2. Declaration of Conformity

The device was tested according to the applicable standards. Conformity was proved. The declaration of conformity is available at the manufacturer BTR NETCOM GmbH.

Notes Regarding Device Description

These instructions include indications for use and mounting of the device. In case of questions that cannot be answered with these instructions please consult supplier or manufacturer.

The indicated installation directions or rules are applicable to the Federal Republic of Germany. If the device is used in other countries it applies to the equipment installer or the user to meet the national directions.

Safety Instructions

Keep the applicable directions for industrial safety and prevention of accidents as well as the VDE rules.

Technicians and/or installers are informed that they have to electrically discharge themselves as prescribed before installation or maintenance of the devices. Only qualified personnel shall do mounting and installation work with the devices, see section “qualified personnel”.

The information of these instructions have to be read and understood by every person using this device.

Symbols

Warning of dangerous electrical voltage

Danger

means that non-observance may cause risk of life, grievous bodily harm or heavy material damage.

Qualified Personnel

Qualified personnel in the sense of these instructions are persons who are well versed in the use and installation of such devices and whose professional qualification meets the requirements of their work.

This includes for example:

• Qualification to connect the device according the VDE specifications and the local regulations and a qualification to put this device into operation, to power it down or to activate it by respecting the internal directions.

• Knowledge of safety rules.

• Knowledge about application and use of the device within the equipment system etc.

3. Technical Data

Modbus Interface

Protocol Modbus RTU

Transmission rate 1200 ... 115200 Bd (factory setting 19200 Bd Even)

Cabling RS485 two wire bus with voltage equalizing cable in bus / line topology

Supply

Operating voltage range 20 ... 28 V AC/DC (SELV)

Current consumption 200 mA (AC) / 75 mA (DC)

Relative duty cycle 100 %

Input

Voltage input 30 V AC/DC

High-signal recognition >8 V AC/DC

Output

Output contacts 2 changeover contacts

Switching voltage max. 250 V AC

Continuous current max. 16 A / relay (80 A / 20 ms)

Total current for all contacts 25 A

Housing

Dimensions WxHxD 2.0 x 2.8 x 3.0 in. (50 x 70 x 75 mm)

Weight 126 g

Mounting position any

Mounting standard rail TH35 per IEC 60715

Mounting in series the maximum quantity of modules connected in line is limited to 15 or to a maximum power consumption of 2 Amps (AC or DC) per connection to the power supply. For any similar block of additional modules a separate connection to the power supply is mandatory.

Material

Housing Polyamide 6.6 V0

Terminal blocks Polyamide 6.6 V0

Cover plate Polycarbonate

Type of protection (IEC 60529) IP54

IP20

Operating voltage 24 V AC/DC

Temperature range Operating -5 °C ... +55 °C

Storage -20 °C ... +70 °C

Protective circuitry polarity reversal protection of operating voltage polarity reversal protection of supply and bus

Display Operating and bus activity green LED

Error indication red LED

Status of the inputs & outputs yellow LED

1. Description

The Modbus module with 4 digital inputs and 2 relay outputs is designed for local switching operations. It is suitable to receive for example light switches and window contacts in a room and to operate two light bands or to be used as sunblind control. It can also be used to control two motor driven fire dampers or for many other applications. We recommend to protect the relay contacts additionally by a RC-element or high inductive loads.

The relays are provided with a manual control facility. Depending on the position of the jumper (below the faceplate) the inputs can be operated as contact and voltage inputs (A1, 24 V AC/DC; jumper J - A2) or with actuation to GND (A2; jumper J - A1). Inputs and outputs can be operated and scanned via a Modbus-Master.

Setting of the slave address, bit rate and parity is done with the jumper (A1, 24 V AC/DC; jumper J - A2) or with actuation to GND (A2; jumper J - A1). Inputs can be operated as contact and voltage inputs (A1, 24 V AC/DC; jumper J - A2) or with actuation to GND (A2; jumper J - A1. Inputs and outputs can be operated and scanned via a Modbus-Master. Setting of the slave address, bit rate and parity is done with the two address switches (x1 / x10) on the front. Possible settings are addresses 00 to 99 and bit rates 1200, 2400, 4800, 9600, 19200, 38400, 57600 und 115200 Bd.

The device does not participate in bus communication if the address is 00 (reserved for broadcast commands).

Communication with the master can be monitored with a watch-dog timer. If master or communication fail the outputs are switched to their basic state (secure state) and the red LED is lighting. The timer restarts with each valid message addressed to the device. When defining the time constant it is necessary to take account of the baud rate, the number of slaves on the bus and the length of the messages per slave.

4. Wiring Diagram

5. Connection Diagram
6. Mounting
Power down the equipment
Mount the module on standard rail (TH35 per IEC 60715 in junction boxes and/or on distribution panels).
Installation
Electric installation and device termination shall be done by qualified persons only, by respecting all applicable specifications and regulations.
Plug in the terminal block for bus connection

Mounting in series

The module can be aligned without interspace. Use the jumper plug to connect bus and supply voltage when the modules are mounted in series.
The maximum quantity of modules connected in line is limited to 15 or to a maximum power consumption of 2 Amps (AC or DC) per connection to the power supply. For any similar block of additional modules a separate connection to the power supply is mandatory.

7. Bit rate and Parity setting
The bit rate and parity can be set in the programming mode when a jumper is plugged behind the front cover of the module. This jumper is removed in normal mode. A connection to the bus is not required during bit rate setting.
The bit rate of the modules can be set in the following way:
1. remove the front cover of the module;
2. plug a jumper to the two middle pins of the 4 pole header between the red and green LED (0);
3. set the desired parity and bit rate with the address switches (3) in accordance to the chart below.

<table>
<thead>
<tr>
<th>Bitrate (Bit/s)</th>
<th>1200</th>
<th>2400</th>
<th>4800</th>
<th>9600</th>
<th>19200</th>
<th>38400</th>
<th>57600</th>
<th>115200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parity</td>
<td>even</td>
<td>odd</td>
<td>none</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. switch on the supply voltage of the module; it is now permanently saving the bit rate in an EEPROM;
5. switch off the supply voltage of the module;
6. remove the jumper from the header and place the front cover.

If the settings differ from the settings specified in the chart the factory setting applies.
Factory setting: 19200 Bd Even

8. Connection examples
Connection examples 1 and 2

Connection example 3

9. Beschreibung der Software
9.1 I/O Commands
"01 (0x01) Read Coils"
Request
<table>
<thead>
<tr>
<th>Valid Coil Starting Address</th>
<th>0 .. 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid Quantity of Outputs</td>
<td>1 .. 4</td>
</tr>
</tbody>
</table>

Response
<table>
<thead>
<tr>
<th>Byte Count</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Status</td>
<td>Bit0 .. Bit3 (Bit 4 .. 7 = 0)</td>
</tr>
</tbody>
</table>

Information
1 = Status input closed
0 = Status input open

"05 (0x05) Write Single Coil"
Request
| Valid Output Address | 0 .. 3 |
| Valid Output Value   | 0x0000 or 0xFF00 |

Response
<table>
<thead>
<tr>
<th>Echo of the request</th>
<th>1</th>
</tr>
</thead>
</table>

"15 (0x0F) Write Multiple Coils"
Request
| Valid Coil Starting Address | 0 .. 3 |
| Valid Quantity of Outputs  | 1 .. 2 |
| Valid Byte Count           | 1 |
| Output Value               | 0 or 1 in Bit0 .. Bit1 |

Response
<table>
<thead>
<tr>
<th>Function Code, Starting Address, Quantity of Outputs</th>
<th>1</th>
</tr>
</thead>
</table>
### Continuation Software description

**“04 (0x04) Read Input Registers”**

**Request**

<table>
<thead>
<tr>
<th>Valid Request Starting Address</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid Quantity of Registers</td>
<td>1</td>
</tr>
<tr>
<td>Response</td>
<td></td>
</tr>
</tbody>
</table>

**Response**

<table>
<thead>
<tr>
<th>Byte Count</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Values Register</td>
<td>Input Status Bit 0.3</td>
</tr>
</tbody>
</table>

**“03 (0x03) Read Holding Registers”**

**Request**

<table>
<thead>
<tr>
<th>Valid Request Starting Address</th>
<th>0.1 or 66</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid Quantity of Registers</td>
<td>2 or 1</td>
</tr>
<tr>
<td>Response</td>
<td></td>
</tr>
</tbody>
</table>

**Function Code, Byte Count, Register Values**

**Values Register 0:**

- **Value Register 0:**
  - Bit Information
    - 0: Status relay 1 off
    - 1: Status relay 1 on
  - Bit Information
    - 0: Status relay 2 off
    - 1: Status relay 2 on
  - Bit Information
    - 0: relay 1 switched via bus
    - 1: relay 1 switched via manual control
  - Bit Information
    - 0: relay 2 switched via bus
    - 1: relay 2 switched via manual control

**Value Register 6:**

- Time constant for communication monitoring.
- Register Value = 0 (0x0000) there is no communication monitoring.
- all other values are for communication monitoring with a solution of 10 ms.
- 0x0000 to 0xFFFF = > 0 to 655.35 seconds = 10.9 minutes

### Continuation Software description

**“06 (0x06) Write Single Register”**

**Request**

<table>
<thead>
<tr>
<th>Valid Request Starting Address</th>
<th>0 or 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid Quantity of Registers</td>
<td>0 or 1</td>
</tr>
<tr>
<td>Value Register</td>
<td>Bits 0 – 1 according to tables or the description above</td>
</tr>
</tbody>
</table>

**Response**

**“16 (0x10) Write Multiple Registers”**

**Request**

<table>
<thead>
<tr>
<th>Valid Request Starting Address</th>
<th>0 or 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid Quantity of Registers</td>
<td>1.2</td>
</tr>
<tr>
<td>Byte Count</td>
<td>2 x Quantity of registers</td>
</tr>
<tr>
<td>Values Register Value</td>
<td>Quantity of registers x 2 Byte</td>
</tr>
<tr>
<td>Bits Count</td>
<td>2 Bytes</td>
</tr>
</tbody>
</table>

**Response**

**Function Code, Register Starting Address, Quantity of Registers**

#### 9.2 Bit rate setting with Modbus command

Parity and bit rate have the same value as when setting them by address switch.

If Parity or Bit has the value 0, no setting or storage is carried out.

The register content is stored in the EEPROM.

**“06 (0x06) Write Single Register”**

**Request**

<table>
<thead>
<tr>
<th>Valid Request Starting Address</th>
<th>0 or 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Register Value 2 Bytes</td>
<td>0x41 (65)</td>
</tr>
</tbody>
</table>

**Values Register 1:**

- **Value Register 1:**
  - Bit Information
    - 0: initial state after Reset or communication control relay 1 off
    - 1: initial state after Reset or communication control relay 1 on
  - Bit Information
    - 0: initial state after Reset or communication control relay 2 off
    - 1: initial state after Reset or communication control relay 2 on

**Value Register 6:**

- Time constant for communication monitoring.
- Register Value = 0 (0x0000) there is no communication monitoring.
- all other values are for communication monitoring with a solution of 10 ms.
- 0x0000 to 0xFFFF = > 0 to 655.35 seconds = 10.9 minutes

### Continuation Software description

**“08 (0x08) Diagnostics”**

**Subfunction “0” (0x0000) Return Query Data”**

<table>
<thead>
<tr>
<th>Data Field Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response: Echo of Request</td>
</tr>
<tr>
<td>Object ID 0x0000</td>
</tr>
</tbody>
</table>

**Subfunction “1” (0x0001) Restart Communication Option**

| Data Field 0x0000 oder 0xFF00 |
| Response: Echo of Request |
| Action: Clears all Error Counters, Restarts node |

**Subfunction “4” (0x0004) Force Listen Only Mode”**

| Data Field 0x0000 |
| No Response |
| Action: No response until Node Reset or Function Code 08 |

**Subfunction “10” (0x000A) Clear Counters”**

| Data Field 0x0000 |
| Response: Echo of Request |
| Action: Clears all Error Counters |

**Subfunction “11” (0x000B) Return Bus Message Count”**

| Data Field 0x0000 |
| Response: Quantity of messages that the remote device has detected on the communications system since its last restart, clear counters operation, or power-up. |

**Subfunction “12” (0x000C) Return Bus Communication Error Count”**

| Data Field 0x0000 |
| Response: Quantity of errors encountered by the remote device since its last restart, clear counters operation, or power-up. (CRC, Length <3, Parity, Framing) |

**Subfunction “13” (0x000D) Return Bus Exception Error Count”**

| Data Field 0x0000 |
| Response: Quantity of messages addressed to the remote device, or broadcast, that the remote device has processed since its last restart, clear counters operation, or power-up. |

**Subfunction “15” (0x000F) Return Slave No Response Count”**

| Data Field 0x0000 |
| Response: Quantity of messages addressed to the remote device for which it has returned no response (neither a normal response nor an exception response), since its last restart, clear counters operation, or power-up. |

### Continuation Software description

**“43 /14 (0x2B / 0x0E) Read Device Identification”**

**Request**

<table>
<thead>
<tr>
<th>Device ID code:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object ID 0x00</td>
</tr>
<tr>
<td>Response: Object ID 0x01</td>
</tr>
</tbody>
</table>

**Device ID code**

| 0x01 |
| Conformity level |
| 0x01 |

**More follows**

**Object ID 0x00 |
| Number of objects |
| 0x03 |

**Object ID 0x01 |
| Object Length |
| 0x09 |

**Object Value**

| “BTR” |
| “MR-DIO4/2” |
| “V.1.0” |