elvaco

CMeX40 Users Manual English

1050002-CMeX40 M-Bus I/O

The CMeX40 is an M-Bus slave module with one input and one output

Content

1 Document notes

All information in this manual, including product data, diagrams, charts, etc. represents information on products at the time of publication, and is subject to change without prior notice due to product improvements or other reasons. It is therefore recommended that customers contact Elvaco AB for the latest product information before purchasing a CMeX40 product.

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2   Using this manual

2.1   Purpose and Audience

This manual covers information needed to mount, configure and use the CMeX40 I/O module. It is intended for field engineers and developers.

2.2   Models

This manual covers CMeX40 I/O module.

2.3   Additional and updated information

Latest documentation version is available on Elvaco web site at http://www.elvaco.com.

2.4   Symbols

Throughout the user's manual the note symbol will be used. Its meaning is described below.

The Note symbol is used to highlight an important aspect of a section. The note might be important to take into consideration for safety reasons or just to make sure that the product will works the way it is supposed to.

3 Introduction

3.1 Product configuration

Use the table below to find out the capabilities of your product.

Product name	Comments
CMeX40	DIN-mounted M-Bus I/O slave module

Table 1 Product configuration

3.2 Capabilities

The CMeX40 is a stand-alone, DIN-mounted M-Bus slave module equipment with one input and one output. The input has a counter functionality and the output can operate up to 8A 230V.

3.3 Applications

The CMeX40 is usable when an input level should be read or to break remote equipment, i.e. fans, engines or other powered equipments.

4   Getting Started

This chapter covers the steps required for getting the CMeX40 installed and operational. No pre-configuration is needed before using the CMeX40.

4.1   Overview

1. Serial number
   (Secondary address)
2. Button
3. M-Bus connector
4. Input +
5. Input GND
6. Relay output
7. Relay output
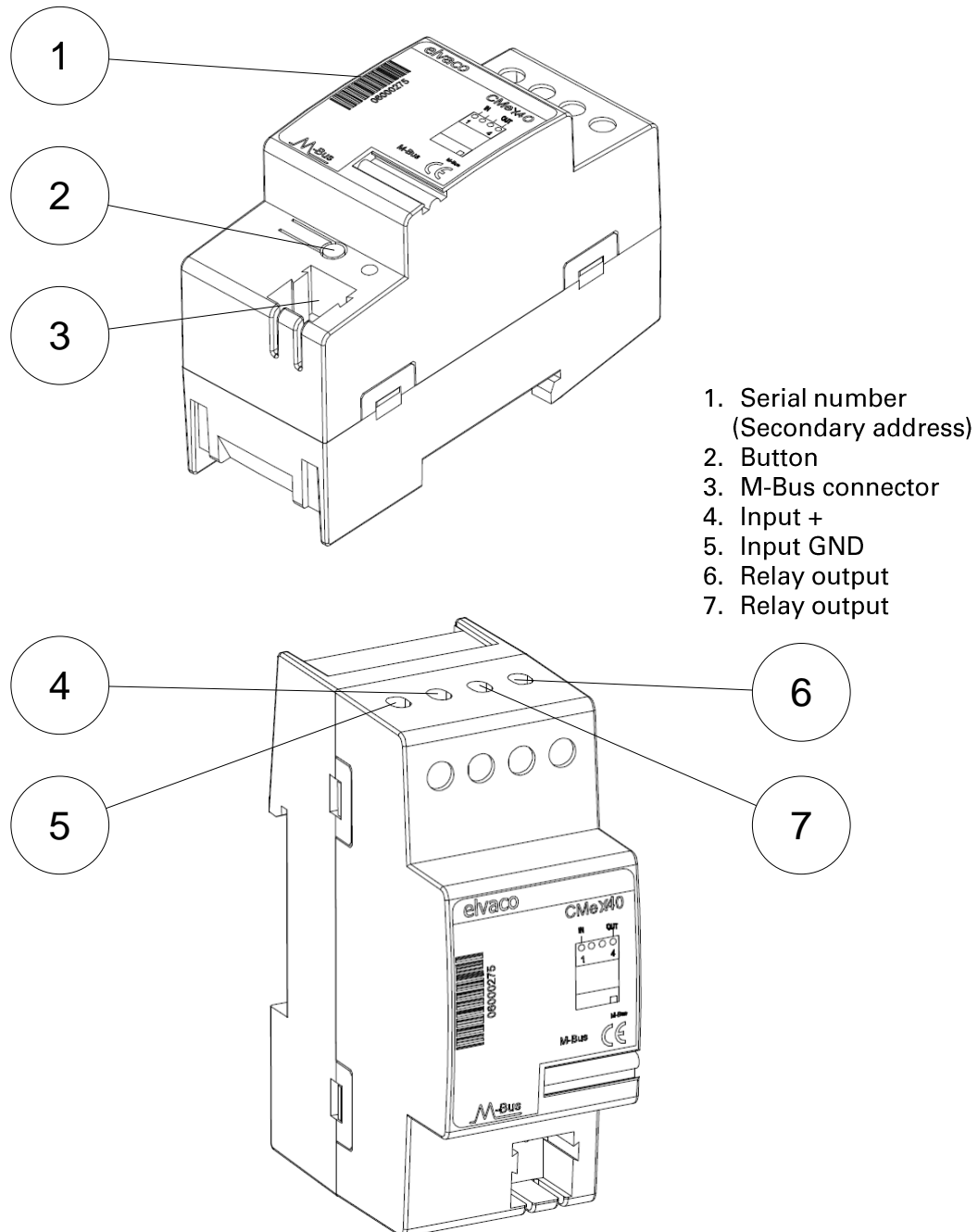
Figure 1 CMeX40 Overview

4.2 Mounting

The CMeX40 should be mounted on a DIN-rail. The metallic clip on the bottom is used to mount and demount the unit from the DIN-rail. DIN-rail enclosure must cover the terminals

4.2.1 Relay output

Connect the power source, which should be managed by the product, to screw terminal (6) and (7). The relay output control can handle currents up to 8A (240 VAC).

4.2.2 Input signal

Connect to input signal (normally open), which should be monitored by the product, to the screw terminal (4) and (5).

4.2.3 M-Bus 2-wire bus

M-Bus is a multi-drop 2-wire bus, with no polarity. A cable of either shielded (typically 4 x 0.8 mm diam./0.5 mm^2 telephone type or standard mains type (1.5 mm^2) should be used. Connect the wiring to the connector (3).

⚠ **IMPORTANT**

Please take the following in consideration:

- All connected M-Bus slave devices must have unique M-Bus secondary or primary addresses depending on addressing mode.

- Measure voltage over M-Bus slave connection to verify M-Bus master connection. Voltage should be between 24-48 VDC.

5 Application description

This chapter covers general application description of the product.

5.1 Purpose

The product has two main purposes:

- A signal should be monitored or counted (CMeX40 input)

    o Relays

    o Breaker signals

    o Magnetic sockets

    o S0 pulses from meters

- A power source should be controlled (CMeX40 relay output)

All parameters and information, such as baud rate, primary and secondary address, output level, input level and local control of output relay using the push-button can be remotely configured and read.

5.2 Operation

The product has different operation states depending on the current operation mode. The operation state and input/output levels are maintained during reboot and power cycling.

5.2.1 Power On

When powered on (connected to M-Bus master), the product will be in the same state after power loss. The output is a bi-stable relay, which stays in the current mode until a new control command is received.

5.2.2 Normal operation

During normal operation, the following tasks are executed:

- Read input and count changes

- Check for any incoming M-Bus commands

- Status indication (LED) of current input/output mode

- Monitor button for relay output control

5.3 Local output control

Pressing the push-button in normal operation, the relay output control will toggle state. The local output control of relay can be enabled/disabled using M-Bus commands, preventing unwanted output control by unauthorized users.

The push-button is disabled for press during capacitor charging, approximately 10 seconds after last toggling of relay output.

5.3.1 Indications

The product is equipped with a single LED, which can show the colors green and red in combinations. The green LED shows current input status and the red LED shows current relay output status.

Please review tables below for indication description.

Red LED	Product state	Visual
1000 ms off / 10 ms on	Short flash every second. Charging of capacitor is taking place	
4000 ms off / 10 ms on	Short flash every 4 second. Relay output is off	
4000 ms off / ms on / 300 ms off / 100 ms on	2 short flashes every second. Relay output is on	

Table 2 Red LED description - Relay output status

Green LED	Product state	Visual
4000 ms off / 10 ms on	Short flash every 4 second. Input is off (open)	
4000 ms off / ms on / 300 ms off / 100 ms on	2 short flashes every second. Input is activated	

Table 3 Green LED description - Input status

5.4 Reset to factory default

In order to reset the product configuration to factory default, press and hold the button on power-up for 10 seconds. The product configuration will reset to factory default and restart. Reset to factory defaults can also be made using M-Bus command Application reset, see 7.6.4.

6   Operations guide

Remote operations of the relay

6.1   Purpose

The CMeX40 contains a relay which can be toggled to change a digital output signal, depending on the indata it receives. This makes it possible for the I/O module to enable/disable an electrical current, which might for example be a desired functionality for a real estate companies who needs to turn on/off electricity in a building or an apartment.

The relay can be toggled in several different ways, the simplest being to use the CMeX40 Push button (2). Toggling may also be performed remotely by using one of Elvaco's M-Bus Metering Gateways, CMe2100 and CMe3100. Depending on which one is being used, there are different toggling options available. CMeX40 also responds to direct M-Bus commands, for example from an CMa30 Elvaco M-Bus Master. This option might for example be used in case of troubleshooting to ensure that the I/O module responds to the M-Bus commands it receives.

6.2   Use a CMe2100 to control the CMeX40 relay

6.2.1.1   Purpose

The CMeX40 relay may be toggled using a CMe2100. This M-Bus Metering Gateway supports communication by GPRS, and makes it possible to toggle the relay by SMS. The CMe2100 receives the SMS, and transmits an M-Bus command to the CMeX40 to make it perform the toggling.

> ⚠ Make sure that the CMe2100 has been installed and configured before attempting to use it to toggle the CMeX40 relay. For more information on the subject, please see the CMe2100 user's manual which can be downloaded at http://www.elvaco.com/en/download.

6.2.2   Connect the CMeX40 and the CMe2100

Use a cable with a cross sectional area of 0.25-1.55 mm^2 to connect the M-Bus connector (3) of the CMeX40 to the M-Bus connector of the CMe2100. The I/O module will be ready for use right after start-up.

6.2.3   Toggle the relay using SMS

To toggle the relay through a CMe2100 using SMS:

- Send the command "device ADDRESS bron/broff" by SMS to the mobile number of the SIM card installed in the CMe2100. "ADDRESS" corresponds to the primary or the secondary address (displayed on the front of the device) of the CMeX40.

- The CMe2100 will respond by confirming a start-up and send an "OK". The toggling of the relay has then been performed.

Command	Response	Explanation
device 02001098 bron	device started OK	Turn on the breaker functionality of the CMeX40 with secondary address 02001098.
device 02001098 broff	device started OK	Turn off the breaker functionality of the CMeX40 with secondary address 02001098.

Table 4: Commands to toggle the CMeX40 relay through a CMe2100 using SMS

> ⚠️ Make sure that SIM card is installed in the CMe2100. If not, it will not be able to receive commands by SMS.

6.3   Use a CMe3100 to control the CMeX40 relay

6.3.1.1   Purpose

The CMeX40 relay may be toggled using a CMe3100. This M-Bus Metering Gateway enables toggling of the relay using Telnet and REST. The CMe3100 transmits an M-Bus command to the CMeX40 to make it perform the toggling.

If unable to connect to the CMe3100 through Telnet, make sure that the service is enabled in the CMe3100 integrated web interface and that the TCP port number has not been changed from the default setting (9999). To do so, log into the CMe3100 web interface and go to **Configuration > Services**. Find **Console** in the list and make sure the service is enabled. Click on it to see the TCP port number being used for the Telnet service.

6.3.2 Connect the CMa30 and the CMe3100

Use a cable with a cross sectional area of 0.25-1.55 mm^2 to connect the M-Bus connector (3) of the CMa10 to the M-Bus connector of the CMe3100. The I/O module will be ready for use right after start-up.

6.3.3 Toggle the relay using Telnet

To toggle the relay through a CMe3100 using Telnet:

- Open Windows command line, e.g. by typing "cmd" into the Windows start interface and pressing enter.
- Type "telnet ip 9999" and click enter. The Telnet application will now connect to the CMe3100.
- Type "device ADDRESS action" and click enter. ADDRESS corresponds to the primary or the secondary address (displayed on the front of the device) of the CMeX40. "action" corresponds to the action you want to be performed
- The CMe3100 will respond by confirming a start-up and send an "OK". The toggling of the relay has then been performed.

Command	Response	Explanation
device 02001098 bron	device started OK	Turn on the breaker functionality of the CMeX40 with secondary address 02001098.
device 02001098 broff	device started OK	Turn off the breaker functionality of the CMeX40 with secondary address 02001098.

Table 5: Commands to toggle the CMeX40 relay through a CMe3100 using Telnet

6.3.4 Toggle the relay using REST

When using REST, commands to toggle the relay are sent according to the structure of Figure 1, where "nn" represents the secondary address of the I/O module and "action" represents the action to be performed.

```
body
        {
         "command": "device",
         "params": [
```

Figure 2: Structure of the REST command

Command	Explanation

body
    {
        "command": "device",
	Turn on the breaker functionality of the CMeX40 with the secondary address 02001098.

"params": [　　　　"02001098" 　　　　"bron" 　　　　] 　}	

body
　{
　　"command": "device",
　　"params": [
　　　　"02001098"
　　　　"bron"
　　　　]
　}
	Turn off the breaker functionality of the CMeX40 with the secondary address 02001098.

"nn", 　　　　　　"action" 　　　　] 　}	

Table 6: Commands to toggle the CMeX40 relay through a CMe3100 using REST

To toggle the relay through a CMe3100 using REST:

- Open the integrate web interface of CMe3100 and go to **Device > Licenses & Add-ons.** Click **Add-ons**.

- Find the REST add-on in the list and click **Elvaco-Rest**.

- Click on **Help** and then on **Try**. Find "console: Operations about console commands" in the list and click on it. Click on **Post**.

- Enter a command according to the structure of Figure 1 and click **Try it out!** The toggling will be performed. A response will be sent by the CMe3100 using REST format, illustrated in the picture below.

> ⚠ Make sure that a REST license has been purchased and installed for the CMe3100 before attempting to toggle the CMeX40 relay by REST. To learn more about how to install a license for the CMe3100, go to http://www.elvaco.com/en/download and download the CMe3100 user's manual.

Response Messages

HTTP Status Code	Reason	Response Model
202	Accepted	
400	Bad request	
401	Unauthorized	
404	Not found	

Try it out!   Hide Response

Request URL

```
http://10.40.1.230:80/Elvaco-Rest/rest/console/command
```

Response Body

```
{
   "status": "device started."
}
```

Response Code

```
202
```

Response Headers

```
{
   "Access-Control-Allow-Origin": "*",
   "Date": "Mon, 03 Oct 2016 14:27:13 GMT",
   "Server": "Elvaco CMe3100 /tjws Version 1.107",
   "Connection": "close",
   "Mime-Version": "1.0",
   "Access-Control-Allow-Methods": "GET, POST, PUT, DELETE",
   "Content-Type": "application/json"
}
```

6.4   Use direct M-Bus commands to control the CMeX40 relay

6.4.1.1   Purpose

The CMeX40 relay can also be toggled by transmitting an M-Bus command directly to the device. There are several ways of doing so. One is by using an Elvaco CMa30 to transmit M-Bus command from a computer to the I/O module.

⚠ Toggling of the CMex40 relay by direct M-Bus command is mainly done in troubleshooting purpose to make sure that the device respond the way it is supposed to. For day-to-day operations, a Gateway is used to toggle the relay.

M-Bus commands used to toggle the relay are sent according to the template of Table 4.

M-Bus command	Explanation
01 fd 1a 40	Turn on the breaker functionality of CMeX40
01 fd 1a 80	Turn off the breaker functionality of CMeX40

Table 7: Commands to toggle the relay through a CMa30 using M-Bus commands

6.4.2 Connect a CMa30 to the CMeX40

To connect a CMa30 to the CMeX40:

- Connect the CMa30 to the USB port of a laptop and to the M-Bus connector (3) of the CMeX40. The CMa30 will automatically detect the address of the I/O module.

- Start up MBCONF. If you have not installed the software yet, go to http://www.elvaco.com/en/download/ to download and install it.

- Set the **COM-Port** to "COM9" in the interface and click **Connect to meter**. Click **Ok**.
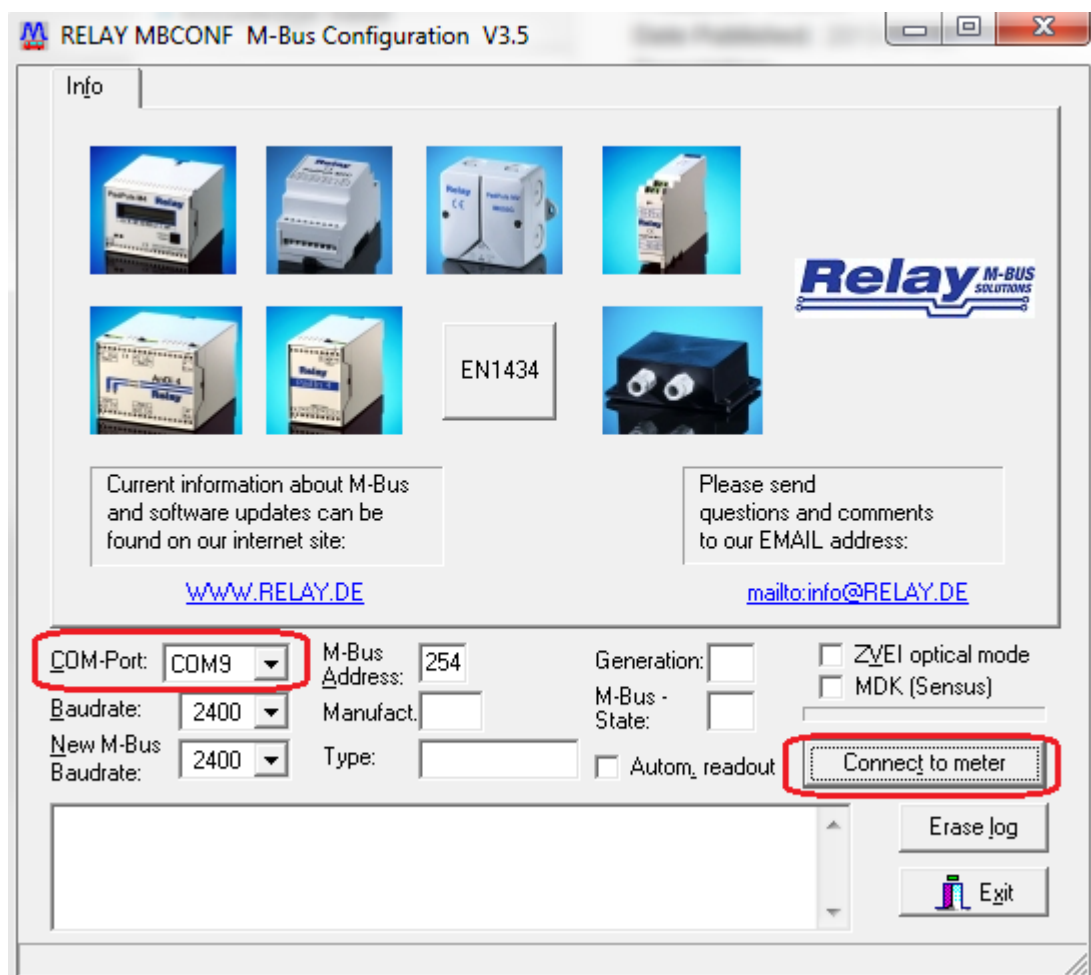
6.4.3 Toggle the relay using the CMa30 interface

To toggle the relay through a CMa30 using direct M-Bus commands:

- Enter the desired M-Bus command of Table 4 into the **Custom-String** field.

- Click **Write CS**. The toggling will now be performed.
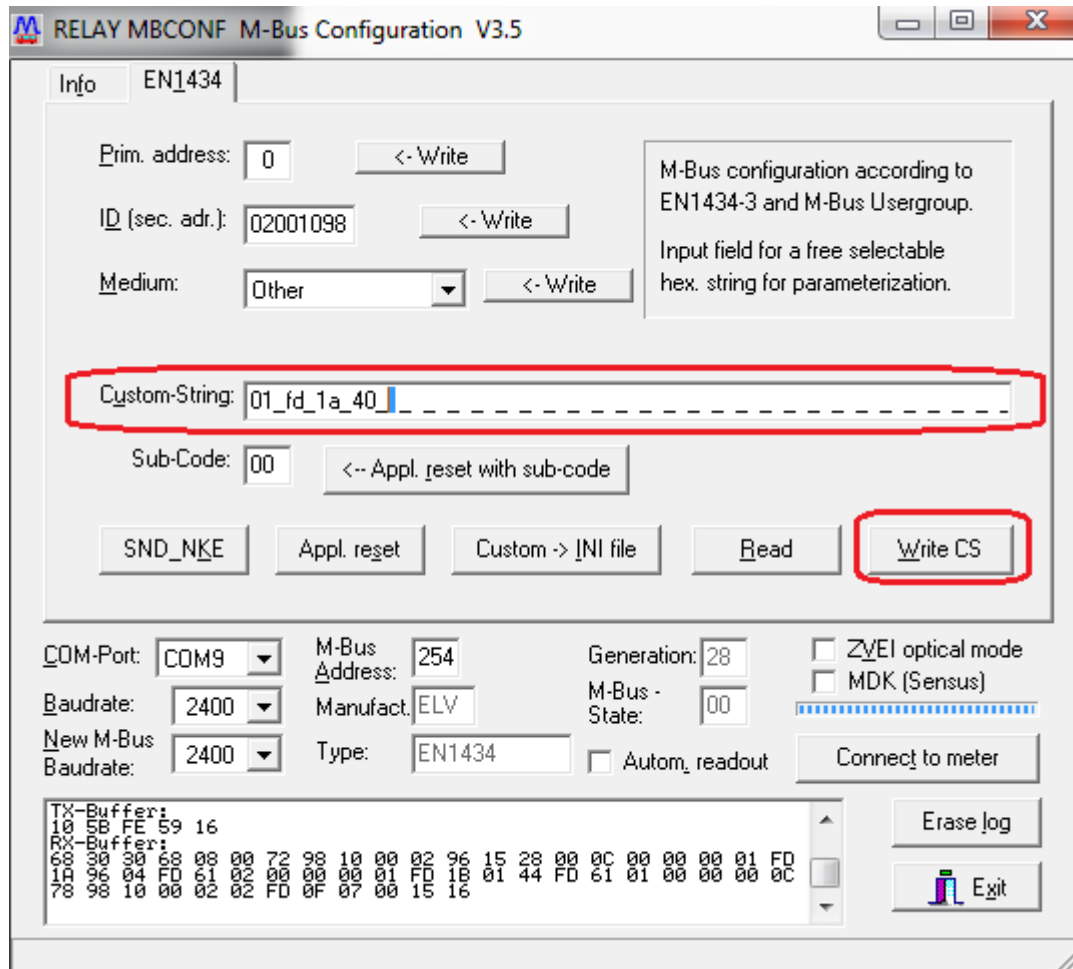
7 Administration of the product

This chapter covers the configuration and M-Bus implementation of the product. The M-Bus slave implementation is according to the new M-Bus standard EN13757.

7.1 M-Bus product identification

The product can be identified by the following information:

- Manufacturer string = ELV
- Medium = Other
- Generation = 40-49

The Generation field between product releases will **only** change (increase by 1) if the M-Bus protocol information changes between versions. Use the software version field in the M-Bus telegram to identify current software version.

7.2 M-Bus addressing mode

The product implements both primary and secondary addressing mode. The primary and secondary addresses can be changed using M-Bus standard command. Primary address from factory is **0**, secondary address from factory is the fabrication number (serial number).

7.3 M-Bus baud rate

The product can handle 300 or 2400 baud. No auto-baud detection is available. The baud rate can be changed using M-Bus standard commands. Baud rate from factory is **2400** baud.

7.4 FCB-bit toggling (multi-telegram)

No multi-telegram or FCB-bit toggling is implemented (FCB bit is ignored). The product will always answer with first telegram and last byte set to 0x0f.

7.5 M-Bus break

M-Bus master break signals are handled according to the M-Bus standard and any ongoing communication from M-Bus slave to master will be aborted on break detection from the M-Bus master.

7.6 M-Bus commands

7.6.1 Initialize product (SND_NKE)

7.6.1.1 Master to slave

Byte index	Data	Description
0	0x10	Start character
1	0x40	C-Field = SND_NKE
2	0xnn	A-Field = Address of slave
3	0xnn	Checksum
4	0x16	Stop character

7.6.1.2 Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

7.6.2 Request user data (REQ_UD2)

Request user data from product and wait for slave response.

7.6.2.1 Master to slave

Byte index	Data	Description
0	0x10	Start character
1	0x4b | 0x5b | 0x6b | 0x7b	C-Field = REQ_UD2
2	0xnn	A-Field = Address of slave
3	0xnn	Checksum
4	0x16	Stop character

7.6.2.2 Slave to master

Byte index	Data	Description
0	0x68	Start character 1
1	0xnn	L-Field 1
2	0xnn	L-Field 2
3	0x68	Start character 2
4	0x08	RSP_UD
5	0xnn	A-Field = Address of slave
6	0x72	Variable data respond, mode 1 = LSByte first
7-10	0xnnnnnnnn	Secondary address
11-12	0x9615	Manufacturer id "ELV"
13	0xnn	Generation field In the range from 40 to 49.
14	0x00	Device type / medium = other
15	0xnn	Access number
16	0xnn	Status byte 0x00 = Ok (no error) 0x12 = Error (temporary error + application error) Status byte will indicate an error on the following conditions: - Timeout occurred when charging the relay drive capacitor.

		- Little or no discharge of the relay drive capacitor when pulsing the relay. This may indicate a problem with a relay coil, its connections or the relay driver hardware. The status byte will be cleared to 0x00 as soon as both error conditions disappear i.e. it is a non-latching error alarm.
17-18	0x0000	Signature, 16 bit binary
19	0x01	Relay status DIF
20	0xfd	Relay status VIF
21	0x1a	Relay status VIFE = digital output

22	0xnn	8-bit integer value with following bit-mask:
		
		Bit 7,6:
		  - 00 (DC)
		  - 01 = Relay EEPROM setting is on
		  - 10 = Relay EEPROM setting is off
		  - 11 (DC)
		Bit 5,4:
		  - 00 (DC)
		  - 01 = Push-button relay turn-on enabled
		  - 10 = Push-button relay turn-on disabled
		  - 11 (DC)
		Bit 3,2:
		  - 00 (DC)
		  - 01 = Push-button relay turn-off enabled
		  - 10 = Push-button relay turn-off disabled
		  - 11 (DC)
		Bit 1,0:
		  - 00 = Relay actual status is unknown
		  - 01 = Relay actual status is on
		  - 10 = Relay actual status is off
		  - 11 = Relay discharge error
		
		The RSP_UD relay status byte is mapped exactly like the corresponding SND_UD relay control byte except for bits 1 and 0.
		
		After power-on, the relay actual state will be reported as unknown until the relay has been pulsed to the state saved in EEPROM. This does not happen until the relay drive capacitor has been fully charged.

23	0x04	Relay turn-on counter DIF, storage nr 0

24	0xfd	Relay turn-on counter VIF
25	0x61	Relay turn-on counter VIFE = cumulative counter
26-29	0xnnnnnnnn	Counter value, 32-bit unsigned value The counter is "volatile" and will be reset to zero at every power-on. The counter rolls over from 0xffffffff (4,294,967,296) to 0x00000000.
30	0x01	Digital input status DIF
31	0xfd	Digital input status VIF
32	0x1b	Digital input status VIFE = digital input

33	0xnn	8-bit integer value with following bit-mask:
		
		Bit 7,6,5,4,3,2,1 = DC (always 0):
		Bit 0:
		   - 0 = Input is closed
		   - 1 = Input is open

34	0x44	Digital input counter DIF, storage nr 1
35	0xfd	Digital input counter VIF
36	0x61	Digital input VIFE = cumulative counter
37-40	0xnnnnnnnn	Counter value, 32-bit unsigned value The counter is "volatile" and will be reset to zero at every power-on. The counter rolls over from 0xffffffff (4,294,967,296) to 0x00000000.
41	0x0c	Fabrication number DIF
42	0x78	Fabrication number VIF
43-46	0xnnnnnnnn	Fabrication number, 8-digit packed BCD
47	0x02	Firmware version DIF
48	0xfd	Firmware version VIF
49	0x0F	Firmware version VIFE = software version number
50-51	0xnnnn	LSByte = Minor version (8-bit unsigned) MSByte = Major version (8-bit unsigned)
52	0xnn	Checksum
53	0x16	Stop character

7.6.3 Set baud rate

Set baud rate of slave.

7.6.3.1 Master to slave

Byte index	Data	Description
0	0x68	Start character 1
1	0x03	L-Field 1
2	0x03	L-Field 2
3	0x68	Start character 2
4	0x43 | 0x53 | 0x63 | 0.73	C-Field = SND_UD
5	0xnn	A-Field = Address of slave
6	0xnn	CI-Field = Baud rate selection code: 0xb8 = 300 baud 0xb9 = 600 baud 0xbA = 1200 baud 0xbb = 2400 baud 0xbc = 4800 baud (note 1) 0xbd = 9600 baud (note 1) 0xbe = no change (note 2) 0xbf = no change (note 2) Baud rates > 2400 baud do work but have not been tested to comply with the timing specifications in the M-Bus standard. Baud rate codes 0xbe and 0xbf are ACKed with 0xe5 although they do not change the baud rate (this is in accordance with the M-Bus specification).
7	0xnn	Checksum
8	0x16	Stop character

7.6.3.2 Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

7.6.4 Application reset

Restore all information to factory defaults, see Table 9.

7.6.4.1 Master to slave

Byte index	Data	Description
0	0x68	Start character 1
1	0x04	L-Field 1
2	0x04	L-Field 2
3	0x68	Start character 2

4	0x43 | 0x53 | 0x63 | 0.73	C-Field = SND_UD
5	0xnn	A-Field = Address of slave
6	0x50	CI-Field = Application reset
7	0xb0	Application reset sub-code
8	0xnn	Checksum
9	0x16	Stop character

7.6.4.2   Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

7.6.5 Set primary address

Change M-Bus primary address.

7.6.5.1   Master to slave

Byte index	Data	Description
0	0x68	Start character 1
1	0x06	L-Field 1
2	0x06	L-Field 2
3	0x68	Start character 2
4	0x43 | 0x53 | 0x63 | 0.73	C-Field = SND_UD
5	0xnn	A-Field = Address of slave
6	0x51	CI-Field
7	0x01	Primary address DIF
8	0x7A	Primary address VIF
9	0xnn	New primary address (0x00-0xfa)
10	0xnn	Checksum
11	0x16	Stop character

7.6.5.2   Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

7.6.6 Set secondary address

Change M-Bus secondary address.

7.6.6.1   Master to slave

Byte index	Data	Description

0	0x68	Start character 1
1	0x09	L-Field 1
2	0x09	L-Field 2
3	0x68	Start character 2
4	0x43 | 0x53 | 0x63 | 0.73	C-Field = SND_UD
5	0xnn	A-Field = Address of slave
6	0x51	CI-Field
7	0x0c	Secondary address DIF
8	0x79	Secondary address VIF
9-12	0xnnnnnnnn	New Secondary address, 8-bit packed BCD
13	0xnn	Checksum
14	0x16	Stop character

7.6.6.2   Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

7.6.7 Relay output control

This command implements relay output control configuration.

7.6.7.1   Master to slave

Byte index	Data	Description
0	0x68	Start character 1
1	0x07	L-Field 1
2	0x07	L-Field 2
3	0x68	Start character 2
4	0x43 | 0x53 | 0x63 | 0.73	C-Field = SND_UD
5	0xnn	A-Field = Address of slave
6	0x51	CI-Field
7	0x01	Output relay DIF
8	0xfd	Output relay VIF
9	0x1a	Output relay VIFE, digital output

10	0xnn	8-bit integer value with following bit-mask: Bit 7,6: - 00 = Do not change relay status - 01 = Relay EEPROM setting is ON - 10 = Relay EEPROM setting is OFF - 11 (DC) Bit 5,4: - 00 = Do not change push-button relay turn-on enable - 01 = Push-button relay turn-on enabled - 10 = Push-button relay turn-on disabled - 11 (DC) Bit 3,2: - 00 = Do not change push-button relay turn-off enable - 01 = Push-button relay turn-off enabled - 10 = Push-button relay turn-off disabled - 11 (DC) Bit 1,0: DC The SND_UD relay status byte is mapped exactly like the corresponding RSP_UD relay control byte except for bits 1 and 0. The relay EEPROM setting will be saved immediately and the relay will be pulsed to the correct state as soon as the capacitor is fully charged. If the capacitor is already fully charged when the command arrives, i.e. if the relay has not been pulsed for a while, then the relay will be pulsed immediately. After power-on, the relay actual state will be reported as unknown until the relay has been pulsed to the state saved in EEPROM. This does not happen until the relay drive capacitor has been fully charged.
11	0xnn	Checksum
12	0x16	Stop character

7.6.7.2   Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

7.6.8 Select slave

Select slave for further secondary addressing. After successful selection, the slave can be addresses using primary address 253.

7.6.8.1   Master to slave

Byte index	Data	Description
0	0x68	Start character 1
1	0xnn	L-Field 1 Variable depending on selection mask. The selection mask can have any size in the range 0..8 bytes expect 5 (Manufacturer id requires a full 16-bit mask).
2	0xnn	L-Field 2 Variable depending on selection mask
3	0x68	Start character 2
4	0x43 | 0x53 | 0x63 | 0.73	C-Field = SND_UD
5	0xnn	A-Field = Address of slave
6	0x52	CI-Field = Slave selection The slave will be deselected if there is any mismatch.
7-10	0xnnnnnnnn	*Optional* M-Bus secondary address mask, packed BCD The M-Bus ID mask can use the nibble 0xf as a wildcard in any of the eight BCD digit positions.
11-12	0xnnnn	*Optional* M-Bus manufacturer id mask, 16-bit binary The M-Bus manufacturer id mask can use 0xff as wildcard for one or both bytes.
13	0xnn	*Optional* M-Bus generation mask, 8-bit binary The M-Bus generation mask can use 0xff as wildcard.
14	0xnn	*Optional* M-Bus medium mask, 8-bit binary The M-Bus meter medium mask will match if 0x00 ("unknown") or 0xff (wildcard).
15	0xnn	Checksum
16	0x16	Stop character

7.6.8.2 Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

8   Troubleshooting

8.1   Pressing push-button does not toggle relay output

Verify relay output control configuration, see M-Bus command Relay output control chapter 7.6.7.

8.2   There is a delay when toggling relay output

There is an internal process for toggling the relay which takes approximately 10 seconds, i.e. toggling relay output cannot be done faster than 10 seconds. This also applies to when pushing the push-button.

8.3   Product does not respond to M-Bus master commands

Please verify your M-Bus slave configuration and connection:

- Voltage over M-Bus connection should be between 24 VDC and 48 VDC.

- All M-Bus slaves connected to the M-Bus master must have unique primary addresses or secondary addresses depending on addressing mode used.

- Verify M-Bus slave baud rate used by M-Bus master. M-Bus master baud rate must be identical to M-Bus slave baud rate.

9   Technical specifications

9.1   Characteristics

Type	Value	Unit	Comments
Mechanics			
Casing material	Polyamide	-	
Protection class	IP20	-	
Dimensions (w x h x d)	36 x 90 x 65	mm	3 DIN modules
Weight	80	G	
Connection M-Bus	Pin terminal	-	Solid wire 0.6-0.8 Ø mm
Power supply	From M-Bus	-	
Electrical			
Nominal voltage	27	VDC	
Voltage range	24-48	VDC	
Power consumption (Max)	1.5	mA	M-Bus 1T
Power consumption (Nom)	1.5	mA	M-Bus 1T
Installation/overvoltage	CAT II	-	
Output relay current (Max)	8	A	
Output relay voltage (Max)	240	VAC	
Input max resistance	1	kOhm	Open connector is detected as normal level (NO).
Input max capacitance	1		
Input minimum open/close time for pulse detection	20	ms	
Environmental			
Operating temperature range	-40 to +70	°C	
Storage temperature range	-40 to +85	°C	
Operating humidity max.	80	% RH	Temperatures up to 31°C, decreasing linearly to 50%RH at 40°C
Pollution	Degree 2	-	
Operating altitude	0-2000	Meters	
Indoor use only	Yes	-	Can be extended with IP55 enclosure for outdoor use, see Elvaco CM Box family enclosures.
User interface			
LED Indication	Green, Red	-	
Push button	-	-	Control output relay and restore to factory default. Minimum of 1 second press to take action.
M-Bus			

M-Bus standard	EN13757	-	
M-Bus baud rate	300,2400	Bit/s	
M-Bus over IR	No	-	
M-Bus commands	SND_UD, SND_NKE, REQ_UD2	-	
Addressing modes	Secondary, Primary	-	

Table 8 Technical specifications

9.2 Factory defaults

Name	Value	Unit	Comments
M-Bus Baud rate	2400	Bit/s	M-Bus slave baud rate
M-Bus primary address	0	-	Slave not installed
M-Bus secondary address	Fabrication number	-	Revert secondary address to fabrication number
Relay output	Off	-	Relay output state
Push-button relay turn-off	Enabled	-	User can press button to turn off relay
Push-button relay turn-on	Enabled	-	User can press button to turn on relay

Table 9 Factory default values

10 Type approvals

CMeX40 is designed to comply with the directives and standards listed below.

Approval	Description
EMC	EN 61000-6-2, EN 61000-6-3
Safety	EN 61010-1, Cat II

Table 10 Type approvals

11 Safety and environment

11.1 Safety precautions

The following safety precautions must be observed during all phases of the operation, usage, service or repair of any CMeX40 product. Users of the product are advised to convey the following safety information to users and operating personnel and to incorporate these guidelines into all manuals supplied with the product. Failure to comply with these precautions violates safety standards of design, manufacture and intended use of the product. Elvaco AB assumes no liability for customer's failure to comply with these precautions.

Do not operate the product in the presence of flammable gases or fumes. Switch off the product when you are near petrol stations, fuel depots, chemical plants or where blasting operations are in progress. Operation of any electrical equipment in potentially explosive atmospheres can constitute a safety hazard.

12 Document History

Version	Date	Description	Author
1.0	2009-12-01	First release	David Vonasek
	2014-03-18	Small changes in language	Ericha Bloom
	2016-10-24	Added the Operations guide	Anton Larsson

12.1 Document software and hardware appliance

Type	Version	Date	Comments
Hardware	R2A	2009-10-01	
Software	0.07	2009-12-01	

13 References

13.1 References

[1] EN-13757-1, EN-13757-2, EN-13757-3
Communication System for meters and remote reading of meters, Part1, Part2 and Part3

[2]

13.2 Terms and Abbreviations

Abbreviation	Description
Product	In this document CMeX40
DIF	Data Information Field (M-Bus data clock information)
VIF	Value Information Field (M-Bus value block information)
M-Bus slave	General in this document CMeX40

13.2.1 Number representation

Decimal numbers are represented as normal number, i.e. 10 (ten).

Hexadecimal numbers are represented with prefix 0x, i.e. 0x0A (ten)

Binary numbers are represented with prefix 0b, i.e. 0b00001010 (ten)