

SIPROTEC

Multifunction protection
7SJ66

Modbus Mapping

Preface

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Preface

Purpose of this manual	<p>The manual describes the register map organisation of the Modbus slave of the SIPROTEC devices 7SJ66 is divided into the following topics:</p> <ul style="list-style-type: none">• Data in the Modbus registers→Chapter 2,• Standard mapping 3-1→Chapter 2,• Standard mapping 3-2→ Chapter 3.
Modbus specification	<p>The Modbus specification with a detailed explanation of the Modbus protocol is contained in:</p> <ul style="list-style-type: none">• 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">• 7SJ66 (firmware version 4.0 or higher). <p>For device parameterization have to be used:</p> <ul style="list-style-type: none">• DIGSI 4.7 or higher,• 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 Siemen 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.

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 manu:

Modified chapters pages	Edition	Reasons of modification
	1.0	First edition, Doc.-No.: C53000-L2240-C383-1 Mar, 2014

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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.

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1.1 Explanations

There are two standard mappings (Standard mapping 3-1 and Standard mapping3-2) available for the SIPROTEC devices 7SJ66.

Standard mapping 3-1

The Standard mapping 3-1 contains:

- Coil Status registers:
 - 9 Double commands incl. 9 Double-point indications as checkback indication
 - 39 Single commands incl. 39 Single-point indications as checkback indication
 - 8 Single-point indications / Exception Flags
- Input Status registers:
 - 272 Single-point indications
- Input registers
 - 28 Measured values
- Holding registers
 - System information
 - Time synchronization
 - 16 Single-point indications / Diagnostic Register
 - 6 Metered measurands / Counters
 - 7 Measured values - Mean values
 - 9 values for Fault currents, Fault locator and Statistic values
 - 34 Min/Max values of measured values

Standard mapping 3-2

The Standard mapping 3-2 contains:

- Coil Status registers:
 - 9 Double commands incl. 9 Double-point indications as checkback indication
 - 39 Single commands incl. 39 Single-point indications as checkback indication
 - 8 Single-point indications / Exception Flags
- Input Status registers:
 - 178 Single-point indications
- Input registers
 - 28 Measured values
- Holding registers
 - System information
 - Time synchronization
 - 16 Single-point indications / Diagnostic Register

- 6 Metered measurands / Counter
- 7 Measured values - Mean values
- 9 values for Fault currents, Fault locator and Statistic values
- 34 Min/Max values of measured values
- Event recorder (Sequence of Events)

Register map

Chapters 2 and 3 define the mapping of the data objects of the SIPROTEC device 7SJ66 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)	Internal object no.
30001	Ia =	Current in phase A	3276.7 A	601

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

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10084	50-1 picked up	1 = 50-1 picked up	1810

The protection annunciator (single-point indication) "50-1 picked up" is assigned to the Input Status register 10084.



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.
- The definition of the data types (single-point indication, measured value etc.) and information about changing the allocations as well as parameterization of Modbus as system interface for SIPROTEC devices are contained in the manual "SIPROTEC Communication module, Modbus - Communication profile" (ref. to page i).

1.2 Coil Status registers (0X references)

The Coil Status register block allows the Modbus master:

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



Note:

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

References

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

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

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.

References

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

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

1.4 Input registers (3X references)

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



Note:

Depending on the device composition not all of the indicated analog inputs (and corresponding Modbus registers) may be available in the SIPROTEC device.

Scaling

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

Full Scale Voltage (parameter address 1101):

→ 1.01 ... 100.00 kV

Full Scale Current (parameter address 1102):

→ 10.01 ... 1000.00 A

Product of:

- Rated Primary Voltage (parameter address 0202) and
- Matching ration Phase-VT to Open-Delta-VT (parameter address 0206)

→ 1.01 ... 100.00 kV

Ignd-CT rated primary current (parameter address 0217)

→ 10.01 ... 1000.00 A

Power values:

- Product of Full Scale Voltage and Full Scale Current multiplies by $\sqrt{3}$

→ 10.01 ... 1000.00 MW (MVAR)



Note:

Changes of the scaling of the measured values are possible in adaption of 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

1.5 Holding registers (4X references)

The Holding register block allows the Modbus master to read metered measurands, statistic and min/max values, system and diagnostic information 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 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

1.5.1 Metered measurands

Scaling

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

60000 impulses per hour for $V = V_{nom}$ and $I = I_{nom}$

V_{nom} = Full Scale Voltage (parameter address = 1101)

I_{nom} = Full Scale Current (parameter address = 1102)

Example

In the parameter set is configured:

$I_{nom} = 100 \text{ A}$ und $V_{nom} = 12.00 \text{ kV}$

60000 impulses correspond so that:

$1 \text{ h} * 100 \text{ A} * 12 \text{ kV} * \sqrt{3} = 2078.46 \text{ kWh}$



Note:

- The type of update (cyclic, with or without deletion) and the update interval must be programmed for the metered measurands with the parameterization software DIG-SI.
- 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

1.5.2 Fault currents, Fault locator, Statistic values

Always the latest fault currents and fault location is stored.

In the event of a fault, reading out of the fault record protocol from the SIPROTEC device is necessary for an exact diagnosis.

The scalings of these values are fixed, as described, and not changeable in DIGSI.

References

Standard mapping 3-1: ref. to chap. 2.4.6

Standard mapping 3-2: ref. to chap. 3.4.6

1.6 Notes to SIPROTEC objects

1.6.1 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. 2.1.3

Standard mapping 3-2: ref. to chap. 3.1.3

1.6.2 Control mode REMOTE

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

- Changing the "Control mode REMOTE" to UNLOCKED permits one unlocked control operation via Modbus.

After execution of the command, the "Control mode REMOTE" in the SIPROTEC device will automatically be reset to LOCKED.

- A programmed test "Switch in position" for unlocked control operations will always be executed.
- If, after changing the "Control mode REMOTE" to UNLOCKED, no command is received via Modbus for a period of 5 minutes, then the "Control mode REMOTE" is automatically reset to LOCKED.
- If the "Control mode REMOTE" was automatically reset to LOCKED by the SIPROTEC device then this status can be recognized by the corresponding bit in the Modbus response message.

In this case the status of "Control mode REMOTE" in output direction has to be updated by the Modbus master.

References

Standard mapping 3-1: ref. to chap. 2.1.3

Standard mapping 3-2: ref. to chap. 3.1.3

1.6.3 Stop data transmission

The functionality "Stop data transmission" is not supported via Modbus communication.

If "Stop data transmission" is active nevertheless, data via Modbus will be transmitted furthermore.

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

References

Standard mapping 3-1: ref. to chap. 2.4.3

Standard mapping 3-2: ref. to chap. 3.4.3

Standard mapping 3-1

This chapter describes the register map organisation of the Modbus slave of the SIPROTEC device 7SJ66 at use of Standard mapping 3-1.

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2.1 Coil Status registers (0X references)

2.1.1 Registers 00001 to 00018: Double commands

User-defined double commands with double-point indication as checkback indication can be routed on the positions “<user-defined>” as “Source/Destination system interface” using the **DIGSI Configuration matrix**.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
00001	52Breaker ON	52 Breaker, Impulse output, 3 relays (2-pole ON, 1-pole OFF)	-
00002	52Breaker OFF		
00003	Disc.Swit. ON	Disconnect Switch, Impulse output, 2 relays, 1-pole	-
00004	Disc.Swit. OFF		
00005	GndSwit. ON	Ground Switch, Impulse output, 2 relays, 1-pole	-
00006	GndSwit. OFF		
00007	Q2 Op/Cl ON	Impulse output, 2 relays, 1-pole	-
00008	Q2 Op/Cl OFF		
00009	Q9 Op/Cl ON	Impulse output, 2 relays, 1-pole	-
00010	Q9 Op/Cl OFF		
00011	<user-defined> ON	not pre-allocated	-
00012	<user-defined> OFF		
00013	<user-defined> ON	not pre-allocated	-
00014	<user-defined> OFF		
00015	<user-defined> ON	not pre-allocated	-
00016	<user-defined> OFF		
00017	<user-defined> ON	not pre-allocated	-
00018	<user-defined> OFF		

00019 - 00032	reserved	The value 0 is always returned if reading. A write access is rejected in the SIPRO- TEC device.	-
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2.1.2 Registers 00033 to 00064: Single commands

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.
00033	<user-defined>	not pre-allocated	-
00034	<user-defined>	not pre-allocated	-
00035	<user-defined>	not pre-allocated	-
00036	<user-defined>	not pre-allocated	-
00037	<user-defined>	not pre-allocated	-
00038	<user-defined>	not pre-allocated	-
00039	<user-defined>	not pre-allocated	-
00040	<user-defined>	not pre-allocated	-
00041	<user-defined>	not pre-allocated	-
00042	<user-defined>	not pre-allocated	-
00043	<user-defined>	not pre-allocated	-
00044	<user-defined>	not pre-allocated	-
00045	<user-defined>	not pre-allocated	-
00046	<user-defined>	not pre-allocated	-
00047	<user-defined>	not pre-allocated	-
00048	<user-defined>	not pre-allocated	-
00049	<user-defined>	not pre-allocated	-
00050	<user-defined>	not pre-allocated	-
00051	<user-defined>	not pre-allocated	-
00052	<user-defined>	not pre-allocated	-
00053	<user-defined>	not pre-allocated	-
00054	<user-defined>	not pre-allocated	-
00055	<user-defined>	not pre-allocated	-
00056	<user-defined>	not pre-allocated	-
00057	<user-defined>	not pre-allocated	-
00058	<user-defined>	not pre-allocated	-
00059	<user-defined>	not pre-allocated	-
00060	<user-defined>	not pre-allocated	-
00061	<user-defined>	not pre-allocated	-

00062	<user-defined>	not pre-allocated	-
00063	<user-defined>	not pre-allocated	-
00064	<user-defined>	not pre-allocated	-

2.1.3 Registers 00065 to 00071: Internal commands

Ref. to chap. 1.6.1 and 1.6.2 for additional notes regarding “Changing the setting group” and “Control mode REMOTE”.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
00065	Command: 79 ON	0 = Deactivation of Auto-Reclose function 1 = Activation of Auto-Reclose function	2782
	Indication: 79 ON	0 = 79 Auto recloser is switched OFF 1 = 79 Auto recloser is switched ON	
00066	Command: ProtActive	0 = Deactivation of protection functions 1 = Activation of protection functions	52
	Indication: ProtActive	0 = No protection function is active. 1 = At least one protection function is active.	
00067	Command: Group A	1 = Activation of setting group A	-
	Indication: Group A	1 = Setting group A is active	
00068	Command: Group B	1 = Activation of setting group B	-
	Indication: Group B	1 = Setting group B is active	
00069	Command: Group C	1 = Activation of setting group C	-
	Indication: Group C	1 = Setting group C is active	
00070	Command: Group D	1 = Activation of setting group D	-
	Indication: Group D	1 = Setting group D is active	
00071	Command: ModeREMOTE	Control mode REMOTE 0 = Set to LOCKED 1 = Set to UNLOCKED	-
	Indication: ModeREMOTE	Control mode REMOTE 0 = LOCKED 1 = UNLOCKED	
00072 - 00080	reserved	The value 0 is always returned if reading. A write access is rejected in the SIPROTEC device.	-

2.1.4 Registers 00257 to 00264: Exception flags

- Registers are write-protected.
- The contents of these registers are also readable using function “Read Exception Status” (function code 7).
- Installation-specific SIPROTEC objects can be routed to 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	-

2.2 Input Status registers (1X references)

2.2.1 Registers 10001 to 10053: 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	<user-defined>	not pre-allocated	-
10010	<user-defined>	not pre-allocated	-
10011	<user-defined>	not pre-allocated	-
10012	<user-defined>	not pre-allocated	-
10013	<user-defined>	not pre-allocated	-
10014	<user-defined>	not pre-allocated	-
10015	<user-defined>	not pre-allocated	-
10016	<user-defined>	not pre-allocated	-
10017	<user-defined>	not pre-allocated	-
10018	<user-defined>	not pre-allocated	-
10019	<user-defined>	not pre-allocated	-
10020	<user-defined>	not pre-allocated	-
10021	<user-defined>	not pre-allocated	-
10022	<user-defined>	not pre-allocated	-
10023	<user-defined>	not pre-allocated	-
10024	<user-defined>	not pre-allocated	-
10025	<user-defined>	not pre-allocated	-
10026	<user-defined>	not pre-allocated	-
10027	<user-defined>	not pre-allocated	-
10028	<user-defined>	not pre-allocated	-
10029	<user-defined>	not pre-allocated	-
10031	<user-defined>	not pre-allocated	-
10032	<user-defined>	not pre-allocated	-

10033	<user-defined>	not pre-allocated	-
10034	<user-defined>	not pre-allocated	-
10035	<user-defined>	not pre-allocated	-
10036	<user-defined>	not pre-allocated	-
10037	<user-defined>	not pre-allocated	-
10038	<user-defined>	not pre-allocated	-
10039	<user-defined>	not pre-allocated	-
10040	<user-defined>	not pre-allocated	-
10041	<user-defined>	not pre-allocated	-
10042	<user-defined>	not pre-allocated	-
10043	<user-defined>	not pre-allocated	-
10044	<user-defined>	not pre-allocated	-
10045	<user-defined>	not pre-allocated	-
10046	<user-defined>	not pre-allocated	-
10047	<user-defined>	not pre-allocated	-
10048	<user-defined>	not pre-allocated	-
10049	<user-defined>	not pre-allocated	-
10050	<user-defined>	not pre-allocated	-
10051	<user-defined>	not pre-allocated	-
10052	<user-defined>	not pre-allocated	-
10053	<user-defined>	not pre-allocated	-

2.2.2 Registers 10054 to 10068: Automatic recloser status

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10054	>CB Ready	1 = Binary input "Circuit breaker ready" is active	2730
10055	79 OFF	1 = 79 Auto recloser is switched OFF	2781
10056	79 is NOT ready	1 = 79 Auto recloser is NOT ready	2784
10057	79 DynBlock	1 = 79 Auto recloser is dynamically BLOCKED	2785
10058	79 in progress	1 = 79 Auto recloser - in progress	2801
10059	79 Close	1 = 79 Auto recloser - Close command	2851
10060	79 Successful	1 = 79 Auto recloser - Cycle successful	2862
10061	79 Lockout	1 = 79 Auto recloser - Lockout	2863
10062	79 L-N Sequence	1 = 79 A/R - single phase reclosing sequence	2878
10063	79 L-L Sequence	1 = 79 A/R - multi-phase reclosing sequence	2879

10064	>ZSC ON	1 = Switch zone sequence coordination ON	2722
10065	>ZSC OFF	1 = Switch zone sequence coordination OFF	2723
10066	ZSC active	1 = Zone Sequencing is active	2883
10067	ZSC ON	1 = Zone sequence coordination switched ON	2884
10068	ZSC OFF	1 = Zone sequence coordination switched OFF	2885

2.2.3 Registers 10069 to 10102: Time overcurrent protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10069	50/51 PH OFF	1 = 50/51 O/C is switched OFF	1751
10070	50/51 PH BLK	1 = 50/51 O/C is BLOCKED	1752
10071	50/51 PH ACT	1 = 50/51 O/C is ACTIVE	1753
10072	50N/51N OFF	1 = 50N/51N is switched OFF	1756
10073	50N/51N BLK	1 = 50N/51N is BLOCKED	1757
10074	50N/51N ACT	1 = 50N/51N is ACTIVE	1758
10075	50(N)/51(N) PU	1 = 50(N)/51(N) O/C PICKUP	1761
10076	50/51 Ph A PU	1 = 50/51 Phase A picked up	1762
10077	50/51 Ph B PU	1 = 50/51 Phase B picked up	1763
10078	50/51 Ph C PU	1 = 50/51 Phase C picked up	1764
10079	50N/51NPickedup	1 = 50N/51N picked up	1765
10080	50(N)/51(N)TRIP	1 = 50(N)/51(N) TRIP	1791
10081	50-2 picked up	1 = 50-2 picked up	1800
10082	50-2 TimeOut	1 = 50-2 Time Out	1804
10083	50-2 TRIP	1 = 50-2 TRIP	1805
10084	50-1 picked up	1 = 50-1 picked up	1810
10085	50-1 TimeOut	1 = 50-1 Time Out	1814
10086	50/51 TRIP	1 = 50/51 I> TRIP	1815
10087	51 picked up	1 = 51 picked up	1820
10088	51 Time Out	1 = 51 Time Out	1824
10089	51 TRIP	1 = 51 TRIP	1825
10090	50N-2 picked up	1 = 50N-2 picked up	1831
10091	50N-2 TimeOut	1 = 50N-2 Time Out	1832

10092	50N-2 TRIP	1 = 50N-2 TRIP	1833
10093	50N-1 picked up	1 = 50N-1 picked up	1834
10094	50N-1 TimeOut	1 = 50N-1 Time Out	1835
10095	50N-1 TRIP	1 = 50N-1 TRIP	1836
10096	51N picked up	1 = 51N picked up	1837
10097	51N TimeOut	1 = 51N Time Out	1838
10098	51N TRIP	1 = 51N TRIP	1839
10099	PhA InrushBlk	1 = Phase A trip blocked by inrush detection	1840
10100	PhB InrushBlk	1 = Phase B trip blocked by inrush detection	1841
10101	PhC InrushBlk	1 = Phase C trip blocked by inrush detection	1842
10102	INRUSH X-BLK	1 = Cross blk: PhX blocked PhY	1843

2.2.4 Registers 10103 to 10140: Directional time overcurrent protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10103	Phase A forward	1 = Phase A forward	2628
10104	Phase B forward	1 = Phase B forward	2629
10105	Phase C forward	1 = Phase C forward	2630
10106	Phase A reverse	1 = Phase A reverse	2632
10107	Phase B reverse	1 = Phase B reverse	2633
10108	Phase C reverse	1 = Phase C reverse	2634
10109	Ground forward	1 = Ground forward	2635
10110	Ground reverse	1 = Ground reverse	2636
10111	67-2 picked up	1 = 67-2 picked up	2642
10112	67N-2 picked up	1 = 67N-2 picked up	2646
10113	67-2 Time Out	1 = 67-2 Time Out	2647
10114	67N-2 Time Out	1 = 67N-2 Time Out	2648
10115	67-2 TRIP	1 = 67-2 TRIP	2649
10116	67/67-TOC OFF	1 = 67/67-TOC is switched OFF	2651
10117	67 BLOCKED	1 = 67/67-TOC is BLOCKED	2652
10118	67 ACTIVE	1 = 67/67-TOC is ACTIVE	2653
10119	67N OFF	1 = 67N/67N-TOC is switched OFF	2656

10120	67N BLOCKED	1 = 67N/67N-TOC is BLOCKED	2657
10121	67N ACTIVE	1 = 67N/67N-TOC is ACTIVE	2658
10122	67-1 picked up	1 = 67-1 picked up	2660
10123	67-1 Time Out	1 = 67-1 Time Out	2664
10124	67-1 TRIP	1 = 67-1 TRIP	2665
10125	67-TOC pickedup	1 = 67-TOC picked up	2670
10126	67-TOC Time Out	1 = 67-TOC Time Out	2674
10127	67-TOC TRIP	1 = 67-TOC TRIP	2675
10128	67N-2 TRIP	1 = 67N-2 TRIP	2679
10129	67N-1 picked up	1 = 67N-1 picked up	2681
10130	67N-1 Time Out	1 = 67N-1 Time Out	2682
10131	67N-1 TRIP	1 = 67N-1 TRIP	2683
10132	67N-TOCPickedup	1 = 67N-TOC picked up	2684
10133	67N-TOC TimeOut	1 = 67N-TOC Time Out	2685
10134	67N-TOC TRIP	1 = 67N-TOC TRIP	2686
10135	67/67N pickedup	1 = 67/67N picked up	2691
10136	67 A picked up	1 = 67/67-TOC Phase A picked up	2692
10137	67 B picked up	1 = 67/67-TOC Phase B picked up	2693
10138	67 C picked up	1 = 67/67-TOC Phase C picked up	2694
10139	67N picked up	1 = 67N/67N-TOC picked up	2695
10140	67/67N TRIP	1 = 67/67N TRIP	2696

2.2.5 Registers 10141 to 10147: Unbalanced load protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10141	46 OFF	1 = 46 is switched OFF	5151
10142	46 BLOCKED	1 = 46 is BLOCKED	5152
10143	46 ACTIVE	1 = 46 is ACTIVE	5153
10144	46-2 picked up	1 = 46-2 picked up	5159
10145	46-1 picked up	1 = 46-1 picked up	5165
10146	46-TOC pickedup	1 = 46-TOC picked up	5166
10147	46 TRIP	1 = 46 TRIP	5170

2.2.6 Registers 10148 to 10158: Frequency protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10148	81 OFF	1 = 81 is switched OFF	5211
10149	81 BLOCKED	1 = 81 is BLOCKED	5212
10150	81 ACTIVE	1 = 81 is ACTIVE	5213
10151	81-1 picked up	1 = 81-1 picked up	5232
10152	81-2 picked up	1 = 81-2 picked up	5233
10153	81-3 picked up	1 = 81-3 picked up	5234
10154	81-4 picked up	1 = 81-4 picked up	5235
10155	81-1 TRIP	1 = 81-1 TRIP	5236
10156	81-2 TRIP	1 = 81-2 TRIP	5237
10157	81-3 TRIP	1 = 81-3 TRIP	5238
10158	81-4 TRIP	1 = 81-4 TRIP	5239

2.2.7 Registers 10159 to 10173: Undervoltage and overvoltage protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10159	27 OFF	1 = 27 Undervoltage protection is switched OFF	6530
10160	27 BLOCKED	1 = 27 Undervoltage protection is BLOCKED	6531
10161	27 ACTIVE	1 = 27 Undervoltage protection is ACTIVE	6532
10162	27-1 picked up	1 = 27-1 Undervoltage picked up	6533
10163	27-1 PU CS	1 = 27-1 Undervoltage PICKUP w/curr. supervision	6534
10164	27-2 picked up	1 = 27-2 Undervoltage picked up	6537
10165	27-2 PU CS	1 = 27-2 Undervoltage PICKUP w/curr. supervision	6538
10166	27-1 TRIP	1 = 27-1 Undervoltage TRIP	6539
10167	27-2 TRIP	1 = 27-2 Undervoltage TRIP	6540
10168	59 OFF	1 = 59-Overvoltage protection is switched OFF	6565
10169	59 BLOCKED	1 = 59-Overvoltage protection is BLOCKED	6566
10170	59 ACTIVE	1 = 59-Overvoltage protection is ACTIVE	6567
10171	59-1 picked up	1 = 59 picked up	6568
10172	59-1 PU CS	1 = 59 picked up w/curr. supervision	6569

10173	59-1 TRIP	1 = 59 TRIP	6570
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2.2.8 Registers 10174 to 10191: Sensitive ground fault protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10174	50Ns/67Ns OFF	1 = 50Ns/67Ns is switched OFF	1211
10175	50Ns/67Ns ACT	1 = 50Ns/67Ns is ACTIVE	1212
10176	64 Pickup	1 = 64 displacement voltage pick up	1215
10177	64 TRIP	1 = 64 displacement voltage element TRIP	1217
10178	50Ns-2 Pickup	1 = 50Ns-2 Pickup	1221
10179	50Ns-2 TRIP	1 = 50Ns-2 TRIP	1223
10180	50Ns-1 Pickup	1 = 50Ns-1 Pickup	1224
10181	50Ns-1 TRIP	1 = 50Ns-1 TRIP	1226
10182	51Ns Pickup	1 = 51Ns picked up	1227
10183	51Ns TRIP	1 = 51Ns TRIP	1229
10184	Sens. Gnd block	1 = Sensitive ground fault detection BLOCKED	1230
10185	<user-defined>	not pre-allocated	-
10186	Sens. Gnd Ph A	1 = Sensitive ground fault picked up in Ph A	1272
10187	Sens. Gnd Ph B	1 = Sensitive ground fault picked up in phase B	1273
10188	Sens. Gnd Ph C	1 = Sensitive ground fault picked up in phase C	1274
10189	SensGnd Forward	1 = Sensitive ground fault in forward direction	1276
10190	SensGnd Reverse	1 = Sensitive ground fault in reverse direction	1277
10191	SensGnd undef.	1 = Sensitive ground fault direction undefined	1278

2.2.9 Registers 10192 to 10199: Circuit breaker failure protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10192	50BF OFF	1 = 50BF is switched OFF	1451
10193	50BF BLOCK	1 = 50BF is BLOCKED	1452
10194	50BF ACTIVE	1 = 50BF is ACTIVE	1453

10195	50BF int Pickup	1 = 50BF (internal) PICKUP	1456
10196	50BF ext Pickup	1 = 50BF (external) PICKUP	1457
10197	50BF TRIP	1 = 50BF TRIP	1471
10198	50BF int TRIP	1 = 50BF (internal) TRIP	1480
10199	50BF ext TRIP	1 = 50BF (external) TRIP	1481

2.2.10 Registers 10200 to 10206: Thermal overload protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10200	49 O/L OFF	1 = 49 Overload protection is switched OFF	1511
10201	49 O/L BLOCK	1 = 49 Overload protection is BLOCKED	1512
10202	49 O/L ACTIVE	1 = 49 Overload protection is ACTIVE	1513
10203	49 O/L I Alarm	1 = 49 Overload Current Alarm (I alarm)	1515
10204	49 O/L Θ Alarm	1 = 49 Overload Alarm! Near Thermal Trip	1516
10205	49 Winding O/L	1 = 49 Winding Overload	1517
10206	49 Th O/L TRIP	1 = 49 Thermal Overload TRIP	1521

2.2.11 Registers 10207 to 10211: Startup counter for motors

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10207	>66 emerg. start	1 = Binary input "Emergency start" is active	4823
10208	66 OFF	1 = 66 Motor start protection is switched OFF	4824
10209	66 BLOCKED	1 = 66 Motor start protection is BLOCKED	4825
10210	66 ACTIVE	1 = 66 Motor start protection is ACTIVE	4826
10211	66 TRIP	1 = 66 Motor start protection TRIP	4827

2.2.12 Registers 10212 to 10217: Startup supervision of motors

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10212	START-SUP OFF	1 = Startup supervision is switched OFF	6811

10213	START-SUP BLK	1 = Startup supervision is BLOCKED	6812
10214	START-SUP ACT	1 = Startup supervision is ACTIVE	6813
10215	START-SUP TRIP	1 = Startup supervision TRIP	6821
10216	Rotor locked	1 = Rotor locked	6822
10217	START-SUP pu	1 = Startup supervision Pickup	6823

2.2.13 Registers 10218 to 10222: Trip circuit supervision

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10218	74TC OFF	1 = 74TC Trip circuit supervision is switched OFF	6861
10219	74TC BLOCKED	1 = 74TC Trip circuit supervision is BLOCKED	6862
10220	74TC ACTIVE	1 = 74TC Trip circuit supervision is ACTIVE	6863
10221	74TC ProgFail	1 = 74TC blocked. Binary input is not set.	6864
10222	FAIL: Trip cir.	1 = 74TC Failure Trip Circuit	6865

2.2.14 Registers 10223 to 10237: Inrush stabilization

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10223	50-1 InRushPU	1 = 50-1 InRush picked up	7551
10224	50N-1 InRushPU	1 = 50N-1 InRush picked up	7552
10225	51 InRushPU	1 = 51 InRush picked up	7553
10226	51N InRushPU	1 = 51N InRush picked up	7554
10227	InRush OFF	1 = InRush is switched OFF	7556
10228	InRushPhBLOCKED	1 = InRush Phase is BLOCKED	7557
10229	InRush Gnd BLK	1 = InRush Ground is BLOCKED	7558
10230	67-1 InRushPU	1 = 67-1 InRush picked up	7559
10231	Rush IE>ger.Anr	1 = Inrush Anregung Stufe IE> ger.	7560
10232	Rush Ip ger.Anr	1 = Inrush Anregung Stufe Ip ger.	7561
10233	Rush IEp gerAnr	1 = Inrush Anregung Stufe IEp ger.	7562
10234	Inrush Anr E	1 = Inrush Anregung U/AMZ Erd	7564
10235	Inrush Anr L1	1 = Inrush Anregung U/AMZ Phase L1	7565

10236	Inrush Anr L2	1 = Inrush Anregung U/AMZ Phase L2	7566
10237	Inrush Anr L3	1 = Inrush Anregung U/AMZ Phase L3	7567

2.2.15 Registers 10238 to 10241: Cold load pickup

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10238	CLP OFF	1 = Cold-load-pickup is switched OFF	1994
10239	CLP BLOCKED	1 = Cold-load-pickup is BLOCKED	1995
10240	CLP running	1 = Cold-load-pickup is RUNNING	1996
10241	Dyn set. ACTIVE	1 = Dynamic settings are ACTIVE	1997

2.2.16 Registers 10242 to 10249: Measurement supervision

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10242	Fail I Superv.	1 = Failure: General current supervision	161
10243	Failure Σ I	1 = Failure: Current summation	162
10244	Fail I balance	1 = Failure: Current Balance	163
10245	Fail V balance	1 = Failure: Voltage Balance	167
10246	Fail Ph. Seq.	1 = Failure: Phase sequence	171
10247	Fail Ph. Seq. I	1 = Failure: Phase Sequence Current	175
10248	Fail Ph. Seq. V	1 = Failure: Phase Sequence Voltage	176
10249	MeasSup OFF	1 = Measurement supervision is switched OFF	197

2.2.17 Registers 10250 to 10259: Set point alarms

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10250	SP. Op Hours>	1 = Set point operating hours	272
10251	SP. IA dmd>	1 = Set point phase A dmd>	273
10252	SP. IB dmd>	1 = Set point phase B dmd>	274
10253	SP. IC dmd>	1 = Set point phase C dmd>	275
10254	SP. I1 dmd>	1 = Set point positive sequence I1 dmd>	276

10255	SP. Pdmd >	1 = Set point Pdmd >	277
10256	SP. Qdmd >	1 = Set point Qdmd >	278
10257	SP. Sdmd >	1 = Set point Sdmd >	279
10258	SP. 37-1 alarm	1 = Set point 37-1 undercurrent alarm	284
10259	SP. PF(55)alarm	1 = Set point 55 power factor alarm	285

2.2.18 Registers 10260 to 10272: Status annunciations

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10260	>Set Group Bit0	1 = Binary input "Setting Group Select Bit 0" is active	7
10261	>Set Group Bit1	1 = Binary input "Setting Group Select Bit 1" is active	8
10262	>Manual Close	1 = Binary input "Manual close signal" is active	356
10263	>DataStop	1 = Binary input "Stop data transmission" is active	16
10264	>Test mode	1 = Binary input "Test mode" ist active	15
10265	>Door open	1 = Binary input "Cabinet door open" ist active	-
10266	>CB wait	1 = Binary input "CB waiting for Spring charged" is active	-
10267	>No Volt.	1 = Binary input "No voltage (fuse blown)" is active	-
10268	>SF6-Loss	1 = Binary input "SF6-Loss" ist active	-
10271	Cntrl Auth	Control authority (0 = REMOTE, 1 = LOCAL)	-
10272	ModeLOCAL	Control mode LOCAL (0 = LOCKED, 1 = UNLOCKED)	-

2.3 Input registers (3X references)

Ref. to chap. 1.4 for additional notes regarding scaling of measured values.

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
30001	Ia =	Ia	3276.7 A	601
30002	Ib =	Ib	3276.7 A	602
30003	Ic =	Ic	3276.7 A	603
30004	In =	In	3276.7 A	604
30005	Va =	Va	327.67 kV	621
30006	Vb =	Vb	327.67 kV	622
30007	Vc =	Vc	327.67 kV	623
30008	Va-b =	Va-b	327.67 kV	624
30009	Vb-c =	Vb-c	327.67 kV	625
30010	Vc-a =	Vc-a	327.67 kV	626
30011	VN =	VN	327.67 kV	627
30012	P =	P (active power)	327.67 MW	641
30013	Q =	Q (reactive power)	327.67 MVAR	642
30014	S =	S (apparent power)	327.67 MVA	645
30015	Freq =	Frequency	327.67 Hz	644
30016	INs Real =	Resistive ground current in isol. systems	3276.7 A	701
30017	INs Reac =	Reactive ground current in isol. systems	3276.7 A	702
30018	PF =	Power Factor	3.2767	901
30019	I1 =	I1 (positive sequence)	3276.7 A	605
30020	I2 =	I2 (negative sequence)	3276.7 A	606
30021	3I0 =	3I0 (zero sequence)	3276.7 A	831
30022	V1 =	V1 (positive sequence)	327.67 kV	629
30023	V2 =	V2 (negative sequence)	327.67 kV	630
30024	V0 =	V0 (zero sequence)	327.67 kV	832
30025	Θ Rotor =	Temperature of Rotor	327.67 %	805
30026	Θ Stator =	Temperature of Stator	327.67 %	806
30027	Td1 =	Transducer 1	32.767 mA	996
30028	Td2 =	Transducer 2	32.767 mA	997

2.4 Holding registers (4X references)

2.4.1 Registers 40001 to 40036: System information

Registers are write-protected.

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> "7SJ66225EB903RH7----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

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
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2.4.3 Register 40129: Diagnosis

- Registers are write-protected.
- The contents of these registers are also readable using function "Diagnostics" (function code 7), subfunction "Return Diagnostic Register" (subfunction code 2).
- Ref. to chap. 1.6.3 for additional notes regarding "Stop data transmission".
- Ref. to chap. "Bus specific parameters" in the manual "SIPROTEC Communication module, Modbus - Communication profile" regarding signalling 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	Settings Calc.	1 = Setting calculation is running	70
40129/2 ³	Chatter ON	1 = Chatter ON	125
40129/2 ⁴	Error Sum Alarm	1 = Error with a summary alarm ON	140
40129/2 ⁵	Alarm Sum Event	1 = Alarm summary event ON	160
40129/2 ⁶	Relay PICKUP	1 = Relay PICKUP (group signal)	501
40129/2 ⁷	Relay TRIP	1 = Relay GENERAL TRIP command	511
40129/2 ⁸	DataStop	1 = "Stop data transmsion" is active	-
40129/2 ⁹	Test mode	1 = Test mode is active	-
40129/2 ¹⁰	<user-defined>	not pre-allocated	-
40129/2 ¹¹	<user-defined>	not pre-allocated	-
40129/2 ¹²	<user-defined>	not pre-allocated	-
40129/2 ¹³	<user-defined>	not pre-allocated	-
40129/2 ¹⁴	<user-defined>	not pre-allocated	-
40129/2 ¹⁵	Data invalid	1 = Data in the Modbus message are invalid. (This indication is created by the Modbus slave; not available in DIGSI and not relocatable.)	-

2.4.4 Registers 40201 to 40208: Metered measurands

- Registers are write-protected.
- Ref. to chap. 1.5.1 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(puls) =	Pulsed Energy Wp (active) (metering impulses at binary input)	$2^{31}-1$ impulses	888
40203 - 40204	Wq(puls) =	Pulsed Energy Wq (reactive) (metering impulses at binary input)	$2^{31}-1$ impulses	889
40205 - 40206	WpForward =	Wp Forward (metered measurand derived from measured values)	$2^{31}-1$ impulses	924
40207 - 40208	WqForward =	Wq Forward (metered measurand derived from measured values)	$2^{31}-1$ impulses	925
40209 - 40210	WpReverse =	Wp Reverse (metered measurand derived from measured values)	$2^{31}-1$ impulses	928
40211 - 40212	WqReverse =	Wq Reverse (metered measurand derived from measured values)	$2^{31}-1$ impulses	929

2.4.5 Registers 40251 to 40257: Measured values - Mean values

- Registers are write-protected.
- Ref. to chap. 1.4 for additional notes regarding scaling of measured values.

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
40251	Ia dmd =	I A demand	3276.7 A	963
40252	Ib dmd =	I B demand	3276.7 A	964
40253	Ic dmd =	I C demand	3276.7 A	965
40254	I1dmd =	I1 (positive sequence) Demand	3276.7 A	833
40255	Pdmd =	Active Power Demand	327.67 MW	834
40256	Qdmd =	Reactive Power Demand	327.67 MVAR	835
40257	Sdmd =	Apparent Power Demand	327.67 MVA	836

2.4.6 Registers 40301 to 40318: Fault currents, Fault locator, Statistic values

- Registers are write-protected.
- Ref. to chap. 1.5.2 for additional notes regarding Fault currents, Fault locator and Statistic values.

Register	Designation of the SIPROTEC objects	Comments	Scaling (100000 corresponds to ...)	Internal object no.
40301 - 40302	Ia =	Primary fault current Ia	1000.00 kA	533
40303 - 40304	Ib =	Primary fault current Ib	1000.00 kA	534
40305 - 40306	Ic =	Primary fault current Ic	1000.00 kA	535
40307 - 40308	Xsec =	Fault Locator: secondary REACTANCE	1000.00 Ohm	1118
40309 - 40310	dist =	Fault Locator: Distance to fault	10000.0 km/miles	1119
40311 - 40312	Sum Ia =	Accumulation of interrupted current Ph A	1000.00 kA	1021
40313 - 40314	Sum Ib =	Accumulation of interrupted current Ph B	1000.00 kA	1022
40315 - 40316	Sum Ic =	Accumulation of interrupted current Ph C	1000.00 kA	1023
40317 - 40318	Op.Hours =	Counter of operating hours	100000 hours	1020

2.4.7 Registers 40351 to 40520: MinIMax values of measured values

- Registers are write-protected.
- Ref. to chap. 1.4 for notes regarding scaling of measured values.
- Information regarding the Time/Date data type you find in the manual "SIPROTEC Communication module, Modbus - Communication profile" (ref to page i).

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
40351 40352 - 40355	la Min= la Min - Time/Date	la Min Date and time of la Min	3276.7 A -	851
40356 40357 - 40360	la Max= la Max - Time/Date	la Max Date and time of la Max	3276.7 A -	852
40361 40362 - 40365	lb Min= lb Min - Time/Date	lb Min Date and time of lb Min	3276.7 A -	853
40366 40367 - 40370	lb Max= lb Max - Time/Date	lb Max Date and time of lb Max	3276.7 A -	854
40371 40372 - 40375	lc Min= lc Min - Time/Date	lc Min Date and time of lc Min	3276.7 A -	855
40376 40377 - 40380	lc Max= lc Max - Time/Date	lc Max Date and time of lc Max	3276.7 A -	856
40381 40382 - 40385	l1 Min= l1 Min - Time/Date	l1 (positive sequence) Minimum Date and time of l1 Min	3276.7 A -	857
40386 40387 - 40390	l1 Max= l1 Max - Time/Date	l1 (positive sequence) Maximum Date and time of l1 Max	3276.7 A -	858
40391 40392 - 40395	Va-nMin= Va-nMin - Time/Date	Va-nMin Date and time of Va-nMin	327.67 kV -	859
40396 40397 - 40400	Va-nMax= Va-nMax - Time/Date	Va-nMax Date and time of Va-nMax	327.67 kV -	860

40401	Vb-nMin=	Vb-nMin	327.67 kV	
40402 - 40405	Vb-nMin - Time/ Date	Date and time of Vb-nMin	-	861
40406	Vb-nMax=	Vb-nMax	327.67 kV	
40407 - 40410	Vb-nMax - Time/ Date	Date and time of Vb-nMax	-	862
40411	Vc-nMin=	Vc-nMin	327.67 kV	
40412 - 40415	Vc-nMin - Time/ Date	Date and time of Vc-nMin	-	863
40416	Vc-nMax=	Vc-nMax	327.67 kV	
40417 - 40420	Vc-nMax - Time/ Date	Date and time of Vc-nMax	-	864
40421	Va-bMin=	Va-bMin	327.67 kV	
40422 - 40425	Va-bMin - Time/ Date	Date and time of Va-bMin	-	865
40426	Va-bMax=	Va-bMax	327.67 kV	
40427 - 40430	Va-bMax - Time/ Date	Date and time of Va-bMax	-	867
40431	Vb-cMin=	Vb-cMin	327.67 kV	
40432 - 40435	Vb-cMin - Time/ Date	Date and time of Vb-cMin	-	868
40436	Vb-cMax=	Vb-cMax	327.67 kV	
40437 - 40440	Vb-cMax - Time/ Date	Date and time of Vb-cMax	-	869
40441	Vc-aMin=	Vc-aMin	327.67 kV	
40442 - 40445	Vc-aMin - Time/ Date	Date and time of Vc-aMin	-	870
40446	Vc-aMax=	Vc-aMax	327.67 kV	
40447 - 40450	Vc-aMax - Time/ Date	Date and time of Vc-aMax	-	871
40451	Vn Min=	V neutral Min	327.67 kV	
40452 - 40455	Vn Min - Time/Date	Date and time of Vn Min	-	872

40456	Vn Max=	V neutral Max	327.67 kV	
40457 - 40460	Vn Max - Time/Date	Date and time of Vn Max	-	873
40461	V1 Min=	V1 (positive sequence) Voltage Minimum	327.67 kV	
40462 - 40465	V1 Min - Time/Date	Date and time of V1 Min	-	874
40466	V1 Max=	V1 (positive sequence) Voltage Maximum	327.67 kV	
40467 - 40470	V1 Max - Time/Date	Date and time of V1 Max	-	875
40471	Pmin =	Active Power Minimum	327.67 MW	
40472 - 40475	Pmin - Time/Date	Date and time of Pmin	-	876
40476	Pmax =	Active Power Maximum	327.67 MW	
40477 - 40480	Pmax - Time/Date	Date and time of Pmax	-	877
40481	Qmin =	Reactive Power Minimum	327.67 MVAR	
40482 - 40485	Qmin - Time/Date	Date and time of Qmin	-	878
40486	Qmax =	Reactive Power Maximum	327.67 MVAR	
40487 - 40490	Qmax - Time/Date	Date and time of Qmax	-	879
40491	Smin =	Apparent Power Minimum	327.67 MVA	
40492 - 40495	Smin - Time/Date	Date and time of Smin	-	880
40496	Smax =	Apparent Power Maximum	327.67 MVA	
40497 - 40500	Smax - Time/Date	Date and time of Smax	-	881
40501	fmin =	Frequency Minimum	327.67 Hz	
40502 - 40505	fmin - Time/Date	Date and time of fmin	-	882
40506	fmax =	Frequency Maximum	327.67 Hz	
40507 - 40510	fmax - Time/Date	Date and time of fmax	-	883

40511	PF Min=	Power Factor Minimum	3.2767	
40512 - 40515	PF min - Time/Date	Date and time of PF min	-	885
40516	PF Max=	Power Factor Maximum	3.2767	
40517 - 40520	PF max - Time/Date	Date and time of PF max	-	884

Standard mapping 3-2

This chapter describes the register map organisation of the Modbus slave of the SIPROTEC device 7SJ66 at use of Standard mapping 3-2.

3.1	Coil Status registers (0X references)	48
3.2	Input Status registers (1X references)	52
3.3	Input registers (3X references)	60
3.4	Holding registers (4X references)	61

3.1 Coil Status registers (0X references)

3.1.1 Registers 00001 to 00018: Double commands

User-defined double commands with double-point indication as checkback indication can be routed on the positions “<user-defined>” as “Source/Destination system interface” using the **DIGSI Configuration matrix**.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
00001	52Breaker ON	52 Breaker, Impulse output, 3 relays (2-pole ON, 1-pole OFF)	-
00002	52Breaker OFF		
00003	Disc.Swit. ON	Disconnect Switch, Impulse output, 2 relays, 1-pole	-
00004	Disc.Swit. OFF		
00005	GndSwit. ON	Ground Switch, Impulse output, 2 relays, 1-pole	-
00006	GndSwit. OFF		
00007	Q2 Op/Cl ON	Impulse output, 2 relays, 1-pole	-
00008	Q2 Op/Cl OFF		
00009	Q9 Op/Cl ON	Impulse output, 2 relays, 1-pole	-
00010	Q9 Op/Cl OFF		
00011	<user-defined> ON	not pre-allocated	-
00012	<user-defined> OFF		
00013	<user-defined> ON	not pre-allocated	-
00014	<user-defined> OFF		
00015	<user-defined> ON	not pre-allocated	-
00016	<user-defined> OFF		
00017	<user-defined> ON	not pre-allocated	-
00018	<user-defined> OFF		

00019 - 00032	reserved	The value 0 is always returned if reading. A write access is rejected in the SIPROTEC device.	-
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3.1.2 Registers 00033 to 00064: Single commands

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.
00033	<user-defined>	not pre-allocated	-
00034	<user-defined>	not pre-allocated	-
00035	<user-defined>	not pre-allocated	-
00036	<user-defined>	not pre-allocated	-
00037	<user-defined>	not pre-allocated	-
00038	<user-defined>	not pre-allocated	-
00039	<user-defined>	not pre-allocated	-
00040	<user-defined>	not pre-allocated	-
00041	<user-defined>	not pre-allocated	-
00042	<user-defined>	not pre-allocated	-
00043	<user-defined>	not pre-allocated	-
00044	<user-defined>	not pre-allocated	-
00045	<user-defined>	not pre-allocated	-
00046	<user-defined>	not pre-allocated	-
00047	<user-defined>	not pre-allocated	-
00048	<user-defined>	not pre-allocated	-
00049	<user-defined>	not pre-allocated	-
00050	<user-defined>	not pre-allocated	-
00051	<user-defined>	not pre-allocated	-
00052	<user-defined>	not pre-allocated	-
00053	<user-defined>	not pre-allocated	-
00054	<user-defined>	not pre-allocated	-
00055	<user-defined>	not pre-allocated	-
00056	<user-defined>	not pre-allocated	-
00057	<user-defined>	not pre-allocated	-
00058	<user-defined>	not pre-allocated	-
00059	<user-defined>	not pre-allocated	-
00060	<user-defined>	not pre-allocated	-
00061	<user-defined>	not pre-allocated	-

00062	<user-defined>	not pre-allocated	-
00063	<user-defined>	not pre-allocated	-
00064	<user-defined>	not pre-allocated	-
00057	<user-defined>	not pre-allocated	-
00058	<user-defined>	not pre-allocated	-
00059	<user-defined>	not pre-allocated	-
00060	<user-defined>	not pre-allocated	-
00061	<user-defined>	not pre-allocated	-
00062	<user-defined>	not pre-allocated	-
00063	<user-defined>	not pre-allocated	-
00064	<user-defined>	not pre-allocated	-

3.1.3 Registers 00065 to 00071: Internal commands

Ref. to chap. 1.6.1 and 1.6.2 for additional notes regarding “Changing the setting group” and “Control mode REMOTE”.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
00065	Command: 79 ON	0 = Deactivation of Auto-Reclose function 1 = Activation of Auto-Reclose function	2782
	Indication: 79 ON	0 = 79 Auto recloser is switched OFF 1 = 79 Auto recloser is switched ON	
00066	Command: ProtActive	0 = Deactivation of protection functions 1 = Activation of protection functions	52
	Indication: ProtActive	0 = No protection function is active. 1 = At least one protection function is active.	
00067	Command: Group A	1 = Activation of setting group A	-
	Indication: Group A	1 = Setting group A is active	
00068	Command: Group B	1 = Activation of setting group B	-
	Indication: Group B	1 = Setting group B is active	
00069	Command: Group C	1 = Activation of setting group C	-
	Indication: Group C	1 = Setting group C is active	
00070	Command: Group D	1 = Activation of setting group D	-
	Indication: Group D	1 = Setting group D is active	

00071	Command: ModeREMOTE	Control mode REMOTE 0 = Set to LOCKED 1 = Set to UNLOCKED	-
	Indication: ModeREMOTE	Control mode REMOTE 0 = LOCKED 1 = UNLOCKED	
00072 - 00080	reserved	The value 0 is always returned if reading. A write access is rejected in the SIPROTEC device.	-

3.1.4 Registers 00257 to 00264: Exception flags

- Registers are write-protected.
- The contents of these registers are also readable using function “Read Exception Status” (function code 7).
- Installation-specific SIPROTEC objects can be routed to 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	-

3.2 Input Status registers (1X references)

3.2.1 Registers 10001 to 10053: 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	<user-defined>	not pre-allocated	-
10010	<user-defined>	not pre-allocated	-
10011	<user-defined>	not pre-allocated	-
10012	<user-defined>	not pre-allocated	-
10013	<user-defined>	not pre-allocated	-
10014	<user-defined>	not pre-allocated	-
10015	<user-defined>	not pre-allocated	-
10016	<user-defined>	not pre-allocated	-
10017	<user-defined>	not pre-allocated	-
10018	<user-defined>	not pre-allocated	-
10019	<user-defined>	not pre-allocated	-
10020	<user-defined>	not pre-allocated	-
10021	<user-defined>	not pre-allocated	-
10022	<user-defined>	not pre-allocated	-
10023	<user-defined>	not pre-allocated	-
10024	<user-defined>	not pre-allocated	-
10025	<user-defined>	not pre-allocated	-
10026	<user-defined>	not pre-allocated	-
10027	<user-defined>	not pre-allocated	-
10028	<user-defined>	not pre-allocated	-
10029	<user-defined>	not pre-allocated	-
10031	<user-defined>	not pre-allocated	-
10032	<user-defined>	not pre-allocated	-

10033	<user-defined>	not pre-allocated	-
10034	<user-defined>	not pre-allocated	-
10035	<user-defined>	not pre-allocated	-
10036	<user-defined>	not pre-allocated	-
10037	<user-defined>	not pre-allocated	-
10038	<user-defined>	not pre-allocated	-
10039	<user-defined>	not pre-allocated	-
10040	<user-defined>	not pre-allocated	-
10041	<user-defined>	not pre-allocated	-
10042	<user-defined>	not pre-allocated	-
10043	<user-defined>	not pre-allocated	-
10044	<user-defined>	not pre-allocated	-
10045	<user-defined>	not pre-allocated	-
10046	<user-defined>	not pre-allocated	-
10047	<user-defined>	not pre-allocated	-
10048	<user-defined>	not pre-allocated	-
10049	<user-defined>	not pre-allocated	-
10050	<user-defined>	not pre-allocated	-
10051	<user-defined>	not pre-allocated	-
10052	<user-defined>	not pre-allocated	-
10053	<user-defined>	not pre-allocated	-

3.2.2 Registers 10054 to 10068: Automatic recloser status

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10054	>CB Ready	1 = Binary input "Circuit breaker ready" is active	2730
10055	79 OFF	1 = 79 Auto recloser is switched OFF	2781
10056	79 is NOT ready	1 = 79 Auto recloser is NOT ready	2784
10057	79 DynBlock	1 = 79 Auto recloser is dynamically BLOCKED	2785
10058	79 in progress	1 = 79 Auto recloser - in progress	2801
10059	79 Close	1 = 79 Auto recloser - Close command	2851
10060	79 Successful	1 = 79 Auto recloser - Cycle successful	2862

10061	79 Lockout	1 = 79 Auto recloser - Lockout	2863
10062	79 L-N Sequence	1 = 79 A/R - single phase reclosing sequence	2878
10063	79 L-L Sequence	1 = 79 A/R - multi-phase reclosing sequence	2879

3.2.3 Registers 10064 to 10087: Time overcurrent protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10064	50/51 PH ACT	1 = 50/51 O/C is ACTIVE	1753
10065	50N/51N ACT	1 = 50N/51N is ACTIVE	1758
10066	50(N)/51(N) PU	1 = 50(N)/51(N) O/C PICKUP	1761
10067	50/51 Ph A PU	1 = 50/51 Phase A picked up	1762
10068	50/51 Ph B PU	1 = 50/51 Phase B picked up	1763
10069	50/51 Ph C PU	1 = 50/51 Phase C picked up	1764
10070	50N/51NPickedup	1 = 50N/51N picked up	1765
10071	50(N)/51(N)TRIP	1 = 50(N)/51(N) TRIP	1791
10072	50-2 picked up	1 = 50-2 picked up	1800
10073	50-2 TRIP	1 = 50-2 TRIP	1805
10074	50-1 picked up	1 = 50-1 picked up	1810
10075	50/51 TRIP	1 = 50/51 I> TRIP	1815
10076	51 picked up	1 = 51 picked up	1820
10077	51 TRIP	1 = 51 TRIP	1825
10078	50N-2 picked up	1 = 50N-2 picked up	1831
10079	50N-2 TRIP	1 = 50N-2 TRIP	1833
10080	50N-1 picked up	1 = 50N-1 picked up	1834
10081	50N-1 TRIP	1 = 50N-1 TRIP	1836
10082	51N picked up	1 = 51N picked up	1837
10083	51N TRIP	1 = 51N TRIP	1839
10084	PhA InrushBlk	1 = Phase A trip blocked by inrush detection	1840

10085	PhB InrushBlk	1 = Phase B trip blocked by inrush detection	1841
10086	PhC InrushBlk	1 = Phase C trip blocked by inrush detection	1842
10087	INRUSH X-BLK	1 = Cross blk: PhX blocked PhY	1843

3.2.4 Registers 10088 to 10107: Directional time overcurrent protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10088	67-2 picked up	1 = 67-2 picked up	2642
10089	67N-2 picked up	1 = 67N-2 picked up	2646
10090	67-2 TRIP	1 = 67-2 TRIP	2649
10091	67 ACTIVE	1 = 67/67-TOC is ACTIVE	2653
10092	67N ACTIVE	1 = 67N/67N-TOC is ACTIVE	2658
10093	67-1 picked up	1 = 67-1 picked up	2660
10094	67-1 TRIP	1 = 67-1 TRIP	2665
10095	67-TOC pickedup	1 = 67-TOC picked up	2670
10096	67-TOC TRIP	1 = 67-TOC TRIP	2675
10097	67N-2 TRIP	1 = 67N-2 TRIP	2679
10098	67N-1 picked up	1 = 67N-1 picked up	2681
10099	67N-1 TRIP	1 = 67N-1 TRIP	2683
10100	67N-TOCPickedup	1 = 67N-TOC picked up	2684
10101	67N-TOC TRIP	1 = 67N-TOC TRIP	2686
10102	67/67N pickedup	1 = 67/67N picked up	2691
10103	67 A picked up	1 = 67/67-TOC Phase A picked up	2692
10104	67 B picked up	1 = 67/67-TOC Phase B picked up	2693
10105	67 C picked up	1 = 67/67-TOC Phase C picked up	2694
10106	67N picked up	1 = 67N/67N-TOC picked up	2695
10107	67/67N TRIP	1 = 67/67N TRIP	2696

3.2.5 Registers 10108 to 10112: Unbalanced load protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10108	46 ACTIVE	1 = 46 is ACTIVE	5153
10109	46-2 picked up	1 = 46-2 picked up	5159
10110	46-1 picked up	1 = 46-1 picked up	5165

10111	46-TOC pickedup	1 = 46-TOC picked up	5166
10112	46 TRIP	1 = 46 TRIP	5170

3.2.6 Registers 10113 to 10121: Frequency protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10113	81 ACTIVE	1 = 81 is ACTIVE	5213
10114	81-1 picked up	1 = 81-1 picked up	5232
10115	81-2 picked up	1 = 81-2 picked up	5233
10116	81-3 picked up	1 = 81-3 picked up	5234
10117	81-4 picked up	1 = 81-4 picked up	5235
10118	81-1 TRIP	1 = 81-1 TRIP	5236
10119	81-2 TRIP	1 = 81-2 TRIP	5237
10120	81-3 TRIP	1 = 81-3 TRIP	5238
10121	81-4 TRIP	1 = 81-4 TRIP	5239

3.2.7 Registers 10122 to 10132: Undervoltage and overvoltage protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10122	27 ACTIVE	1 = 27 Undervoltage protection is ACTIVE	6532
10123	27-1 picked up	1 = 27-1 Undervoltage picked up	6533
10124	27-1 PU CS	1 = 27-1 Undervoltage PICKUP w/curr. supervision	6534
10125	27-2 picked up	1 = 27-2 Undervoltage picked up	6537
10126	27-2 PU CS	1 = 27-2 Undervoltage PICKUP w/curr. supervision	6538
10127	27-1 TRIP	1 = 27-1 Undervoltage TRIP	6539
10128	27-2 TRIP	1 = 27-2 Undervoltage TRIP	6540
10129	59 ACTIVE	1 = 59-Overvoltage protection is ACTIVE	6567
10130	59-1 picked up	1 = 59 picked up	6568
10131	59-1 PU CS	1 = 59 picked up w/curr. supervision	6569
10132	59-1 TRIP	1 = 59 TRIP	6570

3.2.8 Registers 10133 to 10146: Sensitive ground fault protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10133	50Ns/67Ns ACT	1 = 50Ns/67Ns is ACTIVE	1212
10134	64 Pickup	1 = 64 displacement voltage pick up	1215
10135	64 TRIP	1 = 64 displacement voltage element TRIP	1217
10136	50Ns-2 Pickup	1 = 50Ns-2 Pickup	1221
10137	50Ns-2 TRIP	1 = 50Ns-2 TRIP	1223
10138	50Ns-1 Pickup	1 = 50Ns-1 Pickup	1224
10139	50Ns-1 TRIP	1 = 50Ns-1 TRIP	1226
10140	51Ns Pickup	1 = 51Ns picked up	1227
10141	51Ns TRIP	1 = 51Ns TRIP	1229
10142	Sens. Gnd Ph A	1 = Sensitive ground fault picked up in phase A	1272
10143	Sens. Gnd Ph B	1 = Sensitive ground fault picked up in phase B	1273
10144	Sens. Gnd Ph C	1 = Sensitive ground fault picked up in phase C	1274
10145	SensGnd Forward	1 = Sensitive ground fault in forward direction	1276
10146	SensGnd Reverse	1 = Sensitive ground fault in reverse direction	1277

3.2.9 Registers 10147 to 10150: Circuit breaker failure protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10147	50BF ACTIVE	1 = 50BF is ACTIVE	1453
10148	50BF int Pickup	1 = 50BF (internal) PICKUP	1456
10149	50BF ext Pickup	1 = 50BF (external) PICKUP	1457
10150	50BF TRIP	1 = 50BF TRIP	1471

3.2.10 Registers 10151 to 10155: Thermal overload protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10151	49 O/L ACTIVE	1 = 49 Overload protection is ACTIVE	1513
10152	49 O/L I Alarm	1 = 49 Overload Current Alarm (I alarm)	1515
10153	49 O/L Θ Alarm	1 = 49 Overload Alarm! Near Thermal Trip	1516
10154	49 Winding O/L	1 = 49 Winding Overload	1517
10155	49 Th O/L TRIP	1 = 49 Thermal Overload TRIP	1521

3.2.11 Registers 10156 to 10157: Startup counter for motors

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10156	66 ACTIVE	1 = 66 Motor start protection is ACTIVE	4826
10157	66 TRIP	1 = 66 Motor start protection TRIP	4827

3.2.12 Registers 10158 to 10160: Startup supervision of motors

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10158	START-SUP ACT	1 = Startup supervision is ACTIVE	6813
10159	START-SUP TRIP	1 = Startup supervision TRIP	6821
10160	START-SUP pu	1 = Startup supervision Pickup	6823

3.2.13 Registers 10161 to 10162: Trip circuit supervision

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10161	74TC ACTIVE	1 = 74TC Trip circuit supervision is ACTIVE	6863
10162	FAIL: Trip cir.	1 = 74TC Failure Trip Circuit	6865

3.2.14 Registers 10163 to 10164: Cold load pickup

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10163	CLP running	1 = Cold-load-pickup is RUNNING	1996

10164	Dyn set. ACTIVE	1 = Dynamic settings are ACTIVE	1997
-------	-----------------	---------------------------------	------

3.2.15 Register 10165: Measurement supervision

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10165	Alarm Sum Event	1 = Alarm summary event ON	160

3.2.16 Registers 10166 to 10178: Status annunciations

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10166	>Set Group Bit0	1 = Binary input "Setting Group Select Bit 0" is active	7
10167	>Set Group Bit1	1 = Binary input "Setting Group Select Bit 1" is active	8
10168	>Manual Close	1 = Binary input "Manual close signal" is active	356
10169	>DataStop	1 = Binary input "Stop data transmission" is active	16
10170	>Test mode	1 = Binary input "Test mode" ist active	15
10171	>Door open	1 = Binary input "Cabinet door open" ist active	-
10172	>CB wait	1 = Binary input "CB waiting for Spring charged" is active	-
10173	>No Volt.	1 = Binary input "No voltage (fuse blown)" is active	-
10174	>SF6-Loss	1 = Binary input "SF6-Loss" ist active	-
10177	Cntrl Auth	Control authority (0 = REMOTE, 1 = LOCAL)	-
10178	ModeLOCAL	Control mode LOCAL (0 = LOCKED, 1 = UNLOCKED)	-

3.3 Input registers (3X references)

Ref. to chap. 1.4 for additional notes regarding scaling of measured values.

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
30001	Ia =	Ia	3276.7 A	601
30002	Ib =	Ib	3276.7 A	602
30003	Ic =	Ic	3276.7 A	603
30004	In =	In	3276.7 A	604
30005	Va =	Va	327.67 kV	621
30006	Vb =	Vb	327.67 kV	622
30007	Vc =	Vc	327.67 kV	623
30008	Va-b =	Va-b	327.67 kV	624
30009	Vb-c =	Vb-c	327.67 kV	625
30010	Vc-a =	Vc-a	327.67 kV	626
30011	VN =	VN	327.67 kV	627
30012	P =	P (active power)	327.67 MW	641
30013	Q =	Q (reactive power)	327.67 MVAR	642
30014	S =	S (apparent power)	327.67 MVA	645
30015	Freq =	Frequency	327.67 Hz	644
30016	INs Real =	Resistive ground current in isol. systems	3276.7 A	701
30017	INs Reac =	Reactive ground current in isol. systems	3276.7 A	702
30018	PF =	Power Factor	3.2767	901
30019	I1 =	I1 (positive sequence)	3276.7 A	605
30020	I2 =	I2 (negative sequence)	3276.7 A	606
30021	I0 =	I0 (zero sequence)	3276.7 A	831
30022	V1 =	V1 (positive sequence)	327.67 kV	629
30023	V2 =	V2 (negative sequence)	327.67 kV	630
30024	V0 =	V0 (zero sequence)	327.67 kV	832
30025	Θ Rotor =	Temperature of Rotor	327.67 %	805
30026	Θ Stator =	Temperature of Stator	327.67 %	806
30027	Td1 =	Transducer 1	32.767 mA	996
30028	Td2 =	Transducer 2	32.767 mA	997

3.4 Holding registers (4X references)

3.4.1 Registers 40001 to 40036: System information

Registers are write-protected.

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> "7SJ66225EB903RH7----0D-----"
40027-40034	Date and time of mapping data generation (string, max. 16 characters)	<u>Example:</u> "261102083451640" corresponds to → Date: Nov. 26, 2002 →Time: 08 hours, 34 min., 51 sec. and 640 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
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3.4.3 Register 40129: Diagnosis

- Registers are write-protected.
- The contents of these registers are also readable using function "Diagnostics" (function code 7), subfunction "Return Diagnostic Register" (subfunction code 2).
- Ref. to chap. 1.6.3 for additional notes regarding "Stop data transmission".
- Ref. to chap. "Bus specific parameters" in the manual "SIPROTEC Communication module, Modbus - Communication profile" regarding signalling 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	Settings Calc.	1 = Setting calculation is running	70
40129/2 ³	Chatter ON	1 = Chatter ON	125
40129/2 ⁴	Error Sum Alarm	1 = Error with a summary alarm ON	140
40129/2 ⁵	<user-defined>	not pre-allocated	-
40129/2 ⁶	Relay PICKUP	1 = Relay PICKUP (group signal)	501
40129/2 ⁷	Relay TRIP	1 = Relay GENERAL TRIP command	511
40129/2 ⁸	DataStop	1 = "Stop data transmission" is active	-
40129/2 ⁹	Test mode	1 = Test mode is active	-
40129/2 ¹⁰	<user-defined>	not pre-allocated	-
40129/2 ¹¹	<user-defined>	not pre-allocated	-
40129/2 ¹²	<user-defined>	not pre-allocated	-
40129/2 ¹³	<user-defined>	not pre-allocated	-
40129/2 ¹⁴	<user-defined>	not pre-allocated	-
40129/2 ¹⁵	Data invalid	1 = Data in the Modbus message are invalid. (This indication is created by the Modbus slave; not available in DIGSI and not relocatable.)	-

3.4.4 Registers 40201 to 40208: Metered measurands

- Registers are write-protected.

- Ref. to chap. 1.5.1 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(puls) =	Pulsed Energy Wp (active) (metering impulses at binary input)	$2^{31}-1$ impulses	888
40203 - 40204	Wq(puls) =	Pulsed Energy Wq (reactive) (metering impulses at binary input)	$2^{31}-1$ impulses	889
40205 - 40206	WpForward =	Wp Forward (metered measurand derived from measured values)	$2^{31}-1$ impulses	924
40207 - 40208	WqForward =	Wq Forward (metered measurand derived from measured values)	$2^{31}-1$ impulses	925
40209 - 40210	WpReverse =	Wp Reverse (metered measurand derived from measured values)	$2^{31}-1$ impulses	928
40211 - 40212	WqReverse =	Wq Reverse (metered measurand derived from measured values)	$2^{31}-1$ impulses	929

3.4.5 Registers 40251 to 40257: Measured values - Mean values

- Registers are write-protected.
- Ref. to chap. 1.4 for additional notes regarding scaling of measured values.

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
40251	Ia dmd =	I A demand	3276.7 A	963
40252	Ib dmd =	I B demand	3276.7 A	964
40253	Ic dmd =	I C demand	3276.7 A	965
40254	I1dmd =	I1 (positive sequence) Demand	3276.7 A	833
40255	Pdmd =	Active Power Demand	327.67 MW	834
40256	Qdmd =	Reactive Power Demand	327.67 MVAR	835
40257	Sdmd =	Apparent Power Demand	327.67 MVA	836

3.4.6 Registers 40301 to 40318: Fault currents, Fault locator, Statistic values

- Registers are write-protected.
- Ref. to chap. 1.5.2 for additional notes regarding Fault currents, Fault locator and

Statistic values.

Register	Designation of the SIPROTEC objects	Comments	Scaling (100000 corresponds to ...)	Internal object no.
40301 - 40302	Ia =	Primary fault current Ia	1000.00 kA	533
40303 - 40304	Ib =	Primary fault current Ib	1000.00 kA	534
40305 - 40306	Ic =	Primary fault current Ic	1000.00 kA	535
40307 - 40308	Xsec =	Fault Locator: secondary REACTANCE	1000.00 Ohm	1118
40309 - 40310	dist =	Fault Locator: Distance to fault	10000.0 km/miles	1119
40311 - 40312	Sum Ia =	Accumulation of interrupted current Ph A	1000.00 kA	1021
40313 - 40314	Sum Ib =	Accumulation of interrupted current Ph B	1000.00 kA	1022
40315 - 40316	Sum Ic =	Accumulation of interrupted current Ph C	1000.00 kA	1023
40317 - 40318	Op.Hours =	Counter of operating hours	100000 hours	1020

3.4.7 Registers 40351 to 40520: MinI Max values of measured values

- Registers are write-protected.
- Ref. to chap. 1.4 for notes regarding scaling of measured values.
- Information regarding the Time/Date data type you find in the manual “SIPROTEC Communication module, Modbus - Communication profile” (ref to page i).

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
40351 40352 - 40355	Ia Min= Ia Min - Time/Date	Ia Min Date and time of Ia Min	3276.7 A -	851

40356	Ia Max=	Ia Max	3276.7 A	852
40357	Ia Max - Time/Date	Date and time of Ia Max	-	
40360				
40361	Ib Min=	Ib Min	3276.7 A	853
40362	Ib Min - Time/Date	Date and time of Ib Min	-	
40365				
40366	Ib Max=	Ib Max	3276.7 A	854
40367	Ib Max - Time/Date	Date and time of Ib Max	-	
40370				
40371	Ic Min=	Ic Min	3276.7 A	855
40372	Ic Min - Time/Date	Date and time of Ic Min	-	
40375				
40376	Ic Max=	Ic Max	3276.7 A	856
40377	Ic Max - Time/Date	Date and time of Ic Max	-	
40380				
40381	I1 Min=	I1 (positive sequence) Minimum	3276.7 A	857
40382	I1 Min - Time/Date	Date and time of I1 Min	-	
40385				
40386	I1 Max=	I1 (positive sequence) Maximum	3276.7 A	858
40387	I1 Max - Time/Date	Date and time of I1 Max	-	
40390				
40391	Va-nMin=	Va-nMin	327.67 kV	859
40392	Va-nMin - Time/Date	Date and time of Va-nMin	-	
40395				
40396	Va-nMax=	Va-nMax	327.67 kV	860
40397	Va-nMax - Time/Date	Date and time of Va-nMax	-	
40400				
40401	Vb-nMin=	Vb-nMin	327.67 kV	861
40402	Vb-nMin - Time/Date	Date and time of Vb-nMin	-	
40405				
40406	Vb-nMax=	Vb-nMax	327.67 kV	862
40407	Vb-nMax - Time/Date	Date and time of Vb-nMax	-	
40410				

40411	Vc-nMin=	Vc-nMin	327.67 kV	
40412				863
-				
40415	Vc-nMin - Time/Date	Date and time of Vc-nMin	-	
40416	Vc-nMax=	Vc-nMax	327.67 kV	
40417				864
-				
40420	Vc-nMax - Time/Date	Date and time of Vc-nMax	-	
40421	Va-bMin=	Va-bMin	327.67 kV	
40422				865
-				
40425	Va-bMin - Time/Date	Date and time of Va-bMin	-	
40426	Va-bMax=	Va-bMax	327.67 kV	
40427				867
-				
40430	Va-bMax - Time/Date	Date and time of Va-bMax	-	
40431	Vb-cMin=	Vb-cMin	327.67 kV	
40432				868
-				
40435	Vb-cMin - Time/Date	Date and time of Vb-cMin	-	
40436	Vb-cMax=	Vb-cMax	327.67 kV	
40437				869
-				
40440	Vb-cMax - Time/Date	Date and time of Vb-cMax	-	
40441	Vc-aMin=	Vc-aMin	327.67 kV	
40442				870
-				
40445	Vc-aMin - Time/Date	Date and time of Vc-aMin	-	
40446	Vc-aMax=	Vc-aMax	327.67 kV	
40447				871
-				
40450	Vc-aMax - Time/Date	Date and time of Vc-aMax	-	
40451	Vn Min=	V neutral Min	327.67 kV	
40452				872
-				
40455	Vn Min - Time/Date	Date and time of Vn Min	-	
40456	Vn Max=	V neutral Max	327.67 kV	
40457				873
-				
40460	Vn Max - Time/Date	Date and time of Vn Max	-	
40461	V1 Min=	V1 (positive sequence) Voltage Minimum	327.67 kV	
40462				874
-				
40465	V1 Min - Time/Date	Date and time of V1 Min	-	

40466	V1 Max=	V1 (positive sequence) Voltage Maximum	327.67 kV	875
40467				
- 40470	V1 Max - Time/Date	Date and time of V1 Max	-	
40471	Pmin =	Active Power Minimum	327.67 MW	876
40472				
- 40475	Pmin - Time/Date	Date and time of Pmin	-	
40476	Pmax =	Active Power Maximum	327.67 MW	877
40477				
- 40480	Pmax - Time/Date	Date and time of Pmax	-	
40481	Qmin =	Reactive Power Mini- mum	327.67 MVAR	878
40482				
- 40485	Qmin - Time/Date	Date and time of Qmin	-	
40486	Qmax =	Reactive Power Maxi- mum	327.67 MVAR	879
40487				
- 40490	Qmax - Time/Date	Date and time of Qmax	-	
40491	Smin =	Apparent Power Mini- mum	327.67 MVA	880
40492				
- 40495	Smin - Time/Date	Date and time of Smin	-	
40496	Smax =	Apparent Power Maxi- mum	327.67 MVA	881
40497				
- 40500	Smax - Time/Date	Date and time of Smax	-	
40501	fmin =	Frequency Minimum	327.67 Hz	882
40502				
- 40505	fmin - Time/Date	Date and time of fmin	-	
40506	fmax =	Frequency Maximum	327.67 Hz	883
40507				
- 40510	fmax - Time/Date	Date and time of fmax	-	
40511	PF Min=	Power Factor Minimum	3.2767	885
40512				
- 40515	PF min - Time/Date	Date and time of PF min	-	
40516	PF Max=	Power Factor Maximum	3.2767	884
40517				
- 40520	PF max - Time/Date	Date and time of PF max	-	

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

- Registers are write-protected (with the exception of “SOE_Control”).
- 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	Register type / Bit offset #2
40612		Register address #2
40613		Message cause / Indication type #2
40614		Value #2
40615 - 40618		Time stamp #2
40619	Message block #3	Register type / Bit offset #3
40620		Register address #3
40621		Message cause / Indication type #3
40622		Value #3
40623 - 40626		Time stamp #3

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	Parameterization system for SIPROTEC devices
DC	Double Command
DIGSI	Parameterization system / parameterization software for SIPROTEC devices
DP	Double-point indication
Input data Input direction	Data from the Modbus slave to the Modbus master.
LRC	Longitudinal Redundancy Check
LSB	Least Significant Byte
Mapping	Allocation of the SIPROTEC data objects to the positions in the Modbus register map.
MSB	Most Significant Byte
Output data Output direction	Data from the Modbus master to the Modbus slave.
SC	Single Command
SP	Single-point Indication

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