



CMa10w, CMa11w G.2
User's Manual
English
v 1.0

Content

1	DOCUMENT NOTES	3
1.1	COPYRIGHT AND TRADEMARK	3
1.2	CONTACTS	3
2	IMPORTANT USAGE AND SAFETY INFORMATION	4
3	USING THIS MANUAL	5
3.1	PURPOSE AND AUDIENCE	5
3.2	ONLINE RESOURCES	5
3.3	SYMBOLS	5
4	INTRODUCTION	6
4.1	APPLICATION DESCRIPTION	6
5	GETTING STARTED	7
5.1	PURPOSE	7
5.2	PRODUCT SPECIFICATION	7
5.3	MOUNT THE DEVICE	7
5.4	DEMOUNT THE DEVICE	8
5.5	CONNECT THE DEVICE	9
5.5.1	<i>Wireless M-Bus</i>	9
5.5.2	<i>Unencrypted mode activation</i>	9
5.5.3	<i>Encrypted mode</i>	9
5.6	LCD DISPLAY	10
5.6.1	<i>Standard mode</i>	10
5.6.2	<i>Setup mode</i>	10
5.6.3	<i>CMa10w flow chart</i>	12
5.6.4	<i>Display symbols</i>	13
5.7	NFC	13
5.8	SETUP LOCK	14
5.9	FACTORY DEFAULT	14
6	ADMINISTRATION REFERENCE	15
6.1	PURPOSE	15
6.2	M-BUS PRODUCT IDENTIFICATION	15
6.3	WIRELESS M-BUS MODE	15
6.4	ADDRESSING	15
6.5	OPERATION MODE	15
6.6	TRANSMISSIONS	15
7	TROUBLESHOOTING	19
7.1	THE MASTER DOES NOT RECEIVE ANY TELEGRAM FROM THE SENSOR	19
7.2	CMa10w DOES NOT DISPLAY ANY INFORMATION	19
7.3	TEMPERATURE VALUE IS INACCURATE	19
8	TECHNICAL SPECIFICATIONS	20
9	TYPE APPROVALS	22
10	DOCUMENT HISTORY	23
10.1	VERSIONS	23

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 CMa10w/CMa11w 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.

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CMa10w/CMa11w is a trademark of Elvaco AB, Sweden.

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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 CMa10w/CMa11w 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 CMa10w/CMa11w is installed and used. They contain important information about how the product is used properly.

The installation of CMa10w/CMa11w 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.

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 CMa10w/CMa11w Wireless M-Bus indoor temperature and humidity sensor. It targets 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 CMa10w/CMa11w is a 1-way wireless M-Bus temperature and humidity sensor for indoor use. The sensor offers high accuracy, user-friendliness and a long battery-life (up to 12 years), which makes it the optimal choice for tenant owners. Readout and configuration are easily performed via the LCD display (CMa10w) or by using a mobile phone (via NFC).

CMa10w 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 CMa10w/CMa11w. After reading and carefully following each step of this chapter, the sensor will be installed and operational.

5.2 Product specification

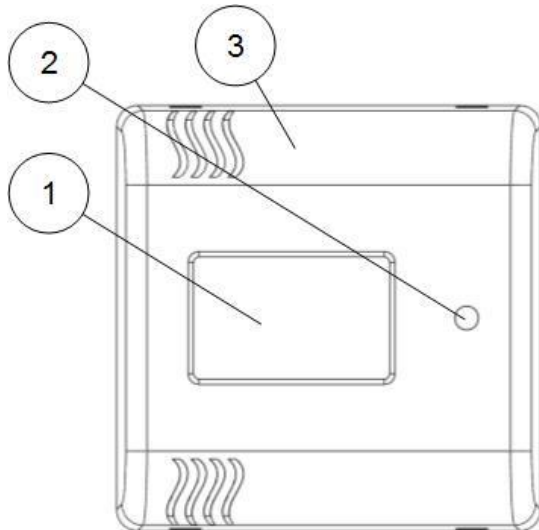


Figure 1: CMa10w front

4. LED light
5. Push button (SW1)
6. Serial number (secondary address)

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

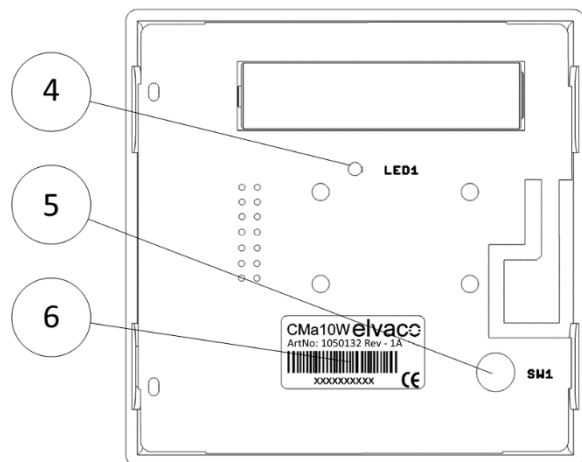


Figure 2: CMa10w back

*Only applicable for CMa10w

5.3 Mount the device

CMa10w/CMa11w is mounted on a wall by using the holes on the product back cover. Avoid using the holes highlighted in Figure 3.

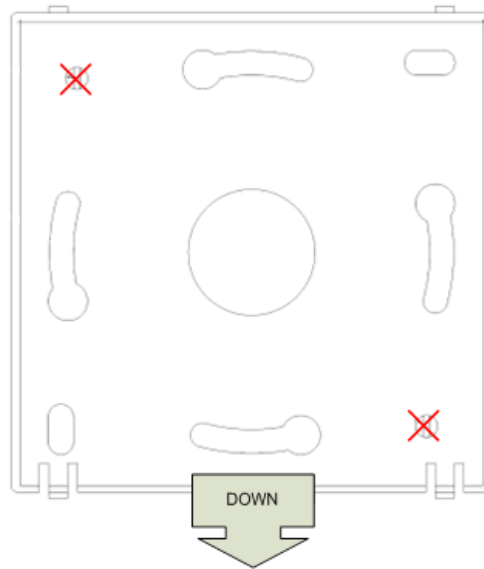


Figure 3: Mounting instructions



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.

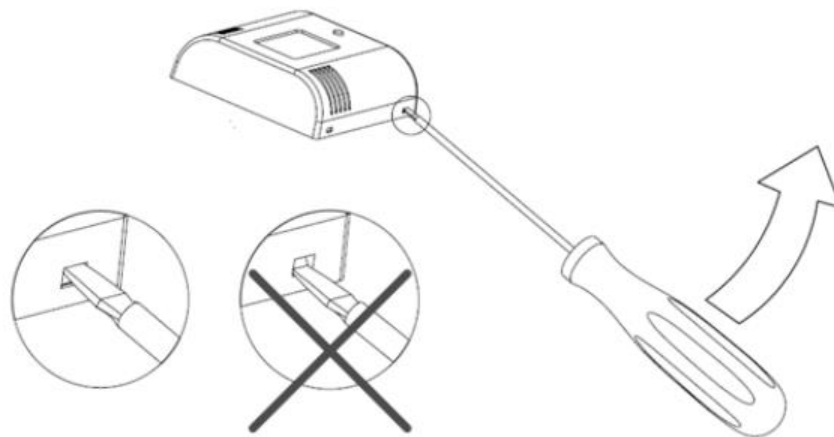


Figure 4: Demounting of CMa10w/CMa11w

5.5 Connect the device

5.5.1 Wireless M-Bus

CMa10w/CMa11w is delivered in inactive mode in order to conserve battery life. The product needs to be activated to start transmitting data. CMa10w/CMa11w can be activated in unencrypted mode (all data is transmitted unencrypted) or encrypted mode (all data is transmitted encrypted).



Make sure to verify that the device has been activated by pushing SW1. If the product has been activated in encrypted mode, the LED light (4) will flash five times. If activated in unencrypted mode, it will flash once.

5.5.2 Unencrypted mode activation

To activate CMa10w/CMa11w in unencrypted mode:

1. Press and hold push button SW1 (5) for 6-10 seconds until the LED lights (4) starts to flash quickly.
2. Release push button SW1.
3. The product will transmit unencrypted wireless M-Bus telegrams (SND_NR) in T1 mode once every 6th minute.

5.5.3 Encrypted mode

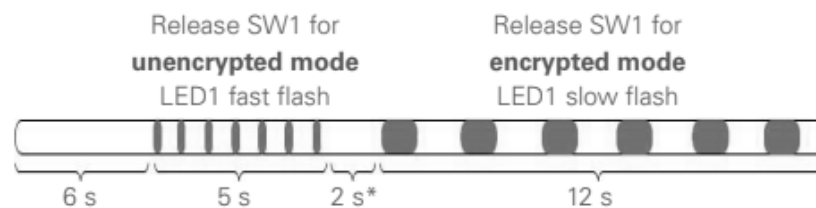
To activate CMa10w/CMa11w in encrypted mode:

1. Press and hold SW1 (5) for at least 13 seconds until the LED light (4) starts to flash slowly.
2. Release push button SW1.
3. The product will transmit encrypted wireless M-Bus telegrams (SND_NR) in T1 mode once every 6th minute.

Data is encrypted with a 128-bit AES algorithm.



Note that the encryption key must be known to the receiving system in order to decrypt incoming data. The 128-bit AES key can be provided by Elvaco on demand.



*** If the button is released in this mode, the CMa10w/CMa11w will return to inactive mode. This also applies if the button is pressed down for longer than 25 seconds.**

Figure 5: Encrypted/unencrypted mode activation

5.6 LCD display

CMa10w 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 (5) at the back of the product. Through the setup mode, the product can be easily configured.

5.6.1 Standard mode

Push button SW2 (2) is used to display the next page in the standard mode. Through the standard menu, information about average, maximum and minimum values, as well as messages, can be accessed.

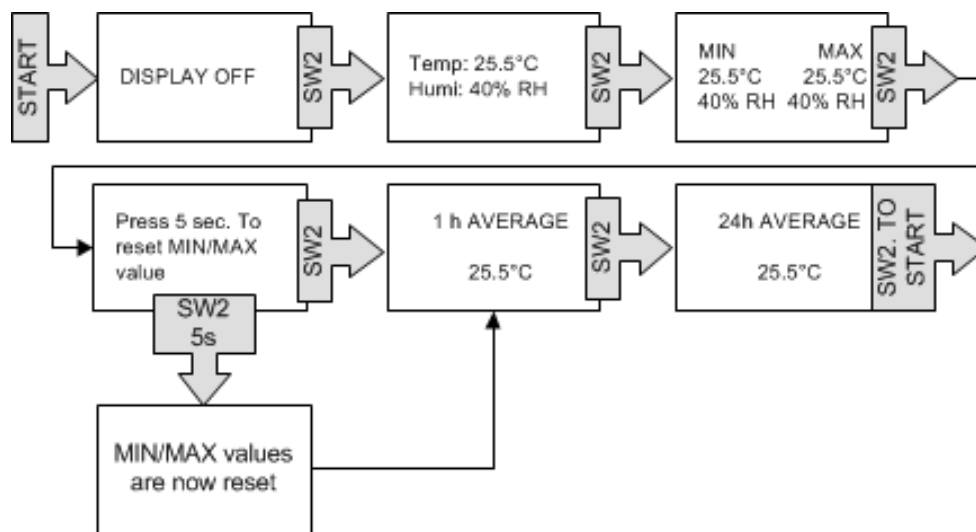


Figure 6: Standard mode

5.6.2 Setup mode

The setup mode is entered by pressing and holding push button SW1 (5) 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) for 2 seconds. If there are more than one configurable field on a page, push button SW1 (5) is used to switch between the fields.

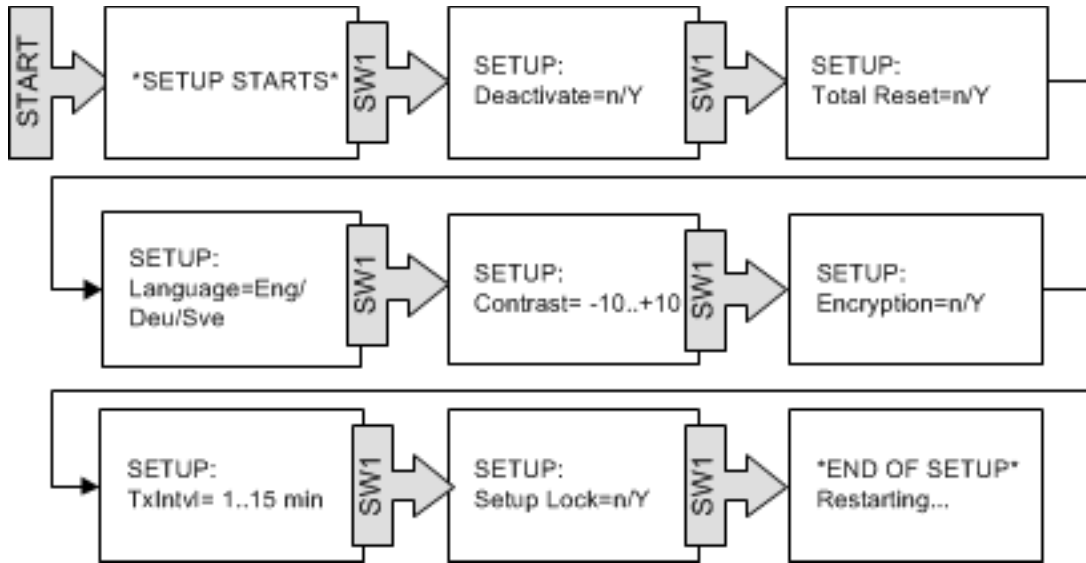


Figure 7: Setup mode

5.6.3 CMa10w flow chart

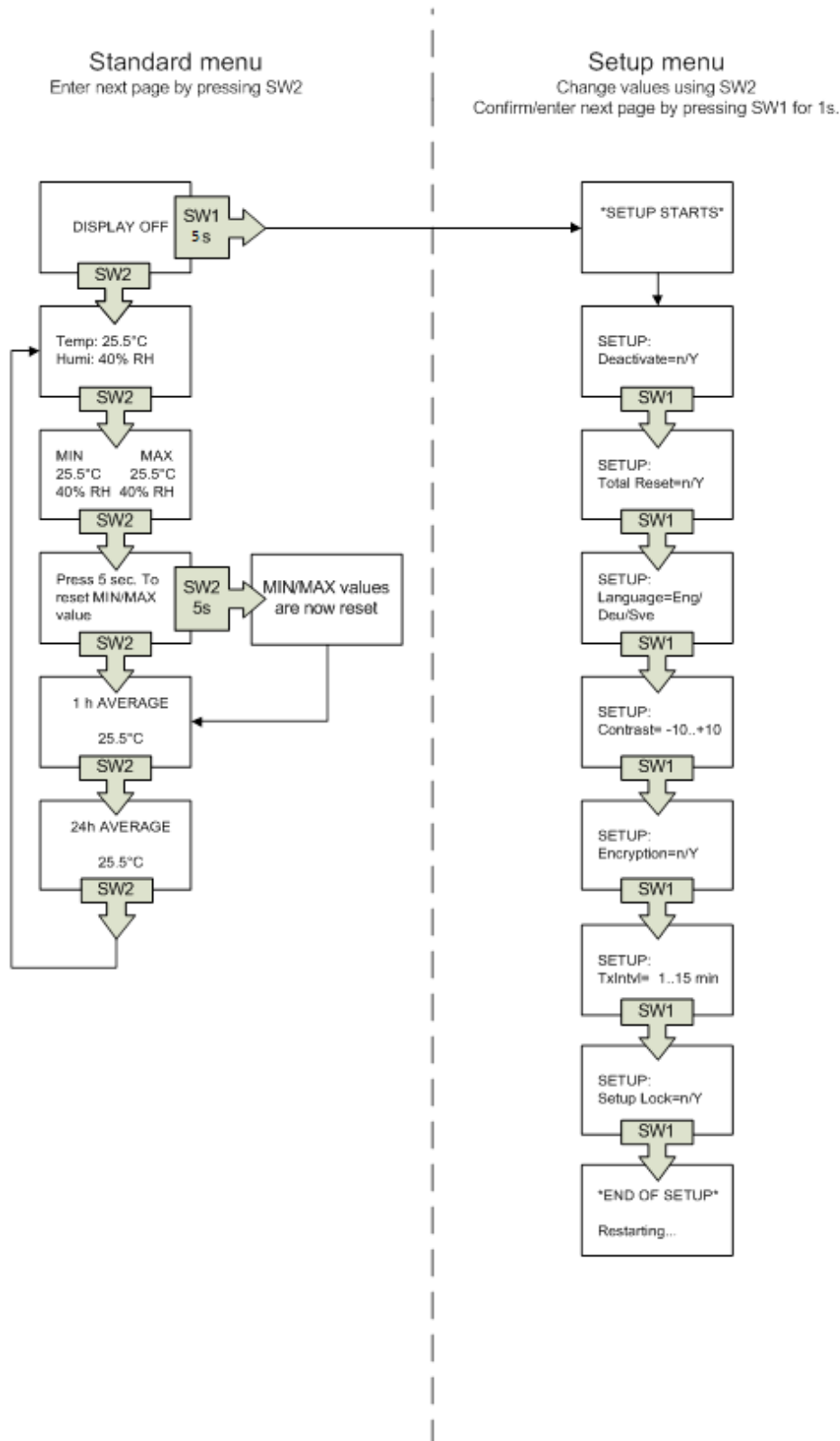



Figure 8: CMa10w flow chart

5.6.4 Display symbols

The CMa10w display uses two symbols to help illustrate encryption mode and battery level.





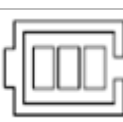
Encryption mode

This symbol is used to illustrate if the device is currently running in encrypted or unencrypted mode. If the key symbol is present on the display, all communication will be encrypted. If it is not, all communication will be unencrypted.

Symbol	Description
	All messages are encrypted by a AES 128-bit algorithm.

Battery level indicator

The battery level indicator is used to illustrate the current battery level. Make sure to exchange the product if the battery level indicator is flashing.

Symbol	Description
	Battery has full capacity.
	Battery level is at medium.
	Battery level is low.
	Battery is almost empty.
 Flashing	Battery level is critically low, and the product will stop working within 12 months.

5.7 NFC

CMa10w/CMa11w 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
- Encryption mode
- Transmit interval
- Wireless M-Bus mode
- SDC status
- SDC data
- Setup lock status

5.8 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
- Encryption status
- Transmit interval
- Setup lock
- Factory reset
- Send telegram
- SDC status



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



“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.

5.9 Factory default

In order to reset CMa10w to factory default settings, enter the setup mode and navigate to “Total Reset”. Select “y”.

CMa10w and CMa11w can both 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 CMa10w/CMa11w factory default settings.

Language	ENG
Transmit interval	Every 6th minute
Encryption mode	Unencrypted
LCD contrast	0
Setup lock	Off

Table 1: Factory default settings

6 Administration reference

6.1 Purpose

This section describes how CMa10w/CMa11w is administrated. The wireless M-Bus implementation is according to M-Bus standard EN13757-2, EN13757-3, EN13757-4 and the OMS specification.

6.2 M-Bus product identification

The product can be identified using the following information:

- Manufacturer string = ELV
- Medium = 0x1B (Room sensor)
- Generation = 01-09 (CMa10w), 10-19 (CMa11w)

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 Wireless M-Bus mode

The product uses wireless M-Bus mode T1, which means that it sends spontaneous data in one direction, from sensor to collector device.

6.4 Addressing

The device address is globally unique and is set during manufacturing.

6.5 Operation mode

The product supports two different encryption modes, unencrypted and encrypted mode. In encrypted mode, OMS encryption mode 5 is used along with an AES 128-bit key. In unencrypted mode, no data will be encrypted.

6.6 Transmissions

The product will automatically begin to transmit data after the activation has been completed. By default, a SND_NR telegram will be transmitted every 6th minute. The transmission interval is configurable in the setup menu of CMa10w. The table lists all the data included in the telegram (SND_NR).

Slave to master

Byte index	Data	Description
0	0xnn	L-Field
1	0x44	C-Field: SND_NR
2..3	0x9615	Manufacturer "ELV"
4..7	0xn timer	Identification number
8	0xnn	Version field
9	0x1B	Device type (Medium) = Room sensor
10..11	0xn timer	CRC-field
12	0x7A	CI-Field (Short header)

13	0xnn	Access number
14	0xnn	Status
15..16	0xnxxx	Configuration word
17..18	0x2f2f	AES check (idle filler)
19	0x02	Instantaneous temperature DIF
20	0x65	Instantaneous temperature VIF, external temperature
21..22	0xnxxx	Instantaneous temperature x 100 In case of error the temperature will be set to 0.
23	0x42 0x72	1-hour temperature rolling average DIF, storage number 1 0x42 = The value is available 0x72 = The value is not yet calculated
24	0x65	1-hour temperature rolling average VIF, external temperature
25..26	0xnxxx	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.
27	0x82 0xb2	24-hour temperature rolling average DIF, storage number 2 0x82 = The value is available 0xb2 = The value is not yet calculated
28	0x01	24-hour temperature rolling average DIFE
29	0x65	24-hour temperature rolling average VIF, external temperature
30..31	0xnxxx	24-hour temperature rolling average x 100 This value is unavailable (0) until 24 hours 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.
32	0x22	1-hour minimum temperature DIF
33	0x65	1-hour minimum temperature VIF, external temperature
34..35	0xnxxx	1-hour minimum temperature x 100 In case of error the temperature will be set to 0. This is the lowest instantaneous temperature since last 1-hour period.
36	0x12	1-hour maximum temperature DIF
37	0x65	1-hour maximum temperature VIF, external temperature
38..39	0xnxxx	1-hour maximum temperature x 100 In case of error the temperature will be set to 0. This is the highest instantaneous temperature since last 1-hour period.
40	0x62	24-hour minimum temperature DIF
41	0x65	24-hour minimum temperature VIF, external temperature
42..43	0xnxxx	24-hour minimum temperature x 100 In case of error the temperature will be set to 0. This is the lowest instantaneous temperature since last 24-hour period.
44	0x52	24-hour maximum temperature DIF
45	0x65	24-hour maximum temperature VIF, external temperature
46..47	0xnxxx	24-hour maximum temperature x 100 In case of error the temperature will be set to 0. This is the highest instantaneous temperature since last 24-hour period.
48	0x02	Instantaneous relative humidity DIF
49	0xfb	Instantaneous relative humidity VIF, extension table FB
50	0x1a	Instantaneous relative humidity VIFE

51..52	0xnxxx	Instantaneous relative humidity x 10 In case of error the relative humidity will be set to 0.
53	0x42 0x72	1-hour humidity rolling average DIF, storage number 1 0x42 = The value is available 0x72 = The value is not yet calculated
54	0xfb	1-hour relative humidity VIF, extension table FB
55	0x1a	1-hour relative humidity VIFE
56..57	0xnxxx	1-hour relative humidity x 10 In case of error the relative humidity will be set to 0.
58	0x82 0xb2	24-hour humidity rolling average DIF, storage number 2 0x82 = The value is available 0xb2 = The value is not yet calculated
59	0x01	24-hour humidity rolling average DIFE
60	0xfb	24-hour relative humidity VIF, extension table FB
61	0x1a	24-hour relative humidity VIFE
62..63	0xnxxx	24-hour relative humidity x 10 In case of error the relative humidity will be set to 0.
64	0x22	1-hour minimum relative humidity DIF
65	0xfb	1-hour minimum relative humidity VIF, extension table FB
66	0x1a	1-hour minimum relative humidity VIFE

7 Troubleshooting

7.1 The master does not receive any telegram from the sensor

Please verify that:

- The sensor has been activated.
- The master is connected to a power source and is correctly configured.
- The master is within range of the radio signal.
- The master antenna is properly mounted for ideal performance.
- The sensor is not mounted inside a metallic cabinet.
- The sensor is not disturbed by other radio equipment.

7.2 CMa10w does not display any information

Please verify that:

- The sensor has been activated.
- The contrast of the LCD display is not set too low.
- There is still battery life left in the sensor. The serial number informs about when the product was manufactured. The sensor has a battery life span of up to 12 years (depending on usage).

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 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 (w x h x d)	80 x 80 x 25	mm	
Weight	75	g	
Mounting	Wall-mount	-	
Electrical connections			
Supply voltage	Battery	-	Life span 12 years
Environmental specifications			
Operating temperature	0-50 (CMa10w) -20-55 (CMa11w)	°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 (CMa10w) -20-55 (CMa11w)	°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	%RH	
Humidity: below 10 %RH or above 90 %RH	+/- 4	%RH	
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	CMa10w: Yes, CMa11w: No	-	
Sensor data readout	Wireless 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	EN13757-4	-	Communication by T1
M-Bus slave interface			
Frequency, wireless M-Bus	868.95	MHz	
Transmit power	10	mW	
Transmit interval	6	min	
Encryption	Yes	-	
Wireless M-Bus modes	T1	-	
Sensitivity	-104	dBm	

Table 2: Technical data

9 Type approvals

CMa10w/CMa11w 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