

EM4-DIN: three-phase energy meter

*Energy meters; Gas and Water meters; Plug and play technique. These are only a few among many other functions performed by your EM4-DIN. What's more, Carlo Gavazzi means ISO9001 certification, a working experience of many decades and a widespread presence all over the world. All this because we want our customers to have the **top service** and the **top products**.*

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EN61036
EN61268

EM4-DIN Instruction manual: INDEX

CARLO GAVAZZI

EM4-DIN, three-phase energy meter

FW rev.01

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We suggest you to keep the original packing in case it is necessary to return the instrument to our Technical Service Department. In order to achieve the best results with your instrument, we recommend you to read this instruction manual carefully.

HOW TO USE THE SYMBOLS



Go to the page where the previous main subject is described.



Go to the page where the next main subject is described.



Go to the page where the subject written on the top of the current page starts.



Go to the page where the subject written on the bottom of the current page finishes.



This symbol indicates a particularly important subject or information.



This symbol indicates that more details are given on the current subject.



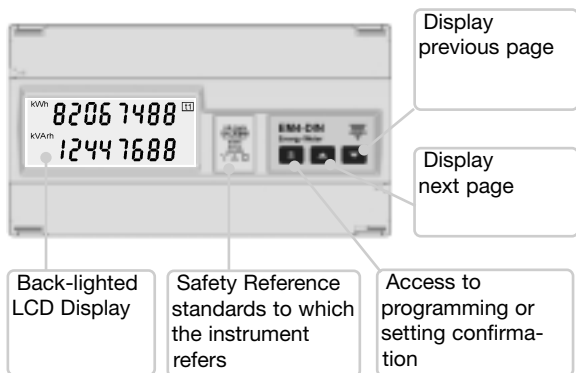
Access to the main menu



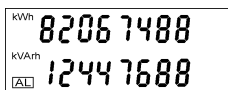
4

To begin with

■ Front panel description



■ List and description of displayed measuring pages



When the instrument is switched on, it displays the first measuring page relating to the kWh and

kvarh total meters (as shown in the picture on the top of the page); the next pages are modified according to the setting of the instrument. To display the other measuring pages, use the ▲ ▼ keys. Using the ▲ key when the instrument is **without digital input module or set on "tot par"**, the instrument displays:

kWh 8206 7488 ^{t1}
kVArh 1244 7688

The values of the partial energy meters.

kWh 8206 7488 ^{t1}
kVArh 1244 7688

The instrument displays the energy values corresponding to the following tariffs: t1, t2, t3 and t4 **when the digital input modules are present and the instrument is set on "tot prd"**. The tariffs are managed by setting the digital inputs as shown in the table on page 13.

kWh 8206 7488 ^{t2}
kVArh 1244 7688

kWh 8206 7488
kVArh 1244 7688 ^{t3}

Energy meters display, tariff 3.

kWh 8206 7488
kVArh 1244 7688 ^{t4}

Energy meters display, tariff 4.

0.0
GAS m³

When digital input modules are present and the instrument is set on "tot 1.Cn", it displays the GAS m³ (daily tariff),

0.0
GAS 'm³

and the GAS m³ (night tariff); hour periods are managed by means of the digital inputs (see table on page 13).

6 To begin with

0.0
H₂O m³



0.0
GAS m³



When digital input modules are present and the instrument is set on “tot 2.Cn”, it displays the

WATER meter m³ (H₂O)
and the GAS m³ meter.

These pages are common to all the settings of the instrument.

w 0.0
L1



It displays the W active power relating to phase 1.

w 0.0
L2



It displays the W active power relating to phase 2.

w 0.0
L3



It displays the W active power relating to phase 3.

w 0.0
d md



It displays the Wdmd system active power



CT ratio



If the RS422/485 is present, then “r” means that the instrument is receiving data, while “t” means that the instrument is transmitting data; this confirms that the serial module is operating correctly and that the wiring is correct.

rt L 123
[AL] Err 123

Phase sequence: 1.2.3 is correct and 3.2.1 is wrong.

“AL” indicates that the alarm is active (for all measuring pages).

“Err” stands for a reversed current connection and “1.2.3” shows its phase. See “Useful information” on page 20.

kWh 8206 7488
kVArh 1244 7688
[AL]

The scrolling of the measuring pages is cyclic, at the end of the cycle, you go back to the first page on the left.

kWh 8206 7488
kVArh 1244 7688
[AL]

■ Access to the main menu

From the measuring and display phase, press the **[S]** key, to enter the programming menu, when the password is requested, enter the correct PASS value by means of the **[▲]** and **[▼]** keys, then confirm it using the **[S]** key.

[S]
PASS ?
1000 [AL]
[S] **[▲]** **[▼]**

If the PASSWORD is correct (when the instrument is new, it's equal to 0), you access the main menu.

Access to the main menu

CnG PASS
1000

S

CnG PASS
255

AL

S

▲

▼

Change password

This function allows you to choose the desired password value (from 0 to 1000). Choose the function “CnG PASS” by means of the ▲ and ▼ keys;

then press S to modify PASS, enter the desired value by means of the ▲ and ▼ keys and confirm the new value with the S key.



When the “AL” box (normally used for the alarm indication) is active during the programming phase, it means that the displayed value can be modified. This rule is valid for all the programming menus.

Ct rAtio
1000

S

Ct rAtio
500

AL

S

▲

1.2...
2.1

▼

rESEt
ALL no

S

AL

rESEt
ALL YES

AL

S

▲

▼

Ct rAtio
500

k

CT ratio

This function allows the user to select the value of the CT ratio. Example: if the CT primary (current transformer) has a current of 300A and the secondary has a current of 5A, the CT ratio corresponds to 60 (that is 300/5). Choose the “Ct rAtio” function by means of the ▲ and ▼ keys;

to enter the menu press S ; then select the desired value by means of the ▲ and ▼ keys and confirm the new value with S.

U_t rAt 10
10

[S]

U_t rAt 10
1999 [AL]

[S]

▲ 1.2. ▼
...2.1

rESET
ALL no [AL]

[S]

rESET
ALL YES [AL]

[S]

▲ ▼

U_t rAt 10
1999



The energy meters are reset by changing the CT or VT ratio.

■ VT ratio

This function allows you to select the VT ratio's value. Example: if the connected VT primary (voltage transformer) is 20kV and the secondary is 100V, the VT ratio corresponds to 200 (that is 20000/100). Choose the "Vt rAtio" function by means of the ▲ and ▼, to enter the menu press [S], then select the desired value by means of the ▲ and ▼ keys and confirm it with [S].

P int t
15

[S]

P int t
30 [AL]

[S]

▲ 1.2. ▼
...2.1

P int t
30 [AL]

■ Dmd calculation

This function allows the user to select the integration time of the W and VA demand value (VA only by means of RS485). To enter these functions select "P int t" from the main menu by means of the ▲ and ▼ keys, to enter the menu press [S]. Set the minutes by the ▲ and ▼ keys and confirm the value with [S].

Access to the main menu

Pulse combination

7

7

17

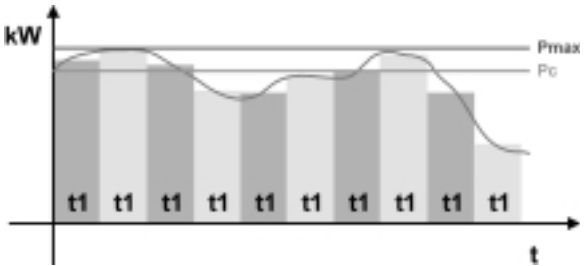
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If, for example, you select the value 15 minutes, the instrument calculates the dmd value and updates it every 15 minutes.

DMD VALUE CALCULATION



Where: P_c is the contractual power,
 t_1 is the selected period of demand/integration

SYNCHRONISATION OF THE POWER DMD CALCULATION

The calculation can be synchronized in two different ways:

- without DIGITAL INPUT module:
the reset and the beginning of the SYNCHRONISATION is carried out when the instrument is switched on;
- with installed DIGITAL INPUT module:
the SYNCHRONISATION starts at the status modification of the digital inputs (therefore when the tariff changes). A following change of status resets and synchronizes again the power demand calculation.

COUnTEr
tot PAr

S

CountEr
tot PAr

AL

S



Scroll the parameters of the energy meters, see the functions described below.

■ Access to the energy meters menu

This function allows the user to choose the parameters for the management of the energy meters. Choose the function “COUnTEr” by means of the and keys: to confirm the value and enter the submenu press . By means of the and keys, it's possible to scroll all the functions relating to the energy meters that will be described in detail below.



The submenu of the energy meters with the relevant functions is only available if the digital input module is present; if not, the instrument displays only the total and partial energy meters (kWh and kvarh) and the relevant menu “COUnTEr tot PAr”.

COUnTEr
tot PAr

S



CountEr
tot Prd

AL

S



□ The functions of the Energy Meters submenu.

Choose the desired function by means of the and keys, press to confirm. It's possible to choose the following combinations:

tot PAr: it enables the combination of total and partial meters.

tot Prd: it enables the combination of total and partial meters: tariff t1, t2, t3 and t4 managed by the digital inputs;

12 Programming

CountEr
tot 1.Cn

AL

S

PrESCAL
C1 10

AL

S

▲

1.2.
..2.1

▼

CountEr
tot 2.Cn

AL

S

PrESCAL
C1 10

AL

S

▲

1.2.
..2.1

▼

PrESCAL
C2 10

AL

S

▲

1.2.
..2.1

▼

tot 1.Cn: it enables the combination of total meters and day-time and night-time GAS counters (see also “Display pages” on page 5). Once “PrESCAL C1” has been selected,

enter by means of the ▲ ▼ keys the weight of every pulse of the IN2 digital input of the GAS counters and confirm with **S**.

The same input increases alternatively the day-time and night-time meters.

tot 2.Cn: it enables the combination of total meters and Water and Gas counters (see also “Display pages” on page 6). Once the “PrESCAL C 1” has been selected,

enter by means of the ▲ ▼ keys the weight of every pulse of the IN1 digital input of the water counter, confirm with **S** and go to the “PrESCAL C 2” submenu.

Enter by means of the ▲ ▼ keys the weight of every pulse of the IN2 digital input of the Gas counters, then confirm with **S**.



The prescaler (PrESCAL) sets the weight of the input pulses to the digital input module; e.g.: by setting the prescaler at 10, for each received pulse the meter increases by 10 (10, 20, 30, etc.). The range of the prescaler varies from 0.1 to 100.0.

Access to the main menu

7

Digital outputs

14

7

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The increase of the Water, Gas / night tariff gas counters or the change of tariff (t1, t2 t3, t4) is carried out thanks to the combination of the input pulses to the AO2940 digital input module, according to the following table:

INSTRUMENT MODE	DIGITAL INPUTS		RESULT
	IN 1	IN 2	
“tot Prd” mode Display of total and partial multitariff meters.	ON	ON	Tariff 1
	ON	OFF	Tariff 2
	OFF	ON	Tariff 3
	OFF	OFF	Tariff 4
“tot 1.Cn” mode Display of total and day/night time tariff GAS meters.	ON	GAS counter increase	GAS Night tariff
	OFF		GAS Day tariff
“tot 2.Cn” mode Display of total, GAS and WATER meters.	WATER counter increase	GAS counter increase	

For the connections of the AO2940 digital input module, see page 26.

diG out

[S]

diG out 1
ACt EnE

[S]

[AL]

diG out 1
rEA EnE

[S]

[AL]

[▲] [▼]

^w diG out 1
AL dmd

[AL]

[S]

Alarm parameters on page 15

[▲]

[▼]

diG out 1
rEn

[S]

diGout 1
PUL 100

[AL]

[S]

[▲]

1.2.
.2.1

[▼]

To digital output 2 on page 16

Digital Outputs

Digital Output 1

This function enables to set the parameters of the open collector digital outputs. Choose the “diGout” function by means of the **diGout** function by means of the **▲** and **▼** keys, to enter the menu press **[S]**. Then, you may set the following parameters.

ACt EnE: enable the retransmission of the active energy by means of pulses. Confirm with **[S]** and then set the number of pulses (see table on page 19) by means of the **▲** and **▼** keys and confirm the value with **[S]**.

rEA EnE: enable the retransmission of the reactive energy by means of pulses. Confirm it with **[S]** and then set the number of pulses (see table on page 19) by means of the **▲** and **▼** keys and confirm the value with **[S]**.

AL dmd: access to the alarm function (see alarm digital output

on page 15). Confirm with **[S]** to enter the relevant menu.

rEn: enables the activation of the output by means of the serial communication. Confirm with **[S]** to enable the function.

W d iG out 1
AL AL dmd

S

W d iG out 1
AL on 1999

S ▲ 1.2. ▼
.2.1

W d iG out 1
AL off 1999

S ▲ 1.2. ▼
.2.1

d iG out 1
AL nd

d iG out 1
AL nE

S ▲ ▼

d iG out 1
AL SEC 255

S ▲ 1.2. ▼
.2.1

To digital output 2
on page 16

Alarm Digital Output

This function allows the user to set the parameters of the alarm digital output relating to the Wdmd variable (Power dmd). Choose the “diGout1- AL dmd”

function by means of the ▲ ▼ keys: to enter the menu press S.

Then, you may set the following parameters.

on: on-alarm set-point. It's the value of the W dmd variable over which the alarm is activated.

Select the value of the W dmd variable by means of the ▲

▼ keys and confirm with S.

off: off-alarm set-point. It's the Wdmd value over which the alarm is deactivated. Select the Wdmd

value by means of the ▲ ▼

keys and confirm it with S.

nd: normally de-energized output when there is no alarm.

nE: normally energized output when there is no alarm.

Select the output status by means of the ▲ and ▼ keys and confirm it with S.

SEC: delay time at the activation of the alarm output. Choose the value of the delay time in seconds by means of the ▲ ▼ keys (up to 255 seconds) and confirm with S.

16 Programming

From Digital output 1,
rEn, Pul, SEC page15

dig out2
[AL] Act EnE

dig out2
[AL] rEA EnE

dig out2
[AL] Pul 100

[S] ▲ 1.2... ▼
 .2.1

dig out

□ Digital output 2

Act EnE: enables the retransmission of the active energy by means of pulses. Confirm with [S] and afterwards set the number of pulses (see table on page 19) by means of the ▲ ▼ keys and confirm the value with [S].

rEA EnE: enables the retransmission of the reactive energy by means of pulses. Confirm it with [S] and then set the number of pulses (see table on page 19) by means of the ▲ ▼ keys and confirm with [S].

AddrESS
1

[S]

AddrESS
[AL] 255

[S] ▲ 1.2... ▼
 .2.1

AddrESS
255

■ RS422/ 485 Serial port address

Select “AddrESS” from the main menu by means of the ▲ ▼ keys; to enter the menu press [S], then set the desired address value (from 1 to 255) by means of the ▲ ▼ keys and confirm it with [S].

rESEt
tot

S

rESEt
tot no

S

rESEt
tot YES

S

▲ ▼

RESET

Reset of total meters

Select “rESEt tot” from the main menu by means of the ▲ ▼ keys, then confirm with **S**; when the instrument asks for the reset, you can choose, by means of the ▲ ▼ keys:

- “no tot” to avoid the reset or
- “YES tot” to confirm it.

Then, press **S** to carry out the command.

rESEt
Prt

S

rESEt
Prt no

S

rESEt
Prt YES

S

▲ ▼

RESET

Reset of partial meters

Select “rESEt Prt” from the main menu by means of the ▲ ▼ keys, then confirm with **S**; when the instrument asks for the reset, you can choose, by means of the ▲ ▼ keys:

- “Prt no” to avoid the reset or
- “prt YES” to confirm it;

then, press **S** to carry out the command.

End
r.0.1

S

To measur-
ing mode

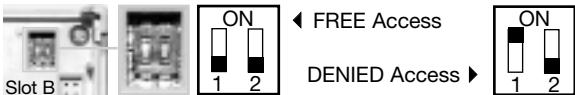
Instrument's
revision

End of programming

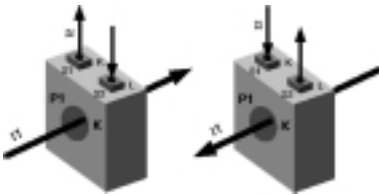
Use it to exit from programming and go back to the measuring mode. Select “End” from the main menu by means of the ▲ ▼ keys, then confirm it with **S**.

■ How to prevent the programming by key-pad

It's possible to prevent access to programming by modifying the dip-switch under slot B. Set dip-switch 1 in ON position to inhibit programming; set dip-switch 1 in OFF position to enable programming again.



The variables measured by the instrument are correct if the polarities of the inputs have been observed (as shown in the figure below); if not, measuring and retransmission errors may occur due to the wrong direction of the current flowing in the primary / secondary of the connected current transformer.



■ CT and VT programming; Open collector digital output pulse table

The CT is programmable from 1 to 5000, the VT is programmable from 1.0 to 199.9 and from 200 to 1999 (CT*VT ratio limited to 5000). The CT must be programmed before

the VT because the programming of VT depends on the CT value: if the CT is modified, then the VT value automatically satisfies the expression: $CT \cdot VT \leq 5000$. If the CT or VT values are modified, then the display resolution of the variables and of the “pul” (pulses) parameter changes automatically according to the table below.

When the CT or VT value is modified, then the energy meters are reset (after an alert message for confirmation). the resolution of the energy meters is 0.1k (Wh/varh) with maximum indication 1999999.9k (display from 0.0k to 1999999.9k and from 2000000k to 99999999k). Once the limit of 99999999k is reached, the meters are automatically reset.

EM4 version 5(10) A				
CT ratio * VT ratio		Range: pulses/kWh (kvarh)		
From	To	From	To	
1.0	5.0	1	100	pulses/kWh(kvarh)
5.1	50.0	0.1	10.0	pulses/kWh(kvarh)
50.1	500.0	0.01	1.00	pulses/kWh(kvarh)
500.1	5000.0	1	100	pulses/kWh(kvarh)
EM4 version 20(90)A excluded version 660VAC				
CT ratio * VT ratio		Range: pulses/kWh (kvarh)		
From	To	From	To	
1.0	5.0	1	100	pulses/kWh(kvarh)
EM4 version 20(90)A only version 660VAC				
CT ratio * VT ratio		Range: pulses/kWh (kvarh)		
From	To	From	To	
5.1	50.0	0.1	10.0	pulses/kWh(kvarh)

■ The “Err” message

The instrument takes the measure only for quadrants 1 and 4 (consumed energy). The active energy is obtained by integrating only the sum of the phase active powers on quadrants 1 and 4. Any active powers in quadrants 2 and 3 are forced to zero and the message “Err” (phase 1, 2 or 3) is displayed on the current page to indicate a wrong connection (see the relevant page displayed by the instrument on page 7).

■ Displayed variables

No	1 st variable	2 nd variable	Notes
1	kWh	kvarh	
2a	kWh (t1 or t1-t2-t3-t4)	kvar (t1 or t1-t2-t3-t4)	Depending on the type of selection.
2a	GAS m ³ day-time	GAS m ³ night-time	For the energy you can choose two op. modes: t1 partial meters or t1-t2-t3-t4 multi-tariff select.
2c	H ₂ O m ³	GAS m ³	
3	W _{L1}		
4	W _{L2}		
5	W _{L3}		
6	W _{dmd}		dmd=demand
7	Display of serial communication status, phase sequence and wrong connection of current measuring inputs.		

W and var are the variables that can be retransmitted by means of pulses.

W_{dmd} (power dmd) is the only variable that can be monitored by the alarm output. Both the functions: retransmission by means of pulses and alarm are carried out by means of the “AO2900 Open collector output” optional module.

Alarm digital output

The activation of the alarm can be up-type or down-type depending on how the ON and OFF parameters have been set, according to the following table:

ON-OFF VALUES COMPARAISON	ALARM TYPE
$ON \geq OFF$	UP
$ON < OFF$	DOWN

Display of the programming menu



It may be useful to underline that the programming menus displayed by the instrument depend on its configuration; e.g.: the instrument will not display the menu relevant to the digital outputs if the “digital inputs” optional module is not present.

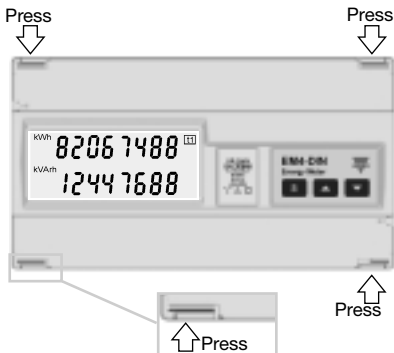


IT IS IMPORTANT that the instrument is switched off when you plug-in or disconnect the optional modules.

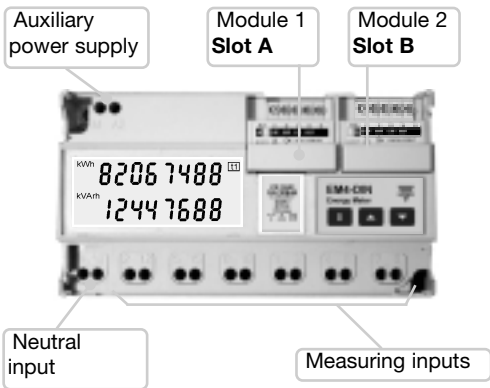
For SAFETY reasons, in the 20(90)A version the tightening torque value of the current terminals must be within 2Nm and 6Nm.

22 Installation

How to remove the front cover



To remove the front cover of EM4-DIN, press contemporaneously the four release levers at the four angles of the instrument as shown above.



Reset of meters

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Removing the modules

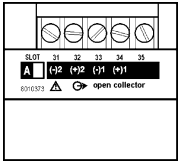
31

24

■ The possible module combinations

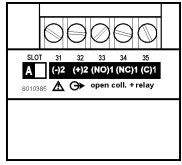
POWER SUPPLY	SELF		AUXILIARY	
MODULE DESCRIPTION	SLOT A	SLOT A	SLOT A	SLOT B
AO2900 open collector output AO2900 (pulse, alarm or remote)	✓	✓		
Relay output + open collector output AO2910	✓	✓		
AO2940 digital inputs		✓		
AR2950 RS422/ 485 Serial port				✓

AO2900



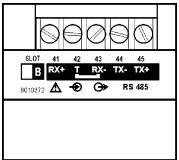
AO2900
open collector output

AO2910



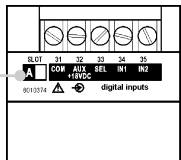
Relay output + open collector output

NOTE: during programming, output 1 is connected to «diGout 1» (digital output 1) and output 2 to «diGout 2» (digital output 2).



AR2950 RS422/485
SERIAL PORT

It shows the position where the optional module is to be installed: slot A in this case.



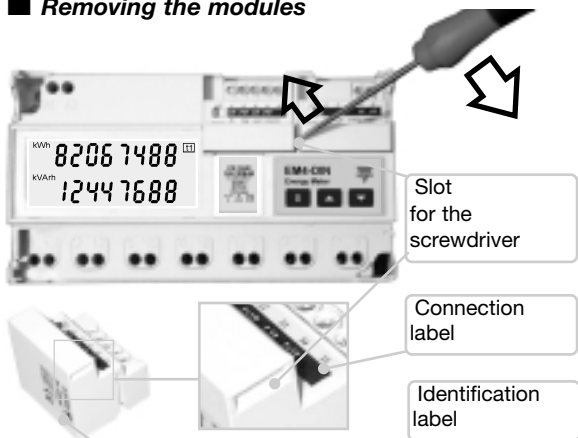
AO2940
DIGITAL INPUTS

High or low alarm

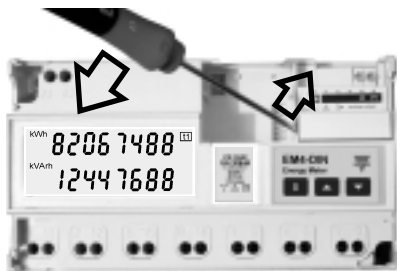
Serial port connections

24 Installation

■ Removing the modules



To remove the modules, use a screwdriver. Insert the screwdriver in the slot on the side of the removable modules, as indicated in the figure above. Use the screwdriver as a lever to take out the module. For the second module follow the same procedure.



Pulse table

19

Digital input modules

26

22

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Access to programming:
ALLOWED. See also
“Useful information”
on page 18.

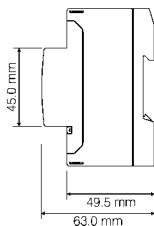
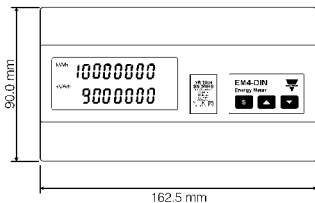


To configure the instrument correctly, it is important to verify that dip-switch 1 is in OFF position. See figure above.



WARNING: DANGEROUS VOLTAGES. The connectors in the optional slots and the screws of the terminals are live if the instrument or the connected load are powered on.

■ Dimensions and panel cut-out



Dimensions for
panel-cut-out



Hole distances for
panel mounting

Module combination

5A electrical diagrams

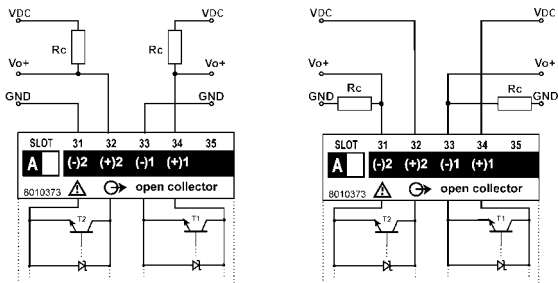
23

22

31

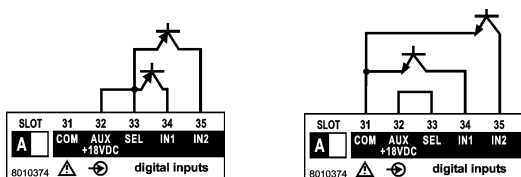
29

Open collector output connections



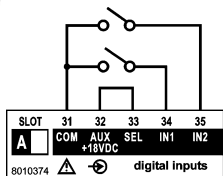
The grounds of the open collector outputs are separate, so that it's possible to carry out two different connections for the same module. The load resistance (R_c) must have a value that makes the short-circuit current lower than 100mA; the VDC voltage must be lower than or equal to 30V.

Digital input connections

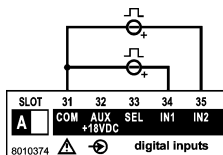


PNP connection

NPN connection



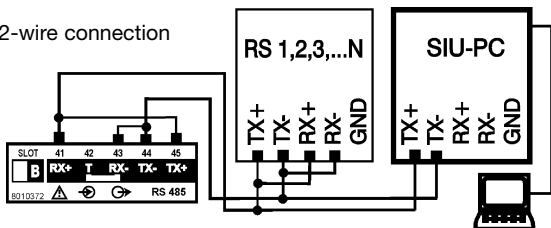
Terminal connection



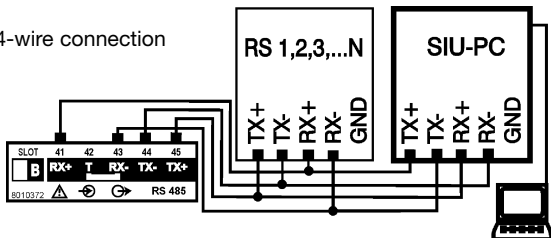
Voltage connection

RS422/ 485 serial port connections

2-wire connection



4-wire connection



The termination of the serial port is carried out only on the last instrument of the network, by means of a jumper connection between (RX-) and (T). The 4-wire connection is recommended since the data, by means of serial port, are exchanged more quickly.

20 (90)A version electrical diagrams

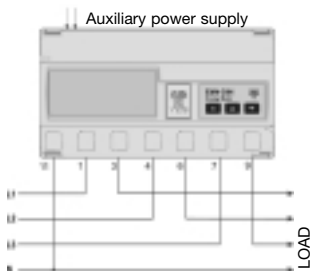


Fig. 1: Direct connection with neutral (3-phase system) Unbalanced load

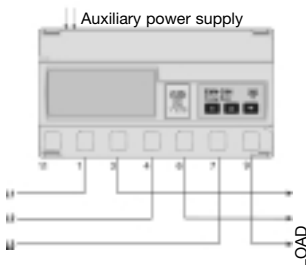


Fig. 2: Direct connection without neutral (3-phase system) Unbalanced load

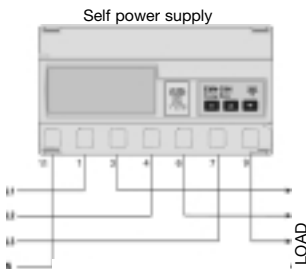


Fig. 3: Direct connection without neutral (3-phase system) Unbalanced load
Note: the neutral in the self-supplied version must always be connected to the instrument

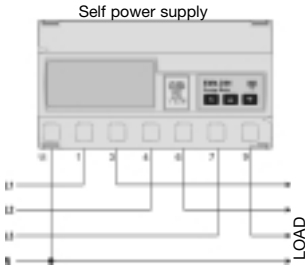


Fig. 4: Direct connection with neutral (3-phase system) Unbalanced load

5 (10)A version electrical diagrams

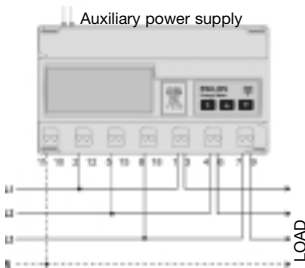


Fig. 5: Direct connection with/without neutral (3-phase system) Unbalanced load

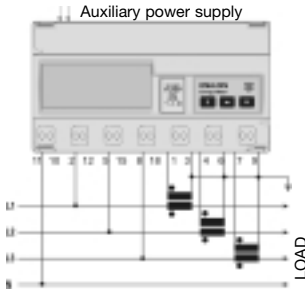


Fig. 6: CT connection with neutral (3-phase system) Unbalanced load



■ 5 (10)A version electrical diagrams

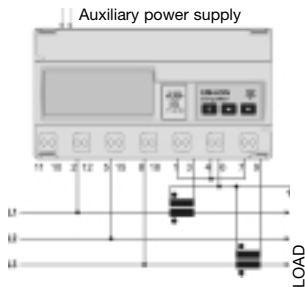


Fig. 7: ARON CT connection without neutral (3-phase system) Unbalanced load

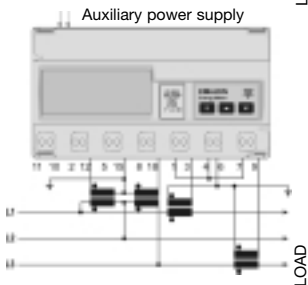


Fig. 8: CT (ARON) and VT connection without neutral (3-phase system) Unbalanced load

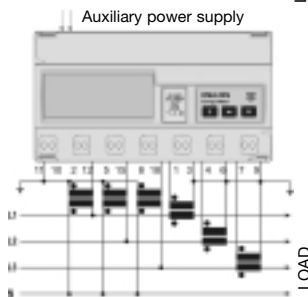


Fig. 9: CT and VT connection with neutral (3-phase system) Unbalanced load

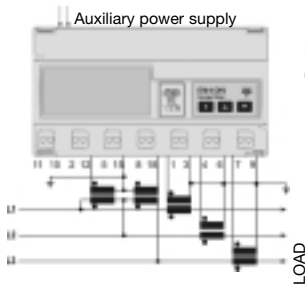


Fig. 10: CT and VT connection without neutral (3-phase system)
Unbalanced load

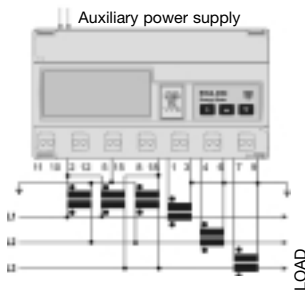


Fig. 11: CT and VT connection without neutral (3-phase system)
Unbalanced load

2-phase system

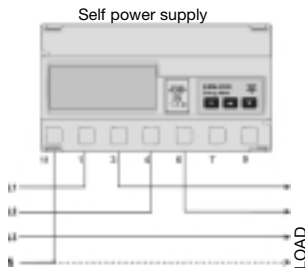


Fig. 12: 2-phase system
Unbalanced load

■ Number of inputs

Current: 3

Voltage: 4

■ Accuracy

Display, RS422/ 485: lb: 5A, lmax: 10A; lb: 20A, lmax: 90A

Current: from 0.003lb to 0.2lb: $\pm(0.5\%RDG + 3DGT)$;
from 0.2lb to lmax: $\pm(0.5\%RDG + 1DGT)$.

Voltage: in the Un range: $\pm(0.5\% RDG + 1DGT)$.

Frequency: $\pm 0.1\% RDG$ (50 to 60 Hz).

Active power: (@ $25^{\circ}C \pm 5^{\circ}C$, R.H. $\leq 90\%$):

$\pm 1\% RDG \pm 1DGT$ (PF 1, 0.1lb to lmax, in the Un range;
PF 0.5L, PF 0.8C, 0.2lb to lmax, in the Un range).

Energies: (@ $25^{\circ}C \pm 5^{\circ}C$, R.H. $\leq 90\%$): Class 1 according to EN61036; Class 2 according to EN61268; lb: 5A, lmax: 10A 0.1lb: 500mA start-up current: 20mA; lb: 20A, lmax: 90A 0.1lb: 2A start-up current: 80mA. "Un" see "Rated input voltages (Un)/range"

■ Additional errors

According to EN61036, EN61268.

Wave form: $< 1\%$ (3rd harmonic: 10%).

Voltage asymmetry: $< 0.5\%$ (with reference to Un).

Magnetic induction: 0 (up to 0.5 mT).

HF electromagnetic fields: $< 1\%$

Influence of accessories: 0.

■ Temperature drift

$\leq 200ppm/^{\circ}C$.

■ Sampling

1000 samples/s at 50Hz.

■ Display

Type: back-lighted LCD.

Display of instantaneous variables: $4 \times 3^{1/2}$ DGT.

Energies: total meters: 8 DGT $+7^{1/2}$ DGT; **partial meters:** 8 DGT $+7^{1/2}$ DGT.

■ **Maximum and minimum indication**

Max. 19999999 (99999999); Min. 0.

■ **Measurements**

Power, energy, TRMS measurement of distorted waveforms.

Coupling: direct.

■ **Crest factor**

Ib 5A: ≤ 3 (15A peak max.).

Ib 20A: ≤ 6 (127A peak max.).

■ **Current overload**

5(10) A, for 10ms: 300A max, at 50Hz.

5(10) A, for 500ms: 200A max, at 50Hz.

5(10) A, permanent: 10A, at 50Hz.

20(90) A, for 10ms: 2700A max, at 50Hz.

20(90) A, permanent: 90A, at 50Hz.

■ **Voltage overload**

Permanent: 1.2 Un;

For 1s: 2 Un.

■ **Rated input voltages (Un)/range**

AV0: 208VL-L/20(90)AAC, Un: -20+15%

AV1: 400VL-L/20(90)AAC, Un: -20+15%

AV3: 660VL-L/20(90)AAC, Un: -30+15%

AV4: 208VL-L/5(10)AAC, Un: -20+15%

AV5: 400VL-L/5(10)AAC, Un: -20+15%

AV6: 100VL-L/5(10)AAC, Un: -20+20%

AV7: 660VL-L/5(10)AAC, Un: -30+15%

AV8: 208VL-L/20(90)AAC Un: -20+15%

AV9: 400VL-L/20(90)AAC Un: -20+15%

■ **Input impedance**

AV1-AV5-AV9: $400V_{L-L} > 720K\Omega$

AV0-AV4-AV8: $208V_{L-L} > 720K\Omega$

AV3-AV7: $660V_{L-L} > 1.97K\Omega$

AV6: $100V_{L-L} > 400K\Omega$

AV4-AV5-AV6-AV7: 5(10) A < 0.3VA

AV0-AV1-AV3-AV8-AV9: 20(90) A < 4VA

■ Frequency

50 to 60 Hz.

■ Interface modules technical features

RS422/RS485 (on request) Module AR2950

Type: bidirectional multidrop (static and dynamic variables)

Connections: 2 or 4 wires, max. distance 1200m, termination directly on the instrument.

Addresses: 255, key-pad selectable.

Protocol: MODBUS/JBUS;

Data (bidirectional): dynamic (reading only); phase and system variables: see table "Display variables" on page 20.

Static (writing only): all the configuration parameters, energy reset, activation of static output.

Energy storing (EEPROM): max. 99.999.999 kWh/kvarh

Data format: 1 start bit, 8 data bit, no parity, 1 stop bit.

Baud-rate: 9600 bit/s

Insulation: by means of optocouplers, 2000 V_{RMS} between output and measuring inputs, 2000 V_{RMS} between output and power supply input.

Digital outputs (on request) module AO2900

For energy retransmission, water and gas, static, remote and alarm output. Three operating modes are selectable:

- two pulse outputs (kWh and kvarh)
- one alarm output (kWdmd) and one pulse output (kWh kvarh)
- one output remotely controlled by means of the serial communication and one pulse output (kWh or kvarh).

Pulse outputs: number of outputs 2; number of pulses from

0.01 to 100 pulses programmable depending on the selected CT and VT ratios.

Output type: open collector (NPN transistor)

V_{ON} 1.2 VDC / max. 100 mA; V_{OFF} 30 VDC max.

Pulse duration: 220 ms (ON), ≥ 220 ms (OFF) acc. to DIN43864.

Alarm output: Number of outputs: 1

Alarm type: up or down.

Setpoint: can be modified from 0 to 100% of the electrical scale.

Hysteresis: can be modified from 0 to 100% of the electrical scale.

Activation time delay: from 0 to 255 seconds

Response time: 700 ms.

Type: open collector (NPN transistor)

V_{ON} 1.2 VDC / max. 100 mA; V_{OFF} 30 VDC max.

Insulation (AO2900 module): by means of optocouplers:

2000 V_{RMS} between outputs and measuring inputs,

2000 V_{RMS} between outputs and power supply input.

Insulation between the two outputs: functional.

Digital inputs (on request) AO2940 module

Four operating modes are selectable:

- energy meters (kWh, kvarh): totals and partials (without using the digital inputs);
- energy meters (kWh, kvarh): totals and partials managed by hour time period ($t_1-t_2-t_3-t_4$);
- total energy meters (kWh, kvarh) and “day-time/night-time” GAS meters;
- total energy meters (kWh, kvarh), GAS and WATER meters.

Number of inputs: 2

Input frequency: 20Hz max.

Duty cycle: 50%

Prescaler: from 0.1 to 100.0 m^3 / pulse.

Contact reading voltage: $12V < +Aux < 24VDC$

Logic status: OFF $< 2V$; ON $> 10V$.

Contact reading voltage: 15mA max.

Input impedance: $1k\Omega$

Contact resistance: $\leq 1k\Omega$ close contact, $\geq 100k\Omega$ open contact

Insulation: by means of optocouplers, $2000 V_{RMS}$ between digital inputs and measuring inputs, $2000 V_{RMS}$ between digital inputs and power supply input.

■ Software functions

Password: numerical code of max. 3 digits; 2 protection levels of the programming data:

1st level Password "0", no protection;

2nd level Password from 1 to 1000, all data are protected.

Transformer ratio

CT: from 1 to 5000

VT: from 1.0 to 199.9 and from 200 to 1999

Note: the CT * VT ratio must never exceed 5000. The current measuring inputs are able to manage the CTs with secondary of 1A and 5A (the accuracy is anyway always referred to 5A).

Display: up to 2 variables/page.

Page 1: kWh, kvarh

Page 2a: kWh ($t_1-t_2-t_3-t_4$), kvarh ($t_1-t_2-t_3-t_4$)

Page 2b: GAS m^3 day-time tariff, GAS m^3 night-time tariff

Page 2c: H₂O m^3 , GAS m^3

Page 3: W_{L1}

Page 4: W_{L2}

Page 5: W_{L3}

Page 6: W_{dmd} (power demand)

Errors: Phase sequence, serial communication status, wrong connection of current measuring inputs.

■ Power supply features

Self-supplied version

400V_{L-L} -20% +15%, 50-60Hz

208V_{L-L} -20% +15% , 50-60Hz

Auxiliary power supply

230V -15 +10%, 50-60Hz

115V -15 +10%, 50-60Hz

48VAC -15 +10%, 50-60Hz

24VAC -15 +10%, 50-60Hz

from 18 to 60VDC

Energy consumption: ≤ 7VA

■ General features

Operating temperature: 0 to +55°C

(R.H. < 90% non-condensing at 40°C).

Storage temperature: -20 to +60°C

(R.H. < 90% non-condensing at 40°C).

Installation category: Cat. III (IEC 664)

Insulation: 2000 V_{RMS} between inputs / outputs and earth.

Dielectric strength: 4000 V_{RMS} for 1 minute.

Rejection: CMRR 100 dB, 48 to 62 Hz.

EMC: burst: 4kV/level 4 (EN61000-4-4).

Radiated electromagnetic fields: 10V/m 26-1000MHz

(EN61000-4-3). Electrostatic discharges: 15kV (EN61000-4-

2). Radio frequency emissions: according to the limits of

CISPR 14 and CISPR 22. Pulse voltage (1.2/50µs): 8kV

(EN61000-4-5).

Standards: Safety: IEC664-1. Metrology: energy measure-

ments: EN61036, EN61268; pulse output: DIN43864.

Approvals: CE.

5(10) A connections: screw-type, max. cable section 4 mm²

20(90) A connections: screw-type, min/max cable section

6 mm² / 35 mm²; Min./max. tightening torque: 2 Nm / 6 Nm

(90A inputs)

Alarm output

35

32

38

Housing: dimensions 162.5 x 90 x 63 mm; material ABS, NORYL, PC, self-extinguishing: UL 94 V-0.

Mounting: DIN-rail and wall mounting.

Protection degree: front IP40; connections IP20.

Weight: 800 g approx. (packing included).

Note: the pictures in the manual refer to an EM4-DIN 5(10)A.

Some pictures have been digitally modified and may not correspond to the instrument in all its details.

Name:Surname:
Company name:

EM4-DIN serial number:
Password:

Instrument's settings:

Pulse value for gas meters:water:
Pulse value for kWh meters:kvarh:
CT ratio:VT:
Serial address:
Integration time, min:

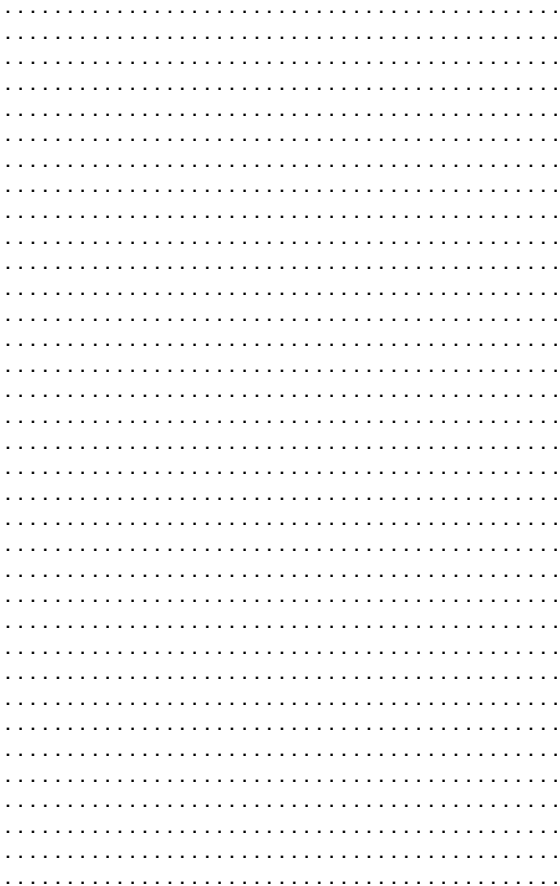
Tariffs

t1from:to:
t2from:to:
t3from:to:
t4from:to:

Hardware configuration

Slot A:Slot B:
Wdmd alarm set-point:ON:OFF:

NOTES:
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Digital inputs

35



39

