

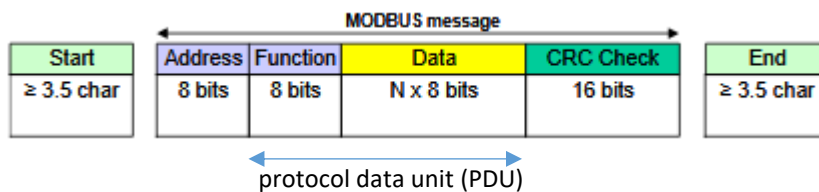
## Interface Beschreibung STG.1000.B

Pick-to-light, Phoenix Mecano Solutions AG

### ModBus Interface

- Modbus RTU
- RS485
- Baudrate 115200
- 1 start bit
- 8-bit
- 1 stopbit
- No parity
- Max. intercharacter delay 2,5 Char.
- Big Endian data transfer.
- Device Addresses are configured via 8-bit DIP-Switch.

### Modbus RTU Frame



The first Byte in MODBUS message (**Address**) is the Device Address specified by DIP-Switch on each Modbus-Device.

The following bytes in MODBUS message specify the protocol data unit (PDU) and the CRC checksum.

### Protokoll Data Unit (PDU)

#### Function Code

The following functions will be implemented:

- 0x03 Read Holding Registers
- 0x06 Write Single Register
- 0x10 Write Multiple Registers

#### Data

The Data Section of PDU contains function dependent data

#### Register Address vs. Register Number

Register Address = Register Number -1

#### Example:

Register Sensorstatus (0x01) will be send as Register Address 0x00 on bus lines (see example of implemented function code 0x03).

Read Sensoradress 01, register 01 including CRC:  
01 03 00 00 00 01 84 0A

## Implemented Function Codes

- 0x03 Read Holding Registers

### Request

Function code	1 Byte	0x03
Starting Address	2 Bytes	0x0000 to 0xFFFF
Quantity of Registers	2 Bytes	1 to 125 (0x7D)

### Response

Function code	1 Byte	0x03
Byte count	1 Byte	2 x N'
Register value	N' x 2 Bytes	

\*N = Quantity of Registers

### Error

Error code	1 Byte	0x83
Exception code	1 Byte	01 or 02 or 03 or 04

Here is an example of a request to read registers 108 – 110:

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
Function	03	Function	03
Starting Address Hi	00	Byte Count	06
Starting Address Lo	6B	Register value Hi (108)	02
No. of Registers Hi	00	Register value Lo (108)	2B
No. of Registers Lo	03	Register value Hi (109)	00
		Register value Lo (109)	00
		Register value Hi (110)	00
		Register value Lo (110)	64

- 0x06 Write Single Register

#### Request

Function code	1 Byte	0x06
Register Address	2 Bytes	0x0000 to 0xFFFF
Register Value	2 Bytes	0x0000 to 0xFFFF

#### Response

Function code	1 Byte	0x06
Register Address	2 Bytes	0x0000 to 0xFFFF
Register Value	2 Bytes	0x0000 to 0xFFFF

#### Error

Error code	1 Byte	0x86
Exception code	1 Byte	01 or 02 or 03 or 04

Here is an example of a request to write register 2 to 00 03 hex:

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
Function	06	Function	06
Register Address Hi	00	Register Address Hi	00
Register Address Lo	01	Register Address Lo	01
Register Value Hi	00	Register Value Hi	00
Register Value Lo	03	Register Value Lo	03

- 0x10 Write Multiple Registers

#### Request

Function code	1 Byte	0x10
Starting Address	2 Bytes	0x0000 to 0xFFFF
Quantity of Registers	2 Bytes	0x0001 to 0x007B
Byte Count	1 Byte	2 x N'
Registers Value	N' x 2 Bytes	value

\*N' = Quantity of Registers

#### Response

Function code	1 Byte	0x10
Starting Address	2 Bytes	0x0000 to 0xFFFF
Quantity of Registers	2 Bytes	1 to 123 (0x7B)

#### Error

Error code	1 Byte	0x90
Exception code	1 Byte	01 or 02 or 03 or 04

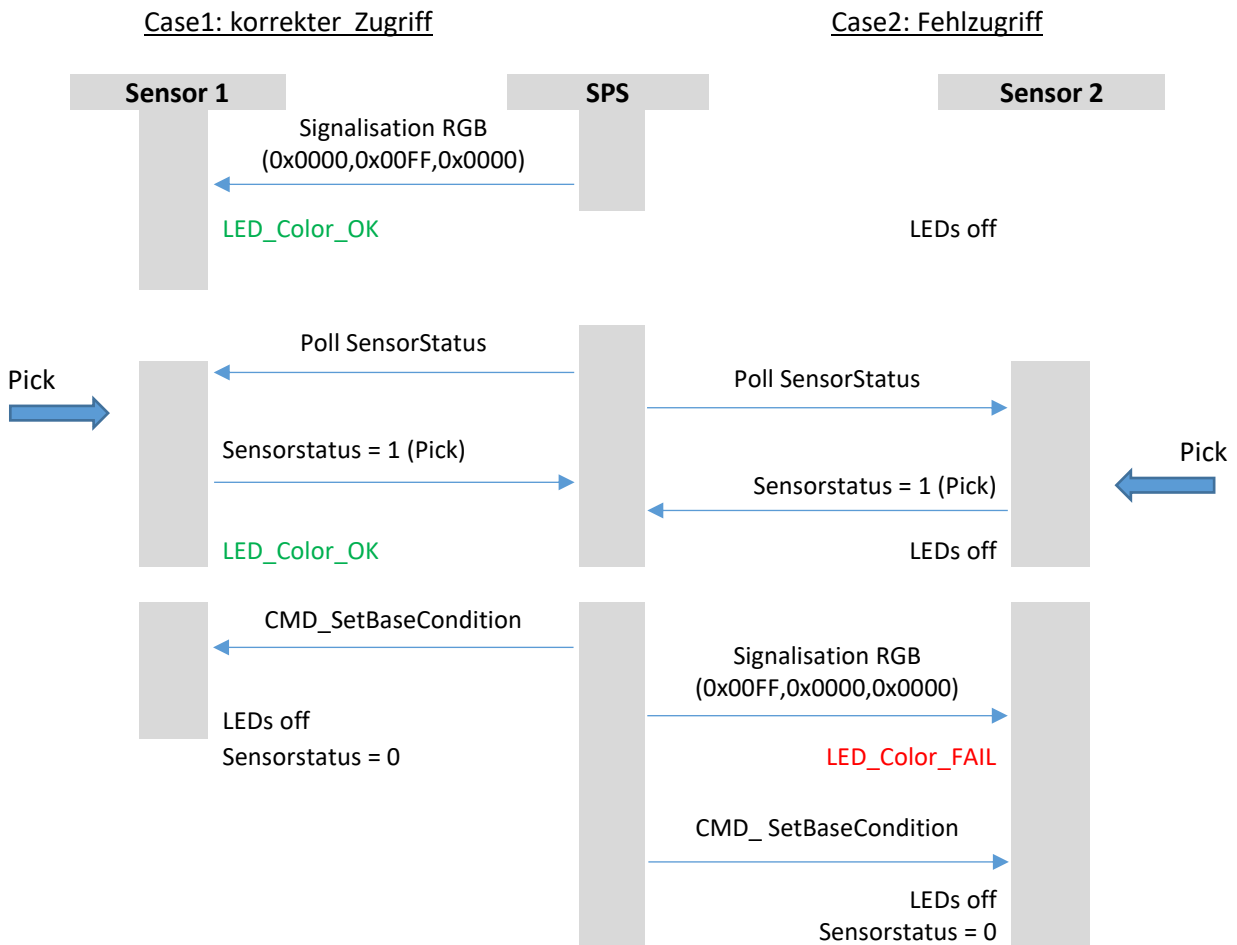
Here is an example of a request to write two registers starting at 2 to 00 0A and 01 02 hex:

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
Function	10	Function	10
Starting Address Hi	00	Starting Address Hi	00
Starting Address Lo	01	Starting Address Lo	01
Quantity of Registers Hi	00	Quantity of Registers Hi	00
Quantity of Registers Lo	02	Quantity of Registers Lo	02
Byte Count	04		
Registers Value Hi	00		
Registers Value Lo	0A		
Registers Value Hi	01		
Registers Value Lo	02		

## Available Registers

Register Number	Register Name	Function Code	Reg-Size (Byte)	Description
0x01	Sensorstatus (read only)	0x03	2	0x0001: Pick detected 0x1X00: DeviceError (X: Errorcode)
0x02	Signalisation (write only)	0x10	6	R: 0x0000 – 0x00FF G: 0x0000 – 0x00FF B: 0x0000 – 0x00FF
0x05	Command (write only)	0x06	2	0x0001: CMD_SetBaseCondition Reset Sensorstatus, Switch Off LEDs
0x0A	Firmware Version	0x03	2	
0x0B	Schwellwert Distanz	0x03 / 0x06	2	
0x0C	RGB-Einstellung OK	0x03 / 0x10	6	R: 0x0000 – 0x00FF G: 0x0000 – 0x00FF B: 0x0000 – 0x00FF
0x0F	RGB-Einstellung Störung	0x03 / 0x10	6	R: 0x0000 – 0x00FF G: 0x0000 – 0x00FF B: 0x0000 – 0x00FF
0x12	Optional Helligkeit der LED	0x03 / 0x06	2	0 – 100% {0x0000 ... 0x0064}
0x13	Blinkfrequenz bei Störungsanzeige	0x03 / 0x06	2	3 Blinkfrequenzen {0x0001 ... 0x0003} 0x0001: 1 / 100ms 0x0002: 1 / 500ms 0x0003: 1 / 1000ms
0x30	Range Value	0x03	2	(optional for debugging)
0x31	Signal Rate	0x03	2	(optional for debugging)
0x32	Ambient Rate	0x03	2	(optional for debugging)

## Sequenzdiagramm



### Time estimation

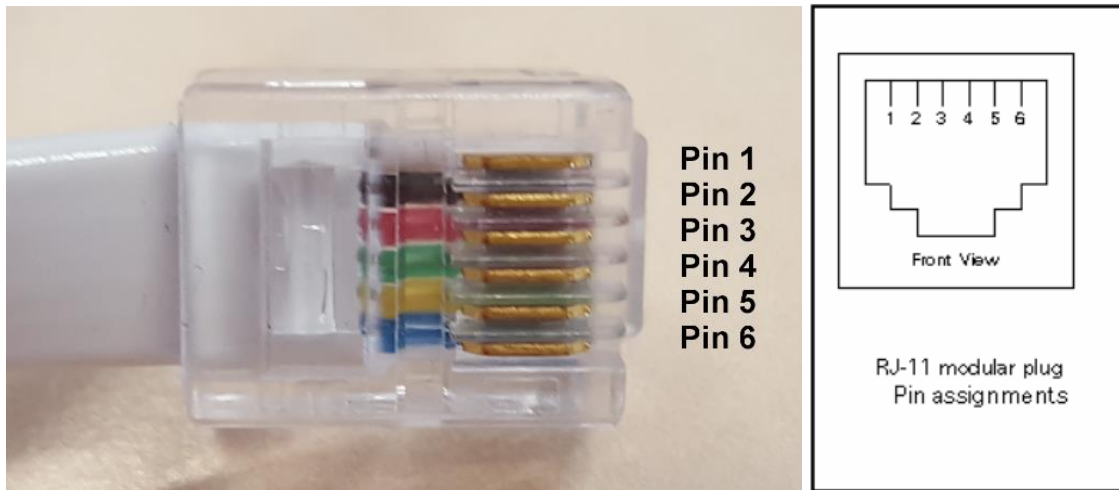
RTU mode :  
 11 bit/char at 115200bit/s → 95.5us/char

### Read Sensorstatus

For a telegram of 15 chars (MODBUS message) and 7 chars (Start-End) the system needs ~2ms.

## Pinbelegung Sensor

Pin 1	+24VDC	Weiss
Pin 2	0V/GND	Schwarz
Pin 3	ModBus - RxTx+	Rot
Pin 4	ModBus - RxTx-	Grün
Pin 5	0V/GND	Gelb
Pin 6	+24VDC	Blau



## Adressierung Sensor

Die Sensoradresse wird mittels 8-bit DIP-Switch eingestellt.

