Energy Management
Energy Analyzer
Type EM24 DIN

- **Dimensions: 4-DIN modules**
- **Protection degree (front): IP50**
- **RS485 serial output (on request) (MODBUS-RTU), iFIX SCADA compatibility**
- **Application adaptable display and programming procedure (Easyprog function)**
- **Easy connections management**
- **MID “annex MI-003” (Measuring Instruments Directive) compliant**

- **Class 1 (kWh) according to EN62053-21**
- **Class 2 (kvarh) according to EN62053-23**
- **Accuracy ±0.5 RDG (current/voltage)**
- **Energy analyzer**
- **Instantaneous variables readout: 4 DGT**
- **Energies/gas/water readout: 7+1 DGT**
- **System variables: VLL, VLN, Admd, VA, VAdmd, VAdmd max, W, Wdmd, Wdmd max, var, PF, Hz, Phase-sequence.**
- **Single phase variables: VLL, VLN, A, VA, W, var, PF**
- **Energy measurements: total and partial kWh and kvarh or based on 4 different tariffs; single phase measurements**
- **Gas, cold water, hot water, kWh remote heating measurements**
- **Hour counter (6+2 DGT)**
- **TRMS measurements of distorted sine waves (voltages/currents)**
- **Self power supply (AV0-AV9 inputs)**
- **Auxiliary power supply (AV5-AV6)**
- **3 digital inputs for tariff selection, DMD synch or gas/water (hot-cold) and remote heating metering (on request)**
- **2 digital outputs for pulses or for alarms or as a mix of them (on request)**

Product Description

Three-phase energy analyzer with built-in configuration joystick and LCD data displaying; particularly indicated for active and reactive energy metering and for cost allocation. Housing for DIN-rail mounting with IP50 (front) protection degree. Direct connection up to 64A and by means of external current and potential transformers. Moreover the meter can be provided with digital outputs that can be either for pulse proportional to the active and reactive energy being measured or for alarm outputs. In alternative the RS485 communication port and 3 digital inputs are available as an option.

How to order

EM24 DIN AV5 3 X O2 X

Model
Range code
System
Power supply
Output
Option

Type Selection

Range codes

AV5: AV5: 400V_{LL} AC - 1/5 (10)A (CT connection) **(*)**
AV6: 120V_{LN}/208V_{LL} AC - 1/5(10)A (VT/PT and CT connections) **(*)**
AV0: 120V_{LN}/208V_{LL} AC -10(64)A (Direct connection) **(**)**
AV9: 400V_{LL} AC - 10(64)A **(*)** (Direct connection)

(*) as standard.
(**) on request.

System

1: 1-phase., 2-wire; 3-phase, 3-wire, balanced load **(**)**
3: balanced and unbalanced load: 3-phase, 4-wire; 3-phase, 3-wire; 2-phase, 3-wire; 1-phase, 2-wire **(*)**

Options

X: none **(*)**
P: PTB approval **(**)**

Output

XX: none **(*)**
O2: dual open collector type (dual pulse or one pulse + one alarm or dual alarm) **(*)**
R2: dual relay type (functions as per “O2”) **(**)**
XS: RS485 port **(**)**
IS: 3 digital inputs for tariff selection or Gas / water / remote heating metering plus RS485 port **(*)**
DP: Dupline port **(**)**

Power supply

X: Self power supply See “Power supply specifications” **(*)**
L: 18 to 60VAC/DC (48 to 62Hz) **(**)**
D: 115/230 VAC (48 to 62Hz) **(*)**
Note: “L” and “D” power supplies only for AV5 and AV6 inputs; “X” power supply only for AV0 and AV9 inputs.

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Input specifications

Rated inputs	System type: 3
Current type	Galvanic insulation by means of built-in CT's (AV5 and AV6 models)
Current range (by CT)	AV5 and AV6: 1/5(10)A
Voltage	AV5: 400VLL;
Voltage by VT/PT	AV6: 120/208VLL
Current range (direct)	AV0: 10(64)A; AV9: 10(64)A
Voltage	AV0: 208 VLL AC AV9: 400 VLL AC
Accuracy (Display + RS485) (@25°C ±5°C, R.H. ≤60%, 48 to 62Hz)	Ib: see below, Un: see below
AV5 model	In: 5A, Imax: 10A; Un: 160 to 480VLN (277 to 830VLL)
AV6 model	In: 5A, Imax: 10A; Un: 40 to 144VLN (70 to 250VLL)
AV0 model	Ib: 10A, Imax: 64A; Un: 96 to 144VLN (166 to 250VLL)
AV9 model	Ib: 10A, Imax: 64A; Un: 184 to 276VLN (318 to 480VLL)
Current	
AV5, AV6 models	From 0.002In to 0.2In: ±(0.5% RDG +3DGT) From 0.2In to Imax: ±(0.5% RDG +1DGT).
AV0, AV9 models	From 0.004Ib to 0.2Ib: ±(0.5% RDG +3DGT) From 0.2Ib to Imax: ±(0.5% RDG +1DGT).
Phase-neutral voltage	In the range Un: ±(0,5% RDG +1DGT)
Phase-phase voltage	In the range Un: ±(1% RDG +1DGT)
Frequency	±0.1Hz (45 to 65Hz)
Active and Apparent power	±(1%RDG +2DGT)
Power Factor	±[0.001+1%(1.000 - "PF RDG")]
Reactive power	±(2%RDG +2DGT)
Energies	Class 1 according to EN62053-21 and MID Annex MI-003 Class B Class 2 according to EN62053-23
AV5, AV6 models	In: 5A, Imax: 10A; 0.1 In: 0.5A, Start up current: 10mA
AV0, AV9 models	Ib: 10A, Imax: 64A; 0.1 Ib: 1,0A, Start up current: 40mA
Energy additional errors	
Influence quantities	According to EN62053-21, EN62053-23
Temperature drift	≤200ppm/°C
Sampling rate	1600 samples/s @ 50Hz 1900 samples/s @ 60Hz
Display	3 lines (1 x 8 DGT; 2 x 4 DGT)
Type	LCD, h 7mm
Instantaneous variables read-out	4 DGT
Energies	Imported Total/Partial/ Tariff: 7+1DGT or 8DGT; Exported Total/Partial/ Tariff: 6+1DGT or 7DGT (with "-" sign).
Overload status	EEEE indication when the value being measured is exceeding the "Continuous inputs overload" (maximum measurement capacity)
Max. and Min. indication	Max. instantaneous variables: 9999; energies: 9 999 999.9 or 99 999999. Min. instantaneous variables: 0; energies 0.0 or 0
LEDs	Red LED (Energy consumption), 1000 imp./kWh/kvarh Max frequency: 16Hz according to EN62052-11
Measurements	See "List of the variables that can be connected to:"
Method	TRMS measurements of distorted wave forms.
Coupling type	Direct for AV0 and AV9 models. By means of external CT's for AV5 and AV6
Crest factor	Ib 10A ≤4 (91A max. peak) In 5A ≤3 (15A max. peak)
Current Overloads	
Continuous	1/5(10) A: 10A, @ 50Hz 10(64) A: 64A, @ 50Hz
For 500ms	1/5(10) A: 200A, @ 50Hz
For 10ms	10(64) A: 1920A max, @ 50Hz
Voltage Overloads	
Continuous	1.2 Un
For 500ms	2 Un
Input impedance	
208VL-L (AV6)	>1600KΩ
208VL-L (AV0)	Refer to "Power Consumption"
400VL-L (AV5)	>1600KΩ
400VL-L (AV9)	Refer to "Power Consumption"
1/5(10) A (AV5-AV6)	< 0.3VA
10(64) A (AV0-AV9)	< 4VA
Frequency	45 to 65 Hz
Joystick	For variable selection and programming of the instrument working parameters

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Output specifications

Digital outputs	
Pulse type	
Number of outputs	Up to 2, independent. Programmable from 0.01 to 1000 pulses per kWh/kvarh.
Type	Outputs connectable to the energy meters (Wh/varh)
Pulse duration	≥100ms < 120msec (ON), ≥120ms (OFF), according to EN62052-31
Alarm type	
Number of outputs	Up to 2, independent
Alarm modes	Up alarm, down alarm (see the table “List of the variables that can be connected to”)
Set-point adjustment	From 0 to 100% of the display scale
Hysteresis	From 0 to full scale
On-time delay	0 to 255s
Output status	Selectable; normally de-energized and normally energized
Min. response time	≤ 700ms, filters excluded. Set-point on-time delay: “0 s”
Note	The 2 digital outputs can also work as a dual pulse output, dual alarm output, one pulse output and one alarm output.
Static output	
Purpose	For pulse output or alarm output
Signal	V_{ON} 1.2 VDC/ max. 100 mA V_{OFF} 30 VDC max.
Insulation	By means of optocuplers, 4000 VRMS output to measuring inputs, 4000 VRMS output to power supply input.
Relay output	
Purpose	For alarm output or pulse output
Type	Reed Relay, SPST type AC 1-5A @ 250VAC DC 12-5A @ 24VDC AC 15-1.5A @ 250VAC DC 13-1.5A @ 24VDC
Insulation	4000 VRMS output to measuring input. 4000 VRMS output to supply input.
Note	The meters equipped with the relay outputs (“AV0” and “AV9” models with “R2” option) work even if VL1 is missing (VL3, VL2 and neutral have to be available)
RS485	
Type	Multidrop, bidirectional (static and dynamic variables)
Connections	2-wire Max. distance 1200m Termination directly on the instrument
Addresses	247, selectable by means of the front joystick
Protocol	MODBUS/JBUS (RTU)
Data (bidirectional)	
Dynamic (reading only)	System and phase variables: see table “List of variables...”
Static (writing only)	All the configuration parameters.
Data format	1 start bit, 8 data bit, no parity,1 stop bit
Baud-rate	4800, 9600 bits/s
Driver input capability	1/5 unit load Maximum 160 transceivers on the same bus.
Insulation	By means of optocouplers, 4000 VRMS output to measuring input. 4000 VRMS output to supply input
Note:	The meters equipped with the communication port (“AV0” and “AV9” models with “XS” and “IS” options) work even if VL1 is missing (VL3, VL2 and neutral have to be available)
Dupline	
Bus	Full Dupline compatibility
Addresses	128, selectable by means of the front joystick
Variables	Total kWh, total kvarh. W, Wdmd, Wdmd max

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Digital input specifications

Number of inputs	3
Input frequency	20Hz max, duty cycle 50%
Prescaler adjustment	From 0,1 to 100,0 m^3/ pulse
Contact measuring voltage	5VDC +/- 5%
Contact measuring current	10mA max
Input impedance	680Ω
Contact resistance	≤100Ω, closed contact ≥500kΩ, open contact
Working modes	Selectable: • total and partial energy meters (kWh and kvarh) without digital inputs; • total and partial energy meters (kWh and kvarh) managed by time periods (t1-t2-t3-t4), W dmd synchronisation (the synchronisation is made every time the tariff changes) and GAS (m^3) or WATER (hot-cold m^3) or remote heating (kWh) meters; • total and partial energy meters (kWh and kvarh) managed by time periods (t1-t2), W dmd synchronisation (the synchronisation is made independently from the tariff selection) and GAS (m^3) or WATER (hot-cold m^3) or remote heating (kWh) meters; • total energy (kWh, kvarh) and GAS, WATER (hot-cold m^3) and remote heating meters (3 choices only).
Note	The energy metering is only made by means of the analogue inputs.
Insulation	By means of optocouplers, 4000 VRMS digital inputs to measuring inputs. 4000 VRMS digital inputs to supply input.

Software functions

Password	Numeric code of max. 4 digits; 2 protection levels of the programming data:
1st level	Password “0”, no protection;
2nd level	Password from 1 to 9999, all data are protected
System selection	
System 3-Ph.n unbalanced load	3-phase (4-wire); 3-phase (3-wire).
System 3-Ph.1 (only AV5 and AV6) balanced load	3-phase (3-wire) one current and 3-phase to phase voltage measurements. 3-phase (4-wire) one current and 3-phase to neutral voltage measurements. 3-phase (2-wire) one current and 1-phase (L1) to neutral voltage measurement.
System 2-Ph	2-phase (3-wire).
System 1-Ph	1-phase (2-wire).
Transformer ratio	
VT (PT)	1.0 to 999.9 / 1000 to 9999 / 10.00k to 60.00k (only AV6)
CT	1.0 to 999.9 / 1000 to 6000 (only AV5 and AV6). The maximum power being measured cannot exceed 210 MW (calculated as maximum input voltage and current, see the “Accuracy” paragraph before. The maximum VT by CT ratio is 48.600). For MID complaint applications the maximum power being measured is 25MW.
Filter	
Operating range	0 to 100% of the input display scale
Filtering coefficient	1 to 32
Filter action	Measurements, serial output (fundamental variables: V, A, W and their derived ones).
Displaying	Up to 3 variables per page See « Display pages » 8 different set of variables available (see « Display pages ») according to the application being selected
Reset	By means of the front joystick: - dmd and max. dmd; - total energies and gas/water: kWh, kvarh; - partial energies and tariffs: kWh, kvarh
Easy connection function	
AV9-AV0 models	Automatic phase sequence detection with current and voltage synchronisation.
AV5-AV6-AV9-AV0 models	For all the display selections, both energy and power measurements are independent from the current direction. The displayed energy is always “imported” with the only exception of “F” and “H” types (see “display pages” table). For those latter selections the energies can be either “imported” or “exported” depending on the current direction.

General specifications

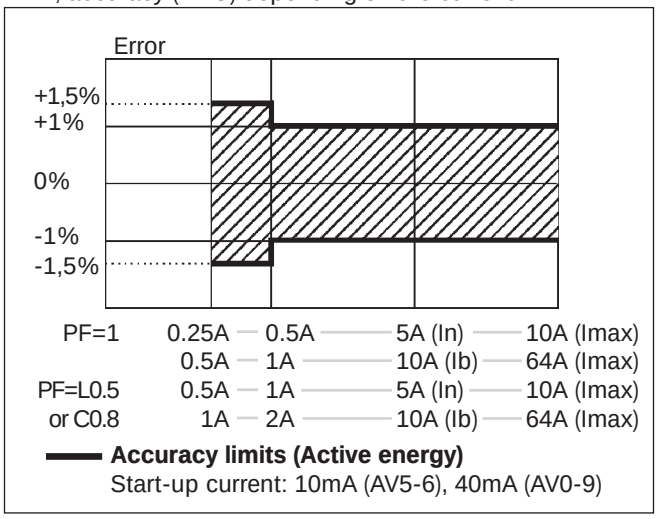
Operating temperature	-25°C to +55°C (13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C) according to EN62053-21 and EN62053-23
Storage temperature	-30°C to +70°C (22°F to 140°F) (R.H. < 90% non-condensing @ 40°C) according to EN62053-21 and EN62053-23
Installation category	Cat. III (IEC60664, EN60664)
Insulation (for 1 minute)	4000 VRMS between measuring inputs and power supply. 4000 VRMS between power supply and RS485/digital output
Dielectric strength	4000 VRMS for 1 minute
Noise rejection CMRR	100 dB, 48 to 62 Hz
EMC	According to EN62052-11
Electrostatic discharges	15kV air discharge;
Immunity to irradiated electromagnetic fields	Test with current: 10V/m from 80 to 2000MHz; Test without any current: 30V/m from 80 to 2000MHz;
Burst	On current and voltage measuring inputs circuit: 4kV
Immunity to conducted disturbances	10V/m from 150KHz to 80MHz
Surge	On current and voltage measuring inputs circuit: 4kV; on “L” auxiliary power supply input: 1kV;
Radio frequency suppression	According to CISPR 22
Standard compliance	
Safety	IEC60664, IEC61010-1 EN60664, EN61010-1 EN62052-11
Metrology	EN62053-21, EN62053-23. MID ”annex MI-003”
Pulse output	DIN43864, IEC62053-31
Approvals	CE, PTB (Revenue Approvals)
Connections	Screw-type
Cable cross-section area AV0-AV9 models	Max. 16 mm² (measuring inputs); Min. 2.5 mm² (measuring inputs) Other inputs: 1.5 mm² Min./Max. screws tightening torque: 1.7 Nm / 3 Nm
Cable cross-section area AV5-AV6 models	Max. 1.5 mm²
Housing DIN	
Dimensions (WxHxD)	71 x 90 x 64.5 mm
Material	Nylon PA66, self-extinguishing: UL 94 V-0
Mounting	DIN-rail
Protection degree	
Front	IP50
Screw terminals	IP20
Weight	Approx. 400 g (packing included)

Power supply specifications

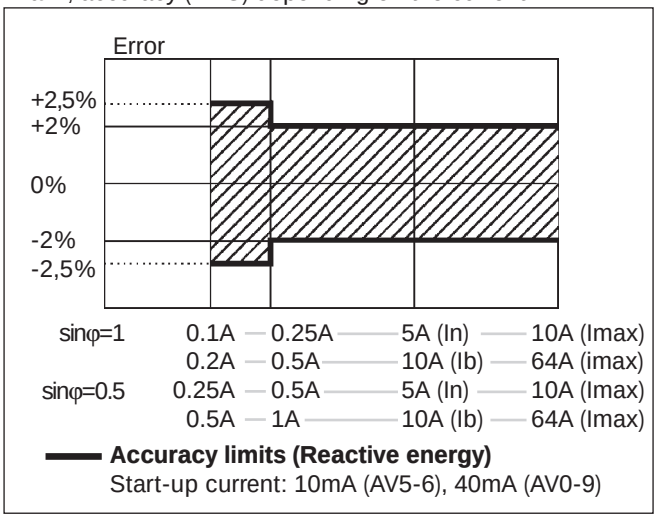
Self supplied version	AV9-AV0 models “O2” and “DP” options only: -20% +15%, 48-62Hz “R2”, “XS” and “IS” options only: -15% +10%, 48-62Hz
Note	The instruments provided with “IS” and “R2” options work only if all the voltage inputs are connected (3-phase and neutral). If a 1-phase connection has to be performed, the L1, L2 and L3 voltage inputs have to be short circuited. The instrument provided with “O2” option, working in a 3-phase system with neutral may work also if one or two phases are missing.
Auxiliary power supply	AV5-AV6 modules: L: 18 to 60VAC/DC; D: 115VAC/230VAC (48 to 62Hz)
Power consumption	
AV9-AV0 models	≤ 20VA/1W
AV9-AV0 models (IS option only)	≤ 12VA/2W
AV5-AV6 models	≤ 2VA/2W

Accuracy

kWh, accuracy (RDG) depending on the current



kvarh, accuracy (RDG) depending on the current



MID "Annex MI-003" compliance

Accuracy	0.9 Un ≤ U ≤ 1.1 Un; 0.98 fn ≤ f ≤ 1.02 fn; fn: 50 or 60Hz; cosφ: 0.5 inductive to 0.8 capacitive.
AV0-AV9 models	Class B I st: 0.04A; I min: 0.5A; I tr: 1A; I max: 64A.
AV5-AV6 models	Class B I st: 0.01A; I min: 0.05A; I tr: 0.25A; I n: 5A; I max: 10A
Operating temperature	-25°C to +55°C (13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C)
EMC compliance	E2

Used calculation formulas

Phase variables

Instantaneous effective voltage

$$V_{1N} = \sqrt{\frac{1}{n} \cdot \sum_{1}^{n} (V_{1N})_i^2}$$

Instantaneous active power

$$W_1 = \frac{1}{n} \cdot \sum_{1}^{n} (V_{1N})_i \cdot (A_1)_i$$

Instantaneous power factor

$$\cos\phi_1 = \frac{W_1}{VA_1}$$

Instantaneous effective current

$$A_1 = \sqrt{\frac{1}{n} \cdot \sum_{1}^{n} (A_1)_i^2}$$

Instantaneous apparent power

$$VA_1 = V_{1N} \cdot A_1$$

Instantaneous reactive power

$$VAr_1 = \sqrt{(VA_1)^2 - (W_1)^2}$$

System variables

Equivalent three-phase voltage

$$V_\Sigma = \frac{V_{12} + V_{23} + V_{31}}{3}$$

Voltage asymmetry

$$ASY_{LL} = \frac{(V_{LL\,max} - V_{LL\,min})}{V_{LL\,\Sigma}}$$

$$ASY_{LN} = \frac{(V_{LN\,max} - V_{LN\,min})}{V_{LN\,\Sigma}}$$

Three-phase reactive power

$$VAr_\Sigma = (VAr_1 + VAr_2 + VAr_3)$$

Three-phase active power

$$W_\Sigma = W_1 + W_2 + W_3$$

Three-phase apparent power

$$VA_\Sigma = \sqrt{W_\Sigma^2 + VAr_\Sigma^2}$$

Three-phase power factor (TPF)

$$\cos\phi_\Sigma = \frac{W_\Sigma}{VA_\Sigma}$$

Energy metering

$$kWh_i = \int_{t_1}^{t_2} P_i(t)\,dt \cong \Delta t \sum_{n_1}^{n_2} P_{n,i}$$

$$kVarh_i = \int_{t_1}^{t_2} Q_i(t)\,dt \cong \Delta t \sum_{n_1}^{n_2} Q_{n,i}$$

Where:

i= considered phase (L1, L2 or L3)
P= active power; **Q**= reactive power;
t_1, t_2 =starting and ending time points of consumption recording; **n**= time unit;Δ**t**= time interval between two successive power consumptions;
n_1, n_2 = starting and ending discrete time points of consumption recording

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List of the variables that can be connected to:

- RS485 communication port
- Alarm outputs (“max” variable”, “energies” and “hour counter” excluded)
- Pulse outputs (only “energies”)
- Dupline bus (only “kWh, kvarh, W, Wdmd, Wdmd max”)

No	Variable	1-phase system	2-phase system	3-ph. 4-wire balanced sys.	3-ph. 4-wire unbal. sys.	3 ph. 3-wire bal. sys.	3 ph. 3-wire unbal. sys.	Notes
1	V L-N sys	o	x	x	x	x	x	sys=system
2	V L1	x	x	x	x	x	x	
3	V L2	o	x	x	x	x	x	
4	V L3	o	o	x	x	x	x	
5	V L-L sys	o	x	x	x	x	x	sys=system
6	V L1-2	o	x	x	x	x	x	
7	V L2-3	o	o	x	x	x	x	
8	V L3-1	o	o	x	x	x	x	
9	A dmd max	o	x	x	x	x	x	Highest “dmd” current among the phases (1)
10	A L1	x	x	x	x	x	x	
11	A L2	o	x	x	x	x	x	
12	A L3	o	o	x	x	x	x	
13	VA sys	x	x	x	x	x	x	sys=system
14	VA sys dmd	x	x	x	x	x	x	sys=system (1)
15	VA L1	x	x	x	x	x	x	
16	VA L2	o	x	x	x	x	x	
17	VA L3	o	o	x	x	x	x	
18	var sys	x	x	x	x	x	x	sys=system
19	var L1	x	x	x	x	x	x	
20	var L2	o	x	x	x	x	x	
21	var L3	o	o	x	x	x	x	
22	W sys	x	x	x	x	x	x	sys=system
23	W sys dmd	x	x	x	x	x	x	sys=system (1)
24	W L1	x	x	x	x	x	x	
25	W L2	o	x	x	x	x	x	
26	W L3	o	o	x	x	x	x	
27	PF sys	x	x	x	x	x	x	
28	PF L1	x	x	x	x	x	x	
29	PF L2	o	x	x	x	x	x	
30	PF L3	o	o	x	x	x	x	
31	Hz	x	x	x	x	x	x	
32	Phase seq.	o	x	x	x	x	x	
33	Hours	x	x	x	x	x	x	
34	kWh (+)	x	x	x	x	x	x	Total or by user
35	kvarh (+)	x	x	x	x	x	x	Total or by user
36	kWh (+)	x	x	x	x	x	x	Partial or by tariff
37	kvarh (+)	x	x	x	x	x	x	Partial or by tariff
38	kWh (-)	x	x	x	x	x	x	Total
39	kvarh (-)	x	x	x	x	x	x	Total
40	m^3 Gas	x	x	x	x	x	x	Total
41	m^3 Cold H_2O	x	x	x	x	x	x	Total
42	m^3 Hot H_2O	x	x	x	x	x	x	Total
43	kWh H_2O	x	x	x	x	x	x	Total

(x) = available
(o) = not available (zero indication on the display)
(1) Max. value with data storage

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Display pages

Sel. pos.	No	1st variable (1st line)	2nd variable (2nd line)	3rd variable (3rd line)	Note	Applications							
						A	B	C	D	E	F	G	H
	1	Phase seq.	VLN sys	Hz		x	x	x		x	x	x	x
	2	Phase seq.	VLL sys	Hz							x	x	x
	3	Total kWh (+)	W sys dmd	W sys dmd max		x	x	x		x	x	x	x
	4	kWh (+)	A dmd max	“PArt”	“PArt” = Partial kWh (+)						x	x	x
	5	Total kvarh (+)	VA sys dmd	VA sys dmd max			x	x			x	x	x
	6	kvarh (+)	VA sys	“PArt”	“PArt” = Partial kvarh (+)						x	x	x
	7	Totalizer 1 (2)	W sys	(3)	(1)			x			x	x	x
	8	Totalizer 2 (2)	W sys	(3)	(1)			x			x	x	x
	9	Totalizer 3 (2)	W sys	(3)	(1)			x			x	x	x
	10	kWh (+)	t1 tariff	W sys dmd	(1) digital input enabled			x			x	x	x
	11	kWh (+)	t2 tariff	W sys dmd	(1) digital input enabled			x			x	x	x
	12	kWh (+)	t3 tariff	W sys dmd	(1) digital input enabled			x			x	x	x
	13	kWh (+)	t4 tariff	W sys dmd	(1) digital input enebled			x			x	x	x
	14	kvarh (+)	t1 tariff	W sys dmd	(1) digital input enabled			x			x	x	x
	15	kvarh (+)	t2 tariff	W sys dmd	(1) digital input enabled			x			x	x	x
	16	kvarh (+)	t3 tariff	W sys dmd	(1) digital input enabled			x			x	x	x
	17	kvarh (+)	t4 tariff	W sys dmd	(1) digital input enabled			x			x	x	x
	18	kWh (+) X	W X	User X	(1) specific function enabled				x				
	19	kWh (+) Y	W Y	User Y	(1) specific function enabled				x				
	20	kWh (+) Z	W Z	User Z	(1) specific function enabled				x				
	21	Total kvarh (-)	VA sys dmd	VA sys dmd max							x		x
	22	Total kWh (-)	W sys dmd	W sys dmd max						x	x		x
	23	Hours	W sys	PF sys						x	x	x	x
	24	Hours	var sys	PF sys						x	x	x	x
	25	var L1	var L2	var L3								x	x
	26	VA L1	VA L2	VA L3								x	x
	27	PF L1	PF L2	PF L3								x	x
	28	W L1	W L2	W L3						x		x	x
	29	A L1	A L2	A L3						x		x	x
	30	V L1-2	V L2-3	V L3-1								x	x
	31	V L1	V L2	V L3			x		x	x		x	x
0	Selector position which can be linked to any of the variable conbinations listed above (No. from 1 to 31)												
1	Selector position which can be linked to any of the variable conbinations listed above (No. from 1 to 31)												
2	Selector position which can be linked to any of the variable conbinations listed above (No. from 1 to 31)												
3	Selector position which can be linked to any of the variable conbinations listed above (No. from 1 to 31). In this position the front LED blinks proportionally to the reactive energy (kvarh) being mesured												

(1) The page is available according to the enabled measurement.

(2) m^3 Gas, m^3 Water, kWh remote heating.

(3) Hot or Cold (water).

Note: in case of alarm the down arrow on the display blinks. There is a time-out of 60s that brings the scrolled page to the default one (selectable according to the table given above).

Additional available information on the display

Type	1st line	2nd line	3rt line
Meter information 1	Serial number	Year of production	Display page index
Meter information 2 (AV0-9)	System (1-2-3-phase)	Connection (2-3-4-wire)	dmd (time)
Meter information 3 (AV5-6)	CT ratio	System (1-2-3-phase)	Connection (2-3-4-wire)
Meter information 4 (AV5-6)	VT/PT ratio		dmd (time)
In case of alarm output	Alarm output 1 or 2 status	Set-point value	Variable type
In case of pulse output	Pulse output 1 or 2 variable link (kWh/kvarh)	Output pulse weight (pulse/kWh/kvarh)	
In case of communication port	Serial port	Address	RS485 status (RX-TX)

List of selectable applications

	Description	Notes
A	Basic domestic	Mainly energy metering
B	Shopping centres	Mainly energy metering
C	Advanced domestic	Mainly energy metering (total and based on tariff), gas and water metering
D	Multi domestic (also camping and marinas)	Mainly energy metering (3 by single phase)
E	Solar	Energy meter with some basic power analyzer functions
F	Industrial	Mainly energy metering
G	Advanced industrial	Energy metering and power analysis
H	Advanced industrial for power generation	Complete energy metering and power analysis

Insulation between inputs and outputs

	Measuring Inputs	Relay outputs	Open collector outputs	Comm. port and digital inputs	Self power supply	Auxiliary power supply
Measuring Inputs	-	4kV	4kV	4kV	0kV	4kV
Relay outputs	4kV	-	-	-	4kV	4kV
Open collector outputs	4kV	-	-	-	4kV	4kV
Comm. port and digital inputs	4kV	-	-	-	4kV	4kV
Self power supply	0kV	4kV	4kV	4kV	-	-
Aux. power supply	4kV	4kV	4kV	4kV	-	-

NOTE: all the models with auxiliary power supply have, mandatory, to be connected to external current transformers because the isolation among the current inputs is just functional (100VAC).

Tamper proof accessory kit

The “tamper proof” kit is available with the “P” option (two screw protection covers).

The instrument can be sealed in three points:
- Upper cover;
- Lower cover;
- Front selector (to lock the instrument programming);

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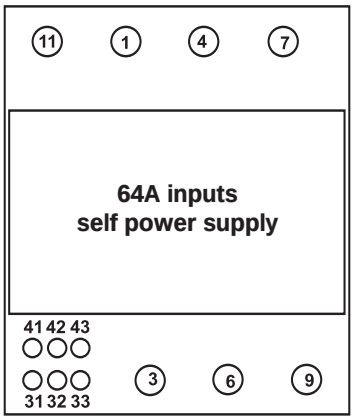
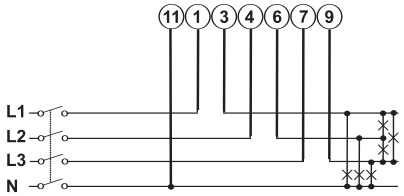
Wiring diagrams

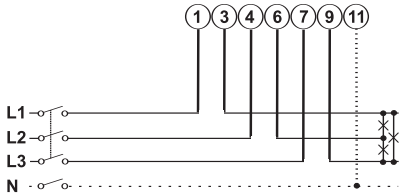


(64A) System type selection: 3P.n

3-ph, 4-wire, unbal./bal. load **Fig.1**



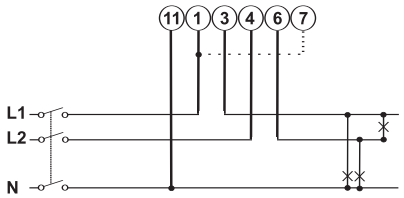
3-ph, 3-wire, unbal./bal. load **Fig. 2**



The neutral connection is mandatory with "IS" or "R2" options.

(64A) System type selection: 2P

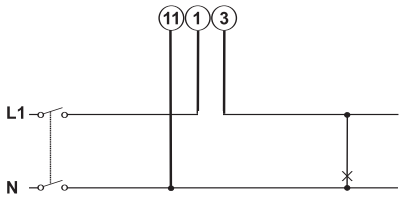
2-ph, 3-wire, unbal./bal. load **Fig. 3**



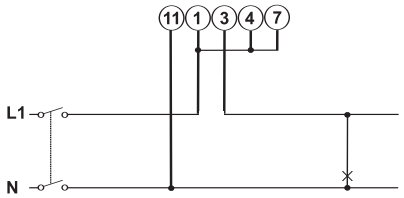
The ⑦ connection is mandatory with "IS" or "R2" options.

(64A) System type selection: 1P

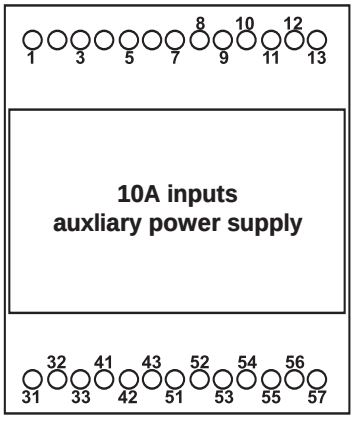
1-ph, 2-wire, "O2" option **Fig. 4**



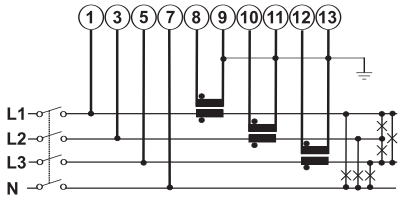
1-ph, 2-wire, "IS" and "R2" option **Fig. 5**



(10A) System type selection: 3P.n

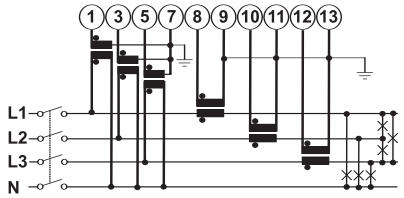


3-ph, 4-wire, unbalanced load **Fig. 6**



3-CT connection

3-ph, 4-wire, unbalanced load **Fig. 7**



3-CT and 3-VT/PT connections

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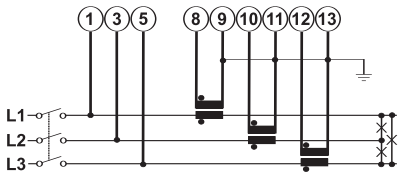
Wiring diagrams

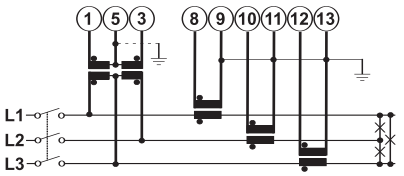
(10A) System type selection: 3P.n

3-ph, 3-wire, unbalanced load **Fig. 8**



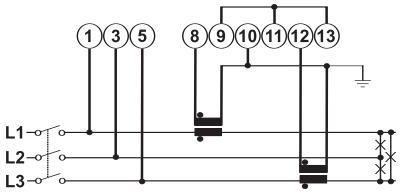
3-CT connection

3-ph, 3-wire, unbalanced load **Fig. 9**



3-CT and 2-VT/PT connections

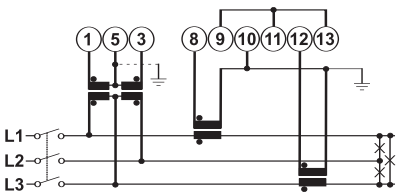
3-ph, 3-wire, unbalanced load **Fig. 10**



2-CT connections (ARON)

System type selection: 3P.1

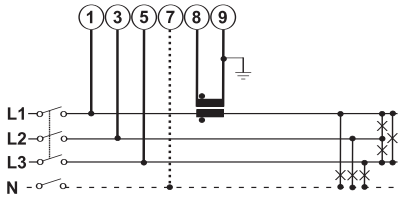
3-ph, 3-wire, unbalanced load **Fig. 11**



2-CT and 2-VT/PT connections ARON

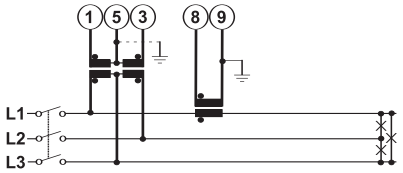
3-ph, 3-wire, balanced load **Fig. 12**

1-CT connection



NOTE: a 2-wire connection for voltage measurement is available accross ① and ⑦ .

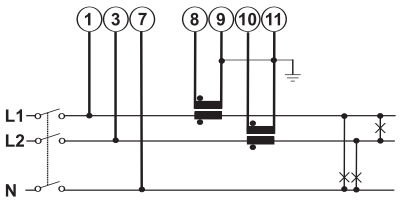
3-ph, 3-wire, balanced load **Fig. 13**



1-CT and 2-VT/PT connections

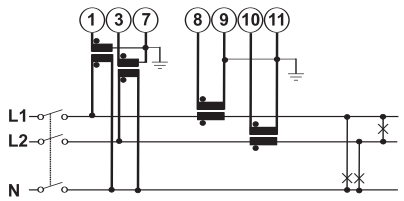
(10A) System type selection: 2P

2-ph, 3-wire **Fig. 14**



2-CT connection

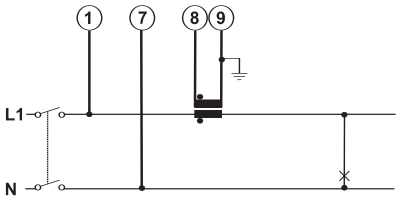
2-ph, 3-wire **Fig. 15**



2-CT and 2-VT/PT connections

(10A) System type selection: 1P

1-ph, 2-wire **Fig. 16**

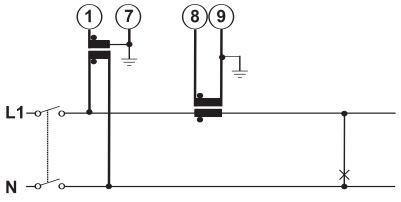


1-CT connection

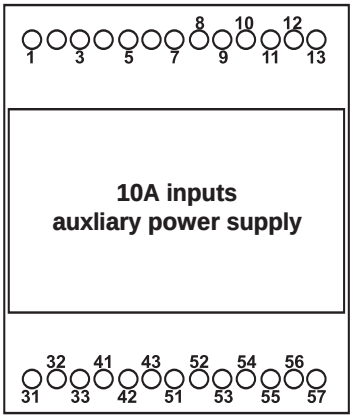
Wiring diagrams

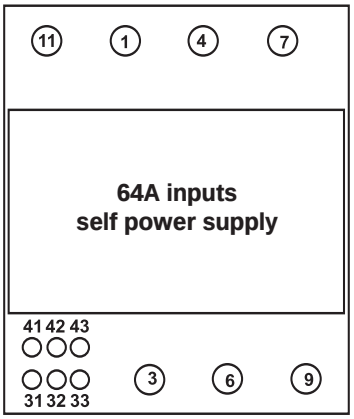
(10A) System type selection: 1P

1-ph, 2-wire **Fig. 17**



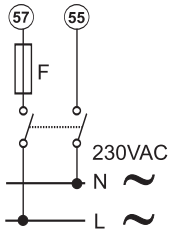
1-CT and 1-VT connections





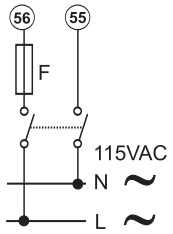
Power supply wiring diagrams (auxiliary power supply)

230VAC (“D” option)



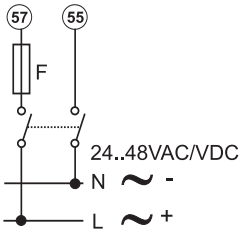
F= 250V [T] 50mA

115VAC (“D” option)



F= 250V [T] 100mA

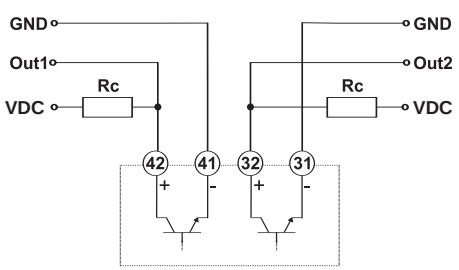
24 to 48VAC/DC (“L” option)



F= 250V [T] 200mA

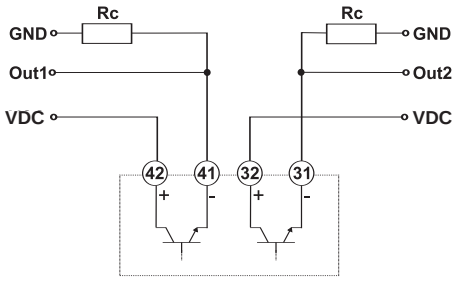
Open collector and relay outputs wiring diagrams

Open Collector



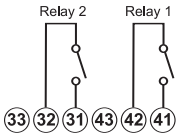
GND reference

Open Collector



VDC reference

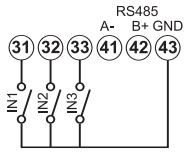
Relay



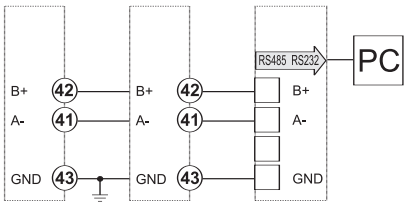
The load resistances (RC) must be designed so that the close contact current is lower than 100mA; the VDC voltage must be lower than or equal to 30VDC.

Digitala inputs and RS485 port wiring diagrams

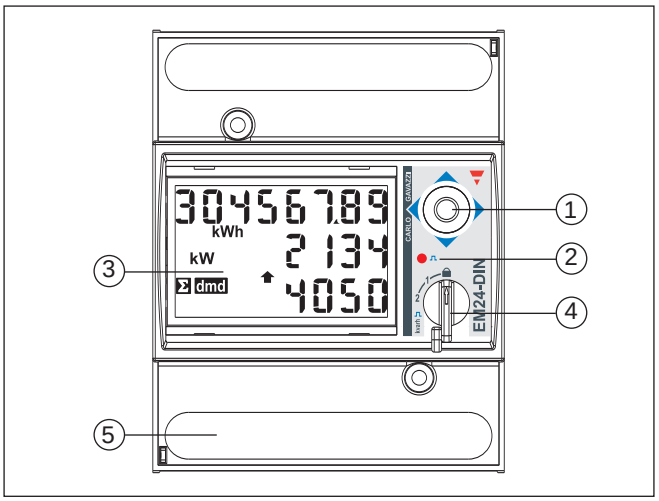
Digital Inputs

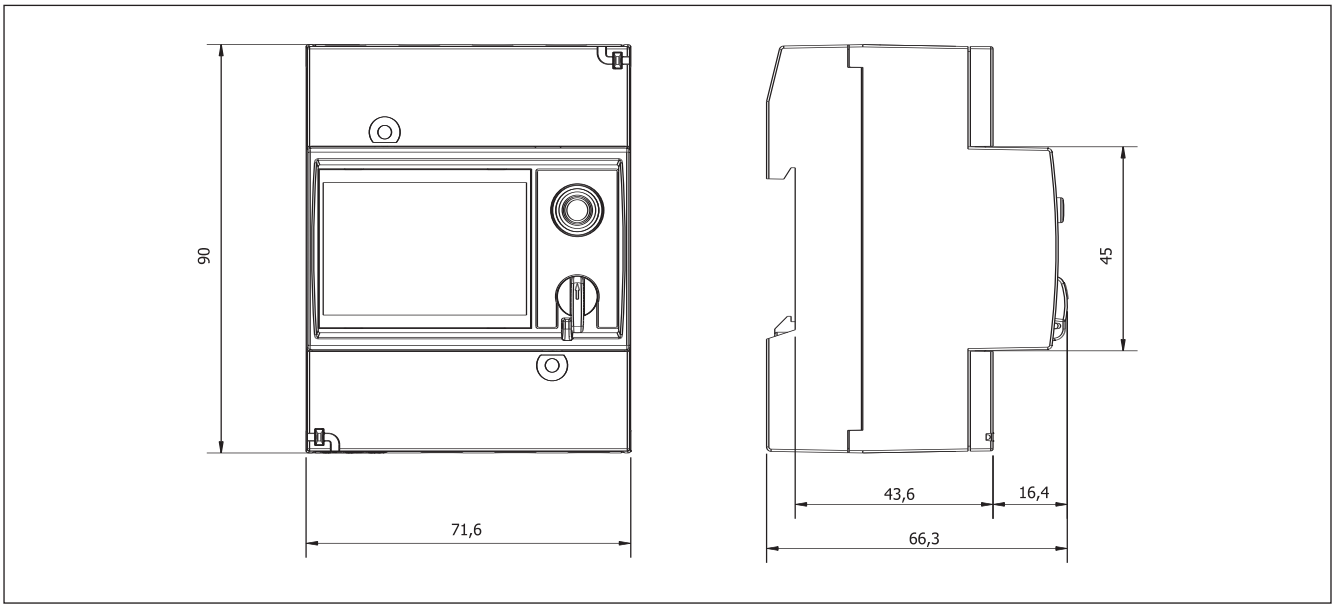


RS485 port



Front panel description



1. **Joystick**
   To program the configuration parameters and scroll the variables on the display.
2. **LED**
   Red LED blinking proportional to the energy being measured.
3. **Display**
   LCD-type with alphanumeric indications to:
   - display configuration parameters;
   - display all the measured variables.
4. **Selector**
   To select the desired display pages and to lock the programming.
5. **Connections**
   Screw terminal blocks for instrument wiring.

Dimensions