

SIPROTEC

Multifunctional machine protection 7UM62

Communication module

Modbus
Bus mapping

Preface

Table of contents

Data in the Modbus registers

1

Standard mapping 3-1

2

Standard mapping 3-2

3

Index

Revision 2.2

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Liability statement

We have checked the contents of this manual against the hardware and software described. Exclusions and deviations cannot be ruled out; we accept no liability for lack of total agreement.

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 organisation of the Modbus slave of the SIPROTEC device 7UM62 and is divided into the following topics:

- Data in the Modbus registers → Chapter 1,
- Standard mapping 3-1 → Chapter 2,
- Standard mapping 3-2 → Chapter 3.

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 modul 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">• 7UM62 (firmware version 4.0 or higher), <p>with</p> <ul style="list-style-type: none">• Modbus communication module version 02.00.05 or higher,• Modbus communication module version 03.00.04 or higher at use of the Event recorder and Standard mapping 3-2. <p>For device parameterization have to be used:</p> <ul style="list-style-type: none">• DIGSI 4.3 or higher,• DIGSI 4.21 considering the preconditions explained in the manual “SIPROTEC Communication module, Modbus - Communication profile” (ref. to page i),• Modbus standard mappings 3-1 to 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.

„Announcements“, 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-C009-03 Oct 23 rd , 2001
Chap. 1.2.3 Chap. 1.3.26 Chap. 1.3.30 - 1.3.33 Chap. 1.4 Chap. 1.5.6 Chap. 1.5.7	2.0	<ul style="list-style-type: none"> Registers 00027 to 00030 for Double commands/Double-point indications added (with 7UM62 V4.10 or higher) Register 10101: 64R-2 picked up --> 64R-1 picked up Additional indications at registers 10116 to 10129 with 7UM62 V4.10 Register 30012: $\Theta R/\Theta R_{max}$ --> "<user-defined>" Registers 40301 to 40324 (Statistic values) new with 7UM62 V4.10 Registers 40351 to 40410 (Min/Max values) new with 7UM62 V4.10 March 26 th , 2002
	2.1	New: Standard mapping 3-2 (with Event recorder) Reorganisation of the manual: <ul style="list-style-type: none"> Chap. 1: Descriptions to the Modbus register map organization and notes for evaluation of selected SIPROTEC-Objects Chap. 2: Standard mapping 3-1 Chap. 3: Standard mapping 3-2 March 17 th , 2003
Chap. 1.1, 3.2.33, 3.3	2.2	Amount of Single-point indications, available via Input Status registers, and of Measured values, available via Input registers, changed in Standard mapping 3-2: <ul style="list-style-type: none"> 129 Single-point indications in mapping version V02.01.01, 126 Single-point indications from mapping version V02.02.01 15 Measured values in mapping version V02.01.01, 21 Measured values from mapping version V02.02.01 April 22 nd , 2004

Table of contents

Preface	i
Revision index	v
1 Data in the Modbus registers	1-1
1.1 Explanations	1-2
1.2 Modbus registers	1-5
1.2.1 Coil Status registers (0X references).....	1-5
1.2.2 Input Status registers (1X references).....	1-5
1.2.3 Input registers (3X references).....	1-6
1.2.4 Holding registers (4X references).....	1-6
1.3 Notes to SIPROTEC objects	1-7
1.3.1 Changing the setting group	1-7
1.3.2 Cooling medium temperature	1-7
1.3.3 Metered measurands / Counters	1-8
2 Standard mapping 3-1	2-1
2.1 Coil Status registers (0X references).....	2-2
2.1.1 Registers 00001 to 00010: Internal Commands	2-2
2.1.2 Registers 00011 to 00026: Single commands and taggings	2-2
2.1.3 Registers 00027 to 00030: Double commands	2-3
2.1.4 Registers 00257 to 00264: Exception Flags.....	2-3
2.2 Input Status registers (1X references).....	2-4
2.2.1 Registers 10001 to 10008: User-defined annunciations.....	2-4
2.2.2 Registers 10009 to 10013: Overcurrent time protection I>.....	2-4
2.2.3 Registers 10014 to 10019: Overcurrent time protection I>>.....	2-4
2.2.4 Registers 10020 to 10023: Inverse time overcurrent protection.....	2-5
2.2.5 Registers 10024 to 10026: Thermal overload protection.....	2-5
2.2.6 Registers 10027 to 10031: Unbalanced load protection.....	2-5
2.2.7 Registers 10032 to 10036: Sensitive ground fault protection.....	2-5
2.2.8 Registers 10037 to 10040: Stator ground fault protection	2-6
2.2.9 Registers 10041 to 10042: Stator ground fault protection with 3 rd harmonic	2-6
2.2.10 Registers 10043 to 10046: Overvoltage protection	2-6
2.2.11 Registers 10047 to 10050: Undervoltage protection	2-6

2.2.12	Registers 10051 to 10058: Frequency protection.....	2-7
2.2.13	Registers 10059 to 10063: Overexcitation protection.....	2-7
2.2.14	Registers 10064 to 10066: Reverse power protection.....	2-7
2.2.15	Registers 10067 to 10070: Forward power supervision	2-7
2.2.16	Register 10071: Fuse Failure Monitor	2-8
2.2.17	Registers 10072 to 10077: Underexcitation protection.....	2-8
2.2.18	Registers 10078 to 10079: Circuit breaker failure protection.....	2-8
2.2.19	Registers 10080 to 10087: Impedance protection	2-8
2.2.20	Registers 10088 to 10091: Binary inputs.....	2-9
2.2.21	Registers 10092 to 10093: Inadvertent energisation protection	2-9
2.2.22	Register 10094: Trip coil monitor.....	2-9
2.2.23	Registers 10095 to 10096: Inverse undervoltage protection	2-9
2.2.24	Registers 10097 to 10099: Startup supervision of motors.....	2-9
2.2.25	Register 10100: Startup counter for motors.....	2-10
2.2.26	Registers 10101 to 10102: Rotor ground fault protection (R,fn)	2-10
2.2.27	Registers 10103 to 10104: DC voltage/current protection.....	2-10
2.2.28	Registers 10105 to 10108: State of the out-of-step protection	2-10
2.2.29	Registers 10109 to 10115: Differential protection.....	2-10
2.2.30	Registers 10116 to 10117: Stator ground fault protection 100%.....	2-11
2.2.31	Registers 10118 to 10119: Rotor ground fault protection 1-3 Hz	2-11
2.2.32	Registers 10120 to 10121: Restricted ground fault protection.....	2-11
2.2.33	Registers 10122 to 10129: Fault indications of protection functions	2-11
2.3	Input registers (3X references)	2-12
2.4	Holding registers (4X references).....	2-13
2.4.1	Registers 40001 to 40036: System information.....	2-13
2.4.2	Registers 40065 to 40069: Time synchronization.....	2-13
2.4.3	Register 40129: Diagnosis.....	2-14
2.4.4	Registers 40201 to 40208: Metered measurands.....	2-15
2.4.5	Register 40251: Measured values in output direction.....	2-15
2.4.6	Registers 40301 to 40324: Statistic values.....	2-16
2.4.7	Registers 40351 to 40410: Min/Max values of measured values	2-17
3	Standard mapping 3-2	3-1
3.1	Coil Status registers (0X references).....	3-2
3.1.1	Registers 00001 to 00010: Internal Commands	3-2
3.1.2	Registers 00011 to 00026: Single commands and taggings	3-2
3.1.3	Registers 00027 to 00030: Double commands.....	3-3
3.1.4	Registers 00257 to 00264: Exception Flags	3-3
3.2	Input Status registers (1X references).....	3-4
3.2.1	Registers 10001 to 10008: User-defined annunciations.....	3-4
3.2.2	Registers 10009 to 10013: Overcurrent time protection I>.....	3-4
3.2.3	Registers 10014 to 10019: Overcurrent time protection I>>.....	3-4
3.2.4	Registers 10020 to 10023: Inverse time overcurrent protection	3-5

3.2.5	Registers 10024 to 10026: Thermal overload protection.....	3-5
3.2.6	Registers 10027 to 10031: Unbalanced load protection.....	3-5
3.2.7	Registers 10032 to 10036: Sensitive ground fault protection	3-5
3.2.8	Registers 10037 to 10040: Stator ground fault protection	3-6
3.2.9	Registers 10041 to 10042: Stator ground fault protection with 3 rd harmonic	3-6
3.2.10	Registers 10043 to 10046: Overvoltage protection	3-6
3.2.11	Registers 10047 to 10050: Undervoltage protection	3-6
3.2.12	Registers 10051 to 10058: Frequency protection.....	3-7
3.2.13	Registers 10059 to 10063: Overexcitation protection.....	3-7
3.2.14	Registers 10064 to 10066: Reverse power protection	3-7
3.2.15	Registers 10067 to 10070: Forward power supervision	3-7
3.2.16	Register 10071: Fuse Failure Monitor	3-8
3.2.17	Registers 10072 to 10077: Underexcitation protection.....	3-8
3.2.18	Registers 10078 to 10079: Circuit breaker failure protection	3-8
3.2.19	Registers 10080 to 10087: Impedance protection.....	3-8
3.2.20	Registers 10088 to 10091: Binary inputs.....	3-9
3.2.21	Registers 10092 to 10093: Inadvertent energisation protection	3-9
3.2.22	Register 10094: Trip coil monitor.....	3-9
3.2.23	Registers 10095 to 10096: Inverse undervoltage protection	3-9
3.2.24	Registers 10097 to 10099: Startup supervision of motors.....	3-9
3.2.25	Register 10100: Startup counter for motors	3-10
3.2.26	Registers 10101 to 10102: Rotor ground fault protection (R,fn).....	3-10
3.2.27	Registers 10103 to 10104: DC voltage/current protection.....	3-10
3.2.28	Registers 10105 to 10108: State of the out-of-step protection	3-10
3.2.29	Registers 10109 to 10115: Differential protection	3-10
3.2.30	Registers 10116 to 10117: Stator ground fault protection 100%.....	3-11
3.2.31	Registers 10118 to 10119: Rotor ground fault protection 1-3 Hz	3-11
3.2.32	Registers 10120 to 10121: Restricted ground fault protection	3-11
3.2.33	Registers 10122 to 10129: Fault indications of protection functions	3-11
3.3	Input registers (3X references).....	3-12
3.4	Holding registers (4X references).....	3-13
3.4.1	Registers 40001 to 40036: System information.....	3-13
3.4.2	Registers 40065 to 40069: Time synchronization	3-13
3.4.3	Register 40129: Diagnosis	3-14
3.4.4	Registers 40201 to 40208: Metered measurands	3-15
3.4.5	Register 40251: Measured values in output direction	3-15
3.4.6	Registers 40301 to 40324: Statistic values	3-16
3.4.7	Registers 40351 to 40410: Min/Max values of measured values	3-17
3.4.8	Registers 40601 to 40626: Event recorder (Sequence of Events)	3-19

Glossary	4-1
-----------------------	------------

Index	5-1
--------------------	------------

Data in the Modbus registers

This chapter gives explanations to the descriptions of the Modbus register map organisation (Standard mappings) in the following chapters 2 and 3 and notes for evaluation of selected SIPROTEC objects.

1.1	Explanations	1-2
1.2	Modbus registers	1-5
1.3	Notes to SIPROTEC objects	1-7

1.1 Explanations

There are two standard mappings (Standard mapping 3-1 and Standard mapping 3-2) available for the SIPROTEC devices 7UM62 which differ in the offered data size.

Preconditions for use of the respective standard mapping are described in section "Validity" (ref. to page ii)

Standard mapping 3-1

The Standard mapping 3-1 contains:

- Coil Status registers:
 - 2 Double commands incl. 2 Double-point indications as checkback indication
 - 18 Single commands incl. 18 Single-point indications as checkback indication
 - 8 Single-point indications / Exception Flags
- Input Status registers:
 - 129 Single-point indications
- Input registers
 - 15 Measured values
- Holding registers
 - System information
 - Time synchronization
 - 16 Single-point indications / Diagnostic Register
 - 4 Metered measurands / Counters
 - 1 Measured value in output direction (Cooling medium temperature)
 - 12 Statistic values
 - 12 Min/Max values of measured values

**Standard mapping
3-2**

The Standard mapping 3-2 contains:

- Coil Status registers:
 - 2 Double commands incl. 2 Double-point indications as checkback indication
 - 18 Single commands incl. 18 Single-point indications as checkback indication
 - 8 Single-point indications / Exception Flags
- Input Status registers:
 - 126 Single-point indications¹
- Input registers
 - 21 Measured values²
- Holding registers
 - System information
 - Time synchronization
 - 16 Single-point indications / Diagnostic Register
 - 4 Metered measurands / Counters
 - 1 Measured value in output direction (Cooling medium temperature)
 - 12 Statistic values
 - 12Min/Max values of measured values
 - Event recorder (Sequence of Events)

1. 129 Single-point indications in version V02.01.01 of the Standard mapping 3-2.
126 Single-point indications from version V02.02.01 of the Standard mapping 3-2.
2. 15 Measured values in version V02.01.01 of the Standard mapping 3-2.
21 Measured values from version V02.02.01 of the Standard mapping 3-2.

Register map

Chapters 2 and 3 define the mapping of the data objects of the SIPROTEC device 7UM62 to the associated Modbus registers.

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



Note:

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

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	IA S2=	Operat. meas. current A side 2	327.67 %	724

The measured value "IA S2" is assigned to register 30001 (Input register).

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10009	50/51-1 Ph A PU	1 = 50/51-1 Phase A picked up	1811

The single-point indication "50/51-1 Ph A PU" is assigned to register 10009 (Input Status register).



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 Modbus registers

1.2.1 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.

References

Standard mapping 3-1: ref. to chap. 2.1

Standard mapping 3-2: ref. to chap. 3.1

1.2.2 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.

References

Standard mapping 3-1: ref. to chap. 2.2

Standard mapping 3-2: ref. to chap. 3.2

1.2.3 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 transferred percentage values are with reference to the nominal values of the primary equipment.
 - Changes of 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).
-

References

Standard mapping 3-1: ref. to chap. 2.3

Standard mapping 3-2: ref. to chap. 3.3

1.2.4 Holding registers (4X references)

The Holding register block allows the Modbus master to read system and diagnostic information, metered measurands, statistic and min/max values as well as to execute time synchronization of the SIPROTEC device.

If the selected Standard mapping supports an Event recorder (Sequence of Events) then Holding registers are used for reading the Event recorder entries.



Note:

Depending on the device composition not all of the indicated measured values, statistic values or metered measurands (and corresponding Modbus registers) may be available in the SIPROTEC device.

References

Standard mapping 3-1: ref. to chap. 2.4

Standard mapping 3-2: ref. to chap. 3.4

1.3 Notes to SIPROTEC objects

1.3.1 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.
- 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 *Protocol*.

References

Standard mapping 3-1: ref. to chap. 2.1.1

Standard mapping 3-2: ref. to chap. 3.1.1

1.3.2 Cooling medium temperature

- The cooling medium temperature is transferred in per cent (%) to the 7UM62. The protection device must be informed about the 100 % corresponding temperature using parameter **49 Temperature for Scaling** (function **49 Thermal Overload**, parameter address = 1608).
- The temperature value via Modbus is only taken into account and shown at the SIPROTEC device if the parameter **49 Temperature Input** (function **49 Thermal Overload**, parameter address = 1607) has the value *Fieldbus*.
- Unlike measured values in input direction, the identification "Overflow" or "Invalid" is not indicated with the value -32768 (ref. to manual "SIPROTEC Communication module, Modbus - Communication profile").

If an evaluation of the measurement status of the cooling medium temperature is required then the indication ">Fail. Temp. input" (>49 Failure temperature input, internal object no. = 1508), routed to "Destination system interface" in the **DIGSI Configuration matrix**, has to be used for this separately.

References

Standard mapping 3-1: ref. to chap. 2.4.5

Standard mapping 3-2: ref. to chap. 3.4.5

1.3.3 Metered measurands / Counters

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

60000 impulses per hour for $S = S_{nom}$

S_{nom} = Rated Apparent Power of the Generator (parameter address = 0252)

Example In the parameter set is configured:

$S_{nom} = 5.27$ MVA

60000 impulses correspond so that:

$1 \text{ h} * 5.27 \text{ MVA} = 5.27 \text{ MVAh}$



Note:

- The type of the update (cyclic, with or without deletion) and the update interval must be programmed for the metered measurands with the parameterization software DIGSI.
 - The scaling of the metered measurands at binary inputs (pulse counters) depends on the externally connected pulse generator.
-

References *Standard mapping 3-1:* ref. to chap. 2.4.4

Standard mapping 3-2: ref. to chap. 3.4.4

Standard mapping 3-1

This chapter describes the register map organisation of the Modbus slave of the SIPROTEC device 7UM62 at use of Standard mapping 3-1.

2.1	Coil Status registers (0X references)	2-2
2.2	Input Status registers (1X references)	2-4
2.3	Input registers (3X references)	2-12
2.4	Holding registers (4X references)	2-13

2.1 Coil Status registers (0X references)

2.1.1 Registers 00001 to 00010: Internal Commands

- Ref. to chap. 1.3.1 for additional notes regarding “Changing the setting group”.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
00001	Command: Setting Group A	0 = not permitted 1 = Activation of setting group A	53
	Indication: Setting Group A	0 = Setting group A is not active 1 = Setting group A is active	
00002	Command: Setting Group B	0 = not permitted 1 = Activation of setting group B	54
	Indication: Setting Group B	0 = Setting group B is not active 1 = Setting group B is active	
00003 - 00010	reserved	The value 0 is always returned if reading. A write access is rejected in the SIPROTEC device.	

2.1.2 Registers 00011 to 00026: Single commands and taggings

- User-defined single commands and taggings can be routed on these positions as “Source/Destination system interface” using the **DIGSI Configuration matrix**.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
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	-
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	-

2.1.3 Registers 00027 to 00030: Double commands

- User-defined double commands and associated checkback indications as double-point indications can be routed on these positions as “Source/Destination system interface” using the **DIGSI Configuration matrix**.
- Please ref. to chap. “Double command / Double-point indication” in the manual “SIPROTEC Communication module, Modbus - Communication profile” for additional notes.
- Registers 00027 to 00030 are available with 7UM62 V4.10 or higher.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
00027	<user-defined> ON	not pre-allocated	-
00028	<user-defined> OFF		
00029	<user-defined> ON	not pre-allocated	-
00030	<user-defined> OFF		

2.1.4 Registers 00257 to 00264: Exception Flags

- Registers are write-protected.¹
- The contents of these registers are 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).

2.2 Input Status registers (1X references)

2.2.1 Registers 10001 to 10008: User-defined annunciations

- User-defined protection annunciations, single-point indications or taggings can be routed on these register positions as “Destination system interface” using the **DI GSI 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	-

2.2.2 Registers 10009 to 10013: Overcurrent time protection I>

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10009	50/51-1 Ph A PU	1 = 50/51-1 Phase A picked up	1811
10010	50/51-1 Ph B PU	1 = 50/51-1 Phase B picked up	1812
10011	50/51-1 Ph C PU	1 = 50/51-1 Phase C picked up	1813
10012	V< seal in	1 = 50/51-1 undervoltage seal-in	1970
10013	50/51 TRIP	1 = 50/51 I> TRIP	1815

2.2.3 Registers 10014 to 10019: Overcurrent time protection I>>

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10014	67 forward	1 = 67 I>> direction forward	1806
10015	67 backward	1 = 67 I>> direction backward	1807
10016	50/51-2 Ph A PU	1 = 50/51-2 Phase A picked up	1801
10017	50/51-2 Ph B PU	1 = 50/51-2 Phase B picked up	1802
10018	50/51-2 Ph C PU	1 = 50/51-2 Phase C picked up	1803
10019	51/67 TRIP	1 = 50/51/67 I>> TRIP	1809

2.2.4 Registers 10020 to 10023: Inverse time overcurrent protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10020	51V Ph A PU	1 = 51V Phase A picked up	1896
10021	51V Ph B PU	1 = 51V Phase B picked up	1897
10022	51V Ph C PU	1 = 51V Phase C picked up	1898
10023	51V TRIP	1 = 51V TRIP	1900

2.2.5 Registers 10024 to 10026: Thermal overload protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10024	49 O/L I Alarm	1 = 49 Overload Current Alarm (I alarm)	1515
10025	49 O/L Θ Alarm	1 = 49 Thermal Overload Alarm	1516
10026	49 Th O/L TRIP	1 = 49 Thermal Overload TRIP	1521

2.2.6 Registers 10027 to 10031: Unbalanced load protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10027	46-1 Warn	1 = 46-1 Current warning stage	5156
10028	46-1 picked up	1 = 46-1 picked up	5165
10029	46-2 picked up	1 = 46-2 picked up	5159
10030	46-2 TRIP	1 = 46-2 TRIP of current stage	5160
10031	46- Θ TRIP	1 = 46 TRIP of thermal stage	5161

2.2.7 Registers 10032 to 10036: Sensitive ground fault protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10032	Failure 64R In<	1 = Failure 64R In<: measuring circuit	5396
10033	50Ns-1 Pickup	1 = 50Ns-1 Pickup	1224
10034	50Ns-1 TRIP	1= 50Ns-1 TRIP	1226
10035	50Ns-2 Pickup	1 = 50Ns-2 Pickup	1221
10036	50Ns-2 TRIP	1 = 50Ns-2 TRIP	1223

2.2.8 Registers 10037 to 10040: Stator ground fault protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10037	59/67 V0 PU	1 = 59N/67GN V0 picked up	5186
10038	59/67 I0 PU	1 = 59N/67GN I0 picked up	5188
10039	59/67 V0 TRIP	1 = 59N/67GN V0 stage TRIP	5187
10040	59N/67GN TRIP	1 = 59N/67GN TRIP	5193

2.2.9 Registers 10041 to 10042: Stator ground fault protection with 3rd harmonic

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10041	27TN/59TN PU	1 = 27TN/59TN with 3 rd harmonic picked up	5567
10042	27TN/59TN TRP	1 = 27TN/59TN with 3 rd harmonic TRIP	5568

2.2.10 Registers 10043 to 10046: Overvoltage protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10043	59-1 picked up	1 = 59-1 Overvoltage V> picked up	6568
10044	59-2 picked up	1 = 59-2 Overvoltage V>> picked up	6571
10045	59-1 TRIP	1 = 59-1 Overvoltage V> TRIP	6570
10046	59-2 TRIP	1 = 59-2 Overvoltage V>> TRIP	6573

2.2.11 Registers 10047 to 10050: Undervoltage protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10047	27-1 picked up	1 = 27-1 Undervoltage V< picked up	6533
10048	27-2 picked up	1 = 27-2 Undervoltage V<< picked up	6537
10049	27-1 TRIP	1 = 27-1 Undervoltage V< TRIP	6539
10050	27-2 TRIP	1 = 27-2 Undervoltage V<< TRIP	6540

2.2.12 Registers 10051 to 10058: Frequency protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10051	81-1 picked up	1 = 81-1 picked up	5232
10052	81-2 picked up	1 = 81-2 picked up	5233
10053	81-3 picked up	1 = 81-3 picked up	5234
10054	81-4 picked up	1 = 81-4 picked up	5235
10055	81-1 TRIP	1 = 81-1 TRIP	5236
10056	81-2 TRIP	1 = 81-2 TRIP	5237
10057	81-3 TRIP	1 = 81-3 TRIP	5238
10058	81-4 TRIP	1 = 81-4 TRIP	5239

2.2.13 Registers 10059 to 10063: Overexcitation protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10059	24 warn	1 = 24 V/f warning stage	5367
10060	24-1 picked up	1 = 24-1 V/f> picked up	5370
10061	24-2 picked up	1 = 24-2 V/f>> picked up	5373
10062	24 th.TRIP	1 = 24 TRIP of thermal stage	5372
10063	24-2 TRIP	1 = 24-2 TRIP of V/f>> stage	5371

2.2.14 Registers 10064 to 10066: Reverse power protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10064	32R picked up	1 = 32R picked up	5096
10065	32R TRIP	1 = 32R TRIP	5097
10066	32R+SV TRIP	1 = 32R TRIP with stop valve	5098

2.2.15 Registers 10067 to 10070: Forward power supervision

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10067	32F< picked up	1 = 32F P< stage picked up	5126
10068	32F> picked up	1 = 32F P> stage picked up	5127
10069	32F P< TRIP	1 = 32F P< stage TRIP	5128
10070	32F P> TRIP	1 = 32F P> stage TRIP	5129

2.2.16 Register 10071: Fuse Failure Monitor

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10071	VT Fuse Failure	1 = Voltage Transformer Fuse Failure	6575

2.2.17 Registers 10072 to 10077: Underexcitation protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10072	40 Vexc failure	1 = 40 Exc. voltage failure recognized	5336
10073	40 picked up	1 = 40 picked up	5337
10074	40-1 TRIP	1 = 40 characteristic 1 TRIP	5344
10075	40-2 TRIP	1 = 40 characteristic 2 TRIP	5345
10076	40&V<TRIP	1 = 40 characteristic&Vexc< TRIP	5346
10077	40-3 TRIP	1 = 40 characteristic 3 TRIP	5343

2.2.18 Registers 10078 to 10079: Circuit breaker failure protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10078	50BF pickup	1 = 50BF picked up	1455
10079	50BF TRIP	1 = 50BF TRIP	1471

2.2.19 Registers 10080 to 10087: Impedance protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10080	21 Fault Ph A	1 = 21 Fault detection , Phase A	3967
10081	21 Fault Ph B	1 = 21 Fault detection , Phase B	3968
10082	21 Fault Ph C	1 = 21 Fault detection , Phase C	3969
10083	21 I> & U<	1 = 21 O/C with undervoltage seal in	3970
10084	21 Z1< TRIP	1 = 21 Z1< TRIP	3977
10085	21 Z1B< TRIP	1 = 21 Z1B< TRIP	3978
10086	21 Z2< TRIP	1 = 21 Z2< TRIP	3979
10087	21 T3> TRIP	1 = 21 T3> TRIP	3980

2.2.20 Registers 10088 to 10091: Binary inputs

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10088	Ext 1 Gen.TRP	1 = External trip 1: General TRIP	4537
10089	Ext 2 Gen.TRP	1 = External trip 2: General TRIP	4557
10090	Ext 3 Gen.TRP	1 = External trip 3: General TRIP	4577
10091	Ext 4 Gen.TRP	1 = External trip 4: General TRIP	4597

2.2.21 Registers 10092 to 10093: Inadvertent energisation protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10092	50/27 picked up	1 = 50/27 picked up	5547
10093	50/27 TRIP	1 = 50/27 TRIP	5548

2.2.22 Register 10094: Trip coil monitor

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10094	FAIL: Trip cir.	1 = 74TC Failure Trip Circuit	6865

2.2.23 Registers 10095 to 10096: Inverse undervoltage protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10095	Vp< picked up	1 = Inverse Undervoltage Vp< picked up	6525
10096	Vp< TRIP	1 = Inverse Undervoltage Vp< TRIP	6527

2.2.24 Registers 10097 to 10099: Startup supervision of motors

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10097	48 Rot. locked	1 = 48 Rotor LOCKED after Lock. Rotor Time	6822
10098	48 picked up	1 = 48 Starting time supervision picked up	6823
10099	48 TRIP	1 = 48 Starting time supervision TRIP	6821

2.2.25 Register 10100: Startup counter for motors

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10100	66 TRIP	1 = 66 Restart inhibit motor TRIP	4827

2.2.26 Registers 10101 to 10102: Rotor ground fault protection (R,fn)

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10101	64R-1 picked up	1 = 64R-1 picked up (Alarm)	5397
10102	64R-2 TRIP	1 = 64R-2 TRIP	5399

2.2.27 Registers 10103 to 10104: DC voltage/current protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10103	DC Prot.pick.up	1 = DC protection picked up	5306
10104	DC Prot. TRIP	1 = DC protection TRIP	5307

2.2.28 Registers 10105 to 10108: State of the out-of-step protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10105	78 det. char. 1	1 = 78 characteristic 1 picked up	5069
10106	78 det. char. 2	1 = 78 characteristic 2 picked up	5070
10107	78 TRIP char. 1	1 = 78 TRIP characteristic 1	5071
10108	78 TRIP char. 2	1 = 78 TRIP characteristic 2	5072

2.2.29 Registers 10109 to 10115: Differential protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10109	87 picked up	1 = 87 Differential protection picked up	5631
10110	87 TRIP	1 = 87 Differential protection TRIP	5671
10111	87 TRIP Phase A	1 = 87 Differential protection: TRIP Phase A	5672
10112	87 TRIP Phase B	1 = 87 Differential protection: TRIP Phase B	5673
10113	87 TRIP Phase C	1 = 87 Differential protection: TRIP Phase C	5674
10114	87 Diff> TRIP	1 = 87 Differential prot.: TRIP by IDIFF>	5691
10115	87 Diff>> TRIP	1 = 87 Diff>> TRIP	5692

2.2.30 Registers 10116 to 10117: Stator ground fault protection 100%

- Registers 10116 and 10117 are available with 7UM62 V4.10 or higher.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10116	SGF100 Alarm	1 = Stator ground fault prot. 100%: Alarm stage	5487
10117	SGF100 TRIP	1 = Stator ground fault prot. 100%: TRIP	5489

2.2.31 Registers 10118 to 10119: Rotor ground fault protection 1-3 Hz

- Registers 10118 and 10119 are available with 7UM62 V4.10 or higher.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10118	64R-1_3Hzpickup	1 = 64R-1 (1-3Hz) picked up (Alarm)	5403
10119	64R-2_3Hz TRIP	1 = 64R-2 (1-3Hz) TRIP	5407

2.2.32 Registers 10120 to 10121: Restricted ground fault protection

- Registers 10120 and 10121 are available with 7UM62 V4.10 or higher.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10120	87N picked up	1 = 87N picked up	5817
10121	87N TRIP	1 = 87N TRIP	5821

2.2.33 Registers 10122 to 10129: Fault indications of protection functions

- User-defined protection annunciations, single-point indications or taggings can be routed on the positions "<user-defined>" as "Destination system interface" using the **DIGSI Configuration matrix**.
- Registers 10122 to 10129 are available with 7UM62 V4.10 or higher.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10122	Failure SGF	1 = Failure stator ground fault prot. 100%	5486
10123	Failure 64R	1 = Failure 64R: measuring circuit	5400
10124	Fail 64R 1-3Hz	1 = Failure 64R protection (1-3Hz)	5401
10125	<user-defined>	not pre-allocated	-
10126	<user-defined>	not pre-allocated	-
10127	<user-defined>	not pre-allocated	-
10128	<user-defined>	not pre-allocated	-
10129	<user-defined>	not pre-allocated	-

2.3 Input registers (3X references)

- Ref. to chap. 1.2.3 for additional notes regarding scaling of measured values.

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
30001	IA S2=	Operat. meas. current A side 2	327.67 %	724
30002	IB S2=	Operat. meas. current B side 2	327.67 %	725
30003	IC S2=	Operat. meas. current C side 2	327.67 %	726
30004	Va-b=	Va-b	327.67 %	624
30005	Vb-c=	Vb-c	327.67 %	625
30006	Vc-a=	Vc-a	327.67 %	626
30007	P =	P (active power)	327.67 %	641
30008	Q =	Q (reactive power)	327.67 %	642
30009	f =	Frequency	327.67 Hz	644
30010	I2 =	I2 (negative sequence)	327.67 %	606
30011	Θ/Θ trip =	Temperature rise for warning and trip	327.67 %	801
30012	<user-defined>	not pre-allocated	-	-
30013	IA S1=	Operat. meas. current A side 1	327.67 %	721
30014	IB S1=	Operat. meas. current B side 1	327.67 %	722
30015	IC S1=	Operat. meas. current C side 1	327.67 %	723

2.4 Holding registers (4X references)

2.4.1 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> "7UM62115EA923CA0----0D-----"
40027 - 40034	Date and time of mapping data generation (string, max. 16 characters)	<u>Example:</u> "140201095747330" corresponds to → Date: Feb. 14th, 2001 → 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

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

2.4.3 Register 40129: Diagnosis

- Registers are write-protected.¹
- The contents of these registers are 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 signalisation 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	<user-defined>	not pre-allocated	-
40129/2 ²	ProtActive	1 = At least one protection function is active	52
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	Operat. Cond.	1 = Suitable measured quantities are present at the device inputs ($V > 0.05 * V_{nom}$, $I > 0.05 * I_{nom}$ and $10 \text{ Hz} < \text{Freq.} < 70 \text{ Hz}$)	5002
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 valid	1 = Data in the Modbus message are valid. (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).

2.4.4 Registers 40201 to 40208: Metered measurands

- Registers are write-protected.¹
- Ref. to chap. 1.3.3 for additional notes regarding scaling of metered measurands.

Register	Designation of the SIPROTEC objects	Comments	Scaling ($2^{31}-1$ corresponds to ...)	Internal object no.
40201 - 40202	Wp+	Wp Forward (Metered measurand derived from measured values)	$2^{31}-1$ impulses	924
40203 - 40204	Wq+	Wq Forward (Metered measurand derived from measured values)	$2^{31}-1$ impulses	925
40205 - 40206	Wp-	Wp Reverse (Metered measurand derived from measured values)	$2^{31}-1$ impulses	928
40207 - 40208	Wq-	Wq Reverse (Metered measurand derived from measured values)	$2^{31}-1$ impulses	929

2.4.5 Register 40251: Measured values in output direction

- Ref. to chap. 1.3.2 regarding transmission of the “Cooling medium temperature” via Modbus.

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
40251	AMB.TEMP =	Cooling medium temperature	327.67 %	-

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

2.4.6 Registers 40301 to 40324: Statistic values

- Registers are write-protected.¹
- Installation-specific values can be routed on these register positions as “Destination system interface” using the **DIGSI Configuration matrix**.
- Registers 40301 to 40324 are available with 7UM62 V4.10 or higher.

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	-
40309 - 40310	<user-defined>	not pre-allocated	-
40311 - 40312	<user-defined>	not pre-allocated	-
40313 - 40314	<user-defined>	not pre-allocated	-
40315 - 40316	<user-defined>	not pre-allocated	-
40317 - 40318	<user-defined>	not pre-allocated	-
40319 - 40320	<user-defined>	not pre-allocated	-
40321 - 40322	<user-defined>	not pre-allocated	-
40323 - 40324	<user-defined>	not pre-allocated	-

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

2.4.7 Registers 40351 to 40410: Min/Max values of measured values

- Registers are write-protected.¹
- Min/Max values of measured values can be routed on these register positions using the **DIGIS Configuration matrix**.
- The transmission of Min/Max values of measured values is only possible as primary values.
- Information regarding the Time/Date data type you find in the manual “SIPROTEC Communication module, Modbus - Communication profile” (ref to page i).
- Registers 40351 to 40410 are available with 7UM62 V4.10 or higher.

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

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

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
40391 40392 – 40395	<user-defined> Min/Max Time/Date	not pre-allocated Time and Date of “<user-defined> Min/Max”	-	-
40396 40397 – 40400	<user-defined> Min/Max Time/Date	not pre-allocated Time and Date of “<user-defined> Min/Max”	-	-
40401 40402 – 40405	<user-defined> Min/Max Time/Date	not pre-allocated Time and Date of “<user-defined> Min/Max”	-	-
40406 40407 – 40410	<user-defined> Min/Max Time/Date	not pre-allocated Time and Date of “<user-defined> Min/Max”	-	-

Standard mapping 3-2

This chapter describes the register map organisation of the Modbus slave of the SIPROTEC device 7UM62 at use of Standard mapping 3-2.

3.1	Coil Status registers (0X references)	3-2
3.2	Input Status registers (1X references)	3-4
3.3	Input registers (3X references)	3-12
3.4	Holding registers (4X references)	3-13

3.1 Coil Status registers (0X references)

3.1.1 Registers 00001 to 00010: Internal Commands

- Ref. to chap. 1.3.1 for additional notes regarding “Changing the setting group”.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
00001	Command: Setting Group A	0 = not permitted 1 = Activation of setting group A	53
	Indication: Setting Group A	0 = Setting group A is not active 1 = Setting group A is active	
00002	Command: Setting Group B	0 = not permitted 1 = Activation of setting group B	54
	Indication: Setting Group B	0 = Setting group B is not active 1 = Setting group B is active	
00003 - 00010	reserved	The value 0 is always returned if reading. A write access is rejected in the SIPROTEC device.	

3.1.2 Registers 00011 to 00026: Single commands and taggings

- User-defined single commands and taggings can be routed on these positions as “Source/Destination system interface” using the **DIGSI Configuration matrix**.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
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	-
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	-

3.1.3 Registers 00027 to 00030: Double commands

- User-defined double commands and associated checkback indications as double-point indications can be routed on these positions as “Source/Destination system interface” using the **DIGSI Configuration matrix**.
- Please ref. to chap. “Double command / Double-point indication” in the manual “SIPROTEC Communication module, Modbus - Communication profile” for additional notes.
- Registers 00027 to 00030 are available with 7UM62 V4.10 or higher.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
00027	<user-defined> ON	not pre-allocated	-
00028	<user-defined> OFF		
00029	<user-defined> ON	not pre-allocated	-
00030	<user-defined> OFF		

3.1.4 Registers 00257 to 00264: Exception Flags

- Registers are write-protected.¹
- The contents of these registers are 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).

3.2 Input Status registers (1X references)

3.2.1 Registers 10001 to 10008: User-defined annunciations

- User-defined protection annunciations, single-point indications or taggings can be routed on these register positions as “Destination system interface” using the **DI GSI 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	-

3.2.2 Registers 10009 to 10013: Overcurrent time protection I>

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10009	50/51-1 Ph A PU	1 = 50/51-1 Phase A picked up	1811
10010	50/51-1 Ph B PU	1 = 50/51-1 Phase B picked up	1812
10011	50/51-1 Ph C PU	1 = 50/51-1 Phase C picked up	1813
10012	V< seal in	1 = 50/51-1 undervoltage seal-in	1970
10013	50/51 TRIP	1 = 50/51 I> TRIP	1815

3.2.3 Registers 10014 to 10019: Overcurrent time protection I>>

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10014	67 forward	1 = 67 I>> direction forward	1806
10015	67 backward	1 = 67 I>> direction backward	1807
10016	50/51-2 Ph A PU	1 = 50/51-2 Phase A picked up	1801
10017	50/51-2 Ph B PU	1 = 50/51-2 Phase B picked up	1802
10018	50/51-2 Ph C PU	1 = 50/51-2 Phase C picked up	1803
10019	51/67 TRIP	1 = 50/51/67 I>> TRIP	1809

3.2.4 Registers 10020 to 10023: Inverse time overcurrent protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10020	51V Ph A PU	1 = 51V Phase A picked up	1896
10021	51V Ph B PU	1 = 51V Phase B picked up	1897
10022	51V Ph C PU	1 = 51V Phase C picked up	1898
10023	51V TRIP	1 = 51V TRIP	1900

3.2.5 Registers 10024 to 10026: Thermal overload protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10024	49 O/L I Alarm	1 = 49 Overload Current Alarm (I alarm)	1515
10025	49 O/L Θ Alarm	1 = 49 Thermal Overload Alarm	1516
10026	49 Th O/L TRIP	1 = 49 Thermal Overload TRIP	1521

3.2.6 Registers 10027 to 10031: Unbalanced load protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10027	46-1 Warn	1 = 46-1 Current warning stage	5156
10028	46-1 picked up	1 = 46-1 picked up	5165
10029	46-2 picked up	1 = 46-2 picked up	5159
10030	46-2 TRIP	1 = 46-2 TRIP of current stage	5160
10031	46- Θ TRIP	1 = 46 TRIP of thermal stage	5161

3.2.7 Registers 10032 to 10036: Sensitive ground fault protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10032	Failure 64R In<	1 = Failure 64R In<: measuring circuit	5396
10033	50Ns-1 Pickup	1 = 50Ns-1 Pickup	1224
10034	50Ns-1 TRIP	1 = 50Ns-1 TRIP	1226
10035	50Ns-2 Pickup	1 = 50Ns-2 Pickup	1221
10036	50Ns-2 TRIP	1 = 50Ns-2 TRIP	1223

3.2.8 Registers 10037 to 10040: Stator ground fault protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10037	59/67 V0 PU	1 = 59N/67GN V0 picked up	5186
10038	59/67 I0 PU	1 = 59N/67GN I0 picked up	5188
10039	59/67 V0 TRIP	1 = 59N/67GN V0 stage TRIP	5187
10040	59N/67GN TRIP	1 = 59N/67GN TRIP	5193

3.2.9 Registers 10041 to 10042: Stator ground fault protection with 3rd harmonic

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10041	27TN/59TN PU	1 = 27TN/59TN with 3 rd harmonic picked up	5567
10042	27TN/59TN TRP	1 = 27TN/59TN with 3 rd harmonic TRIP	5568

3.2.10 Registers 10043 to 10046: Overvoltage protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10043	59-1 picked up	1 = 59-1 Overvoltage V> picked up	6568
10044	59-2 picked up	1 = 59-2 Overvoltage V>> picked up	6571
10045	59-1 TRIP	1 = 59-1 Overvoltage V> TRIP	6570
10046	59-2 TRIP	1 = 59-2 Overvoltage V>> TRIP	6573

3.2.11 Registers 10047 to 10050: Undervoltage protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10047	27-1 picked up	1 = 27-1 Undervoltage V< picked up	6533
10048	27-2 picked up	1 = 27-2 Undervoltage V<< picked up	6537
10049	27-1 TRIP	1 = 27-1 Undervoltage V< TRIP	6539
10050	27-2 TRIP	1 = 27-2 Undervoltage V<< TRIP	6540

3.2.12 Registers 10051 to 10058: Frequency protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10051	81-1 picked up	1 = 81-1 picked up	5232
10052	81-2 picked up	1 = 81-2 picked up	5233
10053	81-3 picked up	1 = 81-3 picked up	5234
10054	81-4 picked up	1 = 81-4 picked up	5235
10055	81-1 TRIP	1 = 81-1 TRIP	5236
10056	81-2 TRIP	1 = 81-2 TRIP	5237
10057	81-3 TRIP	1 = 81-3 TRIP	5238
10058	81-4 TRIP	1 = 81-4 TRIP	5239

3.2.13 Registers 10059 to 10063: Overexcitation protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10059	24 warn	1 = 24 V/f warning stage	5367
10060	24-1 picked up	1 = 24-1 V/f> picked up	5370
10061	24-2 picked up	1 = 24-2 V/f>> picked up	5373
10062	24 th.TRIP	1 = 24 TRIP of thermal stage	5372
10063	24-2 TRIP	1 = 24-2 TRIP of V/f>> stage	5371

3.2.14 Registers 10064 to 10066: Reverse power protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10064	32R picked up	1 = 32R picked up	5096
10065	32R TRIP	1 = 32R TRIP	5097
10066	32R+SV TRIP	1 = 32R TRIP with stop valve	5098

3.2.15 Registers 10067 to 10070: Forward power supervision

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10067	32F< picked up	1 = 32F P< stage picked up	5126
10068	32F> picked up	1 = 32F P> stage picked up	5127
10069	32F P< TRIP	1 = 32F P< stage TRIP	5128
10070	32F P> TRIP	1 = 32F P> stage TRIP	5129

3.2.16 Register 10071: Fuse Failure Monitor

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10071	VT Fuse Failure	1 = Voltage Transformer Fuse Failure	6575

3.2.17 Registers 10072 to 10077: Underexcitation protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10072	40 Vexc failure	1 = 40 Exc. voltage failure recognized	5336
10073	40 picked up	1 = 40 picked up	5337
10074	40-1 TRIP	1 = 40 characteristic 1 TRIP	5344
10075	40-2 TRIP	1 = 40 characteristic 2 TRIP	5345
10076	40&V<TRIP	1 = 40 characteristic&Vexc< TRIP	5346
10077	40-3 TRIP	1 = 40 characteristic 3 TRIP	5343

3.2.18 Registers 10078 to 10079: Circuit breaker failure protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10078	50BF pickup	1 = 50BF picked up	1455
10079	50BF TRIP	1 = 50BF TRIP	1471

3.2.19 Registers 10080 to 10087: Impedance protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10080	21 Fault Ph A	1 = 21 Fault detection , Phase A	3967
10081	21 Fault Ph B	1 = 21 Fault detection , Phase B	3968
10082	21 Fault Ph C	1 = 21 Fault detection , Phase C	3969
10083	21 I> & U<	1 = 21 O/C with undervoltage seal in	3970
10084	21 Z1< TRIP	1 = 21 Z1< TRIP	3977
10085	21 Z1B< TRIP	1 = 21 Z1B< TRIP	3978
10086	21 Z2< TRIP	1 = 21 Z2< TRIP	3979
10087	21 T3> TRIP	1 = 21 T3> TRIP	3980

3.2.20 Registers 10088 to 10091: Binary inputs

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10088	Ext 1 Gen.TRP	1 = External trip 1: General TRIP	4537
10089	Ext 2 Gen.TRP	1 = External trip 2: General TRIP	4557
10090	Ext 3 Gen.TRP	1 = External trip 3: General TRIP	4577
10091	Ext 4 Gen.TRP	1 = External trip 4: General TRIP	4597

3.2.21 Registers 10092 to 10093: Inadvertent energisation protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10092	50/27 picked up	1 = 50/27 picked up	5547
10093	50/27 TRIP	1 = 50/27 TRIP	5548

3.2.22 Register 10094: Trip coil monitor

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10094	FAIL: Trip cir.	1 = 74TC Failure Trip Circuit	6865

3.2.23 Registers 10095 to 10096: Inverse undervoltage protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10095	Vp< picked up	1 = Inverse Undervoltage Vp< picked up	6525
10096	Vp< TRIP	1 = Inverse Undervoltage Vp< TRIP	6527

3.2.24 Registers 10097 to 10099: Startup supervision of motors

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10097	48 Rot. locked	1 = 48 Rotor LOCKED after Lock. Rotor Time	6822
10098	48 picked up	1 = 48 Starting time supervision picked up	6823
10099	48 TRIP	1 = 48 Starting time supervision TRIP	6821

3.2.25 Register 10100: Startup counter for motors

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10100	66 TRIP	1 = 66 Restart inhibit motor TRIP	4827

3.2.26 Registers 10101 to 10102: Rotor ground fault protection (R,fn)

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10101	64R-1 picked up	1 = 64R-1 picked up (Alarm)	5397
10102	64R-2 TRIP	1 = 64R-2 TRIP	5399

3.2.27 Registers 10103 to 10104: DC voltage/current protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10103	DC Prot.pick.up	1 = DC protection picked up	5306
10104	DC Prot. TRIP	1 = DC protection TRIP	5307

3.2.28 Registers 10105 to 10108: State of the out-of-step protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10105	78 det. char. 1	1 = 78 characteristic 1 picked up	5069
10106	78 det. char. 2	1 = 78 characteristic 2 picked up	5070
10107	78 TRIP char. 1	1 = 78 TRIP characteristic 1	5071
10108	78 TRIP char. 2	1 = 78 TRIP characteristic 2	5072

3.2.29 Registers 10109 to 10115: Differential protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10109	87 picked up	1 = 87 Differential protection picked up	5631
10110	87 TRIP	1 = 87 Differential protection TRIP	5671
10111	87 TRIP Phase A	1 = 87 Differential protection: TRIP Phase A	5672
10112	87 TRIP Phase B	1 = 87 Differential protection: TRIP Phase B	5673
10113	87 TRIP Phase C	1 = 87 Differential protection: TRIP Phase C	5674
10114	87 Diff> TRIP	1 = 87 Differential prot.: TRIP by IDIFF>	5691
10115	87 Diff>> TRIP	1 = 87 Diff>> TRIP	5692

3.2.30 Registers 10116 to 10117: Stator ground fault protection 100%

- Registers 10116 and 10117 are available with 7UM62 V4.10 or higher.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10116	SGF100 Alarm	1 = Stator ground fault prot. 100%: Alarm stage	5487
10117	SGF100 TRIP	1 = Stator ground fault prot. 100%: TRIP	5489

3.2.31 Registers 10118 to 10119: Rotor ground fault protection 1-3 Hz

- Registers 10118 and 10119 are available with 7UM62 V4.10 or higher.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10118	64R-1_3Hzpickup	1 = 64R-1 (1-3Hz) picked up (Alarm)	5403
10119	64R-2_3Hz TRIP	1 = 64R-2 (1-3Hz) TRIP	5407

3.2.32 Registers 10120 to 10121: Restricted ground fault protection

- Registers 10120 and 10121 are available with 7UM62 V4.10 or higher.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10120	87N picked up	1 = 87N picked up	5817
10121	87N TRIP	1 = 87N TRIP	5821

3.2.33 Registers 10122 to 10129: Fault indications of protection functions

- User-defined protection annunciations, single-point indications or taggings can be routed on the positions "<user-defined>" as "Destination system interface" using the **DIGSI Configuration matrix**.
- Registers 10122 to 10129 are available with 7UM62 V4.10 or higher.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10122	Failure SGF	1 = Failure stator ground fault prot. 100%	5486
10123	Failure 64R	1 = Failure 64R: measuring circuit	5400
10124	Fail 64R 1-3Hz	1 = Failure 64R protection (1-3Hz)	5401
10125	<user-defined>	not pre-allocated	-
10126	<user-defined>	not pre-allocated	-
10127	<user-defined> ¹	not pre-allocated	-
10128	<user-defined> ¹	not pre-allocated	-
10129	<user-defined> ¹	not pre-allocated	-

¹ Only available in version V02.01.01 of Standard mapping 3-2.

3.3 Input registers (3X references)

- Ref. to chap. 1.2.3 for additional notes regarding scaling of measured values.

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
30001	IA S2=	Operat. meas. current A side 2	327.67 %	724
30002	IB S2=	Operat. meas. current B side 2	327.67 %	725
30003	IC S2=	Operat. meas. current C side 2	327.67 %	726
30004	Va-b=	Va-b	327.67 %	624
30005	Vb-c=	Vb-c	327.67 %	625
30006	Vc-a=	Vc-a	327.67 %	626
30007	P =	P (active power)	327.67 %	641
30008	Q =	Q (reactive power)	327.67 %	642
30009	f =	Frequency	327.67 Hz	644
30010	I2 =	I2 (negative sequence)	327.67 %	606
30011	Θ/Θ trip =	Temperature rise for warning and trip	327.67 %	801
30012	<user-defined>	not pre-allocated	-	-
30013	IA S1=	Operat. meas. current A side 1	327.67 %	721
30014	IB S1=	Operat. meas. current B side 1	327.67 %	722
30015	IC S1=	Operat. meas. current C side 1	327.67 %	723
30016	<user-defined> ¹	not pre-allocated	-	-
30017	<user-defined> ¹	not pre-allocated	-	-
30018	<user-defined> ¹	not pre-allocated	-	-
30019	<user-defined> ¹	not pre-allocated	-	-
30020	<user-defined> ¹	not pre-allocated	-	-
30021	<user-defined> ¹	not pre-allocated	-	-

¹ Available from version V02.02.01 of Standard mapping 3-2.

3.4 Holding registers (4X references)

3.4.1 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> "7UM62115EA923CA0----0D-----"
40027 - 40034	Date and time of mapping data generation (string, max. 16 characters)	<u>Example:</u> "140201095747330" corresponds to → Date: Feb. 14th, 2001 → 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

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

3.4.3 Register 40129: Diagnosis

- Registers are write-protected.¹
- The contents of these registers are 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 signalisation 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	<user-defined>	not pre-allocated	-
40129/2 ²	ProtActive	1 = At least one protection function is active	52
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	Operat. Cond.	1 = Suitable measured quantities are present at the device inputs ($V > 0.05 * V_{nom}$, $I > 0.05 * I_{nom}$ and $10 \text{ Hz} < \text{Freq.} < 70 \text{ Hz}$)	5002
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 valid	1 = Data in the Modbus message are valid. (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).

3.4.4 Registers 40201 to 40208: Metered measurands

- Registers are write-protected.¹
- Ref. to chap. 1.3.3 for additional notes regarding scaling of metered measurands.

Register	Designation of the SIPROTEC objects	Comments	Scaling ($2^{31}-1$ corresponds to ...)	Internal object no.
40201 - 40202	Wp+	Wp Forward (Metered measurand derived from measured values)	$2^{31}-1$ impulses	924
40203 - 40204	Wq+	Wq Forward (Metered measurand derived from measured values)	$2^{31}-1$ impulses	925
40205 - 40206	Wp-	Wp Reverse (Metered measurand derived from measured values)	$2^{31}-1$ impulses	928
40207 - 40208	Wq-	Wq Reverse (Metered measurand derived from measured values)	$2^{31}-1$ impulses	929

3.4.5 Register 40251: Measured values in output direction

- Ref. to chap. 1.3.2 regarding transmission of the “Cooling medium temperature” via Modbus.

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
40251	AMB.TEMP =	Cooling medium temperature	327.67 %	-

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

3.4.6 Registers 40301 to 40324: Statistic values

- Registers are write-protected.¹
- Installation-specific values can be routed on these register positions as “Destination system interface” using the **DIGSI Configuration matrix**.
- Registers 40301 to 40324 are available with 7UM62 V4.10 or higher.

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	-
40309 - 40310	<user-defined>	not pre-allocated	-
40311 - 40312	<user-defined>	not pre-allocated	-
40313 - 40314	<user-defined>	not pre-allocated	-
40315 - 40316	<user-defined>	not pre-allocated	-
40317 - 40318	<user-defined>	not pre-allocated	-
40319 - 40320	<user-defined>	not pre-allocated	-
40321 - 40322	<user-defined>	not pre-allocated	-
40323 - 40324	<user-defined>	not pre-allocated	-

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

3.4.7 Registers 40351 to 40410: Min/Max values of measured values

- Registers are write-protected.¹
- Min/Max values of measured values can be routed on these register positions using the **DIGIS Configuration matrix**.
- The transmission of Min/Max values of measured values is only possible as primary values.
- Information regarding the Time/Date data type you find in the manual “SIPROTEC Communication module, Modbus - Communication profile” (ref to page i).
- Registers 40351 to 40410 are available with 7UM62 V4.10 or higher.

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

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

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
40391 40392 – 40395	<user-defined> Min/Max Time/Date	not pre-allocated Time and Date of “<user-defined> Min/Max”	-	-
40396 40397 – 40400	<user-defined> Min/Max Time/Date	not pre-allocated Time and Date of “<user-defined> Min/Max”	-	-
40401 40402 – 40405	<user-defined> Min/Max Time/Date	not pre-allocated Time and Date of “<user-defined> Min/Max”	-	-
40406 40407 – 40410	<user-defined> Min/Max Time/Date	not pre-allocated Time and Date of “<user-defined> Min/Max”	-	-

3.4.8 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. 3.4.3) 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
40612	Register address #2	
40613	Message cause / Indication type #2	
40614	Value #2	
40615 - 40618	Time stamp #2	
40619	Message block #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

Index

Numerics

21	2-8, 3-8
24	2-7, 3-7
27	2-6, 3-6
32F	2-7, 3-7
32R	2-7, 3-7
40	2-8, 3-8
46	2-5, 3-5
48	2-9, 3-9
49	2-5, 3-5
50/27	2-9, 3-9
50/51	2-4, 3-4
50BF	2-8, 3-8
50Ns	2-5, 3-5
59	2-6, 3-6
59/67	2-6, 3-6
64R	2-10, 2-11, 3-10, 3-11
66	2-10, 3-10
67	2-4, 3-4
74TC	2-9, 3-9
78	2-10, 3-10
81	2-7, 3-7
87	2-10, 3-10
87N	2-11, 3-11

C

Changing the setting group	1-7
Circuit breaker failure protection	2-8, 3-8
Cooling medium temperature	1-7
Counters	1-8

D

DC voltage/current protection	2-10, 3-10
Differential protection	2-10, 3-10
Double commands	2-3, 3-3
Double-point indications	2-3, 3-3

E

Event recorder	3-19
----------------	------

F

Fault indications of protection functions	2-11, 3-11
Forward power supervision	2-7, 3-7
Frequency protection	2-7, 3-7
Fuse Failure Monitor	2-8, 3-8

I

Impedance protection	2-8, 3-8
Inadvertent energisation protection	2-9, 3-9
Inverse undervoltage protection	2-9, 3-9

M

Measured values	1-6, 1-7, 2-12, 3-12
Min/Max values	2-17, 3-17
Message blocks	3-19
Metered measurands	1-8, 2-15, 3-15

O

Overcurrent time protection	2-4, 3-4
Overexcitation protection	2-7, 3-7
Overvoltage protection	2-6, 3-6

Q

Qualified personnel (definition)	P-iii
----------------------------------	-------

R

Restricted ground fault protection	2-11, 3-11
Reverse power protection	2-7, 3-7
Rotor ground fault protection (R,fn)	2-10, 3-10
Rotor ground fault protection 1-3 Hz	2-11, 3-11

S		T	
Sensitive ground fault protection	2-5, 3-5	Target audience	<i>P-ii</i>
Sequence of Events		Thermal overload protection	2-5, 3-5
→Event recorder		Time synchronization	2-13, 3-13
Startup counter for motors	2-10, 3-10	Trip coil monitor	2-9, 3-9
Startup supervision of motors	2-9, 3-9	Typographic conventions	<i>P-iii</i>
State of the out-of-step protection	2-10, 3-10		
Statistic values	2-16, 3-16	U	
Stator ground fault protection	2-6, 3-6	Unbalanced load protection	2-5, 3-5
100%	2-11, 3-11	Underexcitation protection	2-8, 3-8
		Undervoltage protection	2-6, 3-6
		V	
		Validity of the manual	<i>P-ii</i>

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