BA00216R/09/EN/03.17
71355431
Valid as of FW version:
03.08.xx (device software)

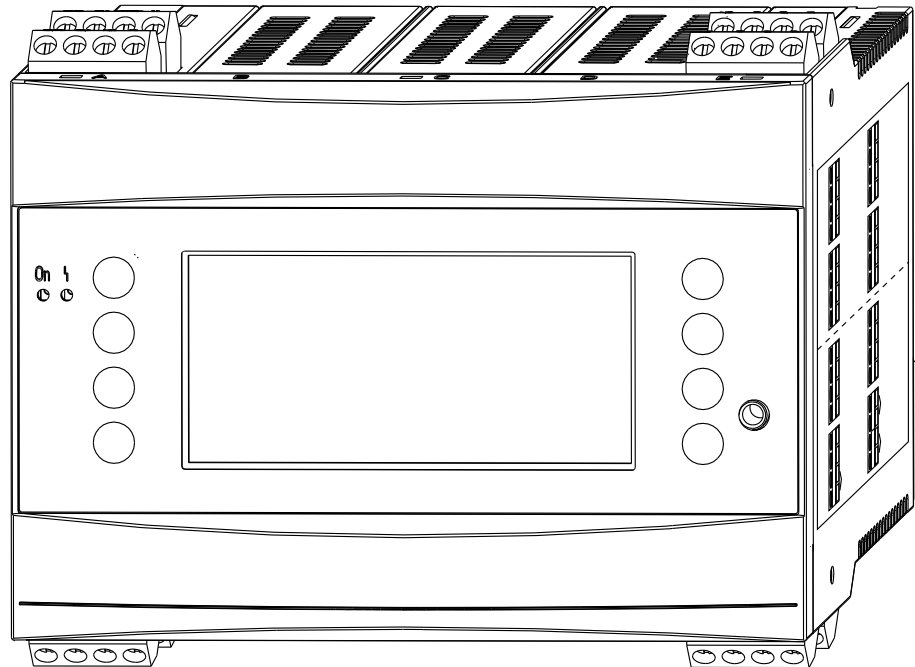Products   Solutions   Services

Operating Instructions
RMx621

Appendix to the Operating Instructions
M-Bus interface V3.08.00: Connecting the Energy
Manager to M-Bus system (two-wire bus in accordance
with DIN EN 1434-3)

M-Bus

Endress+Hauser

People for Process Automation

Table of contents

1 General

1.1 Transport damage

Please inform both your supplier and transport company.

1.2 Scope of delivery

- These Operating Instructions
- Energy Manager RMx621 with M-Bus option (order code:
  RMC621-XxxXXXxx7x or RMC621-XxxXXXxx8x
  RMS621-xxXXXxx5x or RMS621xxXXXxx6x)
- Operating Instructions for the RMx621

If anything is missing, inform your supplier immediately!

1.3 Safety symbols

Symbol	Meaning
⚠ DANGER	**DANGER!** This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
⚠ WARNING	**WARNING!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
⚠ CAUTION	**CAUTION!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE	**NOTE!** This symbol contains information on procedures and other facts which do not result in personal injury.

1.4 Basics

Simultaneous use of the M-Bus interface and the front-side RS232 interface is not possible for devices for the non-hazardous area (order code: RMC621-AxxXXXxxxx and all RMS621). If the M-BUS interface is activated, no communication is possible via the RS232 interface (jack socket). The bus interface has to be switched to RS232 at the device if data are transmitted or read out with the PC configuration software.

The M-Bus option for the Energy Computer RMx621 supports communication in accordance with DIN EN 1434-3 (standard for data exchange and interfaces for heat counters).

2   Installation

Refer to the installation instructions provided in the corresponding Operating Instructions.

2.1   Prerequisites

The M-Bus option is available for Energy Manager RMx621 with firmware version V 3.01.00 or later.

The M-Bus multi-slave option is available for Energy Manager RMx621 with firmware version V 3.06.00 or later.

From firmware version V3.08.00 of the energy manager the data format for counter can be selected (32-bit float or 48-bit integer).

2.2   Connections and terminal diagram

Connecting the Energy Manager RMx621 to an M-Bus system.
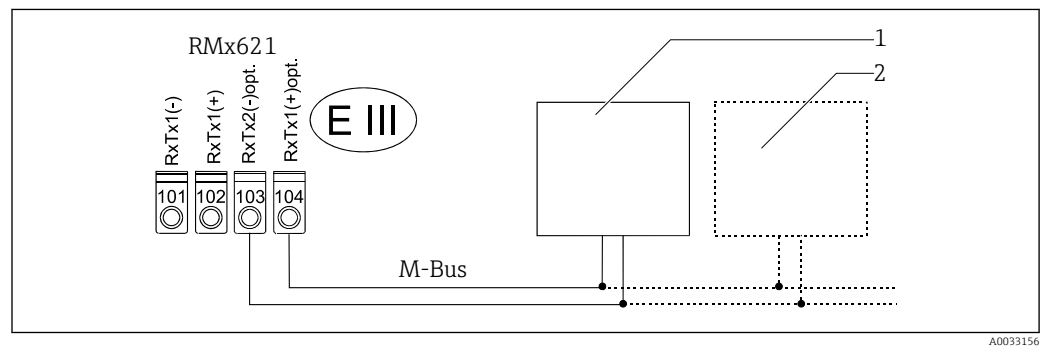
1   e.g. M-Bus converter or PC
2   further M-Bus devices

Inverting the polarity of the M-Bus cable has no effect on the function of the M-Bus. The M-Bus interface (terminals 103, 104) is available only if the energy computer is equipped with the corresponding option.

3   Commissioning

3.1   Configuring the M-Bus interface on the Energy Manager RMx621

The "Setup/Communication/RS232/M-Bus (2)" menu item contains all of the parameters relevant to the M-Bus interface.

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If you are commissioning the device for the first time, set the "Use" parameter to "M-Bus".
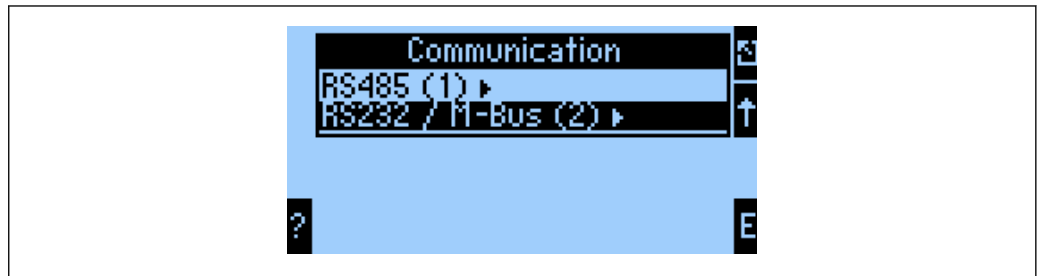
This makes the following parameters visible:
- No. Slaves
- Baudrate
- Unit addr. 1
- Count. format
- Identification number
- Number of values to be transmitted on the M-Bus
- Selection of the values to be transmitted

| Function (menu item)	Parameter setting	Description
Use	RS232 M-Bus	Defines the operating mode of the optional interface
Baud rate	300 2400	In "M-Bus" mode, speeds of 300 and 2400 baud are supported
Manufactur.	EAH	Cannot be modified by the user.
Version	2	Cannot be modified by the user.
Medium	0E	Cannot be modified by the user.
Count. format	32-bit float or 48-bit integer	Defines the data format for the transmission of counters.
No. Slaves	1	Defines the number of slaves. Up to three slaves can be configured.
Device addr.1	000	Primary address (max. 250) for slave 1.
Ident no.1	00000000	This, in combination with the manufacturer's ID, version and medium, makes up the secondary address of slave 1 (refer to Chapter 4.2.2). This can be modified by the user.
Number1	00	Number of values to be transmitted via the M-Bus from the Energy Computer RMx621 for slave 1. A maximum of 36 values can be output.
Values from 01 to 36		Selection of values to be transmitted. It is possible to transmit all values that are measured or calculated in the RMx621. Can be set independently for each slave.
Device addr.2	00	Primary address (maximum 250) for slave 2. (visible only if No. slaves > 1)

Function (menu item)	Parameter setting	Description
Ident no.2	00000000	Secondary address for slave 2. (visible only if No. slaves > 1)
Number 2	00	Number of values to be transmitted via the M-Bus from the Energy Computer RMx621 for slave 2. A maximum of 36 values can be output.
Device addr.3		Primary address (maximum 250) for slave 3. (visible only if No. slaves > 2)
Ident no.3	0000000000	Secondary address for slave 3. (visible only if No. slaves > 2)
Number 3	00	Number of values to be transmitted via the M-Bus from the Energy Computer RMx621 for slave 3. A maximum of 36 values can be output. (visible only if No. slaves > 2)

The number of process values sent is defined in the Energy Manager configuration, see section 3.1. The minimum number is 1 process value (5 Byte), the maximum is 36 process values.

3.1.1   Setting the unit address(es)

The energy manager can be set up in such a way that it is included several times in the M-Bus (multislave). This can be used to allocate application-specific measured values to individual logic devices. To this end, the number of slaves can be set in the parameter "No.slaves" in the "Setup/Communication/RS232/M-Bus (2)" menu. Up to three slaves can be configured. Each slave has to be assigned a distinct device address and ident number!

Select "Setup/Communication/RS232/M-Bus (2)" from the menu to set the unit address (slave address).
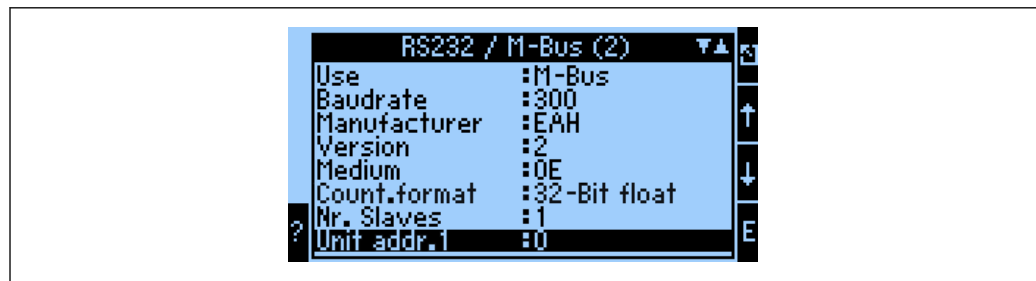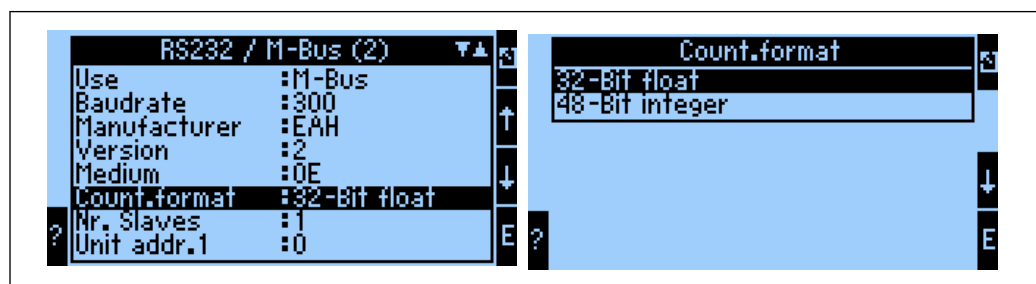

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3.1.2   Counter format

2 counter formats are available:
- 32-bit float
- 48-bit integer

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4 Data transmission

4.1 General

Data format:
- 300 baud or 2400 baud can be set on the device
  (menu item: "Setup/Communication/RS232/M-Bus(2)")
- No automatic baud rate detection
- 8 data bits, EVEN parity (not selectable)

Timeout:
The RMx621 waits 11 bit times before responding after having received a request.

Operating mode:
Generally, **Mode 1** is used, i.e. LSB is transmitted first.

Control characters:
- Start character: 10h (short block) or 68h (long block)
- End character: 16h

Manufacturer's ID:
The manufacturer's ID is EAH (stands for **E**ndress **A**nd **H**auser)

Medium:
The medium is always 0E (=Bus/System)

The process values are always transmitted in the following basic units:

Volume flow	m³/h
Temperature	°C
Pressure	bar
Heat flow (power) for steam applications	MW
Heat flow (power) for all other applications	kW
Mass flow for steam applications	t/h
Mass flow for all other applications	kg/h
Standard volume	(N)m³/h
Total volume	32-bit float: m³ 48-bit integer: liter
Total mass for steam applications	32-bit float: t 48-bit integer: kg
Total mass for all other applications	kg
Total heat quantity for steam applications	32-bit float: MWh³ 48-bit integer: kWh
Total heat quantity for all other applications	kWh
Total standard volume	(N)m³
Density	32-Bit float:(N) m³ 48-Bit integer: (N) liter
Enthalpy	kJ/kg

The number of process values sent is specified in the configuration of the Energy Manager, see Section 3.1. The minimum is 1 process value (5 byte) and the maximum is 36 process values.
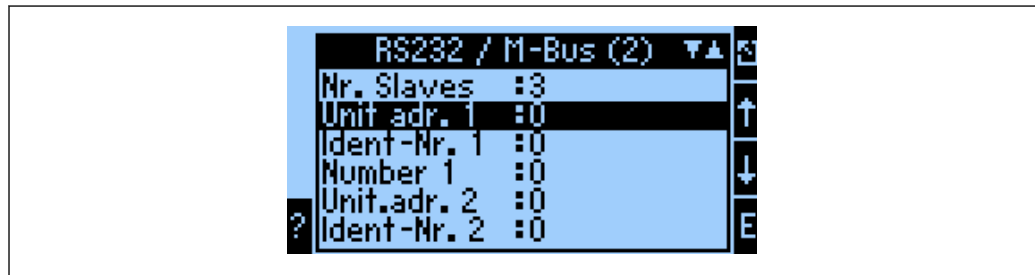
4.2 Addresses

4.2.1 Slave address (primary address)

00	:	New device
01..250	:	Available for use
251	:	Reserved
252	:	Reserved
253	:	Addressing via secondary addresses
254	:	All slaves, all respond (only for point-to-point)
255	:	All slaves, none responds

The slave address can be set on the device.

For multi-slave a unique address must be assigned to each slave.

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4.2.2 Secondary address

The identification number, manufacturer's ID, version and medium together make up the secondary address. If an RMx621 (slave) is addressed by the master via this address, its secondary address is sent with the primary address 253. The RMx621 (slave) whose secondary address matches the sent secondary address responds with E5h and is now connected to the master via primary address 253. Further responses from the RMx621 (slave) are sent via address 253. A RESET command or the selection of a different bus station (slave) causes the RMx621 (slave) to be deselected. This breaks the connection to the master.

The identification number (for secondary addressing) is a unique, 8-digit number within the device that is factory assigned and, with the RMx621, is generated from the CPU number. This number can be modified on the device, though not via M-BUS.

The identification number can be set using the M-Bus setup function. Here, the manufacturer's ID, version and medium are displayed. Addressing is also possible using wildcards. For the identification number, this is "**F**hex", and for the manufacturer's ID, version and medium, it is "**FF**hex".
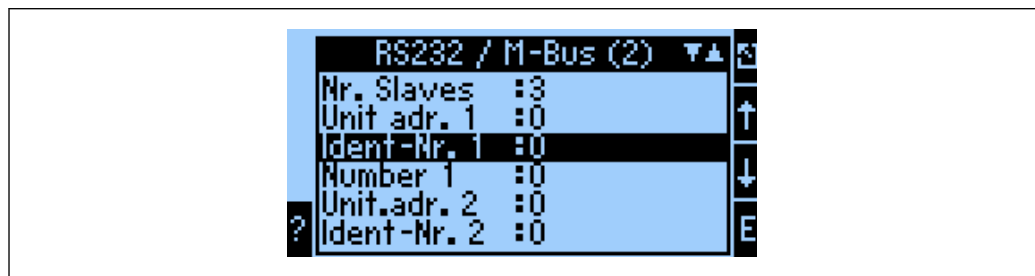
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4.3   Commands

4.3.1   Reset

From master (hex):

10 40 sa cs 16

sa	Slave address (1..250)
cs	Checksum 40h + sa (e.g. 42h for slave address 02h)

Response from slave on successful transmission: E5h

The Reset command returns the access counter to zero and, if secondary addressing is enabled, switches to primary addressing.

4.3.2   Selecting a slave (RMx621) using the secondary address

From master (hex):

68	Long block control character
lg	Length, here always 0B
lg	Length, here always 0B
68	Long block control character
53	C field
FD	Slave address always 253
52	CI field
i0 i1 i2 i3	Identification number (BCD, Low Byte first)
h0 h1	Manufacturer's ID (28h and 14h means EAH for Endress And Hauser)
vv	Version
me	Medium
cs	Checksum (addition from inclusive 08 up to the last character before cs)
16	End character

Response from Rx621 (slave) on successful transmission: E5h

4.3.3   Transmitting counter statuses

Counter data format 32-bit float

From master (hex):

10 7B sa cs 16 (5B instead of 7B also possible)

sa	Slave address
cs	Checksum (7B + ad, yields, for example, 7Ch for slave address 01)

Response from RMx621 (slave) on successful request:

68	Long block control character
lg	Length of the data block from inclusive 08 up to exclusive checksum
lg	Length of the data block from inclusive 08 up to exclusive checksum
68	Long block control character
53	C field
FD	Slave address
52	CI field
i0 i1 i2 i3	Identification number (BCD, Low Byte first)
h0 h1	Manufacturer's ID (28h and 14h means EAH for Endress And Hauser)
vv	Version, is increased by 1 when M-Bus software change implemented
me	Medium 0E
zu	Number of accesses
st	Status 00

nb	Not used
nb	Not used
04	Control character for 32-bit integer
6D	Control character date and time
mm hh dy my	Date and time, format is set as it is for date/time command
05	Control character for 32-bit float
pe	Physical unit for the first counter
w0 w1 w2 w3	First counter in 32-bit float format
05 (35)	Control character for 32-bit float (05: valid value; 35: invalid value)
pe	Physical unit for the second counter
w0 w1 w2 w3	Second counter in 32-bit float format
...	
05 (35)	Control character for 32-bit float (05: valid value; 35: invalid value)
pe	Physical unit for the last counter
w0 w1 w2 w3	Last counter (format: 32-bit float)
cs	Checksum (addition from inclusive 08 up to the last character before the checksum)
16	End character

Counter data format 48-bit integer

For the configuration of the counter format = 48-bit integer the counters are transmitted as 6-byte signed integer values in the unit (kWh, liter, kg).

The control character used is: 06h valid value, 36h invalid value.

5   Troubleshooting

5.1   No communication with RMx621

If communication with the RMx621 does not materialize via the M-Bus, check the following:
- Does the unit address in the RMx621 match the master?
- Are the RMx621 and the master using the same baud rate?
- Was setup in the RMx621 completed correctly?
- Is there more than one device with the same unit address attached to the M-Bus?
- Is the RS232 interface plugged into the front? (Only for non-explosion-proof devices)
- Is the M-Bus connected to the RMx621 correctly?

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