

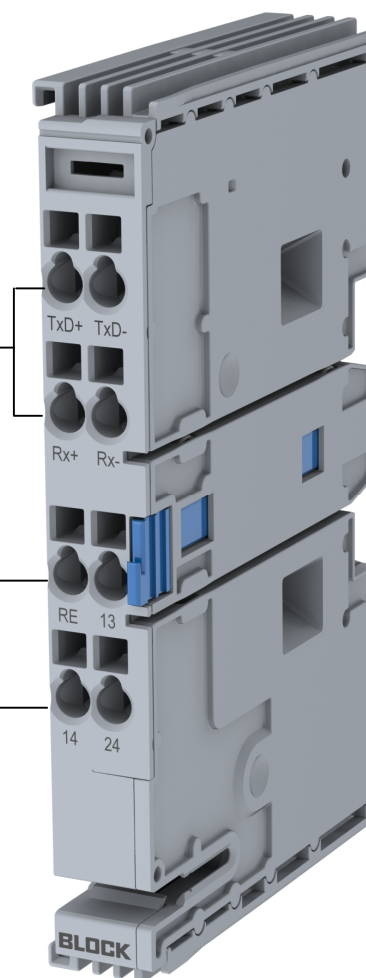
EB-MODBUS-RTU

Coupler between PLC / PC and 1-channel circuit breaker system

RS 485/RS 422
Interface

Group reset input

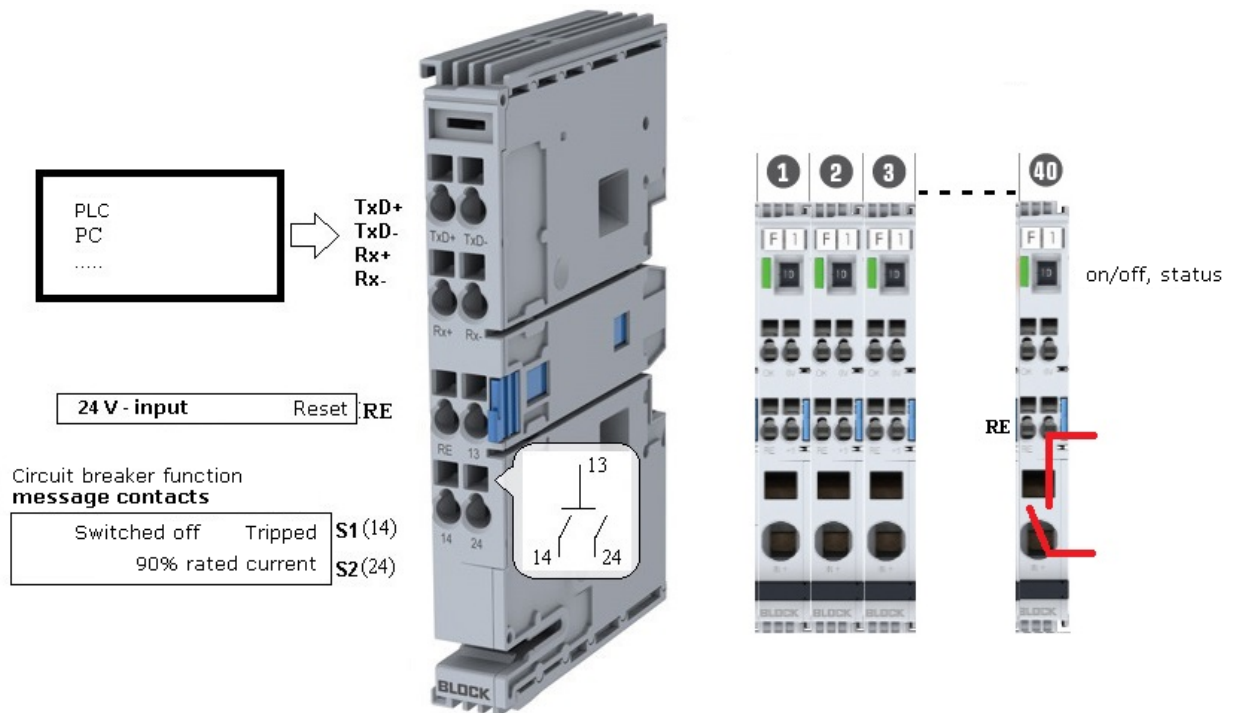
2 potential-free group
message contacts



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1. Function sketch



2. General

2.1. Overview of the ModBus functions

ModBus-function		FRAME LENGTH (in bytes)		Description of the function
		Without CRC-Bytes		
Designation	dez hex	Request	Response	
READ_COIL_Status	1 1	6	3 + Bytecount	Reading out digital output states
READ_HOLDING_REGISTERS	3 3	6	3 + Bytecount	Reading out measured values
WRITE_SINGLE_REGISTER	6 6	6	6	Write a register
Loopback_Diagnostic_Test	8 8	6	6	Device connection test
WRITE_SINGLE_REGISTER	16 10	7 + Bytecount	6	Write register, device programming

MODBUS		DATA				MODBUS	
Addr.	Function	r/w start addr.		Number of states		CRC	
byte	byte	h-byte	l-byte	h-byte	l-byte	l-byte	h-byte

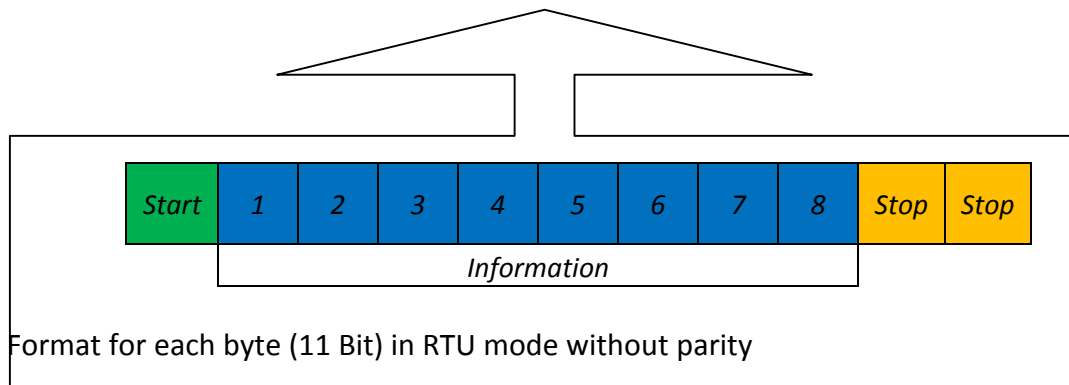
Frame:
Master -> Slave

MODBUS			DATA		MODBUS	
Addr.	Function	No. Data bytes			CRC	
byte	byte	byte	up to 252 bytes		l-byte	h-byte

Frame:
Slave -> Master

2.2. Byte transfer

MODBUS		DATA				MODBUS	
Addr.	Function	r/w start addr.		Number of states		CRC	
byte	byte	h-byte	l-byte	h-byte	l-byte	l-byte	h-byte



3. Communication and examples

3.1. Loopback Diagnostic Test

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

Frame: Master -> Slave

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

Frame: Slave -> Master

3.2. Status request

Circuit breaker 1 via MODBUS-RTU

MODBUS		DATA				MODBUS	
Addr.	Function	r/w start addr.		Number of states		CRC	
byte	byte	h-byte	l-byte	h-byte	l-byte	l-byte	h-byte
1	1	1	245	0	1	150	122

Frame: Master -> Slave

MODBUS-RTU Address

Reading out outputs

Circuit breaker 1, status (register address 501) See "Overview of single channel circuit breaker functions"

Number of selected circuit breakers (device/register addresses always 1)

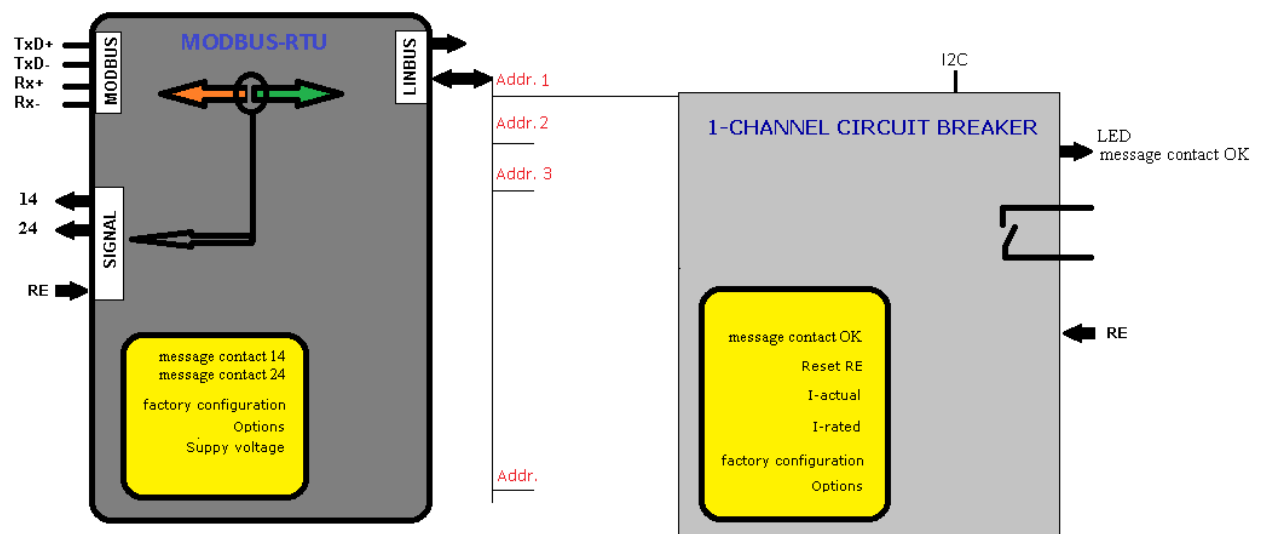
CRC

4. Error message

MODBUS		DATA	
Addr.	Function	Adr.	
x	Funct+80H	1	Use of an unsupported function code
		2	Use of an inadmissible memory register
		3	Wrong value
		6	Device cannot currently process requests. Repeat request later
		8	Area is write-protected

Frame: Slave -> Master

5. Function overview



5.1. EasyB 1-CHANNEL CIRCUIT BREAKER

Function	Request				Response	
	Number	Start address	Value	Description		
Request message contact "OK" READ_COIL_Status	1	101 - 140	0x00 0x01	Off (channel tripped or switched off) On (interconnected channel)		
Request actual current READ_HOLDING_REGISTERS	3	301 - 340	high byte low byte	in mA in mA		
Request rated current READ_HOLDING_REGISTERS	3	401 - 440	high byte low byte	in mA in mA		
Request status READ_HOLDING_REGISTERS	3	501 - 540	1. byte 0x00 0x01 0x02 2. byte 3-4. byte high byte low byte 5-6. byte high byte low byte 7-8. byte high byte low byte	Status of group message contacts EB-MODBUS-RTU No events Message contact 14 (tripped or switched off) Message contact 24 (rated current >= 90%) State EB circuit breaker Status (refer to EB status byte) Actual current EB circuit breaker in mA in mA Rated current EB circuit breaker in mA in mA Power supply EB-MODBUS-RTU in mV in mV		
Request factory configuration READ_HOLDING_REGISTERS	3	601 - 640	1-2. byte 3-6. byte 7-10. byte 11-12. byte	Firmware version Production order Serial number Variant value (refer to EB-Variants)		
Request options READ_HOLDING_REGISTERS	3	701 - 740	high byte low byte high byte low byte	Options (refer to Options) Options (refer to Options) Complement options (refer to Options) Complement options (refer to Options)		
Set status WRITE_SINGLE_REGISTER	6	501 - 540	0x01 0x02 0x04	Off On Reset		
Set rated current WRITE_SINGLE_REGISTER	6	401 - 440	high byte low byte	Rated current in mA Rated current in mA		
Set options WRITE_MULTIPLE_REGISTERS	16	701 - 740	high byte low byte high byte low byte	nur für ein Gerät Options (refer to Options) Options (refer to Options) Complement options (refer to Options) Complement options (refer to Options)		

5.2. EB status byte

7	6	5	4	3	2	1	0	Bedeutung	LED
								No device connected	off
								Switched off (by user)	shines
								Switched on	shines
								tripped	flashes
								on, current over warning threshold (rated current $\geq 90\%$)	flashes
								on, current over warning threshold (rated current $\geq 100\%$)	flashes
								tripped, hardware error (Fuse)	flashes
								tripped, thermal relaxation	flashes
								Switched off, local	shines
								RC (Rotary wheel position)	

Attention
From firmware 1.10 the status byte is extended

5.3. Options

NR	Bit-Wert	H-Byte								L-Byte								Description	
		7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0		
1	1																	1	Switched off und tripped
	0																	0	Tripped
2	1																	1	OK-Signal not inverted
	0																	0	OK-Signal inverted
3	1																	1	Disable automatic addressing
	0																	0	Enable automatic addressing

5.4. Example options

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

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

OPTION_SIGNAL_IF_CHANNEL_OFF

Bit no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Options																1 set	Activate only, Rest remain unchanged
Options Complement	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1 reset	

OPTION_SIGNAL_OUTPUT_LOW_ON_ERROR

Bit no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Options																1 set	Activate only, Rest remain unchanged
Options Complement	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1 reset	

aktivieren: OPTION_SIGNAL_OUTPUT_LOW_ON_ERROR

deaktivieren: OPTION_SIGNAL_IF_CHANNEL_OFF

Bit no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Options																1 set	aktiviere, deactivate, Rest remain unchanged
Options Complement	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1 reset	

5.5. EB-Variants

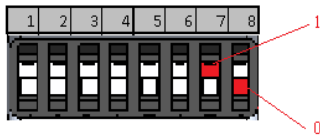
	Name	Variant value	Device	Variant
1	EB-MODBUS-RTU	0xCC10	bus coupler	0
2	EB-IO-LINK	0xCC20	bus coupler	0
3	EB-3824-100-0	0xCBAA	circuit breaker	10A nominal
4	EB-0824-100-0	0xCB8A	circuit breaker	10A nominal
5	EB-1824-010-0	0xCB91	circuit breaker	1A nominal
6	EB-1824-020-0	0xCB92	circuit breaker	2A nominal
7	EB-1824-030-0	0xCB93	circuit breaker	3A nominal
8	EB-1824-040-0	0xCB94	circuit breaker	4A nominal
9	EB-1824-060-0	0xCB96	circuit breaker	6A nominal
10	EB-1824-080-0	0xCB98	circuit breaker	8A nominal
11	EB-1824-100-0	0xCB9A	circuit breaker	10A nominal

5.6. EasyB COUPLING MODULE MODBUS RTU

Function	Request				Response	
	Number	Start address	Value	Description		
Request message contact 14	0 - 0	1 - 1				
READ_COIL_Status	1		0x00 0x01	On (interconnected channel) Off (channel tripped or switched off)		
Request message contact 24	0 - 0	2 - 2				
READ_COIL_Status	1		0x00 0x01	No warning Warning (rated current >= 90%)		
Request factory configuration	0 - 0	4 - 4				
READ_HOLDING_REGISTERS	3		1-2. byte 3-6. byte 7-10. byte 11-12. byte	Firmware version Production order Serial number Variant value (refer to EB-Variants)		
Request options	0 - 0	5 - 5				
READ_HOLDING_REGISTERS	3		high byte low byte high byte low byte	Options (refer to Options) Options (refer to Options) Complement options (refer to Options) Complement options (refer to Options)		
Request supply voltage	0 - 0	6 - 6				
READ_HOLDING_REGISTERS	3		high byte low byte	Voltage in mV Voltage in mV		
Set options	0 - 0	5 - 5				
WRITE_MULTIPLE_REGISTERS	16		high byte low byte high byte low byte	für alle Geräte im Verbund Options (refer to Options) Options (refer to Options) Complement options (refer to Options) Complement options (refer to Options)		

6. Configuration

6.1. DIP switch



Connection: 2/4-wire transmit

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

Term.+PullUp off
 RS485 Term.+PullUp/Dn
 RS422 Term.+PullUp/Dn

Connection: 2/4-wire receive

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

Rx 2-wire
 Rx 4-wire

End of frame time

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

3,5 Byte Standard
 10 ms
 50 ms
 500 ms

ModBus-Adress

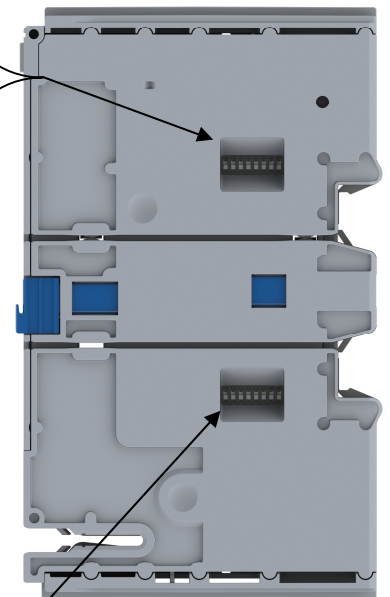
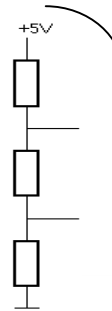
1	2	3	4	5	6	7	8
0	0	0	0	1			
x	x	x	x	x			
1	1	1	1	1			

ModBus-Addr. 1
 ModBus-Addr. X
 ModBus-Addr. 31

Baudrate

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

9600 Bd Standard
 4800 Bd
 19200 Bd
 38400 Bd



6.2. Others

Information byte consists of:

- 1 Start bit
- 8 Information bits
- no parity
- 2 Stop bits

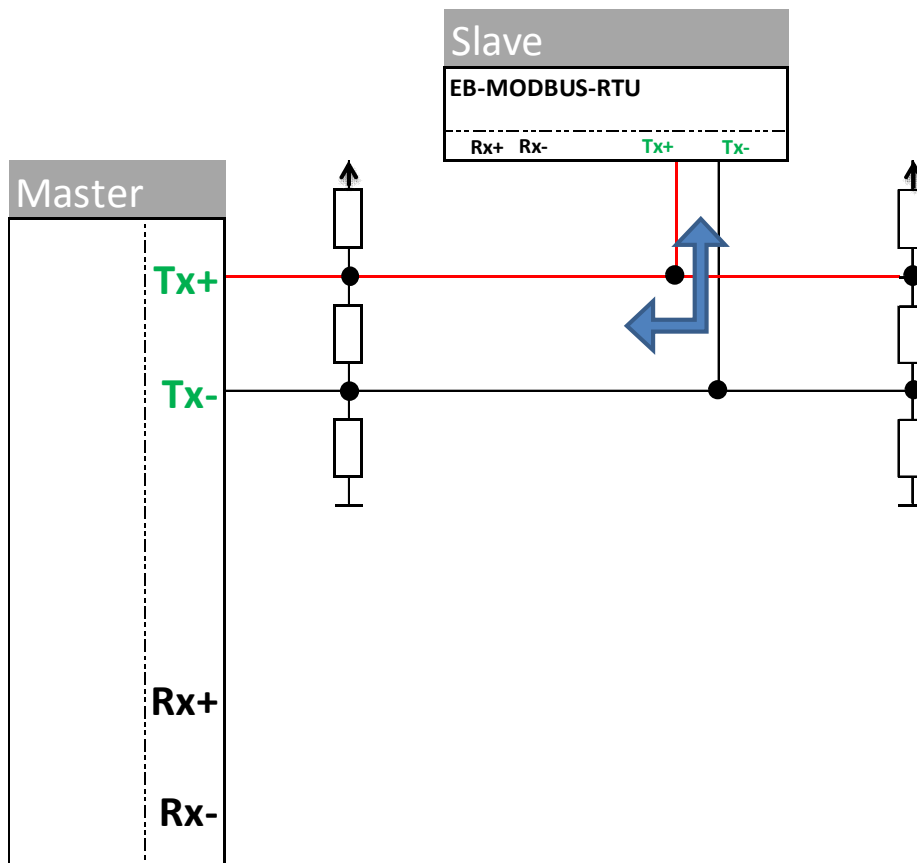
6.3. Configuration example 2-wire

2-wire transmit/receive
EOF=3,5 byte standard

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

ModBus-Addr. 1
9600 Bd standard

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



6.4. Configuration example 4-wire

4-wire transmit/receive
EOF=3,5 byte standard

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

ModBus-Addr. 1
9600 Bd standard

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

