### General

The **Interface Module XC** M-Bus is designed for use with the EMH LZQJ-XC and DMTZ-XC meters. The module is equipped with a M-Bus (2 wires) interface. The module can be plugged easily into the module compartment of the meter. It can be mounted or exchanged during operation (without breaking approval seal). An integrated M-Bus interface (Protocol Converter to DIN EN 13757-3) provides a simple means of connecting multi-energy meters. This makes multi-energy applications an affordable proposition for domestic use. Due to the communication, the modules are suitable for a lot of control centres.
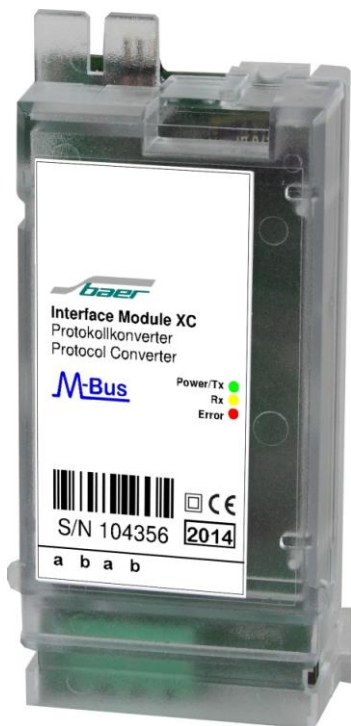

Compatible meters

- LZQJ-XC (special meter for industrial applications):
  - Standard meter for direct connection
  - Transformer connection version Cl. B (Cl. 1)
  - Precision meter Cl. C (Cl. 0.5S)
  - Precision meter Cl. 0,2S
- DMTZ-XC (residential meter)

Functions

- M-Bus interface (2 wires, passive) for bi-directional communications;
  Alternative: BFC-Bus (BAER Field Control, 56VDC);
- Transmission protocol: M-Bus (DIN EN 13757-3:2013-08);
- Internal communication interface for the transfer data between the meter and the interface module (service data list / table TS);
- Protocol converter for meter data into M-Bus-Format (non transparent data readout);
- Internal power supply from meter;
- Exchangeable during the meter operation;

Safety Notes
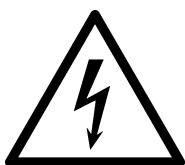
The owner of the interface modules is responsible that all persons engaged on work with the modules:
- Are competent and qualified in accordance with national regulations (see ISSA "Guideline for Assessing the Competence of Electrically Skilled Persons").
- Have read and understood the relevant sections of the user manual.
- Strictly observe the safety regulations (according to the following section) and the instructions in the individual chapters.

The owner of the modules is also responsible for:
- The protection of persons.
- The prevention of material damage.
- The training of personnel.

The following safety regulations must be observed at all times:
- Devices which have fallen down should not be installed, even if no damage is apparent, and should be returned for testing to an authorised service centre (internal damage possible).
- Modules must never be cleaned with running water or high pressure devices. Water can cause short-circuits or damage el. components.

Installation Hints

The installation must be done in a way, that even in the case of cable break no dangerous voltages are applied to touchable parts of the module. Generally, meters are delivered with the communication modules installed. The fitting of a meter with a communication module is, therefore, an exception and can be necessary e.g. when a module needs to be replaced.

<div align="center">

Strictly observe the safety regulations!

</div>

The interface module is exchangeable during the meter operation. Fit the interface module in the meter as follows:
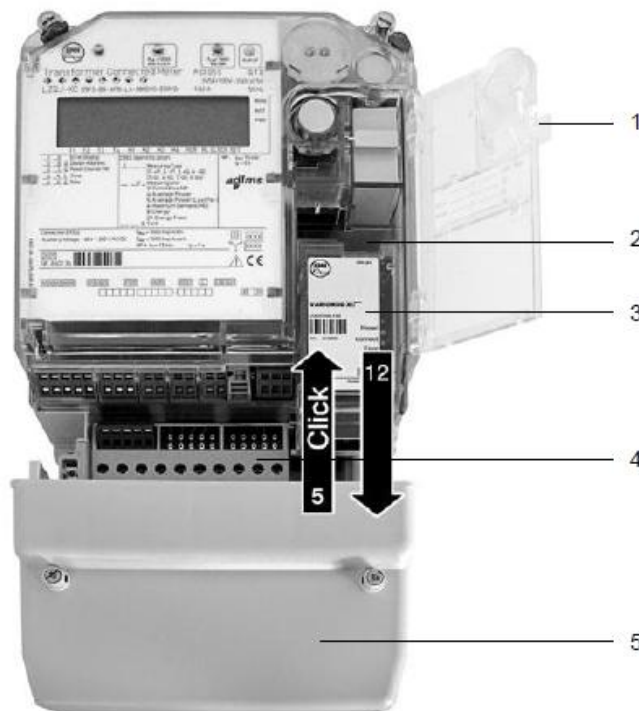
Installation of the interface module:

1.   Check the interface module.
2.   Remove the terminal cover [5].
3.   Open the transparent module cover [1].
4.   Insert the interface module [3] carefully at the place provided in the meter [2].
5.   Push the module in to the internal contacts.
6.   Connect the cable.
7.   Close the transparent module cover [1].
8.   Close the terminal cover [5].

Removing of the interface module:

9.   Remove the terminal cover [5].
10.   Open the transparent module cover [1].
11.   Disconnect the cable.
12.   Remove the interface module.
13.   Close the transparent module cover [1].
14.   Close the terminal cover [5].

LED Displays

Three LED's display the current operating status of the module and give information about the data transfer.

Power/Tx	🟢 green	Status and communication via M-Bus interface: LED signals, that the module is supplied with power LED goes off during transmit data via M-Bus interface
Rx	🟡 yellow	Communication via M-Bus interface: receive data
Error	🔴 red	Communication error (internal meter interface)

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Communication (M-Bus, Protocol Converter)

The M-Bus interface is conforming to DIN EN 13757-3:2013-08.

Fixed baud rate from the 2nd electrical interface (see EMH COMBI-TOOL-Software: communication interfaces, set please the data transmission at a fixed baud rate without baud rate changeover), data format: 8E1;
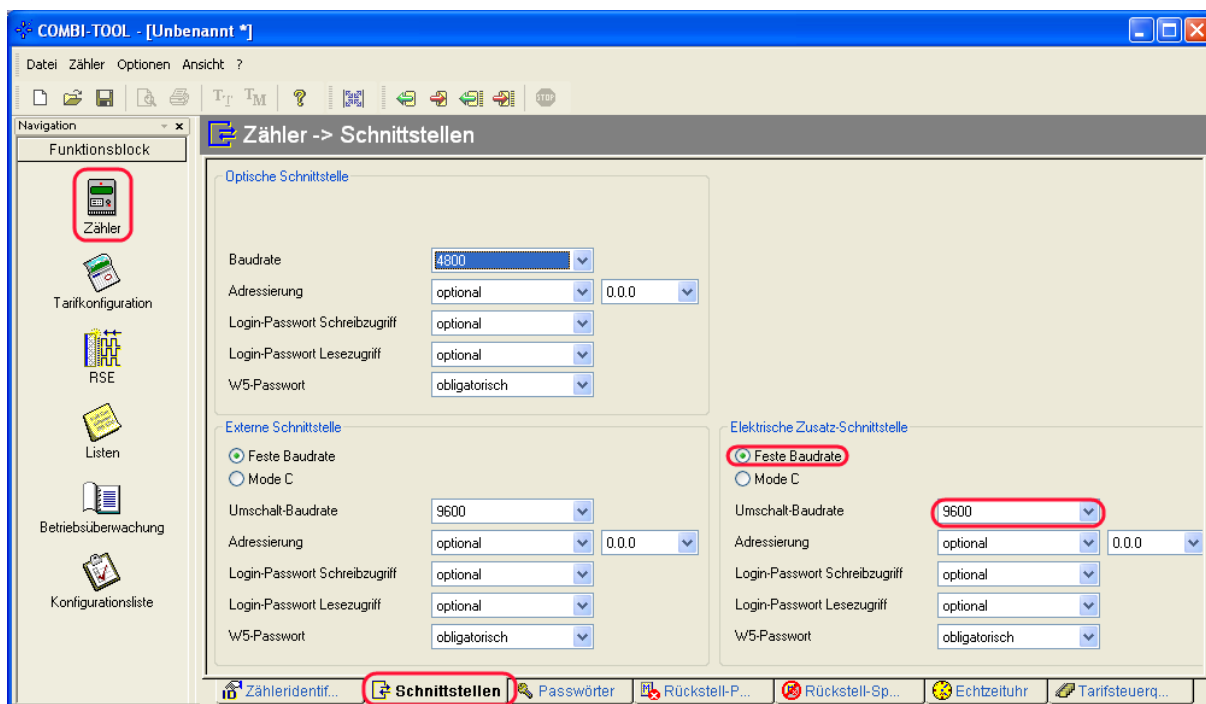
Parameterisation of the meter (EMH COMBI-TOOL-Software)

At the first read the read all data from the meter (via optical IR interface):
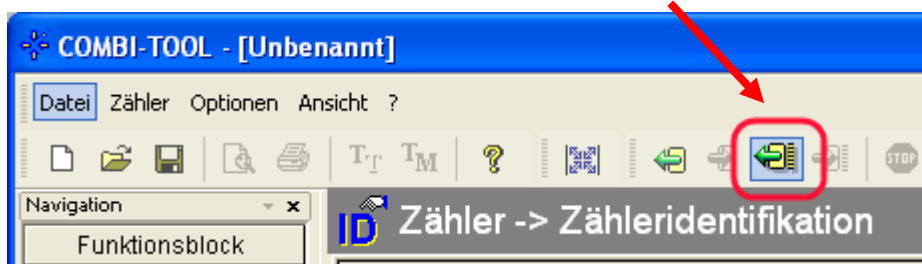
Baud rate

The **Interface Module XC $\mathcal{M}$-Bus** uses the same baud rate like the communication interface at the meter. For setting use please the EMH COMBI-TOOL-Software:
menu **Meter ➔ Interfaces ➔ Electrical interface**:

For correct working set please a **fixed bad rate** (e.g. 9600 baud). If you use the baud rate changeover according to mode C: the communication is possible with 300 baud only.
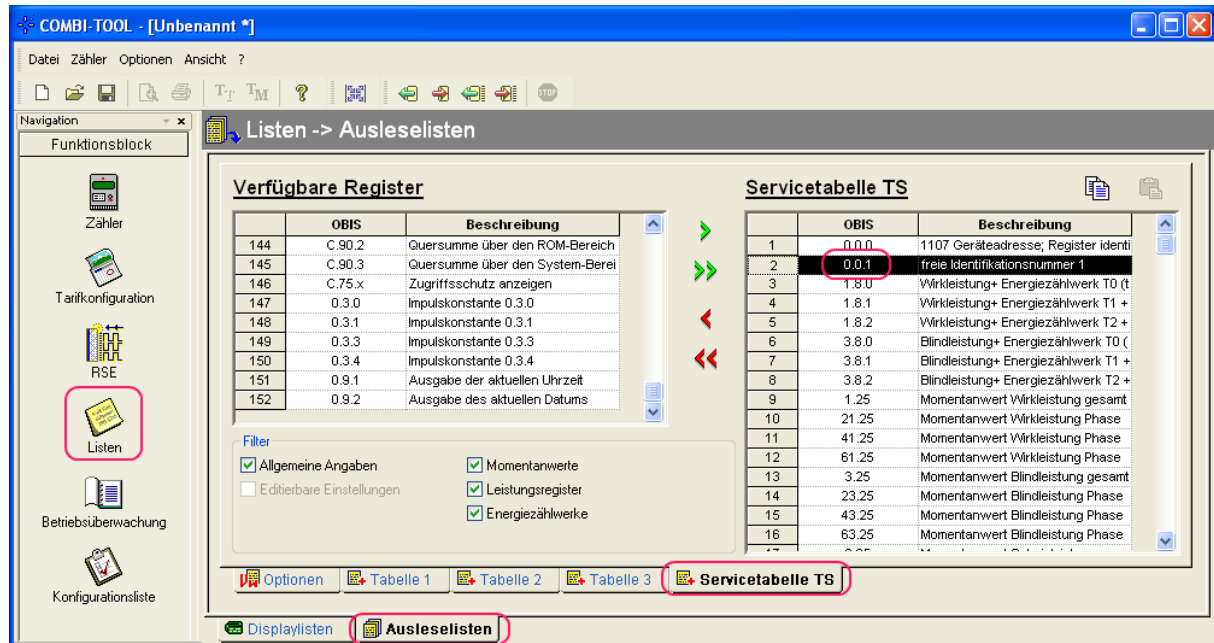
Reset

Note: The EMH LZQJ-XC meter performs automatically a daily reset at 00:00 in the interface module.

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Service Data List / Table TS and M-Bus-Address

For setting the meter data list use menu
Lists ➜ Reading lists ➜ Service Table TS:

Note 1: the M-Bus module uses for **ID-Addresses** the OBIS Register 0.0.0 (secondary address) and 0.0.1 (primary address) in the service data list (TS).
In this example we use the identification number 1 (OBIS 0.0.1) for M-Bus primary address:
menu **Meter ➜ Meter ID ➜ OBIS Register 0.0.1**, e.g. value 123 (:= 00000123):
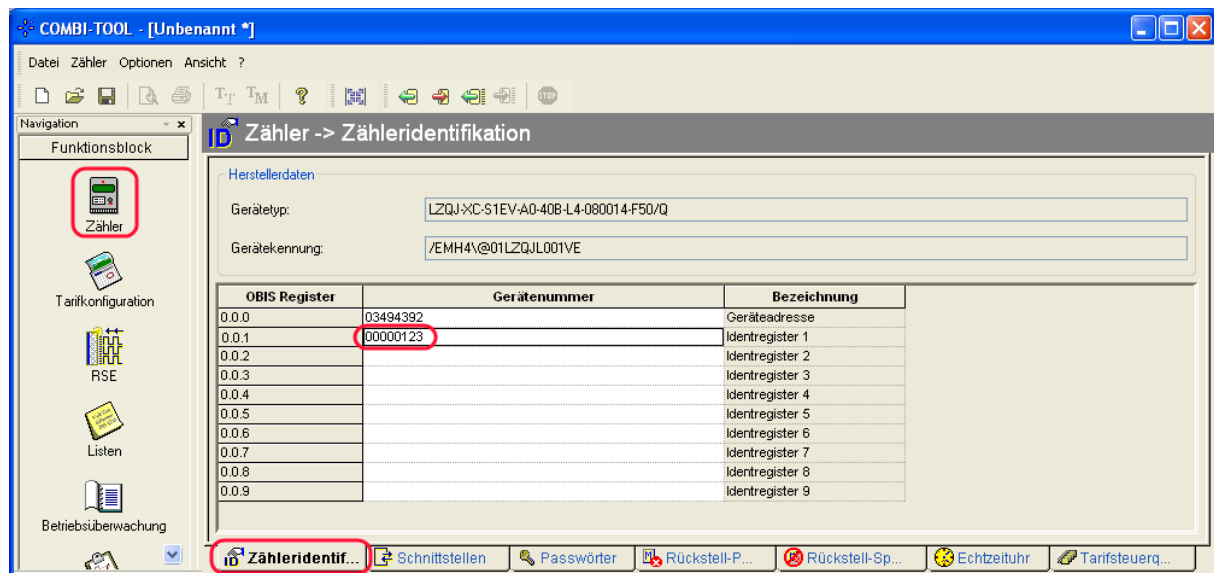
Standards for M-Bus addresses:
- Primary address: OBIS Register 0.0.1 (Identification 1), range 1 to 250, default := 1
- Secondary address: OBIS Register 0.0.0 (device number / fabrication number), range 0 to 99999999, default := 0

For determining the address it is possible to use the wildcard searching procedure (answer $E5_{Hex}$).

Accepting the meter data

The **Interface Module XC M-Bus** reads the **service data list / table (TS)** from the meter periodically (interval between two readings: ca. 1 second) and creates an internal table. The OBIS coded values from the meter will be convert to the M-Bus data (DIFs/VIFs: according to DIN EN 13757-3:2013-08 without manufacturer specific extensions).

Data field coding: 32 Bit Integer only (data field := 0100_{Binary}), type B.

Telegram format: variable data respond.

Used telegram formats (examples):

- Master: SND_NKE (Send Link Reset)
  Answer: $E5_{Hex}$ (acknowledge)
- Master: SND_UD (CI-Field 52_{Hex} for selection the secondary address; request via address FD_{Hex})
  Answer: $E5_{Hex}$ (acknowledge)
- Master: REQ_UD2 (Request User Data Class 2)
  Answer: RSP_UD (Respond User Data)

Further specifications:

- The following definitions shall also apply for the selection of a new secondary address (SND_UD):
  - the manufacturer code (15_{Hex} $A8_{Hex}$ for "EMH") will be evaluated, wildcard (FF_{Hex} FF_{Hex}) is possible;
  - the version byte (Ver) will be ignored: all bytes are possible (e.g.: FF_{Hex});
  - the medium byte (02 for electricity) will be evaluated, wildcard (FF_{Hex}) is possible;
- Data encryption is not allowed.
- Max. telegram length: 252 bytes (ca. 30 values).
- Support only for mode 1 (CI-Field): the least significant byte (LSB) of a multibyte record is transmitted first.
- Status byte: only bit 4 ("temporary error") is used: internal communication error between the modules and the meter.
- Implementation of one FCB-Bit (Frame Count Bit) only (use either the primary or secondary address).

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Structure of a data telegram (RSP_UD)

Name	No. of Bytes	Value (hex)	Description
Start	1	68	
L	1	LL	Length of the telegram
L	1	LL	Length of the telegram
Start	1	68	
C	1	08	Control field: RSP_UD
A	1	PAdr	Primary address (OBIS-Register 0.0.1)
CI	1	72	Control information field: variable data respond
Identification no.	4	SAdr	Secondary address (OBIS-Register 0.0.0)
Manufacturer code	2	15 A8	Code for "EMH"
Version of device	1	Ver	Version of the interface module
Medium	1	02	Electricity
Access No.	1	AccNo	Access number is increased by one after each respond user data (RSP_UD) from the slave
Status	1	Stat	Status
Signature	2	00 00	Not used
User data	**n**	**...**	
Check sum	1	xx	Arithmetical sum of the data mentioned above
Stop	1	16	

User data

Used OBIS-Registers:

- **Counter values** for active, reactive and apparent energy (OBIS-Registers 1.8.x, 2.8.x, 3.8.x, 4.8.x, 9.8.x, 10.8.x).
- **Instantaneous values** for active and reactive power, voltage, current and line frequency (OBIS-Registers 1.25 at seq., 3.25 at seq., 12.25 at seq., 11.25 at seq. and 14.25).

Possible OBIS-Registers in the service data list / table TS:

OBIS-Register	Description	
0.0.0	Identification 0 (device address / meter number): secondary address	
0.0.1	Identification 1: primary address; possible range: 1 to 250	
1.8.t * s	Counter value active energy, import	
2.8.t * s	Counter value active energy, export	
3.8.t * s	Counter value reactive energy, import	t = tariff (0..8), v = stored values (0..99)
4.8.t * s	Counter value reactive energy, export	
9.8.t * s	Counter value apparent energy, import	
10.8.t * s	Counter value apparent energy, export	
1.25	Instantaneous value active power, cumulative	
21.25	Instantaneous value active power, phase 1	
41.25	Instantaneous value active power, phase 2	
61.25	Instantaneous value active power, phase 3	
3.25	Instantaneous value reactive power, cumulative	

23.25	Instantaneous value reactive power, phase 1
43.25	Instantaneous value reactive power, phase 2
63.25	Instantaneous value reactive power, phase 3
12.25	Instantaneous value voltage, cumulative
32.25	Instantaneous value voltage, phase 1
52.25	Instantaneous value voltage, phase 2
72.25	Instantaneous value voltage, phase 3
11.25	Instantaneous value current, cumulative
31.25	Instantaneous value current, phase 1
51.25	Instantaneous value current, phase 2
71.25	Instantaneous value current, phase 3
14.25	Instantaneous value line frequency

Other OBIS-Registers will not be stored and cannot be transmitted.

Examples for read out with **primary address**:

Master: **10 40 00 40 16** (primary address: 0 / SND_NKE: Send Link Reset)
Answer: **E5**

Master: **10 40 FE 3E 16** (primary address: wildcard 254 = FE$_{Hex}$)
Answer: **E5**

Master: **10 40 7B BB 16** (primary address: 123 = 7B$_{Hex}$)
Answer: **E5**

Master: **10 7B 7B F6 16** (REQ_UD2: Request User Data)
Answer: **68 0F 0F 68 08 7B 72 87 98 16 04 A8 15 00 02 00 10 00 00 FD 16** (empty message)

Master: **10 5B 7B D6 16** (REQ_UD2: Request User Data)
Answer: **68 EA EA 68 08 7B 72 87 98 16 04 A8 15 00 02 01 00 00 00 04 03 C9 16 00 00 C4 05 03 6D 13 00 00 84 10 03 C2 10 00 00 C4 15 03 A8 0E 00 00 84 20 03 06 06 00 00 C4 25 03 C5 04 00 00 04 FB 82 73 90 03 00 00 C4 05 FB 82 73 06 02 00 00 84 10 FB 82 73 4A 02 00 00 C4 15 FB 82 73 54 01 00 00 84 20 FB 82 73 46 01 00 00 C4 25 FB 82 73 B1 00 00 00 04 2B 0C 00 00 00 04 AB FC 01 00 00 00 00 04 AB FC 02 00 00 00 00 04 AB FC 03 0C 00 00 00 04 FB 14 05 00 00 00 04 FB 94 FC 01 00 00 00 00 04 FB 94 FC 02 00 00 00 00 04 FB 94 FC 03 05 00 00 00 04 FD D8 FC 01 10 00 00 00 04 FD D8 FC 02 0E 00 00 00 04 FD D8 FC 03 13 03 00 00 04 FD C7 FC 01 3E 00 00 00 04 FD C7 FC 02 38 00 00 00 04 FD C7 FC 03 30 59 00 00 04 FB 2D 87 13 00 00 0C 16** (RSP_UD: Respond User Data)

Examples for read out with **secondary address**:

Master: **68 0B 0B 68 53 FD 52 00 00 00 00 FF FF FF FF 9E 16** (selection with the secondary address: 00 00 00 00)

Answer: **E5**

Master: **68 0B 0B 68 53 FD 52 FF FF FF FF FF FF FF FF 9A 16** (selection with the secondary address: wildcard FF FF FF FF$_{Hex}$)

Answer: **E5**

Master: **68 0B 0B 68 53 FD 52 87 98 16 04 FF FF FF FF D7 16** (selection with the secondary address: 04 16 98 87$_{Hex}$)

Answer: **E5**

Master: **10 7B FD 78 16** (REQ_UD2: Request User Data)

Answer: **68 EA EA 68 08 7B 72 87 98 16 04 A8 15 00 02 02 00 00 00 04 03 77 15 00 00 C4 05 03 6D 13 00 00 84 10 03 E6 0F 00 00 C4 15 03 A8 0E 00 00 84 20 03 90 05 00 00 C4 25 03 C5 04 00 00 04 FB 82 73 F5 02 00 00 C4 05 FB 82 73 06 02 00 00 84 10 FB 82 73 E5 01 00 00 C4 15 FB 82 73 54 01 00 00 84 20 FB 82 73 0F 01 00 00 C4 25 FB 82 73 B1 00 00 00 04 2B 0C 00 00 00 04 AB FC 01 00 00 00 00 04 AB FC 02 00 00 00 00 04 AB FC 03 0C 00 00 00 04 FB 14 05 00 00 00 04 FB 94 FC 01 00 00 00 00 04 FB 94 FC 02 00 00 00 00 04 FB 94 FC 03 05 00 00 00 04 FD D8 FC 01 0C 00 00 00 04 FD D8 FC 02 08 00 00 00 04 FD D8 FC 03 08 03 00 00 04 FD C7 FC 01 3F 00 00 00 04 FD C7 FC 02 38 00 00 00 04 FD C7 FC 03 49 59 00 00 04 FB 2D 87 13 00 00 32 16** (RSP_UD: Respond User Data)

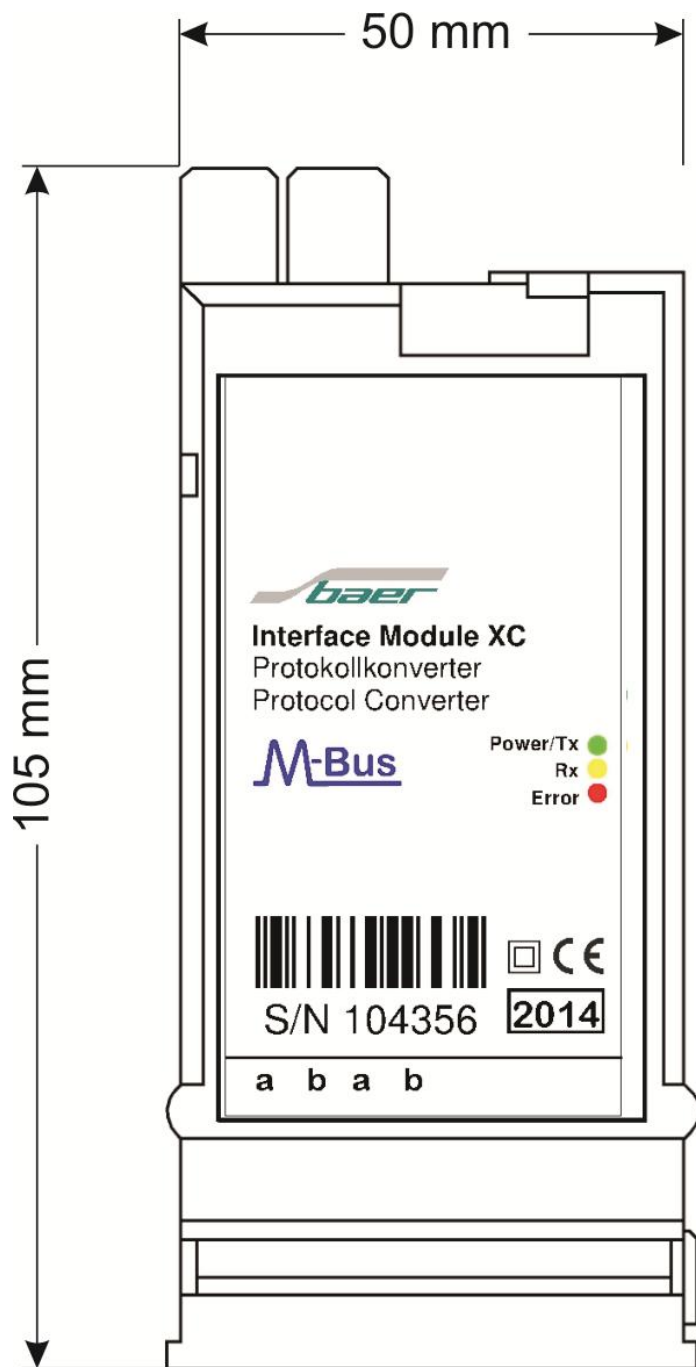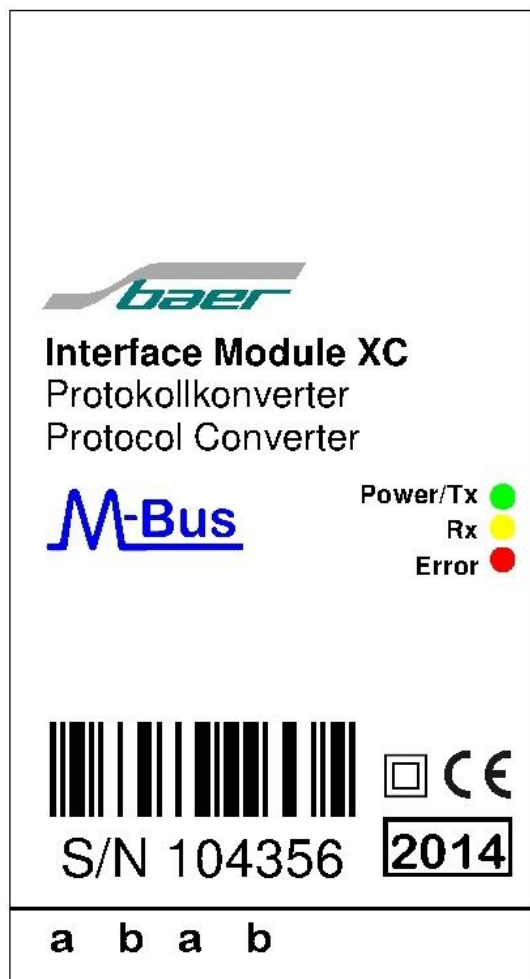Master: **10 40 FD 3D 16** (deselection of the secondary address allocation)

Answer: **E5**

Technical data

Housing:	Polycarbonate housing with terminals for using with EMH LZQJ-XC and DMTZ-XC meters for residential and industrial applications
Degree of protection:	IP20 (according to IEC 60529)
Protection class:	2
Temperature range:	-25°C to +55°C (operational) -40°C to +80°C (storage temperature)
Relative humanity:	0..95%, non-condensing
Dimensions:	Ca. 50mm x 105mm x 27mm (W x H x D)
Nominal voltage:	Internal power supply from LZQJ-XC or DMTZ-XC meter
M-Bus load:	1,9mA, max. voltage: 56VDC
Battery:	None
Installation:	Exchangeable during the meter operation
LED displays:	3 LEDs: 🟢 (green) Power/Tx: power / transmit data via M-Bus 🟡 (yellow) Rx: receive data via M-Bus 🔴 (red) Error: internal communication error
Interface:	M-Bus (2 wires, passive) according to DIN EN 13757-2 (Physical Layer)Alternative: BFC-Bus (BAER Field Control, 56VDC)
Baud rate:	300 to 9600 baud (fixed baud rate)
Data format:	8E1
Data readout:	Internal service data list / table TS
Transmission protocol:	According to DIN EN 13757-3:2013-08 (Application Layer)
Order number:	#12760
Accessories:	Bus Master / Repeater / Mini-Master AMR-Software: SIGLON © Field Control Center: Meter2SCADA ©

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Dimensions

Terminal assignment

Terminal block:

Terminal	Description
a	M-Bus (passive) or BFC-Bus
b	M-Bus (passive) or BFC-Bus

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