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 METZ CONNECT 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 device.
Only qualified personnel shall do mounting and installation work with the device, 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 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.

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 terminate with 120 Ohms

Supply
Operating voltage range 20 ... 28 V AC/DC (SELV)
Current consumption 170 mA (AC) / 65 mA (DC)
Relative duty cycle 100 %

Input
4x S0 input according to DIN EN 62053-31 Class A

Housing
Dimensions WxHxD 1.4 x 2.8 x 3.0 in. (35 x 70 x 65 mm)
Weight 95 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 VO
Terminal blocks Polyamide 6.6 VO
Cover plate Polycarbonate
Type of protection (IEC 60529) IP40

Terminal blocks
Supply and bus 4 pole terminal block max. AWG 16 (1.5 mm²) solid wire max. AWG 18 (1.0 mm²) stranded wire min. 0.3 mm up to max. 1.4 mm (terminal block and jumper plug are included to each packing unit)
Wire diameter
Module connection max. AWG 12 (4.0 mm²) solid wire max. AWG 14 (2.5 mm²) stranded wire min. 0.3 mm up to max. 2.7 mm
Wire diameter
Temperature range
Operation -5 °C ... +55 °C
Storage -20 °C ... +70 °C
Protective circuitry 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

1. Description
The Modbus module with 4 50 inputs to DIN EN 62053-31 class A was developed for decentralized switching tasks. It is suitable for counting 50 counter pulses. This allows very good integration of the module into an energy controlling system. In case of a power failure, the last counter readings are saved. The inputs can be scanned by means of standard objects via a Modbus master. The module was developed for decentralized switching tasks. It is suitable for the last counter readings are saved. The inputs can be scanned by means of standard objects via a Modbus master. The module was developed for decentralized switching tasks. It is suitable for

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 device.
Only qualified personnel shall do mounting and installation work with the device, 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
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• 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 terminate with 120 Ohms

Supply
Operating voltage range 20 ... 28 V AC/DC (SELV)
Current consumption 170 mA (AC) / 65 mA (DC)
Relative duty cycle 100 %

Input
4x S0 input according to DIN EN 62053-31 Class A

Housing
Dimensions WxHxD 1.4 x 2.8 x 3.0 in. (35 x 70 x 65 mm)
Weight 95 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 VO
Terminal blocks Polyamide 6.6 VO
Cover plate Polycarbonate
Type of protection (IEC 60529) IP40

Terminal blocks
Supply and bus 4 pole terminal block max. AWG 16 (1.5 mm²) solid wire max. AWG 18 (1.0 mm²) stranded wire min. 0.3 mm up to max. 1.4 mm (terminal block and jumper plug are included to each packing unit)
Wire diameter
Module connection max. AWG 12 (4.0 mm²) solid wire max. AWG 14 (2.5 mm²) stranded wire min. 0.3 mm up to max. 2.7 mm
Wire diameter
Temperature range
Operation -5 °C ... +55 °C
Storage -20 °C ... +70 °C
Protective circuitry 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
6. Mounting

Mounting in series.

Connect the cable for bus supply.

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 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 (B1);
3. set the desired parity and bit rate with the address switches (B3) in according to the chart below.

4. switch on the supply voltage of the module;
5. switch off the supply voltage of the module;
6. remove the jumper from the header and place the front cover.

5 mm

8. Software Description

8.1 I/O Commands

"02 (0x02) Read Discrete Inputs"

<table>
<thead>
<tr>
<th>Address</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 3</td>
<td>INPUT</td>
</tr>
</tbody>
</table>

Switch x10 1 2 3
Parity even odd none

Switch x3 1 2 3 4 5 6 7 8

If the settings differ from the settings specified in the chart the factory setting applies.

Factory setting: 19200 Bd Even

8.2 Modbus functions

The following functions are used to read or write the registers. The valid address ranges are indicated in brackets.

Read Input Registers (0-20)

Write Single Register (20-43)

Write Single Register (65)

Write Multiple Registers (0-43)

For long data types with a length of several registers, these registers are listed directly one after the other and the one with the highest value are indicated first. This data can only be transmitted in complete form.

Discrete Inputs (Read-Only)

Address | Name | Description |
---------|------|-------------|
0 – 3    | INPUT| Switching status of the inputs (switches are connected), 0: Off (switch is open), 1: On (switch is closed) |

Input Register (Read-Only)

Address | Name | Description |
---------|------|-------------|
0 – 11   | IZ   | Pulse counter Data type uint48 (3 registers each) |
12 – 19  | EZ   | Calculated counter reading Data type uint48 (2 registers each) |
20       | INPUT| Bits 0-3 contain Discrete Input 0-3 |

Holding Register

Address | Name | Description |
---------|------|-------------|
0 – 11   | IT   | Copy of the pulse counter after having pressed the key Data type uint48 (3 registers each) (EEPROM) |
12 – 19  | AZ   | Initial count Data type uint32 (2 registers each) Factory setting 0 (EEPROM) |
20 – 23  | E    | Pulses per unit Data type uint16 (1 register each) Factory setting 1 (EEPROM) |
24 – 27  | W    | Current conversion factor Data type uint16 (1 register each) Factory setting 1 (EEPROM) |

8.3 Operating mode for calculation with conversion factor

In the WP register, there is a code 0...1 that determines, together with the conversion factors WI and WU, the way how they are included in the calculation. WP, WI and WU depend on whether the converters are switched by the counters, whether the counter indicates the consumption in a primary or secondary way and whether the emitted pulses correspond primarily or secondarily to the consumption.

A difference must be made between the following electricity meter types:

Type 1: Directly measuring counter, display: primary, pulse: primary

Note: Indicates the actual consumption

Species: DIN rail counter with mechanical drum-type counting mechanism, Ferraris counter

Type of formula: WP = 0

Factors: WI = WU = 1

Type 2: Conversion counter, display: primary, pulse: secondary

Note: Indicates the actual consumption

Species: Counter with LCD display

Type of formula: WP = 1

Factors: WI and WU correspond to the converters

Type 3: Conversion counter, display: primary, pulse: primary

Note: Indicates the actual consumption

Species: Counter with LCD display, multi-function meters

Type of formula: WP = 0

Factors: WI = WU = 1

Type 4: Conversion counter, display: primary, pulse: secondary

Note: Indicates the actual consumption

Species: Counter with LCD display, multi-function meters

Type of formula: WP = 1

Factors: WI and WU correspond to the converters

(continued) Description of the software

- 28 – 31 WU Voltage conversion factor
- 32 – 35 WP Operating mode for calculation with conversion factor
- 36 – 39 ZS Format of the counter digit display
- 40 – 43 TA Flag for key activation
- 65 BAU Codes for baud rates and parity
(continued) Description of the software

8.6 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 rate 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 Register Address</th>
<th>Ox41 (65)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid Register Value 2 Bytes</td>
<td>15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0</td>
</tr>
<tr>
<td>0x53</td>
<td>Parity</td>
</tr>
</tbody>
</table>

Bit 15:8: Magic Number 0x53 = 83 as protection against accidental writing.

The command will be further analysed only with this number.

Bit 7-4: 1 2 3

Parity: even odd none

Bit 3-0: 1 2 3 4 5 6 7 8

Bitrate: 1200 2400 4800 9600 19200 38400 57600 115200

Response

Echo of Request

Example for a frame:

Slave address Ox12
Function Ox06 Write Single Register
Register address Hi Ox00
Register address Lo Ox41
Register contents Hi Ox53 Magic Number
Register contents Lo Ox15 Parity Even, 19200 baud

All devices can be switched simultaneously with a broadcast command (Slave address Ox00). However, 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.

When all devices are switched, it is advised to check communication. Any function of the device providing a feedback is suitable. If a single function is to be used being independent from the process periphery then the function „Diagnostic“ sub-function „Return Query Data“ is suitable, it returns the transferred data.

If bit rate and parity setting of a device are unknown it is possible to address the device successively with all combinations of bit rate and parity until the device answers. Try the most likely combinations first. Try the lower bit rates last as they take longer.

(response)

8.7 General Commands

"08 (0x08) Diagnostics"

Subfunction: "0 (0x00) Return Query Data"

Data Field Any
Response: Echo of Request

Subfunction: "1 (0x01) Restart Communication Option"

Data Field Ox0000 oder Ox0000
Response: Echo of Request

Action: Clears all Error Counters, Restarts node

Subfunction: "4 (0x0004) Force Listen Only Mode"

Data Field Ox0000
Response: No Response

Action: No response until Node Reset or Function Code 08

Subcode 01

Subfunction: "10 (0x000A) Clear Counters"

Data Field Ox0000
Response: Echo of Request

Action: Clears all Error Counters

Subfunction: "11 (0x000B) Return Bus Message Count"

Data Field Ox0000
Response: Quantity of messages that the remote device has detected on the communication system since its last restart, clear counters operation, or power-up.

Subfunction: "12 (0x000C) Return Bus Communication Error Count"

Data Field Ox0000
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 Ox0000
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 Ox0000
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 Ox0000
Response: Quantity of messages addressed to the remote device, for which it has returned no response (either a normal response nor an exception response), since its last restart, clear counters operation, or power-up.