

Operating Manual URB40


Stand: 2024-01-24 / tw

- RS485 interface with modbus protocol

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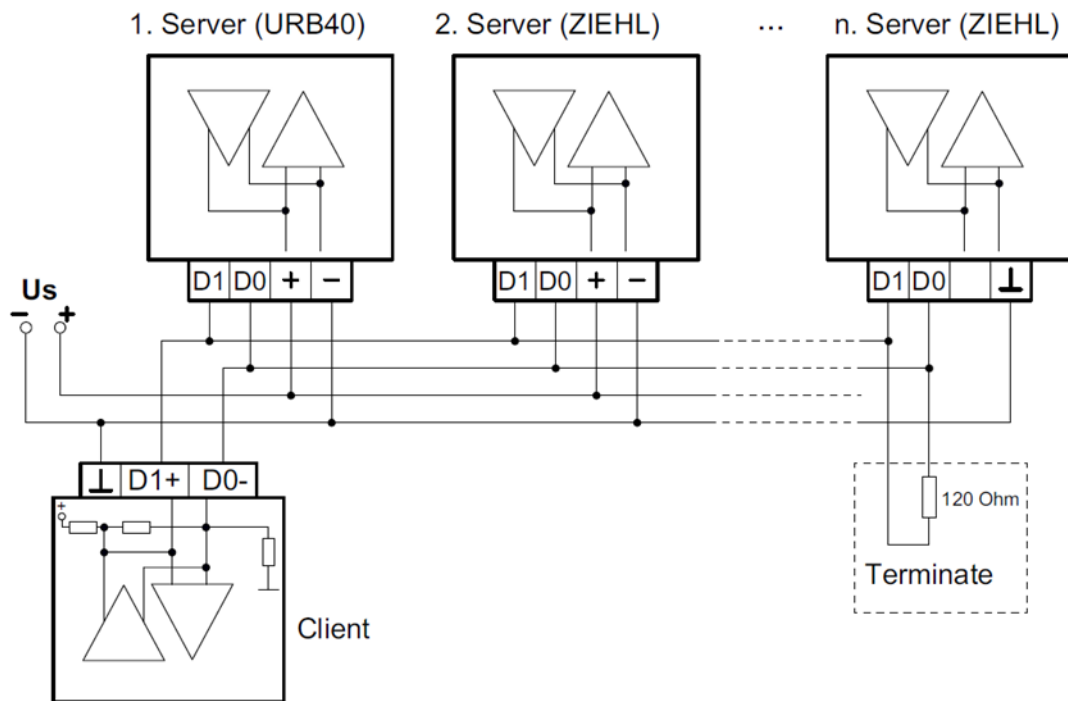
1 Important information



Please read the general operating manual of the STWA4MH carefully and observe the safety instructions.

| LED functions | | |
|--------------------|----------------|--|
| Power LED (green) | Flashes | For 60s after switching Us on (additional Modbus address 247 is active), device is ready for operation |
| | On | Device is ready for operation |
| RS485 LED (yellow) | Pulses briefly | URB40 received a new data packet |
| | Flashes | Communication breakdown occurred |

2 Connecting diagram for RS485-BUS



3 RS485-BUS interface parameter

| BUS-address | Baud rate | Data bits | Parity | Stop bit |
|-------------|--------------------------|-----------|-----------------|----------|
| 1 ... 246 | 4800, 9600, 19200, 57600 | 8 | even, odd, none | 1, 2 |

Factory setting interface parameters:

- Address = 248 (Invalid Modbus address, must be changed during the initial operation)
- 9600 Baud, 8 data bits, even parity, 1 stop bit
- Internal terminating resistor (120Ω) is inactive
- Timeout delay = 10s

The URB40 acts as a client in the bus system.

RTU – Mode is used.

All initial parameters can be configured by the sever via the corresponding Modbus register (see below). For this purpose the device remains accessible for 1 min. after being switched on by an additional address (Addr. 247). A direct connection (PTP) to the server is required.

4 Structure of the telegram

Based on Modbus specifications.

For more details, please refer to the original Modbus documentation which can be accessed at <http://www.modbus.org>

5 RS485 Timeout / Communication breakdown

The URB40 expects a cyclic read/write access to detect a potential communication failure. The time up to a communication error can be adjusted via register No. 12.

6 Supported function codes

| Function code | description | usage |
|---------------|-------------------------|--------------------------|
| 03 / (03H) | Read Holding Registers | Read data off a register |
| 16 / (10H) | Write Holding Registers | Write data to a register |

7 Function code 0x03 – Read data from registers

| Server request | | | | |
|-----------------------|--------------------------|---------|-------------|-------------|
| Byte no. | description | | 1. Beispiel | 2. Beispiel |
| 1 | Client-address | | 0x01 | 0xF7 |
| 2 | function | | 0x03 | 0x03 |
| 3 | start-address | Hi-Byte | 0x00 | 0x00 |
| 4 | | Lo-Byte | 0x11 | 0x00 |
| 5 | No. words (Bytes / 2) | Hi-Byte | 0x00 | 0x00 |
| 6 | | Lo-Byte | 0x07 | 0x04 |
| 7 | checksum CRC-16 | Lo-Byte | 0x54 | 0x50 |
| 8 | | Hi-Byte | 0x0D | 0x9F |

| Client response (URB40) | | | | |
|--------------------------------|-----------------------------|---------|------------|------------|
| Byte no. | description | | 1. example | 2. example |
| 1 | Client- address | | 0x01 | 0xF7 |
| 2 | function | | 0x03 | 0x03 |
| 3 | No. Bytes (n) (word x 2) | | 0x0E | 0x08 |
| 4 | 1. word (2 Bytes) | Hi-Byte | 0x00 | 0x00 |
| 5 | | Lo-Byte | 0x00 | 0xF8 |
| 6 | 2. word (2 Bytes) | Hi-Byte | 0x00 | 0x00 |
| 7 | | Lo-Byte | 0x00 | 0x01 |
| 8 | 3. word (2 Bytes) | Hi-Byte | 0x00 | 0x00 |
| 9 | | Lo-Byte | 0x00 | 0x01 |
| 10 | n- word (2 Bytes) | Hi-Byte | 0x00 | 0x00 |
| 11 | | Lo-Byte | 0x00 | 0x01 |
| : | : | | | |
| : | : | | | |
| 3 + (n + 1) | checksum CRC-16 | Lo-Byte | 0x2B | 0x5C |
| 3 + (n + 2) | | Hi-Byte | 0x37 | 0x53 |

7.1 Function code 0x03 – Table of register

| Add. hex | Data type | Register | value / range of values | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 0000 | unsigned int 16 | Modbus address | 1 ... 246 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0001 | unsigned int 16 | Baud rate | 0 = 4800Bd, 1 = 9600Bd, 2 = 19200Bd, 3 = 57600Bd, 4 = 115200Bd | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0002 | unsigned int 16 | Parity | 0 = no Parity, 1 = odd Parity, 2 = even Parity | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0003 | unsigned int 16 | Stop bit | 0 = 1 stop bit, 1 = 2 stop bit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0004 | unsigned int 16 | Terminating resistor | 0 = inactive, 1 = active | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0005 | unsigned int 16 | Relay configuration | see Register 6H – 11H Bits 15 – 12 → Relay K4 Bits 11 – 08 → Relay K3 Bits 07 – 04 → Relay K2 Bits 03 – 00 → Relay K1 <table border="1"> <thead> <tr> <th>15</th><th>14</th><th>13</th><th>12</th><th>11</th><th>10</th><th>09</th><th>08</th><th>07</th><th>06</th><th>05</th><th>04</th><th>03</th><th>02</th><th>01</th><th>00</th><th>Bit</th><th></th></tr> </thead> <tbody> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>de-/energized</td><td>K1</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Rel. function</td><td>K1</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>TO. func. / 1</td><td>K1</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>TO. func. / 2</td><td>K1</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>de-/energized</td><td>K2</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Rel. function</td><td>K2</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>TO. func. / 1</td><td>K2</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>TO. func. / 2</td><td>K2</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>de-/energized</td><td>K3</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Rel. function</td><td>K3</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>TO. func. / 1</td><td>K3</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>TO. func. / 2</td><td>K3</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>de-/energized</td><td>K4</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Rel. function</td><td>K4</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>TO. func. / 1</td><td>K4</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>TO. func. / 2</td><td>K4</td></tr> </tbody> </table> | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 | Bit | | | | | | | | | | | | | | | | | | de-/energized | K1 | | | | | | | | | | | | | | | | | Rel. function | K1 | | | | | | | | | | | | | | | | | TO. func. / 1 | K1 | | | | | | | | | | | | | | | | | TO. func. / 2 | K1 | | | | | | | | | | | | | | | | | de-/energized | K2 | | | | | | | | | | | | | | | | | Rel. function | K2 | | | | | | | | | | | | | | | | | TO. func. / 1 | K2 | | | | | | | | | | | | | | | | | TO. func. / 2 | K2 | | | | | | | | | | | | | | | | | de-/energized | K3 | | | | | | | | | | | | | | | | | Rel. function | K3 | | | | | | | | | | | | | | | | | TO. func. / 1 | K3 | | | | | | | | | | | | | | | | | TO. func. / 2 | K3 | | | | | | | | | | | | | | | | | de-/energized | K4 | | | | | | | | | | | | | | | | | Rel. function | K4 | | | | | | | | | | | | | | | | | TO. func. / 1 | K4 | | | | | | | | | | | | | | | | | TO. func. / 2 | K4 |
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| | | | | | | | | | | | | | | | | | | | Rel. function | K1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | Rel. function | K2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | TO. func. / 1 | K2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | TO. func. / 2 | K2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | de-/energized | K3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | Rel. function | K3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | TO. func. / 1 | K3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | TO. func. / 2 | K3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | de-/energized | K4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | Rel. function | K4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | TO. func. / 1 | K4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | TO. func. / 2 | K4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0006 | unsigned int 16 | Relay K1 | 0 = de-energized 1 = energized | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0007 | unsigned int 16 | Relay K2 | 0 = de-energized 1 = energized | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0008 | unsigned int 16 | Relay K3 | 0 = de-energized 1 = energized | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0009 | unsigned int 16 | Relay K4 | 0 = de-energized 1 = energized | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 000A | unsigned int 16 | Relay function K1 (Relay behaviour when triggered) | 0 = normal 1 = inverted | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 000B | unsigned int 16 | Relay function K2 (Relay behaviour when triggered) | 0 = normal 1 = inverted | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | | |
|------|--------------------|---|---|
| 000C | unsigned int 16 | Relay function K3 (Relay behaviour when triggered) | 0 = normal 1 = inverted |
| 000D | unsigned int 16 | Relay function K4 (Relay behaviour when triggered) | 0 = normal 1 = inverted |
| 000E | unsigned int 16 | RS485 Timeout → Relay K1 behaviour during Timeouts | 0 = unaltered 1 = Kontakt 11 ↔ 14 2 = Kontakt 11 ↔ 12 |
| 000F | unsigned int 16 | RS485 Timeout → Relay K2 behaviour during Timeouts | 0 = unaltered 1 = terminal 21 ↔ 24 2 = terminal 21 ↔ 22 |
| 0010 | unsigned int 16 | RS485 Timeout → Relay K3 behaviour during Timeouts | 0 = unaltered 1 = terminal 31 ↔ 34 2 = terminal 31 ↔ 32 |
| 0011 | unsigned int 16 | RS485 Timeout → Relay K4 behaviour during Timeouts | 0 = unaltered 1 = terminal 41 ↔ 44 2 = terminal 41 ↔ 42 |
| 0012 | unsigned int 16 | RS485 Timeout (value x 100ms) | 00001 = 100ms 54000 = 1.5h |
| 0013 | unsigned int 16 | Switching cycle Relay K1 | 0 - 65535 |
| 0014 | unsigned int 16 | Switching cycle Relay K2 | 0 - 65535 |
| 0015 | unsigned int 16 | Switching cycle Relay K3 | 0 - 65535 |
| 0016 | unsigned int 16 | Switching cycle Relay K4 | 0 - 65535 |
| 0017 | unsigned int 16 | ----- reserved ----- | |
| 0018 | unsigned int 16 | ----- reserved ----- | |
| 0019 | unsigned int 16 | TBD | |
| 001A | unsigned int 16 | TBD | |
| 001B | unsigned int 16 | TBD | |
| 001C | unsigned int 16 | TBD | |
| 001D | unsigned int 16 | TBD | |
| 001E | unsigned int 16 | TBD | |
| 001F | unsigned int 16 | Voltag monitoring 3,3V voltage divider 2x 10k Ohm | specification in [mV] |
| 0020 | unsigned int 16 | Voltag monitoring 6V voltage divider 2x 10k Ohm | specification in [mV] |
| 0021 | unsigned int 16 | Voltag monitoring 18V voltage divider 1k/11kOhm | specification in [mV] |
| 0022 | unsigned int 16 | Operating hours counter | 0h – 2730h |
| 0023 | unsigned int 16 | Hardware Revision → 12910-0300-xx | 00 - 04 |
| 0024 | unsigned int 16 | Firmware version → 12910-14xx-yy | 0x0000 – 0xFFFF |
| 0025 | unsigned int 16 | Bootloader version → 12910-14xx-yy Note: xx = 00 → Bootloader not available xx = 50 → Bootloader available | 0x0000 – 0x50FF |
| 0026 | unsigned int 16 | | |

8 Function code 0x10 – Write data to register

| Server request | | | | |
|-----------------------|--------------------------|---------|------------|------------|
| Byte Nr. | description | | 1. example | 2. example |
| 1 | Client-address | | 0x01 | 0xF7 |
| 2 | Function | | 0x10 | 0x10 |
| 3 | Start-address | Hi-Byte | 0x00 | 0x00 |
| 4 | | Lo-Byte | 0x00 | 0x00 |
| 5 | No. words (Bytes / 2) | Hi-Byte | 0x00 | 0x00 |
| 6 | | Lo-Byte | 0x04 | 0x04 |
| 7 | No. Bytes (n) | | 0x08 | 0x08 |
| 8 | 1. Register | Hi-Byte | 0x00 | 0x00 |
| 9 | | Lo-Byte | 0x01 | 0x01 |
| 10 | 2. Register | Hi-Byte | 0x00 | 0x00 |
| 11 | | Lo-Byte | 0x04 | 0x01 |
| 12 | 3. Register | Hi-Byte | 0x00 | 0x00 |
| 13 | | Lo-Byte | 0x00 | 0x01 |
| 14 | 4. Register | Hi-Byte | 0x00 | 0x00 |
| 15 | | Lo-Byte | 0x02 | 0x01 |
| : | : | | | |
| : | : | | | |
| 7 + (n + 1) | checksum CRC-16 | Lo-Byte | 0xD6 | 0x7D |
| 7 + (n + 2) | | Hi-Byte | 0xBB | 0x3C |

| Client response (URB40) | | | | |
|--------------------------------|------------------------------|---------|------------|------------|
| Byte Nr. | description | | 1. example | 2. example |
| 1 | Client-address | | 0x01 | 0xF7 |
| 2 | Function | | 0x10 | 0x10 |
| 3 | Start-address | Hi-Byte | 0x00 | 0x00 |
| 4 | | Lo-Byte | 0x00 | 0x00 |
| 5 | No. words (n) (Bytes / 2) | Hi-Byte | 0x00 | 0x00 |
| 6 | | Lo-Byte | 0x04 | 0x04 |
| 7 | Relay configuration* | Lo-Byte | 0x00 | 0x11 |
| 8 | | Hi-Byte | 0x00 | 0x11 |
| 9 | checksum CRC-16 | Lo-Byte | 0xC1 | 0xD5 |
| 10 | | Hi-Byte | 0xCA | 0x5C |

*Equal to register 0x5H (s. table: 0x03 bzw. 0x10)

8.1 Function code 0x10 – Table of register

| Addr. hex | Data type | Register | value / range of values | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 0000 | unsigned int 16 | Modbus address | 1 ... 246 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0001 | unsigned int 16 | Baud rate | 0 = 4800Bd, 1 = 9600Bd, 2 = 19200Bd, 3 = 57600Bd, 4 = 115200Bd | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 0004 | unsigned int 16 | Terminating resistor | 0 = inactive, 1 = active | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0005 | unsigned int 16 | Relay configuration | see Register 6H – 11H Bits 12 – 15 → Rel. K4 Bits 08 – 11 → Rel. K3 Bits 04 – 07 → Rel. K2 Bits 00 – 03 → Rel. K1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th>15</th><th>14</th><th>13</th><th>12</th><th>11</th><th>10</th><th>09</th><th>08</th><th>07</th><th>06</th><th>05</th><th>04</th><th>03</th><th>02</th><th>01</th><th>00</th><th>Bit</th> </tr> </thead> <tbody> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Anziehen</td><td>K1</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Rel. Funktion</td><td>K1</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>TO. Funk. / 1</td><td>K1</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>TO. Funk. / 2</td><td>K1</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Anziehen</td><td>K2</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Rel. Funktion</td><td>K2</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>TO. Funk. / 1</td><td>K2</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>TO. Funk. / 2</td><td>K2</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Anziehen</td><td>K3</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Rel. Funktion</td><td>K3</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>TO. Funk. / 1</td><td>K3</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>TO. Funk. / 2</td><td>K3</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Anziehen</td><td>K4</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Rel. Funktion</td><td>K4</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>TO. Funk. / 1</td><td>K4</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>TO. Funk. / 2</td><td>K4</td> </tr> </tbody> </table> | | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 | Bit | | | | | | | | | | | | | | | | | Anziehen | K1 | | | | | | | | | | | | | | | | | Rel. Funktion | K1 | | | | | | | | | | | | | | | | | TO. Funk. / 1 | K1 | | | | | | | | | | | | | | | | | TO. Funk. / 2 | K1 | | | | | | | | | | | | | | | | | Anziehen | K2 | | | | | | | | | | | | | | | | | Rel. Funktion | K2 | | | | | | | | | | | | | | | | | TO. Funk. / 1 | K2 | | | | | | | | | | | | | | | | | TO. Funk. / 2 | K2 | | | | | | | | | | | | | | | | | Anziehen | K3 | | | | | | | | | | | | | | | | | Rel. Funktion | K3 | | | | | | | | | | | | | | | | | TO. Funk. / 1 | K3 | | | | | | | | | | | | | | | | | TO. Funk. / 2 | K3 | | | | | | | | | | | | | | | | | Anziehen | K4 | | | | | | | | | | | | | | | | | Rel. Funktion | K4 | | | | | | | | | | | | | | | | | TO. Funk. / 1 | K4 | | | | | | | | | | | | | | | | | TO. Funk. / 2 | K4 |
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| | | | | | | | | | | | | | | | | | | | Anziehen | K3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | Rel. Funktion | K3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | TO. Funk. / 1 | K3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | TO. Funk. / 2 | K3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | Anziehen | K4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | Rel. Funktion | K4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | TO. Funk. / 1 | K4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | TO. Funk. / 2 | K4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0006 | unsigned int 16 | Relay K1 | 0 = de-energized 1 = energized | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0007 | unsigned int 16 | Relay K2 | 0 = de-energized 1 = energized | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0008 | unsigned int 16 | Relay K3 | 0 = de-energized 1 = energized | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0009 | unsigned int 16 | Relay K4 | 0 = de-energized 1 = energized | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 000A | unsigned int 16 | Relay function K1 (Relay behaviour when triggered) | 0 = normal 1 = inverted | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 000B | unsigned int 16 | Relay function K2 (Relay behaviour when triggered) | 0 = normal 1 = inverted | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | | |
|------|--------------------|--|---|
| 000C | unsigned int 16 | Relay function K3 (Relay behaviour when triggered) | 0 = normal 1 = inverted |
| 000D | unsigned int 16 | Relay function K4 (Relay behaviour when triggered) | 0 = normal 1 = inverted |
| 000E | unsigned int 16 | RS485 Timeout → Relay K1 behaviour during Timeouts | 0 = Unverändert 1 = Kontakt 11 ↔ 14 2 = Kontakt 11 ↔ 12 |
| 000F | unsigned int 16 | RS485 Timeout → Relay K2 behaviour during Timeouts | 0 = Unverändert 1 = Kontakt 21 ↔ 24 2 = Kontakt 21 ↔ 22 |
| 0010 | unsigned int 16 | RS485 Timeout → Relay K3 behaviour during Timeouts | 0 = Unverändert 1 = Kontakt 31 ↔ 34 2 = Kontakt 31 ↔ 32 |
| 0011 | unsigned int 16 | RS485 Timeout → Relay K4 behaviour during Timeouts | 0 = Unverändert 1 = Kontakt 41 ↔ 44 2 = Kontakt 41 ↔ 42 |
| 0012 | unsigned int 16 | RS485 Timeout (Wert x 100ms) | 00001 = 100ms 54000 = 1.5h |
| 0013 | unsigned int 16 | Switching cycle Relay K1 | 0 - 65535 |
| 0014 | unsigned int 16 | Switching cycle Relay K2 | 0 - 65535 |
| 0015 | unsigned int 16 | Switching cycle Relay K3 | 0 - 65535 |
| 0016 | unsigned int 16 | Switching cycle Relay K4 | 0 - 65535 |
| 0017 | unsigned int 16 | Reset Update Device | 0 = Firmware 1 = Device reset 2 = Bootloader Mode |
| 0018 | unsigned int 16 | Factory reset | 1 = initiates reset |

9 Function code 0x2B – Read device information

| Request from Master | | | | |
|---------------------|--------------------------------------|---------|------------|------------|
| Byte no. | definition | | 1. example | 2. example |
| 1 | slave- address | | 0x01 | 0x0A |
| 2 | function | | 0x2B | 0x2B |
| 3 | MEI Type (always 0x0E) ^{*1} | | 0x0E | 0x0E |
| 4 | Read Device ID code ^{*2} | | 0x01 | 0x02 |
| 5 | Object Id | | 0x00 | 0x03 |
| 6 | checksum CRC-16 | Lo-Byte | 0x70 | 0x95 |
| 7 | | Hi-Byte | 0x77 | 0x47 |

^{*1} MEI = MODBUS Encapsulated Interface (see Modbus documentation, <http://www.modbus.org>)

^{*2} 0x01: Query of “Basic” device information (stream access)
 0x02: Query of “Regular” device information (stream access)
 0x03: Query of “Extended” device information (stream access)
 0x04: Querying individual device information (individual access)

9.1 Function code 0x2B - Objects

| Object Id | Object-name / description | content | type | category |
|-----------|----------------------------|--|--------------|----------|
| 0x00 | Manufacturer name | ZIEHL industrie- elektronik GmbH + Co KG | ASCII String | Basic |
| 0x01 | Product- (article-) number | T224356 | | |
| 0x02 | Revision Firmware | 00-00 | | |
| 0x03 | Manufacturer URL | www.ziehl.com | ASCII String | Regular |
| 0x04 | Product Name | Universal Relaisbox | | |
| 0x05 | Product designation | URB40 | | |
| 0x80 | Serial number | xxxxxxxx | ASCII String | Extended |
| 0x81 | Revision Hardware | 00-00 | | |
| 0x82 | Revision Bootloader | 50-00 | | |

10 Error messages

The telegram sent by the master is checked by the client (URB40). In the event of an error, an error message is generated and sent back to the master. The 7th bit in the function byte is set to "1".

Error telegram:

| Byte Nr. | definition | | 1. (0x03) example | 2. (0x10) example |
|----------|----------------|---------|----------------------|----------------------|
| 1 | Client-address | | 0x01 | 0x0A |
| 2 | Function | | 0x83 | 0x90 |
| 3 | Error code | | 0x02 | 0x03 |
| 4 | Checksum | Lo-Byte | 0xC1 | 0x7D |
| 5 | CRC-16 | Hi-Byte | 0x91 | 0xC3 |

Following error codes are possible:

- 1 (01H) invalid function
- 2 (02H) invalid start address
- 3 (03H) invalid data value

Error that are not recognized by the client (telegram is rejected):

- Wrong checksum CRC-16
- Unknown Client - address

11 Checksum CRC-16

The checksum is appended to each Modbus telegram and is used to identify transmission errors. It is 2 bytes long and is calculated from all bytes of a telegram. The Lo byte is transferred first and then the Hi byte.

For details, please refer to the original Modbus documentation, which can be found at:

<http://www.modbus.org>