

SIPROTEC

Transformer differential  
protection  
7UT612

Communication module

Modbus  
Bus mapping

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Revision 1.1

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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 device 7UT612 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.

<b>Validity</b>	<p>This manual is valid for the SIPROTEC devices:</p> <ul style="list-style-type: none"><li>• 7UT612 (firmware version 4.00 or higher),</li></ul> <p>with</p> <ul style="list-style-type: none"><li>• Modbus communication module version 02.00.05 or higher.</li></ul> <p>For device parameterization have to be used:</p> <ul style="list-style-type: none"><li>• DIGSI 4.30 or higher,</li><li>• DIGSI 4.21 considering the preconditions explained in the manual “SIPROTEC Communication module, Modbus - Communication profile” (ref. to page 3),</li><li>• Modbus standard mappings 3-1 to 3-n (n = device type dependent number of standard mappings).</li></ul>
<b>Additional Support</b>	<p>For questions regarding SIPROTEC4 devices, please contact your Siemens representative.</p>
<b>Training courses</b>	<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>
<b>Target audience</b>	<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!

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

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

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

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

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### QUALIFIED PERSONNEL

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

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

### Typographic and 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-C010-03 Jan. 14 <sup>th</sup> , 2002
general Chap. 1.3.5	1.1	<ul style="list-style-type: none"><li>• Page numbering in the manual now continuous, not chapter-related any more</li><li>• Corrected: 10032 50-1 TRIP instead of 50-2 TRIP</li></ul> Feb. 14 <sup>th</sup> , 2005





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# Modbus register map

This chapter describes the register map organization of the Modbus slave of the SIPROTEC device 7UT612.

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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 device 7UT612 to the associated Modbus registers.

The columns "Designation of the SIPROTEC objects" contain the names 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	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 the Input Status register 10009.



*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 3).
- 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 3).

## 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 00008: 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**.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
00001	<user-defined> ON	not pro-allocated	-
00002	<user-defined> OFF		
00003	<user-defined> ON	not pro-allocated	-
00004	<user-defined> OFF		
00005	<user-defined> ON	not pro-allocated	-
00006	<user-defined> OFF		
00007	<user-defined> ON	not pro-allocated	-
00008	<user-defined> OFF		

### 1.2.2 Registers 00009 to 00016: 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.
00009	<user-defined>	not pre-allocated	-
00010	<user-defined>	not pre-allocated	-
00011	<user-defined>	not pre-allocated	-

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
00012	<user-defined>	not pre-allocated	-
00013 - 00016	reserved	= 0	-

### 1.2.3 Registers 00017 to 00020: Internal commands

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
00017	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	
00018	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	
00019	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	
00020	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.

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**.

### 1.2.4 Registers 00257 to 00264: Exception Flags

- Registers are write-protected.<sup>1</sup>
- 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	<reserved>	= 0	-
00262	<reserved>	= 0	-
00263	<reserved>	= 0	-
00264	<reserved>	= 0	-

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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: User-defined annunciations

- User-defined protection annunciations, single-point indications and taggings 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 - 10016	<reserved>	= 0	-

### 1.3.2 Registers 10017 to 10023: Differential protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10017	87 picked up	1 = 87 Differential protection picked up	5631
10018	87 TRIP	1 = 87 TRIP	5671
10019	87 TRIP Phase A	1 = 87 TRIP Phase A	5672
10020	87 TRIP Phase B	1 = 87 TRIP Phase B	5673
10021	87 TRIP Phase C	1 = 87 TRIP Phase C	5674



Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10022	87-1 TRIP	1 = 87-1 TRIP	5691
10023	87-2 TRIP	1 = 87-2 TRIP	5692

### 1.3.3 Registers 10024 to 10025: Restricted ground fault protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10024	87G Picked Up	1 = 87G Picked up	5817
10025	87G TRIP	1 = 87G TRIP	5821

### 1.3.4 Registers 10026 to 10027: Time overcurrent protection (general)

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10026	50(N,G) PU	1 = 50(N,G)/51(N,G) O/C PICKUP	1761
10027	50/51(N,G) TRIP	1 = 50(N,G)/51(N,G) TRIP	1791

### 1.3.5 Registers 10028 to 10038: Time overcurrent protection (50/51)

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10028	50/51 Ph A PU	1 = 50/51 Phase A picked up	1762
10029	50/51 Ph B PU	1 = 50/51 Phase B picked up	1763
10030	50/51 Ph C PU	1 = 50/51 Phase C picked up	1764
10031	50-2 TRIP	1 = 50-2 TRIP	1805
10032	50-1 TRIP	1 = 50-1 TRIP	1815
10033	51 picked up	1 = 51 picked up	1820
10034	51 TRIP	1 = 51 TRIP	1825
10035	Ia InRush PU	1 = Phase A InRush picked up	7565
10036	Ib InRush PU	1 = Phase B InRush picked up	7566
10037	Ic InRush PU	1 = Phase C InRush picked up	7567
10038	50/51 Dset.ACT	1 = Dynamic settings 50/51 are ACTIVE	1998

**1.3.6 Registers 10039 to 10045: Time overcurrent protection (50N/51N)**

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10039	50N/51NPickedup	1 = 50N/51N picked up	1766
10040	50N-2 TRIP	1 = 50N-2 TRIP	1903
10041	50N-1 TRIP	1 = 50N-1 TRIP	1906
10042	51N picked up	1 = 51N picked up	1907
10043	51N TRIP	1 = 51N TRIP	1909
10044	50/51N InRushPU	1 = 50/51N InRush picked up	7568
10045	50/51N Dset.ACT	1 = Dynamic settings 50N/51N are ACTIVE	1999

**1.3.7 Registers 10046 to 10052: Time overcurrent protection (50G/51G)**

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10046	50G/51GPickedup	1 = 50G/51G picked up	1765
10047	50G-2 TRIP	1 = 50G-2 TRIP	1833
10048	50G-1 TRIP	1 = 50G-1 TRIP	1836
10049	51G picked up	1 = 51G picked up	1837
10050	51G TRIP	1 = 51G TRIP	1839
10051	Gnd InRush PU	1 = Ground InRush picked up	7564
10052	50/51G Dset.ACT	1 = Dynamic settings 50G/51G are ACTIVE	2000

**1.3.8 Registers 10053 to 10059: Thermal overload protection**

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10053	49 O/L I Alarm	1 = 49 Overload Current Alarm (I alarm)	1515
10054	49 O/L $\Theta$ Alarm	1 = 49 Thermal Overload Alarm	1516
10055	49 Th O/L TRIP	1 = 49 Thermal Overload TRIP	1521
10056	49 ht. spot Al.	1 = 49 Thermal Overload hot spot Th. Alarm	1541
10057	49 ht.spot TRIP	1 = 49 Thermal Overload hot spot Th. TRIP	1542
10058	49 al.rate Al.	1 = 49 Thermal Overload aging rate Alarm	1543
10059	49 ag.rt. TRIP	1 = 49 Thermal Overload aging rate TRIP	1544

### 1.3.9 Registers 10060 to 10063: Unbalanced load protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10060	46-2 picked up	1 = 46-2 picked up	5159
10061	46-1 picked up	1 = 46-1 picked up	5165
10062	46-TOC pickedup	1 = 46-TOC pickedup	5166
10063	46 TRIP	1 = 46 TRIP	5170

### 1.3.10 Registers 10064 to 10066: Circuit breaker failure protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10064	50BF int Pickup	1 = 50BF (internal) PICKUP	1456
10065	50BF ext Pickup	1 = 50BF (external) PICKUP	1457
10066	50BF TRIP	1 = 50BF TRIP	1471

### 1.3.11 Registers 10067 to 10069: Time overcurrent protection (50 1Ph)

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10067	50 1Ph Pickup	1 = 50 1Ph Picked up	5971
10068	50 1Ph-1 TRIP	1 = 50 1Ph-1 TRIP	5975
10069	50 1Ph-2 TRIP	1 = 50 1Ph-2 TRIP	5979

**1.3.12 Registers 10070 to 10082: Thermobox (7XV566)**

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10070	Fail: RTD	1 = Fail: RTD (broken wire/shorted)	14101
10071	RTD 1 St.1 p.up	1 = RTD 1 Temperature stage 1 picked up	14112
10072	RTD 1 St.2 p.up	1 = RTD 1 Temperature stage 2 picked up	14113
10073	RTD 2 St.1 p.up	1 = RTD 2 Temperature stage 1 picked up	14122
10074	RTD 2 St.2 p.up	1 = RTD 2 Temperature stage 2 picked up	14123
10075	RTD 3 St.1 p.up	1 = RTD 3 Temperature stage 1 picked up	14132
10076	RTD 3 St.2 p.up	1 = RTD 3 Temperature stage 2 picked up	14133
10077	RTD 4 St.1 p.up	1 = RTD 4 Temperature stage 1 picked up	14142
10078	RTD 4 St.2 p.up	1 = RTD 4 Temperature stage 2 picked up	14143
10079	RTD 5 St.1 p.up	1 = RTD 5 Temperature stage 1 picked up	14152
10080	RTD 5 St.2 p.up	1 = RTD 5 Temperature stage 2 picked up	14153
10081	RTD 6 St.1 p.up	1 = RTD 6 Temperature stage 1 picked up	14162
10082	RTD 6 St.2 p.up	1 = RTD 6 Temperature stage 2 picked up	14163

**1.3.13 Registers 10083 to 10084: External trip commands**

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10083	Ext 1 Gen. TRIP	1 = External trip 1: General TRIP	4537
10084	Ext 2Gen. TRIP	1 = External trip 2: General TRIP	4557

**1.3.14 Register 10085: Trip coil monitor**

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10085	FAIL: Trip cir.	1 = 74TC Failure Trip Circuit	6865

## 1.4 Input registers (3X references)

The Input register block allows the Modbus master to read the values of 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 given default scaling values for the measured values in the standard mapping apply to installations with the following nominal operating values:

Rated Apparent Power of the Transformer (parameter address 0249):

→ 10.01 ... 100.00 MVA

Rated Primary Voltage Side 1 (parameter address 0240):

→ 100.01 ... 1000.00 kV



*Note:*

- 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 3).
- If other measured values than routed per default shall be transmitted via Modbus, then the positions of the not required measured values have to be released in the **DIGSI Configuration matrix** first (remove the cross in the associated column "Destination system interface").  
For this the protection function of the SIPROTEC device in which the measured values currently routed are available must if necessary be activated.

*Example:*

The device 7UT612 shall be used as 1 phase busbar protection.

To release the positions of the measured values routed per default for transformer protection select Protection Object = 3 phase Transformer first and remove the measured values from "Destination system interface".

After this the positions are available for new routing with device configuration Protection Object = 1 phase Busbar.

### 1.4.1 Registers 30001 to 30013: Operational values

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
30001	IA S1 =	Current A side 1	32767 A	721
30002	IB S1 =	Current B side 1	32767 A	722
30003	IC S1 =	Current C side 1	32767 A	723
30004	IA S2 =	Current A side 2	327.67 kA	724
30005	IB S2 =	Current B side 2	327.67 kA	725

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
30006	IC S2 =	Current C side 2	327.67 kA	726
30007	Freq =	Frequency	327.67 Hz	644
30008	3I0S1=	3I0 (zero sequence) of side 1	32767 A	30640
30009	I1S1 =	I1 (positive sequence) of side 1	32767 A	30641
30010	I2S1 =	I2 (negative sequence) of side 1	32767 A	30642
30011	3I0S2 =	3I0 (zero sequence) of side 2	327.67 kA	30643
30012	I1S2 =	I1 (positive sequence) of side 2	327.67 kA	30644
30013	I2S2 =	I2 (negative sequence) of side 2	327.67 kA	30645

### 1.4.2 Registers 30014 to 30020: Thermal measurement

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
30014	Θ / Θtrip =	Temperat. rise for warning and trip	327.67 %	801
30015	Θ leg A =	Hot spot temperature of leg A	3276.7 °C/°F *	1060
30016	Θ leg B =	Hot spot temperature of leg B	3276.7 °C/°F *	1061
30017	Θ leg C =	Hot spot temperature of leg C	3276.7 °C/°F *	1062
30018	Ag.Rate =	Aging Rate	327.67 (dimensionless)	1063
30019	Res-1 =	Load Reserve to Stage-1 level	327.67 %	1066
30020	Res-2 =	Load Reserve to Stage-2 level	327.67 %	1067

\* ref. to parameter **Temperature unit** (parameter address = 0276)

### 1.4.3 Registers 30021 to 30026: Thermobox (7XV556)

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
30021	Θ RTD 1 =	Temperature of RTD1	3276.7 °C/°F *	1068
30022	Θ RTD 2 =	Temperature of RTD1	3276.7 °C/°F *	1069
30023	Θ RTD 3 =	Temperature of RTD1	3276.7 °C/°F *	1070
30024	Θ RTD 4 =	Temperature of RTD1	3276.7 °C/°F *	1071
30025	Θ RTD 5 =	Temperature of RTD1	3276.7 °C/°F *	1072
30026	Θ RTD 6 =	Temperature of RTD1	3276.7 °C/°F *	1073

\* ref. to parameter **Temperature unit** (parameter address = 0276)

## 1.5 Holding registers (4X references)

The Holding register block allows the Modbus master to read metered measurands, system and diagnostic information as well as to execute time synchronisation of the SIPROTEC device.

### 1.5.1 Registers 40001 to 40036: System information

- Registers are write-protected.<sup>1</sup>

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> "7UT61215EC921BA0----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

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.<sup>1</sup>
- 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 signalization of "Data invalid" (register 40129/2<sup>15</sup>).

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
40129/2 <sup>0</sup>	Device OK	1 = Update of the device replica in the SIPROTEC device completed after initial start or restart	51
40129/2 <sup>1</sup>	<user-defined>	not pre-allocated	-
40129/2 <sup>2</sup>	ProtActive	1 = At least one protection function is active	52
40129/2 <sup>3</sup>	Error Sum Alarm	1 = Error with a summary alarm ON	140
40129/2 <sup>4</sup>	Alarm Sum Event	1 = Alarm summary event ON	160
40129/2 <sup>5</sup>	Relay PICKUP	1 = Relay PICKUP (group signal)	501
40129/2 <sup>6</sup>	Relay TRIP	1 = Relay GENERAL TRIP command	511
40129/2 <sup>7</sup>	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 <sup>8</sup>	<user-defined>	not pre-allocated	-
40129/2 <sup>9</sup>	<user-defined>	not pre-allocated	-
40129/2 <sup>10</sup>	<user-defined>	not pre-allocated	-
40129/2 <sup>11</sup>	<user-defined>	not pre-allocated	-
40129/2 <sup>12</sup>	<user-defined>	not pre-allocated	-
40129/2 <sup>13</sup>	<user-defined>	not pre-allocated	-
40129/2 <sup>14</sup>	<user-defined>	not pre-allocated	-
40129/2 <sup>15</sup>	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 40201 to 40204: Metered measurands

- Registers are write-protected.<sup>1</sup>
- Installation-specific metered measurands / counters can be routed on these register positions as “Destination system interface” using the **DIGSI Configuration matrix**.

Register	Designation of the SIPROTEC objects	Comments	Scaling ( $2^{31}-1$ corresponds to ...)	Internal object no.
40201 - 40202	<user-defined>	not pre-allocated	$2^{31}-1$ impulses	-
40203 - 40204	<user-defined>	not pre-allocated	$2^{31}-1$ impulses	-

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1. A write access is rejected with exception code 03 (ILLEGAL\_DATA\_VALUE).

### 1.5.5 Registers 40301 to 40316: Statistic values

- Registers are write-protected.<sup>1</sup>
- 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	-
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	-

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1. A write access is rejected with exception code 03 (ILLEGAL\_DATA\_VALUE).



# Glossary

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



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