# SIPROTEC

# Breaker Management Relay 7VK61

Communication module

DNP 3.0

Bus mapping / Point lists



Revision: 1.0

Edition: November 2002

C53000-L1840-A013-03

Siemens Aktiengesellschaft Buch-Nr. C53000-L1840-A013-03

# 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 |
|---|---|---|
| Breaker Management Relay SIPROTEC 7VK61 | Function, operation, assembly and commissioning of the SIPROTEC® device 7VK61 | C53000-G1176-C159 |
| 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 7VK61 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.

# 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 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 5V", "Error neutral CT", "Error 1A/5A wrong", "Error A/D converter".

**Reference** ref to chap. 3.1.7

### 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:

- “Error Board 1“, “Error Board 2“, "Error Board 3“, "Error Board 4“, "Error Board 5“, “Error Board 6“, "Error Board 7“,
- "Alarm NO calibration“, "Failure Battery“,
- "Failure Phase Sequence", "VT Fuse Failure", "Failure Voltage Balance", "Failure Voltage Summation Phase – Ground", "Failure General Voltage Supervision",
- "Failure Current Balance", "Failure Current Summation", "Failure General Current Supervision",
- “>Failure: Feeder VT (MCB tripped)”.

**Reference** ret. to chap. 3.1.7

### 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.

**Reference** ref. to chap. 3.1.8

## 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.

**Reference** ref. to chap. 3.2.1

### 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:

Measurement: Full Scale Voltage (parameter address 1103):
– >100 ... 1000 kV

Measurement: Full Scale Current (parameter address 1104):
– >10 ... 1000 A

Product of:
- Transformers – Rated Primary Voltage (parameter address 0203) and
- Ratio factor Vph/Vdelta (parameter address 0211)

– >100 ... 1000 kV

Product of:
- Transformers– CT Rated primary current (parameter address 0205) and
- Ratio factor I4/Iph (parameter address 0221)
- >10 ... 1000 A

Power values:
- Product of Full Scale Voltage and Full Scale Current multiplied by $\sqrt{3}$

– >100 ... 1000 MW (MVAR)

*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”).

## 1.4 Metered measurands

**Scaling**

The scaling of the metered measurands, which are derived from measured values, refers to**:**

**60000 impulses per hour for V = Vprim and I = Iprim**

$V_{prim}$ = **Full Scale Voltage**
(parameter address = 1103)

$I_{prim}$ = **FULL SCALE CURRENT**
parameter address = 1104)

**Example**

In the parameter set is configured:

$I_{prim}$ = 1000 A and $V_{prim}$ = 400.0 kV,

60000 impulses correspond so that:

1 h * 1000 A * 400 kV * $\sqrt{3}$ = 692.82 MWh

*Note*

- The type of the update (cyclic, with or without deletion) and the update interval must be programmed for the metered measurands with the parametrization software DIGSI® 4.
- The scaling of the metered measurands at binary inputs ("Wp(puls)" and "Wq(puls)") depends on the externally connected pulse generator.

# 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)<br>06 (no range)<br>07, 08 (limited qfy)<br>17, 28 (index) | | |
| 1 | 2 | Binary Input with Status | 1 (read) | 00, 01 (start-stop)<br>06 (no range)<br>07, 08 (limited qfy)<br>17, 28 (index) | 129 (response) | 00, 01 (start-stop)<br>17, 28 (index) |
| 2 | 0 | Binary Input Change - Any Variations | 1 (read) | 06 (no range)<br>07, 08 (limited qfy) | | |
| 2 | 2 | Binary Input Change with Time | 1 (read) | 06 (no range)<br>07, 08 (limited qfy) | 129 (response)<br>130 (unsol. resp) | 17, 28 (index) |
| 10 | 0 | Binary Output - Any Variations | 1 (read) | 00, 01 (start-stop)<br>06 (no range)<br>07, 08 (limited qfy)<br>17, 28 (index) | | |
| 10 | 2 | Binary Output with Status | 1 (read) | 00, 01 (start-stop)<br>06 (no range)<br>07, 08 (limited qfy)<br>17, 28 (index) | 129 (response) | 00, 01 (start-stop)<br>17, 28 (index) |
| 12 | 1 | Contol Relay Output Block | 3 (select)<br>4 (operate)<br>5 (direct op.)<br>6 (dir. op. noack) | 00, 01 (start-stop)<br>07, 08 (limited qfy)<br>17, 28 (index) | 129 (response) | echo of response |
| 20 | 0 | Binary Counter - Any Variations | 1 (read) | 00, 01 (start-stop)<br>06 (no range)<br>07, 08 (limited qfy)<br>17, 28 (index) | | |
| 20 | 1 | 32-Bit Binary Counter (with Flag) | 1 (read) | 00, 01 (start-stop)<br>06 (no range)<br>07, 08 (limited qfy)<br>17, 28 (index) | | |
| 22 | 0 | Counter Change Event - Any Variations | 1 (read) | 06 (no range)<br>07, 08 (limited qfy) | | |
| 22 | 1 | 32-Bit Counter Change Event without Time | 1 (read) | 06 (no range)<br>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)<br>06 (no range)<br>07, 08 (limited qfy)<br>17, 28 (index) | | |
| 30 | 1 | 32-Bit Analog Input with Status | 1 (read) | 00, 01 (start-stop)<br>06 (no range)<br>07, 08 (limited qfy)<br>17, 28 (index) | 129 (response) | 00, 01 (start-stop)<br>17, 28 (index) |
| 30 | 2 | 16-Bit Analog Input with Status | 1 (read) | 00, 01 (start-stop)<br>06 (no range)<br>07, 08 (limited qfy)<br>17, 28 (index) | 129 (response) | 00, 01 (start-stop)<br>17, 28 (index) |
| 32 | 0 | Analog Change Event - Any Variations | 1 (read) | 06 (no range)<br>07, 08 (limited qfy) | | |
| 32 | 1 | 32-Bit Analog Change Event without Time | 1 (read) | 06 (no range)<br>07, 08 (limited qfy) | 129 (response)<br>130 (unsol. resp) | 17, 28 (index) |
| 32 | 2 | 16-Bit Analog Change Event without Time | 1 (read) | 06 (no range)<br>07, 08 (limited qfy) | 129 (response)<br>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)<br>07, 08 (limited qfy) | | |
| 60 | 3 | Class 2 Data | 1 (read) | 06 (no range)<br>07, 08 (limited qfy) | | |
| 60 | 4 | Class 3 Data | 1 (read) | 06 (no range)<br>07, 08 (limited qfy) | | |
| 80 | 1 | Internal Indications | 2 (write) | 00 (start-stop)<br>(index must = 7) | | |

## 2.2 Device Profile Document

# DNP V3.0

**DEVICE PROFILE DOCUMENT**

Vendor Name: **SIEMENS AG**

Device Name: **7VK61**

| Highest DNP Level Supported: | Device Function: |
|---|---|
| For Requests DNP-L2<br>For Responses DNP-L2 | ☐ Master ☒ 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): | Maximum Application Fragment Size (octets): |
|---|---|
| Transmitted____292_____<br>Received_____292_____ | Transmitted _Configurable up to 2048<br>Received_____2048_____ |

| Maximum Data Link Re-tries: | Maximum Application Layer Re-tries: |
|---|---|
| ☒ None<br>☐ Fixed at<br>☐ Configurable, range _0_to _255_ | ☒ None<br>☐ Configurable, range ____ to _____<br>(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:<br><br>☐ Never<br>☒ Only time-tagged<br>☐ Only non-time-tagged<br>☐ Configurable to send both, one or the other (attach explanation) | Reports time-tagged Binary Input Change Events when no specific variation requested:<br><br>☐ Never<br>☒ Binary Input Change With Time<br>☐ Binary Input Change With Relative Time<br>☐ Configurable (attach explanation) |
| Sends Unsolicited Responses:<br><br>☐ Never<br>☒ Configurable (Unsolicited data response mode are switched on/off via the configuration tool )<br>☐ Only certain objects<br>☐ Sometimes (attach explanation)<br><br>☒ ENABLE/DISABLE UNSOLICITED Function codes supported | Sends Static Data in Unsolicited Responses:<br><br>☒ Never<br>☐ When Device Restarts<br>☐ When Status Flags Change<br><br>No other options are permitted. |
| Default Counter Object/Variation:<br><br>☐ No Counters Reported<br>☐ Configurable (attach explanation)<br>☒ Default Object ___20_____<br>Default Variation ___01_____<br>☐ Point-by-point list attached<br><br>Sends 32-Bit counters. | Counters Roll Over at:<br><br>☐ No Counters Reported<br>☐ Configurable (attach explanation)<br>☐ 16 Bits<br>☒ 32 Bits<br>☐ Other Value _____<br>☐ 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 Automatic recloser** | | |
| 0 | 79 OFF | 79 Auto recloser is switched OFF; ON=1, OFF=0 | 2 |
| 1 | 79 ON | 79 Auto recloser is switched ON; ON=1, OFF=0 | 2 |
| 2 | 79 is blocked | 79: Auto recloser is blocked; ON=1, OFF=0 | 2 |
| 3 | 79 not ready | 79: Auto recloser is not ready; ON=1, OFF=0 | 2 |
| 4 | CB not ready | 79: Circuit breaker 1 not ready; ON=1, OFF=0 | 2 |
| 5 | 79 T-CBreadyExp | 79: CB ready monitoring window expired; ON=1, OFF=0 | 3 |
| 6 | 79 in progress | 79 - in progress; ON=1, OFF=0 | 2 |
| 7 | 79 Evolving Flt | 79: Evolving fault recognition; ON=1, OFF=0 | 3 |
| 8 | 79 Close | 79 - Close command; ON=1, OFF=0 | 2 |
| 9 | 79 Remote Close | 79 Remote close signal send; ON=1, OFF=0 | 3 |
| 10 | 79 ADT run. | 79 cycle is running in ADT mode; ON=1, OFF=0 | 3 |
| 11 | 79 Program1pole | 79 is set to operate after 1p trip only; ON=1, OFF=0 | 3 |
| 12 | 79 Tdead 1pTrip | 79 dead time after 1pole trip running; ON=1, OFF=0 | 3 |
| 13 | 79 Tdead 3pTrip | 79 dead time after 3pole trip running; ON=1, OFF=0 | 3 |
| 14 | 79 Tdead 1pFlt | 79 dead time after 1phase fault running; ON=1, OFF=0 | 3 |
| 15 | 79 Tdead 2pFlt | 79 dead time after 2phase fault running; ON=1, OFF=0 | 3 |
| 16 | 79 Tdead 3pFlt | 79 dead time after 3phase fault running; ON=1, OFF=0 | 3 |
| 17 | 79 Close1.Cyc1p | 79: Close command after 1pole, 1st cycle; ON=1, OFF=0 | 3 |
| 18 | 79 Close1.Cyc3p | 79: Close command after 3pole, 1st cycle; ON=1, OFF=0 | 3 |
| 19 | 79 Close 2.Cyc | 79: Close command 2nd cycle (and higher) ; ON=1, OFF=0 | 3 |
| 20 | 79 1stCyc. run. | 79 1st cycle running; ON=1, OFF=0 | 3 |
| 21 | 79 2ndCyc. run. | 79 2nd cycle running; ON=1, OFF=0 | 3 |
| 22 | 79 3rdCyc. run. | 79 3rd cycle running; ON=1, OFF=0 | 3 |
| 23 | 79 4thCyc. run. | 79 4th or higher cycle running; ON=1, OFF=0 | 3 |
| 24 | 79 1.CycZoneRel | 79 1st cycle zone extension release; ON=1, OFF=0 | 3 |
| 25 | 79 T-Recl. run. | 79: Reclaim time is running; ON=1, OFF=0 | 3 |
| 26 | 79 Successful | 79 - cycle successful; ON=1, OFF=0 | 3 |
| 27 | Definitive Trip | Definitive TRIP; ON=1, OFF=0 | 2 |
| 28 | 79 1p Trip Perm | 79: 1pole trip permitted by internal AR; ON=1, OFF=0 | 3 |
| 29 | 79 Sync.Request | 79: 1pole trip permitted by internal AR; ON=1, OFF=0 | 3 |
| 30 | 79 2.CycZoneRel | 79 2nd cycle zone extension release; ON=1, OFF=0 | 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 |
|---|---|---|---|
| 31 | 79 3.CycZoneRel | 79 3rd cycle zone extension release; ON=1, OFF=0 | 3 |
| 32 | 79 TRIP 3pole | 79: TRIP command 3pole; ON=1, OFF=0 | 2 |
| 33 | 79 4.CycZoneRel | 79 4th cycle zone extension release; ON=1, OFF=0 | 3 |
| 34 | 79 Zone Release | 79 zone extension (general) ; ON=1, OFF=0 | 3 |
| 35 | 79 T-Start Exp | 79: Start-signal monitoring time expired; ON=1, OFF=0 | 3 |
| 36 | 79 TdeadMax Exp | 79: Maximum dead time expired; ON=1, OFF=0 | 3 |
| 37 | 79 Td. evol.Flt | 79 dead time after evolving fault; ON=1, OFF=0 | 3 |
| | **3.1.2 Synchronism check** | | |
| 38 | 25 Sync. OFF | 25 Synchronism check is switched OFF; ON=1, OFF=0 | 3 |
| 39 | 25 Sync. BLOCK | 25 Synchronism check is BLOCKED; ON=1, OFF=0 | 3 |
| 40 | 25 Sync. faulty | 25: Synchro-check function faulty; ON=1, OFF=0 | 3 |
| 41 | 25 Sy.Tsup.Exp | 25: Synchro-check supervision time exp. ; ON=1, OFF=0 | 3 |
| 42 | 25 Sy. running | 25: Synchronization is running; ON=1, OFF=0 | 3 |
| 43 | 25 Sy. Override | 25: Synchro-check override/bypass; ON=1, OFF=0 | 3 |
| 44 | 25 Synchronism | 25: Synchronism detected; ON=1, OFF=0 | 2 |
| 45 | 25 Vsyn< Vline> | 25: Sync. dead bus / live line detected; ON=1, OFF=0 | 3 |
| 46 | 25 Vsyn> Vline< | 25: Sync. live bus / dead line detected; ON=1, OFF=0 | 3 |
| 47 | 25 Vsyn< Vline< | 25: Sync. dead bus / dead line detected; ON=1, OFF=0 | 3 |
| 48 | 25 Sync. Vdiff> | 25: Sync. Volt. diff. greater than limit; ON=1, OFF=0 | 3 |
| 49 | 25 Sync. fdiff> | 25: Sync. Freq. diff. greater than limit; ON=1, OFF=0 | 3 |
| 50 | 25 Sync.PHIdiff> | 25: Sync. Angle diff. greater than limit; ON=1, OFF=0 | 3 |
| 51 | 25 Sync.Release | 25: Synchronism release (to ext. AR) ; ON=1, OFF=0 | 2 |
| 52 | 25 Sy. CloseCmd | 25: Close command from synchro-check; ON=1, OFF=0 | 2 |
| | **3.1.3 Voltage protection** | | |
| 53 | 59-Vphg OFF | 59-Vphg Overvolt. is switched OFF; ON=1, OFF=0 | 3 |
| 54 | 59-Vphg BLK | 59-Vphg Overvolt. is BLOCKED; ON=1, OFF=0 | 3 |
| 55 | 59-Vphph OFF | 59-Vphph Overvolt. is switched OFF; ON=1, OFF=0 | 3 |
| 56 | 59-Vphph BLK | 59-Vphph Overvolt. is BLOCKED; ON=1, OFF=0 | 3 |
| 57 | 59-3Vo OFF | 59-3Vo Overvolt. is switched OFF; ON=1, OFF=0 | 3 |
| 58 | 59-3Vo BLK | 59-3Vo Overvolt. is BLOCKED; ON=1, OFF=0 | 3 |
| 59 | 59-V1 OFF | 59-V1 Overvolt. is switched OFF; ON=1, OFF=0 | 3 |
| 60 | 59-V1 BLK | 59-V1 Overvolt. is BLOCKED; ON=1, OFF=0 | 3 |
| 61 | 59-V2 OFF | 59-V2 Overvolt. is switched OFF; ON=1, OFF=0 | 3 |
| 62 | 59-V2 BLK | 59-V2 Overvolt. is BLOCKED; ON=1, OFF=0 | 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 |
|---|---|---|---|
| 63 | 27-Vphg OFF | 27-Vphg Undervolt. is switched OFF; ON=1, OFF=0 | 3 |
| 64 | 27-Vphg BLK | 27-Vphg Undervolt. is BLOCKED; ON=1, OFF=0 | 3 |
| 65 | 27-Vphph OFF | 27-Vphph Undervolt. is switched OFF; ON=1, OFF=0 | 3 |
| 66 | 27-Vphph BLK | 27-Vphph Undervolt. is BLOCKED; ON=1, OFF=0 | 3 |
| 67 | 27-V1 OFF | 27-V1 Undervolt. is switched OFF; ON=1, OFF=0 | 3 |
| 68 | 27-V1 BLK | 27-V1 Undervolt. is BLOCKED; ON=1, OFF=0 | 3 |
| 69 | 27/59 ACTIVE | 27/59 Voltage protection is ACTIVE; ON=1, OFF=0 | 3 |
| 70 | 59-1-Vpg Pickup | 59-1-Vphg Pickup; ON=1, OFF=0 | 2 |
| 71 | 59-2-Vpg Pickup | 59-2-Vphg Pickup; ON=1, OFF=0 | 2 |
| 72 | 59-Vpg PU A | 59-Vphg Pickup A; ON=1, OFF=0 | 2 |
| 73 | 59-Vpg PU B | 59-Vphg Pickup B; ON=1, OFF=0 | 2 |
| 74 | 59-Vpg PU C | 59-Vphg Pickup C; ON=1, OFF=0 | 2 |
| 75 | 59-Vpg TRIP | 59-Vphg TRIP command; ON=1, OFF=0 | 2 |
| 76 | 59-1-Vpp Pickup | 59-1-Vphph Pickup; ON=1, OFF=0 | 2 |
| 77 | 59-2-Vpp Pickup | 59-2-Vphph Pickup; ON=1, OFF=0 | 2 |
| 78 | 59-Vpp PickupAB | 59-Vphph Pickup A-B; ON=1, OFF=0 | 3 |
| 79 | 59-Vpp PickupBC | 59-Vphph Pickup B-C; ON=1, OFF=0 | 3 |
| 80 | 59-Vpp PickupCA | 59-Vphph Pickup C-A; ON=1, OFF=0 | 3 |
| 81 | 59-Vpp TRIP | 59-Vphph TRIP command; ON=1, OFF=0 | 2 |
| 82 | 59-1-3Vo Pickup | 59-1-3Vo Pickup; ON=1, OFF=0 | 3 |
| 83 | 59-2-3Vo Pickup | 59-2-3Vo Pickup; ON=1, OFF=0 | 3 |
| 84 | 59-3Vo TRIP | 59-3Vo TRIP command; ON=1, OFF=0 | 2 |
| 85 | 59-1-V1 Pickup | 59-1-V1 Pickup; ON=1, OFF=0 | 3 |
| 86 | 59-2-V1 Pickup | 59-2-V1 Pickup; ON=1, OFF=0 | 3 |
| 87 | 59-V1 TRIP | 59-V1 TRIP command; ON=1, OFF=0 | 2 |
| 88 | 59-1-V2 Pickup | 59-1-V2 Pickup; ON=1, OFF=0 | 3 |
| 89 | 59-2-V2 Pickup | 59-2-V2 Pickup; ON=1, OFF=0 | 3 |
| 90 | 59-V2 TRIP | 59-V2 TRIP command; ON=1, OFF=0 | 2 |
| 91 | 27-1-V1 Pickup | 27-1-V1 Pickup; ON=1, OFF=0 | 3 |
| 92 | 27-2-V1 Pickup | 27-2-V1 Pickup; ON=1, OFF=0 | 3 |
| 93 | 27-V1 TRIP | 27-V1 TRIP command; ON=1, OFF=0 | 2 |
| 94 | 27-1-Vpg Pickup | 27-1-Vphg Pickup; ON=1, OFF=0 | 3 |
| 95 | 27-2-Vpg Pickup | 27-2-Vphg Pickup; ON=1, OFF=0 | 3 |
| 96 | 27-Vpg PU A | 27-Vphg Pickup A; 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 |
|---|---|---|---|
| 97 | 27-Vpg PU B | 27-Vphg Pickup B; ON=1, OFF=0 | 3 |
| 98 | 27-Vpg PU C | 27-Vphg Pickup C; ON=1, OFF=0 | 3 |
| 99 | 27-Vpg TRIP | 27-Vphg TRIP command; ON=1, OFF=0 | 2 |
| 100 | 27-1-Vpp Pickup | 27-1-Vphph Pickup; ON=1, OFF=0 | 3 |
| 101 | 27-2-Vpp Pickup | 27-2-Vphph Pickup; ON=1, OFF=0 | 3 |
| 102 | 27-Vpp PU AB | 27-Vphph Pickup A-B; ON=1, OFF=0 | 3 |
| 103 | 27-Vpp PU BC | 27-Vphph Pickup B-C; ON=1, OFF=0 | 3 |
| 104 | 27-Vpp PU CA | 27-Vphph Pickup C-A; ON=1, OFF=0 | 3 |
| 105 | 27-Vpp TRIP | 27-Vphph TRIP command; ON=1, OFF=0 | 2 |
| | **3.1.4 Breaker failure protection** | | |
| 106 | 50BF OFF | 50BF is switched OFF; ON=1, OFF=0 | 3 |
| 107 | 50BF BLOCK | 50BF is BLOCKED; ON=1, OFF=0 | 3 |
| 108 | 50BF ACTIVE | 50BF is ACTIVE; ON=1, OFF=0 | 3 |
| 109 | 50BF Start | 50BF Breaker failure protection started; ON=1, OFF=0 | 3 |
| 110 | BF T1-TRIP 1pL1 | BF Trip T1 (local trip) - only phase L1; ON=1, OFF=0 | 3 |
| 111 | BF T1-TRIP 1pL2 | BF Trip T1 (local trip) - only phase L2; ON=1, OFF=0 | 3 |
| 112 | BF T1-TRIP 1pL3 | BF Trip T1 (local trip) - only phase L3; ON=1, OFF=0 | 3 |
| 113 | BF T1-TRIP L123 | BF Trip T1 (local trip) - 3pole; ON=1, OFF=0 | 3 |
| 114 | BF TRIP Cbdefec | BF Trip in case of defective CB; ON=1, OFF=0 | 3 |
| 115 | BF T2-TRIP(bus) | BF Trip T2 (busbar trip); ON=1, OFF=0 | 3 |
| 116 | BF EndFlt TRIP | BF Trip End fault stage; ON=1, OFF=0 | 3 |
| 117 | BF CBdiscr TRIP | BF Pole discrepancy Trip; ON=1, OFF=0 | 3 |
| | **3.1.5 Circuit breaker test** | | |
| 118 | CB1-TESTtrip PhA | CB1-TEST TRIP command - Only Phase A; ON=1, OFF=0 | 3 |
| 119 | CB1-TESTtrip PhB | CB1-TEST TRIP command - Only Phase B; ON=1, OFF=0 | 3 |
| 120 | CB1-TESTtrip PhC | CB1-TEST TRIP command - Only Phase C; ON=1, OFF=0 | 3 |
| 121 | CB1-TESTtripABC | CB1-TEST TRIP command ABC; ON=1, OFF=0 | 3 |
| 122 | CB1-TEST close | CB1-TEST CLOSE command; ON=1, OFF=0 | 3 |
| 123 | CB-TEST running | CB-TEST is in progress; ON=1, OFF=0 | 3 |
| | **3.1.6 Measurement supervision** | | |
| 124 | Fail I Superv. | Failure: general Current Supervision; ON=1, OFF=0 | 3 |
| 125 | Failure Sum I | Failure: Current Summation; ON=1, OFF=0 | 1 |
| 126 | Fail I balance | Failure: Current Balance; ON=1, OFF=0 | 1 |
| 127 | Fail V Superv. | Failure: general Voltage Supervision; 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 |
|---|---|---|---|
| 128 | Fail Sum V Ph-G | Failure: Voltage Summation Phase-Ground; ON=1, OFF=0 | 1 |
| 129 | Fail V balance | Failure: Voltage Balance; ON=1, OFF=0 | 1 |
| 130 | VT FuseFail>10s | VT Fuse Failure (alarm >10s) ; ON=1, OFF=0 | 1 |
| 131 | Fail Ph. Seq. | Failure: Phase Sequence; ON=1, OFF=0 | 3 |
| 132 | Fail Conductor | Failure: Broken Conductor; ON=1, OFF=0 | 1 |
| 133 | Fuse Fail M.OFF | Fuse Fail Monitor is switched OFF; ON=1, OFF=0 | 3 |
| 134 | MeasSup OFF | Measurement Supervision is switched OFF; ON=1, OFF=0 | 3 |
| | **3.1.7 Diagnosis / General alarms** | | |
| 135 | Device OK | Device is operational and protecting; ON=1, OFF=0 | 1 |
| 136 | ProtActive | At least one protection funct. is active; ON=1, OFF=0 | 2 |
| 137 | Settings Calc. | Setting calculation is running; ON=1, OFF=0 | 3 |
| 138 | Error Sum Alarm | Error with a summary alarm; ON=1, OFF=0<br>(ref. to chap. 1.1.1) | 2 |
| 139 | Alarm Sum Event | Alarm Summary Event; ON=1, OFF=0<br>(ref. to chap. 1.1.2) | 2 |
| 140 | Relay PICKUP | Relay PICKUP; ON=1, OFF=0 | 1 |
| 141 | Relay PICKUP PhA | Relay PICKUP Phase A; ON=1, OFF=0 | 1 |
| 142 | Relay PICKUP PhB | Relay PICKUP Phase B; ON=1, OFF=0 | 1 |
| 143 | Relay PICKUP PhC | Relay PICKUP Phase C; ON=1, OFF=0 | 1 |
| 144 | Relay PICKUP G | Relay PICKUP GROUND; ON=1, OFF=0 | 1 |
| 145 | Relay TRIP | Relay GENERAL TRIP command; ON=1, OFF=0 | 1 |
| 146 | Definitive TRIP | Relay Definitive TRIP; ON=1, OFF=0 | 1 |
| 147 | Relay TRIP PhA | Relay TRIP command Phase A; ON=1, OFF=0 | 1 |
| 148 | Relay TRIP PhB | Relay TRIP command Phase B; ON=1, OFF=0 | 1 |
| 149 | Relay TRIP PhC | Relay TRIP command Phase C; ON=1, OFF=0 | 1 |
| | **3.1.8 Internal mode status** | | |
| 150 | DataStop | Stop data transmission; ON=1, OFF=0<br>(ref. to chap. 1.1.3) | 3 |
| 151 | Test mode | Test mode; ON=1, OFF=0 | 3 |
| 152 | Chatter ON | Chatter ON; ON=1, OFF=0 | 3 |
| 153 | Man.Clos.Detect | Manual close signal detected; ON=1, OFF=0 | 2 |
| 154 | Man.Close Cmd | CB CLOSE command for manual closing; ON=1, OFF=0 | 2 |
| 155 | LOCKOUT | LOCKOUT is active; ON=1, OFF=0 | 1 |
| 156 | Cntrl Auth | Control Authority; LOCAL=1, REMOTE=0 | 3 |
| 157 | ModeLOCAL | Control mode LOCAL; UNLOCKED=1, LOCKED=0 | 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 |
|---|---|---|---|
| 158 | ModeREMOTE | Control mode REMOTE; UNLOCKED=1, LOCKED=0 | 3 |
| | **3.1.9 Setting group** | | |
| 159 | Group A | Setting Group A; ON=1, OFF=0 | 1 |
| 160 | Group B | Setting Group B; ON=1, OFF=0 | 1 |
| 161 | Group C | Setting Group C; ON=1, OFF=0 | 1 |
| 162 | Group D | Setting Group D; ON=1, OFF=0 | 1 |
| | **3.1.10 User-allocated single-point indications** | | |
| 163 | <unnamed>* | User input 1 | 2 |
| 164 | <unnamed> | User input 2 | 2 |
| 165 | <unnamed> | User input 3 | 2 |
| 166 | <unnamed> | User input 4 | 2 |
| 167 | <unnamed> | User input 5 | 2 |
| 168 | <unnamed> | User input 6 | 2 |
| 169 | <unnamed> | User input 7 | 2 |
| 170 | <unnamed> | User input 8 | 2 |
| 171 | <unnamed> | User input 9 | 2 |
| 172 | <unnamed> | User input 10 | 2 |
| 173 | <unnamed> | User input 11 | 2 |
| 174 | <unnamed> | User input 12 | 2 |
| 175 | <unnamed> | User input 13 | 2 |
| 176 | <unnamed> | User input 14 | 2 |
| 177 | <unnamed> | User input 15 | 2 |

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

## 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 | 79 ON | Activation / deactivation of Auto-reclosure function | Latch On, Latch Off |
| 1 | ProtActive | Protection activation / deactivation | Latch On, Latch Off |
| 2 | Group A | Select setting group A and deactivate setting group B,C,D (ref. to chap. 1.2.3) | Latch On |
| 3 | Group B | Select setting group B and deactivate setting group A,C,D | Latch On |
| 4 | Group C | Select setting group C and deactivate setting group A,B,D | Latch On |
| 5 | Group D | Select setting group D and deactivate setting group A,B,C | Latch On |
| 6 | ModeREMOTE | Mode remote control; UNLOCKED=1, LOCKED=0 (ref. to chap. 1.2.2) | Latch On; Latch Off |
| | **3.2.2 User-allocated single commands**<br>Please ref. to chap. 1.2.1 for additional notes. | | |
| 7 | <unnamed>* | User output 1 | Latch On, Latch Off |
| 8 | <unnamed> | User output 2 | Latch On, Latch Off |
| 9 | <unnamed> | User output 3 | Latch On, Latch Off |
| 10 | <unnamed> | User output 4 | Latch On, Latch Off |
| 11 | <unnamed> | User output 5 | Latch On, Latch Off |
| 12 | <unnamed> | User output 6 | Latch On, Latch Off |
| 13 | <unnamed> | User output 7 | Latch On, Latch Off |
| 14 | <unnamed> | User output 8 | Latch On, Latch Off |
| 15 | <unnamed> | User output 9 | Latch On, Latch Off |
| 16 | <unnamed> | User output 10 | Latch On, Latch Off |
| 17 | <unnamed> | User output 11 | Latch On, Latch Off |
| 18 | <unnamed> | User output 12 | Latch On, Latch Off |
| 19 | <unnamed> | User output 13 | Latch On, Latch Off |
| 20 | <unnamed> | User output 14 | Latch On, Latch Off |
| 21 | <unnamed> | User output 15 | Latch On, Latch Off |

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

## 3.3 Counters

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

## 3.4 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 |
|---|---|---|---|---|
| | **3.4.1 Recorded measured values** | | | |
| 0 | Ia = | Ia | 3276.7 A | 1 |
| 1 | Ib = | Ib | 3276.7 A | 1 |
| 2 | Ic = | Ic | 3276.7 A | 1 |
| 3 | 3Io = | 3Io (zero sequence) | 3276.7 A | 2 |
| 4 | Va = | Va | 3276.7 kV | 1 |
| 5 | Vb = | Vb | 3276.7 kV | 1 |
| 6 | Vc = | Vc | 3276.7 kV | 1 |
| 7 | Va-b= | Va-b | 3276.7 kV | 1 |
| 8 | Vb-c= | Vb-c | 3276.7 kV | 1 |
| 9 | Vc-a= | Vc-a | 3276.7 kV | 1 |
| 10 | 3Vo = | 3Vo (zero sequence) | 3276.7 kV | 2 |
| 11 | Vdiff = | V-diff (line-bus) | 3276.7 kV | 2 |
| 12 | Vline = | V-line | 3276.7 kV | 2 |
| 13 | Vbus = | V-bus | 3276.7 kV | 2 |
| 14 | P = | P (active power) | 3276.7 MW | 1 |
| 15 | Q = | Q (reactive power) | 3276.7 MVAR | 1 |
| 16 | PF = | Power Factor | 3.2767 | 1 |
| 17 | Freq= | Frequency | 327.67 Hz | 1 |
| 18 | S = | S (apparent power) | 3276.7 MVAR | 2 |
| 19 | F-bus = | Frequency (busbar) | 327.67 Hz | 2 |
| 20 | F-diff= | Frequency (difference line-bus) | 327.67 Hz | 2 |
| 21 | PHI-diff= | Angle (difference line-bus) | 3276.6 $^{0}$ | 2 |
| 22 | F-line= | Frequency (line) | 327.67 Hz | 2 |
| 23 | <unnamed> | User input 1 | | |
| 24 | <unnamed> | User input 2 | | |
| 25 | <unnamed> | User input 3 | | |
| 26 | <unnamed> | User input 4 | | |
| 27 | <unnamed> | User input 5 | | |

**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 |
|---|---|---|---|---|
| **If Object 30 Variation 01 (32-Bit Analog Input) requesten, additional:** | | | | |
| | **3.4.2 Fault locator and fault currents** | | | |
| 28 | Ia = | Primary fault current Ia | 327.67 kA | 3 |
| 29 | Ib = | Primary fault current Ib | 327.67 kA | 3 |
| 30 | Ic = | Primary fault current Ic | 327.67 kA | 3 |
| 31 | Last Ia = | Last fault current Phase A | 327.67 kA | 3 |
| 32 | Last Ib = | Last fault current Phase B | 327.67 kA | 3 |
| 33 | Last Ic = | Last fault current Phase C | 327.67 kA | 3 |
| | **3.4.3 Statistic values** | | | |
| 34 | # TRIPs= | Number of breaker TRIP commands | | 3 |
| 35 | # TRIPs PhA= | Number of breaker TRIP commands, Ph A | | 3 |
| 36 | # TRIPs PhB= | Number of breaker TRIP commands, Ph B | | 3 |
| 37 | # TRIPs PhC= | Number of breaker TRIP commands, Ph C | | 3 |
| 38 | Sum Ia = | Accumulation of interrupted current Ph A | 327.67 kA | 3 |
| 39 | Sum Ib = | Accumulation of interrupted current Ph B | 327.67 kA | 3 |
| 40 | Sum Ic = | Accumulation of interrupted current Ph C | 327.67 kA | 3 |

# Index

# 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 |

**To**

Siemens AG

Dept. PTD PA D PSN

D–13623 Berlin

Germany

**From**

Name:

Company/Dept.:

Address:

Phone no.: Fax no.:

Dear reader,

printing errors can never be entirely eliminated: therefore, should you come across any when reading this manual, kindly enter them in this form together with any comments or suggestions for improvement that you may have.

**Corrections/Suggestions**

Subject to technical alteration

Siemens Aktiengesellschaft

Order-no.: C53000-L1840-A013-03
Available from: LZF Fürth-Bislohe
Printed in Germany/Imprimé en Allemagne
AG 0101 0.2 FO 123 En