CMeX10S-13S User Manual

DIN-mounted M-Bus master for 32-256 M-Bus unit loads

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 CMeX10 Series 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

CMeX10 Series is a trademark of Elvaco AB, Sweden.

1.2 Contacts

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2 Using this manual

2.1 Purpose and Audience

This manual provides information needed to mount, configure and use the CMeX10 Series product. It is intended for field engineers and developers.

2.2 Models

CMeX10, CMeX11, CMeX10S, CMeX11S, CMeX12S, CMeX13S

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
CMeX10	M-Bus master for up to 32 M-Bus slaves with IR-interface
CMeX11	M-Bus master for up to 64 M-Bus slaves with IR-interface
CMeX10S	M-Bus master for up to 32 M-Bus slaves with IR-interface and RS232 interface
CMeX11S	M-Bus master for up to 64 M-Bus slaves with IR-interface and RS232 interface
CMeX12S	M-Bus master for up to 128 M-Bus slaves with IR-interface and RS232 interface
CMeX13S	M-Bus master for up to 256 M-Bus slaves with IR-interface and RS232 interface

Table 1 Product configuration

3.2 Capabilities

The CMeX10 Series makes it possible to expand your CMe Series with up to 256 extra M-Bus slaves. The CMeX10 Series features standard M-Bus over IR communication and is equipped with the unique IR Pass Through function, making the product series stackable. The modular and expandable design allows the customer to select a suitable level based on price and functionality.

The CMeX10S, CMeX11S, CMeX12S and CMeX13S also add the RS232 interface to use with any standard RS232 communicating device.

3.3 Applications

The CMeX10 Series fits into almost any kind of meter collection system. For example:

- With CMe Series to expand your M-Bus master to handle up to 256 M-Bus slaves
- Standalone M-Bus master from RS232 to M-Bus 2-wire
- Split M-Bus 2-wire bus between two M-Bus masters with galvanic isolation using the IR- Pass Through

3.4 Overview CMeX10, CMeX11

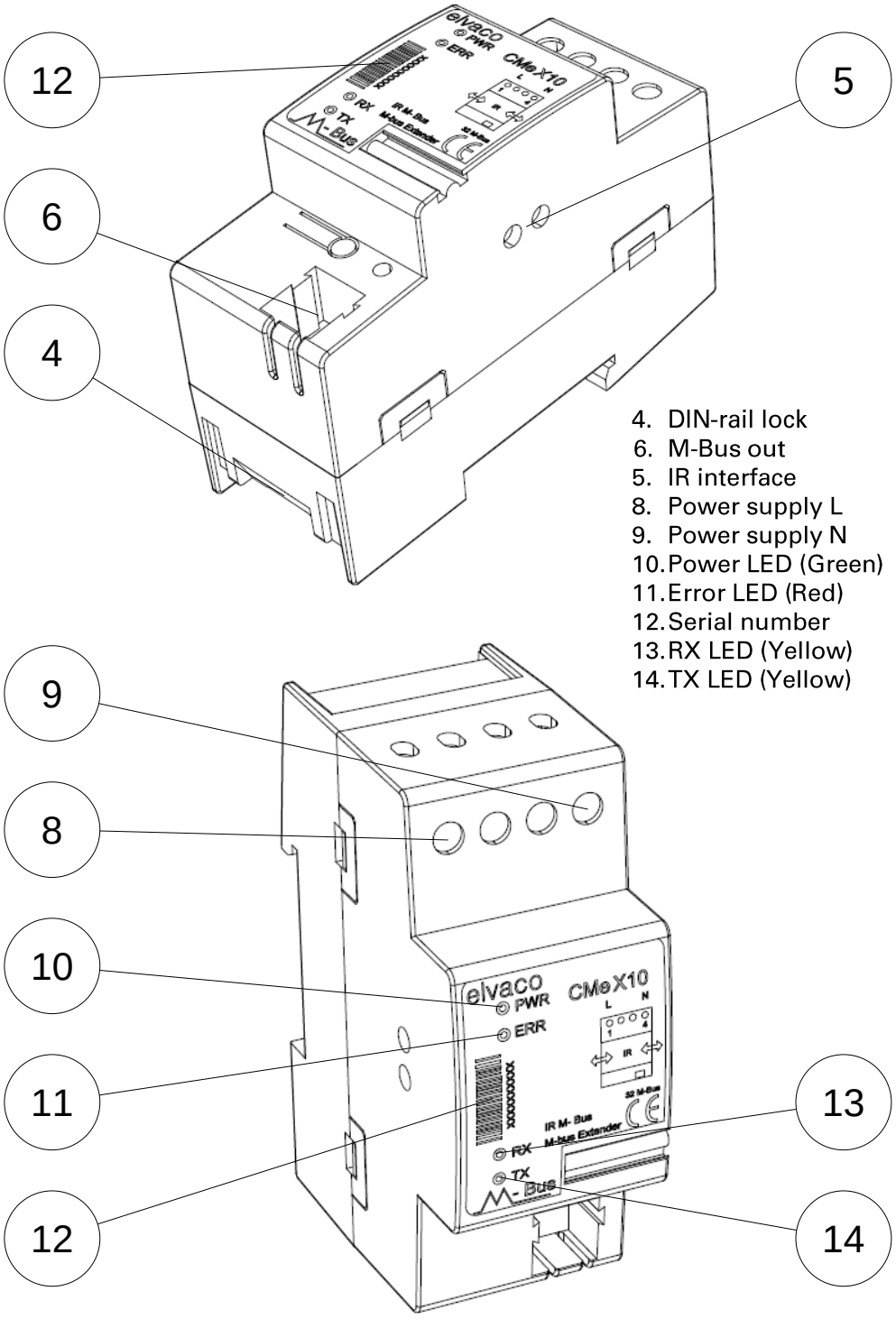
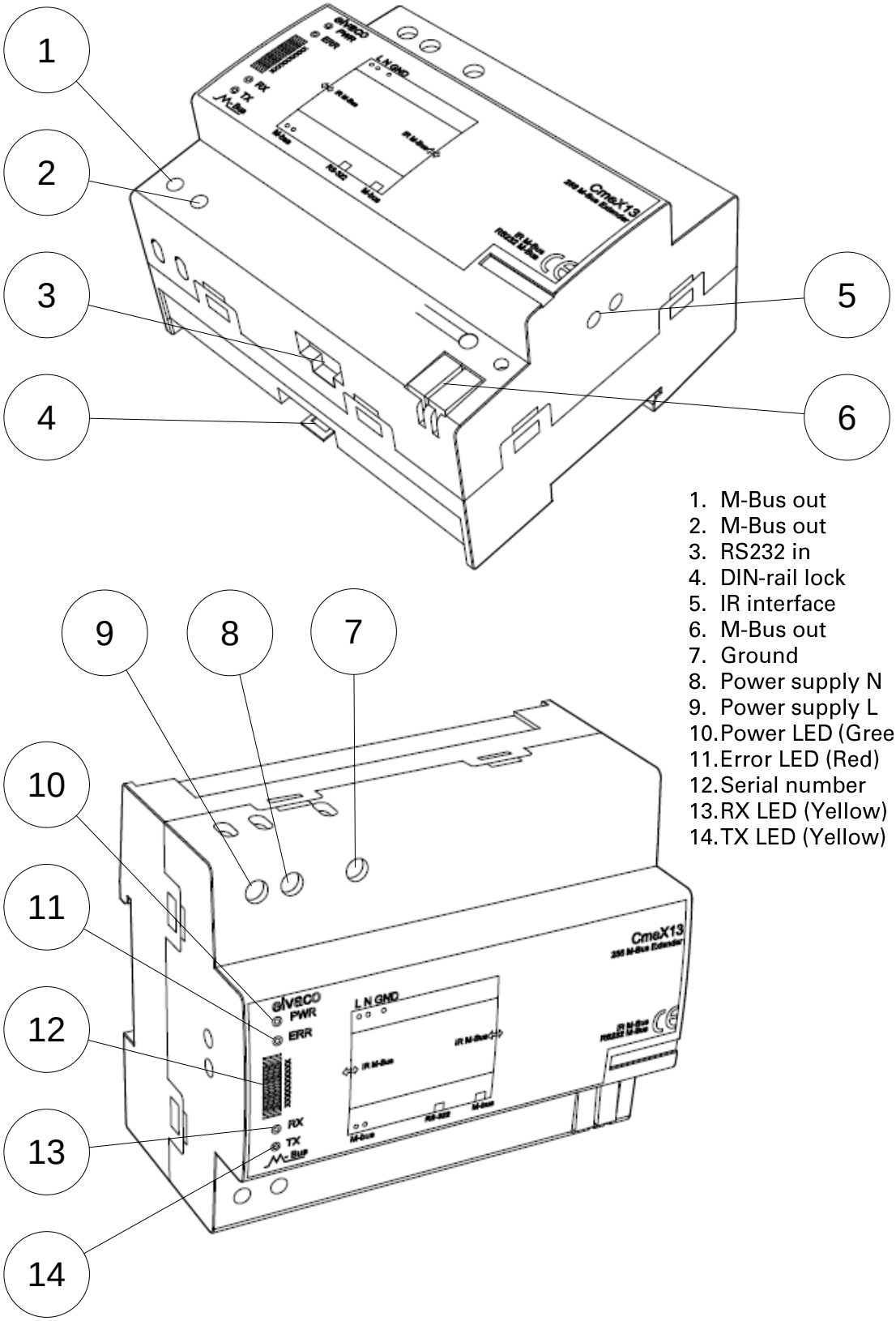


Figure 1 CMeX10, CMeX11 Overview

3.5 Overview CMeX10S, CMeX11S, CMeX12S, CMeX13S



1. M-Bus out
2. M-Bus out
3. RS232 in
4. DIN-rail lock
5. IR interface
6. M-Bus out
7. Ground
8. Power supply N
9. Power supply L
10. Power LED (Green)
11. Error LED (Red)
12. Serial number
13. RX LED (Yellow)
14. TX LED (Yellow)

Figure 2 CMeX10S, CMeX11S, CMeX12S, CMeX13S Overview

4 Physical Installation

This chapter covers the physical installation of the CMeX10 Series.

4.1 Mounting

The product should be mounted on a DIN-rail. The DIN-lock (4) on the bottom is used to mount and demount the unit from the DIN-rail. To fully comply with safety regulations, a DIN-rail enclosure must cover the terminals.

4.1.1 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). Connect the wiring to the screw connector (1, 2) or the push wire connector (6). Do not exceed the maximum cable length of 1000 (CMeX10, CMeX11) or 5000 meters (CMeX10S, CMeX11S, CMeX12S, CMeX13S).

⚠ **IMPORTANT**

Please take the following in consideration:

- CMeX10 Series handles from 32 up to 256 slaves, be sure to use the correct model in your application. Overloading the bus will turn the ERR LED on and turn off the M-Bus bus.
- All connected M-Bus slave devices must have unique primary or secondary M-Bus addresses depending on addressing mode used.

4.1.2 IR Interface with ABB electricity meters or CMeX series modules

If the IR interface is to be used beside an ABB electricity meter or other CMeX module, the IR shield (5) should be removed. The CMeX10 Series should be mounted on the left side of the ABB electricity meter. There shall be no space between the CMeX10 Series product and the ABB electricity meters or other CMeX module. (Do not remove the shield if not used beside an ABB electricity meter or CMeX module.)

4.1.3 RS232 interface

Use the RS232 interface to use the CMeX10S, CMeX11S, CMeX12S and CMeX13S as an M-Bus master from RS232 to M-Bus 2-wire interface. Connect the RS232 interface to the RJ45 connector (3).

4.1.4 Power supply

The installation should be performed by a qualified electrician or an installer with the required knowledge. The power supply should be connected via a switch so the unit can be switched off during service work. The main supply should be connected to screw terminal (8) and screw terminal (9). Main supply voltage should be in the range of 100-240 VAC, 50/60 Hz. If ground signal is available, connect to ⏚ screw terminal (7).

5 Application description

This chapter covers general application description of the product.

5.1.1 Power on

When powered on, the CMeX10 Series product has an internal boot time before the product can be used. The boot time depends on the numbers of M-Bus slaves connected to the bus. The maximum boot time is approximately 10 seconds. During boot the ERR LED (red) is permanently on.

5.1.2 Normal operation/Idle

In normal operation, ERR LED (red) is off and PWR LED (green) is on. During normal communication, TX LED will flash when communication takes place from the DTE to the M-Bus 2-wire bus, and vice versa on the RX LED when M-Bus slave devices transmitting data back to the DTE.

5.1.3 Light collision detect (25 mA to 500 mA)

When the product detects a light slave collision, i.e. during secondary addressing, the product will send a break signal of 45 ms on the M-Bus 2-wire bus and to the right IR interface. The product will also send a break signal (45 ms), garbage characters (200 ms) and a break signal (45 ms) again to the DTE (left IR interface and RS232 interface). This procedure makes it possible to detect slave collisions in the DTE even if the used bearer does not support break signalling, i.e. TCP/IP communication.

5.1.4 Heavy collision detect and short circuit (>500 mA)

When the product detects a heavy collision, i.e. during secondary addressing or short circuit of the bus, the product will turn off the bus for 0.5 seconds. The product will also send a break signal of 45 ms to the right IR interface and a break signal (45 ms), garbage characters (200 ms) and a break signal (45 ms) again to the DTE (left IR interface and RS232 interface).

5.1.5 High idle current

When the M-Bus 2-wire bus is in idle state and the idle current is too high (depending on CMeX10 Series model), the product will turn off the M-Bus 2-wire interface and restart. The ERR LED (red) will be permanently on during this state. This procedure will continue until the idle current is within acceptable level for the CMeX10 Series model.

5.1.6 LED indications

5.1.6.1 PWR LED (green)

PWR LED (green) indicates mains supply.

Mode	Description	Visual
Permanently on	Mains power connected	
Permanently off	No mains power connected	

Table 2 PWR LED

5.1.6.2 ERR LED (red)

ERR LED (red) indicates M-Bus 2-wire bus status.

Mode	Description	Visual
Permanently on	Short circuit of the M-Bus 2-wire bus	
Permanently off	Normal mode, Idle	
Short flash every second	No M-Bus slaves connected	
Flashing for 1 second	M-Bus slave collision	

Table 3 ERR LED

5.1.6.3 RX LED (yellow)

RX LED (yellow) indicates communication from M-Bus slave to DTE.

Mode	Description	Visual
On/Flashing	M-Bus slave is transmitting data	
Off	M-Bus slave is not transmitting data.	

Table 4 RX LED

5.1.6.4 TX LED (yellow)

TX LED (yellow) indicates communication from DTE to M-Bus slaves.

Mode	Description	Visual
On/Flashing	DTE is transmitting data	
Off	DTE is not transmitting data	

Table 5 TX LED

6 Troubleshooting

6.1 All LEDs are permanently off

There is a problem with the supply voltage. Please verify 100-240 VAC. If the problem persists, the product may be malfunctioning.

6.2 Red LED is permanently on

This indicates an error on the M-Bus 2-wire bus.

Please verify no short-circuit of the M-Bus bus. The voltage of the bus should be between 21 VDC and 42 VDC.

6.3 Cannot read connected M-Bus slaves

Please verify M-Bus status:

- Voltage over M-Bus slave device should be between 21 VDC and 42 VDC
- All M-Bus slave devices must have unique secondary or primary M-Bus addresses depending on addressing mode
- M-Bus slave device baud rates

6.4 TX LED is permanently on

When CMeX10 Series is stacked with other CMeX10 Series products and there is a short circuit on a product which is mounted on the left side of the issued product, the TX LED may be permanently on. Verify left side mounted products for no short circuit.

If you still have problems getting your CMeX10 Series running, please contact Elvaco support, see contact information section 1.2.

7 Technical specifications

7.1 Characteristics

Type	Value	Unit	Comments
Mechanics			
Casing material	Polyamide	-	
Protection class	IP20	-	
Dimensions (w x h x d)	CMeX10, CMeX11: 36 x 90 x 65 CMeX10S, CMeX11S, CMeX12S, CMeX13S: 108 x 90 x 65	mm	CMeX10,CMeX11: 3 modules wide CMeX10S, CMeX11S, CMeX12S, CMeX13S 7 modules wide
Weight	CMeX10, CMeX11: 100 CMeX10S, CMeX11S, CMeX12S, CMeX13S: 220	g	
Connection M-Bus	CMeX10, CMeX11: Pin terminal CMeX10S, CMeX11S, CMeX12S, CMeX13S: Pin terminal and screw terminal	-	Pin terminal: Solid wire 0.6-0.8 Ø mm Screw terminal: Cable 0-2.5 mm^2, 0.5 Nm tightening torque
Mounting	DIN-mounted	-	
Power supply	Screw terminal	-	Cable 0.75-2.5 mm^2, 0.5 Nm tightening torque
Electrical			
Nominal voltage	100-240	VAC	
Voltage range	-10 to +10	%	Of nominal voltage
Frequency	50/60	Hz	

Power consumption (max)	CMeX10, CMeX11: 6 CMeX10S, CMeX11S, CMeX12S, CMeX13S: 25	W	
Power consumption (nom)	CMeX10: 3,5 CMeX11: 6 CMeX10S, CMeX11S, CMeX12S, CMeX13S: 0,07 W x number of M-Bus slaves + 1,5 W	W	
Power consumption M-Bus (max)	CMeX10: 50 CMeX11: 100	mA	
Installation category	CAT 3	-	
Environmental			
Operating temperature range	-30 to +55	°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	m	
Usage	Indoor use only		Can be extended with IP67 enclosure for outdoor use
User interface			
Green LED	Power	-	
Red LED	Error	-	
Yellow LED	RX	-	
Yellow LED	TX	-	
Push button	-	-	Not used
M-Bus			
M-Bus standard	EN 13757	-	
M-Bus baud rate	300, 2400	Bit/s	
Maximum connected M-Bus slaves	32-256	-	CMeX10: 32 M-Bus slaves CMeX11: 64 M-Bus slaves CMeX10S: 32 M-Bus slaves CMeX11S: 64 M-Bus slaves

			CMeX12S: 128 M-Bus slaves CMeX13S: 256 M-Bus slaves
Maximum cable length	CMeX10, CMeX11: 1000 CMeX10S, CMeX11S, CMeX12S, CMeX13S: 5000	m	
Maximum load capacitance	1.5	uF	
Light collision detect	>28 to 500	mA	
Heavy collision detect and short circuit	>500	mA	
RS232 to M-Bus	CMeX10, CMeX11: No CMeX10S, CMeX11S, CMeX12S, CMeX13S: Yes	-	
Break signal length M-Bus 2-wire and right IR interface	45	ms	
Break signal RS232 interface and left IR interface	-	-	45 ms break + garbage 200ms 45 ms break. This method is used for garbage generation when using other bearer than RS232, i.e. TCP/IP.
Nominal voltage	CMeX10, CMeX11: 28 CMeX10S, CMeX11S, CMeX12S, CMeX13S: 42	VDC	
Maximum idle current	CMeX10: 55 CMeX11: 100 CMeX10S: 55 CMeX11S: 100 CMeX12S: 200 CMeX13S: 400	mA	
IR interface	Yes	-	

Pass Through	Yes	-	Maximum of 4 CMeX10 Series products side by side
Compatibility	All standard M-Bus meters, all ABB meters with IR interface, CMeX Series products	-	

Table 6 Technical specifications

8 Type approvals

CMeX10 Series 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 3

Table 7 Type approvals

9 Safety and environment

9.1 Safety precautions

The following safety precautions must be observed during all phases of the operation, usage, service or repair of any CMeX10 Series 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 CMeX10 Series is installed and used. They contain important information about how the product is used properly.

The installation of CMeX10 Series 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.

The symbol indicates that the product belongs to insulation class II and no protective earth is necessary. The product is equipped with double insulation.

10 Document History

Version	Date	Description	Author
1.0	2010-01-25	First release	David Vonasek
2.0	2010-11-23	Updated text and technical specifications	Ericha Bloom
3.0	2011-09-23	Updated with CMeX10S, CMeX11S, CMeX12S and CMeX13S.	Ericha Bloom
4.0	2013-09-19	Updated technical specifications	Ericha Bloom
	2014-06-13	Updated section 4.1.4 and technical specifications	Ericha Bloom

10.1 Document software and hardware appliance

10.1.1 CMeX10

Type	Version	Date	Comments
Hardware	R2A	2010-01	
Software	1.0.0	2010-01	

10.1.2 CMeX11

Type	Version	Date	Comments
Hardware	R2A	2010-01	
Software	1.0.0	2010-01	

10.1.3 CMeX10S

Type	Version	Date	Comments
Hardware	R4B	2010-01	
Software	1.0.5	2010-01	

10.1.4 CMeX11S

Type	Version	Date	Comments
Hardware	R4B	2010-01	
Software	1.0.5	2010-01	

10.1.5 CMeX12S

Type	Version	Date	Comments
Hardware	R4B	2010-01	
Software	1.0.5	2010-01	

10.1.6 CMeX13S

Type	Version	Date	Comments
Hardware	R4B	2010-01	
Software	1.0.5	2010-01	

11 References

11.1 References

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

11.2 Terms and Abbreviations

Abbreviation	Description
AMR	Automatic Meter Reading
Product	In this document, CMeX10 Series product.

11.3 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)