage Line3 (parameter address 0241) and
- VT Rated Primary Voltage Busbar (parameter address 0235) ,

– >0.15 ... 1200 kV

- CT Rated Primary Voltage Line1 (parameter address 0251) ,
- CT Rated Primary Voltage Line2 (parameter address 0253) ,
- CT Rated Primary Voltage Line3 (parameter address 0259) and
- CT Rated Primary Voltage Busbar (parameter address 0255) ,

– >100 ... 20000 A

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

The following table gives a list of all objects recognized and returned by the SIPROTEC® device.

For static objects, requests sent with qualifiers 00, 01, 06, 07 or 08 will be responded with qualifiers 00 or 01.

Requests sent with qualifiers 17 or 28 will be responded with qualifiers 17 or 28.

For change-event objects, qualifiers17 or 28 are always responded.

In the table below text 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 qfy) 17, 28 (index)		
1	2	Binary Input with Status	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
2	0	Binary Input Change - Any Variations	1 (read)	06 (no range) 07, 08 (limited qfy)		
2	2	Binary Input Change with Time	1 (read)	06 (no range) 07, 08 (limited qfy)	129 (response) 130 (unsol. resp)	17, 28 (index)
10	0	Binary Output - Any Variations	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 17, 28 (index)		
10	2	Binary Output with Status	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
12	1	Contol Relay Output Block	3 (select) 4 (operate) 5 (direct op.) 6 (dir. op. noack)	00, 01 (start-stop) 07, 08 (limited qfy) 17, 28 (index)	129 (response)	echo of response
20	0	Binary Counter - Any Variations	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 17, 28 (index)		
20	1	32-Bit Binary Counter (with Flag)	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 17, 28 (index)		
22	0	Counter Change Event - Any Variations	1 (read)	06 (no range) 07, 08 (limited qfy)		
22	1	32-Bit Counter Change Event without Time	1 (read)	06 (no range) 07, 08 (limited qfy)		

OBJECTS			REQUEST		RESPONSE	
Object	**Vari-ation**	**Description**	**Function Codes (dec)**	**Qualifier Codes (hex)**	**Function Codes (dec)**	**Qualifier Codes (hex)**
30	0	16-Bit Analog Input - Any Variations	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 17, 28 (index)		
30	1	32-Bit Analog Input with Status	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
30	2	16-Bit Analog Input with Status	1 (read)	00, 01 (start-stop) 06 (no range) 07, 08 (limited qfy) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
32	0	Analog Change Event - Any Variations	1 (read)	06 (no range) 07, 08 (limited qfy)		
32	1	32-Bit Analog Change Event without Time	1 (read)	06 (no range) 07, 08 (limited qfy)	129 (response) 130 (unsol. resp)	17, 28 (index)
32	2	16-Bit Analog Change Event without Time	1 (read)	06 (no range) 07, 08 (limited qfy)	129 (response) 130 (unsol. resp)	17, 28 (index)
50	1	Time and Date	2 (write)	07 (limited qfy = 1)		
60	1	Class 0 Data	1 (read)	06 (no range)		
60	2	Class 1 Data	1 (read)	06 (no range) 07, 08 (limited qfy)		
60	3	Class 2 Data	1 (read)	06 (no range) 07, 08 (limited qfy)		
60	4	Class 3 Data	1 (read)	06 (no range) 07, 08 (limited qfy)		
80	1	Internal Indications	2 (write)	00 (start-stop) (index must = 7)		

2.2 Device Profile Document

DNP V3.0

DEVICE PROFILE DOCUMENT

Vendor Name: **SIEMENS AG**

Device Name: **7VU683**

Highest DNP Level Supported:	Device Function:
For Requests DNP-L2	☐ Master ☒ Slave
For Responses DNP-L2	

Notable objects, functions, and/or qualifiers supported in addition to the Highest DNP Levels Supported (the complete list is described in the attached table):

For static (non-change-event) object requests, request qualifier codes 00 and 01 (start-stop), 07 and 08 (limited quantity), and 17 and 28 (index) are supported in addition to request qualifier code 06 (no range). Static object requests sent with qualifiers 00, 01, 06, 07, or 08, will be responded with qualifiers 00 or 01. Static object requests sent with qualifiers 17 or 28 will be responded with qualifiers 17 or 28. For change-event object requests, qualifiers 17 or 28 are always responded.

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

The write function code for Object 50 (Time and Date), variation 1, is supported.

The features outlined within this Device Profile have successfully passed DNP Conformance Test of Subset Level 2 outlined in DNP3-2000 IED Certification Procedure.

Maximum Data Link Frame Size (octets):	Maximum Application Fragment Size (octets):
Transmitted____292_____	Transmitted _Configurable up to 2048
Received_____292_____	Received_____2048_____

Maximum Data Link Re-tries:	Maximum Application Layer Re-tries:
☒ None ☐ Fixed at ☐ Configurable, range _0_to _255_	☒ None ☐ Configurable, range ____ to _____ (Fixed is not permitted)

Requires Data Link Layer Confirmation:

☐ Never
☐ Always
☐ Sometimes If 'Sometimes', when? _____
☒ Configurable If 'Configurable', how? by the protection data processing program DIGSI® 4

Requires Application Layer Confirmation:

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

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
Complete Appl. Response	☒	None	☐	Fixed at _____	☐	Variable	☐	Configurable

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

Sends/Executes Control Operations:

WRITE Binary Outputs	☒	Never	☐	Always	☐	Sometimes	☐	Configurable
SELECT/OPERATE	☐	Never	☒	Always	☐	Sometimes	☐	Configurable
DIRECT OPERATE	☐	Never	☒	Always	☐	Sometimes	☐	Configurable
DIRECT OPERATE - NO ACK	☐	Never	☒	Always	☐	Sometimes	☐	Configurable
Count > 1	☒	Never	☐	Always	☐	Sometimes	☐	Configurable
Pulse On	☐	Never	☒	Always	☐	Sometimes	☐	Configurable
Pulse Off	☒	Never	☐	Always	☐	Sometimes	☐	Configurable
Latch On	☐	Never	☒	Always	☐	Sometimes	☐	Configurable
Latch Off	☐	Never	☒	Always	☐	Sometimes	☐	Configurable
Queue	☒	Never	☐	Always	☐	Sometimes	☐	Configurable
Clear Queue	☒	Never	☐	Always	☐	Sometimes	☐	Configurable

Note:
CONTROL RELAY OUTPUT BLOCK parameters (count, on-time, off-time) are ignored.

TimeSync Information:

a.) TimeSync Period
- ☐ Never
- ☐ Fixed at _____seconds
- ☒ Configurable, range ____1____to __86400_seconds

b.) Maximum time base drift over 10 minute interval: ____30__ms
c.) Maximum Internal Time Reference Error when set via DNP: _____1__ms
d.) Maximum Delay Measurement error: ____20__ms
e.) Maximum response time: ___100__ms
c.) Event data time-tag error – if different than (c):

Binary Input Change Events	_____ms
Counter Change Events	_____ms
Frozen Counter Change Events	_____ms
Analog Change Events	_____ms
Frozen Analog Change Events	_____ms

Reports Binary Input Change Events when no specific variation requested: ☐ Never ☒ Only time-tagged ☐ Only non-time-tagged ☐ Configurable to send both, one or the other (attach explanation)	Reports time-tagged Binary Input Change Events when no specific variation requested: ☐ Never ☒ Binary Input Change With Time ☐ Binary Input Change With Relative Time ☐ Configurable (attach explanation)
Sends Unsolicited Responses: ☐ Never ☒ Configurable (Unsolicited data response mode are switched on/off via the configuration tool) ☐ Only certain objects ☐ Sometimes (attach explanation) ☒ ENABLE/DISABLE UNSOLICITED Function codes supported	Sends Static Data in Unsolicited Responses: ☒ Never ☐ When Device Restarts ☐ When Status Flags Change No other options are permitted.
Default Counter Object/Variation: ☐ No Counters Reported ☐ Configurable (attach explanation) ☒ Default Object ___20_____ Default Variation ___01_____ ☐ Point-by-point list attached Sends 32-Bit counters.	Counters Roll Over at: ☐ No Counters Reported ☐ Configurable (attach explanation) ☐ 16 Bits ☒ 32 Bits ☐ Other Value _____ ☐ Point-by-point list attached
Sends Multi-Fragment Responses: ☒ Yes ☐ No	

Point lists

3

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		
9	Relay PICKUP	Relay PICKUP (group signal); ON=1, OFF=0	1
10	Relay TRIP	Relay GENERAL TRIP command; ON=1, OFF=0	1
	3.1.2 Protection		
19	I> Trip	Phase Over-current I> Trip; ON=1, OFF=0	1
20	I>> Trip	Phase Over-current I>> Trip; ON=1, OFF=0	1
21	Ie> Trip	Earth Over-current I> Trip; ON=1, OFF=0	1
22	Ie>> Trip	Earth Over-current I>> Trip; ON=1, OFF=0	1
23	I> SOF Trip	Phase O/C I> Switch-Onto-Fault Trip; ON=1, OFF=0	1
24	I>> SOF Trip	Phase O/C I>> Switch-Onto-Fault Trip; ON=1, OFF=0	1
25	Ie> SOF Trip	Earth O/C I> Switch-Onto-Fault Trip; ON=1, OFF=0	1
26	Ie>> SOF Trip	Earth O/C I>> Switch-Onto-Fault Trip; ON=1, OFF=0	1
27	Phase O/C OnOff	Phase Over-current Protection ON/OFF; ON=1, OFF=0	2
28	Earth O/C OnOff	Earth Over-current Protection ON/OFF; ON=1, OFF=0	2
29	PhO/C SOF OnOff	Phase O/C Switch-Onto-Fault Prot.ON/OFF; ON=1, OFF=0	2
30	EaO/C SOF OnOff	Earth O/C Switch-Onto-Fault Prot.ON/OFF; ON=1, OFF=0	2
	3.1.3 HSBT		
11	HSBT ON/OFF	HSBT ON/OFF; ON=1, OFF=0	2
12	Port. ON/OFF	Protections ON/OFF; ON=1, OFF=0	2
13	CommandOpenCB1	CommandOpenCB1; ON=1, OFF=0	2
14	CommandOpenCB2	CommandOpenCB2; ON=1, OFF=0	2
15	CommandOpenCB3	CommandOpenCB3; ON=1, OFF=0	2
16	CommandCloseCB1	CommandCloseCB1; ON=1, OFF=0	2
17	CommandCloseCB2	CommandCloseCB2; ON=1, OFF=0	2
18	CommandCloseCB3	CommandCloseCB3; ON=1, OFF=0	2
31	L1->L2 Succeed	Line1->Line2 Succeeded; ON=1, OFF=0	1
32	L1->L2 Failed	Line1->Line2 Failed; ON=1, OFF=0	1
33	L2->L1 Succeed	Line2->Line1 Succeeded; ON=1, OFF=0	1
34	L2->L1 Failed	Line2->Line1 Failed; ON=1, OFF=0	1
35	B1->B2 Succeed	Busbar1->Busbar2 Succeeded; ON=1, OFF=0	1
36	B1->B2 Failed	Busbar1->Busbar2 Failed; ON=1, OFF=0	1
37	B2->B1 Succeed	Busbar2->Busbar1 Succeeded; ON=1, OFF=0	1

Binary Input Points
Static (Steady-State) Object Number: **1**
Change Event Object Number: **2**
Request Function Codes supported: **1 (read)**
Static Variation reported when variation 0 requested: **1 (Binary Input with status)**
Change Event Variation reported when variation 0 requested: **2 (Binary Input Change with Time)**

Point Index	Name	Description	Class
38	B2->B1 Failed	Busbar2->Busbar1 Failed; ON=1, OFF=0	1
39	B1->L1 Succeed	Busbar1->Line1 Succeeded; ON=1, OFF=0	1
40	B1->L1 Failed	Busbar1->Line1 Failed; ON=1, OFF=0	1
41	B2->L2 Succeed	Busbar2->Line2 Succeeded; ON=1, OFF=0	1
42	B2->L2 Failed	Busbar2->Line2 Failed; ON=1, OFF=0	1
43	HSBT is ready	HSBT is ready; ON=1, OFF=0	1
44	HSBT succeed	HSBT succeed; ON=1, OFF=0	1
45	HSBT Failed	HSBT Failed; ON=1, OFF=0	1
46	L1->L2 ON/OFF	Line1->Line2 ON/OFF; ON=1, OFF=0	2
47	L2->L1 ON/OFF	Line2->Line1 ON/OFF; ON=1, OFF=0	2
48	B1->B2 ON/OFF	Busbar1->Busbar2 ON/OFF; ON=1, OFF=0	2
49	B1->L1 ON/OFF	Busbar2->Line1 ON/OFF; ON=1, OFF=0	2
50	B2->B1 ON/OFF	Busbar2->Busbar1 ON/OFF; ON=1, OFF=0	2
51	B2->L2 ON/OFF	Busbar2->Line2 ON/OFF; ON=1, OFF=0	2
52	LVLSH Trip	Low Voltage Load-Shedding Trip; ON=1, OFF=0	1
53	B1 LVLSH Trip	Bus1 Low Voltage Load-Shedding Trip; ON=1, OFF=0	1
54	B2 LVLSH Trip	Bus2 Low Voltage Load-Shedding Trip; ON=1, OFF=0	1
55	L1->L3 Succeed	Line1->Line3 Succeeded; ON=1, OFF=0	1
56	L1->L3 Failed	Line1->Line3 Failed; ON=1, OFF=0	1
57	L2->L3 Succeed	Line2->Line3 Succeeded; ON=1, OFF=0	1
58	L2->L3 Failed	Line2->Line3 Failed; ON=1, OFF=0	1
59	L3->L1 Succeed	Line3->Line1 Succeeded; ON=1, OFF=0	1
60	L3->L1 Failed	Line3->Line1 Failed; ON=1, OFF=0	1
61	L3->L2 Succeed	Line3->Line2 Succeeded; ON=1, OFF=0	1
62	L3->L2 Failed	Line3->Line2 Failed; ON=1, OFF=0	1
63	L1->L3 ON/OFF	Line1->Line3 ON/OFF; ON=1, OFF=0	2
64	L2->L3 ON/OFF	Line2->Line3 ON/OFF; ON=1, OFF=0	2
65	L3->L1 ON/OFF	Line3->Line1 ON/OFF; ON=1, OFF=0	2
66	L3->L2 ON/OFF	Line3->Line2 ON/OFF; ON=1, OFF=0	2
	3.1.4 Setting Group		
0	Group A	Protection Parameter Group A; 0 = Group A is deactivated, 1= Group A is activated and Group B,C,D are deactivated.	2
1	Group B	Protection Parameter Group B; 0 = Group B is deactivated, 1= Group B is activated and Group A,C,D are deactivated.	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
2	Group C	Protection Parameter Group C; 0 = Group C is deactivated, 1= Group C is activated and Group A,B,D are deactivated.	2
3	Group D	Protection Parameter Group D; 0 = Group D is deactivated, 1= Group D is activated and Group A,B,C are deactivated.	2
	3.1.5 User-defined indications		
4	User-defined 1	0 = Open (off), 1= Close (on)	2
5	User-defined 2	0 = Open (off), 1= Close (on)	2
6	User-defined 3	0 = Open (off), 1= Close (on)	2
7	User-defined 4	0 = Open (off), 1= Close (on)	2
8	User-defined 5	0 = Open (off), 1= Close (on)	2
68	User-defined 6	0 = Open (off), 1= Close (on)	3
69	User-defined 7	0 = Open (off), 1= Close (on)	3
70	User-defined 8	0 = Open (off), 1= Close (on)	3
71	User-defined 9	0 = Open (off), 1= Close (on)	3
72	User-defined 10	0 = Open (off), 1= Close (on)	3
73	User-defined 11	0 = Open (off), 1= Close (on)	3
74	User-defined 12	0 = Open (off), 1= Close (on)	3
75	User-defined 13	0 = Open (off), 1= Close (on)	3
76	User-defined 14	0 = Open (off), 1= Close (on)	3
77	User-defined 15	0 = Open (off), 1= Close (on)	3
78	User-defined 16	0 = Open (off), 1= Close (on)	3
79	User-defined 17	0 = Open (off), 1= Close (on)	3
80	User-defined 18	0 = Open (off), 1= Close (on)	3
81	User-defined 19	0 = Open (off), 1= Close (on)	3
82	User-defined 20	0 = Open (off), 1= Close (on)	3
83	User-defined 21	0 = Open (off), 1= Close (on)	3
84	User-defined 22	0 = Open (off), 1= Close (on)	3
85	User-defined 23	0 = Open (off), 1= Close (on)	3
86	User-defined 24	0 = Open (off), 1= Close (on)	3
87	User-defined 25	0 = Open (off), 1= Close (on)	3
88	User-defined 26	0 = Open (off), 1= Close (on)	3
89	User-defined 27	0 = Open (off), 1= Close (on)	3
90	User-defined 28	0 = Open (off), 1= Close (on)	3
91	User-defined 29	0 = Open (off), 1= Close (on)	3
92	User-defined 30	0 = Open (off), 1= Close (on)	3

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
93	User-defined 31	0 = Open (off), 1= Close (on)	3
94	User-defined 32	0 = Open (off), 1= Close (on)	3
95	User-defined 33	0 = Open (off), 1= Close (on)	3
96	User-defined 34	0 = Open (off), 1= Close (on)	3
97	User-defined 35	0 = Open (off), 1= Close (on)	3
98	User-defined 36	0 = Open (off), 1= Close (on)	3
99	User-defined 37	0 = Open (off), 1= Close (on)	3
100	User-defined 38	0 = Open (off), 1= Close (on)	3
101	User-defined 39	0 = Open (off), 1= Close (on)	3
102	User-defined 40	0 = Open (off), 1= Close (on)	3

3.2 Control Relay Output Blocks/Binary Output Status

Binary Output Status Points
Object Number: **10**
Request Function Codes supported: **1 (Read)**
Default Variation reported when variation 0 requested: **2 (Binary Output Status)**

Control Relay Output Blocks/Binary Output Status
Object Number: **12**
Request Function Codes supported: **3 (select), 4 (operate), 5 (direct operate), 6 (direct operate, no ack)**

Point Index	Name	Description	Supported Control Relay Output Block Fields
	3.2.1 Internal commands		
0	Group A	Select parametergroup A and deactivate parametergroup B,C,D ref. to chap. 1.2.3	Latch On
1	Group B	Select parametergroup B and deactivate parametergroup A,C,D	Latch On
2	Group C	Select parametergroup C and deactivate parametergroup A,B,D	Latch On
3	Group D	Select parametergroup D and deactivate parametergroup A,B,C	Latch On
4	Reset LED	Reset LED	Latch On; Latch Off
5	HSBT ON/OFF	HSBT ON/OFF	Latch On; Latch Off
7	Port. ON/OFF	Protection ON/OFF	Latch On; Latch Off
8	Remote Op. CB1	Remote Open CB1	Latch On; Latch Off
9	Remote Op. CB2	Remote Open CB2	Latch On; Latch Off
12	Remote Op. CB3	Remote Open CB3	Latch On; Latch Off
	3.2.2 User-allocated single commands Please ref to chap. 1.2.1 for additional notes.		
6	User-defined1	User-defined output 1	Latch On; Latch Off
10	User-defined2	User-defined output 2	Latch On; Latch Off
11	User-defined3	User-defined output 3	Latch On; Latch Off
13	User-defined4	User-defined output 4	Latch On; Latch Off
14	User-defined5	User-defined output 5	Latch On; Latch Off
15	User-defined6	User-defined output 6	Latch On; Latch Off
16	User-defined7	User-defined output 7	Latch On; Latch Off
17	User-defined8	User-defined output 8	Latch On; Latch Off
18	User-defined9	User-defined output 9	Latch On; Latch Off
19	User-defined10	User-defined output 10	Latch On; Latch Off
20	User-defined11	User-defined output 11	Latch On; Latch Off
21	User-defined12	User-defined output 12	Latch On; Latch Off
22	User-defined13	User-defined output 13	Latch On; Latch Off
23	User-defined14	User-defined output 14	Latch On; Latch Off
24	User-defined15	User-defined output 15	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
25	User-defined16	User-defined output 16	Latch On; Latch Off
26	User-defined17	User-defined output 17	Latch On; Latch Off
27	User-defined18	User-defined output 18	Latch On; Latch Off
	3.2.3 Extrenal commands(Double Commands)		
28	User-defined1	Trip1	Trip, Pulse On (On-Time Fixed)
29	User-defined1	Close1	Close, Pulse On (On-Time Fixed)
30	User-defined2	Trip2	Trip, Pulse On (On-Time Fixed)
31	User-defined2	Close2	Close, Pulse On (On-Time Fixed)
32	User-defined3	Trip3	Trip, Pulse On (On-Time Fixed)
33	User-defined3	Close3	Close, Pulse On (On-Time Fixed)

3.3 Analog Inputs

Analog Inputs
Static (Steady-State) Object Number: **30**
Change Event Object Number: **32**
Request Function Codes supported: **1 (read)**
Static Variation reported when variation 0 requested: **02 (16-Bit Analog Input)**
Change Event Variation reported when variation 0 requested:**02 (Analog Change Event without Time)**

Point Index	Name	Description	Scaling(32767 corresponds to ...)	Default Change Event assigned Class
	3.3.1 Recorded measured values			
0	Uab_B=	Bus Voltage phase a to phase b	327.67 kV	3
1	Ubc_B=	Bus Voltage phase b to phase c	327.67 kV	3
2	Uca_B=	Bus Voltage phase c to phase a	327.67 kV	3
3	Uab_B1=	Bus1 Voltage phase a to phase b	327.67 kV	3
4	Ubc_B1=	Bus1 Voltage phase b to phase c	327.67 kV	3
5	Uca_B1=	Bus1 Voltage phase c to phase a	327.67 kV	3
6	Uab_B2=	Bus2 Voltage phase a to phase b	327.67 kV	3
7	Ubc_B2=	Bus2 Voltage phase b to phase c	327.67 kV	3
8	Uca_B2=	Bus2 Voltage phase c to phase a	327.67 kV	3
9	Ux_L1=	Line1 Voltage	327.67 kV	3
10	Ux_L2=	Line2 Voltage	327.67 kV	3
11	Ia_B=	Bus current a	327.67 kA	3
12	Ib_B=	Bus current b	327.67 kA	3
13	Ic_B=	Bus current c	327.67 kA	3
14	Ie_B=	Bus earth current	327.67 kA	3
15	Ix_L1=	Line1 current	327.67 kA	3
16	Ix_L2=	Line2 current	327.67 kA	3
17	Ux_L3=	Line3 Voltage	327.67 kV	3
18	Ix_L3=	Line3 current	327.67 kA	3
19	UsrMv1	user defined measurement	327.67	3
20	UsrMv2	user defined measurement	327.67	3
21	UsrMv3	user defined measurement	327.67	3
22	UsrMv4	user defined measurement	327.67	3
23	UsrMv5	user defined measurement	327.67	3
24	UsrMv6	user defined measurement	327.67	3
25	UsrMv7	user defined measurement	327.67	3
26	UsrMv8	user defined measurement	327.67	3
27	UsrMv9	user defined measurement	327.67	3
28	UsrMv10	user defined measurement	327.67	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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