elvaco

CMa10, CMa11 G.2
User's Manual
English
v 1.0

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 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

1.2 Contacts

Elvaco AB

Kabelgatan 2T
434 37 Kungsbacka
SWEDEN

Phone: +46 300 30250

E-Mail: info@elvaco.com

Elvaco AB Technical Support

Phone: +46 300 434300
E-Mail: support@elvaco.se

Online: http://www.elvaco.com

2 Important usage and safety information

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.

3 Using this manual

3.1 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.

3.2 Online resources

To download the latest version of this user's manual, please visit the Elvaco website, https://www.elvaco.se/en/. There, you will also find information about Elvaco's other products and services.

3.3 Symbols

The following symbols are used throughout the manual to emphasize important information and useful tips:

The Note symbol is used to mark information that is important to take into consideration for safety reasons or to assure correct operation of the sensor.

The Tip symbol is used to mark information intended to help you get the most out of your product. It can for example be used to highlight a possible customization option related to the current section.

4 Introduction

4.1 Application description

The CMa10/CMa11 is a 2-way M-Bus temperature and humidity sensor for indoor use. The sensor offers high accuracy and user-friendliness, which makes it the optimal choice for tenant owners. Readout and configuration are easily performed via M-Bus, the LCD display (CMa10) or by using a mobile phone (via NFC).

CMa10 has a message feature that makes it possible to communicate with the end-user via the product's LCD display. The product supports six different language options: Swedish, English, German, Spanish, Finnish and Italian.

5 Getting started

5.1 Purpose

This chapter provides instructions on how to get started with CMa10/CMa11. After reading and carefully following each step of this chapter, the sensor will be installed and operational.

5.2 Product specification
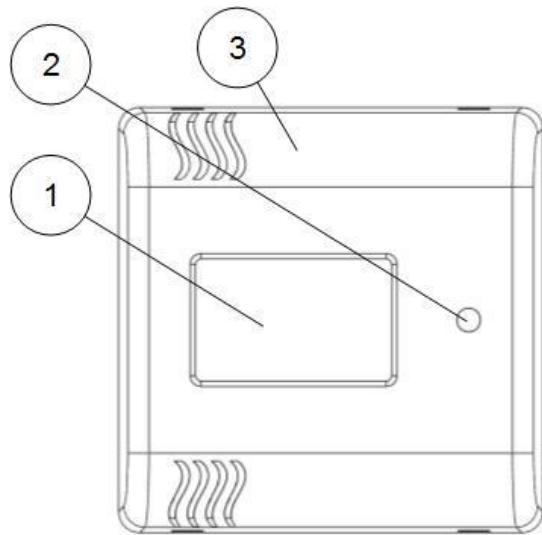
Figure 1: CMa10 front

1. LCD display*
2. Push button (SW2)*
3. NFC antenna

Figure 2: CMa10 back

4. Push button (SW1)
5. M-Bus connector
6. Serial number (secondary address)
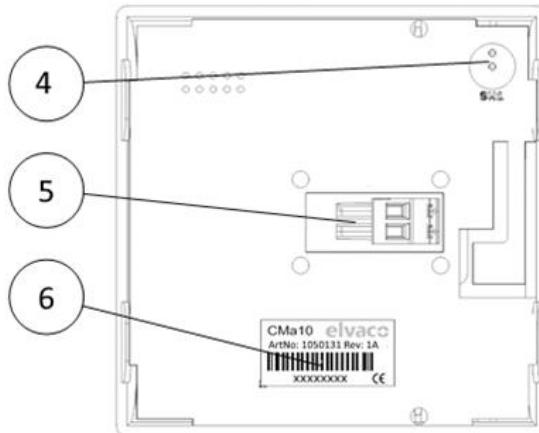
*Only applicable for CMa10

5.3 **Mount the device**

CMa10/CMa11 is mounted on a wall by using the holes on the product rear cover. Avoid using the holes highlighted in Figure 3.
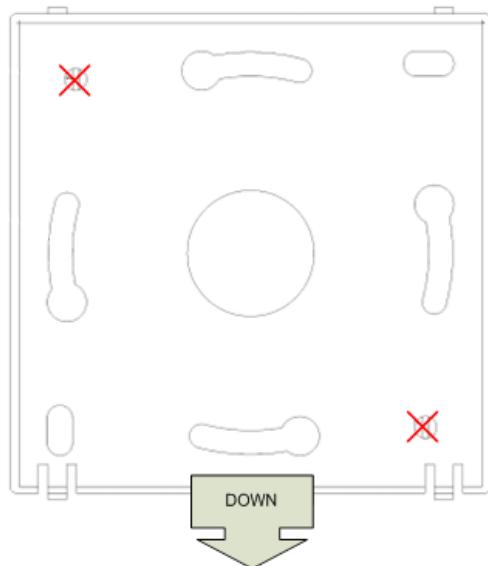
Figure 3: Mounting instructions

⚠	Avoid mounting the product near supplementary heat sources, such as kitchen stoves or in direct sunlight.

⚠	Make sure to mount the product at least 1.5 meters above the floor and at least 1 meter from nearest radiator.

⚠	Do not mount the product on an external wall or near a door. If mounted over a conduit pipe, make sure that the pipe is filled to prevent air flow.

5.4 Demount the device

To demount the sensor, carefully insert the end of a screwdriver in the upper part of one of the enclosure top holes, as illustrated by Figure 4.
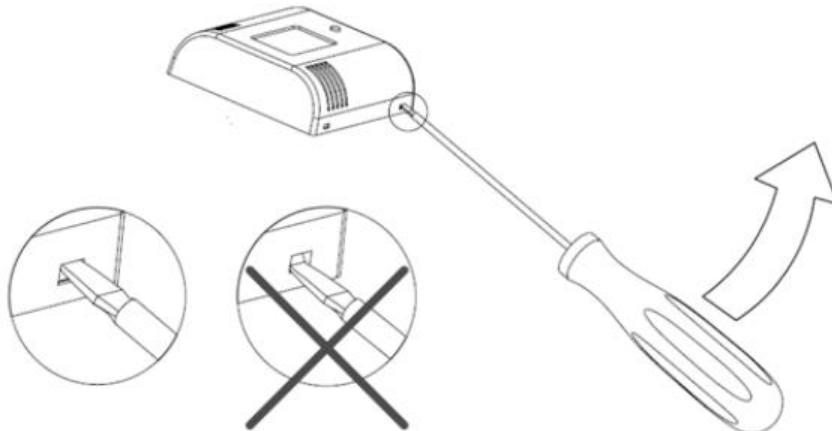
Figure 4: Demounting of CMa10/CMa11

5.5 Connect the device

5.5.1 M-Bus

M-Bus is a multi-drop 2-wire bus, with no polarity. Use a cable with an area of 0.25-1.5 mm^2, e.g. a standard telephone cable (EKKX 2x2x0.25), to connect CMa10/CMa11 to an M-Bus master device.

Remove the rear cover. Slide and hold the M-Bus connector (5) to the left, connect the two wires and slide the terminal back in position.

⚠	Each CMa10/CMa11 sensor must use a unique address (primary or secondary, depending on addressing mode used).

⚠	Make sure to measure voltage level over the M-Bus connector to verify that the M-Bus master has been connected properly. The voltage should be in the range of 21-42 VDC.

5.6 Operation

All configuration parameters are maintained during reboot and power cycling and 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.

5.7 LCD display

CMa10 is equipped with a display with two different modes: standard mode and setup mode. End-users will only have access to the standard mode, which displays current sensor information. The setup mode is entered by using push button SW1 (4) at the back of the product. Through the setup mode, the product can be easily configured.

5.7.1 Standard mode

Push button SW2 (2) is used to display the next page in the standard mode. Through the standard menu, average/maximum/minimum values and messages can be accessed.
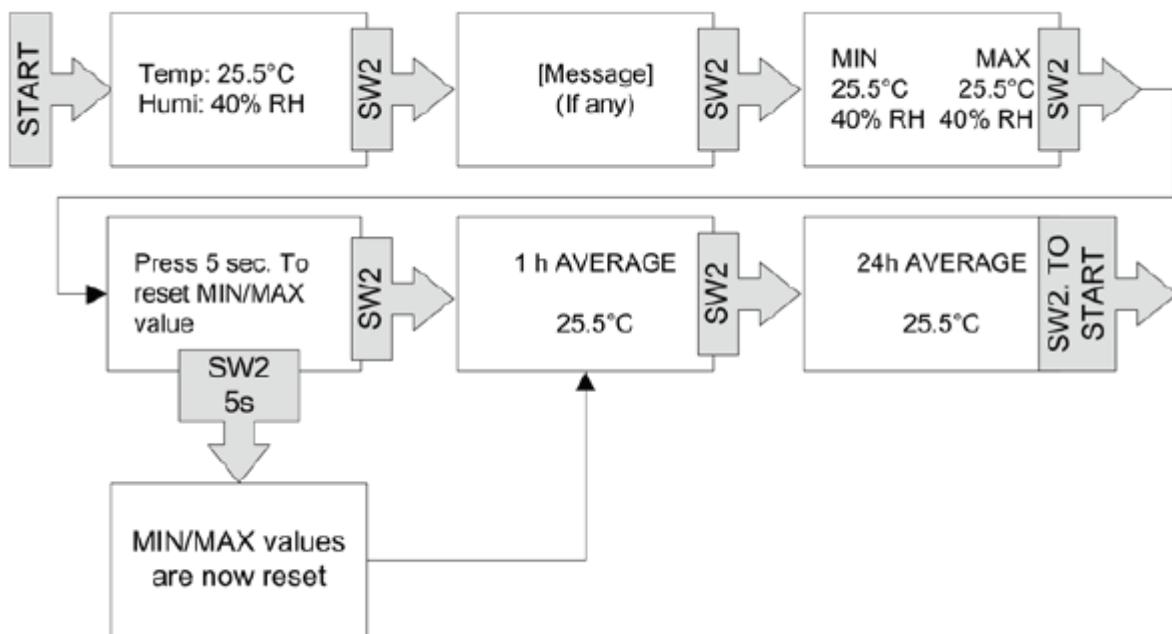
Figure 5: Standard mode

5.7.2 Setup mode

The setup mode is entered by pressing and holding push button SW1 (4) for 5 seconds (when LCD display is off). The next page is displayed by pressing SW1 for 2 seconds. To configure a parameter, press push button SW2 (2). If there are more than one configurable field on a page, push button SW1 (4) is used to switch between the two.
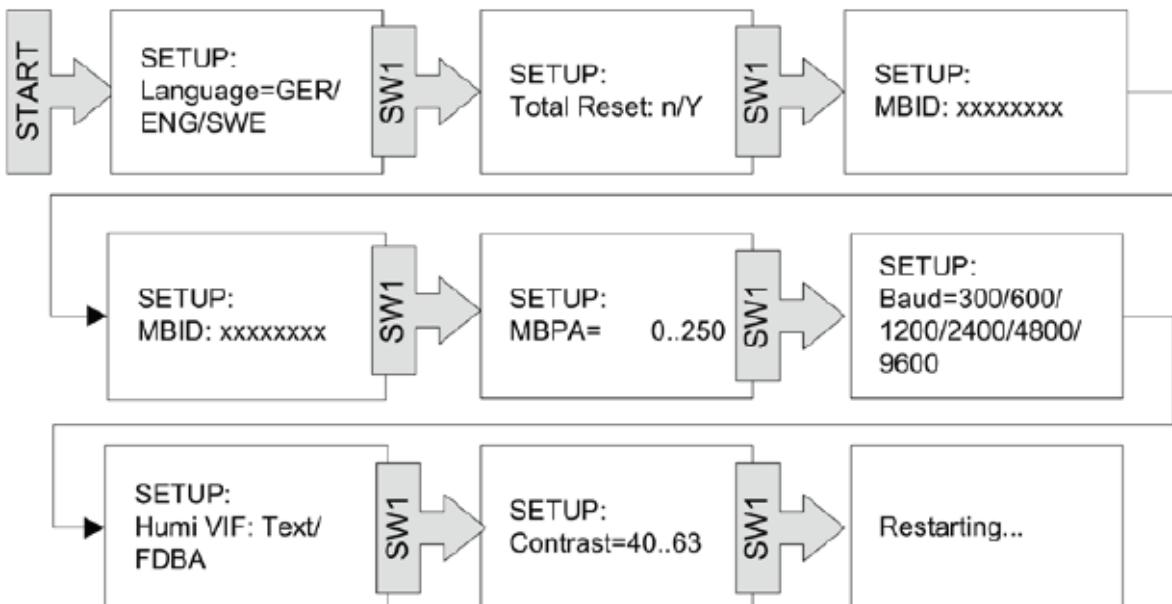
Figure 6: Setup mode

5.7.3 CMa10 flow chart

Standard Menu
Enter next page by pressing SW2

Setup menu
Change values using SW2
Confirm/enter next page by pressing SW1 for 2s.

Temp: 25.5°C
Humi: 40% RH

SW1
5 s

SW2

[Message]
(If any)

SW2

MIN   MAX
25.5°C   25.5°C
40% RH   40% RH

SW2

Press 5 sec. To
reset MIN/MAX
value

SW2
5s

MIN/MAX values
are now reset

SW2

1 h AVERAGE

25.5°C

SW2

24h AVERAGE

25.5°C

SW2

SETUP:
Language=GER/
ENG/SWE

SW1
2s

SETUP:
Total Reset: n/Y

SW1
2s

SETUP:
MBID: xxxxxxxx

SW1
2s

SETUP:
MBPA=   0..250

SW1
2s

SETUP:
Baud=300/600/
1200/2400/4800/
9600

SW1
2s

SETUP:
Humi VIF: Text/
FDBA

SW1
2s

SETUP:
Contrast=40..63

SW1
2s

Restarting...

Figure 7: CMa10 flow chart

5.8 NFC

CMa10/CMa11 has a built-in NFC antenna which can be used to perform readouts from the device via a mobile phone. Place the mobile phone NFC reader next to the device NFC antenna (3). The readout will be performed automatically. The following information will be read:

- Model name
- Firmware version
- Hardware version
- Activation status
- Serial number
- Temperature, current/average over last 24 hours
- Humidity, current/average over last 24 hours
- LCD contrast
- Setup lock status
- SDC status
- SDC data

5.9 Setup lock

When enabling setup lock, the correct encryption key will be needed in order to configure device settings. The following configuration fields and features will be affected (locked) when setup lock is enabled:

- LCD contrast
- Language
- Primary address
- Humidity VIF code
- Baud rate
- Setup lock
- Factory reset
- SDC status

⚠	If setup lock has been enabled, the device cannot be unlocked again.

ℹ	"SDC data" is the only configuration field which can be written to without having access to the encryption key if the device has been locked.

5.10 Factory default

In order to reset CMa10 to factory default settings, enter the setup mode and navigate to "Total Reset". Select "y".

Both CMa10 and CMa11 can be reset to factory default settings via M-Bus commands. See "Application reset" command in Administration reference below for more information.

Table 1 lists the CMa10/CMa11 factory default settings.

M-Bus baud rate	2400 Bit/s
M-Bus primary address	0
M-Bus secondary address	Serial number
LCD-contrast (only CMa10)	52

Table 1: Factory default settings

6 Adminstration reference

6.1 Purpose

This section describes how CMa10/CMa11 is configured via M-Bus. The M-Bus implementation is according to M-Bus standard EN13757.

6.2 M-Bus product identification

The product can be identified using 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.

6.3 M-Bus addressing mode

The product supports both primary and secondary addressing. Addresses can be changed via M-Bus commands, see chapter 6.7.5 and 6.7.6 for more information. Primary address will by default be set to **0** and secondary address to the fabrication number (serial number) of the device.

6.4 M-Bus baud rate

The product supports baud rates of 300 and 2400 bit/s. No auto-baud detection is available. The baud rate can be configured via M-Bus standard commands, see chapter 6.7.3 for more information. Baud rate will be set to **2400** bit/s by default.

6.5 FCB-bit toggling (multi-telegram)

CMa10/CMa11 supports FCB toggling, i.e. multi-telegram mode. The first telegram will contain momentary, min/max and average temperature/humidity values. The second telegram will contain information about the last 24 hours of temperature values.

6.6 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.

6.7 M-Bus commands

This section lists all M-Bus commands that can be used to configure the product.

6.7.1 Initialize product (SND_NKE)

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

Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.7.2 Request user data (REQ_UD2)

This command is used to request data from the product.

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.

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 6th 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 6th 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 hours have 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..77	0xnnnnnnnnnn	Firmware version string in format: Major.Minor.PatchLevel
78	0x1f	End of telegram, more data follows
79	0xnn	Checksum
80	0x16	Stop character

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 bits 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

6.7.3 Set baud rate

This command is used to configure the baud rate of a device.

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

Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.7.4 Application reset

This command can be used to restore the device to factory default settings. For information about these settings, see chapter 5.10.

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

Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.7.5 Set primary address

This command is used to change M-Bus primary address.

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

Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.7.6 Set secondary address

This command is used to change M-Bus secondary address.

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

Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.7.7 Select slave for secondary addressing

This command is used to select slave for further secondary addressing. After successful selection, the slave can be addressed using primary address 253.

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

Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.7.8 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)

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

Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.7.9 Set LCD contrast

The LCD contrast default value will be 52 (0x34). Increasing the value will make the display darker, increasing it will lighten the display. 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 after receiving the 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.

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

Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.7.10 Send/store text message

This command is used to send information to LCD display of a CMa10.

Text formatting

The allowed size of a text message size is 1-210 characters. Each LCD page can display up to 42 characters, divided into 3 lines of 14 characters each.

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 of text 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. It will be displayed until the message is deleted. The message can be deleted either by an M-Bus command (see below) or by user action (push-button).

For normal messages, the LED light of CMa10 will flash until the message has been read. CMa10 also has an invisible message features which can be used to prevent the LED light from reacting upon message receiving. The normal and the invisible message is described below.

Master to slave – normal message

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

Master to slave – invisible message

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	0x07	Elvaco command Send/store text message VIF
9..N	0xnn	Message N = 2-211
N+1	0xnn	Checksum
N+2	0x16	Stop character

Slave to master – normal/invisible message

Byte index	Data	Description
0	0xe5	Acknowledge

6.7.11 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).

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

Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.7.12 Select user display language

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

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 Spanish=0x03 Finnish=0x04 Italian=0x05
10	0xnn	Checksum
11	0x16	Stop character

Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

6.7.13 Select Humidity VIF code

This command will change the relative humidity VIF presentation.

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

Slave to master

Byte index	Data	Description
0	0xe5	Acknowledge

7 Troubleshooting

7.1 Product does not respond to M-Bus master

Please verify that:

- Voltage over M-Bus connector is in the range of 21-42 VDC.

- The product uses a unique primary/secondary address (depending on addressing mode set).

- The product and the M-Bus master uses the same baud rate.

7.2 CMa10 does not display any information

The problem might be a result of the LCD contrast being set too low. The value can be configured by using the M-Bus command "Set LCD contrast" (see user's manual for more information). By performing a factory reset CMa10 will return to its original LCD contrast settings.

7.3 Temperature value is inaccurate

Although the temperature sensor is normally very accurate, an incorrect positioning of the product can sometimes result in unintended temperature variations. When mounting the sensor, please verify that:

- The product is not mounted near any heat or cold sources.

- The product is not mounted in direct sunlight

- The product is not mounted in a spotlight beam

8 Technical specifications

Type	Value	Unit	Comments
Mechanics			
Casing material	ABS UL94-V0	-	White
Protection class	IP30	-	
Dimensions	80 x 80 x 25	mm	
Weight	75	g	
Mounting	Wall-mount	-	
Electrical connections			
Supply voltage	From M-Bus	-	
M-Bus slave port	0.25-1.5	mm^2	Screw terminal
Electrical characteristics			
Nominal voltage	21-42	VDC	
Environmental specifications			
Operating temperature	0-50 (CMa10) -20-55 (CMa11)	°C	
Operating humidity	0 -95	%RH	No condensation
Operating altitude	0-2000	M	
Pollution degree	Degree 2	-	
Usage environment	Indoors		
Storage temperature	-40-85	°C	
Measurement range, temperature	0-50 (CMa10) -20-55 (CMa11)	°C	
Measurement range, humidity	0-100	%RH	
Temperature sensor, margin of error			
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: below -10 °C or above +30 °C	+/- 1.5	°C	
Humidity sensor, margin of error			
Repeatability RH	+/- 0.1	%RH	
Humidity: 10 to 90 %RH	+/- 2	%	
Humidity: below 10 %RH or above 90 %RH	+/- 4	%	
User interface			

Push button SW1	Enter setup mode, next page in setup mode	-	
Push button SW2	Next page in standard mode, edit configurable field in setup mode	-	
LCD display	CMa10: Yes, CMa11: No	-	
Sensor data readout	M-Bus or NFC		
Momentary values	Temperature, humidity, status	-	
Historic values	Average values over last hour/day	-	
Display language	English, Swedish, German, Spanish, Finnish, Italian	-	
M-Bus			
Interfaces	M-Bus slave	-	
M-Bus standard	EN13757	-	
M-Bus slave interface			
M-Bus baud rate	300 and 2400	Bit/s	
Nominal voltage slave port	21-42	VDC	
Power consumption	1/1.5	T/mA	
Addressing modes	Primary, secondary	-	
Default address	0 (primary) and serial number (secondary)	-	

Table 2: Technical data

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 3: Type approvals

10 Document History

10.1 Versions

Version	Date	Description	Author
1.0	2018-05	Initial version	Anton Larsson

Table 4: Document version