

SIPROTEC

Multifunction Paralleling
Devices
7VE61, 7VE63

Communication module

Modbus
Bus mapping

Preface

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Revision 1.0

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The information in this manual is checked periodically, and necessary corrections will be included in future editions.

We appreciate any suggested improvements.

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Preface

Purpose of this manual

The manual describes the register map organization of the Modbus slave of the SIPROTEC devices 7VE61, 7VE63 and is divided into the following topics:

- Modbus register map → Chapter 1.

General details about the function, operation, assembly and commissioning of the SIPROTEC devices you find in the

- SIPROTEC4 System Manual, order no. E50417–H1176–C151.

Modbus communication profile documentation

The following additional manual informs you about the data types, bus specific parameters and hardware interface of the Modbus slave module of the SIPROTEC devices:

| Manual | Order number |
|---|----------------------|
| SIPROTEC Communication module, Modbus - Communication profile | C53000-L1840-C001-03 |

Modbus specification

The Modbus specification with a detailed explanation of the Modbus protocol is contained in:

- MODICON
Modbus Protocol
Reference Guide
PI-MBUS-300 Rev. J
June 1996, Modicon, Inc.

| | |
|---------------------------|---|
| Validity | <p>This manual is valid for the SIPROTEC devices:</p> <ul style="list-style-type: none">• 7VE61, 7VE63 (firmware version 4.0 or higher), <p>with</p> <ul style="list-style-type: none">• Modbus communication module version 03.00.04 or higher. <p>For device parameterization have to be used:</p> <ul style="list-style-type: none">• DIGSI 4.3 or higher,• Modbus standard mappings 3-n (n = device type dependent number of standard mappings). |
| Additional Support | <p>For questions regarding SIPROTEC4 devices, please contact your Siemens representative.</p> |
| Training courses | <p>Individual course offerings may be found in our Training Catalog and questions can be directed to our Training Centre. Please contact your Siemens representative.</p> |
| Target audience | <p>Protection engineers, commissioning engineers, personnel concerned with adjustment, checking and service of selective protective equipment, automatic and control facilities and personnel of electrical facilities and power plants.</p> |



Warning!

During operation of electrical equipment, certain parts of these devices are under high voltage. Severe personal injury or significant equipment damage could result from improper behaviour.

Only qualified personnel should work on this equipment or in the vicinity of this equipment. These personnel must be familiar with all warnings and service procedures described in this manual, as well as with safety regulations.

Prerequisites to proper and safe operation of this product are proper transport, proper storage, setup, installation, operation, and maintenance of the product, as well as careful operation and servicing of the device within the scope of the warnings and instructions of this manual.

In particular, the general facility and safety regulations for work with high-voltage equipment (e.g. ANSI, IEC, EN, or other national or international regulations) must be observed. Noncompliance may result in death, injury or significant equipment damage.

QUALIFIED PERSONNEL

Within the meaning of safety precautions of this manual and the instructions, qualified personnel are those persons who are qualified to set up, install, place into service, and operate this device, and who possess the following qualifications:

- Training and instruction (or other qualification) for switching, grounding, and designating devices and systems.
- Training or instruction in accordance with safety standards for care and use of certain safety equipment.

First aid training.

Typographic and graphical conventions

The following text formats are used to identify concepts giving device information described by the text flow:

Parameter names, or identifiers for configuration or function parameters that appear in the device display or on the screen of a PC (with DIGSI) are shown in mono-script (same point size) bold text. This also applies to header bars for selection menus.

Parameter conditions, or possible settings of parameters that appear in the device display or on the screen of a PC (with DIGSI), are additionally shown in italic style. This also applies to selection items for selection menus.

„Annunciations“, or identifiers for information produced by the device or required by other devices or from the switchgear is shown in mono-script (same point size) and placed into quotation marks.

For diagrams in which the identifier type results from the representation itself, text conventions may differ from the above-mentioned.

Revision index

Listing of the changes between the editions of this manual:

| Modified chapters / pages | Edition | Reasons of modification |
|---------------------------|---------|---|
| | 1.0 | First edition, Doc.-No.: C53000-L1840-C017-03 July 30 th , 2003 |
| | | |

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Modbus register map

This chapter describes the register map organization of the Modbus slave of the SIPROTEC devices 7VE61, 7VE63.

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1.1 Explanations



Note:

The examples shown in this chapter 1.1 do not necessarily correspond to the real allocation of the objects in the register mapping.

Chapters 1.2 to 1.5 define the mapping of the data objects of the SIPROTEC devices 7VE61, 7VE63 to the associated Modbus registers.

The columns "Designation of the SIPROTEC objects" contain the texts of the SIPROTEC objects for "US English" device language.

The listed SIPROTEC data objects are *sorted by register numbers* (starting with 1), e.g.:

| Register | Designation of the SIPROTEC objects | Comments | Scaling (32767 corresponds to...) | Internal object no. |
|----------|-------------------------------------|-------------------|-----------------------------------|---------------------|
| 30001 | V1 = | Measured value V1 | 3276,7 V | 25044 |

The measured value "V1" is assigned to register 30001 (Input register).

| Register | Designation of the SIPROTEC objects | Comments | Internal object no. |
|----------|-------------------------------------|---------------------------------|---------------------|
| 10017 | 25 MonTimeExc | 1 = 25 Monitoring time exceeded | 222.2025.01 |

The single-point indication "25 MonTimeExc" is assigned to the Input Status register 10017.



Note:

- The description of the standard mappings contains the pre-allocation of the mapping files *at delivery or at first assignment* of a mapping in DIGSI to the SIPROTEC device.
- Changes of the allocation and the scaling of the measured values are possible in adaptation to the concrete installation environment. You find information about this in the manual "SIPROTEC Communication module, Modbus - Communication profile" (ref. to page i).
- The definition of the data types (single-point indication, measured value etc.) are contained in the manual "SIPROTEC Communication module, Modbus - Communication profile" (ref. to page i).

1.2 Coil Status registers (0X references)

The Coil Status register block allows the Modbus master:

- command outputs through the output relays of the SIPROTEC device (external commands),
- manipulation of taggings (internal commands),
- reading the checkback indication and/or the status of output relays as well as taggings.



Note:

- The allocation of the output relays to the switching devices and to the output channels is defined during parameterization of the SIPROTEC devices.
- Depending on the device composition there may be less than indicated output relays (and corresponding Modbus registers) available in the SIPROTEC device.

1.2.1 Registers 00001 to 00044: Single commands (with checkback indication)

- User-defined single commands with checkback indication or taggings can be routed on these position as “Source/Destination system interface” using the **DIGSI Configuration matrix**.

| Register | Designation of the SIPROTEC objects | Comments | Internal object no. |
|----------|-------------------------------------|-------------------|---------------------|
| 00001 | <user-defined> | not pre-allocated | - |
| 00002 | <user-defined> | not pre-allocated | - |
| 00003 | <user-defined> | not pre-allocated | - |
| 00004 | <user-defined> | not pre-allocated | - |
| 00005 | <user-defined> | not pre-allocated | - |
| 00006 | <user-defined> | not pre-allocated | - |
| 00007 | <user-defined> | not pre-allocated | - |
| 00008 | <user-defined> | not pre-allocated | - |
| 00009 | <user-defined> | not pre-allocated | - |
| 00010 | <user-defined> | not pre-allocated | - |
| 00011 | <user-defined> | not pre-allocated | - |
| 00012 | <user-defined> | not pre-allocated | - |
| 00013 | <user-defined> | not pre-allocated | - |
| 00014 | <user-defined> | not pre-allocated | - |
| 00015 | <user-defined> | not pre-allocated | - |
| 00016 | <user-defined> | not pre-allocated | - |
| 00017 | <user-defined> | not pre-allocated | - |
| 00018 | <user-defined> | not pre-allocated | - |
| 00019 | <user-defined> | not pre-allocated | - |

| Register | Designation of the SIPROTEC objects | Comments | Internal object no. |
|----------|-------------------------------------|-------------------|---------------------|
| 00020 | <user-defined> | not pre-allocated | - |
| 00021 | <user-defined> | not pre-allocated | - |
| 00022 | <user-defined> | not pre-allocated | - |
| 00023 | <user-defined> | not pre-allocated | - |
| 00024 | <user-defined> | not pre-allocated | - |
| 00025 | <user-defined> | not pre-allocated | - |
| 00026 | <user-defined> | not pre-allocated | - |
| 00027 | <user-defined> | not pre-allocated | - |
| 00028 | <user-defined> | not pre-allocated | - |
| 00029 | <user-defined> | not pre-allocated | - |
| 00030 | <user-defined> | not pre-allocated | - |
| 00031 | <user-defined> | not pre-allocated | - |
| 00032 | <user-defined> | not pre-allocated | - |
| 00033 | <user-defined> | not pre-allocated | - |
| 00034 | <user-defined> | not pre-allocated | - |
| 00035 | <user-defined> | not pre-allocated | - |
| 00036 | <user-defined> | not pre-allocated | - |
| 00037 | <user-defined> | not pre-allocated | - |
| 00038 | <user-defined> | not pre-allocated | - |
| 00039 | <user-defined> | not pre-allocated | - |
| 00040 | <user-defined> | not pre-allocated | - |
| 00041 | <user-defined> | not pre-allocated | - |
| 00042 | <user-defined> | not pre-allocated | - |
| 00043 | <user-defined> | not pre-allocated | - |
| 00044 | <user-defined> | not pre-allocated | - |

1.2.2 Registers 00045 to 00048: Internal commands

| Register | Designation of the SIPROTEC objects | Comments | Internal object no. |
|----------|-------------------------------------|--|---------------------|
| 00045 | Command: Setting Group A | 0 = not permitted 1 = Activation of setting group A | - |
| | Indication: Setting Group A | 0 = Setting group A is not active 1 = Setting group A is active | |
| 00046 | Command: Setting Group B | 0 = not permitted 1 = Activation of setting group B | - |
| | Indication: Setting Group B | 0 = Setting group B is not active 1 = Setting group B is active | |
| 00047 | Command: Setting Group C | 0 = not permitted 1 = Activation of setting group C | - |
| | Indication: Setting Group C | 0 = Setting group C is not active 1 = Setting group C is active | |
| 00048 | Command: Setting Group D | 0 = not permitted 1 = Activation of setting group D | - |
| | Indication: Setting Group D | 0 = Setting group D is not active 1 = Setting group D is active | |



Changing the setting group:

- In order to change the setting group, the value "1" = ON must be transmitted to the corresponding register.
- Switching ON one setting group automatically switches OFF the current active setting group.
- Transmission of the value "0" = OFF is insignificant for the change of the setting group and is refused by the device.

Note:

A change of the setting group is only possible via Modbus if the parameter **Change to Another Setting Group** (parameter address = 302) has the value **Protocol1**.

1.2.3 Registers 00049 to 00052: Double commands (with checkback indication)

- User-defined double commands with double-point indication as checkback indication can be routed on these position as “Source/Destination system interface” using the **DIGSI Configuration matrix**.
- Ref. to chap. “Double command / Double-point indication” in the manual “SIPROTEC Communication module, Modbus - Communication profile” for additional notes regarding controlling of double commands.

| Register | Designation of the SIPROTEC objects | Comments | Internal object no. |
|----------|-------------------------------------|-------------------|---------------------|
| 00049 | <user-defined> ON | not pre-allocated | - |
| 00050 | <user-defined> OFF | | |
| 00051 | <user-defined> ON | not pre-allocated | - |
| 00052 | <user-defined> OFF | | |

1.2.4 Registers Registers 00257 to 00264: Exception Flags

- Registers are write-protected.¹
- The contents of these registers is also readable using function "Read Exception Status" (function code 7).
- Installation-specific SIPROTEC objects can be routed on these register positions using parameterization system DIGSI.

| Register | Designation of the SIPROTEC objects | Comments | Internal object no. |
|----------|-------------------------------------|-------------------|---------------------|
| 00257 | <user-defined> | not pre-allocated | - |
| 00258 | <user-defined> | not pre-allocated | - |
| 00259 | <user-defined> | not pre-allocated | - |
| 00260 | <user-defined> | not pre-allocated | - |
| 00261 | <user-defined> | not pre-allocated | - |
| 00262 | <user-defined> | not pre-allocated | - |
| 00263 | <user-defined> | not pre-allocated | - |
| 00264 | <user-defined> | not pre-allocated | - |

1. A write access is rejected with exception code 03 (ILLEGAL_DATA_VALUE).

1.3 Input Status registers (1X references)

The Input Status register block allows the Modbus master to scan the current status of the input channels as well as the annunciations generated in the SIPROTEC device (e.g. protection annunciations, status annunciations).



Note:

- The allocation of the input channels to the binary inputs is defined during parameterization of the devices.
- Depending on the device composition and the existing protection packages not all of the indicated binary inputs or protection annunciations (and corresponding Modbus registers) may be available in the SIPROTEC device.

1.3.1 Registers 10001 to 10016: Single-point indications, taggings

- Further protection annunciations, single-point indications and taggings (internal single-point indications) can be routed on these register positions as "Destination system interface" using the **DIGSI Configuration matrix**.

| Register | Designation of the SIPROTEC objects | Comments | Internal object no. |
|----------|-------------------------------------|-------------------|---------------------|
| 10001 | <user-defined> | not pre-allocated | - |
| 10002 | <user-defined> | not pre-allocated | - |
| 10003 | <user-defined> | not pre-allocated | - |
| 10004 | <user-defined> | not pre-allocated | - |
| 10005 | <user-defined> | not pre-allocated | - |
| 10006 | <user-defined> | not pre-allocated | - |
| 10007 | <user-defined> | not pre-allocated | - |
| 10008 | <user-defined> | not pre-allocated | - |
| 10009 | <user-defined> | not pre-allocated | - |
| 10010 | <user-defined> | not pre-allocated | - |
| 10011 | <user-defined> | not pre-allocated | - |
| 10012 | <user-defined> | not pre-allocated | - |
| 10013 | <user-defined> | not pre-allocated | - |
| 10014 | <user-defined> | not pre-allocated | - |
| 10015 | <user-defined> | not pre-allocated | - |
| 10016 | <user-defined> | not pre-allocated | - |

1.3.2 Registers 10017 to 10029: Error messages synchronization

| Register | Designation of the SIPROTEC objects | Comments | Internal object no. |
|----------|-------------------------------------|--|---------------------|
| 10017 | 25 MonTimeExc | 1 = 25 Monitoring time exceeded | 222.2025.01 |
| 10018 | 25 FG-Error | 1 = 25 Multiple selection of func-groups | 222.2096.01 |
| 10019 | 25 Fail.Conf. | 1 = 25 Failure in Configuration | 222.2331.01 |
| 10020 | 25 sup.asym. | 1 = 25-supervision V1,V2 asymmetrical | 222.2309.01 |
| 10021 | 25 sup. α | 1 = 25-supervision Alpha> | 222.2310.01 |
| 10022 | 25-1 PaErr | 1 = 25-group 1: Parameter not plausible | 170.2097.01 |
| 10023 | 25-2 PaErr | 1 = 25-group 2: Parameter not plausible | 170.2097.02 |
| 10024 | 25-3 PaErr | 1 = 25-group 3: Parameter not plausible | 170.2097.03 |
| 10025 | 25-4 PaErr | 1 = 25-group 4: Parameter not plausible | 170.2097.04 |
| 10026 | 25-5 PaErr | 1 = 25-group 5: Parameter not plausible | 170.2097.05 |
| 10027 | 25-6 PaErr | 1 = 25-group 6: Parameter not plausible | 170.2097.06 |
| 10028 | 25-7 PaErr | 1 = 25-group 7: Parameter not plausible | 170.2097.07 |
| 10029 | 25-8 PaErr | 1 = 25-group 8: Parameter not plausible | 170.2097.08 |

1.3.3 Registers 10030 to 10095: Synchronization

| Register | Designation of the SIPROTEC objects | Comments | Internal object no. |
|----------|-------------------------------------|---|---------------------|
| 10030 | 25-1 activ | 1 = 25 Function group 1 is active | 170.2311.01 |
| 10031 | 25-2 activ | 1 = 25 Function group 2 is active | 170.2311.02 |
| 10032 | 25-3 activ | 1 = 25 Function group 3 is active | 170.2311.03 |
| 10033 | 25-4 activ | 1 = 25 Function group 4 is active | 170.2311.04 |
| 10034 | 25-5 activ | 1 = 25 Function group 5 is active | 170.2311.05 |
| 10035 | 25-6 activ | 1 = 25 Function group 6 is active | 170.2311.06 |
| 10036 | 25-7 activ | 1 = 25 Function group 7 is active | 170.2311.07 |
| 10037 | 25-8 activ | 1 = 25 Function group 8 is active | 170.2311.08 |
| 10038 | 25-1 meas. | 1 = 25-group 1: measurement in progress | 170.2022.01 |
| 10039 | 25-2 meas. | 1 = 25-group 2: measurement in progress | 170.2022.02 |
| 10040 | 25-3 meas. | 1 = 25-group 3: measurement in progress | 170.2022.03 |
| 10041 | 25-4 meas. | 1 = 25-group 4: measurement in progress | 170.2022.04 |
| 10042 | 25-5 meas. | 1 = 25-group 5: measurement in progress | 170.2022.05 |
| 10043 | 25-6 meas. | 1 = 25-group 6: measurement in progress | 170.2022.06 |
| 10044 | 25-7 meas. | 1 = 25-group 7: measurement in progress | 170.2022.07 |
| 10045 | 25-8 meas. | 1 = 25-group 8: measurement in progress | 170.2022.08 |
| 10046 | 25-1 BLOCK | 1 = 25-group 1 is BLOCKED | 170.0051.01 |
| 10047 | 25-2 BLOCK | 1 = 25-group 2 is BLOCKED | 170.0051.02 |

| Register | Designation of the SIPROTEC objects | Comments | Internal object no. |
|----------|-------------------------------------|--|---------------------|
| 10048 | 25-3 BLOCK | 1 = 25-group 3 is BLOCKED | 170.0051.03 |
| 10049 | 25-4 BLOCK | 1 = 25-group 4 is BLOCKED | 170.0051.04 |
| 10050 | 25-5 BLOCK | 1 = 25-group 5 is BLOCKED | 170.0051.05 |
| 10051 | 25-6 BLOCK | 1 = 25-group 6 is BLOCKED | 170.0051.06 |
| 10052 | 25-7 BLOCK | 1 = 25-group 7 is BLOCKED | 170.0051.07 |
| 10053 | 25-8 BLOCK | 1 = 25-group 8 is BLOCKED | 170.0051.08 |
| 10054 | 25 V1>V2< | 1 = 25 Condition V1> V2< fulfilled | 222.2027.01 |
| 10055 | 25 V1<V2> | 1 = 25 Condition V1< V2> fulfilled | 222.2028.01 |
| 10056 | 25 V1<V2< | 1 = 25 Condition V1< V2< fulfilled | 222.2029.01 |
| 10057 | 25 Vdiff ok | 1 = 25 Voltage difference (Vdiff) okay | 222.2030.01 |
| 10058 | 25 fdiff ok | 1 = 25 Frequency difference (fdiff) okay | 222.2031.01 |
| 10059 | 25 α diff ok | 1 = 25 Angle difference (alphadiff) okay | 222.2032.01 |
| 10060 | 25 f1>> | 1 = 25 Frequency f1 > fmax permissible | 222.2033.01 |
| 10061 | 25 f1<< | 1 = 25 Frequency f1 < fmin permissible | 222.2034.01 |
| 10062 | 25 f2>> | 1 = 25 Frequency f2 > fmax permissible | 222.2035.01 |
| 10063 | 25 f2<< | 1 = 25 Frequency f2 < fmin permissible | 222.2036.01 |
| 10064 | 25 V1>> | 1 = 25 Voltage V1 > Umax permissible | 222.2037.01 |
| 10065 | 25 V1<< | 1 = 25 Voltage V1 < Umin permissible | 222.2038.01 |
| 10066 | 25 V2>> | 1 = 25 Voltage V2 > Umax permissible | 222.2039.01 |
| 10067 | 25 V2<< | 1 = 25 Voltage V2 < Umin permissible | 222.2040.01 |
| 10068 | 25 V2>V1 | 1 = 25 Vdiff too large (V2>V1) | 222.2090.01 |
| 10069 | 25 V2<V1 | 1 = 25 Vdiff too large (V2<V1) | 222.2091.01 |
| 10070 | 25 f2>f1 | 1 = 25 fdiff too large (f2>f1) | 222.2092.01 |
| 10071 | 25 f2<f1 | 1 = 25 fdiff too large (f2<f1) | 222.2093.01 |
| 10072 | 25 α 2> α 1 | 1 = 25 alphadiff too large (α 2> α 1) | 222.2094.01 |
| 10073 | 25 α 2< α 1 | 1 = 25 alphadiff too large (α 2< α 1) | 222.2095.01 |
| 10074 | 25 synchron 1 | 1 = 25 Synchronization condition 1 okay | 222.2302.01 |
| 10075 | 25 synchron 2 | 1 = 25 Synchronization condition 2 okay | 222.2303.01 |
| 10076 | 25 CloseRel 1 | 1 = 25 Release of Close Command 1-1 | 170.2300.01 |
| 10077 | 25 CloseRel 2 | 1 = 25 Release of Close Command 2-1 | 170.2301.01 |
| 10078 | 25 CloseRel 1 | 1 = 25 Release of Close Command 1-2 | 170.2300.02 |
| 10079 | 25 CloseRel 2 | 1 = 25 Release of Close Command 2-2 | 170.2301.02 |
| 10080 | 25 CloseRel 1 | 1 = 25 Release of Close Command 1-3 | 170.2300.03 |
| 10081 | 25 CloseRel 2 | 1 = 25 Release of Close Command 2-3 | 170.2301.03 |
| 10082 | 25 CloseRel 1 | 1 = 25 Release of Close Command 1-4 | 170.2300.04 |
| 10083 | 25 CloseRel 2 | 1 = 25 Release of Close Command 2-4 | 170.2301.04 |
| 10084 | 25 CloseRel 1 | 1 = 25 Release of Close Command 1-5 | 170.2300.05 |
| 10085 | 25 CloseRel 2 | 1 = 25 Release of Close Command 2-5 | 170.2301.05 |

| Register | Designation of the SIPROTEC objects | Comments | Internal object no. |
|----------|-------------------------------------|-------------------------------------|---------------------|
| 10086 | 25 CloseRel 1 | 1 = 25 Release of Close Command 1-6 | 170.2300.06 |
| 10087 | 25 CloseRel 2 | 1 = 25 Release of Close Command 2-6 | 170.2301.06 |
| 10088 | 25 CloseRel 1 | 1 = 25 Release of Close Command 1-7 | 170.2300.07 |
| 10089 | 25 CloseRel 2 | 1 = 25 Release of Close Command 2-7 | 170.2301.07 |
| 10090 | 25 CloseRel 1 | 1 = 25 Release of Close Command 1-8 | 170.2300.08 |
| 10091 | 25 CloseRel 2 | 1 = 25 Release of Close Command 2-8 | 170.2301.08 |
| 10092 | 25 V2 down | 1 = 25 decrease voltage V2 | 222.2324.01 |
| 10093 | 25 V2 up | 1 = 25 increase voltage V2 | 222.2325.01 |
| 10094 | 25 f2 down | 1 = 25 decrease frequency f2 | 222.2326.01 |
| 10095 | 25 f2 up | 1 = 25 increase frequency f2 | 222.2327.01 |

1.4 Input registers (3X references)

The Input register block allows the Modbus master to read the values of the the analog inputs of the SIPROTEC device (recorded measured values).



Note:

- Depending on the device composition not all of the indicated analog inputs (and corresponding Modbus registers) may be available in the SIPROTEC device.
- The pre-allocated measured values are transferred as secondary values per default.
- Changes of the scaling of the measured values are possible in adaption to the concrete installation environment.
You find information about this in the manual "SIPROTEC Communication module, Modbus - Communication profile" (ref. to page i).

| Register | Designation of the SIPROTEC objects | Comments | Scaling (32767 corresponds to ...) | Internal object no. |
|----------|-------------------------------------|---------------------------|---------------------------------------|---------------------|
| 30001 | V1 = | Measured value V1 | 3276,7 V | 25044 |
| 30002 | V2 = | Measured value V2 | 3276,7 V | 25045 |
| 30003 | f1 = | Measured value f1 | 327,67 Hz | 25046 |
| 30004 | f2 = | Measured value f2 | 327,67 Hz | 25047 |
| 30005 | dU = | Measured value dU | 3276,7 V | 25048 |
| 30006 | df = | Measured value df | 327,67 Hz | 25049 |
| 30007 | d α = | Measured value d α | 3276,7 ° | 25050 |
| 30008 | <user-defined> | not pre-allocated | - | - |
| 30009 | <user-defined> | not pre-allocated | - | - |
| 30010 | <user-defined> | not pre-allocated | - | - |
| 30011 | <user-defined> | not pre-allocated | - | - |
| 30012 | <user-defined> | not pre-allocated | - | - |
| 30013 | <user-defined> | not pre-allocated | - | - |

1.5 Holding registers (4X references)

The Holding register block allows the Modbus master:

- query of system and diagnostic information, statistic values as well as min/max values,
- time synchronization of the SIPROTEC device and
- reading the Event recorder (Sequence of Events).

1.5.1 Registers 40001 to 40036: System information

- Registers are write-protected.¹

| Register | Designation of the SIPROTEC objects | Comments |
|---------------------|---|--|
| 40001 - 40008 | Hardware designation of the communication module (string, max. 16 characters) | "AME-GEN" for AME module, "AMO-GEN" for AMO module |
| 40009 - 40010 | Communication module software revision | <u>Example:</u> Register 40009 = 0001H, register 40010 = 0205H → Revision 1.2.5 |
| 40011 - 40026 | MLFB (order number) of the SIPROTEC device (string, max. 32 characters) | <u>Example:</u> "7VE61105EB910DB1----0D-----" |
| 40027 - 40034 | Date and time of mapping data generation (string, max. 16 characters) | <u>Example:</u> "170203095747330" corresponds to → Date: Feb. 17th, 2003 → Time: 09 hours, 57 min., 47 sec. and 330 milliseconds |
| 40035 - 40036 | Number of selected standard mapping, Revision of mapping data | MSB of register 40035: → Number of selected standard mapping LSB of register 40035 and value of register 40036: → Revision of mapping data <u>Example:</u> Register 40035 = 3102H, register 40036 = 0304H → Standard mapping 3-1, Revision 2.3.4 |

1. A write access is rejected with exception code 03 (ILLEGAL_DATA_VALUE).

1.5.2 Registers 40065 to 40069: Time synchronization

- Ref. to chap. "Time synchronization" in the manual "SIPROTEC Communication module, Modbus - Communication profile" for additional notes regarding methods of time synchronization and Time/Date data type.

| Register | Designation of the SIPROTEC objects | Comments |
|----------|-------------------------------------|--|
| 40065 | Milliseconds | Time/Date transfer registers |
| 40066 | Hours / Minutes | |
| 40067 | Month / Day | |
| 40068 | Time/Date status byte / Year | |
| 40069 | "Set Time and Date" | available only, if time synchronization is configured with use of the "Set Time and Date" register |

1.5.3 Register 40129: Diagnosis

- Registers are write-protected.¹
- The contents of this register is also readable using function "Diagnostics" (function code 7), subfunction "Return Diagnostic Register" (subfunction code 2).
- Ref. to chap. "Bus specific parameters" in the manual "SIPROTEC Communication module, Modbus - Communication profile" regarding signalization of "Data invalid" (register 40129/2¹⁵).

| Register | Designation of the SIPROTEC objects | Comments | Internal object no. |
|-----------------------|-------------------------------------|--|---------------------|
| 40129/2 ⁰ | Device OK | 1 = Update of the device replica in the SIPROTEC device completed after initial start or restart | 51 |
| 40129/2 ¹ | ProtActive | 1 = At Least one protection function is active | 52 |
| 40129/2 ² | <user-defined> | not pre-allocated | - |
| 40129/2 ³ | Error Sum Alarm | 1 = Error with a summary alarm ON | 140 |
| 40129/2 ⁴ | Alarm Sum Event | 1 = Alarm summary event ON | 160 |
| 40129/2 ⁵ | Relay PICKUP | 1 = Relay PICKUP (group signal) | 501 |
| 40129/2 ⁶ | Relay TRIP | 1 = Relay GENERAL TRIP command | 511 |
| 40129/2 ⁷ | <user-defined> | not pre-allocated | - |
| 40129/2 ⁸ | <user-defined> | not pre-allocated | - |
| 40129/2 ⁹ | <user-defined> | not pre-allocated | - |
| 40129/2 ¹⁰ | <user-defined> | not pre-allocated | - |
| 40129/2 ¹¹ | <user-defined> | not pre-allocated | - |
| 40129/2 ¹² | <user-defined> | not pre-allocated | - |
| 40129/2 ¹³ | <user-defined> | not pre-allocated | - |
| 40129/2 ¹⁴ | <user-defined> | not pre-allocated | - |
| 40129/2 ¹⁵ | Data invalid | 1 = Data in the Modbus message are invalid. (This indication is created by the Modbus slave; not available in DIGSI and not relocatable.) | - |

1. A write access is rejected with exception code 03 (ILLEGAL_DATA_VALUE).

1.5.4 Registers 40301 to 40316: Statistic values

- Registers are write-protected.¹
- Installation-specific statistic values can be routed on these register positions as “Destination system interface” using the **DIGSI Configuration matrix**.

| Register | Designation of the SIPROTEC objects | Comments | Internal object no. |
|---------------------|-------------------------------------|-------------------|---------------------|
| 40301 - 40302 | <user-defined> | not pre-allocated | - |
| 40303 - 40304 | <user-defined> | not pre-allocated | - |
| 40305 - 40306 | <user-defined> | not pre-allocated | - |
| 40307 - 40308 | <user-defined> | not pre-allocated | - |

1. A write access is rejected with exception code 03 (ILLEGAL_DATA_VALUE).

1.5.5 Registers 40351 to 40520: Min/Max values of measured values

- Registers are write-protected.¹
- Min/Max values can be routed on these register positions as “Destination system interface” using the **DIGSI Configuration matrix**.
- Information regarding the Time/Date data type you find in the manual “SIPROTEC Communication module, Modbus - Communication profile” (ref. to page i).

| Register | Designation of the SIPROTEC objects | Comments | Scaling (32767 corresponds to ...) | Internal object no. |
|---------------------|-------------------------------------|---|------------------------------------|---------------------|
| 40351 | <user-defined> | not pre-allocated | - | |
| 40352 - 40355 | Time/Date | Time and Date of the <user-defined> Min/Max value | - | - |
| 40356 | <user-defined> | not pre-allocated | - | |
| 40357 - 40360 | Time/Date | Time and Date of the <user-defined> Min/Max value | - | - |
| 40361 | <user-defined> | not pre-allocated | - | |
| 40362 - 40365 | Time/Date | Time and Date of the <user-defined> Min/Max value | - | - |
| 40366 | <user-defined> | not pre-allocated | - | |
| 40367 - 40370 | Time/Date | Time and Date of the <user-defined> Min/Max value | - | - |
| 40371 | <user-defined> | not pre-allocated | - | |
| 40372 - 40375 | Time/Date | Time and Date of the <user-defined> Min/Max value | - | - |
| 40376 | <user-defined> | not pre-allocated | - | |
| 40377 - 40380 | Time/Date | Time and Date of the <user-defined> Min/Max value | - | - |
| 40381 | <user-defined> | not pre-allocated | - | |
| 40382 - 40385 | Time/Date | Time and Date of the <user-defined> Min/Max value | - | - |
| 40386 | <user-defined> | not pre-allocated | - | |
| 40387 - 40390 | Time/Date | Time and Date of the <user-defined> Min/Max value | - | - |

1. A write access is rejected with exception code 03 (ILLEGAL_DATA_VALUE).

1.5.6 Registers 40601 to 40626: Event recorder (Sequence of Events)

- Registers are write-protected (with the exception of “SOE_Control”).¹
- Information regarding the individual information in the handshake register, the data type “Message block” and the evaluation of Event recorder entries you find in the manual “SIPROTEC Communication module, Modbus - Communication profile” (ref. to page i).
- Only the annunciation “Data invalid” (ref. to chap. 1.5.3) is routed per default to the Event recorder.
Further annunciations can be added to the Event recorder using DIGSI (ref. to chap. “Customization of the allocations” in the manual “SIPROTEC Communication module, Modbus - Communication profile”).

| Register | Designation | Comments |
|---------------------|-------------------------------|--|
| 40601 | No. of Event recorder entries | Number of Event recorder entries which still were not read |
| 40602 | “SOE_Control” | Handshake register (read/write access) |
| 40603 | Message block #1 | Register type / Bit offset #1 |
| 40604 | | Register address #1 |
| 40605 | | Message cause / Indication type #1 |
| 40606 | | Value #1 |
| 40607 - 40610 | | Time stamp #1 |
| 40611 | Message block #2 | Register type / Bit offset #2 |
| 40612 | | Register address #2 |
| 40613 | | Message cause / Indication type #2 |
| 40614 | | Value #2 |
| 40615 - 40618 | | Time stamp #2 |
| 40619 | Message block #3 | Register type / Bit offset #3 |
| 40620 | | Register address #3 |
| 40621 | | Message cause / Indication type #3 |
| 40622 | | Value #3 |
| 40623 - 40626 | | Time stamp #3 |

1. A write access is rejected with exception code 03 (ILLEGAL_DATA_VALUE).

Glossary

| | |
|---|---|
| AME | Universal asynchronous communication module with (electrical) isolated RS485 interface for the SIPROTEC devices from Siemens. |
| AMO | Universal asynchronous communication module with fibre-optical interface for the SIPROTEC devices from Siemens. |
| CFC | Continuous Function Chart |
| CRC | Cyclical Redundancy Check |
| DC | Double Command |
| DIGSI | Parameterization system / parameterization software for SIPROTEC devices |
| DP | Double-point indication |
| Input data / Input direction | Data from the Modbus slave to the Modbus master. |
| LRC | Longitudinal Redundancy Check |
| LSB | Least Significant Byte |
| Mapping | Allocation of the SIPROTEC data objects to the positions in the Modbus register map. |
| MSB | Most Significant Byte |
| Output data / Output direction | Data from the Modbus master to the Modbus slave. |
| SC | Single command |
| SP | Single-point indication |

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To

Siemens AG
Dept. PTD PA D DM
D-13623 Berlin
Germany

From

Name:

Company/Dept.:

Address:

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