

# MANUAL

EB-MODBUS-RTU  
EB-COMMUNICATION MODULE



Easy-B Circuit breaker  
**EB-MODBUS-RTU**

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## 1. ORDERING DATA

The following table shows the ordering data for the Easy B MODBUS RTU module.

*Table 1: Ordering number*

Variant	Input voltage	Channels
<b>EB-MODBUS-RTU</b>	24 Vdc	40

## 2. GENERAL INFORMATIONS

### 2.1 Safety instructions

Please read these warnings and safety instructions carefully before operating the appliance. The device may only be installed by specialised and qualified personnel. In the event of malfunctions or damage, switch off the supply voltage immediately and send the device to BLOCK Transformatoren-Elektronik GmbH for inspection. The device does not contain any service parts. If an internal fuse blows, there is most probably an internal defect in the appliance. The data given are for product description purposes only and are not to be regarded as warranted characteristics in the legal sense.

### 2.2 Qualified personnel

The product associated with this documentation may only be handled by qualified personnel in compliance with the documentation associated with the respective task, in particular the safety instructions and warnings contained therein. Qualified personnel can ensure, based on their training and experience, that the use of the described product fulfils all safety requirements as well as the applicable provisions, regulations, standards and laws.

### 2.3 Intended use

This device is designed for installation in an enclosure and is suitable for use in general electronic devices, such as industrial control systems, office equipment, communication devices or measuring devices. Do not use this device in the control systems of aeroplanes, trains or nuclear facilities where a malfunction could result in serious injury or danger to life.

### 2.4 Disclaimer

The contents of this publication have been checked with the utmost care to ensure that they correspond to the hardware and software described. Nevertheless, there may be discrepancies between the product and the documentation. Deviations may also occur due to the continuous further development of the product. For this reason, we cannot guarantee complete conformity. Should this documentation contain errors, we reserve the right to make any necessary corrections without prior notice.



**ATTENTION**

Switch off the input voltage before carrying out installation, maintenance or modification work and secure it against unintentional switching on again.



**ATTENTION**

Do not make any changes or attempts to repair the appliance. Do not open the device!



**ATTENTION**

Prevent the ingress of foreign objects such as paper clips and metal parts.



**ATTENTION**

Do not operate the appliance in a damp environment or in an environment where condensation or condensation is to be expected.



**ATTENTION**

Do not touch the housing during operation or shortly after switching off.  
Hot surfaces can cause injuries.

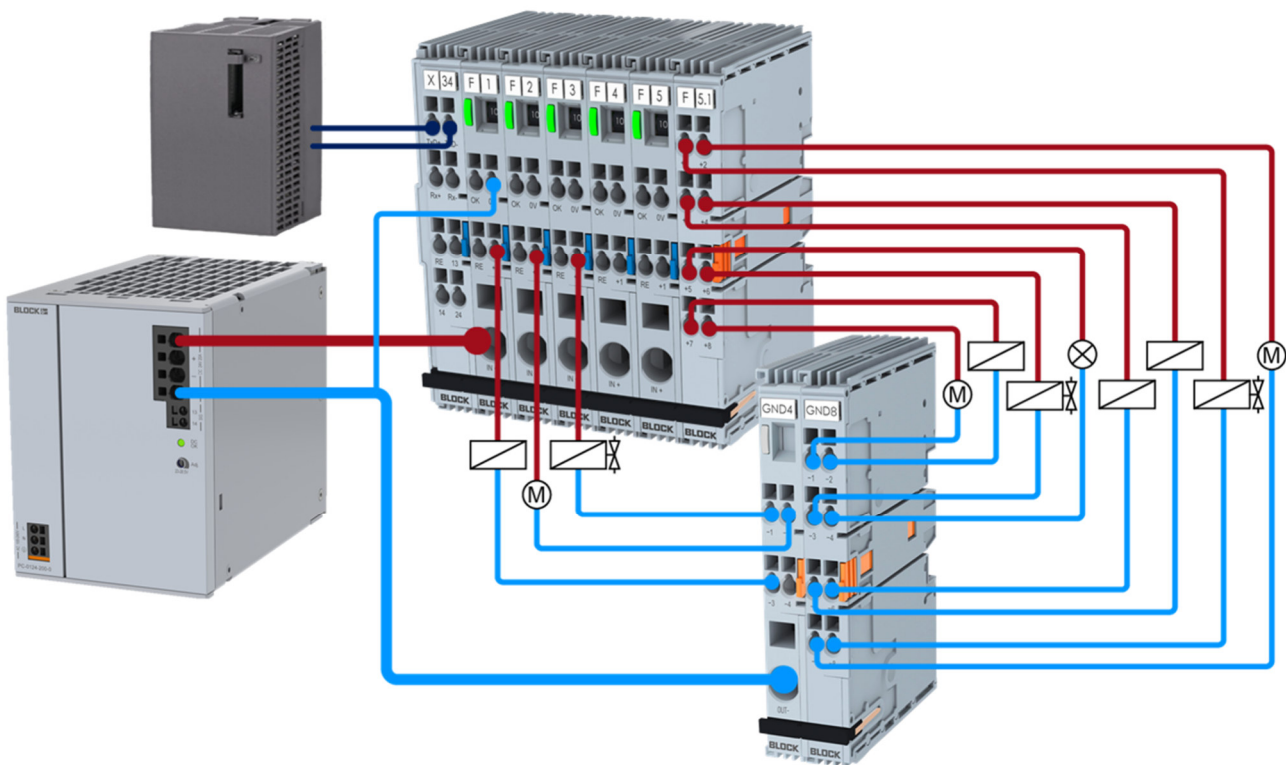
### 3. Product description

#### 3.1 Description of the communication modules

The EB-MODBUS-RTU communication module serves as an interface for connection to a higher-level control system and is compatible with EB-08, EB-18 and EB-38 circuit breakers.

To ensure fault-free operation, the maximum number of 40 circuit breakers must not be exceeded.

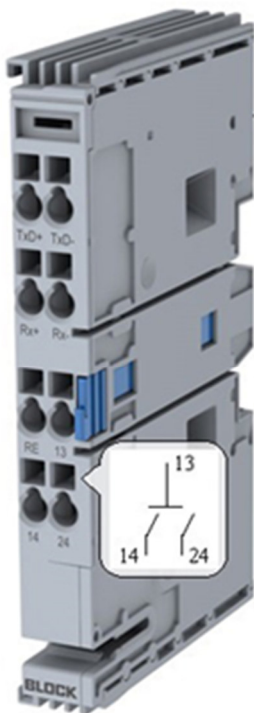
#### 3.2 Functional sketch



**NOTE:**

Deviating wiring can lead to the destruction of the modules.

### 3.3 Connection terminals



#### Communication

TxD+, TxD-, Rx+, Rx- 2/4-wire connections

#### Signal input

RE 24V collective reset input

#### Signal Contacts

13 Potential-free input  
14 Channel triggered and/or switched off  
24 Rated current at 90%

#### Care

IN+ supply voltage input +24VDC (18 - 30V)

## 4. Commissioning

In order for the EB-MODBUS-RTU to communicate with the PLC, a corresponding dip switch configuration must be made.

The MODBUS module initialises itself automatically by applying the supply voltage to the **IN+** terminal.

After the supply voltage is applied, all connected circuit breakers are addressed in sequence and then switched on selectively one after the other.

Using the EB-MODBUS-RTU module, a maximum of up to 40 circuit breaker channels can be addressed and managed.



#### NOTE:

When applying the supply voltage to **IN+**, it is essential that a separate GND line is connected to one of the circuit breaker channels.



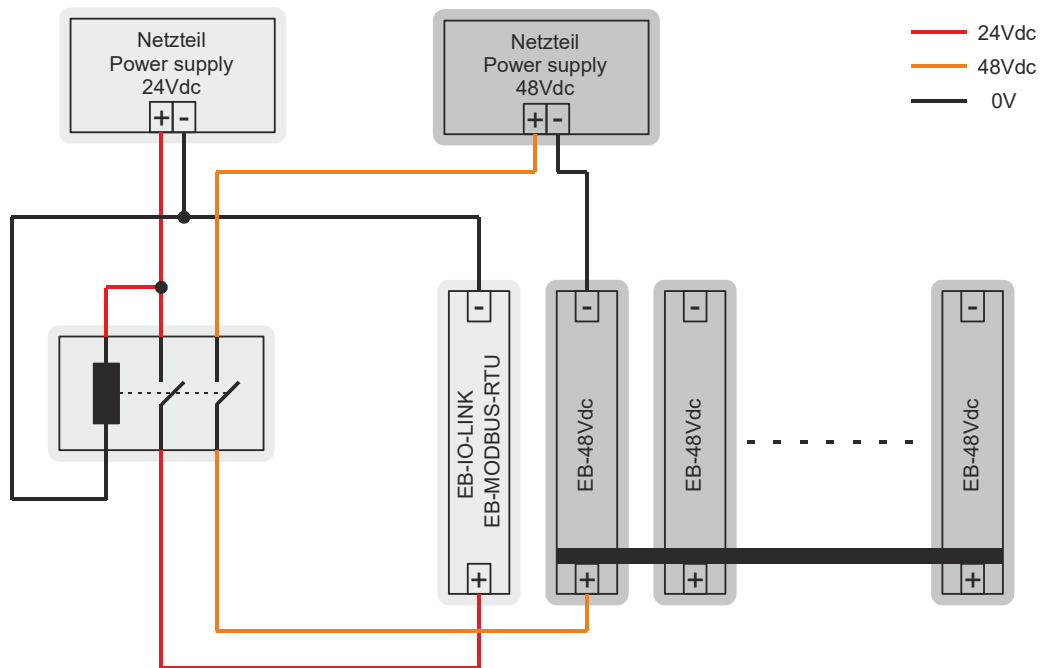
#### NOTE:

Commissioning without connected circuit breaker modules can lead to incorrect behaviour.

## 4.1 48V operation

The MODBUS-RTU communication module only works with a supply voltage of 24V. For this reason, the MODBUS-RTU module may only be used in conjunction with the EASY-B 48V circuit breakers with separate supply voltages. Feeding with the EB-BAR in conjunction with the 48V circuit breakers is not permitted.

One solution for supplying the MODBUS-RTU module would be to feed the circuit breaker modules and the communication module separately via a contactor. This would allow the circuit breakers to be operated with 48V and the MODBUS-RTU module with 24V.



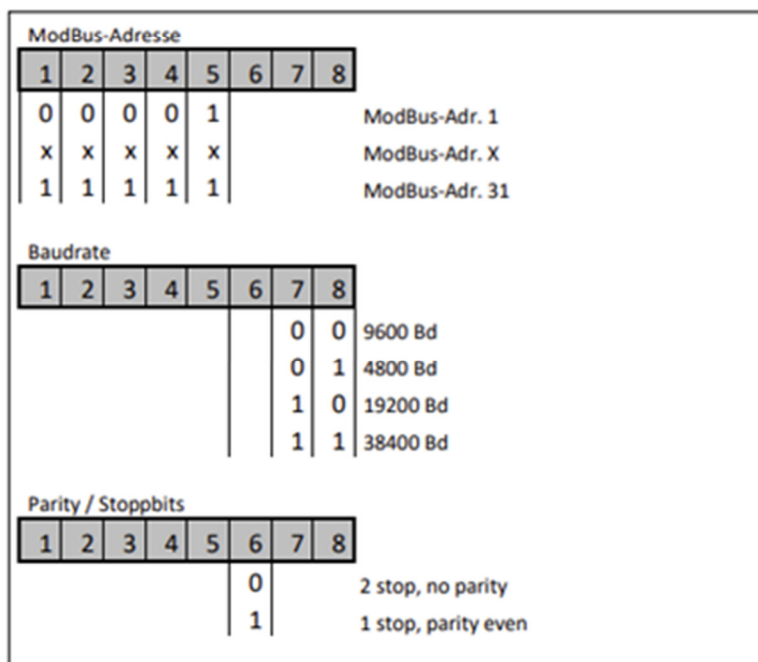
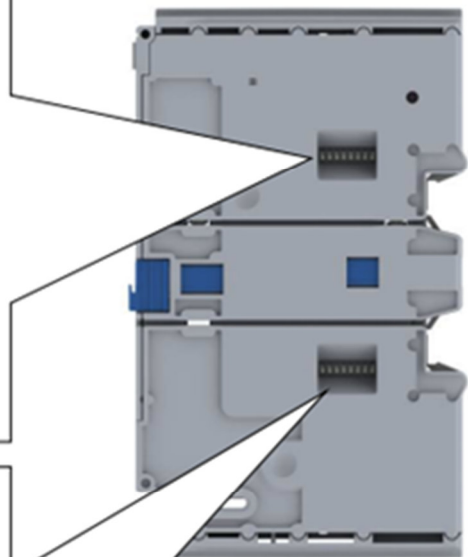
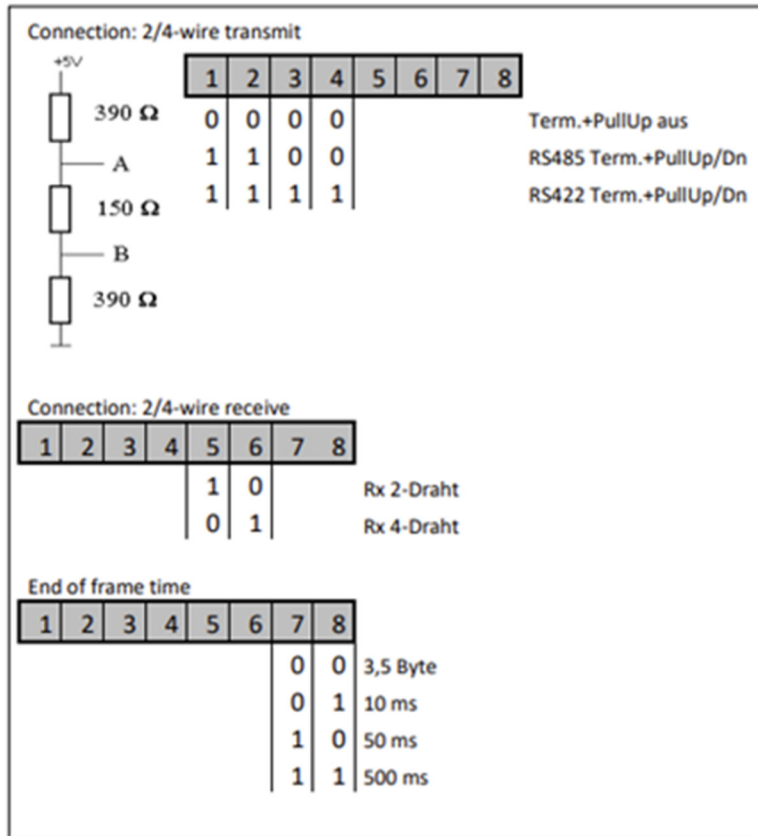
### ATTENTION

48V operation only at your own risk!



## 5. Configuration

### 5.1 Dip switch

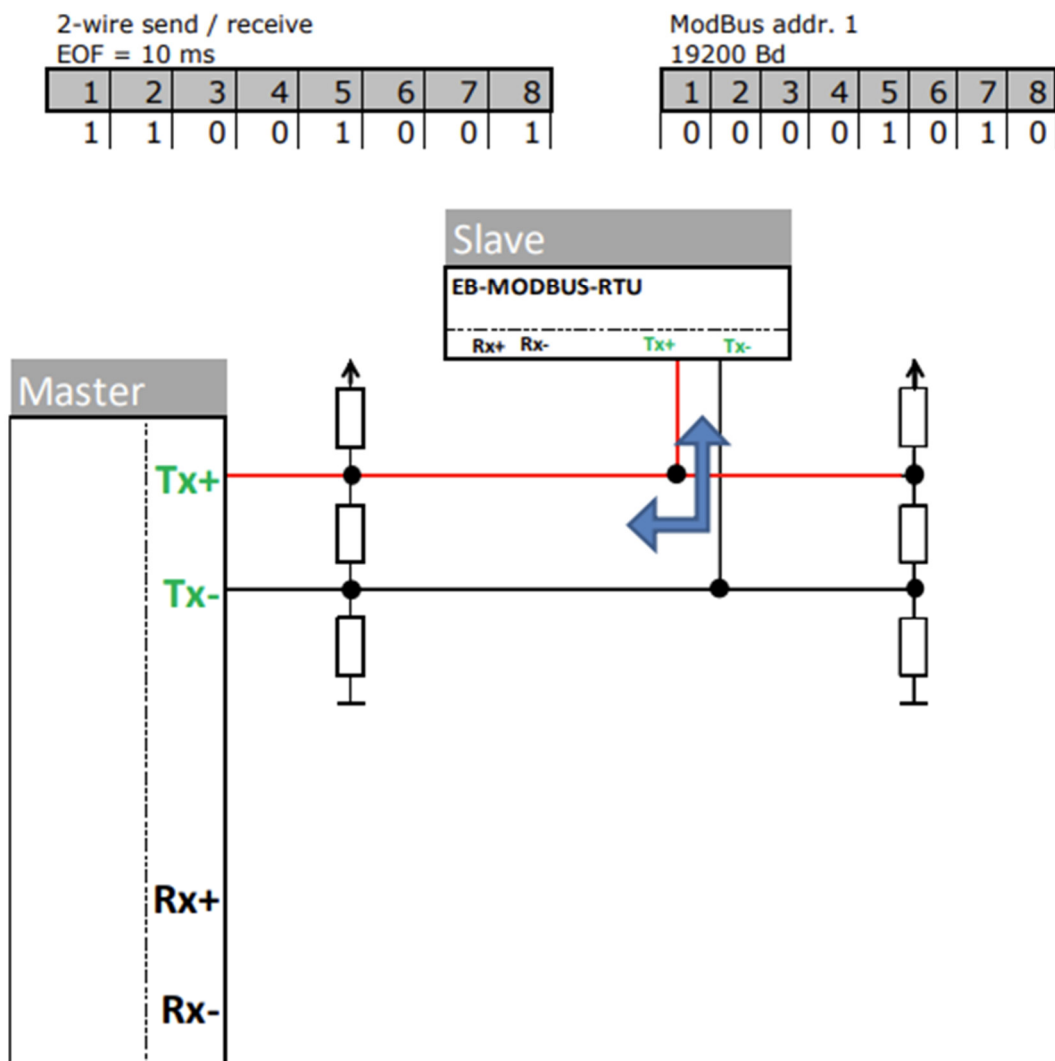


## 5.2 Byte Information

The information byte consists of:

- 1 Startbit
- 8 Informations bits
- 2 stop bits without parity bit or 1 stop, parity bit even

## 5.3 Configuration Example 2-Wire



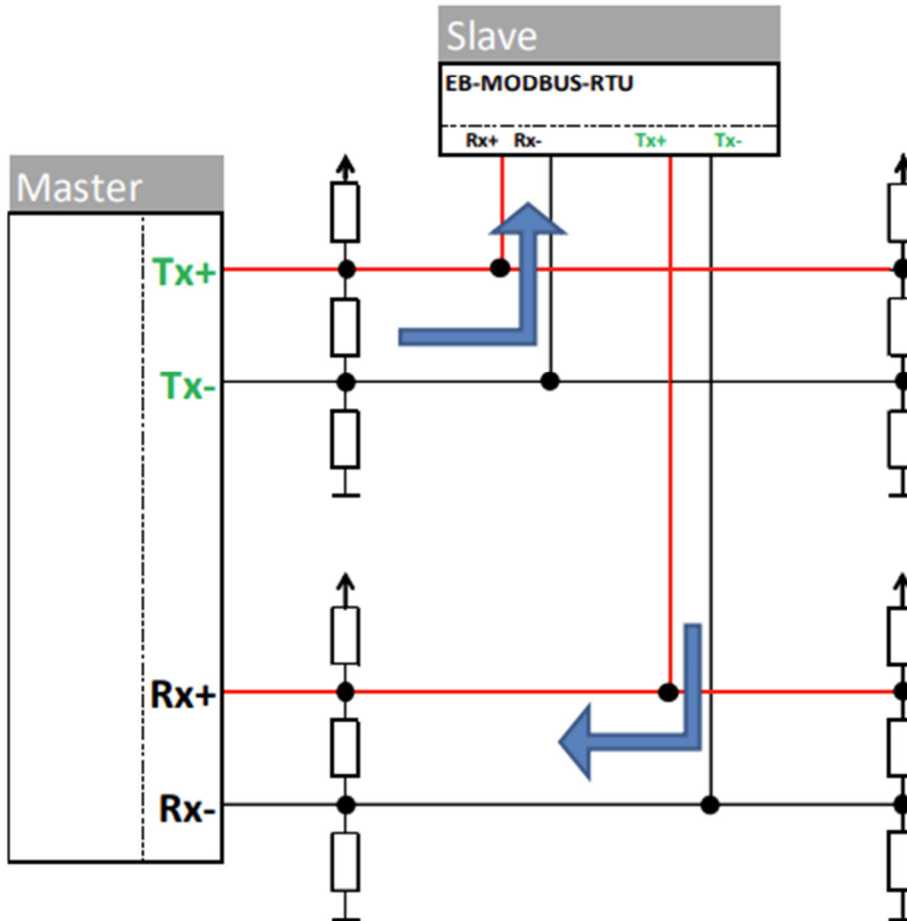
### 5.4 Configuration Example 4-Wire

2-wire send / receive  
EOF = 10 ms

1	2	3	4	5	6	7	8
1	1	1	1	0	1	0	1

ModBus addr. 1  
19200 Bd

1	2	3	4	5	6	7	8
0	0	0	0	1	0	1	0



## 6. Communication and Examples

### 6.1 Loopback Diagnostic Test

MODBUS		DATA				MODBUS	
Addr.	Function					CRC-L	CRC-H
1	8	0	0	AA	55	5E	94

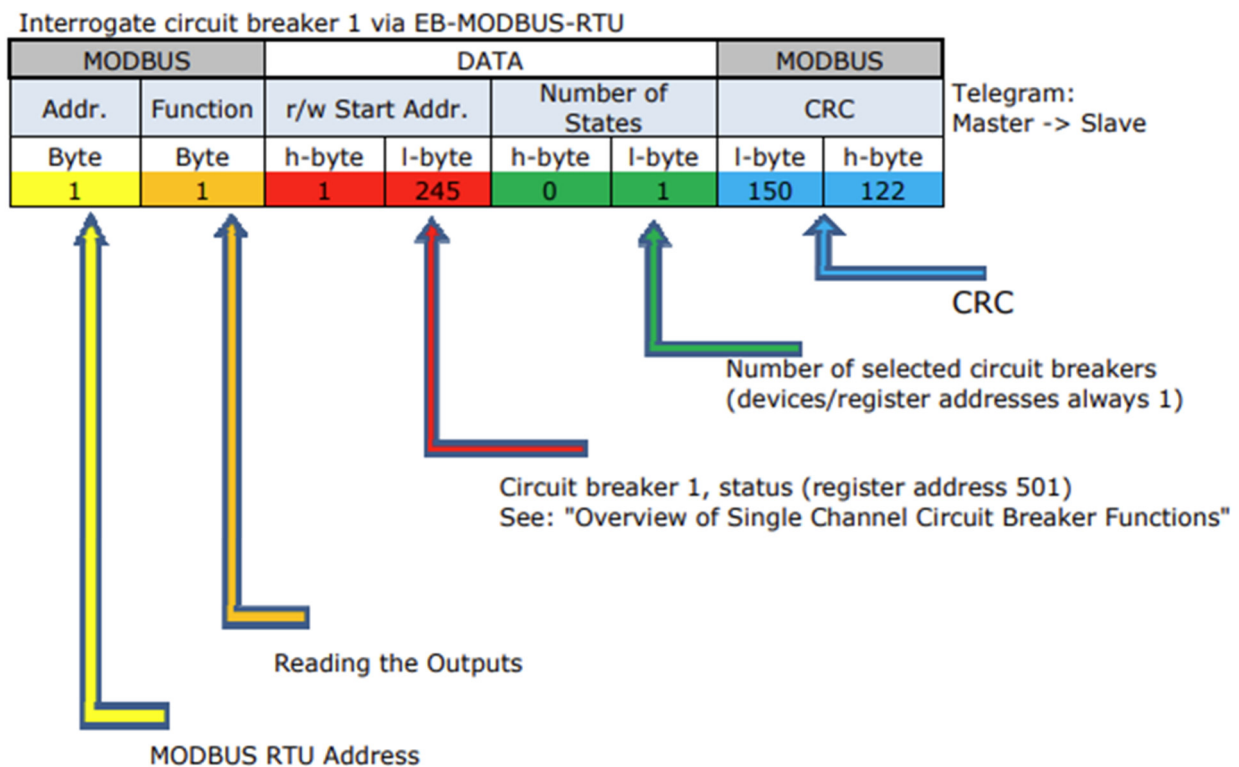
Telegram: Master -> Slave

MODBUS		DATA				MODBUS	
Addr.	Function					CRC-L	CRC-H
1	8	0	0	AA	55	5E	94

Telegram: Slave -> Master

### 6.2 Status Check



### 6.3 Error Message

Addr.	Function	Data	Description
X	Func. + 0x80	1	Use of an unsupported short code
		2	Use of an unauthorized memory register
		3	Wrong value
		6	Device cannot process request at the moment. Repeat request later
		8	Field is read-only

## 7. Register Overview

The following data can be set or retrieved via EB-MODBUS-RTU.

### 7.1 EB-MODBUS-RTU

**Table 1:** EB-MODBUS-RTU register overview

Function	Query		Response	
	Starting Address	Value	Description	
Query status output 14 READ_COIL_Status	1		0x00 0x01	Off Switched off by circuit breaker function (tripped)
Query status output 24 READ_COIL_Status	1	2	0x00 0x01	Off Switched on, current above warning threshold (90% nominal current)
Query device ID READ_HOLDING_REGISTERS	3	4	1-2. byte 3-6. byte 7-10. byte 11-12. byte	Firmware version Production order Serial number Variant (see EB variants)
Query options READ_HOLDING_REGISTERS	3	5	high byte low byte high byte low byte	Options (see Options) Options (see Options) Options Complement (see Options) Options Complement (see Options)
Query supply voltage READ_HOLDING_REGISTERS	3	6	high byte low byte	Voltage in mV Voltage in mV
Set options WRITE_MULTIPLE_REGISTERS	16	5	high byte low byte high byte low byte	<b>For all devices in the network</b> Options (see Options) Options (see Options) Options Complement (see Options) Options Complement (see Options)

## 7.2 EB Single Channel Circuit Breaker

**Table 2:** Register overview for EB-0824-100-0, EB-1824-xxx-0 and EB-3824-100-0

Function	Query			Response	
	Circuit Breakers	Starting Address	Value	Description	
Query status output OK READ_COIL_Status	1	1 - 40	101 - 140	Off On	
Query status only READ_HOLDING_REGISTERS	1	40	201 - 240	high byte see EB status byte	
Query actual current READ_HOLDING_REGISTERS	1	40	301 - 340	high byte low byte in mA in mA	
Query nominal current READ_HOLDING_REGISTERS	1	40	401 - 440	high byte low byte in mA in mA	
Query combination status READ_HOLDING_REGISTERS	1	40	501 - 540	<b>1. byte</b> 0x00 No events 0x01 Signal contact 14 (off / tripped) 0x02 Signal contact 24 (nominal current >= 90%)  <b>2. byte</b> EB circuit breaker status See EB status byte  <b>3-4. byte</b> high byte EB circuit breaker actual current low byte in mA  <b>5-6. byte</b> high byte EB circuit breaker nominal current low byte in mA  <b>7-8. byte</b> high byte EB-MODBUS-RTU Power Supply low byte in mV	
Query device ID READ_HOLDING_REGISTERS	1	40	601 - 640	1-2. byte Firmware version 3-6. byte Production order 7-10. byte Serial number 11-12. byte Variant (see EB variants)	
Query options READ_HOLDING_REGISTERS	1	40	701 - 740	high byte Options (see Options) low byte Options (see Options) high byte Options Complement (see Options) low byte Options Complement (see Options)	
Set status WRITE_SINGLE_REGISTER	1	40	501 - 540	0x01 Off 0x02 On 0x04 Reset	
Set status WRITE_SINGLE_REGISTER	All		500	0x01 Off 0x02 On 0x04 Reset <b>For all devices in the network</b>	
Set nominal current WRITE_SINGLE_REGISTER	1	40	401 - 440	high byte Nominal current in mA low byte Nominal current in mA	
Set options WRITE_MULTIPLE_REGISTERS	1	40	701 - 740	Only for one device high byte Options (see Options) low byte Options (see Options) high byte Options Complement (see Options) low byte Options Complement (see Options)	

### 7.3 EB-Statusbyte

Coding of the status (Index 501 – 540) is shown in Table 2

**Table 3:** Coding of the Status

7	6	5	4	3	2	1	0	Meaning	LED
								No communication	off
								off (by user/ PLC)	lights up
	R							on	lights up
	E							Switched off by circuit breaker function (tripped)	flashes
	S							Switched on, current above warning threshold (90% nominal current)	flashes
	E							Switched on, current above warning threshold (100% nominal current)	flashes
	R							off, hardware error (fuse)	flashes
	V							off, thermal release	flashes
	E							off locally, (by key)	lights up
								RC (rotary wheel position)	



**NOTE:**

If a circuit breaker has been switched off locally, it can only be switched on again locally. This functionality is used for safety when working on the system

### 7.4 Coding of the circuit breaker currents

The coding of the trigger currents (register 401 - 440) is shown in Table 2.

**Table 4:** Coding of the trigger currents

Value	Meaning
500	Tripping current 0,5 A
1000	Tripping current 1 A
2000	Tripping current 2 A
3000	Tripping current 3 A
4000	Tripping current 4 A
5000	Tripping current 5 A
6000	Tripping current 6 A
8000	Tripping current 8 A
10000	Tripping current 10 A



## 7.5 EB variants

The coding of the options (registers 601 - 640) is shown in Table

**Table 5:** Coding of the types

Dec. Value	Description
0xCC10	EB-3824-100-0
0xCC10	EB-0824-100-0
0xCC10	EB-1824-010-0
0xCC10	EB-1824-020-0
0xCC10	EB-1824-030-0
0xCC10	EB-1824-040-0
0xCC10	EB-1824-060-0
0xCC10	EB-1824-080-0
0xCC10	EB-1824-100-0
0xCC10	EB-1724-010-0F
0xCC10	EB-1724-020-0F
0xCC10	EB-1724-030-0F
0xCC10	EB-1724-040-0F
0xCC10	EB-1724-060-0F
0xCC10	EB-1724-075-0F
0xCC10	EB-1724-080-0F
0xCC10	EB-1724-100-0F
0xCC10	EB-3724-100-0F
0xCC10	EB-1724-2020-0F
0xCC10	EB-1724-2040-0F
0xCC10	EB-1724-2060-0F
0xCC10	EB-1724-2080-0F
0xCC10	EB-1724-2120-0F
0xCC10	EB-1724-2150-0F
0xCC10	EB-1724-2160-0F
0xCC10	EB-3724-2160-0F
0xCC10	EB-1724-120-0F
0xCC10	EB-1724-140-0F
0xCC10	EB-1724-150-0F
0xCC10	EB-1724-160-0F
0xCC10	EB-3724-150-0F
0xCC10	EB-3724-160-0F
0xCC10	EB-0724-150-0F
0xCC10	EB-0724-160-0F
0xCC10	EB-0724-100-0F

## 7.6 Options

Coding of the options (register 701 – 740) is shown in Table 2

**Table 6:** Coding of options

Number	Description	MSB1				LSB1				MSB0				LSB0			
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	OK-Signal, when channel is triggered	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OK-Signal status when channel is triggered/switched off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2	OK-Signal 'HIGH' for error	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OK-Signal 'LOW' for error	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
3	Automatic addressing ON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Automatic addressing OFF	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
4	Release behaviour of the SLOW fuse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Release behaviour of the FAST fuse	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
5	OK-Signal as collective status message	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OK-Signal as a single status signal	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
6	RE as normal input	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RE as control input for maintenance	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0



**NOTE:**

The circuit breaker options correspond to 3 (dec) on delivery, i.e. the first two options are set.



**NOTE:**

The 'Switch automatic addressing off/off' option is only available from circuit breaker version 1.10 and enables the automatic address assignment of an already addressed network to be deactivated when the supply voltage is switched on.

## 7.7 Example of options

Bit-No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Options																set
Options Complement																reset

delete everything

Bit-No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Options																set
Options Complement	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	reset

no change

Switched off or signaled as tripped

Bit-No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Options															1	set
Options Complement	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	reset

activate only,  
the rest remain unchanged

Invert OK signal

Bit-No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Options															1	set
Options Complement	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	reset

activate only,  
the rest remain unchanged

Activate: Invert OK signal

Activate: Signal as tripped only

Bit-No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Options															1	set
Options Complement	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	reset

activate, deactivate,  
the rest remain unchanged