

M A N U A L



RESI-MBUST-MODBUS RESI-MBUS-MODBUS RESI-MBUS2-MODBUS RESI-MBUS3-MODBUS



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1 History

Date	Editor	Description
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01.08.08	Ing. O. Reisky	Review
22.08.08	Ing. O. Reisky	Changed value count of RESI-MBUS2-MODBUS form 200 to 500
07.10.08	Ing. O. Reisky	Version 01.01.00: Implemented secondary addressing, increased register count per modbus telegram from 50 to 100 → affected firmware versions: 3.1.0 (RESI-MBUS-MODBUS) / 1.1.0 (RESI-MBUS2-MODBUS) and higher
13.01.10	DI HC Sigl	Adoption to new converter case
7.1.13	DI HC Sigl	Final adoption to new converter
15.2.14	DI HC Sigl	Minor changes
7.2.15	DI HC Sigl	Adding new types of converters

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3 IMPORTANT SECURITY NOTES



Danger to life through electrical current!

Only skilled personal trained in electro-engineering should perform the described steps in the following chapters. Please observe the country specific rules and standards. Do not perform any electrical work while the device is connected to power.

Pay attention to the following rules:

1. Disconnect the system from power
2. Secure the system against automatic power on
3. Check that the system is de-energized
4. Cover other energized parts of the system

IMPORTANT HINT: Before you start with the installation and the initial setup of the device, you have to read this document and the attached installation guide and the actual manual for the device very carefully. You have to follow all the herein given information very accurate!

- Only authorized and qualified personnel is allowed to install and setup the device!
- The connection of the device must be done in de-energized state!
- Do not perform any electrical work while the device is connected to power!
- Disable and secure the system against any automatic restart or power on procedure!
- The device must be operated with the defined voltage level!
- Supply voltage jitters must not exceed the technical specifications and tolerances given in the technical manuals for the product. If you do not obey this issue, the proper performance of the device cannot be guaranteed. This can lead to fail functions of the device and in worst case to a complete breakdown of the device!
- You have to obey the current EMC regulations for wiring!
- All signal, control and supply voltage cables must be wired in a way, that no inductive or capacitive interference or any other severe electrical noise disturbance may interfere with the device. Wrong wiring can lead to a malfunction of the device!
- For signal or sensor cables you have to use shielded cables, to avoid damages through induction!
- You have to obey and to apply the current safety regulations given by the ÖVE, VDE, the countries, their control authorities, the TÜV or the local energy supply company!
- Obey country-specific laws and standards!
- The device must be used for the intended purpose of the manufacturer!
- No warranties or liabilities will be accepted for defects and damages resulting from improper or incorrect usage of the device!
- Subsequent damages, which results from faults of this device, are excluded from warranty and liability!
- Only the technical data, wiring diagrams and operation instructions, which are part to the product shipment are valid!

- The information on our homepage, in our datasheets, in our manuals, in our catalogues or published by our partners can deviate from the product documentation and is not necessarily always actual, due to constant improvement of our products for technical progress!
- In case of modification of our devices made by the user, all warranty and liability claims are lost!
- The installation has to fulfill the technical conditions and specifications (e.g. operating temperatures, power supply, ...) given in the devices documentation!
- Operating our device close to equipment, which do not comply with EMC directives, can influence the functionality of our device, leading to malfunction or in worst case to a breakdown of our device!
- Our devices must not be used for monitoring applications, which solely serve the purpose of protecting persons against hazards or injury, or as an emergency stop switch for systems or machinery, or for any other similar safety-relevant purposes!
- Dimensions of the enclosures or enclosures accessories may show slight tolerances on the specifications provided in these instructions!
- Modifications of this documentation is not allowed!
- In case of a complaint, only complete devices returned in original packing will be accepted!

4 General Information

Since the data from RESI-MBUSx-MODBUS converters can be read from any Modbus-Master (automated control, visualisation system etc...) a very broad range of applications becomes possible. For instance data from a heat meter can be easily represented on a information display. Each of our four different MBUS-MODBUS converter modules can read the data from up to 2 / 8 / 24 / 48 Meter bus unit loads (1 unit load corresponds to 1,5 mA current consumption of one participant), depending on the type of converter. Thus maximal 2 / 8 / 24 / 48 devices each one unit load can be connected to one MBUSx-MODBUS converter, depending on the converter type. The current consumption of a device can be seen from the respective data sheet.

The values to be read are freely configurable and are automatically queried in selectable periods of time.

- Meter-Bus interface for a maximum 2 / 8 / 24 / 48 unit loads (1,5 mA)
- Meter-Bus interface: 300 up to 38400 bps, 8 data bits, even parity, 1 stopbit
- Meter-Bus and Modbus interface electrically isolated
- Modbus interface: RS232 or RS485, 9600 up to 57600 bps, 8 data bits, none or even parity, 1 stopbit
- Modbus address is configurable (1..255)
- Configuration of up to 20 / 100 / 500 / 600 Meter-Bus values
- 5 different data types for value representation in Modbus registers
- 24V DC power supply

Type	Description	Voltage	Power	Weight
RESI-MBUST-MODBUS	Meter-Bus to Modbus converter with RS232 and RS485 interface supporting 2 meters and 20 configurable values, DIP switch for settings	24 V=	<2.5W	60 g
RESI-MBUS-MODBUS	Meter-Bus to Modbus converter with RS232 and RS485 interface supporting 8 meters and 200 configurable values, DIP switch for settings	24 V=	<2.5W	60 g
RESI-MBUS2-MODBUS	Meter-Bus to Modbus converter with RS232 and RS485 interface supporting 24 meters and 500 configurable values, DIP switch for settings	24 V=	<2.5W	60 g
RESI-MBUS3-MODBUS	Meter-Bus to Modbus converter with RS232 and RS485 interface supporting 48 meters and 600 configurable values, DIP switch for settings	24 V=	<3.5W	60 g

Technical Data		
Power supply		
Supply voltage	24 V= +/-10%	Storage temperature
Power LED	Yes	Operating Temperature
		Humidity
Power consumption		Protection Class
RESI-MBUST-MODBUS	<2.5W	Dimensions LxWxH
RESI-MBUS-MODBUS	<2.5W	Weight
RESI-MBUS2-MODBUS	<2.5W	Mounting
RESI-MBUS3-MODBUS	<3.5W	
Modbus Interface		Factory settings
Protocol	Modbus/RTU	Modbus address
Type	RS232 or RS485	Modbus baud rate
Baud rates	9600 to 57600/8/N or E/1	Modbus interface
Cable Connection	Via clamps	MBUS baud rate
LED indicator	Yes	
Galvanic insulation to MBUS interface	Yes	
Meter-Bus Interface		Meter-Bus cabling
Protocol	Meter BUS	Cable type
		Cable length
1 unit load @ 1.5mA = 1 meter		Cable capacity
RESI-MBUST-MODBUS	2 meters	
RESI-MBUS-MODBUS	8 meters	
RESI-MBUS2-MODBUS	24 meters	
RESI-MBUS3-MODBUS	48 meters	
MBUS baud rates	300 to 38400/8/E/1	
Cable connection	Via clamps	
Galvanic insulation to MODBUS interface	Yes	
LED indicator	Yes	
Clamps		CE conformity
Clamp wire cross section	Max. 1,5 mm ²	Yes
Tightening torque	Max. 0.5Nm	

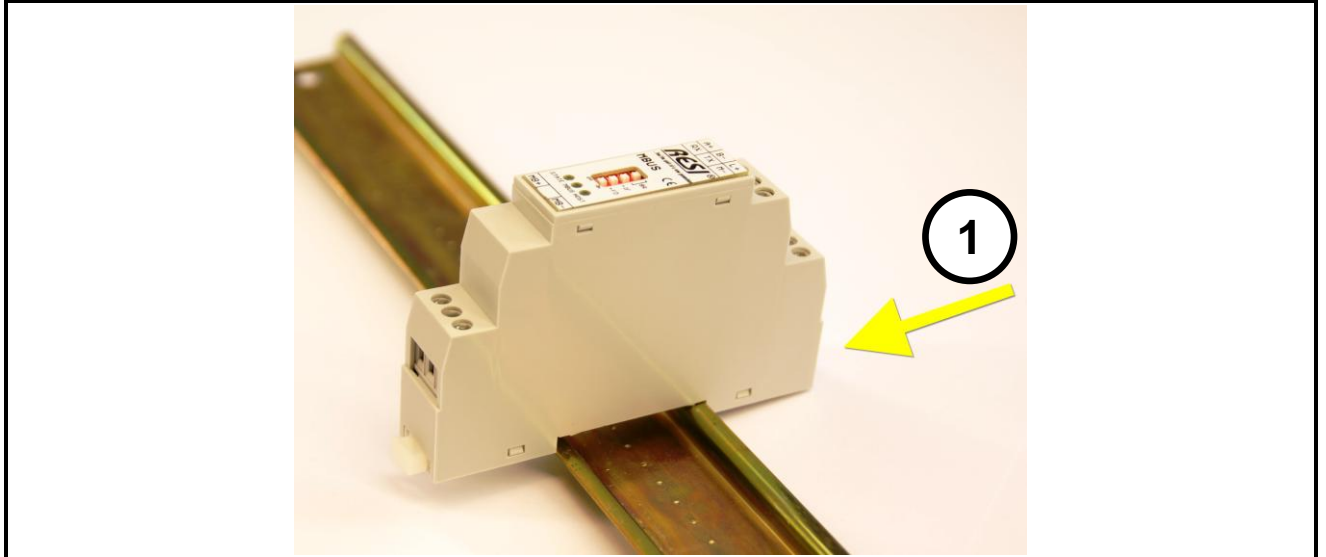
IT Accessories	
RESI-MODBUS-Configurator	Free configuration software for RESI Modbus devices. Download this software from www.RESI.cc

5 Mounting and Connections

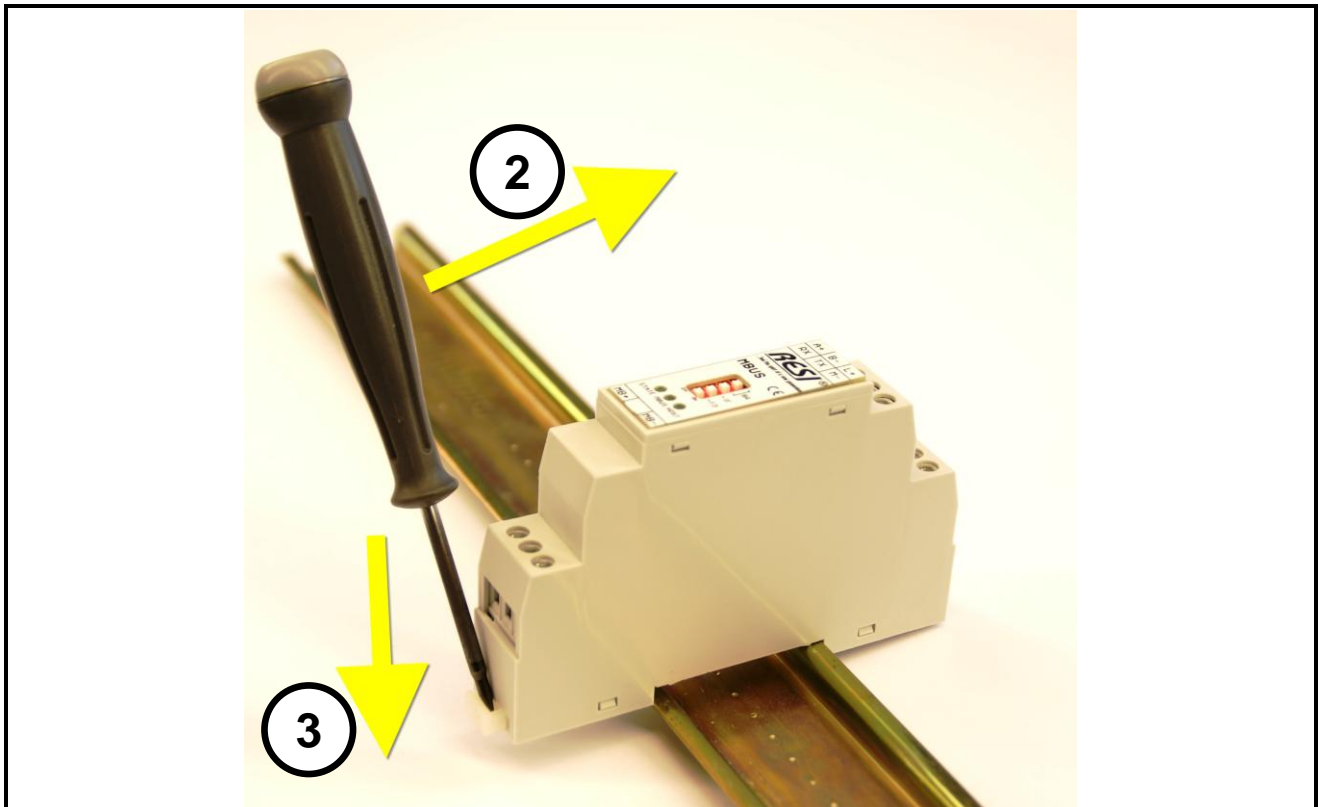
5.1 Assembling

Our RESI-MBUS-MODBUS converters are designed for mounting on a 35mm DIN-EN50022 rail.

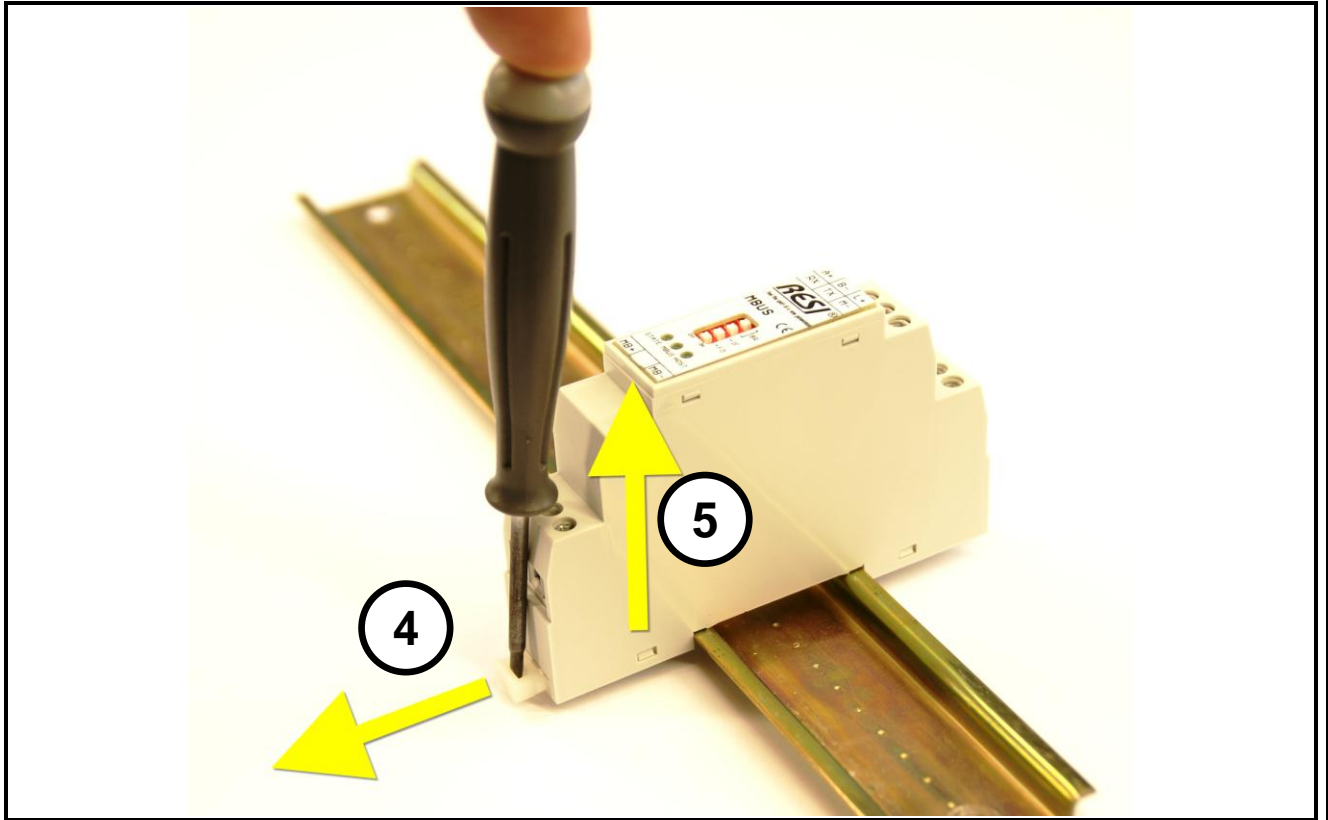
At first, put the converter with the top side on the DIN rail (1).



Then open the clamp lever on the bottom side with a screw driver (2) and press the device on the DIN rail (3). Release the clamp lever. The module is now placed correctly on the DIN rail.



To dismount the module from the DIN rail first open the clamp lever with a screwdriver on the bottom side (4). Hold the clamp lever opened while you lift the module from the DIN rail (5). Then remove the converter from the bar with while pulling it on the top side.



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5.2 DIP switch settings

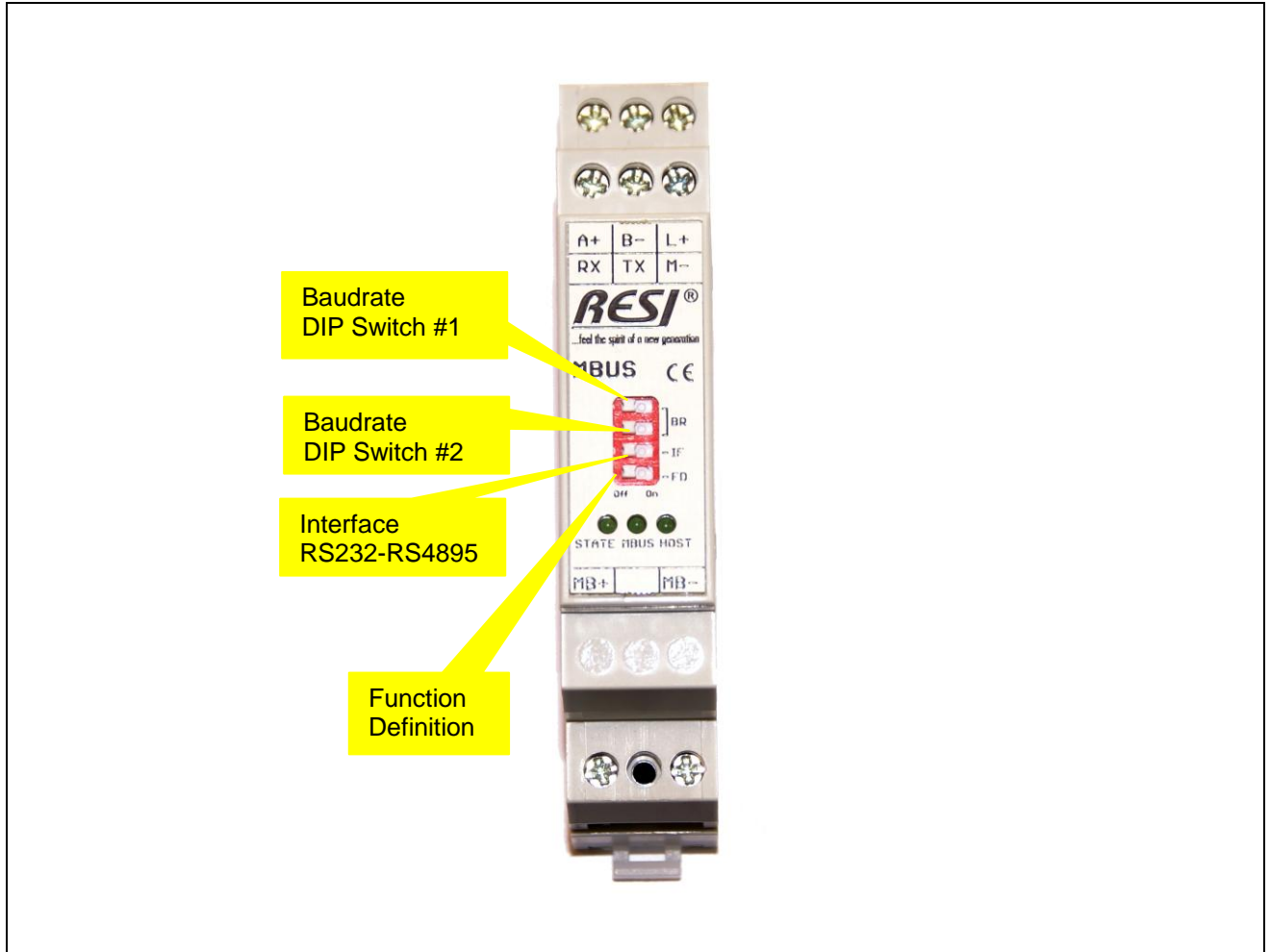


Illustration: DIP Switch settings for the RESI-MBUSx-MODBUS converters

DIP Switch	Description
Baudrate BR	Use DIP Switches 1+2 to select baudrate: OFF OFF: 9600Bd ON OFF: 19200Bd OFF ON: 38400Bd ON ON: 57600Bd HINT: The correct parity (NONE, EVEN or ODD) is configured with the PC software, not via DIP switches!
Interface IF	Select serial interface for MODBUS/RTU Slave OFF=RS232 ON=RS485
Function Definition FD	Selects special Functions OFF=Use Modbus RTU slave busaddress from FLASH memory ON=Use always Slave address 255
HINT	After changing the DIP switches the converter reboots immediately, so no power off or on is necessary. After reboot all the LEDs are on for half a second to signal the power on sequence.

Table: Description of DIP Switch functions

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CLAMPS/LEDS	RESI-MBUSx-MODBUS
L+ M-	Power supply L+: 24 V= M-: Ground
A B	RS485 Modbus/RTU slave interface A: DATA+ B: DATA-
RX TX M-	RS232 Modbus/RTU slave interface RX: serial receive TX: serial transmit M-: Ground for RS232
MB+ MB-	Interface to MBUS devices
STATE	State-LED, flashes, when converter is ok
MBUS	MBUS activity LED, flashes, when MBUS telegrams are on the bus
HOST	HOST-LED, flashes, when host sends/receive MODBUS/RTU telegrams

Table: Description of connectors

5.3 Wiring diagram

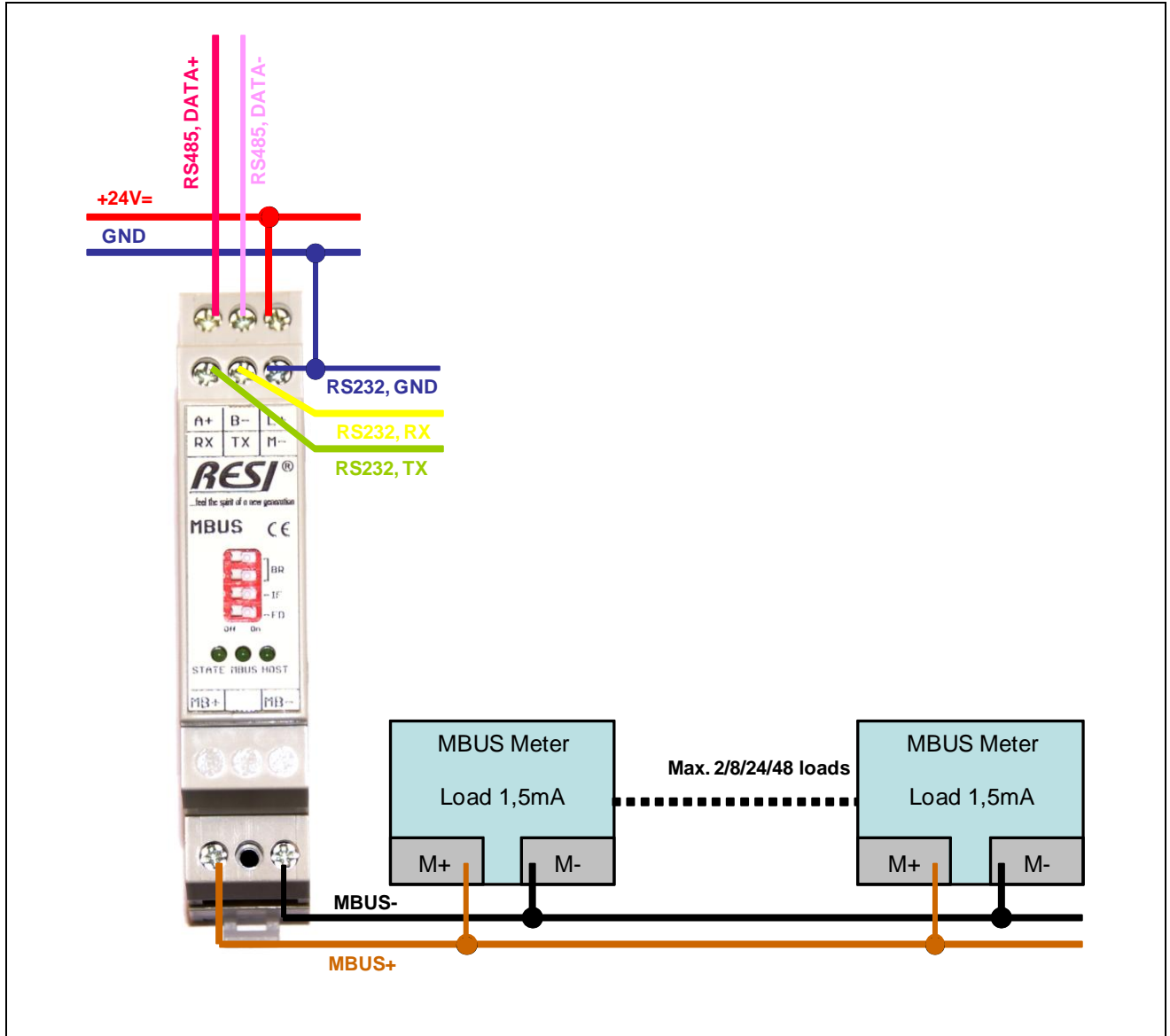


Illustration: wiring diagram for all four types of RESI-MBUSx-MODBUS converters

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6 Functional Description

RESI-MBUSx-MODBUS converters read values of meters with a MBUS interface automatically and store the values in internal Modbus Holding registers. The converters can hold up to 20/200/500/600 MBUS values, depending on the type of the converter. A host system can read out asynchronously the stored values via MODBUS RTU master functionality. The physical connection is done via RS232 or via RS485 interface.

After switching on the power supply the converter checks for a valid configuration and initializes all registers to zero. If there is no valid configuration or an error occurred, the state indicator flashes twice every second, on successful startup it flashes every second. The power on sequence is signaled with a simultaneous short flash of all the LEDs in the converter.

To configure the converters, please use our free software MODBUSConfigurator.exe, which you can download from our homepage www.RESI.cc.

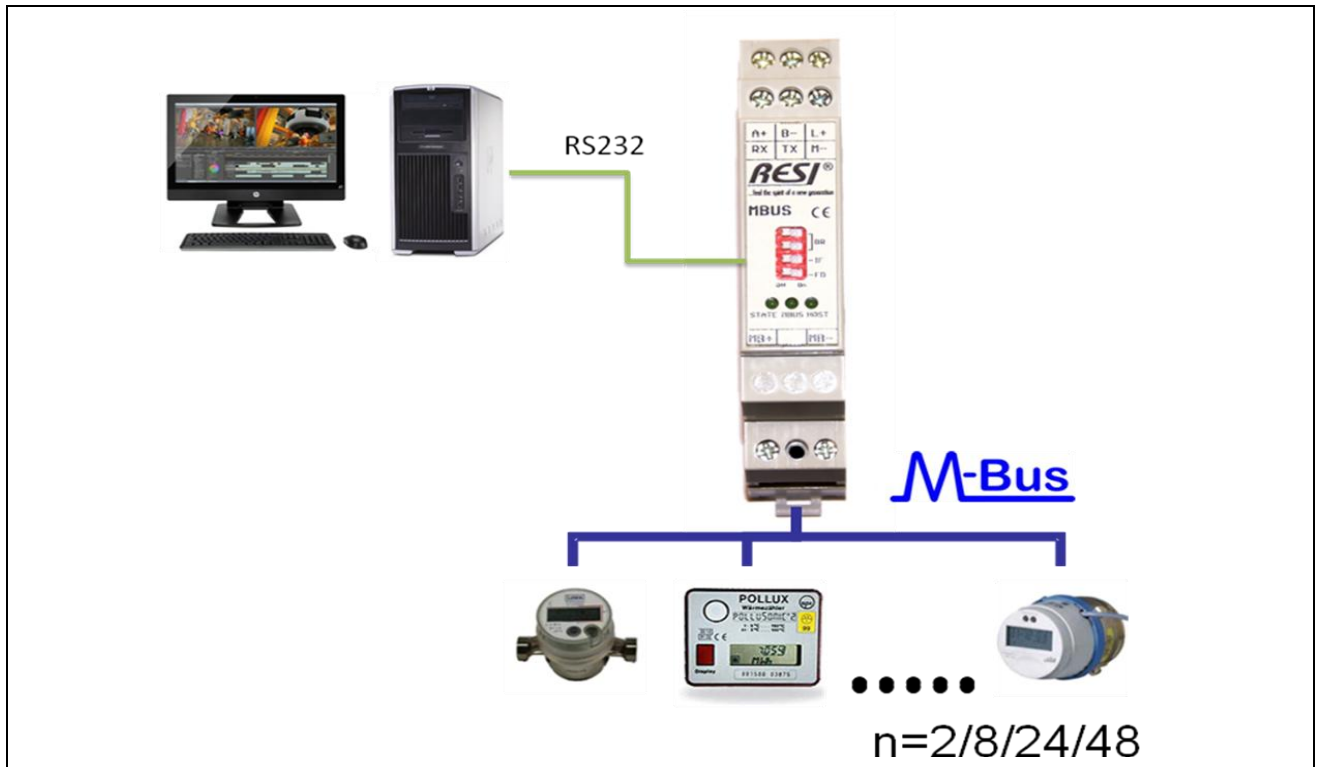
Please read our ONLINE help for the software for a better understanding, how to use our software very efficient. Please refer also to our online WIKI system for more details about the configuration process of meters and how exactly the mapping to MBUS registers is done by the converter. There is also a question & answer list with all common questions to our products. Use this link to access our WIKI system: http://www.resi.cc/resiwiki/index.php/MBUS_products

6.1 Field of applications

This chapter shows typical applications, where our converter can be used.

6.1.1 Use with a SCADA system

Many SCADA systems offer the possibility to install a MODBUS/RTU master driver. With this driver, you can read the converted MBUS values directly from our converter. See the graphics below:

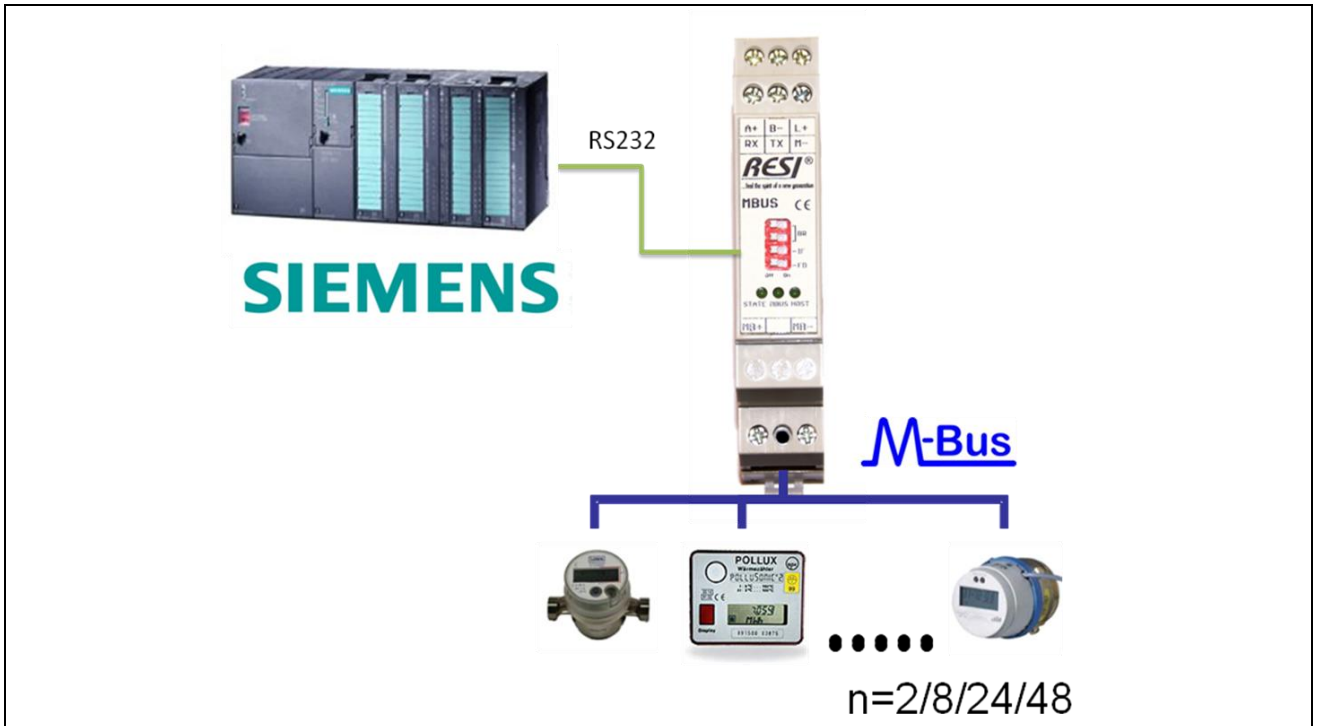
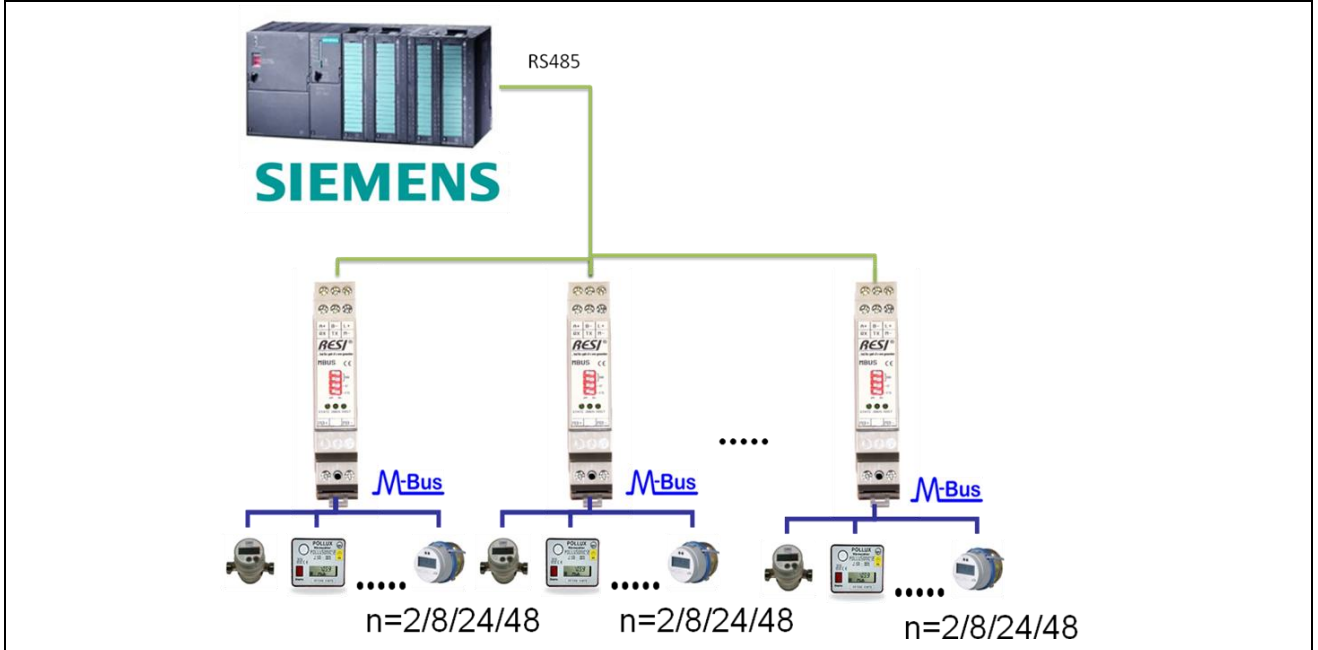


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6.1.2 Use with a PLC

PLC systems offer MODBUS RTU interfaces. With this interface the PLC can read out the converter values via RS232 or via RS485 directly into its internal memory and can use the meter data for calculations eg. Energy optimisation. See the graphics below:

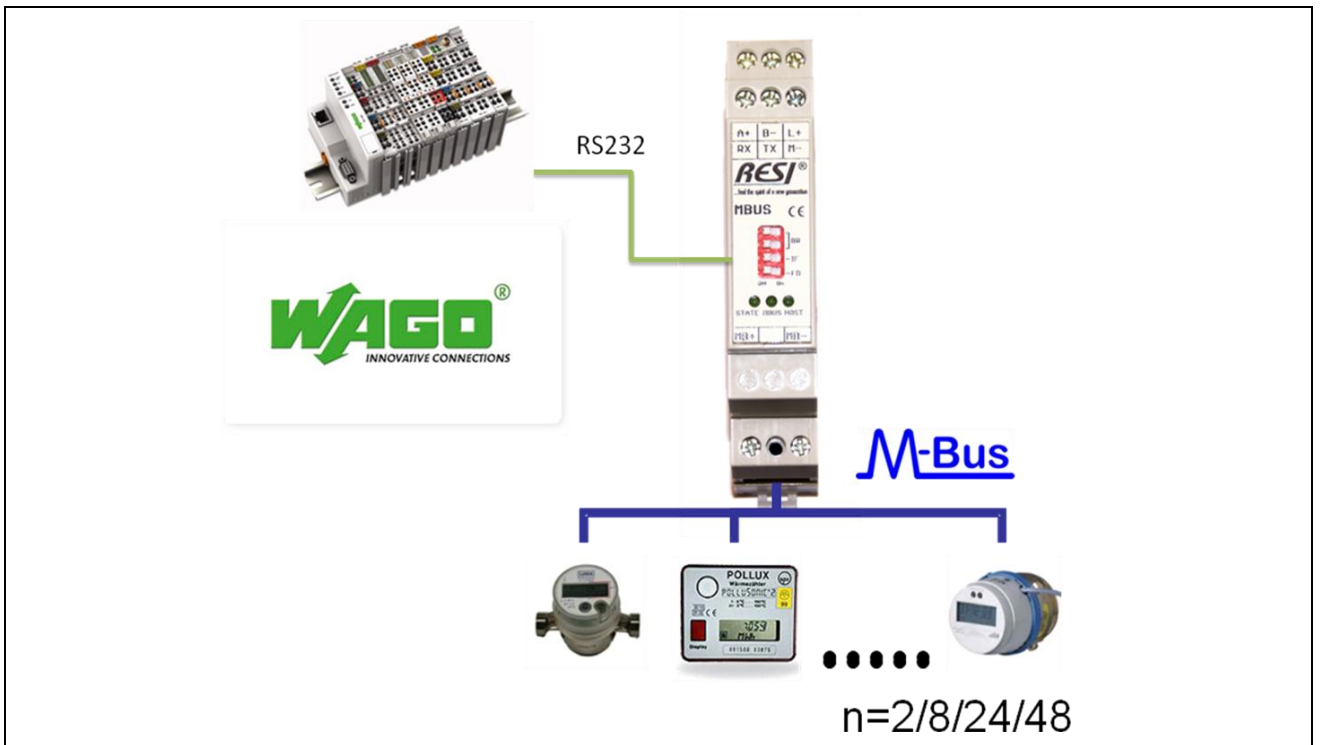
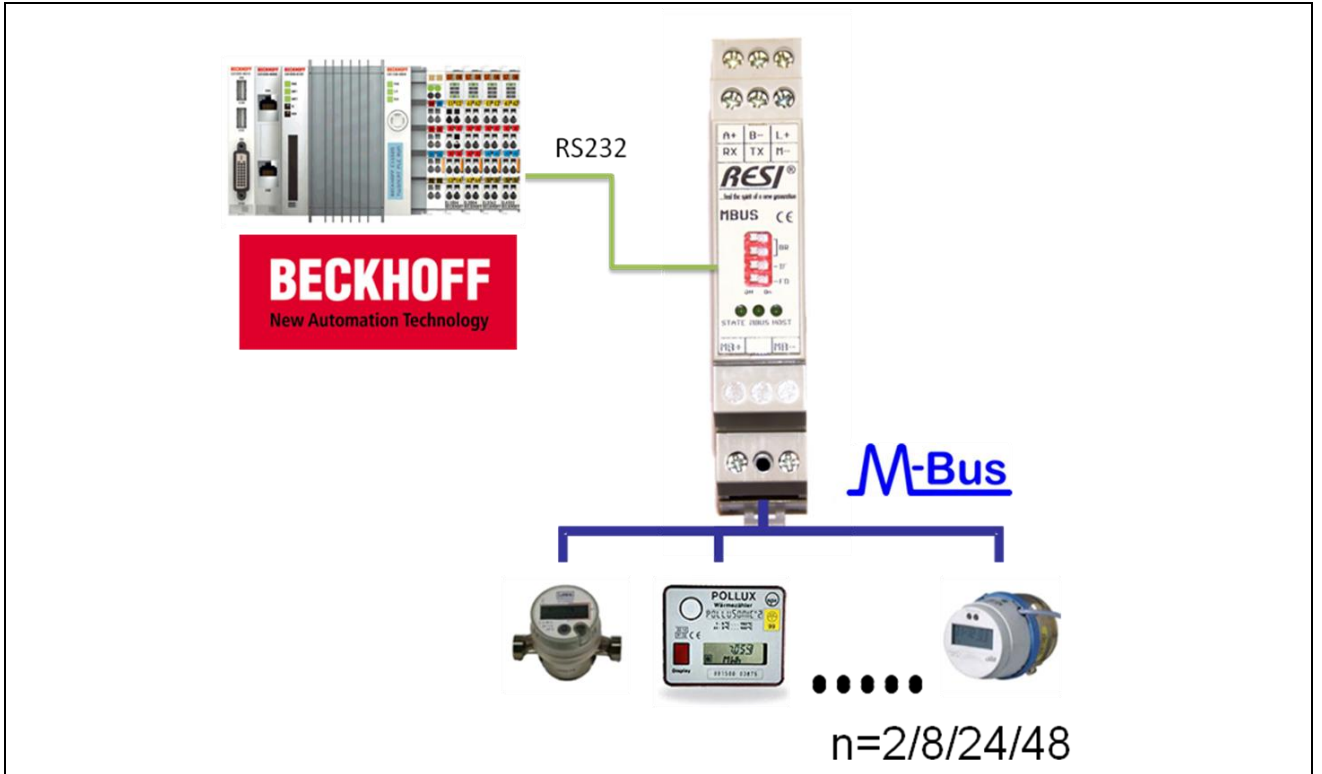


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6.2 Operation

Below the operations in graphic structure

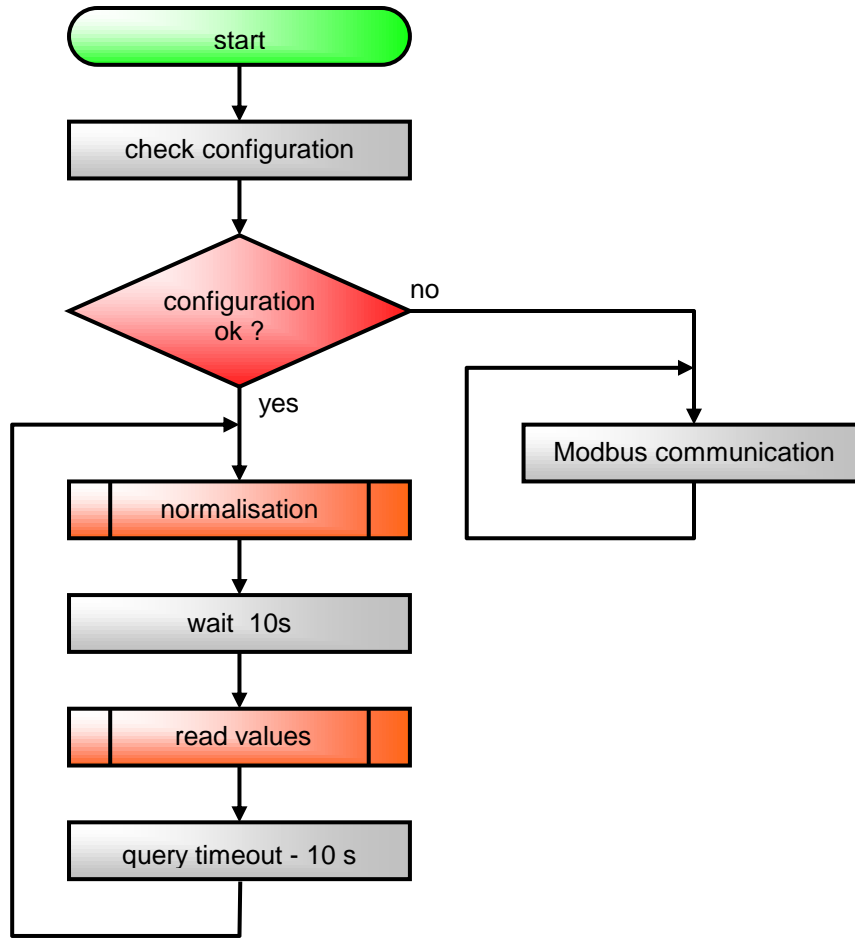
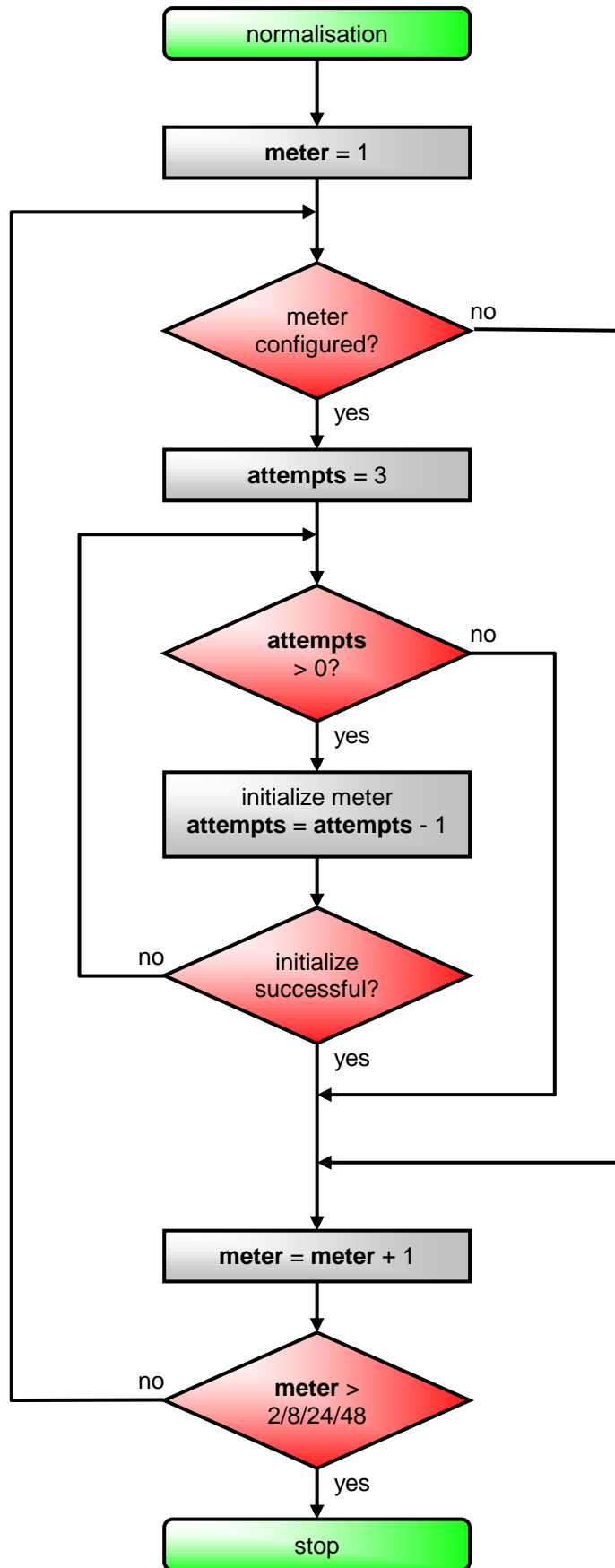


Illustration: Flowchart for the startup procedure of the converter



Illustration; Flowchart for the initialization (-normalization) procedure of the converter

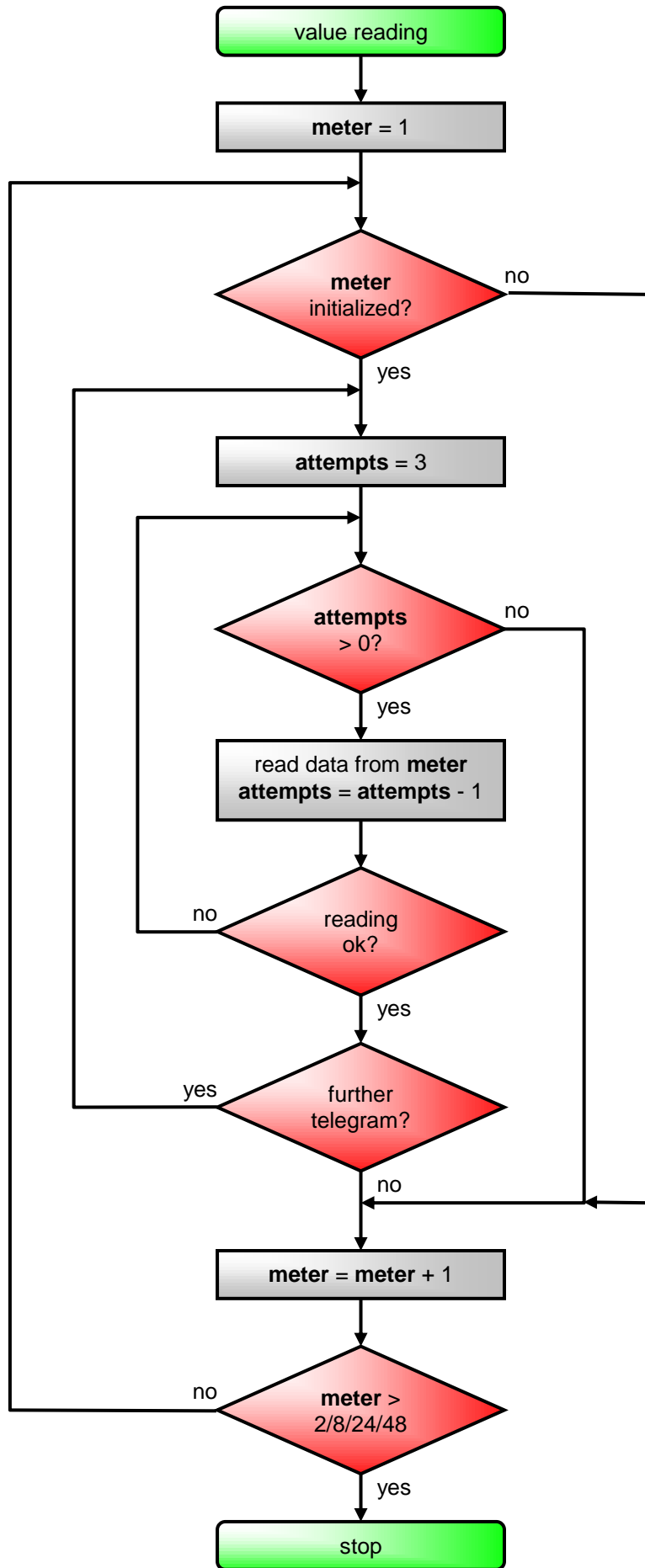


Illustration: Flow chart for the of the data sampling procedure of the meter

6.3 Modbus/RTU interface

For more details and further information, please consult also our online WIKI system. You will find this online knowledge base under http://www.resi.cc/resiwiki/index.php/MBUS_products

For communication via Modbus RTU protocol the following Modbus telegram types are available:

- READ HOLDING REGISTER (function code: 3)
- PRESET SINGLE REGISTER (function code: 6)
- PRESET MULTIPLE REGISTERS (function code: 16)

Special note:

A maximum of 100 registers per telegram is allowed for the telegrams READ HOLDING REGISTER and PRESET MULTIPLE REGISTERS!

Register overview:

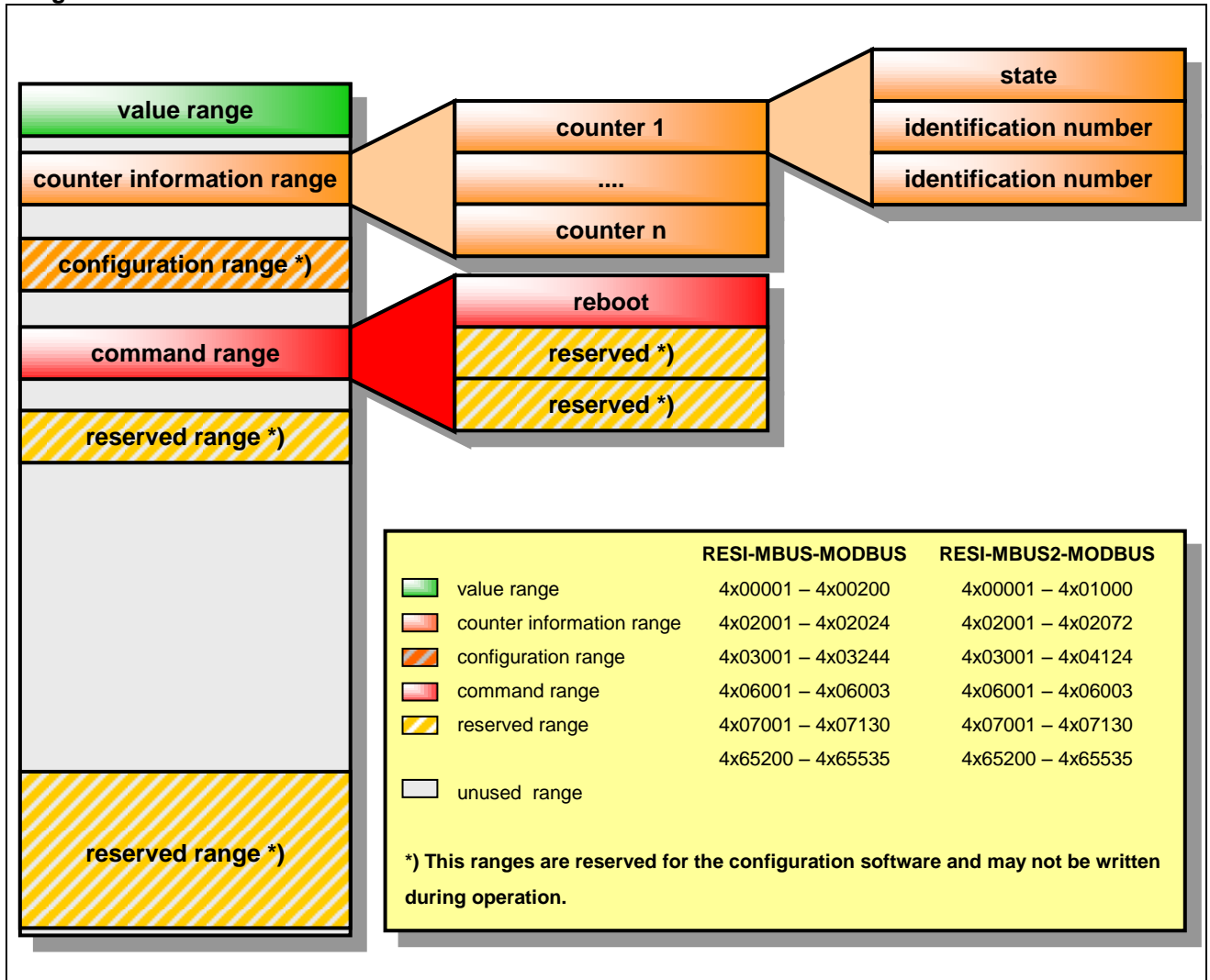


Illustration Register map

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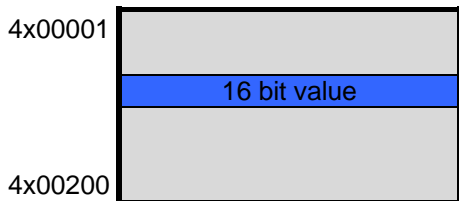
6.3.1 Data formats and value ranges

Following all data formats a value can be represented on the MODBUS side of the converter, are described here. Please consult our article:

RESI-MBUS-MODBUS-HOWTO-map-MBUS-values-to-MODBUS-registers.pdf on the Online WIKI system under http://www.RESI.cc/resiwiki/index.php/MBUS_products

16 bit signed binary:

representation in the value list



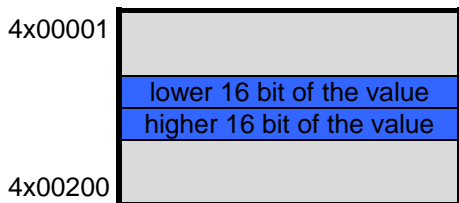
description

This data format is qualified for the representation of small integer values with sign.

value range: -32768 ... 32767
representation: 2's complement

32 bit signed binary:

representation in the value list



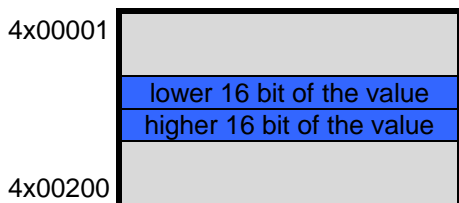
description

This data format is qualified for the representation of big integer values with sign.

value range: -2147483648 ... 2147483647
representation: 2's complement

32 bit IEEE floating-point number:

representation in the value list



description

Used for representation of very big integer and real numbers.

value range: 1,175495e-38 ... 3,40282346e+38
representation: IEEE floating-point 32 bit

Special note:

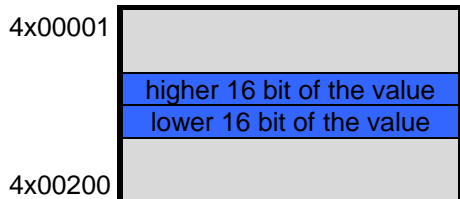
This data type has a limited accuracy. By using, there may be minor deviation of the reading values via MODBUS/RTU and the values which will be shown at the meter. This variations are system-related and no reason for reclamation!

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32 bit IEEE floating-point number inverted:

representation in the value list



description

Used for representation of very big integer and real numbers.
 value range: 1,175495e-38 bis 3,40282346e+38
 representation: IEEE floating-point 32 bit

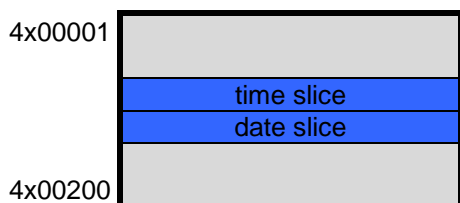
Special note:

This data type has a limited accuracy. By using, there may be minor deviation of the reading values via MODBUS/RTU and the values which will be shown at the meter. This variations are system-related and no reason for reclamation!

32 bit date- & time format:

Because the date – and time format of the M-Bus specification needs some shifting – and masking operations, this data type has been created. It offers a continuous representation which makes the interpretation of the data less difficult. The converter executes the needed shifting operations internally, so the interpretation in the higher-ranking system will be simplified.

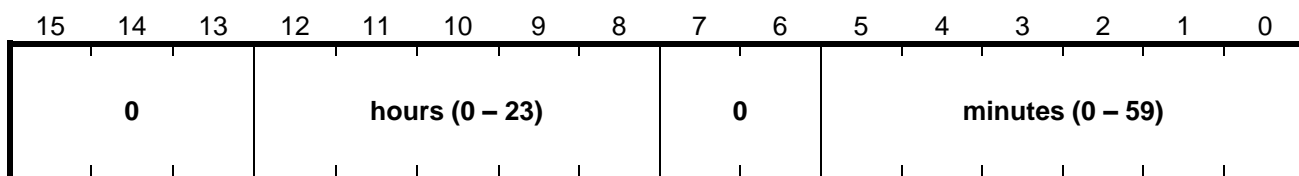
representation in the value list



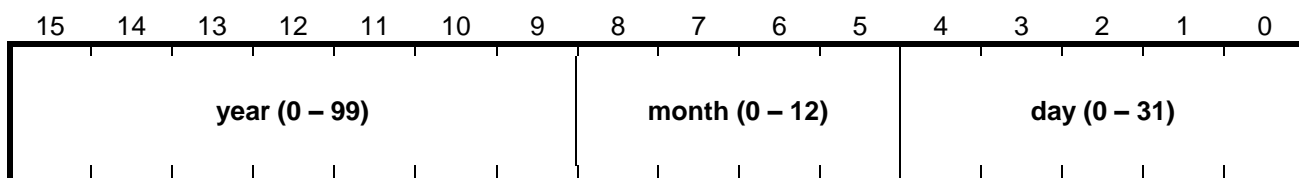
description

This data format is qualified for the representation of the M-Bus data types G and F.

time slice (lower 16 bit)



date slice (higher 16 bit)

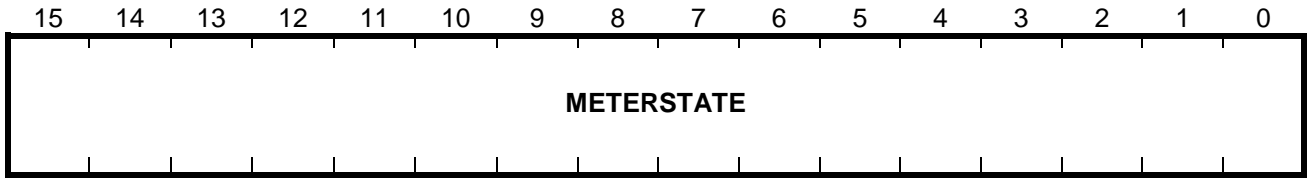


If the M-Bus meter transmitted only one date, the time slice is 00:00.

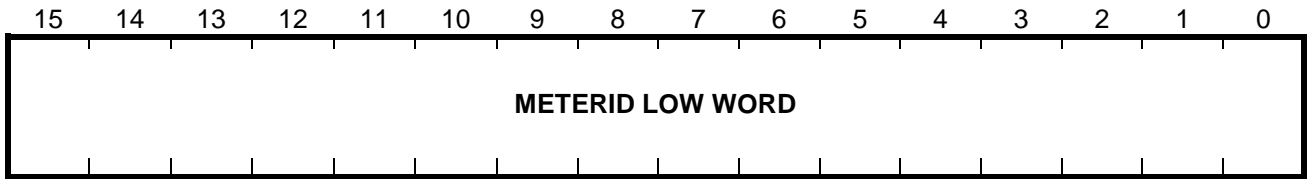
6.3.2 Meter information range

In the meter information range, the state and the identification number of the meter can be read. For each meter there are 3 subsequent registers reserved.

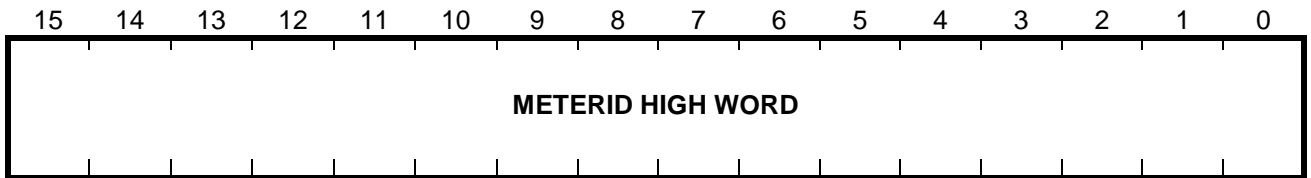
METERSTATEx Holding Register initialization value: 0
(1st register) (4x02001, 4x02004, ... , 4x02070)



METERIDx Holding Register initialization value: 0
(2nd register) (4x02002, 4x02005, ... , 4x02071)



METERIDx Holding Register initialization value: 0
(3rd register) (4x02003, 4x02006, ... , 4x02072)



Value	Description
METERSTATE	<p>State of the meter The state indicates, if the communication with the meter is ok and if the stored values for a meter are actual.</p> <p>Values: 0: Meter not configured 1: Meter wasn't successfully normalized since startup 2: No meter data is available, or meter did not answer to a query or the readout of a meter fails 3: The latest data query was successful and the data in the value range are actual</p>
METERID	<p>Meter identification number The serial number of the meter represented in a 32 bit value in 2 Modbus registers.</p>

6.3.3 Command range

With the help of the register 4x06001, the converter can be rebooted when value 1 is written to the register. The converter gives no answer to the command, when rebooting was successful.

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6.4 Meter-Bus interface

In the table below a summary of the M-Bus master specifications is shown:

Function	Support
communication according EN1434-3	YES
primary addressing	YES
secondary addressing	YES
FCB mechanism	YES
initializing of a meter (SND_NKE)	YES
sending data to the meter (SND_UD)	NO
reading of class 2 data (REQ_UD2)	YES
reading of class 1 data (REQ_UD1)	YES
receive of meter data (RSP_UD)	YES
multiple telegram answer	YES
fixed data structure	YES
variable data structure	YES
integer data typ	YES
real data typ	YES
BCD data format	YES
variable data format	YES, partly
primary VIFs (VIF = Value Information Field)	YES
plain text VIF	YES
linear VIF extension	YES
manufacturer specific VIFs	YES ,partly
manufacturer specific values	YES, partly
baud rate	300 to 38400

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7 Specifications

7.1 Dimensions

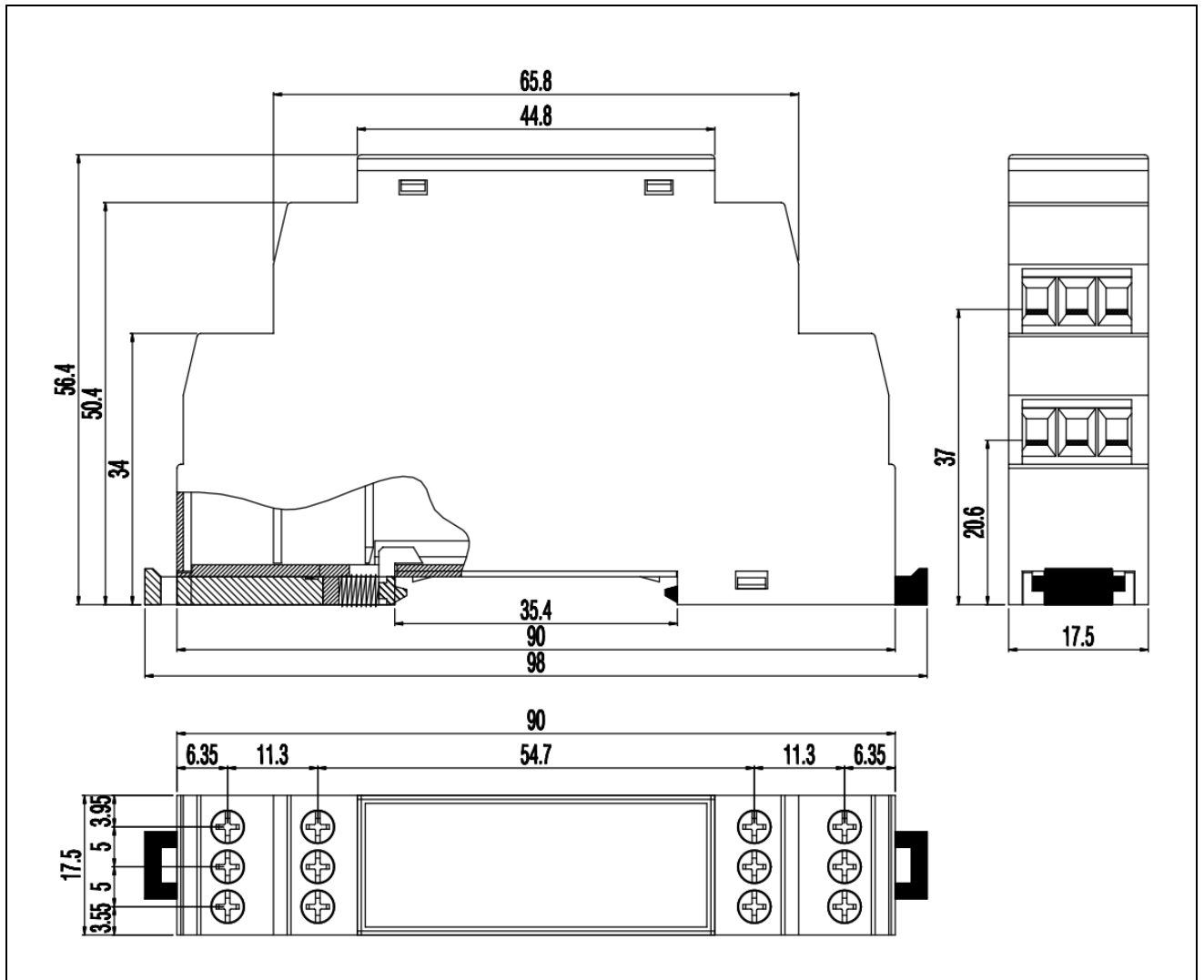


Illustration: dimension illustration in mm

Dimensions	
Enclosure dimensions L x W x H (mm)	17,5 x 90 x 58
Weight	60 g
Colour	Grey RAL7035
Material	PA - UL 94 V0
Protection class	IP20 based on DIN 40050/EN 60529

Table: Data of enclosure