CMa10,CMa11 Users Manual English

1050024-ELVACO-CMa10 M-Bus Tempsensor;
1050054-CMa11 M-Bus Temperatursensor

The CMa10/CMa11 is a 2-way M-Bus communicating temperature and humidity sensor for indoor use. CMa10/CMa11 is the ideal product for comfort level billing.

Contents

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 CMa10/CMa11 product.

The documentation and product are provided on an “as is” basis only and may contain deficiencies or inadequacies. Elvaco AB takes no responsibility for damages, liabilities or other losses by using this product.

1.1 Copyright and Trademark

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2 Using this manual

2.1 Purpose and Audience

This manual covers information needed to mount, configure and use the CMa10/CMa11 M-Bus indoor temperature and humidity sensor. It is intended for field engineers and developers.

2.2 Models

CMa10, CMa11

2.3 Additional and updated information

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

3 Introduction

3.1 Product configuration

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

Product name	Comments
CMa10	Indoor M-Bus temperature and humidity sensor with display
CMa11	Indoor M-Bus temperature and humidity sensor without display

Table 1 Product configuration

3.2 Capabilities

The CMa10/CMa11 is a 2-way M-Bus communicating temperature and humidity sensor for indoor use. CMa10/CMa11 is the ideal product for comfort level billing. The message function is an efficient and cost effective way of distributing information to residents. The high accuracy sensor and user friendly handling makes the CMa10/CMa11 the perfect choice for tenant owners

3.3 Applications

The CMa10/CMa11 should be used in the following scenarios:

- Indoor measurement of temperature and/or humidity
- Messaging/information to residents
- High accuracy indoor climate logging

4 Getting Started

This chapter covers the steps required for getting the CMa10/CMa11 installed and operational. No pre-configuration is needed before using the CMa10/CMa11.

4.1 Overview

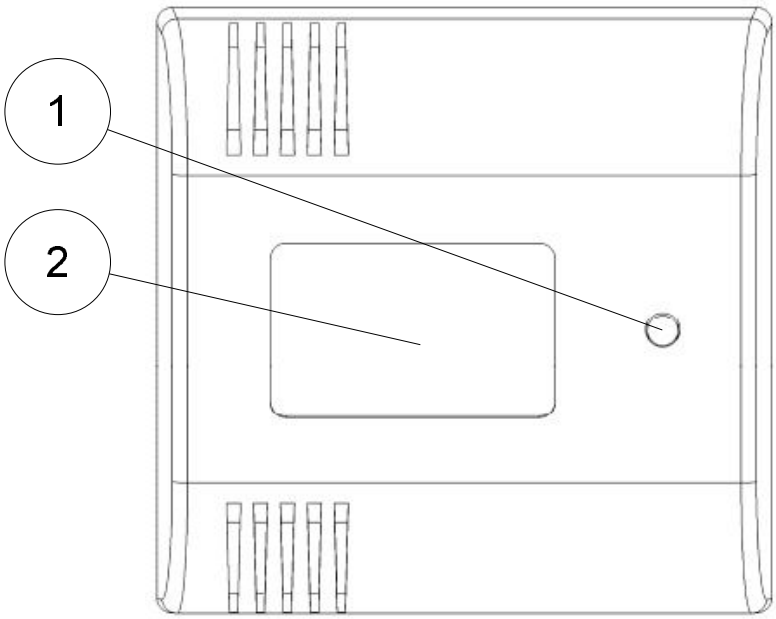

Figure 1 Front view

1. Push-button (SW2) (CMa10)
2. Display (CMa10)
3. Push-button (SW1)
4. M-Bus in
5. Serial Number (Secondary address)

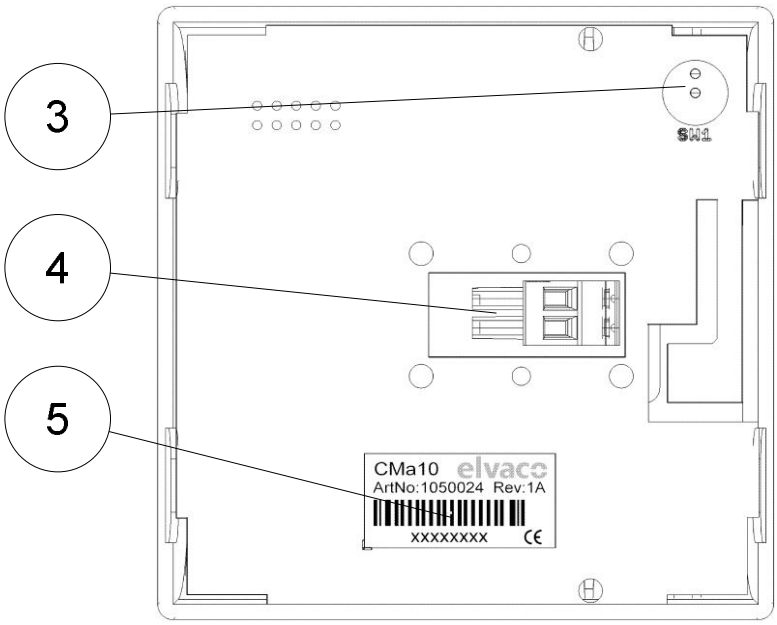

Figure 2 Bottom view (rear cover removed)

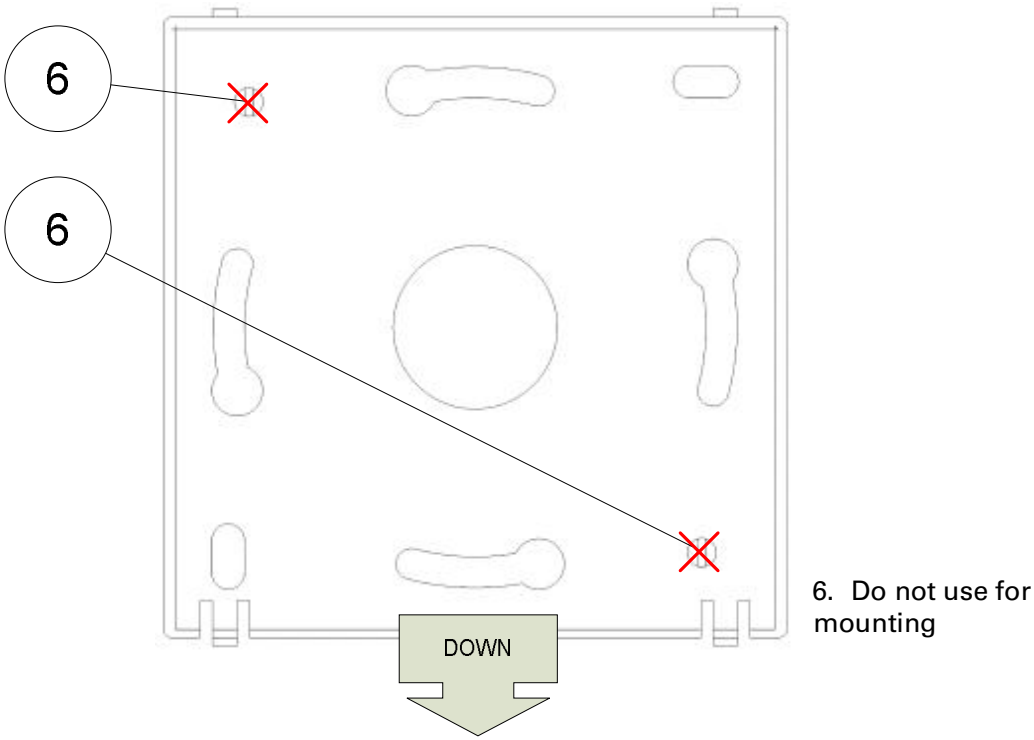

Figure 3 Rear cover

4.2 Mounting

When mounting the CMa10/CMa11, avoid rooms with a lot of supplementary heat, such as kitchens or south facing rooms. Position the sensor away from direct sunlight. Avoid placing on an external wall or near an external door. Make sure that the sensor is not positioned closer than 1 m from the nearest radiator and at least 1.5 m above the floor.

The CMa10/CMa11 can be mounted directly on the wall, or over a mounting box. If the CMa10/CMa11 is placed over a conduit pipe, it is recommended to fill the pipe to prevent air flow.

Remove the rear cover to connect the M-Bus 2-wire interface.

⚠ **IMPORTANT**

Please take the following in consideration:

- Do not use mounting holes (6) as in Figure 3.
- Turn the rear cover as shown in Figure 3.

4.2.1 M-Bus 2-wire bus

M-Bus is a multi-drop 2-wire bus, with no polarity. Use a cable of area 0.25-1.5 mm^2, e.g. a standard telephone cable (EKKX 2x2x0.25).

Demount the M-Bus in terminal (4) by sliding the terminal to the left. Connect the incoming wiring to the terminal and slide back in position.

⚠ **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 21-42 VDC.

5 Application description

This chapter covers general application description and configuration of the product.

5.1 Operation

The product has different operation states depending on the current operation mode. The configuration parameters are maintained during reboot and power cycling. All parameters and information can be remotely configured and read using M-Bus standard commands.

The product is equipped with watchdog monitoring, which secures long term stable operation in field.

5.2 Display menu (CMa10)

The display shows current sensor information and is also used to change and view the CMa10/CMa11 configuration, i.e. M-Bus primary and secondary addresses. Please see Figure 4 for menu options.

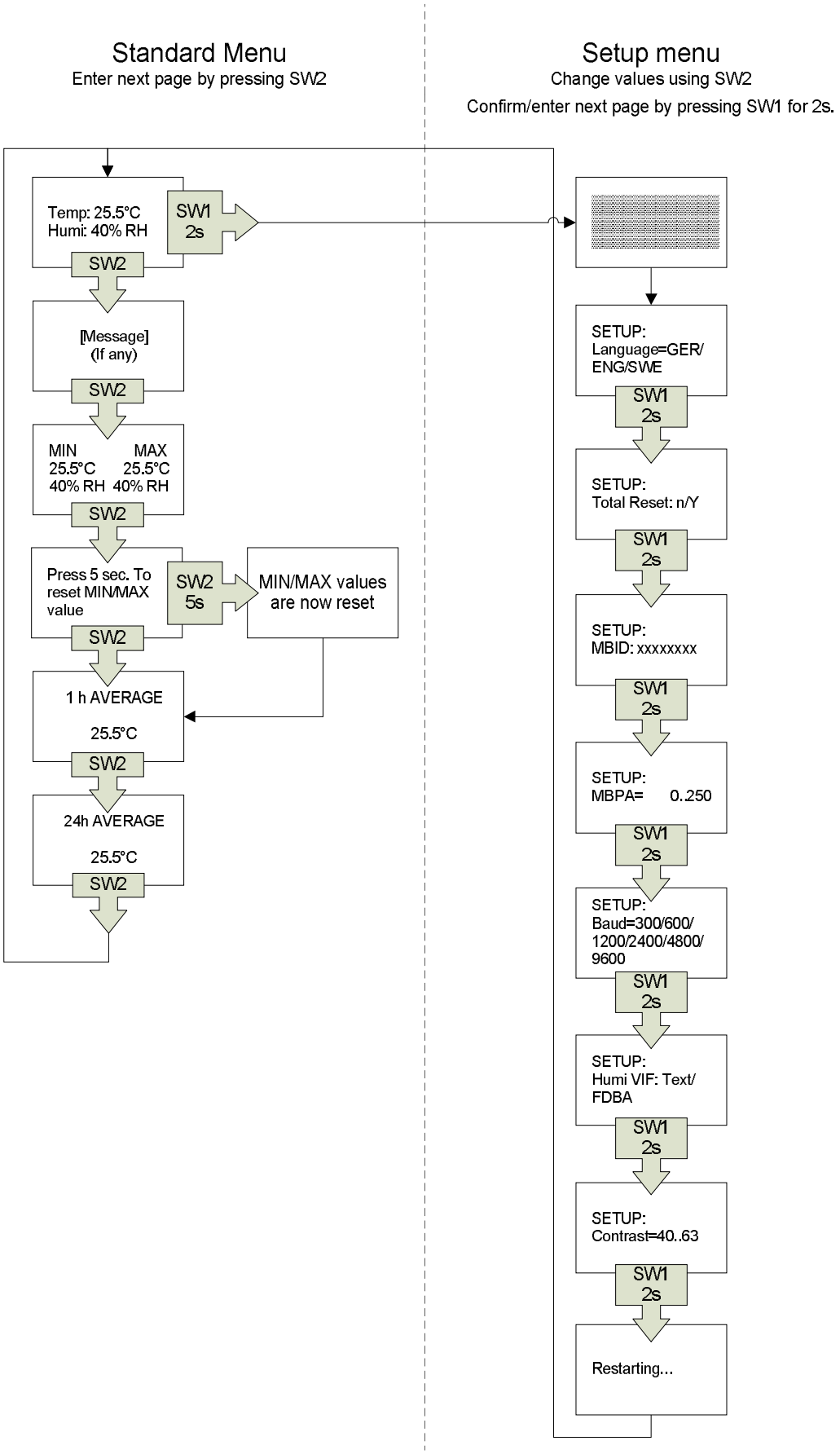

Figure 4 CMa10 Display menu

5.3 Reset to factory default

In order to reset the product configuration to factory default, navigate to “Total Reset” in the setup menu and select “y”. Reset to factory defaults can also be made using M-Bus command Application reset, see chapter 6.6.4.

6 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.

6.1 M-Bus product identification

The product can be identified by the following information:

- Manufacturer string = ELV
- Medium = Room sensor
- Generation = 40-49 (CMa10), 50-59 (CMa11)

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.

6.2 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 commands. Primary address from factory is **0** and secondary address from factory is the fabrication number (serial number).

6.3 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.

6.4 FCB-bit toggling (multi-telegram)

Multi-telegram mode, or FCB-bit toggling, is implemented. First telegram contains momentary values, min/max and average values of measured temperature and humidity. Second telegram contains last 24 hours of temperature values.

6.5 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.

6.6 M-Bus commands

6.6.1 Initialize product (SND_NKE)

6.6.1.1 Master to slave

Byte index	Data	Description
0	0x10	Start character
1	0x40	C-Field = SND_NKE
2	0xnn	A-Field = Primary address
3	0xnn	Checksum

4	0x16	Stop character

6.6.1.2 Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.6.2 Request user data (REQ_UD2)

Request user data from product and wait for slave response.

6.6.2.1 Master to slave

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

The RSP_UD telegram depends on the FCV and FCB bits in the C field of the calling REQ_UD2 telegram. There are two telegrams available:

1) If FCV is 0 in REQ_UD2 or if first, third, fifth etc. REQ_UD2 since last SND_NKE (primary addressing mode) or if first, third, fifth etc. REQ_UD2 since last successful secondary addressing selection first telegram is returned.
2) If FCV is 1 in REQ_UD2 and if second, fourth, sixth etc. REQ_UD2 since last SND_NKE (primary addressing mode) or if second, fourth, sixth etc. REQ_UD2 since last successful secondary addressing selection second telegram is returned.

6.6.2.2 Slave to master – Telegram 1

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 = Primary address
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	0x1B	Device type / medium = room sensor

15	0xnn	Access number
16	0xnn	Status byte 0x00 = Ok (no error) 0x0a = Sensor failure (permanent application error)
17..18	0x0000	Signature, 16 bit binary
19	0x01	Product status DIF
20	0xfd	Product status VIF
21	0x1b	Product status VIFE = digital input
22	0xnn	8-bit integer value with following bit-mask: Bit 7: Text message exists indicator - 1 = Text message exists - 0 = No text message exists Bit 6: Text message read indicator - 1 = Text message not read - 0 = Text message read Bit 5,4,3: Not used (=0) Bit 2: 24h average value indicator - Toggles when the 24h average temperature is updated (every hour) Bit 1: 1h average value indicator - Toggles when the 1h average is updated (every 6 minute) Bit 0: Sensor failure - 1 = Sensor failure (same as 0x0a in header status byte) - 0 = No sensor failure
23	0x02	Instantaneous relative humidity DIF
24	0xfb	Instantaneous relative humidity VIF.
25	0x9b	Relative humidity, in % (integer) VIFE
26	0x74	Scaling VIFE, x 0.01
27..28	0xnnnn	Instantaneous relative humidity In case of error the relative humidity will be set to 0. An optional humidity VIF can be selected in the setup menu. In this case the 3 byte default VIF is replaced by - 0xFC0348522574
29	0x22	Minimum relative humidity DIF
30	0xfb	Minimum relative humidity VIF
31	0x9b	Minimum Relative humidity, in % (integer) VIFE
32	0x74	Scaling VIFE, x 0.01

33..34	0xnnnn	Minimum Instantaneous relative humidity In case of error the minimum relative humidity will be set to 0. This is the lowest instantaneous relative humidity since last min/max reset command. An optional humidity VIF can be selected in the setup menu. In this case the 3 byte default VIF is replaced by - 0xFC0348522574
35	0x12	Maximum relative humidity DIF
36	0xfb	Maximum relative humidity VIF
37	0x9b	Maximum Relative humidity, in % (integer) VIFE
38	0x74	Scaling VIFE, x 0.01
39..40	0xnnnn	Maximum Instantaneous relative humidity In case of error the maximum relative humidity will be set to 0. This is the highest instantaneous relative humidity since last min/max reset command. An optional humidity VIF can be selected in the setup menu. In this case the 3 byte default VIF is replaced by - 0xFC0348522574
41	0x02	Instantaneous temperature DIF
42	0x65	Instantaneous temperature VIF, external temperature
43..44	0xnnnn	Instantaneous temperature x 100 In case of error the temperature will be set to 0.
45	0x22	Minimum temperature DIF
46	0x65	Minimum temperature VIF, external temperature
47..48	0xnnnn	Minimum temperature x 100 In case of error the temperature will be set to 0. This is the lowest instantaneous temperature since last min/max reset

		command.
49	0x12	Maximum temperature DIF
50	0x65	Maximum temperature VIF, external temperature
51..52	0xnnnn	Maximum temperature x 100 In case of error the temperature will be set to 0. This is the highest instantaneous temperature since last min/max reset command.
53	0x01	Average duration DIF
54	0x72	Average duration VIF
55	0xnn	Number of hour average values collected since power-on (0..24) This counter starts from zero at power-on and is incremented once per hour when a new hour average temperature value is stored in the 24-hour table. The counter does not count beyond 24 (i.e. this value is equal to number of valid hour values stored in the 24-hour table) The 24-hour temperature rolling average will not be available until this counter has reached 24.
56	0x42 | 0x72	1-hour temperature rolling average DIF, storage number 1 0x42 = The value is available 0x72 = The value is not yet calculated
57	0x65	1-hour temperature rolling average VIF, external temperature
58..59	0xnnnn	1-hour temperature rolling average x 100 This value is unavailable (0) until 1 hour has passed since power-on. During this first hour the value will be flagged as “value during error state”, DIF bits 5 and 4 = 1. This value is updated every 6 minute. The temperature data will be 0 in case of sensor error. See slave status byte in data header.
60	0x82 | 0xb2	24-hour temperature rolling average DIF, storage number 2 0x82 = The value is available

		0xb2 = The value is not yet calculated
61	0x01	24-hour temperature rolling average DIFE
62	0x65	24-hour temperature rolling average VIF, external temperature
63..64	0xnnnn	24-hour temperature rolling average x 100 This value is unavailable (0) until 24 hour has passed since power-on. During this period the value will be flagged as "value during error state", DIF bits 5 and 4 = 1. This value is updated every hour. The temperature data will be 0 in case of sensor error. See slave status byte in data header.
65	0x0c	Fabrication number DIF
66	0x78	Fabrication number VIF
67..68	0xnnnnnnnn	Fabrication number, 8-digit packed BCD
69	0x0d	Firmware version DIF
70	0xfd	Firmware version VIF
71	0x0f	Firmware version VIFE = " Other software version"
72	0x05	Length of firmware string (varying)
73..74	0xnnnnnnnnnn	Firmware version string in format: Major.Minor.PatchLevel
75	0x1f	End of telegram, more data follows
76	0xnn	Checksum
77	0x16	Stop character

6.6.2.3 Slave to master – Telegram 2

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 = Primary address
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	0x1B	Device type/medium = room sensor
15	0xnn	Access number
16	0xnn	Status byte 0x00 = Ok (no error) 0x0a = Sensor failure (permanent application error)
17..18	0x0000	Signature, 16 bit binary
19 + 5 x N	0xc2 | 0xf2 | 0x82 | 0xb2	24-hour log temperature table DIF Table index = N = 0..23 Storage numbers N + 3 = 3..26 Value age = N (+1/-0) hours The newest value is transmitted first. During the first 24 hours after power-on, values are sent as 0 and flagged as “value during error state” (DIF bits 5 and 4 = 1), while not yet updated. All temperature data will be 0 in case of sensor error. See product status byte or status byte in data header.
19 + 5 x N	0xnn	24-hour log temperature table DIFE nn = (N+3/2)
20 + 5 x N	0x65	24-hour log temperature table VIFE
21..22 + 5 x N	0xnnnn	Average temperature of hour “now – N” x 100
23 + 5 x N	0x0f	End of telegram, no more data follows
23 + 5 x N +1	0xnn	Checksum
23 + 5 x N +2	0x16	Stop character

6.6.3 Set baud rate

Set baud rate of slave.

6.6.3.1 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 | 0x73	C-Field = SND_UD
5	0xnn	A-Field = Primary address
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

6.6.3.2 Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.6.4 Application reset

Restore all information to factory default, see section 8.2 for factory default values.

6.6.4.1 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 | 0x73	C-Field = SND_UD
5	0xnn	A-Field = Primary address
6	0x50	CI-Field = Application reset
7	0xb0	Application reset sub-code
8	0xnn	Checksum
9	0x16	Stop character

6.6.4.2 Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.6.5 Set primary address

Change M-Bus primary address.

6.6.5.1 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 | 0x73	C-Field = SND_UD
5	0xnn	A-Field = Primary address
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

6.6.5.2 Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.6.6 Set secondary address

Change M-Bus secondary address.

6.6.6.1 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 | 0x73	C-Field = SND_UD
5	0xnn	A-Field = Primary address
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

6.6.6.2 Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.6.7 Select slave for secondary addressing

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

6.6.7.1 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 except 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 | 0x73	C-Field = SND_UD
5	0xnn	A-Field = Primary address

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

6.6.7.2 Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.6.8 Reset all min/max registers

This command will reset the temperature and relative humidity min/max registers to the current real time values. Please note that only the "M-Bus min/max registers" are reset; the "user min/max registers", i.e. those shown on the LCD, can only be reset through user action (push-button)

6.6.8.1 Master to slave

Byte index	Data	Description
0	0x68	Start character 1
1	0x05	L-Field 1
2	0x05	L-Field 2

3	0x68	Start character 2
4	0x43 | 0x53 | 0x63 | 0x73	C-Field = SND_UD
5	0xnn	A-Field = Primary address
6	0x51	CI-Field
7	0x0F	Manufacture specific follows DIF
8	0x00	Elvaco command Reset min/max registers VIF
9	0xnn	Checksum
10	0x16	Stop character

6.6.8.2 Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.6.9 Set LCD contrast

The default value is 52 (0x34). Larger values will make the display darker, smaller values will make the display lighter. Please note that the display may become invisible if the contrast value is set too low. Suggested minimum value is 40 (0x28). The LCD contrast is changed immediately upon reception of this command. The value is also stored in EEPROM and will be in effect until a new "Set LCD contrast" command is received or of changed with the programming push-button.

6.6.9.1 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 | 0x73	C-Field = SND_UD
5	0xnn	A-Field = Primary address
6	0x51	CI-Field
7	0x0F	Manufacture specific follows DIF
8	0x01	Elvaco command Set LCD contrast VIF
9	0xnn	LCD contrast nn = 40..63
10	0xnn	Checksum
11	0x16	Stop character

6.6.9.2 Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.6.10 Send/store text message

Send/store text message command is used to send information to display on the LCD.

6.6.10.1 Text formatting

Allowed text message size is 1 to 210 characters. Each LCD screen has 42 character positions which are divided into 3 lines of 14 characters:

User data byte index	Data
2..15	Text for line 1 on page 1
16..29	Text for line 2 on page 1
30..43	Text for line 3 on page 1
44..57	Text for line 1 on page 2
Etc	Etc

Up to 5 pages can be stored. The text message is sent "first character first", in the order of reading (fortunately, the M-Bus standard does not dictate "reversed strings" in manufacturer specific data fields).

Exactly 42 characters are needed to fill a page. Unused space must be padded with ASCII space (0x20) if more text or another page follows.

In addition to the usual 7-bit ASCII table (0x20-0x7F), there are many other characters that can be used. Please see Sitronix ST7036 data sheet for more information. Elvaco manufacture defined characters are listed below:

Character	Byte
Å	0x00
Ä	0x01
Ö	0x02
°	0x03 (Degrees, used for °C)

This command will overwrite a previously stored message, if any.

Reception of this command will turn on the mail icon on the LCD screen and make the LED flash. The LED will stop flashing as soon as the entire message has been read once. The mail icon, on the other hand, will stay on until the message is deleted. The message can be deleted either by an M-Bus command (see below) or by user action (push-button).

6.6.10.2 Master to slave

Byte index	Data	Description
0	0x68	Start character 1
1	0xnn	L-Field 1 3..(N+3)

2	0xnn	L-Field 2 3..(N+3)
3	0x68	Start character 2
4	0x43 | 0x53 | 0x63 | 0x73	C-Field = SND_UD
5	0xnn	A-Field = Primary address
6	0x51	CI-Field
7	0x0F	Manufacture specific follows DIF
8	0x02	Elvaco command Send/store text message VIF
9..N	0xnn	Message N = 2-211
N+1	0xnn	Checksum
N+2	0x16	Stop character

6.6.10.3 Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.6.11 Delete text message

This command will delete any text message stored in the slave and turn off both the mail icon and the flashing LED (if on).

6.6.11.1 Master to slave

Byte index	Data	Description
0	0x68	Start character 1
1	0x05	L-Field 1
2	0x05	L-Field 2
3	0x68	Start character 2
4	0x43 | 0x53 | 0x63 | 0x73	C-Field = SND_UD
5	0xnn	A-Field = Primary address
6	0x51	CI-Field
7	0x0F	Manufacture specific follows DIF
8	0x03	Elvaco command Delete text message VIF
9	0xnn	Checksum
10	0x16	Stop character

6.6.11.2 Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.6.12 Select user display language

This command will change the display language in the user menu.

6.6.12.1 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 | 0x73	C-Field = SND_UD
5	0xnn	A-Field = Primary address
6	0x51	CI-Field
7	0x0F	Manufacture specific follows DIF
8	0x05	Elvaco command Select user display language VIF
9	0xnn	Language code nn = English=0x00 Swedish=0x01 German=0x02
10	0xnn	Checksum
11	0x16	Stop character

6.6.12.2 Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.6.13 Select Humidity VIF code

This command will change the relative humidity VIF presentation.

This command was implemented in software version 4.1.0.

6.6.13.1 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 | 0x73	C-Field = SND_UD
5	0xnn	A-Field = Primary address
6	0x51	CI-Field

7	0x0F	Manufacture specific follows DIF
8	0x06	Elvaco command Select humidity VIF code
9	0xnn	Humidity VIF selector nn = Dimensionless (0xFDBA)=0x00 Plain text (%RH)=0x01
10	0xnn	Checksum
11	0x16	Stop character

6.6.13.2 Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

7 Troubleshooting

7.1 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 21 VDC and 42 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 the M-Bus slave baud rate.

7.2 Information not visible on the display

This problem can be a result of setting the LCD contrast to a low value. Please change the LCD contrast by issuing the M-Bus command Set LCD contrast or Application reset, see chapter 6.6.9 and 6.6.4.

7.3 Temperature value is inaccurate

The temperature sensor is very accurate, but incorrect positioning of the product may result in unintended temperature variation. Please take the following in consideration when mounting the product:

- Do not mount the product close to heat sources (front and rear)
- Do not mount the product in direct sunlight
- Do not mount the product in the area of a spotlight beam

If the problem persists, please contact Elvaco AB.

8 Technical specifications

8.1 Characteristics

Type	Value	Unit	Comments
Mechanics			
Casing material	ABS UL94-V0	-	White
Protection class	IP20	-	
Dimensions	80 x 80 x 28	mm	
Weight	75	g	
Connection M-Bus	Screw terminal / Spring terminal	-	0.25 to 1.5 mm^2
Mounting	Wall mounted		
Electrical			
Power supply	21-42	VDC	Through M-Bus connection, independent of the wiring polarity
Power consumption	1.5	mA	M-Bus 1T
Environmental			
Operating temperature range	0 to +50 (CMa10) -20 to +55 (CMa11)	°C	
Storage temperature range	-40 to +85	°C	
Operating humidity	0 to 95	%RH	No condensation
Temperature sensor			
Temperature range	0 to +50 (CMa10) -20 to +55 (CMa11)	°C	
Temperature +10 to +30 °C	+/- 0.2	°C	
Temperature 0 to +10 °C	+/- 0.4	°C	
Temperature -10 to +0 °C	+/- 0.5	°C	
Temperature -20 to +55 °C	+/- 1.5	°C	
Humidity sensor			
Range	0-100	%RH	
Repeatability RH	+/- 0.1	%RH	
Humidity 10 to 90 %RH	+/- 2	%	
Humidity 0 to 100 %RH	+/- 4	%	
User interface			
LCD display	Yes (CMa10)	-	

Button with LED	Yes (CMa10)	-	Configuration, message indication and confirmation
M-Bus			
M-Bus standard	EN 13757	-	
M-Bus baud rate	300, 2400	Bit/s	
IR Interface	No	-	
M-Bus commands	SND_UD, SND_NKE, REQ_UD2	-	
Addressing modes	Secondary, Primary	-	
Momentary values	Temperature, humidity, status	-	
Historic values	Average values for last hour and last day	-	

Table 2 Technical specifications

8.2 Factory defaults

Name	Value	Unit	Comments
M-Bus baud rate	2400	Bit/s	
M-Bus primary address	0	-	Slave not installed
M-Bus secondary address	Fabrication number	-	
LCD contrast	52	-	

Table 3 Factory defaults

9 Type approvals

CMa10/CMa11 is designed to comply with the directives and standards listed below.

Approval	Description
EMC	EN 61000-6-2, EN 61000-6-3

Table 4 Type approvals

10 Safety and environment

10.1 Safety precautions

The following safety precautions must be observed during all phases of the operation, usage, service or repair of any CMa10/CMa11 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.

All instructions must be carefully read before CMa10/CMa11 is installed and used. They contain important information about how the product is used properly.

The installation of CMa10/CMa11 should not be started before the technical specifications are fully understood. The work must be performed in the order listed in this manual, and only by qualified personnel. The work must also be done in accordance with national electrical specifications and applicable local regulations.

In order to avoid the product being damaged by static electricity, an ESD wristband should be worn when handling the product.

To prevent hazardous power levels, the M-Bus 2-wire cable should be disconnected from the M-Bus master or other installations.

The product is intended for permanent connection to the M-Bus master through the M-Bus 2-wire cable. The M-Bus master's 2-wire cable must be properly dimensioned, and if necessary, it must be possible to disconnect the product from the 2-wire cable.

The labelling of the product may not be changed, removed or made unrecognizable.

11 Document History

Version	Date	Description	Author
1.0	2009-12-09	First release	David Vonasek
1.1	2010-01-18	Updated technical spec.	David Vonasek
1.2	2010-01-19	Added CMa11 description	David Vonasek
1.3	2010-03-19	Added language support for English, Swedish, German	David Vonasek
2.0	2010-11-23	Updated technical spec, added safety and environment, adjusted the text	Ericha Bloom
3.0	2013-03-11	Added description for Elvaco specific command 0x06.	Ericha Bloom
3.1	2013-06-13	Added Appendix A	Peter King/Ericha Bloom
	2014-04-03	Updated section 6.6.9.1	Ericha Bloom

11.1 Document software and hardware appliance

Type	Version	Date	Comments
Hardware	R1A	2009-08-16	
Software	4.1.0	2011-09-01	

12 References

12.1 References

[1] Sitronix ST7036

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

[3]

12.2 Terms and Abbreviations

Abbreviation	Description
Product	In this document, CMa10/CMa11
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 CMa10/CMa11

12.2.1 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)

13 Appendix A – Example

13.1 Denomination of values in reports

Denomination	Description
serial-number	M-Bus master id
device-identification	M-Bus slave id
created	Time stamp
value-data-count	Index at multiple telegram. Usually 0.
manufacturer	Manufacturer
version	Hardware version
device-type	M-Bus slave device type
access-number	Number of times the meter has been read
status	Status
signature	Reserved for future use
digital-input,,inst-value,0,0,0	
%rh ,,inst-value,0,0,0	Humidity, momentary value
%rh ,,min-value,0,0,0	Humidity, lowest value since reset
%rh ,,max-value,0,0,0	Humidity, highest value since reset
ext-temp,°c,inst-value,0,0,0	Temperature, momentary value
ext-temp,°c,min-value,0,0,0	Temperature, lowest value since reset
ext-temp,°c,max-value,0,0,0	Temperature, highest value since reset
avg-duration,hour(s),inst-value,0,0,0	Number of hours that average values have been collected
ext-temp,°c,inst-value,0,0,1	Temperature, 1-hour rolling average
ext-temp,°c,inst-value,0,0,2	Temperature, 24-hour rolling average
fabrication-no,,inst-value,0,0,0	Fabrication number
other-sw-version,,inst-value,0,0,0	Software version
manufacturer-specific,,inst-value,0,0,0	

13.2 Denomination of values for use in filters

Denomination	Description
mbus.dib.%rh.0.0.0.0	Humidity, momentary value
mbus.dib.%rh.0.0.0.2	Humidity, lowest value since reset
mbus.dib.%rh.0.0.0.1	Humidity, highest value since reset
mbus.dib.ext-temp.0.0.0.0	Temperature, momentary value
mbus.dib.ext-temp.0.0.0.2	Temperature, lowest value since reset
mbus.dib.ext-temp.0.0.0.1	Temperature, highest value since reset
Mbus.dib.avg-duration.0.0.0.0	Number of hours that average values have been collected
mbus.dib.ext-temp.0.1.0.0	Temperature, 1-hour rolling average
mbus.dib.ext-temp.0.2.0.0	Temperature, 24-hour rolling average
Mbus.dib.fabrication-no.0.0.0.0	Fabrication number