

Energy Management

Energy Meter

Type EM330

CARLO GAVAZZI



- 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
- Other versions available (not certified, option X): see "how to order" on the next page

- Three phase energy meter
- Class 1 (kWh) according to EN62053-21
- Class B (kWh) according to EN50470-3
- Accuracy $\pm 0.5\%$ RDG (current/voltage)
- Current measurement via CT
- 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; kWh per phase
- System variables: kW, kvar, kVA, VLL, VLN, PF, Hz, kWdmd, kWdmd peak
- Phase variables: kW, kvar, kVA, VLL, VLN, A, PF
- Auxiliary power supply
- Dimensions: 3-DIN module
- Protection degree (front): IP51
- Pulse output (optional, by open collector PNP)
- RS485 Modbus port (optional)
- M-bus port (optional)
- Run hour meter
- Neutral current calculation

Product description

Three-phase energy meter with backlit LCD display with integrated touch keypad. Particularly indicated for active energy metering and for cost

allocation (CT 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 meter is optionally provided with pulse output proportional

to the active energy being measured, RS485 Modbus port or M-bus port. Available for legal metrology (PF option, only for imported energy).



Certified according to MID Directive, Module B and Module D of Annex II, for legal metrology relevant to active electrical energy meters (see Annex V, MI003, of MID). Can be used for fiscal (legal) metrology.

How to order EM330 DIN AV5 3 H O1 PF B

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

Type Selection

Range code	System	Power supply	Output
AV5: 400 VLL AC - 5(6)A (CT connection)	3: 3-phase, 3 or 4 wire	H: auxiliary power supply 90 to 260V ac/dc	O1: pulse output S1: RS485 Modbus port M1: M-bus port
Option	Measurement		
PF: Certified according to MID Directive. Can be used for fiscal (legal) metrology.	A: The power is always integrated (both in case of positive imported and negative exported power) and the total energy meter is certified according to MID. 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 **EM330 DIN AV5 3 H O1 X**

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

Type Selection

Range code	System	Power supply	Output
AV5: 400 VLL ac - 5(6)A (CT connection)	3: 3-phase, 3- or 4-wire; 2-phase 3-wire, 1-phase 2 wire	H: auxiliary power supply 90 to 260V ac/dc	O1: pulse output S1: RS485 Modbus port M1: M-bus port

Option _____
X: none

Input specifications

Rated Inputs		Type	Backlit LCD, 3 rows by 8-digit each, h 7 mm
Current type	3-phase loads, CT connection	Read-out	Energy: 8 digit. Variables: 4 digit
Current range	5(6)A	Touch key	3 (DOWN, Enter and UP).
Nominal voltage	AV5: 400 to 480 VLL ac	Max. and Min. indication	
Max CTxVT	AV5: 1000	Energies	Max. 99 999 999
Accuracy (@25°C ±5°C, R.H. ≤60%, 45 to 65 Hz)		Variables	Min. 0.01 Max. 9999 Min. 0.01
Current	AV5: Imin=0.25A; In: 5A, Imax: 6A; Un: 230 to 277 VLN (400 to 480 VLL) From 0.04In to 0.2In: ±(0.5%RDG+1DGT) From 0.2In to Imax: ±(0.5%RDG)	Memory	
Phase-neutral voltage	In the range Un: ±(0.5% RDG)	Energy	10 ¹² cycles. Energy value is saved every time the less significant digit increases.
Phase-phase voltage	In the range Un: ±(1% RDG)	Programming parameters	10 ¹² cycles. When a parameter is modified, only the relevant memory cell is overwritten
Frequency	Range: 45 to 65Hz.	LEDs	
Active power	From 0.05 In to Imax, within Un range, PF=1: ±(1% RDG) From 0.1 In to Imax, within Un range, PF=0.5L or 0.8C: ±(1% RDG)	Flashing red light pulses	Proportional to the product of the CT and VT ratios
Power factor	±[0.001+1%(1.000 - "PF RDG")]	Weight (pulses/kWh) 1	> 700,1 (CT x VT)
Reactive power	From 0.05 In to Imax, within Un range, sinphi=1: ±(2% RDG) From 0.1 In to Imax, within Un range, sinphi=0.5L or 0.8C: ±(2% RDG)	Weight (pulses/kWh) 10	70.1–700 (CT x VT)
Energies		Weight (pulses/kWh) 100	7.1–70 (CT x VT)
Active energy	Class 1 according to EN62053-21 and MID Annex MI-003 Class B (Class B (kWh) according to EN50470-3)	Weight (pulses/kWh) 1000	< 7.1 (CT x VT)
Reactive energy	Class 2 according to EN62053-23	Duration	90ms
Start-up current:	10mA	Fix orange light	wrong current direction (only with PFB option or with "B" measurement selection in case of X option)
Start-up voltage	90VLN	Current overloads	
Resolution		Continuous	6A, @ 50Hz
Current	Display/serial communication	For 500ms	5 In
Voltage	0.1/0.001 A	Voltage Overloads	
Power	0.1/0.1 V	Continuous	1.2 Un
Frequency	0.01 kW or kvar/ 0.1 W or var	For 500ms	2 Un
PF	0.1 Hz/0.1Hz	Input impedance	
Energies (positive)	0.01/ 0.001	230VL-N	1.2Mohm
Energies (negative)	0.01 kWh or kvarh / 0.1 kWh or kvarh	5(6) A	< 1.25VA
Energy additional errors		Wrong connection detection	
Influence quantities	According to EN62053-21	Phase sequence	Installation guide to indicate if connections are correctly carried out. Can be disabled.
Temperature drift	≤200ppm/°C	Correct current direction	Indicates if the phase sequence is not the correct one (L1-L2-L3)
Sampling rate	4096 samples/s @ 50Hz 4096 samples/s @ 60Hz		Indicates if the current direction is not the right one (only with PFB option or with type "B" measurement selection in case of X)
Display and touch key-pad			

Input specifications (cont.)

Load conditions	option). The wrong connection detection works in case of loads with: - PF>0.766 (<40°) if inductive or PF>0.996 (<5°)	if capacitive - a current at least equal to 10% rated current
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Digital input specifications

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

RS485 serial port Function Protocol Baud rate Data format Address Driver input capability Data refresh time Read command Rx/Tx indication	RS485 by screw connection. For communication of measured data, programming parameters ModBus RTU (slave function) 9.6, 19.2, 38.4, 57.6, 115.2 kbaud, even or no parity, 1 to 247 (default: 01) 1/8 unit load. Maximum 247 devices on the same bus. 1sec 50 words available in 1 read command 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	Protocol Baud rate Meters in the M-bus network Primary address Secondary address Identification number range Other	M-bus according to EN13757-1 0.3, 2.4, 9.6 kbaud 250 Selectable Univocally defined in each unit from 9000 0000 to 9999 9999 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
M-bus port Function	M-bus by screw connection. For communication of measured data	Static output Purpose Pulse rate	For pulse output proportional to the active energy (kWh) Selectable in multiple of 100 Max 500 or 1500 kWh according to pulse ON duration

Output specifications (cont.)

Pulse ON duration	Selectable: 30ms or 100 ms according to EN62052-31	Load	V_{ON} 1 V dc max. 100mA
Output type	Open collector PNP		V_{OFF} 80 V dc max.

General specifications

Operating temperature	-25 to +65 °C (-13 to 149° F), indoor, (R.H. from 0 to 90% non-condensing @ 40°C)	Radio frequency	According to CISPR 22
Storage temperature	-30°C to +80°C (-22 to 176° F) (R.H. < 90% non condensing @ 40°C)	Standard compliance	
Overvoltage category	Cat. III	Safety	EN62052-11
Insulation (for 1 minute)	4000 V ac RMS between measuring inputs and digital/serial output (see table) 4000 V ac RMS	Metrology	EN62053-21, EN50470-3
Dielectric strength	4000 V ac RMS for 1 minute	Approvals	CE, MID (PF option only)
EMC	According to EN62052-11	Connections	
Electrostatic discharges	15kV air discharge;	Cable cross-section area	Voltage inputs: max. 4 mm ² , min. 1 mm ² with/without metallic cable ferrule; Max. screw tightening torque: 0.6 Nm
Immunity to irradiated electromagnetic fields	Test with current: 10V/m from 80 to 2000MHz;	Other terminals	1.5 mm ² , Min./Max. screws tightening torque: 0.4 Nm
Electromagnetic fields	Test without any current: 30V/m from 80 to 2000MHz;	Housing	
Burst	On current and voltage measuring inputs circuit: 4kV	Dimensions (WxHxD)	54 x 90 x 63 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
		Mounting	DIN-rail
		Protection degree	
		Front	IP51
		Screw terminals	IP20
		Weight	Approx. 240 g (packing included)



Power supply specifications

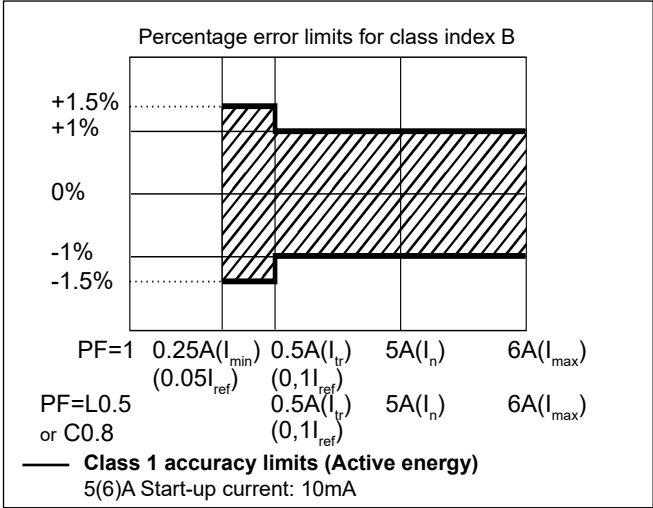
Auxiliary power supply	H: 90 to 260 V ac/dc	Power consumption	≤ 1W, ≤ 10VA
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Insulation (for 1 minute) between inputs and outputs

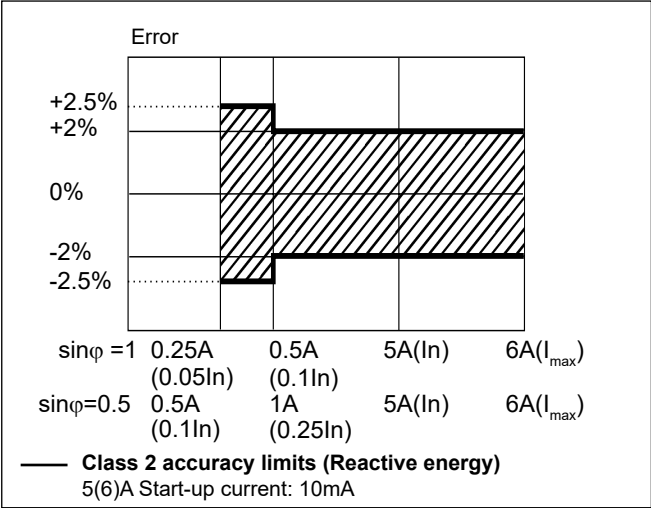
	Measuring input	Digital or serial output	Digital input
Measuring input	-	4 kV	4 kV
Digital or serial output	4 kV	-	0 kV
Digital input	4 kV	0 kV	-

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

kWh, accuracy (RDG) depending on the current



kvarh, accuracy (RDG) depending on the current



Display pages

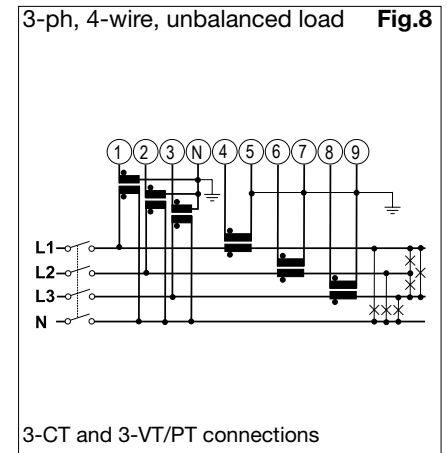
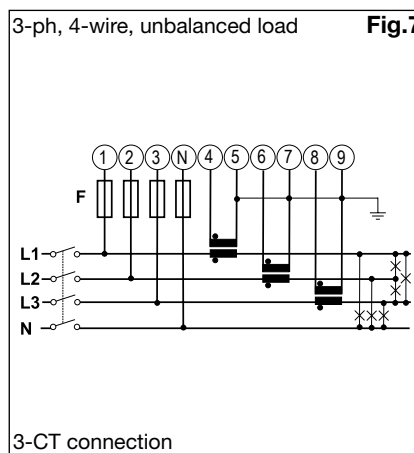
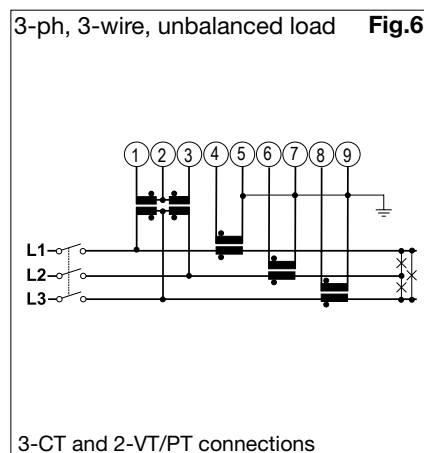
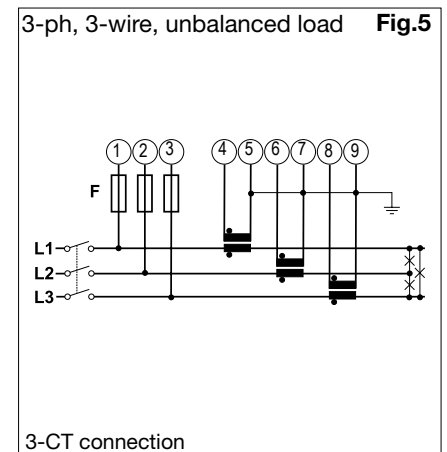
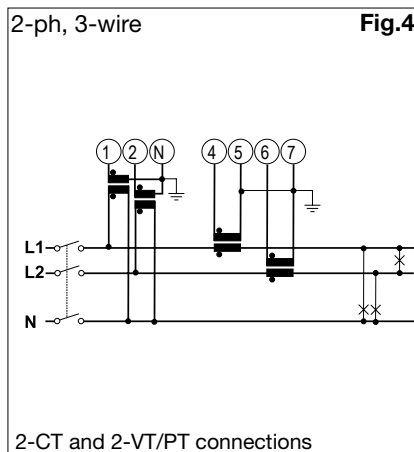
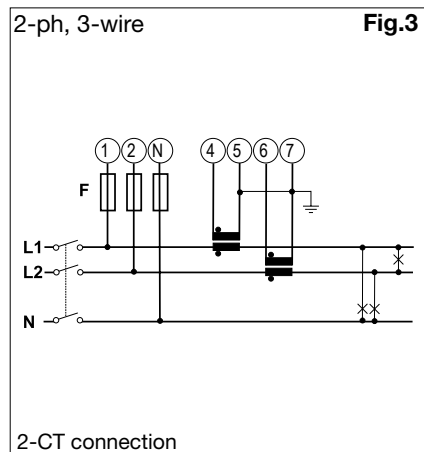
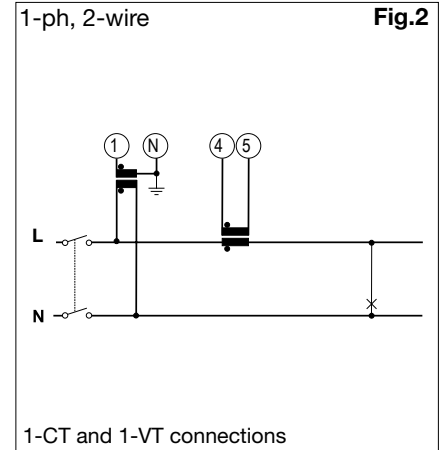
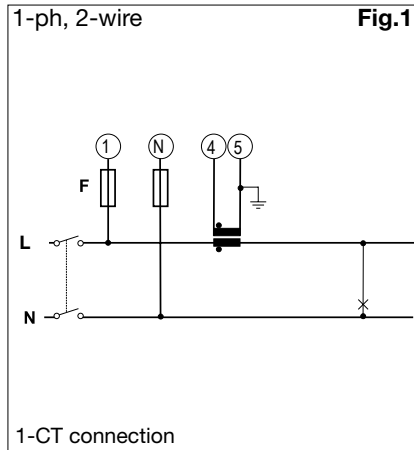
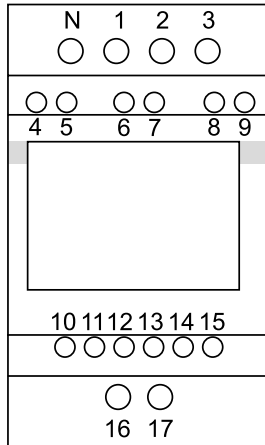
1 st row	2 nd row	3 rd row	“Full” mode	“Easy” mode	Note
kWh+ (imported)		kW system	X	X	In case of Measurement set to “A”, total energy without considering the current direction.
kWh- (exported)		kW system	X	X	Only with Measurement set to “B”
kWh+ (imported)		V L-L system	X	X	
kWh+ (imported)		V L-N system	X	X	
kWh+ (imported)		PF system	X		
kWh+ (imported)		Hz	X		
kvarh+ (imported)		Kvar system	X	X	In case of Measurement set to “A”: total positive reactive energy without considering the current direction.
kvarh- (exported)		Kvar system	X	X	Only with Measurement set to “B”
kWh+ (imported)		kVA system	X		
kWh+ (imported)	kWdmd peak	kWdmd	X		
kWh (t1)	“t1”	kW system	X	X	Only relevant to kWh+, with Tariff menu set to ON.
kWh (t2)	“t2”	kW system	X	X	Only relevant to kWh+, with Tariff menu set to ON.
kWh L1	kWh L2	kWh L3	X		In case of Measurement set to “A”, total energy without considering the current direction. In case of Measurement set to “B”, only imported energy.
kVA L1	kVA L2	kVA L3	X		
kvar L1	kvar L2	kvar L3	X		
PF L1	PF L2	PF L3	X		
V L1-N	V L2-N	V L3-N	X		
V L1-2	V L2-3	V L3-1	X		
run hour meter		An	X		
A L1	A L2	A L3	X	X	
kW L1	kW L2	kW L3	X		

X= available

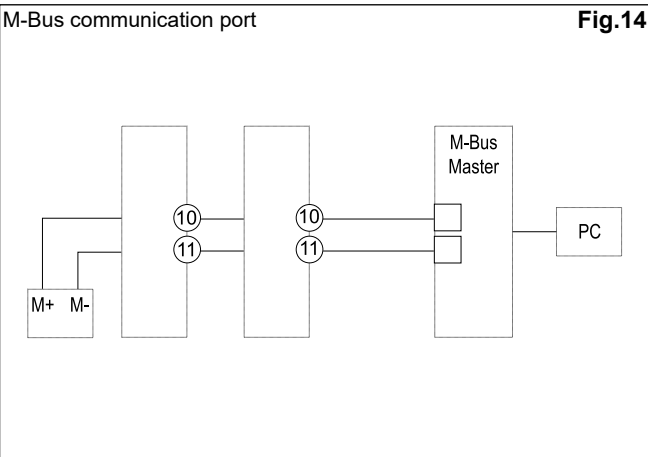
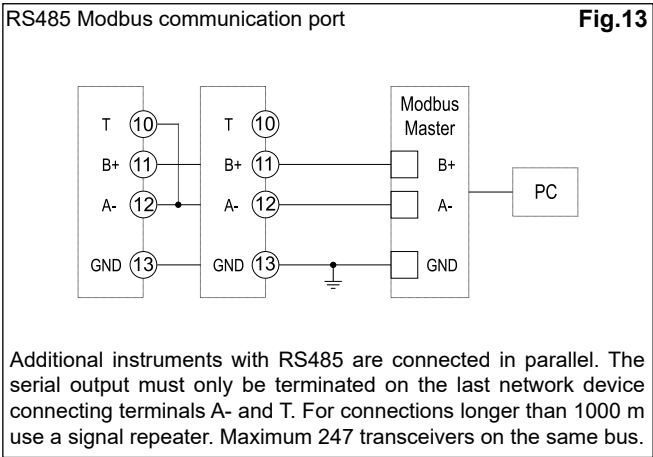
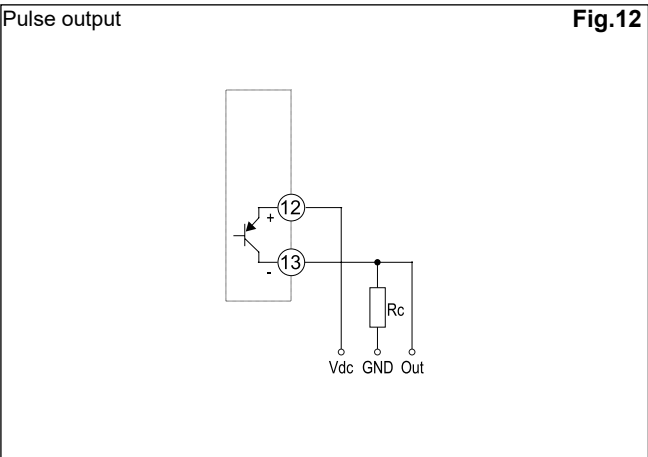
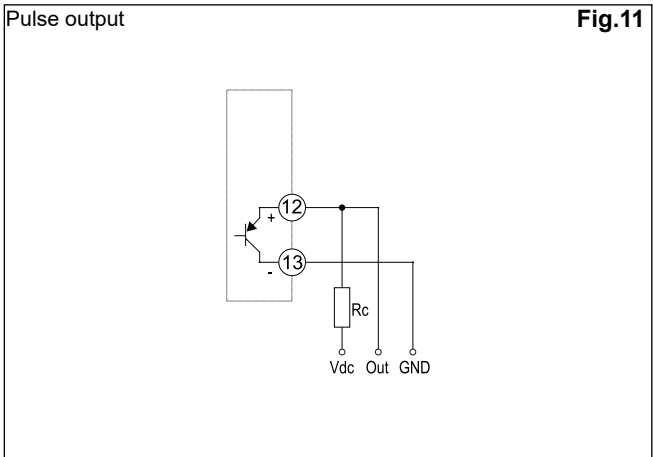
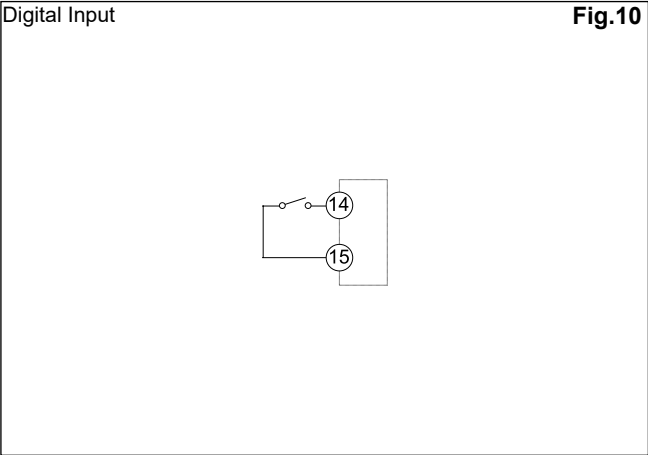
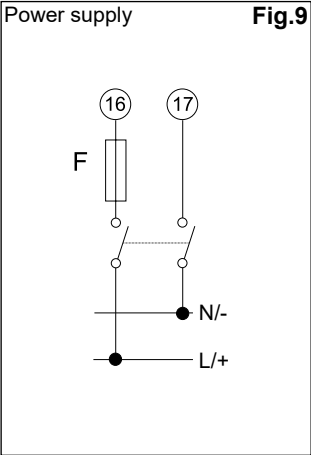
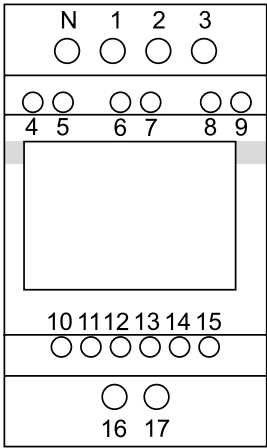
Additional available information on the display

Page	Display	Description
Info 1	YEAr (2015)	Year of production
Info 2	SERIAL n (dddnnnA)	Serial number (ddd= day of the year; nnn=progressive number; A= production line, internal use only)
Info 3	rEVIStIon (A.01)	Firmware revision
Info 4	PuLS LEd	Pulse rate of front LED (pulse/kWh)
P3	SYStEM	System type
P4	CT ratio	current transformer ratio
P5	VT ratio	voltage transformer ratio
P6	MEASurE (only X option)	Measurement type
P7	InStALL	Wrong connection detection function
P8	P Int	Integration time for Wdmd calculation
P9	ModE	Set of variables on display
P10	tArIFF	Tariff enabling (and current tariff if enabled)
P11	HoME (only X option)	Selected home page
P12-1	PuLSE (O1 option)	Selection of pulse ON duration of output
P12-2	PuLrAtE (O1 option)	Selection of the pulse rate of output
P13	PrI Add (M1 option)	M-bus primary address
P14	AddrESS (S1 option)	Modbus serial address
P15	bAud (M1 or S1)	M-bus or Modbus baud rate
P16-1	PARItY (S1)	Modbus parity
P16-2	StoP blt (S1)	Stop bit (in case of No parity only)
Info 5	Secondary address (M1)	M-bus secondary address

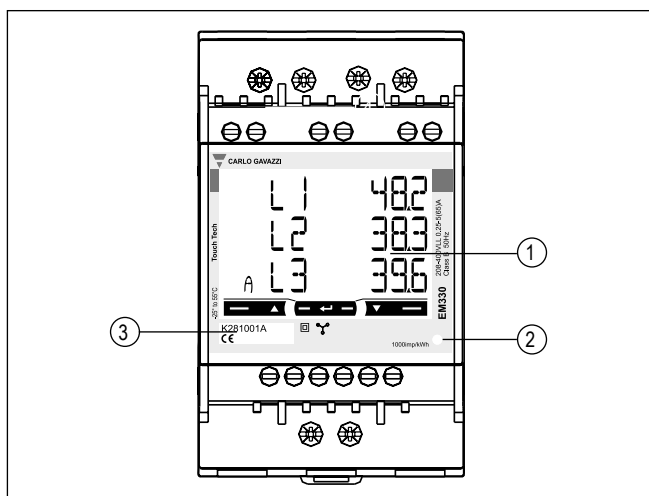
Wiring diagrams



Wiring diagrams (cont.)



Front panel description



1. **Display**
Backlit LCD display with touch key-pad.
2. **LED**
LED proportional to kWh reading
3. **Serial number**
Area reserved to serial number and MID-relevant data in PF versions

Dimensions

