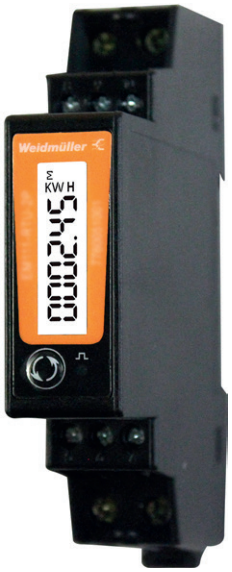
Energy meters - BasicLine

EM111-RTU-2P-MID	**3099190000**
EM111-MBUS-2P-MID	**3140990000**



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Content

1 About this documentation

This document is intended for all persons handling the product during its life cycle.

► Read this document completely before you install and start using the product.

► Keep this document after reading.

1.1 Applicable documents

– Installation instructions

All documents can be downloaded from the Weidmüller website www.weidmueller.com.

1.2 Illustrations and icons

► Action step

– Numbered lists

Sections of text next to this arrow contain notices which are not related to safety, but which provide important information regarding correct and effective work.

⚠ WARNING!

A note with the signal word “**WARNING!**” warns against a danger that can result in serious injury or death if it is not avoided.

⚠ CAUTION!

A note with the signal word “**CAUTION!**” warns against a danger that can result in injuries if it is not avoided.

ATTENTION!

A note with the signal word “**ATTENTION!**” warns against a danger that can result in damage to property or malfunctions of the product if it is not avoided.

Note for an electrician

Note referring to further documentation

Note for required tool

2 For your safety

2.1 Intended use

The device measures and displays the voltage, current, power, frequency, power factor and energy of single phase applications. The device provides two pulse outputs and a remote communication function. The device can work with direct load 45 A. The product may only be used in industrial environments within the technical specifications provided.

2.2 Personnel

The product must only be installed, put into operation, removed and maintained by qualified electricians who are familiar with national and international laws, provisions and standards.

2.3 Safety information

- Until the device is installed, do not connect hazardous voltages to the device.
- In applications where hazardous voltage is connected to in-/outputs of the device, sufficient spacing or isolation from wires, terminals and enclosure to surroundings (incl. neighbouring devices), must be ensured to maintain protection against electric shock.
- The device must not be repaired or modified.
- The device must not be opened, modified or converted.
- If the device is used in a manner not specified by the manufacturer, the protection provided by the device may be impaired.
- Only install and operate the device on a mounting rail inside a suitable, lockable enclosure, cabinet or electrical service room.
- Avoid direct sunlight, dust, high temperatures, mechanical vibrations and shock as well as rain and heavy moisture.
- The devices can be used for Measurement Category II and Pollution Degree 2. The devices are designed to be safe when used in an altitude up to 2000 m.
- The connections of measuring voltage and operating voltage to the device must be equipped with a disconnecting device (switch or power switch) and with an overcurrent protection fuse. The disconnecting device must be placed near the device and be easily accessible.
- Ensure that the conductors used are suitable for the maximum current of the device.
- When de-energised, the device may be cleaned with a damp cloth.
- Appropriate safety measures against electrostatic discharge (ESD) are be considered when handling the devices.

3 Product description

The device measures and displays the characteristics of single phase applications, including voltage, frequency, current, power, active energy, imported or exported. Energy is measured in kWh. In order to measure energy, the device requires voltage and current inputs in addition to the supply required to power the device.

The device supports max. 45 A direct connection and has built-in interfaces for pulse and remote communication.

Product variant	Remote communication
EM111-RTU-2P-MID 3099190000	RS485 port with Modbus RTU
EM111-MBUS-2P-MID 3140990000	M-Bus

4 Installation

The installation is described in the installation instructions, document no. 2711310000. You can find the document on the Weidmüller website.

The product must only be installed, put into operation, removed and maintained by qualified electricians who are familiar with national and international laws, provisions and standards.

5 Operating the Modbus variant

5.1 Initialising the device

When the device is powered on, it initializes a self-check.

Screen	Description
	Start screen shows full screen Shown for 3 seconds.
	Screen shows software version. Shown for 3 seconds.

After the self-check, the screen shows the total active energy (kWh).

5.2 Button functions

► To change the screen, press the button on the front panel.
The display switches to the next screen.
► To enter the setup-mode, keep pressing the button for 3 seconds.

5.3 Screen overview

	Screen	Description
1		Total active energy (kWh) Screen format: 0000.00 → 9999.99 → 10000.0 → 99999.9 → 0000.00
2		Import active energy (kWh) Screen format: 0000.00 → 9999.99 → 10000.0 → 99999.9 → 0000.00
3		Export active energy(kwh) Screen format: 0000.00 → 9999.99 → 10000.0 → 99999.9 → 0000.00
4		Voltage (V)
5		Current (A)
6		Active power (W)
7		Frequency (F)
8		Power factor (PF)

	Screen	Description
9		Modbus address (ID) Default: 001
10		Baud rate Default: 2400bps
11		Parity None/even/odd Default: none
12		Software version

5.4 Set-up mode

Three parameters can be changed in the set-up mode:
– Modbus address
– Baud rate
– Parity

The user can program the device parameters by sending commands via the RS485 port. The protocol is Modbus RTU.

If there is no operation in the set-up mode, the screen switches back to the default screen.

5.5 Modbus address

Screen menu	Button	Description
		► In this menu, press and hold the button for 3 seconds to enter the set-up mode.
		The rightmost digit flashes. ► Press the button to change the number. ► Wait for 4 seconds, the next digits flashes. ► Press the button again to change the number. ► Wait again for 4 seconds, repeat above options until all digits are set.
		► After setting the final digit, wait for 4 seconds. The setting is stored automatically and the screen returns to the setting screen.

5.6 Baud rate

Screen menu	Button	Description
		► In this menu, press and hold the button for 3 seconds to enter the set-up mode.
		The digits flash. ► Press the button to choose baud rate options: 1200 to 9600 bps
		► Wait for 4 seconds. The setting is stored automatically and the screen returns to the setting screen.

5.7 Parity

Screen menu	Button	Description
		► In this menu, press and hold the button for 3 seconds to enter the set-up mode.
		The digits flash. ► Press the button to choose parity options: n = None e = Even o = Odd
		► Wait for 4 seconds. The setting is stored automatically and the screen returns to the setting screen.

6 Modbus-Register

Function code	
04	to read input parameters

Address (Register)	Input Register Parameter			Modbus Protocol Start Address Hex	
	Parameters	Unit	Format	Hi byte	Low Byte
30001	Voltage	Volts	Float	0	0
30007	Current	Amps	Float	0	6
30013	Active power	Watts	Float	0	0C
30019	Apparent power	VA	Float	0	12
30025	Reactive power	VAr	Float	0	18
30031	Power factor	None	Float	0	1E
30071	Frequency	Hz	Float	0	46
30073	Import active energy	kWh	Float	0	48
30075	Export active energy	kWh	Float	0	4A
30077	Import reactive energy	kVArh	Float	0	4C
30079	Export reactive energy	kVArh	Float	0	4E
30085	Total system power demand	W	Float	0	54
30087	Maximum total system power demand	W	Float	0	56
30089	Import system power demand	W	Float	0	58
30091	Maximum Import system power demand	W	Float	0	5A
30093	Export system power demand	W	Float	0	5C
30095	Maximum Export system power demand	W	Float	0	5E
30259	Current demand	Amps	Float	1	2
30265	Maximum current demand	Amps	Float	1	8
30343	Total active energy	kWh	Float	1	56
30345	Total reactive energy	kVArh	Float	1	58

Function code	
10	to set holding parameter
03	to read holding parameter

Address (Register)	Input Register Parameter		Modbus Protocol Start Address Hex		Description
	Parameters	Format	Hi byte	Low Byte	
40003	Demand Period	Float	0	2	Write demand period: 0, 5,8, 10, 15, 20, 30, 60 minutes, default 60. Setting the period to 0 will cause the demand to show the current parameter value, and demand max to show the maximum parameter value since last demand reset.
40013	Pulse 1 Width	Float	00	0C	Write Pulse 1 Width in milliseconds: 60, 100 or 200, default 60ms. Length: 4 byte Data Format: Float
40019	Network Parity Stop	Float	00	12	Write the network port parity/stop bits for MODBUS Protocol.where: 0 = One stop bit and no parity 1 default.= One stop bit and even parity 2 = One stop bit and odd parity 3 = Two stop bits and none parity. Requires a restart to become effective Length: 4 byte Data Format: Float
40021	Meter ID	Float	00	14	Ranges from 1 to 247, Default ID is 1. Length: 4 byte Data Format: Float
40029	Baud rate	Float	00	1C	Write baud rate for MODBUS Protocol, where: 0 = 2400 baud (default) 1 = 4800 baud 2 = 9600 baud 5=1200 baud Length: 4 byte Data Format: Float
40087	Pulse 1 output mode	Float	00	56	Write MODBUSProtocol input parameter for pulse out 1: 0001: Import active energy, 0002: Total active energy (Imp + exp) 0004: Export active energy (default). 0005: Import reactive energy 0006:Total reactive energy (Imp+ exp) 0008: Export reactive energy Length : 4 byte Data Format : Float

Address (Register)	Input Register Parameter		Modbus Protocol Start Address Hex		Description
	Parameters	Format	Hi byte	Low Byte	
461457	Reset historical data	Hex	F0	10	00 00: reset demand info Length: 2 byte Data Format : Hex
463745	Time of scroll screen	BCD	F9	0	0-30s Default 0:does not screen in turns Length: 2 byte Data Format : BCD
463761	Pulse 1 output	Hex	F9	10	0000:0.001kWh/imp(default) 0001:0.01kWh/imp 0002:0.1kWh/imp 0003:1kWh/imp Length: 2 byte Data Format: HEX
463777	Measurement mode	Hex	F9	20	0001:mode 1 (total = import) 0002:mode 2 (total = import + export) (default) 0003:mode 3 (total = import - export) Length: 2 byte Data Format: HEX
464513	Serial number	Unsigned int32	FC	00	Serial Number Length: 4 byte Data Format: Unsigned int32
464515	Meter code	Hex	FC	02	Meter code = 00 20 Length: 2 bytes Data Format: Hex Note: read only

7 Operating the M-Bus variant

7.1 Initialising the device

When the device is powered on, it initalizes a self-check.

Screen	Description
	Start screen shows full screen Shown for 3 seconds.
	Screen shows software version. Shown for 3 seconds.

After the self-check, the screen shows the total active energy (kWh).

7.2 Button functions

► To change the screen, press the button on the front panel.
The display switches to the next screen.
► To enter the setup-mode, keep pressing the button for 3 seconds.

7.3 Screen overview

	Screen	Description
1		Total active energy (kWh) Screen format: 0000.00 → 9999.99 → 10000.0 → 99999.9 → 0000.00
2		Import active energy (kWh) Screen format: 0000.00 → 9999.99 → 10000.0 → 99999.9 → 0000.00
3		Export active energy(kwh) Screen format: 0000.00 → 9999.99 → 10000.0 → 99999.9 → 0000.00
4		Voltage (V)

5		Current (A)
6		Active power (W)
7		Frequency (F)
8		Power factor (PF)
9		M-Bus primary address (ID) Default: 001
10		Baud rate Default: 2400 bps
11		Parity None/even/odd Default: none
12		M-Bus secondary address (High)
13		M-Bus secondary address (Low)
14		Software version

7.4 Set-up mode

Five parameters can be changed in the set-up mode:
– M-Bus primary address
– Baud rate
– Parity
– M-Bus secondary address (High)
– M-Bus secondary address (Low)

The user can program the device parameters by sending commands via the M-Bus port.

If there is no operation in the set-up mode, the screen switches back to the default screen.

7.5 M-Bus address

Screen menu	Button	Description
id 001		► In this menu, press and hold the button for 3 seconds to enter the set-up mode.
id 001		The rightmost digit flashes. ► Press the button to change the number. ► Wait for 4 seconds, the next digits flashes. ► Press the button again to change the number. ► Wait again for 4 seconds, repeat above options until all digits are set.
id 002		► After setting the final digit, wait for 4 seconds. The setting is stored automatically and the screen returns to the setting screen.

7.6 Baud rate

Screen menu	Button	Description
b 2400		► In this menu, press and hold the button for 3 seconds to enter the set-up mode.
b 2400		The digits flash. ► Press the button to choose baud rate options: 1200 to 9600 bps
b 9600		► Wait for 4 seconds. The setting is stored automatically and the screen returns to the setting screen.

7.7 Parity

Screen menu	Button	Description
		► In this menu, press and hold the button for 3 seconds to enter the set-up mode.
		The digits flash. ► Press the button to choose parity options: n = None e = Even o = Odd
		► Wait for 4 seconds. The setting is stored automatically and the screen returns to the setting screen.

8 Disposal

The product contains substances that may be harmful to the environment and human health. In addition, it also contains substances that can be reused through targeted recycling.

Observe the instructions for proper disposal of the product. The instructions can be found at www.weidmueller.com/disposal.