

SIPROTEC

**Transformer differential
protection
7UT612**

Communication module

PROFIBUS-DP
Bus mapping

Preface

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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

This manual describes the data in the PROFIBUS-DP messages of the SIPROTEC device 7UT612 and is divided into the following topics:

- Data in the PROFIBUS-DP messages → Chapter 1,
- Standard mapping 3-1 → Chapter 2,
- Standard mapping 3-2 → Chapter 3.

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

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

PROFIBUS-DP communication profile documentation

The following additional manual informs you about the data types, bus specific parameters and hardware interface of the PROFIBUS-DP slave modul of the SIPROTEC devices:

Manual	Order number
SIPROTEC Communication module, PROFIBUS-DP - Communication profile	C53000-L1840-B001-03

PROFIBUS-DP specification

The PROFIBUS-DP specification and the structure of the PROFIBUS-DP messages are defined in the European Standard EN 50170:

- PROFIBUS Specification
Normative Parts of PROFIBUS-FMS, -DP, -PA
According to the European Standard
EN 50170, Volume 2
PROFIBUS Nutzerorganisation e.V.

Validity	<p>This manual is valid for the SIPROTEC device:</p> <ul style="list-style-type: none">• 7UT612 (firmware version 4.0 or higher) <p>with</p> <ul style="list-style-type: none">• PROFIBUS-DP communication module version 02.00.05 or higher,• PROFIBUS-DP communication module version 03.00.03 or higher at use of standard mapping 3-2. <p>For device parameterization have to be used:</p> <ul style="list-style-type: none">• DIGSI 4.3 or higher,• DIGSI 4.21 considering the preconditions explained in the manual “SIPROTEC Communication module, PROFIBUS-DP - Communication profile” (ref. to page i),• PROFIBUS-DP standard mappings 3-1 to 3-n (n = device type dependent number of standard mappings).
Additional Support	<p>For questions regarding SIPROTEC4 devices, please contact your Siemens representative.</p>
Training courses	<p>Individual course offerings may be found in our Training Catalog and questions can be directed to our Training Centre. Please contact your Siemens representative.</p>
Target audience	<p>Protection engineers, commissioning engineers, personnel concerned with adjustment, checking and service of selective protective equipment, automatic and control facilities and personnel of electrical facilities and power plants.</p>



Warning!

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

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

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

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

QUALIFIED PERSONNEL

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

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

Typographic and graphical conventions

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

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

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

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

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

Revision index

Listing of the changes between the editions of this manual:

Modified chapters / pages	Edition	Reasons of modification
	1.0	First edition, Doc.-No.: C53000-L1840-B010-03 Jan 14 th , 2002
Chap. 1.3.2 Chap. 1.4, 6	2.0	<ul style="list-style-type: none">• Specifications for measurement scaling values corrected• New: Description of standard mapping 3-2 with event recorder May 7 th , 2004

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Data in the PROFIBUS-DP messages

This chapter delivers explanations to the data descriptions of the standard mapping as well as notes for evaluation of selected SIPROTEC objects and for the configuration of the standard mapping in the PROFIBUS-DP master.

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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 bus mapping.

Chapters 2 and 3 define the data area of the PROFIBUS-DP messages for data transfer between the PROFIBUS-DP slave of the SIPROTEC device 7UT612 and the PROFIBUS-DP master.

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

The listed SIPROTEC objects in the PROFIBUS-DP messages' data area are sorted after byte offset, beginning with 0.

Variables with data type greater than or equal to 1 byte

The offset defines the start of the most significant byte in the message, e.g.:

Offset	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to...)	Internal object no.
12	IA S1=	Operat. meas. current A side 1	32767 A	721

The measured value "IA S1" is assigned to data byte 12 (most significant byte of the measured value) and data byte 13 (least significant byte of the measured value) in the PROFIBUS-DP message

Bit variables (SP/SC, DP/DC)

The offset indicates the byte which contains the bit value and the position of bit 0 of the bit variable, e.g. (input message):

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
0 / 0	Breaker ON/OFF OFF	Circuit breaker	-
0 / 1	Breaker ON/OFF ON		

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
2 / 0	Relay TRIP	1 = Relay GENERAL TRIP command	511

The checkback signal from the circuit breaker (as double-point indication) is located in data byte 0, bit position 2^0 (bit 0) and 2^1 (bit 1).

The single-point indication "Relay TRIP" is located in byte 2, bit position 2^0 .



Note:

The definition of the data types (single-point indication, measured value etc.) are contained in the manual "SIPROTEC Communication module, PROFIBUS-DP - Communication profile" (ref. to page i).

1.2 Messages in output direction: PROFIBUS-DP master to the SIPROTEC device

The messages in PROFIBUS-DP output direction (ref to chap. 2.1) allow:

- command outputs through the output relays of the SIPROTEC devices (external commands),
- manipulation of taggings (internal commands),
- transmission of measured values to the SIPROTEC device.



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 PROFIBUS-DP message positions) available in the SIPROTEC device.
-

1.3 Messages in input direction: SIPROTEC device to the PROFIBUS-DP master

The messages in PROFIBUS-DP input direction (ref. to chap. 2.2) allow:

- polling of switching devices' status and binary inputs,
- transmission of annunciations, measurands and meter values to the PROFIBUS-DP master.

1.3.1 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 PROFIBUS-DP message positions) may be available in the SIPROTEC device.

1.3.2 Measured values



Note:

Depending on the device composition not all of the indicated analog inputs (and corresponding PROFIBUS-DP message positions) may be available in the SIPROTEC device.

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

$IL_{xS1} =$

$$S_N / (\sqrt{3} * V_{NSide1}) \rightarrow 100,01 \dots 1000,00 \text{ A}$$

$IL_{xS2} =$

$$S_N / (\sqrt{3} * V_{NSide2}) \rightarrow 1,01 \dots 10,00 \text{ kA}$$

S_N = Rated apparent power of the transformer (parameter address 0249)

V_{NSide1} = Rated primary voltage Side 1 (parameter address 0240)

V_{NSide2} = Rated primary voltage Side 2 (parameter address 0243)



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, PROFIBUS-DP - Communication profile” (ref. to page i).
- If other measured values than routed per default shall be transmitted via PROFIBUS-DP, 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.

1.3.3 Metered measurands



Note:

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

1.4 Configuration data of the standard mappings

There are two standard mappings (standard mapping 3-1 and standard mapping 3-2) available for the SIPROTEC device 7UT612.

Standard mapping 3-1

The standard mapping 3-1 contains:

Output direction:

- 2 double commands
- 6 single commands

Input direction:

- 4 double-point indications
- 88 single-point indications
- 20 measured values (integer)
- 2 metered measurands (unsigned long)

Standard mapping 3-2

The standard mapping 3-2 contains:

Output direction:

- Handshake byte for event list via PROFIBUS-DP
- 2 double commands
- 6 single commands

Input direction:

- 4 double-point indications
- 88 single-point indications
- 20 measured values (integer)
- 2 metered measurands (unsigned long)
- Handshake byte and three message blocks for event list via PROFIBUS-DP

Configuration data

Standard mapping 3-1: **1FH 1FH 1FH 1BH 21H**
(60 bytes input-, 2 bytes output direction)

Standard mapping 3-2: **1FH 1FH 1FH 1BH DFH 23H**
(92 bytes input-, 4 bytes output direction)

PROFIBUS-DP master

At the configuration of a PROFIBUS-DP slave of the SIPROTEC devices in the parameterization system of the PROFIBUS-DP masters are to select the following modules for the 7UT612 standard mapping and to allocate associated addresses in the I/O addressing range of the PROFIBUS-DP master:

Standard mapping 3-1:

Module	Order number	Input address	Output address
0	Input - 16 Bytes	Adr_Ix	
1	Input - 16 Bytes	Adr_Ix + 16	
2	Input - 16 Bytes	Adr_Ix + 32	
3	Input - 12 Bytes	Adr_Ix + 48	
4	Output - 2Bytes		Adr_Ox

Standard mapping 3-2:

Module	Order number	Input address	Output address
0	Input - 16 Bytes	Adr_Ix	
1	Input - 16 Bytes	Adr_Ix + 16	
2	Input - 16 Bytes	Adr_Ix + 32	
3	Input - 12 Bytes	Adr_Ix + 48	
4	Input - 16 Words, consistent	Adr_Ix + 60	
5	Output - 4 Bytes		Adr_Ox

Adr_Ix and Adr_Ox indicate arbitrary (as a rule even) addresses in the I/O addressing range of the PROFIBUS-DP master.

Adr_Ix (base address of the inputs) is identical with offset 0 of the PROFIBUS-DP message data of the SIPROTEC device in input direction (ref. to chap. 2.2 and 3.2).

Adr_Ox (base address of the outputs) is identical with offset 0 of the PROFIBUS-DP message data of the SIPROTEC device in output direction (ref. to chap. 2.1 and 3.1).



Note:

There is dependently on the PROFIBUS-DP master in addition possibly the demand to put the base address of the inputs on a value divisible by four so that accesses on the metered measurands (unsigned long values, ref. to chap. 2.2.3 and 3.2.3) can be correctly carried out in the PROFIBUS-DP master.

1.5 Notes to SIPROTEC objects

This chapter contains notes for the use and evaluation of certain SIPROTEC objects.



Note:

- The description of the standard mappings (ref. to chap. 2 and 3) 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, PROFIBUS-DP - Communication profile" (ref. to page i).
- If a mapping file is assigned to a SIPROTEC device and if the data size of the PROFIBUS-DP message of this SIPROTEC device is changed by choice of a new mapping file then assignments which are not available in the existing mapping file remain unassigned furthermore.
These must afterwards be routed again on "Source system interface" or "Destination system interface" using the **DIGSI Configuration matrix**.

1.5.1 Changing the setting group

In order to change the setting group, the value "10" = ON must be transmitted for the corresponding pair of bits and afterwards be reset to "00" = "Quiescent status" (controlled by an impulse from the PROFIBUS-DP master).

- Switching ON one setting group automatically switches OFF the current active setting group.
- Transmission of the value "01" = 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 PROFIBUS-DP 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. 3.1.4

Standard mapping 3-1

This chapter describes the data in the PROFIBUS-DP messages between the PROFIBUS-DP master and the SIPROTEC device 7UT612.

2.1	Message in output direction	2-2
2.2	Message in input direction	2-3

2.1 Message in output direction

2.1.1 User-defined double commands

- User-defined double commands with double-point indications as checkback indication can be routed on these position as "Source system interface" using the **DI GSI Configuration matrix**.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
0 / 0	<user-defined> OFF	not pre-allocated	-
0 / 1	<user-defined> ON		
0 / 2	<user-defined> OFF	not pre-allocated	-
0 / 3	<user-defined> ON		

2.1.2 User-defined single commands or taggings

- User-defined single commands or taggings can be routed on these position as "Source system interface" using the **DI GSI Configuration matrix**.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
0 / 4	<user-defined> OFF	not pre-allocated	-
0 / 5	<user-defined> ON		
0 / 6	<user-defined> OFF	not pre-allocated	-
0 / 7	<user-defined> ON		

2.1.3 Internal commands

- Ref. to chap. 1.5.1 for additional notes regarding "Changing the setting group".

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
1 / 0	Setting Group A		-
1 / 1	Setting Group A	Activation of setting group A	
1 / 2	Setting Group B		-
1 / 3	Setting Group B	Activation of setting group B	
1 / 4	Setting Group C		-
1 / 5	Setting Group C	Activation of setting group C	
1 / 6	Setting Group D		-
1 / 7	Setting Group D	Activation of setting group D	

2.2 Message in input direction

2.2.1 Annunciations

2.2.1.1 User-defined double-point indications

- User-defined double-point indications (e.g. checkback indications of double commands) can be routed on these position as “Destination system interface” using the **DIGSI Configuration matrix**.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
0 / 0	<user-defined> OFF	not pre-allocated	-
0 / 1	<user-defined> ON		
0 / 2	<user-defined> OFF	not pre-allocated	-
0 / 3	<user-defined> ON		
0 / 4	<user-defined> OFF	not pre-allocated	-
0 / 5	<user-defined> ON		
0 / 6	<user-defined> OFF	not pre-allocated	-
0 / 7	<user-defined> ON		

2.2.1.2 User-defined single-point indications or taggings

- User-defined protection annunciations, single-point indications or taggings can be routed on these position as “Destination system interface” using the **DIGSI Configuration matrix**.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
1 / 0	<user-defined>	not pre-allocated	-
1 / 1	<user-defined>	not pre-allocated	-
1 / 2	<user-defined>	not pre-allocated	-
1 / 3	<user-defined>	not pre-allocated	-

2.2.1.3 Setting group

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
1 / 4	Group A	1 = Setting group A is active	-
1 / 5	Group B	1 = Setting group B is active	-
1 / 6	Group C	1 = Setting group C is active	-
1 / 7	Group D	1 = Setting group D is active	-

2.2.1.4 Diagnosis

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

2.2.1.5 Differential protection

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
3 / 0	87 picked up	1 = 87 Differential protection picked up	5631
3 / 1	87 TRIP	1 = 87 TRIP	5671
3 / 2	87 TRIP Phase A	1 = 87 TRIP Phase A	5672
3 / 3	87 TRIP Phase B	1 = 87 TRIP Phase B	5673
3 / 4	87 TRIP Phase C	1 = 87 TRIP Phase C	5674
3 / 5	87-1 TRIP	1 = 87 TRIP by 87-1	5691
3 / 6	87-2 TRIP	1 = 87 TRIP by 87-2	5692

2.2.1.6 Restricted ground fault protection

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
3 / 7	87G Picked Up	1 = 87G Picked Up	5817
4 / 0	87G TRIP	1 = 87G TRIP	5821

2.2.1.7 Time overcurrent protection (general)

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
4 / 1	50(N,G) PU	1 = 50(N,G)/51(N,G) O/C PICKUP	1761
4 / 2	50/51(N,G) TRIP	1 = 50(N,G)/51(N,G) TRIP	1791

2.2.1.8 Time overcurrent protection (50/51)

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
4 / 3	50/51 Ph A PU	1 = 50/51 Phase A picked up	1762
4 / 4	50/51 Ph B PU	1 = 50/51 Phase B picked up	1763
4 / 5	50/51 Ph C PU	1 = 50/51 Phase C picked up	1764
4 / 6	50-2 TRIP	1 = 50-2 TRIP	1805
4 / 7	50-2 TRIP	1 = 50-2 TRIP	1815
5 / 0	51 picked up	1 = 51 picked up	1820
5 / 1	51 TRIP	1 = 51 TRIP	1825
5 / 2	Ia InRush PU	1 = Phase A InRush picked up	7565
5 / 3	Ib InRush PU	1 = Phase B InRush picked up	7566
5 / 4	Ic InRush PU	1 = Phase C InRush picked up	7567
5 / 5	50/51 Dset.ACT	1 = Dynamic settings 50/51 are ACTIVE	1998

2.2.1.9 Time overcurrent protection (50N/51N)

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
5 / 6	50N/51NPickedup	1 = 50N/51N picked up	1766
5 / 7	50N-2 TRIP	1 = 50N-2 TRIP	1903
6 / 0	50N-1 TRIP	1 = 50N-1 TRIP	1906
6 / 1	51N picked up	1 = 51N picked up	1907
6 / 2	51N TRIP	1 = 51N TRIP	1909
6 / 3	50/51N InRushPU	1 = 50/51N InRush picked up	7568
6 / 4	50/51N Dset.ACT	1 = Dynamic settings 50N/51N are ACTIVE	1999
6 / 5	<user-defined>	not pre-allocated	-

2.2.1.10 Time overcurrent protection (50G/51G)

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
6 / 6	50G/51GPickedup	1 = 50G/51G picked up	1765
6 / 7	50G-2 TRIP	1 = 50G-2 TRIP	1833
7 / 0	50G-1 TRIP	1 = 50G-1 TRIP	1836
7 / 1	51G picked up	1 = 51G picked up	1837
7 / 2	51G TRIP	1 = 51G TRIP	1839
7 / 3	Gnd InRush PU	1 = Ground InRush picked up	7564
7 / 4	50/51G Dset.ACT	1 = Dynamic settings 50G/51G are ACTIVE	2000
7 / 5	<user-defined>	not pre-allocated	-

2.2.1.11 Thermal overload protection

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
7 / 6	49 O/L I Alarm	1 = 49 Overload Current Alarm (I alarm)	1515
7 / 7	49 O/L Θ Alarm	1 = 49 Thermal Overload Alarm	1516
8 / 0	49 Th O/L TRIP	1 = 49 Thermal Overload TRIP	1521
8 / 1	49 ht. spot Al.	1 = 49 Thermal Overload hot spot Th. Alarm	1541
8 / 2	49 ht.spot TRIP	1 = 49 Thermal Overload hot spot Th. TRIP	1542
8 / 3	49 al.rate Al.	1 = 49 Thermal Overload aging rate Alarm	1543
8 / 4	49 ag.rt. TRIP	1 = 49 Thermal Overload aging rate TRIP	1544

2.2.1.12 Unbalanced load protection

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
8 / 5	46-2 picked up	1 = 46-2 picked up	5159
8 / 6	46-1 picked up	1 = 46-1 picked up	5165
8 / 7	46-TOC pickedup	1 = 46-TOC pickedup	5166
9 / 0	46 TRIP	1 = 46 TRIP	5170

2.2.1.13 Circuit breaker failure protection

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
9 / 1	50BF int Pickup	1 = 50BF (internal) PICKUP	1456
9 / 2	50BF ext Pickup	1 = 50BF (external) PICKUP	1457
9 / 3	50BF TRIP	1 = 50BF TRIP	1471

2.2.1.14 Time overcurrent protection (50 1Ph)

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
9 / 4	50 1Ph Pickup	1 = 50 1Ph Picked up	5971
9 / 5	50 1Ph-1 TRIP	1 = 50 1Ph-1 TRIP	5975
9 / 6	50 1Ph-2 TRIP	1 = 50 1Ph-2 TRIP	5979

2.2.1.15 Thermobox (7XV566)

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
9 / 7	Fail: RTD	1 = Fail: RTD (broken wire/shorted)	14101
10 / 0	RTD 1 St.1 p.up	1 = RTD 1 Temperature stage 1 picked up	14112
10 / 1	RTD 1 St.2 p.up	1 = RTD 1 Temperature stage 2 picked up	14113
10 / 2	RTD 2 St.1 p.up	1 = RTD 2 Temperature stage 1 picked up	14122
10 / 3	RTD 2 St.2 p.up	1 = RTD 2 Temperature stage 2 picked up	14123
10 / 4	RTD 3 St.1 p.up	1 = RTD 3 Temperature stage 1 picked up	14132
10 / 5	RTD 3 St.2 p.up	1 = RTD 3 Temperature stage 2 picked up	14133
10 / 6	RTD 4 St.1 p.up	1 = RTD 4 Temperature stage 1 picked up	14142
10 / 7	RTD 4 St.2 p.up	1 = RTD 4 Temperature stage 2 picked up	14143
11 / 0	RTD 5 St.1 p.up	1 = RTD 5 Temperature stage 1 picked up	14152
11 / 1	RTD 5 St.2 p.up	1 = RTD 5 Temperature stage 2 picked up	14153
11 / 2	RTD 6 St.1 p.up	1 = RTD 6 Temperature stage 1 picked up	14162
11 / 3	RTD 6 St.2 p.up	1 = RTD 6 Temperature stage 2 picked up	14163

2.2.1.16 External trip commands

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
11 / 4	Ext 1 Gen. TRIP	1 = External trip 1: General TRIP	4537
11 / 5	Ext 2 Gen. TRIP	1 = External trip 2: General TRIP	4557

2.2.1.17 Trip coil monitor

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
11 / 6	FAIL: Trip cir.	1 = 74TC Failure Trip Circuit	6865
11 / 7	<user-defined>	not pre-allocated	-

2.2.2 Measured values

- Ref. to chap. 1.3.2 for notes regarding scaling of measured values.

2.2.2.1 Operational values

Offset	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
12	IA S1 =	Current A side 1	32767 A	721
14	IB S1 =	Current B side 1	32767 A	722
16	IC S1 =	Current C side 1	32767 A	723
18	IA S2 =	Current A side 2	327.67 kA	724
20	IB S2 =	Current B side 2	327.67 kA	725
22	IC S2 =	Current C side 2	327.67 kA	726
24	Freq =	Frequency	327.67 Hz	644

2.2.2.2 Thermal measurement

Offset	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
26	Θ / Θ trip =	Temperat. rise for warning and trip	327.67 %	801
28	Θ leg A =	Hot spot temperature of leg A	3276.7 °C/°F *	1060
30	Θ leg B =	Hot spot temperature of leg B	3276.7 °C/°F *	1061
32	Θ leg C =	Hot spot temperature of leg C	3276.7 °C/°F *	1062
34	Ag.Rate =	Aging Rate	327.67 (dimensionless)	1063
36	Res-1 =	Load Reserve to Stage-1 level	327.67 %	1066
38	Res-2 =	Load Reserve to Stage-2 level	327.67 %	1067

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

2.2.2.3 Thermobox (7XV556)

Offset	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
40	⊖ RTD 1 =	Temperature of RTD1	3276.7 °C/°F *	1068
42	⊖ RTD 2 =	Temperature of RTD1	3276.7 °C/°F *	1069
44	⊖ RTD 3 =	Temperature of RTD1	3276.7 °C/°F *	1070
46	⊖ RTD 4 =	Temperature of RTD1	3276.7 °C/°F *	1071
48	⊖ RTD 5 =	Temperature of RTD1	3276.7 °C/°F *	1072
50	⊖ RTD 6 =	Temperature of RTD1	3276.7 °C/°F *	1073

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

2.2.3 Metered measurands

- Ref. to chap. 1.3.3 for notes regarding metered measurands.

Offset	Designation of the SIPROTEC objects	Comments	Scaling ($2^{31}-1$ corresponds to ...)	Internal object no.
52	<user-defined>	not pre-allocated	$2^{31}-1$ impulses	-
56	<user-defined>	not pre-allocated	$2^{31}-1$ impulses	-

Standard mapping 3-2

This chapter describes the data in the PROFIBUS-DP messages between the PROFIBUS-DP master and the SIPROTEC device 7UT612.

3.1	Message in output direction	3-2
3.2	Message in input direction	3-4

3.1 Message in output direction

3.1.1 Event list

- Information regarding the handshake bytes as well as the retrieval methods of the event list via PROFIBUS-DP can be found in the manual "SIPROTEC Communication module, PROFIBUS-DP - Communication profile".

Offset	Designation	Comments	Internal object no.
0	Control_O	Handshake byte for event list via PROFIBUS-DP	-
1	SPARE	reserved for future use (the value at this position is ignored)	-

3.1.2 User-defined double commands

- User-defined double commands with double-point indications as checkback indication can be routed on these position as "Source system interface" using the **DI GSI Configuration matrix**.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
2 / 0	<user-defined> OFF	not pre-allocated	-
2 / 1	<user-defined> ON		
2 / 2	<user-defined> OFF	not pre-allocated	-
2 / 3	<user-defined> ON		

3.1.3 User-defined single commands or taggings

- User-defined single commands or taggings can be routed on these position as "Source system interface" using the **DI GSI Configuration matrix**.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
2 / 4	<user-defined> OFF	not pre-allocated	-
2 / 5	<user-defined> ON		
2 / 6	<user-defined> OFF	not pre-allocated	-
2 / 7	<user-defined> ON		

3.1.4 Internal commands

- Ref. to chap. 1.5.1 for additional notes regarding “Changing the setting group”.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
3 / 0	Setting Group A		-
3 / 1	Setting Group A	Activation of setting group A	
3 / 2	Setting Group B		-
3 / 3	Setting Group B	Activation of setting group B	
3 / 4	Setting Group C		-
3 / 5	Setting Group C	Activation of setting group C	
3 / 6	Setting Group D		-
3 / 7	Setting Group D	Activation of setting group D	

3.2 Message in input direction

3.2.1 Annunciations

3.2.1.1 User-defined double-point indications

- User-defined double-point indications (e.g. checkback indications of double commands) can be routed on these position as “Destination system interface” using the **DIGSI Configuration matrix**.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
0 / 0	<user-defined> OFF	not pre-allocated	-
0 / 1	<user-defined> ON		
0 / 2	<user-defined> OFF	not pre-allocated	-
0 / 3	<user-defined> ON		
0 / 4	<user-defined> OFF	not pre-allocated	-
0 / 5	<user-defined> ON		
0 / 6	<user-defined> OFF	not pre-allocated	-
0 / 7	<user-defined> ON		

3.2.1.2 User-defined single-point indications or taggings

- User-defined protection annunciations, single-point indications or taggings can be routed on these position as “Destination system interface” using the **DIGSI Configuration matrix**.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
1 / 0	<user-defined>	not pre-allocated	-
1 / 1	<user-defined>	not pre-allocated	-
1 / 2	<user-defined>	not pre-allocated	-
1 / 3	<user-defined>	not pre-allocated	-

3.2.1.3 Setting group

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
1 / 4	Group A	1 = Setting group A is active	-
1 / 5	Group B	1 = Setting group B is active	-
1 / 6	Group C	1 = Setting group C is active	-
1 / 7	Group D	1 = Setting group D is active	-

3.2.1.4 Diagnosis

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
2 / 0	Device OK	1 = Update of the device replica in the SIPROTEC device completed after initial start or restart	51
2 / 1	ProtActive	1 = At least one protection function is active	52
2 / 2	Settings Calc.	1 = Settings calculation is running	70
2 / 3	Error Sum Alarm	1 = Error with a summary alarm ON	140
2 / 4	Alarm Sum Event	1 = Alarm summary event ON	160
2 / 5	Relay PICKUP	1 = Relay PICKUP (group signal)	501
2 / 6	Relay TRIP	1 = Relay GENERAL TRIP command	511
2 / 7	Data valid	1 = Data in the PROFIBUS-DP message are valid. (This indication is created by the PROFIBUS-DP slave; not available in DIGSI and not relocatable.)	-

3.2.1.5 Alarms

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
3 / 0	87 picked up	1 = 87 Differential protection picked up	5631
3 / 1	87G Picked Up	1 = 87G Picked Up	5817
3 / 2	50(N,G) PU	1 = 50(N,G)/51(N,G) O/C PICKUP	1761
3 / 3	50/51 Ph A PU	1 = 50/51 Phase A picked up	1762
3 / 4	50/51 Ph B PU	1 = 50/51 Phase B picked up	1763
3 / 5	50/51 Ph C PU	1 = 50/51 Phase C picked up	1764
3 / 6	51 picked up	1 = 51 picked up	1820
3 / 7	Ia InRush PU	1 = Phase A InRush picked up	7565
4 / 0	Ib InRush PU	1 = Phase B InRush picked up	7566
4 / 1	Ic InRush PU	1 = Phase C InRush picked up	7567
4 / 2	50N/51NPickedup	1 = 50N/51N picked up	1766
4 / 3	51N picked up	1 = 51N picked up	1907
4 / 4	50/51N InRushPU	1 = 50/51N InRush picked up	7568
4 / 5	50G/51GPickedup	1 = 50G/51G picked up	1765
4 / 6	51G picked up	1 = 51G picked up	1837
4 / 7	Gnd InRush PU	1 = Ground InRush picked up	7564
5 / 0	50 1Ph Pickup	1 = 50 1Ph Picked up	5971
5 / 1	49 O/L I Alarm	1 = 49 Overload Current Alarm (I alarm)	1515
5 / 2	49 O/L Θ Alarm	1 = 49 Thermal Overload Alarm	1516

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
5 / 3	49 ht. spot Al.	1 = 49 Thermal Overload hot spot Th. Alarm	1541
5 / 4	49 al.rate Al.	1 = 49 Thermal Overload aging rate Alarm	1543
5 / 5	46-2 picked up	1 = 46-2 picked up	5159
5 / 6	46-1 picked up	1 = 46-1 picked up	5165
5 / 7	46-TOC pickedup	1 = 46-TOC pickedup	5166
6 / 0	50BF int Pickup	1 = 50BF (internal) PICKUP	1456
6 / 1	50BF ext Pickup	1 = 50BF (external) PICKUP	1457
6 / 2	<user-defined>	not pre-allocated	-
6 / 3	<user-defined>	not pre-allocated	-
6 / 4	<user-defined>	not pre-allocated	-

3.2.1.6 Trip indications

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
6 / 5	87 TRIP	1 = 87 TRIP	5671
6 / 6	87 TRIP Phase A	1 = 87 TRIP Phase A	5672
6 / 7	87 TRIP Phase B	1 = 87 TRIP Phase B	5673
7 / 0	87 TRIP Phase C	1 = 87 TRIP Phase C	5674
7 / 1	87-1 TRIP	1 = 87 TRIP by 87-1	5691
7 / 2	87-2 TRIP	1 = 87 TRIP by 87-2	5692
7 / 3	87G TRIP	1 = 87G TRIP	5821
7 / 4	50/51(N,G) TRIP	1 = 50(N,G)/51(N,G) TRIP	1791
7 / 5	50-2 TRIP	1 = 50-2 TRIP	1805
7 / 6	50-2 TRIP	1 = 50-2 TRIP	1815
7 / 7	51 TRIP	1 = 51 TRIP	1825
8 / 0	50N-2 TRIP	1 = 50N-2 TRIP	1903
8 / 1	50N-1 TRIP	1 = 50N-1 TRIP	1906
8 / 2	51N TRIP	1 = 51N TRIP	1909
8 / 3	50G-2 TRIP	1 = 50G-2 TRIP	1833
8 / 4	50G-1 TRIP	1 = 50G-1 TRIP	1836
8 / 5	51G TRIP	1 = 51G TRIP	1839
8 / 6	50 1Ph-1 TRIP	1 = 50 1Ph-1 TRIP	5975
8 / 7	50 1Ph-2 TRIP	1 = 50 1Ph-2 TRIP	5979
9 / 0	49 Th O/L TRIP	1 = 49 Thermal Overload TRIP	1521
9 / 1	49 ht.spot TRIP	1 = 49 Thermal Overload hot spot Th. TRIP	1542
9 / 2	49 ag.rt. TRIP	1 = 49 Thermal Overload aging rate TRIP	1544
9 / 3	46 TRIP	1 = 46 TRIP	5170

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
9 / 4	50BF TRIP	1 = 50BF TRIP	1471
9 / 5	Ext 1 Gen. TRIP	1 = External trip 1: General TRIP	4537
9 / 6	Ext 2 Gen. TRIP	1 = External trip 2: General TRIP	4557
9 / 7	FAIL: Trip cir.	1 = 74TC Failure Trip Circuit	6865
10 / 0	<user-defined>	not pre-allocated	-
10 / 1	<user-defined>	not pre-allocated	-
10 / 2	<user-defined>	not pre-allocated	-

3.2.1.7 Thermobox (7XV566)

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
10 / 3	RTD 1 St.1 p.up	1 = RTD 1 Temperature stage 1 picked up	14112
10 / 4	RTD 2 St.1 p.up	1 = RTD 2 Temperature stage 1 picked up	14122
10 / 5	RTD 3 St.1 p.up	1 = RTD 3 Temperature stage 1 picked up	14132
10 / 6	RTD 4 St.1 p.up	1 = RTD 4 Temperature stage 1 picked up	14142
10 / 7	RTD 5 St.1 p.up	1 = RTD 5 Temperature stage 1 picked up	14152
11 / 0	RTD 6 St.1 p.up	1 = RTD 6 Temperature stage 1 picked up	14162
11 / 1	Fail: RTD	1 = Fail: RTD (broken wire/shorted)	14101
11 / 2	RTD 1 St.2 p.up	1 = RTD 1 Temperature stage 2 picked up	14113
11 / 3	RTD 2 St.2 p.up	1 = RTD 2 Temperature stage 2 picked up	14123
11 / 4	RTD 3 St.2 p.up	1 = RTD 3 Temperature stage 2 picked up	14133
11 / 5	RTD 4 St.2 p.up	1 = RTD 4 Temperature stage 2 picked up	14143
11 / 6	RTD 5 St.2 p.up	1 = RTD 5 Temperature stage 2 picked up	14153
11 / 7	RTD 6 St.2 p.up	1 = RTD 6 Temperature stage 2 picked up	14163

3.2.2 Measured values

- Ref. to chap. 1.3.2 for notes regarding scaling of measured values.

3.2.2.1 Operational values

Offset	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
12	IA S1 =	Current A side 1	32767 A	721
14	IB S1 =	Current B side 1	32767 A	722
16	IC S1 =	Current C side 1	32767 A	723
18	IA S2 =	Current A side 2	327.67 kA	724
20	IB S2 =	Current B side 2	327.67 kA	725
22	IC S2 =	Current C side 2	327.67 kA	726
24	Freq =	Frequency	327.67 Hz	644

3.2.2.2 Thermal measurement

Offset	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
26	Θ / Θ trip =	Temperat. rise for warning and trip	327.67 %	801
28	Θ leg A =	Hot spot temperature of leg A	3276.7 °C/°F *	1060
30	Θ leg B =	Hot spot temperature of leg B	3276.7 °C/°F *	1061
32	Θ leg C =	Hot spot temperature of leg C	3276.7 °C/°F *	1062
34	Ag.Rate =	Aging Rate	327.67 (dimensionless)	1063
36	Res-1 =	Load Reserve to Stage-1 level	327.67 %	1066
38	Res-2 =	Load Reserve to Stage-2 level	327.67 %	1067

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

3.2.2.3 Thermobox (7XV556)

Offset	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
40	⊖ RTD 1 =	Temperature of RTD1	3276.7 °C/°F *	1068
42	⊖ RTD 2 =	Temperature of RTD1	3276.7 °C/°F *	1069
44	⊖ RTD 3 =	Temperature of RTD1	3276.7 °C/°F *	1070
46	⊖ RTD 4 =	Temperature of RTD1	3276.7 °C/°F *	1071
48	⊖ RTD 5 =	Temperature of RTD1	3276.7 °C/°F *	1072
50	⊖ RTD 6 =	Temperature of RTD1	3276.7 °C/°F *	1073

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

3.2.3 Metered measurands

- Ref. to chap. 1.3.3 for notes regarding metered measurands.

Offset	Designation of the SIPROTEC objects	Comments	Scaling ($2^{31}-1$ corresponds to ...)	Internal object no.
52	<user-defined>	not pre-allocated	$2^{31}-1$ impulses	-
56	<user-defined>	not pre-allocated	$2^{31}-1$ impulses	-

3.2.4 Event list

- Information regarding the handshake bytes as well as the retrieval methods of the event list via PROFIBUS-DP can be found in the manual “SIPROTEC Communication module, PROFIBUS-DP - Communication profile”.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
60	Control_I	Handshake byte for event list via PROFIBUS-DP	-
61	SPARE	reserved for future use (the value 0 is transmitted at this position)	-
62	Message block #1	Identification #1	-
63		Value #1	
64 -		Time stamp #1	
71			
72	Message block #2	Identification #2	-
73		Value #2	
74 -		Time stamp #2	
81			
82	Message block #3	Identification #3	-
83		Value #3	
84 -		Time stamp #3	
91			

Glossary

CFC	Continuous Function Chart
DC	Double command
DDB file / GSD file	<p>The DDB file contains the Device Data Base (technical characteristics) of the PROFIBUS-DP communication module (PROFIBUS-DP slave).</p> <p>This file is required for configuration of the PROFIBUS-DP master and is supplied together with DIGSI.</p>
DIGSI	Parameterization system / parameterization software for SIPROTEC devices
DP	Double-point indication
Input data / Input direction	Data from the PROFIBUS-DP slave to the PROFIBUS-DP master.
Octet	Term from EN 50170, one octet corresponds to 8 bits.
OLM	Optical Link Module
Output data / Output direction	Data from the PROFIBUS-DP master to the PROFIBUS-DP slave.
PNO	PROFIBUS Nutzerorganisation (PROFIBUS International Organization)
PROFIBUS-DP	PROFIBUS - Decentralized Peripherals
PSE	PROFIBUS interface module with (electrical) isolated RS485 interface for the SIPROTEC devices from Siemens.
PSO	PROFIBUS interface module with fibre-optical interface for the SIPROTEC devices from Siemens.
SC	Single command
SP	Single-point indication

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