1. Description
The Modbus module with 10 digital inputs is designed for local switching operations. It is suitable to record potential-free switching states such as electrical limit switches of ventilation valves or auxiliary contacts of power contactors. 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), depending on the setting of the jumper J. The inputs can be 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.

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.

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:** 85 mA AC / 75 mA DC
- **Relative duty cycle:** 100 %

**Input**
- **Input voltage:** 30 V DC
- **High-signal recognition:** >10 V AC/DC

**Dimensions WxHxD:** 1.4 x 2.8 x 2.6 in. (35 x 70 x 65 mm)
**Weight:** 83 g

**Mounting**
- **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.
- **Material:**
  - **Housing:** Polyamide 6.6 V0
  - **Terminal blocks:** Polyamide 6.6 V0
  - **Cover plate:** Polycarbonate

**Temperature range**
- **Operation:** -5 °C ... +55 °C
- **Storage:** -20 °C ... +70 °C

**Protection**
- **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:** yellow LED

4. Wiring Diagram

5. Connection Diagram

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**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 to 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.
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

7. Bit rate and Parity setting
The bit rate and parity can be set in the programming mode when 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 (2);
3. set the desired parity and bit rate with the address switches (3) in accordance to the chart below.
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.

Switch x10
Parity even odd none
Switch x1
Bit rate (Bit/s) 1200 2400 4800 9600 19200 38400 57600 115200
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+2

Connection example 3

9. Software description
9.1 I/O Commands
"02 (0x02) Read Discrete Inputs"
Request
Valid Input Starting Address 0 .. 9
Valid Quantity of Inputs 1 .. 10
Response
Byte Count 1 or 2
Input Status Bit0 ... Bit9
Information
1 = Status input closed
0 = Status input open
"04 (0x04) Read Input Registers"
Request
Valid Register Starting Address 0
Valid Quantity of Registers 1
Response
Byte Count 2
Values Register Input Status Bit 0..9 (MR-DI10)
Continuation Software description
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
Valid Register Address 0x41 (65)
Valid Register Value 2 Bytes
Bit 15-8: Magic-Number 0x53 = 83 as protection against accidental writing. The command will be further analysed only with this number.
Response
Echo of Request

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Additional documentation see www.metz-connect.com
### Example for a frame:

- **Slave address**: 0x12
- **Function**: 0x06 (Write Single Register)
- **Register address Hi**: 0x00
- **Register address Lo**: 0x41
- **Register contents Hi**: 0x53
- **Register contents Lo**: 0x15

**Bit rate and parity**: 19200 Baud

### Broadcast command

- **Slave address**: 0x00

It is advised not to do so as this can cause problems:

- Devices from other manufacturers may have under this address a register for a different purpose that will then be operated in the wrong way.
- There is no feedback from the individual devices. Consequently the control cannot immediately recognize if the command was correctly received.

It is safer to address and switch each device individually. The device will then answer with the old settings of parity and bit rate. Switching will take place only afterwards. However, the answer can get lost if the bus is disturbed.

### General Commands

**“08 (0x08) Diagnostics”**

- **Subfunction “0 (0x0000) Return Query Data”**
  - **Data Field Any**
  - **Response**: Echo of Request

- **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 Subcode 01

- **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 addressed to the remote device, or broadcast, that the remote device has processed 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 MODBUS exception responses returned by the remote device since its last restart, clear counters operation, or power-up.

- **Subfunction “14 (0x000E) Return Slave Message 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.

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

**Request**

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

**Response**

<table>
<thead>
<tr>
<th>Device ID code</th>
<th>0x01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conformity level</td>
<td>0x01</td>
</tr>
<tr>
<td>More follows</td>
<td>0x00</td>
</tr>
<tr>
<td>Next object ID</td>
<td>0x00</td>
</tr>
<tr>
<td>Number of objects</td>
<td>0x03</td>
</tr>
<tr>
<td>Object ID 0x00</td>
<td></td>
</tr>
<tr>
<td>Object Length</td>
<td>0x03</td>
</tr>
<tr>
<td>Object Value</td>
<td>“BTR”</td>
</tr>
<tr>
<td>Object ID 0x01</td>
<td></td>
</tr>
<tr>
<td>Object Length</td>
<td>0x07</td>
</tr>
<tr>
<td>Object Value</td>
<td>“MR-DI10”</td>
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<tr>
<td>Object ID 0x02</td>
<td></td>
</tr>
<tr>
<td>Object Length</td>
<td>0x04</td>
</tr>
<tr>
<td>Object Value</td>
<td>“V1.0”</td>
</tr>
</tbody>
</table>