INSTRUCTION MANUAL

E-T-A
EM12D-
TMB-000
Modbus
RTU

INSTRUCTION MANUAL

ControlPlex® Controller EM12D-TMB

ENGINEERING TECHNOLOGY

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1. GENERAL INFORMATION

Safety instruction
These manual points out possible danger for your personal safety and gives instruction how to avoid property damage. The following safety symbols are used to draw the reader's attention to the safety instructions included in this manual.

⚠	**Danger!** Danger to life and limb unless the following safety precautions are taken.
⚠	**Warning!** Danger to machinery, materials, or the environment unless the following safety precautions are taken.
⚠	**Note** Information is provided to allow a better understanding.
⚠	**Caution!** Electrostatically sensitive devices (ESD). Devices must exclusively be opened by the manufacturer.
♻	**Disposal guidelines** Packaging can be recycled and should generally be brought to reuse.

Qualified personnel
This user manual must exclusively be used by qualified personnel, who are able – based on their training and experience – to realise arising problems when handling the product and to avoid related hazards. These persons must ensure that the use of the product described here meets the safety requirements as well as the requirements of the presently valid directives, standards and laws.

Use
The product is part of a continuous enhancement process. Therefore, there might be deviations between the product in hand and this documentation. These deviations will be remedied by a regular review and resulting corrections in future editions. The right to make changes without notice is reserved. Errors and omissions excepted.

Delivery state
The product is supplied with a defined hardware and software configuration. Any changes more than the documented options are not permitted and lead to liability exclusion.

2. GENERAL DESCRIPTION

Requirements in plant engineering and construction and in building automation are growing and growing. In the context of increasing efficiency and reducing costs, the transparency of systems, remote maintenance and remote access are getting more and more important. Early notification in the event of any disturbances and a fast response to current problems will increase system availability, save costs and improve the overall stability of the production process.

E-T-A provides the ideal solution for machine and panel builders with the intelligent protection system comprising the REX12D and REX22D circuit protectors and the EM12D-TMB interface module. The system combines the well-proven quality of DC24V overcurrent protection with the communication capabilities to superordinate bus systems. It allows complete transparency of the DC24V power supply and provides all necessary information for a reliable production process in this plant sector. Part of the information is the permanent transmission of status indication regarding each individual circuit protector. In addition, the present load current of the circuit breaker and the load voltage are transmitted to the superordinate control unit. A parameterizable limit value allows creation of a warning threshold which advises the user of changing system conditions.

The new generation of electronic overcurrent protection REX12D/REX22D consists of the EM12D-TMB intelligent supply module and the REX12D and REX22D versions of electronic circuit protectors which can be mounted side by side in optional numbers. The 12.5 mm wide modules feature push-in technology for wiring with press release buttons and allow no-tool timesaving and maintenance-free wiring. The supply module is designed for DC 24 V and 40 A and accommodates max. 10 mm² with wire end ferrule as a plus (+) supply. On the load output side, the circuit protector can be wired with 2.5 mm².

It is exactly tailored to the various needs of the users. And what is more: no additional accessories are required when connecting the individual components electrically and mechanically. This helps save time and money!

2.1 Design of the Entire System

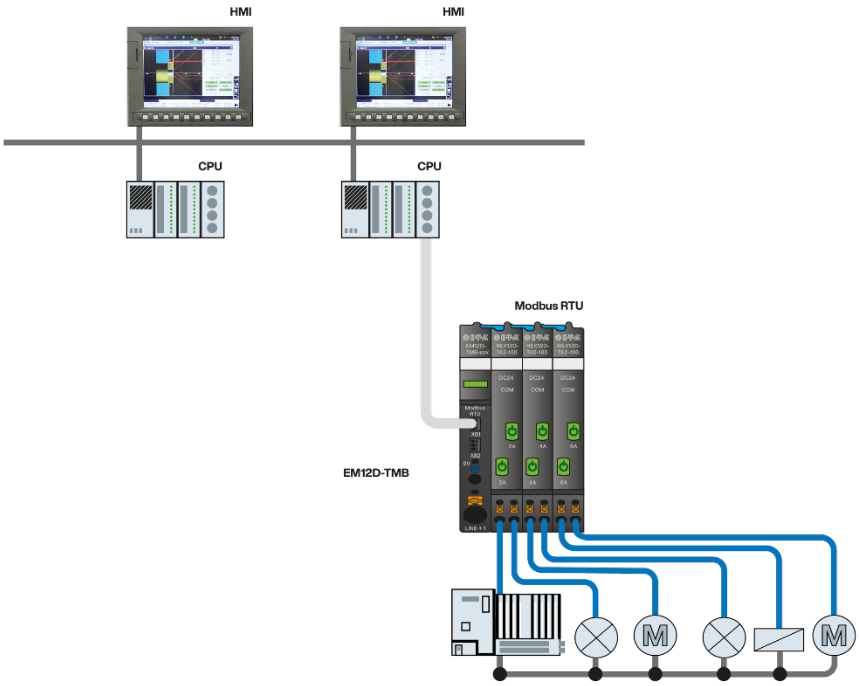


Figure 1: System overview

The Modbus controller EM12D-TMB is the centre of the ***ControlPlex***® system. It collects all information of the REX12D and REX22D electronic circuit protectors and forwards it to the superordinate Modbus server and thus to the superordinate control unit.

The Modbus interface to the superimposed control unit is realised with a 3-wire cable. It allows connection of the ***ControlPlex***® system to the Modbus server, thus enabling display and analysis of the individual measuring values as well as diagnosis and control of the individual electronic circuit protectors. The user has unrestricted access to the safety-relevant functions in the event of a system disruption. Any occurring failures will be detected quickly and can be remedied without delay. The ***ControlPlex***® system effectively reduces system downtimes and significantly increases the productivity.

2.2 Dimensions Bus Controller EM12D-TMB

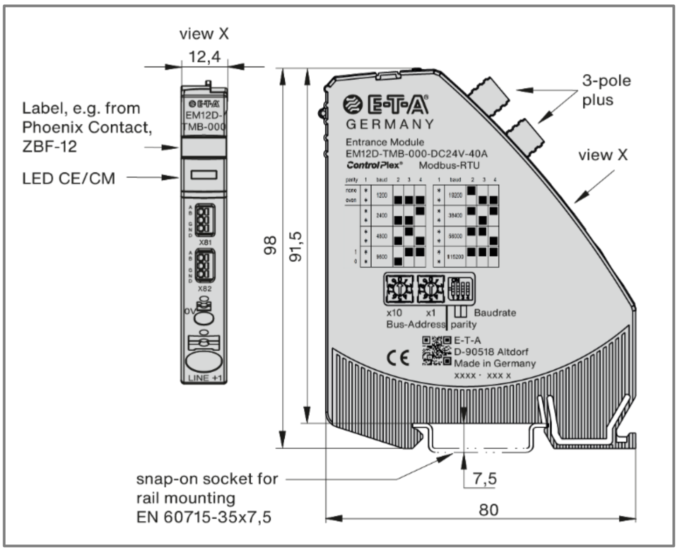

view X
12,4
Label, e.g. from Phoenix Contact, ZBF-12
LED CE/CM
E-T-A
EM12D-TMB-000
X81
X82
0V
LINE +1
98
91,5
E-T-A GERMANY
Entrance Module
EM12D-TMB-000-DC24V-40A
ControlPlex® Modbus-RTU
parity
none
even
baud
1200
2400
4800
9600
19200
38400
56000
115200
x10
x1
Bus-Address
parity
Baudrate
CE
E-T-A
D-90518 Altdorf
Made in Germany
xxxx · xxx x
3-pole plus
view X
snap-on socket for rail mounting EN 60715-35x7,5
7,5
80

Figure 2: Dimensions of the EM12D-TMB

2.3 Status Indication and Terminals

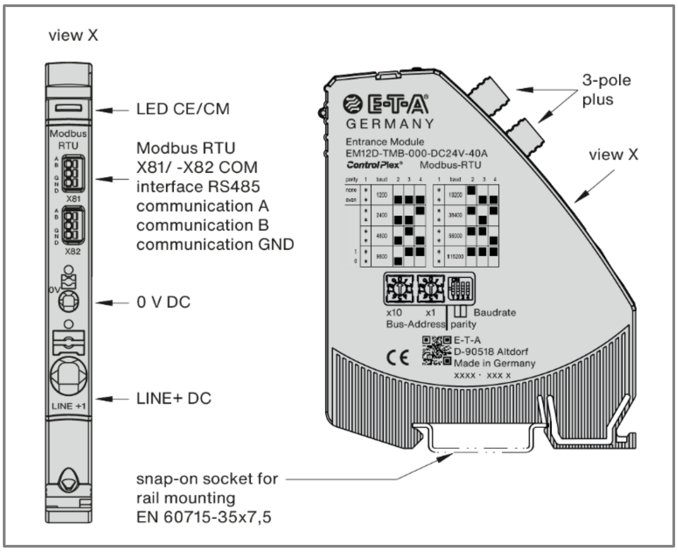

view X
LED CE/CM
Modbus RTU
X81
X82
0V
LINE +1
Modbus RTU X81/ -X82 COM interface RS485
communication A
communication B
communication GND
0 V DC
LINE+ DC
E-T-A GERMANY
Entrance Module
EM12D-TMB-000-DC24V-40A
ControlPlex® Modbus-RTU
x10
x1
Bus-Address
parity
Baudrate
CE
E-T-A
D-90518 Altdorf
Made in Germany
xxxx · xxx x
3-pole plus
view X
snap-on socket for rail mounting EN 60715-35x7,5

Figure 3: Status indicators and terminals EM12D-TMB light emitting diode “CE/CM”

EM12D-light emitting diode CE/CM

The LED CE/CM shows the status of the communication unit. Available LED colours are red, green and yellow/orange. For further details please see fig. 7. Illustration of operating modes.

3. MOUNTING AND INSTALLATION

3.1 Mounting of the System

The preferred mounting position of the EM12D-TMB is horizontal.

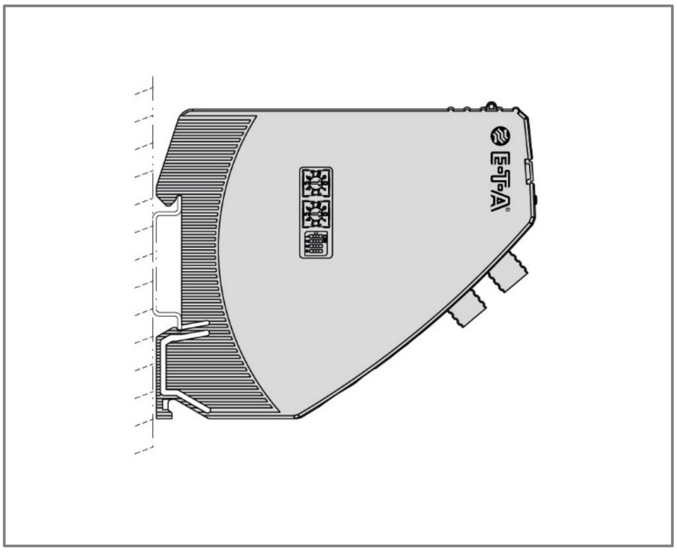


Figure 4: Mounting position of the EM12D-TMB

3.2 Power Supply of the Modbus RTU Controller

Power supply of the Modbus controller is via the line entry terminals LINE+ and 0V.

3.3 Terminals for the Voltage Supply and the *ELBus*®

The operating voltage of the device is 24V DC. Faultless operation of the device is ensured in a voltage range of 18V to 30V. The max. current of the supply module is 40A.

Using a supply voltage outside the indicated operating range can cause malfunctions or destruction of the device.

3.3.1 Connector Sockets for the Modbus RTU Communication, Connector Socket X81/ X82

These connector sockets serve for connection of the Modbus controller EM12D-TMB with the superordinate control unit. This connection is a one-to-one wiring.

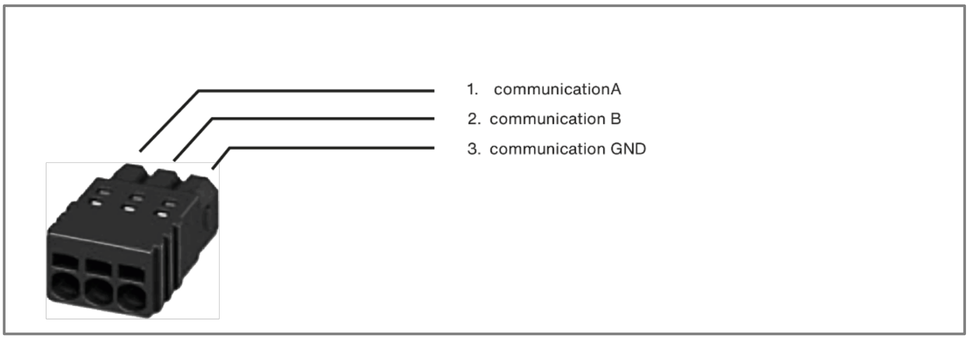

1. communicationA
2. communication B
3. communication GND

Figure 5: Modbus RTU connection

Preferably, the connection should be effected with a three-pole shielded cable. The cable length between the Modbus controller EM12D-TMB and the Modbus server has to comply with the benchmarks.

Benchmarks:
cable length of RS485 approx. 1200 m approx. 110 Ohm
cable length of RS485 approx. 600 m approx. 220 Ohm
cable length of RS485 approx. 300 m approx. 330 Ohm

Use of the terminals for applications not provided for in the operation manual or improper connection can lead to malfunction or destruction of the device.

3.3.2 Marking of the Manufacturing Date, the Device ID and Revision Status of the Software

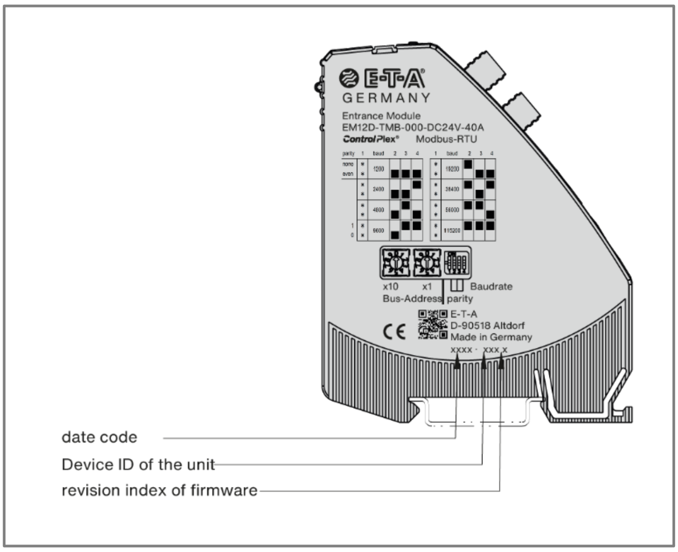

E-T-A
GERMANY
Entrance Module
EM12D-TMB-000-DC24V-40A
ControlPlex®
Modbus-RTU
x10
x1
Bus-Address
parity
Baudrate
E-T-A
D-90518 Altdorf
Made in Germany
xxxx · xxx.x
date code
Device ID of the unit
revision index of firmware

Figure 6: Marking of date code

4. OPERATING MODES OF THE DEVICE EM12D-TMB

4.1 Operating Mode: System Start

The Modbus controller is initialised by applying the supply voltage. The device will carry out implemented programme memory tests and self test routines. During this time a communication via the interfaces is not possible.

4.2 Operating Mode: Critical Failure

If a failure is detected during the self test routines, the Modbus controller will change into operating mode “critical failure”. In the event of a critical failure, the device will also change into this operating mode. This operating mode can only be discontinued by way of re-starting the device and it prevents the data exchange via the interfaces. If the Modbus controller is in this operating mode, no communication is possible with the superordinate control unit. The electronic circuit protectors cannot be controlled by it and remain OFF.

4.3 Operating Mode: non-critical Failure

If there are no valid or invalid configuration data available in the Modbus controller, it will change into this operating mode. This operating mode will be left upon receipt of the correct module and slot parameters and configuration data. The circuit protectors remain OFF.

4.4 Operating Mode: Independent Operation

If no connection to the superordinate control unit is recognised after the supply voltage was applied, the module will change into the operating mode “independent operation”. The circuit protectors will adopt the condition specified by the configuration. If there is a connection between the Modbus controller and the superordinate control unit and there is no critical failure, the operating mode “independent operation” will be quitted. Should the connection between the Modbus controller and the superordinate control unit be interrupted during operation, the Modbus controller will automatically change into the operating mode “independent operation”.

Should the connection between the Modbus controller and the superordinate control unit be interrupted and the non-cyclical parameter “UNFREEZE” be set, all circuit protectors will be switched off before changing into the operating mode “independent operation”.

Should the connection between the Modbus controller and the superordinate control unit be interrupted and the non-cyclical parameter “FREEZE” be set, the condition of the circuit protectors will remain unchanged before changing into the operating mode “independent operation”.

By means of the non-cyclical parameter, the behaviour of the Modbus controller can be defined in the event of an interruption of the communication to the superordinate control unit.

Either the condition of the circuit protector is frozen (FREEZE) or all circuit protectors are switched off (UNFREEZE).

Should the connection between the Modbus controller and the superordinate control unit be restored after a previous interruption, the operating mode “independent operation” will be quitted.

4.5 Operating Mode: Faultless Operation

If there is neither a critical nor a non-critical failure and if there is a connection to the superordinate control unit, the Modbus controller will change into the operating mode “faultless operation”. The parameters will be transmitted from the superordinate control unit to the Modbus controller and will be saved there. Subsequently they will be forwarded to the electronic circuit protectors. The slot configuration data and slot parameters will be exchanged over Modbus Register between the superordinate control unit and the Modbus controller.

4.6 Operating Mode: Bootloader

ControlPlex® Views tool allows putting the Modbus Controller into the bootloader mode and to load a new firmware. The actual procedure is described in a separate document.

4.7 Signalling of the Various Operating Modes

The different operating modes of the Modbus controller are indicated as follows:

Operating mode	Indication of operating mode	Modbus communication
	LED CE/CM	
system start of supply module		not defined
independent operation	green blinking	not available
faultless operation	green	available
critical failure detected	red	not available
uncritical failure detected	yellow	available
uncritical failure detected	yellow blinking	not available
bootloader active	red blinking	not available

Table 1: Available operating modes

4.8 Signalling of Operating Conditions on Circuit Protector REX12D/REX22D

The different operating modes of the REX12D/REX22D are indicated as follows:

Operating condition	LED for signalling	Condition of load output
channel switched off by momentary switch	dark	OFF
channel switched on by momentary switch and switched off by communication	orange	OFF
channel switched on by momentary switch and by communication	green	ON
selected threshold value exceeded	blinking green/orange	ON
overload detected	orange	ON
tripped by short circuit or overload	red	OFF
low voltage detected	red	OFF

Table 2: Signalling of operating conditions of circuit protector REX12D/REX22D

5. BASIC FUNCTIONS OF THE ENTIRE SYSTEM

5.1 Internal Cycle Times

The cycle time via the ***ELBus***® is 530ms. During the aforementioned period the status and the load current of each circuit protector is cyclically transmitted to Controller EM12D-TMB.

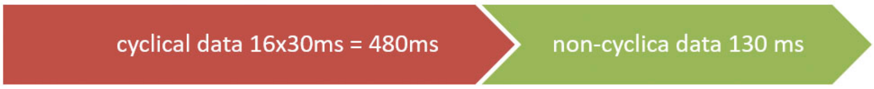


Figure 7: Cycle times of the system

5.2 Hot Swap of Circuit Protectors

The electronic circuit protector REX12D/REX22D can at any time be mounted side by side with a supply module or an existing system. By closing the connector arm a voltage supply of the device is available. Also, the device is connected to the internal ***ELBus***®.

Opening the connector arm is only permitted in the OFF condition. Opening under load can damage the device or cause undefined system conditions.

After plugging in a circuit protector, it will automatically be identified and parameterised if parameters are available for the slot in question. **During this procedure the cyclical data will intermittently be marked as unvalid.**

6. COMMUNICATION VIA MODBUS RTU

6.1 *ControlPlex*® Controller Model

The EM12D-TMB has an internal ***ELBus***® interface enabling the communication with the electronic circuit protector REX12D and REX22D. Up to 16 channels of the REX12D and REX22D electronic circuit protectors (single channeled, multi-channeled or a mixed population) can be connected to the supply module.

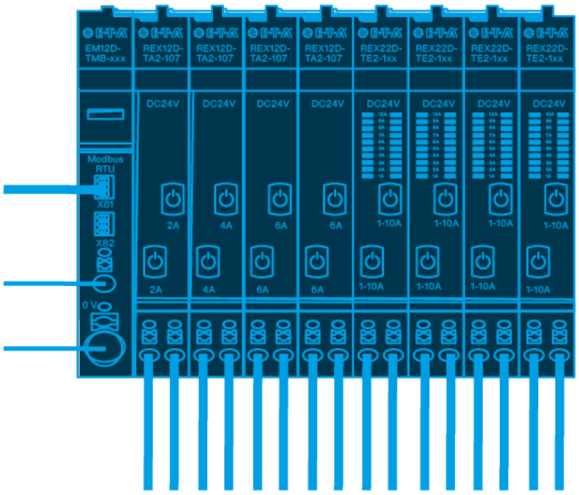

E-T-A
EM12D-TMB-xxx
REX12D-TA2-107
REX12D-TA2-107
REX12D-TA2-107
REX12D-TA2-107
REX22D-TE2-1xx
REX22D-TE2-1xx
REX22D-TE2-1xx
REX22D-TE2-1xx
DC24V
Modbus RTU
X81
X82
0 V
2A
4A
6A
6A
1-10A

Figure 8: EM12D-TMB with 16 channels

6.1.1 Error with Faulty Population

If a double channel device is connected as channel 16/17, the control unit will receive the information that a device is available at channel 16.

When reading out the Cominfo of the circuit protector, received the message that the circuit protector has wrong parameters.

The channels cannot be operated (cannot be switched on).

6.1.2 Error Device Addressing

Due to mechanical problems, there may be addressing errors.

The LED on EM12D-TMB is permanently lighted orange.

Possible causes are deformed or missing contacts in the connector arm.

For putting the device into service again, the faulty circuit protector has to be removed and the supply voltage has to be switched off and on again.

6.2 Physical Interface

The physical interface used is RS485. Protocol used is the Modbus RTU protocol. It is unsusceptible to EMC disturbances and allows artless implementation of the bus communication.

6.3 Setting the Communication Parameters

The parameters for the communication to the Modbus server are realised by means of the switches on the device side.

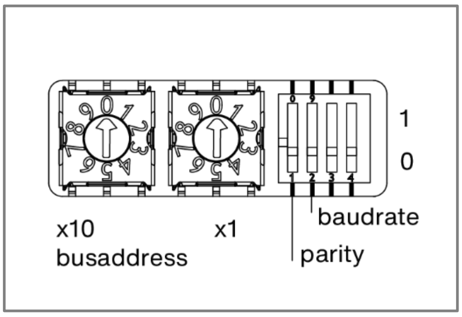


Figure 9: Potentiometers for the communication parameters

The address of the device is fixed in the bus structure by means of the potentiometers. The left rotary switch fixes the power of ten, the right one fixes the power of one.

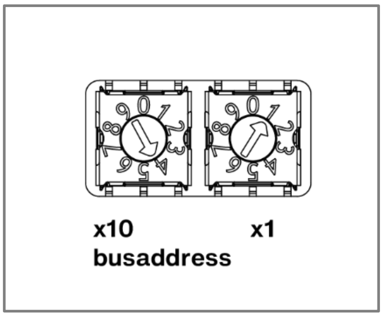
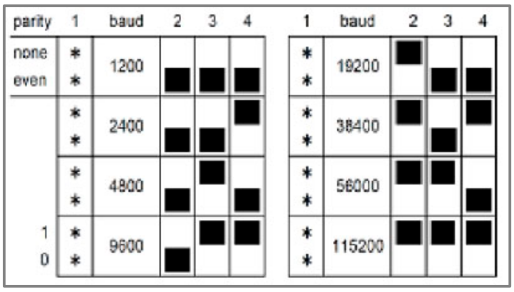


Figure 10: Potentiometers for the communication parameters

Bus address of the device in this example is 41.

The communication speed and the parity bit are fixed by means of the DIP switches on the right side. For the definition of the switch please see the imprinted table.



parity	1	baud	2	3	4	1	baud	2	3	4
none even	* *	1200	▄	▄	▄	* *	19200	▀	▄	▄
	* *	2400	▄	▄	▀	* *	38400	▀	▄	▀
	* *	4800	▄	▀	▄	* *	56000	▀	▀	▄
1 0	* *	9600	▄	▀	▀	* *	115200	▀	▀	▀

Figure 12: Display of communication speed

The left DIP switch fixes the parity. The switching status is defined as follows:

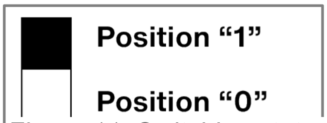


Figure 11: Switching status of the DIP switches

In our example, the DIP switch is set to position “1” and the parity bit is set to “none”. The DIP switches 2 / 3 / 4 define the communication speed.

Stoppbit
For Stoppbit are two fix defined.

7. OVERVIEW OF MODBUS REGISTERS

7.1 Voltage, Current, Status and Control of Channels

This list shows the various kinds of information and the corresponding registers.

Modbus register	Functional code	Data length	Write/read	factor	description
47001	3	2 byte	read	100	Load voltage F1
47002	3	2 byte	read	100	Load voltage F2
47003	3	2 byte	read	100	Load voltage F3
• • •					
47016		2 byte	read	100	Load voltage F16
47101		2 byte	read	100	Load current F1
47102		2 byte	read	100	Load current F2
47103		2 byte	read	100	Load current F3
• • •					
47116		2 byte	read	100	Load current F16
47200	3	2 byte			status controller
47201	3	1 byte	read		status F1
47202	3	1 byte	read		status F2
47203	3	1 byte	read		status F3
• • •					
47216	3	1 byte	read		status F16
47301	6 & 16	2 byte	write		control F1
47302	6 & 16	1 byte	write		control F2
47303	6 & 16	1 byte	write		control F3
• • •					
47316	6 & 16	2 byte	write		control F16

Table 3: Voltage, current, status and control of channels

7.2 Values and Parameters per Channel and of the Supply Module

This list shows the various kinds of information and the corresponding registers.

Modbus register	Functional code	Write/read	Multiplication factor	description
46001	6	write		system commands
46002	3	read		diagnosis controller
46003	6 & 3	read/write		configuration controller
46004	16 & 6 & 3	read/write		channels 1-16 controllable
46005	16 & 6 & 3	read/write		channels 17-32 controllable
46006	16 & 6 & 3	read/write		channels 33-48 controllable
46007	3	read		product type
46008	3	read		serial number
46009				
46010	3	read		hardware version
46011	3	read		software version major.x.x
46012	3	read		software version x.minor.x
46013	3	read		software version x.x.build
460 (14…29)	16 & 3	read/write		application specific tag
40101	6 & 3	read/write		current rating F1
40201	6 & 3	read/write		current rating F2
40301	6 & 3	read/write		current rating F3
• • •				
41601	6 & 3	read/write		current rating F16
40102	6 & 3	read/write		limit value load current F1
40202	6 & 3	read/write		limit value load current F2
40302	6 & 3	read/write		limit value load current F3
• • •				
41602	6 & 3	read/write		limit value load current F16
40109	6 & 3	read/write		channel type (product type) F1
40209	6 & 3	read/write		channel type (product type) F2

Modbus register	Functional code	Write/read	Multiplication factor	description
40309	6 & 3	read/write		channel type (product type) F3
• •				
41609	6 & 3	read/write		channel type (product type) F16
40110	3	read		diagnosis channel F1
40210	3	read		diagnosis channel F2
40310	3	read		diagnosis channel F3
• •				
41610	3	read		diagnosis channel F16
40111	3	read		error memory F1
40211	3	read		error memory F2
40311	3	read		error memory F3
• • •				
41611	3	read		error memory F16
40112	3	read		trip counter F1
40212	3	read		trip counter F2
40312	3	read		trip counter F3
• • •				
41612	3	read		trip counter F16
40113	3	read		trip reason F1
40213	3	read		trip reason F2
40313	3	read		trip reason F3
• • •				
41613	3	read		trip reason F16
40116	3	read	100	Ø load voltage F1
40216	3	read	100	Ø load voltage F2

Modbus register	Functional code	Write/read	Multiplication factor	description
40316	3	read	100	Ø load voltage F3
• •				
41616	3	read	100	Ø load voltage F16
40117	3	read	100	max. load voltage F1
40217	3	read	100	max. load voltage F2
40317	3	read	100	max. load voltage F3
• •				
41617	3	read	100	max. load voltage F16
40118	3	read	100	min. load voltage F1
40218	3	read	100	min. load voltage F2
40318	3	read	100	min. load voltage F3
• •				
41618	3	read	100	min. load voltage F16
40119	3	read	100	Ø load current F1
40219	3	read	100	Ø load current F2
40319	3	read	100	Ø load current F3
• • •				
41619	3	read	100	Ø load current F16
40120	3	read	100	max. load current F1
40220	3	read	100	max. load current F2
40320	3	read	100	max. load current F3
• • •				
41620	3	read	100	max. load current F16
40121	3	read	100	min. load current F1

Modbus register	Functional code	Write/read	Multiplica-tion factor	description
40221	3	read	100	min. load current F2
40321	3	read	100	min. load current F3
• • •				
41621	3	read	100	min. load current F16
40122	3	read		device type F1
40222	3	read		device type F2
40322	3	read		device type F3
• • •				
41622	3	read		device type F16
40123	3	read		hardware version F1
40223	3	read		hardware version F2
40323	3	read		hardware version F3
• • •				
41623	3	read		hardware version F16
40124	3	read		softwareversion major.x.x F1
40224	3	read		softwareversion major.x.x F2
40324	3	read		softwareversion major.x.x F3
• • •				
41624	3	read		softwareversion major.x.x F16
40125	3	read		software version minor.x.x F1
40225	3	read		software version minor.x.x F2
40325	3	read		software version minor.x.x F3
• •				
41625	3	read		software version minor.x.x F16

Modbus register	Functional code	Write/read	factor	description
40126	3	read		software version built F1
40226	3	read		software version built F2
40326	3	read		software version built F3
• • •				
41626	3	read		software version built F16
40127	3	read		serial number F1
40128	3	read		
40227	3	read		serial number F2
40228	3	read		
40327	3	read		serial number F3
40328	3	read		
• • •				
41627	3	read		serial number F16
41628	3	read		
40129	6	write		action command F1
40229	6	write		action command F2
40329	6	write		action command F3
• • •				
41629	6	write		action command F16
45000	6 & 3	read/write		history memory channel no..
45001	3	read		history memory data
• • •				
45400	3	read		history memory data

Table 4: Values and parameters per channel and of the supply module

7.3 Explanation of the Individual Registers which are received

7.3.1 Load Voltage Circuit Protector

Register 47001 – 47016 for channel 1-16, only readable, functional code 3.

The load voltage is determined for each electronic circuit protector and transmitted cyclically to the interface module.
value range: 0-65535 (equals 0.0 – 655.35 V)
data length: 1 word

The load voltage is made available as a standardised 16-bit-value with a solution of 10 mV. Example: measuring value load voltage = 1025 ➞ real measuring value = 10.25 Volt.

Byte (LOW)	**bit 7**	**bit 6**	**bit 5**	**bit 4**	**bit 3**	**bit 2**	**bit 1**	**bit 0**
description	128	64	32	16	8	4	2	1
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Byte (HIGH)	**bit 15**	**bit 14**	**bit 13**	**bit 12**	**bit 11**	**bit 10**	**bit 9**	**bit 8**
description	32768	16384	8192	4096	2048	1024	512	256
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Table 5: Load voltage circuit protector

7.3.2 Load Current Circuit Protector

Register 47101 – 47116 for channel 1 - 16, only readable, functional code 3.
Load current is determined for each electronic circuit protector and transmitted cyclically to the interface module.
value range: 0 - 65535 (equals 0.0 – 655.35 A)
data length: 1 word

The load current is made available as a standardized 16-bit-value with a solution of 10 mA. Measuring value load current = 1025 ➞ real measuring value = 10.25 Ampere.

Byte (LOW)	**bit 7**	**bit 6**	**bit 5**	**bit 4**	**bit 3**	**bit 2**	**bit 1**	**bit 0**
description	128	64	32	16	8	4	2	1
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Byte (HIGH)	**bit 15**	**bit 14**	**bit 13**	**bit 12**	**bit 11**	**bit 10**	**bit 9**	**bit 8**
description	32768	16384	8192	4096	2048	1024	512	256
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Table 6: Load current circuit protector

7.3.3 Status of Interface Module

Register 47200, only readable, functional code 3.
Status of interface module is determined and made available to the superordinate control unit.

value range: 0 – 65535
data length: 1 word

value [dec.]	Definition	explanation
0	DEVICE IS OPERATING PROPERLY	In all other events this value is transmitted
1	MAINTENANCE REQUIRED	This value is transmitted if one of the circuit protectors tripped due to short circuit or overload
2	OUT OF SPECIFICATION	This value is transmitted if one of the circuit protectors detected an undervoltage
3	FUNCTIONAL CHECK	Not supported
4	DEVICE FAILURE	This value is transmitted if one of the connected circuit protectors has set the error-bit in the ***ELBus***® Device Status.

Table 7: Status of interface module

7.3.4 Status Circuit Protector

Register 47201 – 47216 for channel 1 - 16, only readable, functional code 3.
Status for each electronic circuit protector is cyclically transmitted to the interface module. Individual status information is shown in the following table.
value range: 0 – 65535
data length: 1 word

Word	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
description	128	64	32	16	8	4	2	1
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
load output (ON/OFF)								0/1*
short circuit							0/1*	
overload						0/1*		
reserve					0/1*			
reserve				0/1*				
reserve			0/1*					
limit value (reached/ exceeded)		0/1*						
hardware lock (OFF at the device itself)	0/1*							
Word	**bit 15**	**bit 14**	**bit 13**	**bit 12**	**bit 11**	**bit 10**	**bit 9**	**bit 8**
description	32768	16384	8192	4096	2048	1024	512	256
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Word	bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8
reserve								0/1*
reserve							0/1*	
reserve						0/1*		
reserve					0/1*			
reserve				0/1*				
reserve			0/1*					
reserve		0/1*						
reserve	0/1*							

Table 8: status circuit protector

*status not set = 0 / status set = 1

7.3.5 Control of Circuit Protectors

Register 47301 – 47316 for channel 1 - 16, writable, functional codes 6 and 16.

It is possible to access the circuit protectors from the superordinate control unit. Each channel of each electronic circuit protector can be switched on or off or reset. Switch on or off is only possible if corresponding PLCLock Bit is set to false.

value range: 0 – 65535

data length: 1 word

Word	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
description	128	64	32	16	8	4	2	1
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
load output (ON/OFF)								0/1*
reset							0/1*	
overload						0/1*		
reserve					0/1*			
reserve				0/1*				
reserve			0/1*					
reserve		0/1*						
reserve	0/1*							
Word	**bit 15**	**bit 14**	**bit 13**	**bit 12**	**bit 11**	**bit 10**	**bit 9**	**bit 8**
description	32768	16384	8192	4096	2048	1024	512	256
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
reserve								0/1*
reserve							0/1*	

Word	bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8
reserve						0/1*		
reserve					0/1*			
reserve				0/1*				
reserve			0/1*					
reserve		0/1*						
reserve	0/1*							

Table 9: Controlling the circuit protectors

*status not set = 0 / status set = 1

7.3.6 System Commands EM12D-TMB

Register 46001, writable, functional code 6.
Depending to transmitted value one of following functions will be executed.

7.3.6.1 Reset to Factory Settings

Set Value 130 at Register load default Parameter at supply modul.

7.3.6.2 Reset Statistical Information

Set Value 250 at Register reset all Statisticinformation at all channels. It is equally possible to reset these pieces of information channel-wise. This is described in the chapter of the action commands.

7.3.7 Diagnostic Information of the Intelligent Interface Module EM12D-TMB

Register 46002, readable, functional code 3.
The following global errors and diagnostic messages are returned. Evaluation is bit-wise.
value range: 0 – 65535
data length: 1 word (unsigned integer)

Byte [0]	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
description	128	64	32	16	8	4	2	1
TN_SysNoConfig								0/1
TN_SysConfigMismatch							0/1	
						0/1		
					0/1			
TN_SysQueueFull				0/1				
			0/1					
		0/1						
TN_ELBusDown	0/1							

Byte [1]	bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8
description	32768	16384	8192	4096	2048	1024	512	256
								0/1
TN_SysWatchdogReset							0/1	
TN_SysHardwareError						0/1		
(TN_SysBrownout) voltage dip					0/1			
				0/1				
			0/1					
		0/1						
	0/1							

Table 10: Diagnostic information of the intelligent interface module EM12D-TMB

7.3.8 Configuration Data of the EM12D-TMB Intelligent Supply Module

Register 46003, readable, writable, functional code 6 and 3.
This register holds the configuration data of the intelligent supply module EM12D-TMB. Evaluation is bitwise.
value range: Bit 0 - 15
Default value: power saving mode de-activated, freeze active
data length: 1 word (unsigned integer)

Byte [0]	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
description	128	64	32	16	8	4	2	1
								0/1
offline behaviour (unfreeze/freeze)							0/1	
power saving mode						0/1		
					0/1			
				0/1				
			0/1					
		0/1						
	0/1							
Byte [1]	**bit 15**	**bit 14**	**bit 13**	**bit 12**	**bit 11**	**bit 10**	**bit 9**	**bit 8**
description	32768	16384	8192	4096	2048	1024	512	256
								0/1
							0/1	
						0/1		
					0/1			

Byte [1]	bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8
				0/1				
			0/1					
		0/1						
	0/1							

Table 11: Configuration data of the EM12D-TMB intelligent supply module

Behaviour in the event of communication disruption:

Bit 1 unfreeze = 0 all load outputs (channels) of the circuit protectors are switched off and the EM12D-TMB changes into the operating mode “independent operation”.
freeze = 1 all load outputs (channels) of the circuit protectors remain in their current condition and the EM12D-TMB changes into the operating mode “Independent operation”.

Bit 2 power saving mode deactivated = 0 LEDs always have full illuminating power
power saving mode activated = 1 LEDs have reduced illuminating power in the OK condition

7.3.9 Configure Controllability of the Channels via PLCLock in the EM12D-TMB Supply Module
Register 46004, readable, writable, functional code 3, 6 and 16.
The status PLCLock is fed back for all possible 16 channels via one word with one bit each representing the status of a channel:
value range: Bit 0 - 15
data length: 1 word (unsigned integer)

Byte [0]	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
description	128	64	32	16	8	4	2	1
PLCLock channel 1								0/1
PLCLock channel 2							0/1	
PLCLock channel 3						0/1		
PLCLock channel 4					0/1			
PLCLock channel 5				0/1				
PLCLock channel 6			0/1					
PLCLock channel 7		0/1						
PLCLock channel 8	0/1							
Byte [1]	**bit 15**	**bit 14**	**bit 13**	**bit 12**	**bit 11**	**bit 10**	**bit 9**	**bit 8**
description	32768	16384	8192	4096	2048	1024	512	256
PLCLock channel 9								0/1
PLCLock channel 10							0/1	
PLCLock channel 11						0/1		

Byte [1]	bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8
PLCLock channel 12					0/1			
PLCLock channel 13				0/1				
PLCLock channel 14			0/1					
PLCLock channel 15		0/1						
PLCLock channel 16	0/1							

Table 12: Configure controllability of the channels via PLCLock in the EM12D-TMB supply module

Setting the bit means that the channel cannot be switched on or off via the control unit. This means that voltage is applied to the output of the channel when the supply voltage is switched on (provided the channel did not trip previously).

7.3.10 Device Type of EM12D-TMB Supply Module

Register 46007, readable, functional code 3.
The register holds information on the device type of the intelligent supply module EM12D-TMB.
value range: 0 – 65535
data length: 1 word

Value	Device type
1	EM12D-TMB

7.3.11 Serial Number EM12D-TMB

Register 46008 - 46009, readable, functional code 3.
These two registers hold information on the serial no. of the intelligent supply module EM12D-TMB.
value range: 0 – 4294967295
data length: 2 word

Byte [1] (LOW)	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
description	128	64	32	16	8	4	2	1
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Byte [2]	**bit 15**	**bit 14**	**bit 13**	**bit 12**	**bit 11**	**bit 10**	**bit 9**	**bit 8**
Beschreibung	32768	16384	8192	4096	2048	1024	512	256
Wert	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Byte [3]	bit 19	bit 18	bit 17	bit 16
description	524288	262144	131072	65536
value	0/1	0/1	0/1	0/1

Byte [3]	**bit 23**	**bit 22**	**bit 21**	**bit 20**
description	8388608	4194304	2097152	1048576
value	0/1	0/1	0/1	0/1

Byte [4] (HIGH)	**bit 27**	**bit 26**	**bit 25**	**bit 24**
description	134217728	67108864	33554432	16777216
value	0/1	0/1	0/1	0/1
Byte [4] (HIGH)	**bit 31**	**bit 30**	**bit 29**	**bit 28**
description	2147483648	1073741824	536870912	268435456
value	0/1	0/1	0/1	0/1

Table 13: Serial number EM12D-TMB

7.3.12 Hardware Version EM12D-TMB

Register 46010, readable, functional code 3.
This register holds information on the hardware version of the intelligent supply module EM12D-TMB.
value range: 0 – 65535
data length: 1 word

7.3.13 Software Version EM12D-TMB

Register 46011 – 46013, readable, functional code 3.
This register contain the software version of the intelligent supply module EM12D-TMB.
value range: major.minor.build
data length: 3 word

	description	**format**	**register**
Software version	major.x.x	Word	x1
	x.minor.x	Word	x2
	x.x.build	Word	x3

Table 14: Software version EM12D-TMB

7.3.14 Application Specific Tag EM12D-TMB

Register 46014 – 46029 for channel 1 - 16, writable, functional codes 3 and 16.
A customer-specific text can be entered here. The text can hold up to 32 characters. One register holds two characters.
value range: text
data length: 16 word

7.3.15 Current Rating REX12D/REX22D

Register 4(01…16)01 for channel 1 - 16, readable, writable, functional codes 3 and 6.

The parameter returns the current rating of the channel in Amp, depending on the device type. This value is both readable and writable.

value range: 1 - 10 (integer)

default value: 1

data length: 1 word

7.3.16 Limit Value Load Current REX12D/REX22D

Register 4(01...16)02 for channel 1 - 16, readable, writable, functional codes 3 and 6.

The parameter determines at how many percent of the rated current the channel will signal "limit value exceeded". This parameter is readable/writable.

value range: 50 % - 100 % (whole numbers)

default value: 80 %

data length: 1 word

7.3.17 Channel Diagnosis REX12D/REX22D

Register 4(01...16)10 for channel 1 - 16, readable, functional code 3.

This register contains diagnostic information about connected protector channel. For the meaning of the values please see the following table.

value range: 0 – 255

data length: 1 word

	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
description	128	64	32	16	8	4	2	1
Detected unsupported device. An unsupported circuit protector was included in the system.	0	0	0	0	0	0	0	1
The transmitted device parameters were rejected by the circuit protector, because they are outside of the valid range.	1	0	0	1	0	0	0	0
Reserve	1	0	0	1	0	0	0	1
Channel locked. The channel was locked out by actuating the integral momentary switch and cannot be switched on by the intelligent supply module.	1	0	0	1	0	0	1	0

	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Low voltage detected. The operating voltage is below the safe range.	1	0	0	1	0	0	1	1
Reserve	1	0	0	1	0	1	0	0
Device tripped. A reset command has to be sent.	1	0	0	1	1	0	0	0
No error	0	0	0	0	0	0	0	0
The circuit protector is not parameterized.	1	0	0	1	0	1	1	1
Internal error detected.	1	0	0	1	1	0	0	0
Reserve	1	0	0	1	1	0	0	1
Reserve	1	0	0	1	1	0	1	1
Internal *ELBus*® error detected (temporary disruption). This error can be caused by strong EMI.	1	0	0	1	1	0	1	1
Reserve	1	0	0	1	1	1	0	0
No device available.	0	0	0	0	0	0	1	0

Table 15: Channel diagnosis REX12D/REX22D

7.3.18 Error Memory REX12D/REX22D

Register 4(01...16)11 for channel 1 - 16, readable, functional code 3.
Parameters holds the internal error memory of the circuit protector.
value range: 0 – 255
data length: 1 word

	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
description	128	64	32	16	8	4	2	1
no parameters available								0/1*
error parameter memory							0/1*	
error programme memory						0/1*		
error data memory					0/1*			
error control unit				0/1*				
reset through watchdog			0/1*					
Reserve								
Reserve								

Table 16: Error memory REX12D/REX22D

*error not available = 0 / error available = 1

7.3.19 Trip Counter REX12D/REX22D

Register 4(01..16)12 for channel 1 - 16, readable, functional code 3.

The number of all trippings occurred up to now are stored in this parameter. Each trip operation of the circuit protector is stored and added. Thus, the service personnel has an exact overview of the number of trip operations.

7.3.20 Trip Reason REX12D/REX22D

Register 4(01...16)13 for channel 1 - 16, readable, functional code 3.
The parameter holds the latest trip reason of the channel.
value range: 0, 1, 2, 4
data length: 1 word

	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
description	128	64	32	16	8	4	2	1
no reason for trip available (0)	0	0	0	0	0	0	0	0
short circuit (1)	0	0	0	0	0	0	0	1
overload (2)	0	0	0	0	0	0	1	0
internal failure (4)	0	0	0	0	0	1	0	0

Table 17: Trip reason REX12D/REX22D

7.3.21 Voltage Average REX12D/REX22D

Register 4(01...16)16 for channel 1 - 16, readable, functional code 3.
Contains the voltage average of the channel since the last reset.
value range: 0 - 65535 (equals 0.0 – 655.35 V)
data length: 1 word

Byte (LOW)	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
description	128	64	32	16	8	4	2	1
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Byte (HIGH)	**bit 15**	**bit 14**	**bit 13**	**bit 12**	**bit 11**	**bit 10**	**bit 9**	**bit 8**
description	32768	16384	8192	4096	2048	1024	512	256
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Table 18: Mean value voltage REX12D/REX22D

The voltage average is made available as a standardised 16-bit-value with a resolution of 10 mV.

Example: measuring value operating voltage = 2512 ➞ real measuring value = 25.12 Volt

7.3.22 Maximum Voltage REX12D/REX22D

Register 4(01...16)17 for channel 1 - 16, readable, functional code 3.
Contains the highest measured voltage of the channel since the last reset.
value range: 0 - 65535 (equals 0.0 – 655.35 V)
data length: 1 word

Byte (LOW)	**bit 7**	**bit 6**	**bit 5**	**bit 4**	**bit 3**	**bit 2**	**bit 1**	**bit 0**
description	128	64	32	16	8	4	2	1
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Byte (HIGH)	**bit 15**	**bit 14**	**bit 13**	**bit 12**	**bit 11**	**bit 10**	**bit 9**	**bit 8**
description	32768	16384	8192	4096	2048	1024	512	256
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Table 19: Maximum voltage REX12D/REX22D

The maximum voltage is made available as a standardised 16-bit-value with a resolution of 10 mV.

Example: measuring value operating voltage = 2512 ➞ real measuring value = 25.12 Volt.

7.3.23 Minimum Voltage REX12D/REX22D

Register 4(01...16)18 for channel 1 - 16, readable, functional code 3.
Contains the highest measured voltage of the channel since the last reset.
value range: 0 - 65535 (equals 0.0 – 655.35 V)
data length: 1 word

Byte (LOW)	**bit 7**	**bit 6**	**bit 5**	**bit 4**	**bit 3**	**bit 2**	**bit 1**	**bit 0**
description	128	64	32	16	8	4	2	1
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Byte (HIGH)	**bit 15**	**bit 14**	**bit 13**	**bit 12**	**bit 11**	**bit 10**	**bit 9**	**bit 8**
description	32768	16384	8192	4096	2048	1024	512	256
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Table 20: Minimum voltage channel

The minimum voltage is made available as a standardised 16-bit-value with a resolution of 10 mV.

Example: measuring value operating voltage = 2512 ➞ real measuring value = 25.12 Volt

7.3.24 Current Average REX12D/REX22D

Register 4(01...16)19 for channel 1 - 16, readable, functional code 3.

Contains the current average of the channel since the last reset.

value range: 0 - 65535 (equals 0.0 – 655.35 V)

data length: 1 word

Byte (LOW)	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
description	128	64	32	16	8	4	2	1
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Byte (HIGH)	**bit 15**	**bit 14**	**bit 13**	**bit 12**	**bit 11**	**bit 10**	**bit 9**	**bit 8**
description	32768	16384	8192	4096	2048	1024	512	256
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Table 21: Current average channel

The current average is made available as standardized 16-bit value with a resolution of 10 mA (resolution of the channel is one decimal place, for simplification it is shown identically with the voltage with 2 decimal places).

Example: measuring value operating voltage = 710

-> real measuring value = 7.10 Ampere

7.3.25 Maximum Current REX12D/REX22D

Register 4(01...16)20 for channel 1 - 16, readable, functional code 3.

Contains the highest current value of the channel since the last reset.

value range: 0 - 65535 (equals 0.0 – 655.35 A)

data length: 1 word

Byte [9] (LOW)	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
description	128	64	32	16	8	4	2	1
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Byte [10] (HIGH)	**bit 15**	**bit 14**	**bit 13**	**bit 12**	**bit 11**	**bit 10**	**bit 9**	**bit 8**
description	32768	16384	8192	4096	2048	1024	512	256
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Table 22: Maximum current channel

The maximum current is made available as standardized 16-bit value with a resolution of 10 mA (resolution of the channel is one decimal place, for simplification it is shown identically with the voltage with 2 decimal places). Example: measuring value operating voltage = 710

->➞ real measuring value = 7.10 Ampere

7.3.26 Minimum Current REX12D/REX22D

Register 4(01...16)21 for channel 1 - 16, readable, functional code 3.
Contains the lowest current value of the channel since the last reset.
value range: 0 - 65535 (equals 0.0 – 655.35 A)
data length: 1 word

Byte (LOW)	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
description	128	64	32	16	8	4	2	1
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Byte (HIGH)	**bit 15**	**bit 14**	**bit 13**	**bit 12**	**bit 11**	**bit 10**	**bit 9**	**bit 8**
description	32768	16384	8192	4096	2048	1024	512	256
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Table 23: Minimum current channel

The minimum current is made available as standardized 16-bit value with a resolution of 10 mA (resolution of the channel is one decimal place, for simplification it is shown identically with the voltage with 2 decimal places). Example: measuring value operating voltage = 710

->➞ real measuring value = 7.10 Ampere

7.3.27 Device Type REX12D/REX22D

Register 4(01...16)22 for channel 1 - 16, readable, functional code 3.
The parameter indicates the type of device with which the interface module is communicating.
The word contains information on the device type of circuit protector.
value range: 0 - 65535
failure: Circuit protector type not available (255)
data length: 1 word

REX12D type

Byte [9[(Low)	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
description	128	64	32	16	8	4	2	1
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
REX12D (144)	1	0	0	1	0	0	0	0
Byte [10] (High)	**bit 7**	**bit 6**	**bit 5**	**bit 4**	**bit 3**	**bit 2**	**bit 1**	**bit 0**
description	128	64	32	16	8	4	2	1
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
TA1-100 (9)	0	0	0	0	1	0	0	1
TA2-100 (10)	0	0	0	0	1	0	1	0
TE2-100 (14)	0	0	0	0	1	1	1	0

Byte [10] (High)	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
TE2-100-CL2 (46)	0	0	1	0	1	1	1	0
TB1-100 (41)	0	0	1	0	1	0	0	1
TA1-100-CL2 (73)	0	1	0	0	1	0	0	1
TB1-100-CL2 (105)	0	1	1	0	1	0	0	1
TA2-100-CL2 (42)	0	0	1	0	1	0	1	0
TE2-101 (78)	0	1	0	0	1	1	1	0
TE2-101-CL2 (110)	0	1	1	0	1	1	1	0
TA1-101 (137)	1	0	0	0	1	0	0	1
TA2-101 (74)	0	1	0	0	1	0	1	0
TB1-101 (169)	1	0	1	0	1	0	0	1
TA1-101-CL2 (201)	1	1	0	0	1	0	0	1
TB1-101-CL2 (233)	1	1	1	0	1	0	0	1
TA2-101-CL2 (106)	0	1	1	0	1	0	1	0

Table 24: Device information channel: REX12D device type

REX22D type

Byte [9[(Low)	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
description	128	64	32	16	8	4	2	1
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
REX22D (145)	1	0	0	1	0	0	0	1
Byte [10] (High)	**bit 7**	**bit 6**	**bit 5**	**bit 4**	**bit 3**	**bit 2**	**bit 1**	**bit 0**
description	128	64	32	16	8	4	2	1
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
TD2-100-CL2 (10)	0	0	0	0	1	0	1	0
TD2-100 (42)	0	0	1	0	1	0	1	0
TD1-100 (9)	0	0	0	0	1	0	0	1
TA1-100 (41)	0	0	1	0	1	0	0	1
TE2-100 (14)	0	0	0	0	1	1	1	0
TE2-100-CL2 (46)	0	0	1	0	1	1	1	0
TD2-101-CL2 (74)	0	1	0	0	1	0	1	0
TD2-101 (106)	0	1	1	0	1	0	1	0
TD1-101 (73)	0	1	0	0	1	0	0	1
TA1-101 (105)	0	1	1	0	1	0	0	1

Byte [10] (High)	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
TE2-101 (78)	0	1	0	0	1	1	1	0
TE2-101-CL2 (110)	0	1	1	0	1	1	1	0
TE1-100 (13)	0	0	0	0	1	1	0	1
TE1-101 (45)	0	0	1	0	1	1	0	1

Table 25: Device information channel: REX22D device type

7.3.28 Hardware Version REX12D/REX22D

Register 4(01...16)23 for channel 1 - 16, readable, functional code 3.

Holds the hardware version of the corresponding channel: The hardware version is made available in whole numbers.

value range: 0 - 65535

error: Hardware version not available (65535)

data length: 1 word

Byte [7] (LOW)	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
description	128	64	32	16	8	4	2	1
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Byte [8] (HIGH)	**bit 15**	**bit 14**	**bit 13**	**bit 12**	**bit 11**	**bit 10**	**bit 9**	**bit 8**
description	32768	16384	8192	4096	2048	1024	512	256
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Table 26: Device information channel: hardware version

7.3.29 Software Version REX12D/REX22D

Register 4(01...16)24 - 4(01..16)26 for channel 1 - 16, readable, functional code 3.

Holds the software version version of the corresponding channel: The software version is made available coded. It is coded as follows:

value range: major.minor.build

data length: 3 word

	description	format	register
Software version	major.x.x	Word	x24
	x.minor.x	Word	x25
	x.x.build	Word	x26

Table 27: Device information channel: Software version

7.3.30 Serial Number REX12D/REX22D

Register 4(01...16)27 - 4(01..16)28 for channel 1 - 16, readable, functional code 3.
Holds the serial number of the corresponding channel:
value range: 0 - 4294967295
error: Serial number not available (4294967295)
data length: 2 word

Byte [1] (LOW)	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
description	128	64	32	16	8	4	2	1
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Byte [2]	**bit 15**	**bit 14**	**bit 13**	**bit 12**	**bit 11**	**bit 10**	**bit 9**	**bit 8**
description	32768	16384	8192	4096	2048	1024	512	256
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Byte [3]	bit 19	bit 18	bit 17	bit 16
description	524288	262144	131072	65536
value	0/1	0/1	0/1	0/1
Byte [3]	**bit 23**	**bit 22**	**bit 21**	**bit 20**
description	8388608	4194304	2097152	1048576
value	0/1	0/1	0/1	0/1

Byte [4] (HIGH)	bit 27	bit 26	bit 25	bit 24
description	134217728	67108864	33554432	16777216
value	0/1	0/1	0/1	0/1
Byte [4] (HIGH)	**bit 31**	**bit 30**	**bit 29**	**bit 28**
description	2147483648	1073741824	536870912	268435456
value	0/1	0/1	0/1	0/1

Table 28: Device information channel: serial number

7.3.31 Action Commands Channel REX12D/REX22D

Register 4(01...16)29 for channel 1 - 16, readable, functional code 6.
One byte is transmitted, which carries out the following functions depending on its value.
value range: 115 - 120
data length: 1 byte (unsigned character)

Byte [1]	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
description	128	64	32	16	8	4	2	1
value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Reset error memory (115)	0	1	1	1	0	0	1	1
Reset trip counter (116)	0	1	1	1	0	1	0	0
reset minimum statistics (117)	0	1	1	1	0	1	0	1
reset maximum statistics (118)	0	1	1	1	0	1	1	0
reset medium value statistics (119)	0	1	1	1	0	1	1	1
reset all statistical values (120)	0	1	1	1	1	0	0	0

Table 29: Action commands channel REX12D/REX22D

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