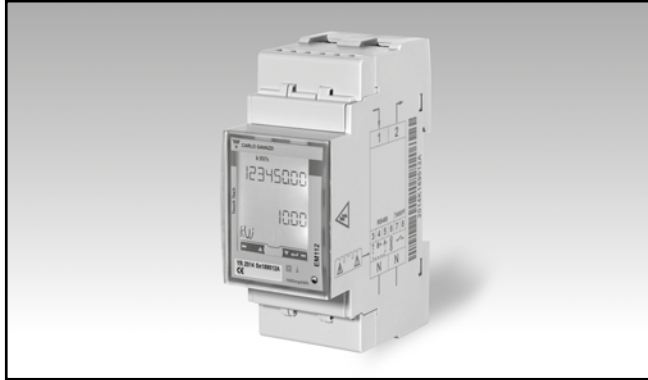


Energy Management Energy Analyzer Type EM112

CARLO GAVAZZI



- Single phase energy analyzer
- Class 1 (kWh) according to EN62053-21
- Class B (kWh) according to EN50470-3
- Accuracy $\pm 0.5\%$ RDG (current/voltage)
- Direct current measurement up to 100AAC
- Backlit LCD display (3x 8-digit) with integrated touch key-pad
- Energy readout on display: 8 digit
- Variable readout on display: 4 digit
- Energy measurement: kWh and kvarh (imported/exported); kWh+ by 2 tariffs
- System variables, kW, kvar, V, A, PF, Hz, kWdmd, kWdmd peak
- Self power supply
- Dimensions: 2-DIN module
- Protection degree (front): IP51
- Pulse output (optional, by open collector PNP)
- RS485 Modbus port (optional)
- M-bus port (optional)
- Digital input (for tariff management)
- Easy connection or wrong current direction detection
- Certified according to MID Directive (option PF only): see "how to order" below

Product description

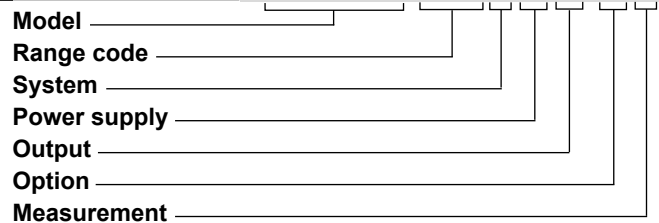
Single-phase energy analyzer with backlit LCD display with integrated touch keypad. Particularly indicated for active energy metering and for cost allocation in applications up to 100 A (direct connection), with dual tariff management availability. It can measure imported and exported energy or be programmed to consider only

the imported one. Housing for DIN-rail mounting, with IP51 front degree protection. The analyzer is optionally provided with pulse output proportional to the active

energy being measured, RS485 Modbus port or M-bus port.

MID Certified according to MID Directive, Annex "B" + Annex "D" or Annex "B" + Annex "F" for legal metrology relevant to active electrical energy meters (see Annex MI-003 of MID). Can be used for fiscal (legal) metrology.

How to order EM112-DIN AV0 1 X 01 PF B



Type Selection

Range code	System	Power supply	Output
AV0: 230VLN AC - 5(100)A (Direct connection)	1: 1-phase 2-wire	X: Self power supply -30% +20% of the rated measuring input voltage, 45 to 65Hz	O1: pulse output S1: RS485 Modbus port M1: M-bus port
AV1: 120VLN AC - 5(100)A (Direct connection)			

Option

PF: Certified according to MID Directive, Annex "B" + Annex "D" for legal metrology relevant to active electrical energy meters (see Annex MI-003 of MID). Can be used for fiscal (legal) metrology.

Measurement

B: Only the total positive energy meter is certified according to MID.

STANDARD

Not certified according to MID Directive. Cannot be used for fiscal (legal) metrology.

How to order EM112-DIN AV0 1 X O1 X

Model _____
 Range code _____
 System _____
 Power supply _____
 Output _____
 Option _____

Type Selection

Range code	System	Power supply	Output
AV0: 230VLN AC - 5(100)A (Direct connection)	1: 1-phase 2-wire	X: Self power supply -30% +20% of the rated measuring input voltage, 45 to 65Hz	O1: pulse output S1: RS485 Modbus port M1: M-bus port
AV1: 120VLN AC - 5(100)A (Direct connection)			

Option

X: none

Input specifications

Rated Inputs		Memory energy storage	
Current type	1-phase loads, direct connection	Energy	10 ¹⁰ cycles. Energy value is saved every time the less significant digit increases.
Current range	5(100)A	Programming parameters	10 ¹⁰ cycles. When a parameter is modified, only the relevant memory cell is overwritten
Nominal voltage	230VLN AC (AV0 option), 120 VLN (AV1 option)		
Accuracy (@25°C ±5°C, R.H. ≤60%, 45 to 65 Hz)		LEDs	Flashing red light pulses according to EN50470-3, EN62052-11, 1000 imp./kWh (min. period: 90ms, max. frequency: 11 Hz) Fix orange light: wrong current direction (only with "B" measurement selection)
AV1	I _{min} =0.25A; I _b : 5A, I _{max} : 100A; U _n : 120VLN -30% +30%		
AV0	I _{min} =0.25A; I _b : 5A, I _{max} : 100A; U _n : 230VLN -30% +20%		
Energies		Current overloads	
Active energy	Class 1 according to EN62053-21 and MID Annex MI-003 Class B (Class B (kWh) according to EN50470-3)	Continuous	100A, @ 50Hz
Reactive energy	Class 2 according to EN62053-23	For 10ms	3000 A
Start-up current:	40mA (AV0, AV1), positive or negative	Voltage Overloads	
Start-up voltage	Self-consumption is not measured. 84VLN (AV1), 161VLN (AV0)	Continuous	1.2 U _n
		For 500ms	2 U _n
Resolution	Display/serial communication	Input impedance	
Current	0.1/0.001 A	Voltage input 230VL-N	1.2Mohm
Voltage	0.1/0.1 V	Voltage input 120VL-N	1.2Mohm
Power	0.01 kW or kVar/ 0.1 W or var	Current inputs: 5(100) A	< 1.25VA
Frequency	0.1 Hz/0.1Hz		
PF	0.01/ 0.001		
Energies (positive)	0.01 kWh or kvarh / 0.1 kWh or kvarh		
Energies (negative)	0.01 kWh or kvarh / 0.1 kWh or kvarh		
Energy additional errors			
Influence quantities	According to EN62053-21		
Temperature drift	≤200ppm/°C		
Sampling rate	4096 samples/s @ 50Hz 4096 samples/s @ 60Hz		
Display and touch key-pad			
Type	Backlit LCD, 3 rows by 8-digit each, h 5 mm		
Read-out	Energy: 8 digit. Variables: 4 digit		
Touch key	2 (Enter and UP).		
Max. and Min. indication			
Energies	Max. 99 999 999 Min. 0.01		
Variables	Max. 9999 Min. 0.01		

Digital input specifications

Digital inputs	Free of voltage contact	Overload	In case a voltage is erroneously applied to the digital input, the input is not damaged up to 30 VAC/DC.
Function	Tariff management (switch between t1-t2)		
Number of inputs	1		
Contact measurement voltage	5 V		
Contact impedance	1kohm		
Contact resistance	1kohm, close contact 100kohm, open contact		

Output specifications

RS485 serial port	RS485 by screw connection.	Other	Available functions: wild card, header, initialisation SND_NKE, and req_udr management. Management of primary address modification via M-bus and reset of partial energy via M-bus available. VIF, VIFE, DIF and DIFE: see protocol
Function	For communication of measured data, programming parameters		
Protocol	ModBus RTU (slave function)		
Baud rate	9.6, 19.2, 38.4, 57.6, 115.2 kbaud, even or no parity,		
Address	1 to 247 (default: 01)		
Driver input capability	1/8 unit load. Maximum 247 transceivers on the same bus.	Static output	
Data refresh time	1sec	Purpose	For pulse output proportional to the active energy (kWh)
Read command	50 words available in 1 read command	Pulse rate	Selectable in multiple of 100
Rx/Tx indication	Rx segment on display is shown when a valid Modbus command is sent to that specific meter Tx segment on display is shown when a valid Modbus reply is sent back to the master	Pulse ON duration	Max 500 or 2000 pulses/kWh according to pulse ON duration Selectable: 30ms or 100 ms according to EN62052-31
M-bus port	M-bus by screw connection.	Output type	open collector PNP
Function	For communication of measured data	Load	V_{ON} 2.5 VAC/DC max. 100mA V_{OFF} 260 VAC max.
Protocol	M-bus according to EN13757-1		
Baud rate	0.3, 2.4, 9.6 kbaud		
Meters in the M-bus network	250		
Primary address	Selectable		
Secondary address	Univocally defined in each unit		
Secondary address range	from 7000 0000 to 7999 9999		

General specifications

Operating temperature	-25 to +65 °C, indoor, (R.H. from 0 to 90% non- condensing @ 40°C)	Standard compliance	EN62052-11 EN62053-21, EN50470-3
Storage temperature	-30°C to +80°C (R.H. < 90% noncondensing @ 40°C)	Safety	
Overvoltage category	Cat. III	Metrology	
Insulation (for 1 minute)	4000 VAC RMS between measuring inputs and digital/serial output (see table) 4000 VAC RMS	Approvals	CE, MID (PF option only)
Dielectric strength	4000 VAC RMS for 1 minute	Connections	
EMC	According to EN62052-11 15kV air discharge;	Cable cross-section area	Measuring inputs: max. 25 mm ² , min. 5 mm ² with/ without metallic cable ferrule; Max. screw tightening torque: 2.8 Nm
Electrostatic discharges		Other terminals	1.5 mm ² , Min./Max. screws tightening torque: 0.5 Nm
Immunity to irradiated electromagnetic fields	Test with current: 10V/m from 80 to 2000MHz; Test without any current: 30V/m from 80 to 2000MHz;	Housing	
Burst	On current and voltage measuring inputs circuit: 4kV	Dimensions (WxHxD)	35 x 63 x 90 mm
Immunity to conducted disturbances	10V/m from 150KHz to 80MHz	Material	Noryl, self-extinguishing: UL 94 V-0
Surge	On current and voltage measuring inputs circuit: 4kV;	Sealing covers	Included
Radio frequency	According to CISPR 22	Mounting	DIN-rail
		Protection degree	
		Front	IP51
		Screw terminals (cable inputs)	IP20
		Weight	Approx. 160 g (packing included)

Power supply specifications

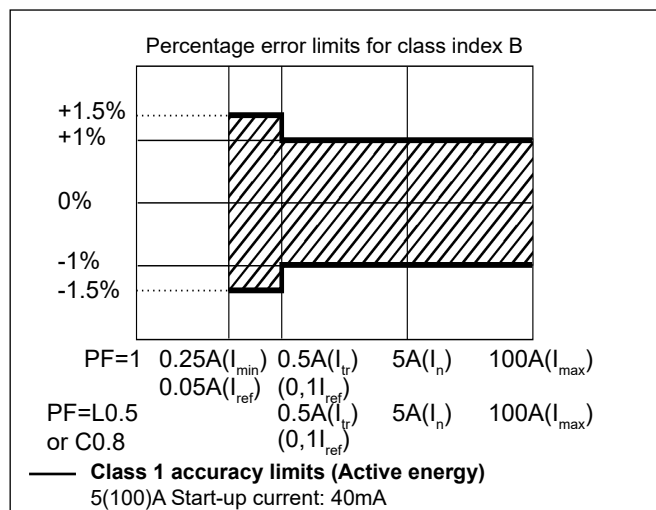
Self power supply		Power consumption	≤ 1.0W, ≤ 8VA
AV0	230VAC VL-N, -30% +20% 50/60Hz		
AV1	120VAC VL-N, -30% +30% 50/60Hz		

Insulation (for 1 minute) between inputs and outputs

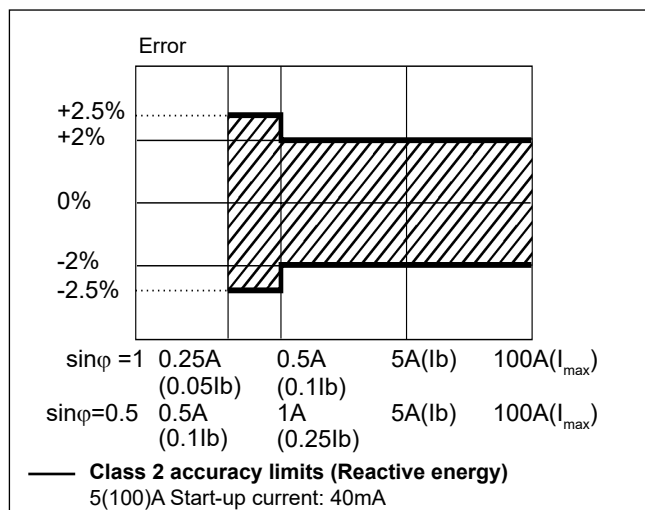
	Measuring input	Digital or serial output	Digital input
Measuring input	-	4 kV	4 kV
Digital or serial output	4 kV	-	0 kV
Digital input	4 kV	0 kV	-

Accuracy (according to EN50470-3 and EN62053-23)

kWh, accuracy (RDG) depending on the current



kvarh, accuracy (RDG) depending on the current



MID "Annex MI-003" compliance (PF option only)

Accuracy	0.9 U _n ≤ U ≤ 1.1 U _n ; 0.98 f _n ≤ f ≤ 1.02 f _n ; f _n : 50 Hz; cosφ: 0.5 inductive to 0.8 capacitive. Class B Considering listed I _b or I _n values
Operating temperature	-25 to +55°C (-13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C)
EMC compliance	E2
Mechanical compliance	M2

Display pages

No	1 st row	2 nd row	3 rd row	"Full" mode	"Easy" mode	Note
0	kWh+ (imported)		kW	X	X	In PF version (MID) this is the only certified energy meter. In X version with Measurement menu set to "A", this is considering the total energy without considering the current direction.
1	kWh- (exported)		kW	X	X	In PFB version and in X version with Measurement menu set to "B"
2	kWh+ (imported)		V	X	X	
3	kWh+ (imported)		A	X	X	
4	kWh+ (imported)		PF	X		
5	kWh+ (imported)		Hz	X		
6	kvarh+ (imported)		kvar	X		In X version with Measurement menu set to "A", this is considering the total positive reactive energy without considering the current direction.
7	kvarh- (exported)		kvar	X		In PFB version and in X version with Measurement menu set to "B"
8	kWh+ (imported)	kWdmd peak	kWdmd	X		
9	kWh (t1)	"t1"	kW	X		Only relevant to kWh+, with Tariff menu set to ON.
10	kWh (t2)	"t2"	kW	X		Only relevant to kWh+, with Tariff menu set to ON.

X= available

List of available menus

Menu name and description		Range	Default setting
PASS	Password request	From 0000 to 9999	0000
nPASS	New password	From 0000 to 9999	0000
Measure	Measurement type (A=easy connection; B=bidirectional, imported and exported energy). Not available in PFA and PFB versions (MID)	A; b	A
P int	Integration time for Wdmd calculation	1 to 30 min	1
Mode	Selection of complete or simplified set of variables on display	Full or Easy	Full
Tariff	Tariff enabling	Yes/No	No
Home	Home page selection (default page at power-on and after 120 s time-out from other pages). Not available in PFA and PFB versions (MID).	0 to 9	0
PULSE (O1 option)	Selection of pulse ON duration	30 or 100 ms	30
	Selection of the pulse rate	100 to 500 (if duration is 100ms) or to 2000 (if 30 ms)	100
Address (S1 option)	Modbus serial address	1 to 247	01
Kbaud (S1)	Modbus baud rate	9.6; 19.2; 38.4; 57.6, 115.2 kbps	9.6
ParlTY (S1)	Modbus parity	No/even	No
PrI Add (M1 option)	M-bus primary address	1 to 250	1
Kbaud (M1)	M-bus baud rate	0.3; 2.4; 9.6 kbps	2.4
RESET	Allow the reset of tariff meters and W dmd peak and of the kWh/kvarh partial meter available only via serial communication	Yes/No	No
End	Exit to measuring mode		

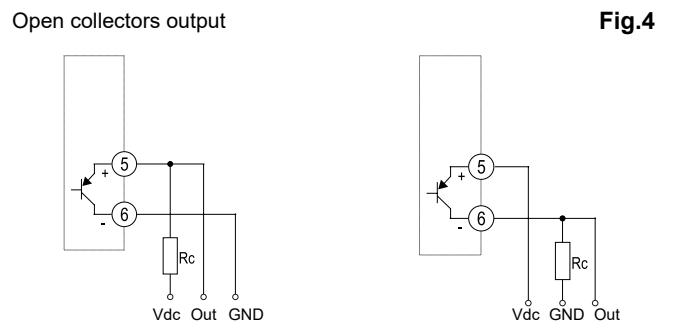
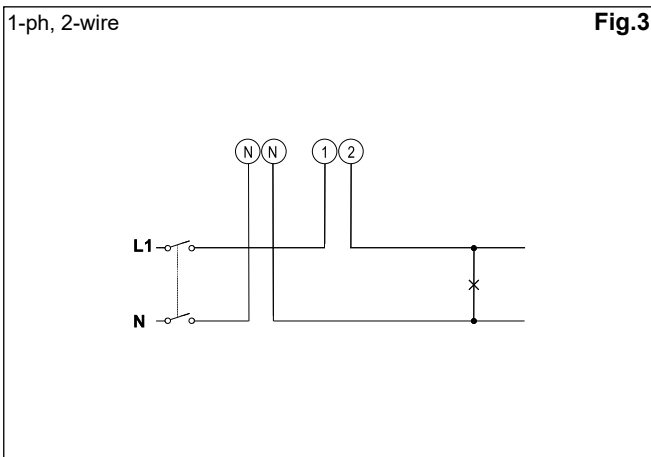
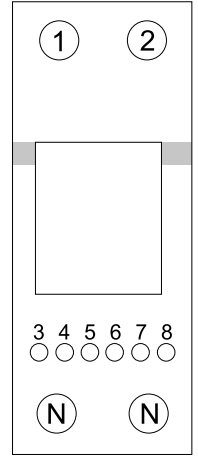
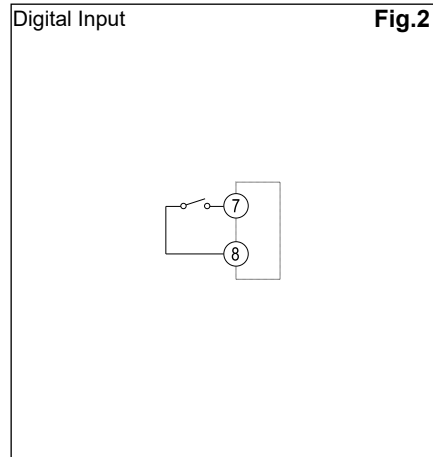
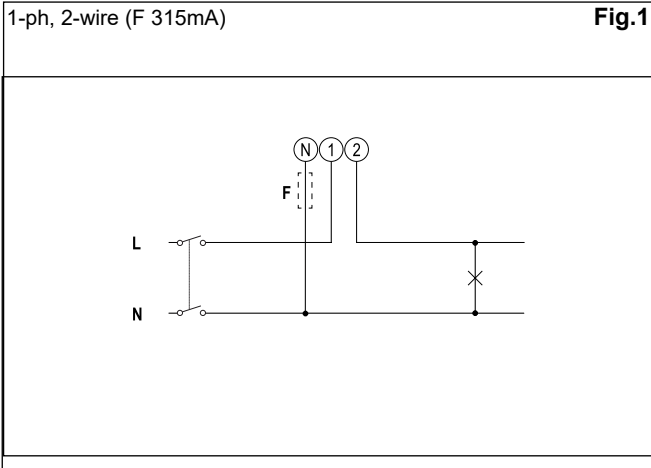
Note: after the confirmation of a new parameter value, the value is stored in the memory without the need to exit the programming mode.

Additional available information on the display (*)

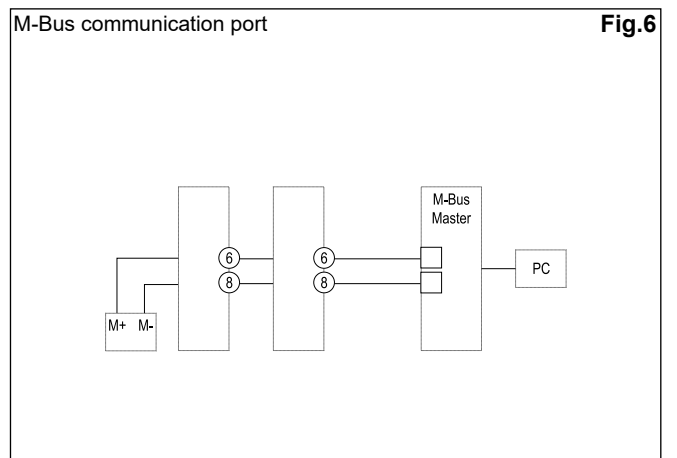
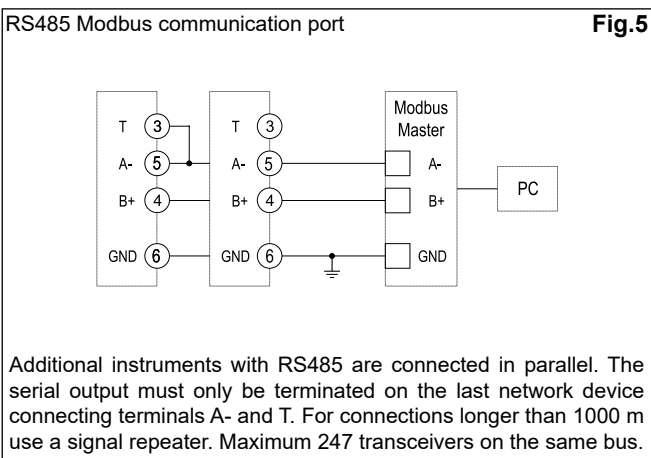
Type	Description	Note
Info page 1	YEA _r (2013)	Year of production
Info page 2	SE _R I _A L (dddnnnA)	Serial number (ddd= day of the year; nnn=progressive number; A= production line, internal use only)
Info page 3	rEV (A.01)	Firmware revision
Info page 4	MEAS _{ur} E	Measurement type
Info page 5	P int	Integration time for Wdmd calculation
Info page 6	ModE	Set of variables on display
Info page 7	tAr _I FF	Tariff enabling
Info page 8	HoME	Selected home page
Info page 9 (O1)	PULSE	Pulse ON duration
		Pulse rate
Info page 9 (S1)	AddrESS	Modbus serial address
Info page 10 (S1)	bAud	Modbus baud rate
Info page 11 (S1)	PAR _I tY	Modbus parity
		Stop bit (in case of No parity only)
Info page 9 (M1)	Pr _I Add	M-bus primary address
Info page 10 (M1)	bAud	M-bus baud rate

(*) can be reached by pressing simultaneously the 2 touch keys

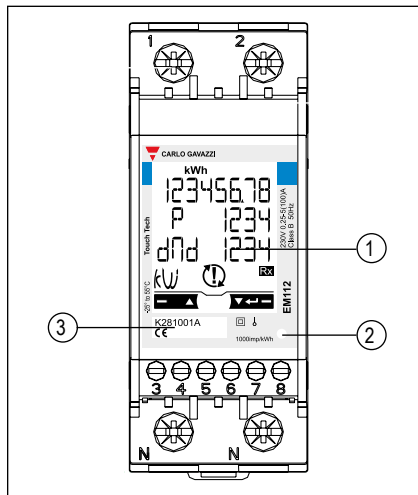
Wiring diagrams



The load resistance (R_c) must be designed so that the closed contact current is under 100 mA (V_{on} is equal to 1 V dc). DC voltage (V_{off}) must be less than or equal to 80 V.

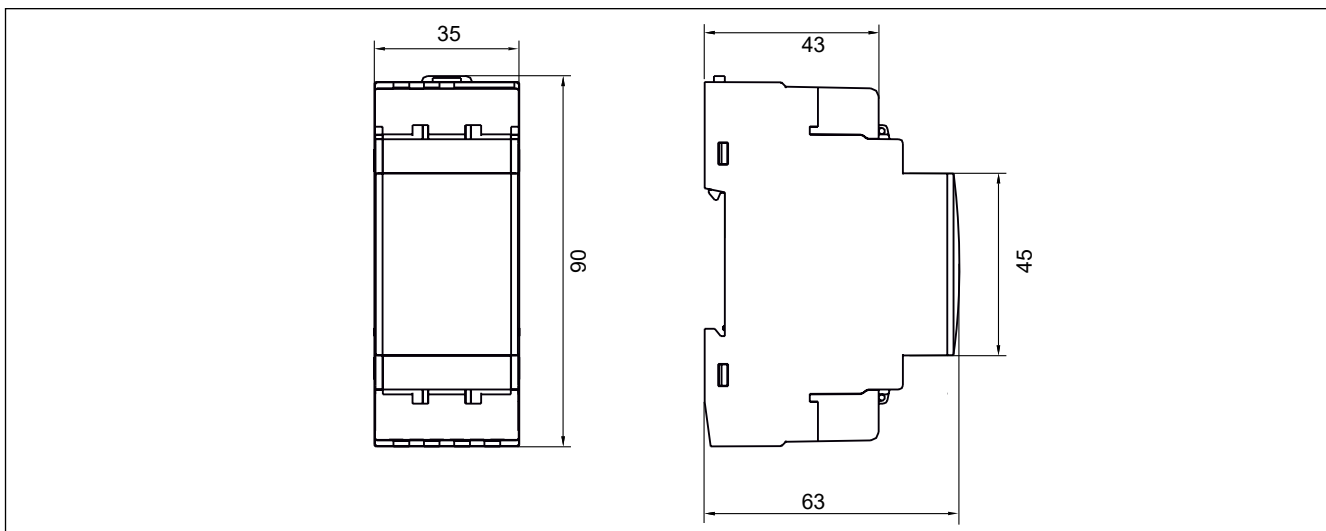


Front panel description



1. **Display**
Backlit LCD display with touch key-pad.
Right key ("E"): enter
Left key ("up"): UP
2. **LED**
LED proportional to kWh reading
3. **Serial number and MID data**
Area reserved to serial number and MID-relevant data in PF versions

Dimensions (mm)



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