

# ENGLISH

## WM3 - 96

### OPERATING INSTRUCTIONS

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#### **Important:**

We suggest you keep the original packing in case it is necessary to return the instrument to our Technical Service Department.

In order to achieve the most from your instrument, we recommend you read this instruction manual carefully.

**CARLO GAVAZZI Instruments****WM3-96, 32-bit  $\mu$ -Processor based power quality analyser with modular housing for Plug and Play modules**

rev. 0

**Operating instructions****Important:**

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**GENERAL FEATURES****The most important features are:**

- Modular housing for Plug and Play modules
- IP65 protection degree
- 32-bit  $\mu$ P-based indicator and controller
- TRMS Measurements
- Back-lighted graphic LCD display (128x64 dots)
- Read-out: 4x4dgt (instantaneous variables)
- Read-out: 4x9dgt (total energies), 4x7dgt (partial energies)
- 4 independent total energy meters (Wh, varh)
- Up to 48 independent partial energy meters (Wh, varh)
- Harmonic analysis up to the 50th harmonic with histogram indication
- Up to 8 simultaneous outputs: pulse, alarm, analogue output and serial communication port
- According to: EN61010-1; Accuracy: EN60688-1, EN61036, EN61268

**The main programming parameters are:**

- Programming of the password
- Selection of the electrical system
- Programming of CT ratio (up to 30.000A)
- Programming of the VT ratio (up to 600kV)
- Selection of the variables for the MIN and MAX detection
- Programming of the integration time period calculation
- Tariff management

- Harmonic analysis enabling
- Clock adjustment (if present)
- Programming of the pulse output (if present)
- Programming of the analogue and serial output (if present)
- Programming of the digital filter.

**TECHNICAL FEATURES****INPUT SPECIFICATIONS****NUMBER OF INPUTS:**

- Current: 6;
- Voltage: 4;
- Digital: 3 free of voltage contacts for synchronization of W-VA-A measurements.

Current/voltage read-out: <8mA/ 17.5V to 25VDC

**ACCURACY** (display, RS485, RS232)

Un: 240VL-N, Uf.s. 300VL-N, Ib: 5A, max 6A

- Current:  $\pm 0.5\%$  rdg (0.2 to 1.2 Ib),  $\pm 5\text{mA}$  (0.02 to 0.2 Ib)
- Voltage:  $\pm 0.5\%$  rdg (0.2 to 1.25 Un) including also frequency, power supply and output load influences
- Frequency:  $\pm 0.1\%$  rdg (from 40 to 440 Hz)
- Active power (@25°C  $\pm 5^\circ\text{C}$ , R.H.  $\leq 60\%$ ):  $\pm 0.5\%$  (rdg. + f.s.) (PF 0.5 L/C, 0.1 to 1.2 Ib, 0.2 to 1.2 Un) or  $\pm 1\%$  rdg. (PF 0.5 L/C, 0.1 to 1.2 Ib, 0.2 to 1.2 Un).
- Reactive power (@25°C  $\pm 5^\circ\text{C}$ , R.H.  $\leq 60\%$ ):  $\pm 0.5\%$  (rdg. + f.s.) (PF 0.5 L/C, 0.1 to 1.2 In, 0.2 to 1.2 Un) or  $\pm 1\%$  rdg. (PF 0.5 L/C, 0.1 to 1.2 Ib, 0.2 to 1.2 Un).
- Apparent power (@25°C  $\pm 5^\circ\text{C}$ , R.H.  $\leq 60\%$ ):  $\pm 0.5\%$  (rdg. + f.s.) (0.1 to 1.2 Ib, 0.2 to 1.2 Un) or  $\pm 1\%$  rdg. (0.1 to 1.2 Ib, 0.2 to 1.2 Un).
- Energies (@25°C  $\pm 5^\circ\text{C}$ , R.H.  $\leq 60\%$ ): class 1 according to EN61036 and to EN61268; Ib: 5A, I<sub>max</sub>: 6A; 0.1 Ib: 500mA; start up current: 20mA; Un: 240V
- Harmonic distortion (@25°C  $\pm 5^\circ\text{C}$ , R.H.  $\leq 60\%$ ): 1% f.s. (f.s.:100%); phase:  $\pm 2^\circ$ ; I<sub>min</sub>: 0.1Arms; I<sub>max</sub>: 15Ap; U<sub>min</sub>: 50Vrms; U<sub>max</sub>: 500Vp; sampling frequency 6400Hz @ 50Hz

**ADDITIONAL ERRORS**

- Humidity: <0.3% rdg, 60% to 90% R.H.
- Magnetic field: <0.5% rdg, @ 400 A/m.

**TEMPERATURE DRIFT:**  $\pm 200$ ppm/ $^{\circ}$ C

**SAMPLING RATE:** 6400Hz @ 50 Hz

#### DISPLAY

Graphic, back-lighted LCD, 128x64 dots. Selectable read-out for the instantaneous variables: 4 x 4 dgt or 4 x 3<sup>1</sup>/<sub>2</sub> dgt.; Total energies: 4 x 9 dgt; Partial energies: 4 x 7 dgt.

#### MAX. AND MIN. INDICATION

Max. 9999 (999999999); Min. -9999 (-999999999)

#### MEASUREMENTS

Current, voltage, power, energy, harmonic distortion (see table "Display pages"); TRMS measurement of a distorted sine wave voltage/current; Coupling type: direct; Crest factor:  $\leq 3$ ; max. 15Ap/500Vp (VL-N) or 15Ap/800Vp (VL-N)

#### RANGE (IMPEDANCE)

- AV5 (Un/lb):  
90V/ $\sqrt{3}$ /100V (600k $\Omega$ ) - 1AAC ( $\leq 0.3$ VA)  
90V/ $\sqrt{3}$ /100V (600k $\Omega$ ) - 5AAC ( $\leq 0.3$ VA)  
250V/433V (600k $\Omega$ ) - 1AAC ( $\leq 0.3$ VA)  
250V/433V (600k $\Omega$ ) - 5AAC ( $\leq 0.3$ VA)
- AV7 (Un/lb):  
110V/ $\sqrt{3}$ /110V (1M $\Omega$ ) - 1AAC ( $\leq 0.3$ VA)  
110V/ $\sqrt{3}$ /110V (1M $\Omega$ ) - 5AAC ( $\leq 0.3$ VA)  
400V/690V (1M $\Omega$ ) - 1AAC ( $\leq 0.3$ VA)  
400V/690V (1M $\Omega$ ) - 5AAC ( $\leq 0.3$ VA)

**FREQUENCY RANGE:** from 40 to 440 Hz

#### OVERLOAD PROTECTION

- Continuous: voltage/current 1.2 Un/lb
- For 1s: voltage/current 2 Un / 20 lb

#### KEYBOARD:

4 keys:

"S" to enter the programming phase and for password confirmation;  
"UP" and "DOWN" for value programming/function selection, page scrolling, "F" for special functions

#### OUTPUT SPECIFICATIONS

**ANALOGUE OUTPUTS** (on request):

- Number of outputs: Up to 4 (on request);
- Accuracy:  $\pm 0.2\%$  f.s.; (@25 $^{\circ}$ C  $\pm 5^{\circ}$ C, R.H.  $\leq 60\%$ )

- Range: 0 to  $\pm 20$ mADC, 0 to  $\pm 20$ mADC, 0 to  $\pm 10$ mADC, 0 to  $\pm 5$ mADC, 0 to 10VDC, 0 to  $\pm 10$ VDC, 0 to  $\pm 5$ VDC, 0 to  $\pm 1$ VDC
- Scaling factor: Programmable within the whole range of retransmission; it allows the retransmission management of all values from: 0 to 20mADC, 0 to  $\pm 20$ mADC, 0 to  $\pm 10$ mADC, 0 to  $\pm 5$ mADC, 0 to 10VDC, 0 to  $\pm 10$ VDC, 0 to  $\pm 5$ VDC, 0 to  $\pm 1$ VDC
- Response time:  $\geq 200$ ms typical (filter excluded, FFT excluded, 3<sup>1</sup>/<sub>2</sub> dgt indication)
- Ripple:  $\leq 1\%$  according to IEC60688-1 and EN60688-1
- Temperature drift: 200 ppm/ $^{\circ}$ C
- Load: 0 to 20mADC  $\leq 600\Omega$ ; 0 to  $\pm 20$ mADC  $\leq 550\Omega$ ;  
0 to  $\pm 10$ mADC  $\leq 1100\Omega$ ; 0 to  $\pm 5$ mADC  $\leq 2200\Omega$ ;  
0 to 10VDC  $\geq 10k\Omega$ ; 0 to  $\pm 10$ VDC  $\geq 10k\Omega$ ;  
0 to  $\pm 5$ VDC  $\geq 10k\Omega$ ; 0 to  $\pm 1$ VDC  $\geq 10k\Omega$ ;  
Insulation: By means of optocouplers, 4000 Vrms output to measuring input, 4000 Vrms output to supply input.

**RS422/RS485 SERIAL OUTPUT** (on request):

- Type: Bidirectional multidrop (static and dynamic variables).
- Connections: 2 or 4 wires, max. distance 1200m, termination directly on the module
- Addresses: from 1 to 255, selectable by key-pad.
- Protocol: MODBUS/JBUS

Data (bidirectional): Dynamic (reading only)

- System variables: P, Pavg, S, Q, PF, VL-L, f, THD, energies and status of digital inputs, set-point output status
- Single phase variables: PL1, SL1, QL1, PFL1, VL1-N, AL1, THDL1; PL2, SL2, QL2, PFL2, VL2-N, AL2, THDL2; PL3, SL3, QL3, PFL3, VL3-N, AL3, THDL3

Static (writing only)

All programming data, reset of energies, activation of static output.

- Stored energy (EEPROM): max 999.999.999 kWh/kvarh
- Data format: 1 start bit, 8 data bit, no parity/even parity/odd parity, 1 stop bit
- Baud-rate: 1200, 2400, 4800 and 9600 baud
- Insulation: by means of optocouplers, 4000 Vrms output to measuring inputs, 4000 Vrms output to supply input.

**RS232 SERIAL OUTPUT** (on request):

- Type: bidirectional (static and dynamic variables)
- Connections: 3 wires, maximum distance 15m

- Data format: 1 start bit, 8 data bit, no parity, 1 stop bit
- Baud-rate: 9600 bauds
- Protocol: MODBUS (JBUS)
- Other data: as per RS485/RS422

**DIGITAL OUTPUTS:** (on request)

the working of the pulse, alarm or pulse/alarm outputs is fully programmable and is independent from the chosen output module.

**PULSE OUTPUT:** (on request)

- Number of outputs: Up to 4 (on request)
- Type: From 1 to 1000 programmable pulses for k-M-G Wh, k-M-G varh, open collector (NPN transistor).
- VON 1.2VDC / max. 100mA; VOFF 30VDC max.
- Pulse duration: 220ms (ON),  $\geq 220$ ms (OFF) according to DIN43864.
- Insulation: By means of optocouplers, 4000 Vrms output to measuring inputs, 4000 Vrms output to supply inputs.
- Note: The outputs can be either open collector type or relay type (for this latter one see the characteristics mentioned in the ALARMS)

**ALARMS:** (on request)

- Number of setpoints: up to 4, independent
- Alarm type: Up alarm, down alarm, up alarm with latch, down alarm with latch, phase asymmetry/phase loss, neutral loss.
- ON set-point adjustment: 0 to 100% of the electrical scale.
- OFF set-point adjustment: 0 to 100% of the electrical scale (hysteresis is given by ON-OFF or OFF-ON).
- On - time delay: 0 to 255s
- Relay status: selectable, normally de-energized, normally energized.
- Output type: relay, SPDT; AC 1-8A, 250VAC; DC 12-5A, 24VDC; AC 15-2.5A, 250VAC; DC 13-2.5A, 24VDC
- Min. response time:  $\geq 150$ ms, filter excluded, setpoint On-time delay: 0
- Insulation: 4000 Vrms output to measuring input, 4000 Vrms output to power supply input.
- Note: the outputs can be either relay type or open collector type (for this latter one, see the characteristics mentioned in the PULSE OUTPUTS).

**SOFTWARE FUNCTIONS**

**PASSWORD:** Numeric code of max. 3 digits;

- 2 protection levels of the programming data.

- 1st level: Password "0", no protection
- 2nd level: Password from 1 to 499, all data are protected.

**MEASUREMENT SELECTION:** see the relevant table.

**TRANSFORMER RATIO:**

For CT up to 30000A, For VT up to 600kV.

**SCALING FACTOR**

Operating mode:

- Electrical scale: compression/expansion of the input scale to be connected to up to 4 analogue outputs and up to 4 alarm outputs.
- Electrical range: Programmable within the whole measuring range.

**DIGITAL FILTER:**

- Filter operating range: 0 to 99.9% of the input electrical scale
- Filtering coefficient: 1 to 255
- Filter action: alarms, analogue and serial outputs (fundamental variables: V, A, W and their derived ones).

**EVENT LOGGING:** Only with the RS232 + RTC module. The max./min. values of the selected variables and the alarm status are stored with reference to date (dd:mm:yy) and time (hh:mm:ss). Max. capacity: 480 events.

**PAGE VARIABLES:** 4 variables per page; up to 27 variable pages one of which is completely programmable.

**POWER SUPPLY SPECIFICATIONS**

**AC VOLTAGE:**

18 - 60 VDC/AC; 90-260 VDC/AC

**POWER CONSUMPTION:**

$\leq 30$ VA / 12W (90-260V);  $\leq 20$ VA / 12W (18-60V)

**GENERAL SPECIFICATIONS**

**OPERATING TEMPERATURE:**

0 to +50°C (R.H. <90% non-condensing)

**STORAGE TEMPERATURE:**

-10 to +60°C (R.H.<90% non-condensing).

**INSULATION REFERENCE VOLTAGE:**

600 VRMS to ground

**INSULATION:** 4000 VRMS between all inputs/outputs to ground

**DIELECTRIC STRENGTH:** 4000 VRMS for 1 minute

**NOISE REJECTION (CMRR):** 100dB, 48 to 62 Hz

**EMC:** EN 50 081-2, EN 50 082-2

**OTHER STANDARDS:**

- Safety requirements: IEC 61010-1, EN 61010-1
- Product requirements: IEC 60688-1, EN 60688-1,
- Energy measurements: EN61036, EN61268.
- Pulse outputs: DIN43864

**CONNECTIONS:**

Screw-type, max. wire section: 1.5 mm<sup>2</sup> x 2 or 2.5 mm<sup>2</sup> x 1

**HOUSING:**

Dimensions: 96 x 96 x 140mm; Materials: ABS; self-extinguishing: UL 94 V-0

**DEGREE OF PROTECTION:** Front: IP 65

**WEIGHT:** 600 g approx. (packing included)

**HARMONIC DISTORTION ANALYSIS**

**ANALYSIS PRINCIPLE:** FFT

**HARMONIC MEASUREMENT:**

- Current: Up to the 50<sup>th</sup> harmonic
- Voltage: Up to the 50<sup>th</sup> harmonic

**TYPE OF HARMONICS:**

- THD (VL1); THD odd (VL1); THD even (VL1) and also for the other phases: L2 and L3.
- THD (AL1); THD odd (AL1); THD even (AL1) and also for the other phases: L2 and L3.

**HARMONIC PHASE ANGLE:**

- The instrument measures the angle between the single harmonic of "V" and the single harmonic of "A" expressed as "°", making it possible to know if the harmonics are generated or imported.
- Note: if the system is a 3-wire type, the angle cannot be measured.

**HARMONIC DETAILS:** For every THD page it is possible to see the harmonic order.

**DISPLAY PAGES:** The harmonic contents is displayed as a graph showing the whole harmonic spectrum.

The information is given also as numerical information:

THD in % / RMS value; THD odd in % / RMS value; THD even in % / RMS value; Single harmonic in % / RMS value

**OTHERS:** The harmonic distortion can be measured both in 3-wire or 4-wire systems. Tw: 0.02 s

**ENERGY MANAGEMENT**

**TIME PERIODS:**

Selectable: single time, dual time and multitime.

**SINGLE TIME:**

Number of energy meters:

total: 4 (9 digits); partial: 4 (7 digits)

**DUAL TIME:**

- Number of energy meters:

total: 4 (9 digits); partial: 8 (6 digits)

- Time periods: 2, programmable within 24 hours

**MULTI-TIME:**

- Number of energy meters:

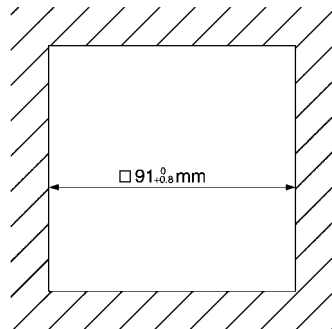
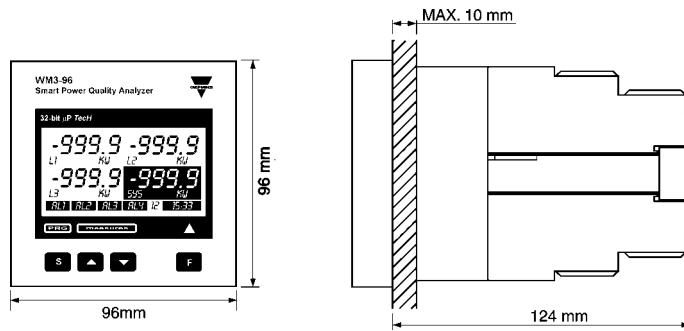
total: 4 (9 digits); partial: 48 (6 digits)

- Time periods: 4, programmable within 24 hours

- Time seasons: 3, programmable within 12 months

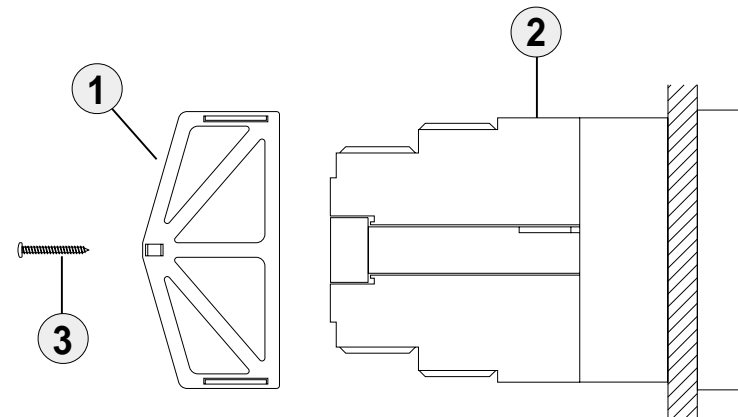
## INSTALLATION

### Overall dimensions and panel cut-out

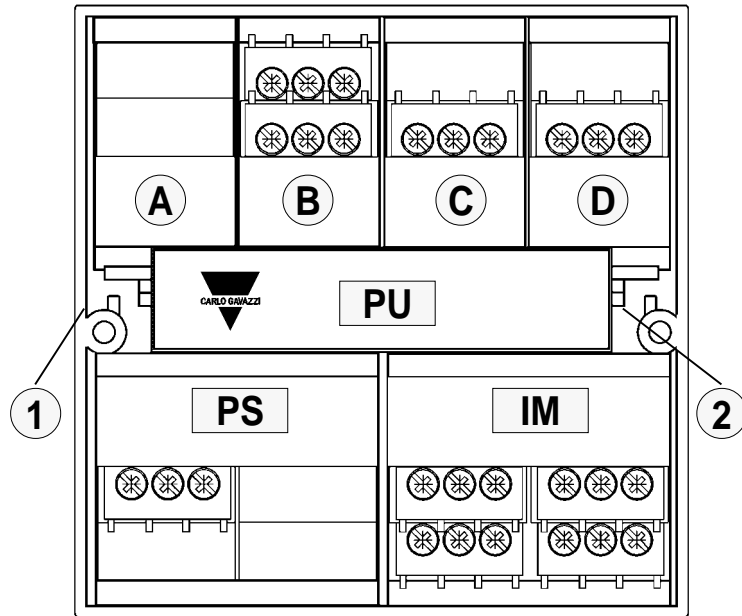


### Mounting

Insert the instrument (holding its front) into the panel and fasten it (from the back) by fixing the two lateral brackets (1) (supplied with the instrument) to the appropriate location (2), using the two screws (3) (supplied with the instrument).



Position of the slots and relevant modules



DESCRIPTION	A	B	C	D	PU	PS	IM
Single analogue output	•	•					
Dual analogue output	•	•					
RS485 serial output		•					
RS232 serial output					•		
Single relay output			•	•			
Dual relay output			•	•			
Single open collector output			•	•			
Dual open collector output			•	•			
4 open collector outputs				•			
Digital inputs			•				
Power supply						•	
Measuring inputs							•

## PRELIMINARY OPERATIONS

Before supplying the instrument, make sure that the power supply voltage corresponds to what is indicated on the lateral label of the relevant module. For example:

### AP1020

#### Universal power supply

input range: **100V...240V DC/AC (50Hz to 60Hz)**

power consumption: **12W / 30VA 1 PHASE**

serial number: **S/N 002700/20345**

#### Preliminary operations

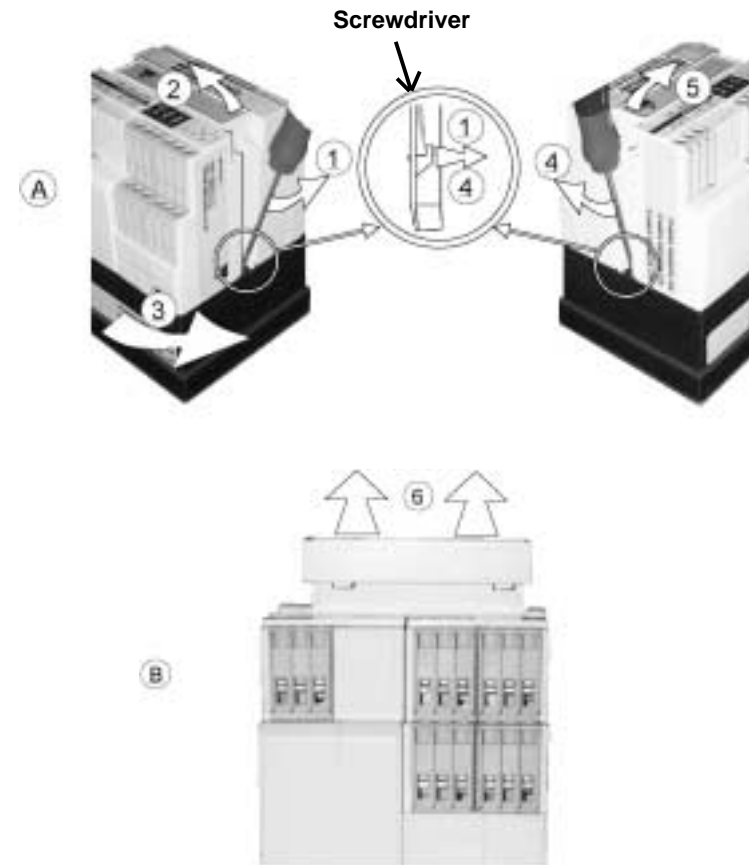
The various modules (input, output and power supply) have been conceived to be mounted in the proper slots. To know in which slot every module is to be mounted, refer to the drawings on the previous page.

For a correct mounting of the instrument, insert the modules in the relevant slots, then, at the end, enter the central module, which can be a blind type or an RS232 communication module; the central module will help fixing also the other modules in the relevant slots.

To remove the modules, use a screwdriver:

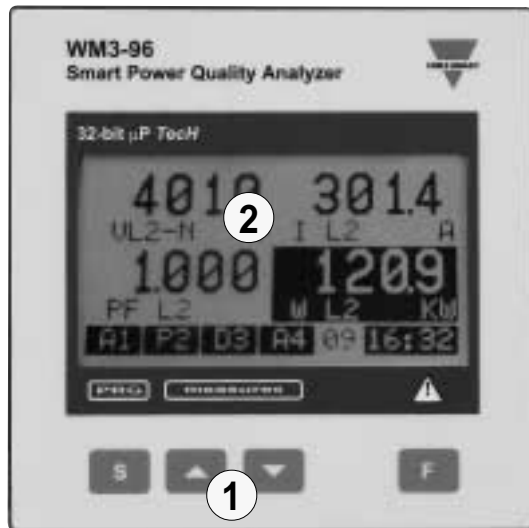
- A) gently depress the two fixing tabs (points "1" and "4" in the drawing on the following page),
- B) extract the central module,
- C) remove also the other modules.

NOTE: any slot which has not been used must be filled with the blind plug modules.









## FRONT PANEL DESCRIPTION



### 1. Keypad

Functions available out of the programming phase. Keys to be pressed:

-  Scroll to the following page
-  Scroll to the previous page
-  Where enabled, it allows you to access some functions relating to the displayed variables
-  Access to the programming phase





### 2. Display

Alphanumeric indication by means of a 7-segment graphic LCD (128x 64 dots):

- of the programming parameters;
- of the measured variables.

## OPERATING MODE

### DISPLAYING OF THE VARIABLES



1.25	230.0
A L1	V L1
287.5	230.0
W L1	VA L1
	
	
00	15:25


When the instrument is switched on, the main page of variable displaying is shown. This first page, called page "00", is configurable by the user who can choose, by means of the programming, which variables are to be displayed in the 4 ranges. In all the other pages (up to 27 depending on the instrument configuration), the type of variables displayed in the four ranges are automatically selected and cannot be changed. In the table on page 30 you can see the contents of all the pages that can be displayed by WM3-96.


The low part of the display, where the status of the digital outputs is indicated in 4 dedicated areas, is common to all the pages. If the outputs are not present, only a black rectangle is shown; if the outputs are present, the display will show a letter followed by a number. The letter can be of 3 types:






- "P" indicates a pulse output
- "A" indicates an alarm output. In this case the letter can be white in a black background to indicate that the output is in alarm, or black in a white background to indicate that the output is not in alarm.
- "D" indicates a diagnostic output. This is a particular type of alarm that is activated when the neutral connection is missing. The alarm is active when the background is black, while the alarm is not active when the background is white.




The number that follows the letter is the progressive number of the output (from 1 to 4).

To scroll the various pages, use the  and  keys.





Pressing the  key in any one of the display pages, you access the programming phase.




The  key, on the contrary, has various functions depending on the page where the operator is working.

- Pages from "00" to "13": disabled
- Pages from "14" to "18": access to the function of reset of the "MIN" and "MAX" values. To reset the meters, proceed as follows: enter the function, press the  key to confirm, then, by means of the  and  keys, go to the value that you want to reset and press the  key. To exit the function, press the  key again.

- Pages from "19" to "24": access to the detailed analysis of the harmonics. After pressing the  key, move along the histogram to display the data relating to the single harmonics using the  and  keys. For each harmonic the instrument measures the % value with reference to the fundamental and for the single harmonic angle between the "V" harmonic and the "A" harmonic of the same order.

**NOTE:** this angle is displayed only if the measures are carried out in a three-phase system with neutral.


- Page "25": disabled
- Page "26": pressing the  key for the first time, the range relating to the season is highlighted. By using the  and  key, it's possible to change the season displayed in that page. Pressing the  key another time, the range relating to the period is highlighted.

Using the  and  keys, it's possible to change the period within the displayed season. Pressing the  key for the third time, you go back to the display page. The changings of season and period carried out in this page, refer only to the displaying of the values stored in the corresponding season and period.

The changings carried out in this page do not have any influence on the method of tariff management of the instrument.




- Page "27": disabled.

## PROGRAMMING PHASE

You access to the programming phase from any displaying page by pressing the  key.

The instrument asks for the password to be entered:

**PASS ?** 

Enter the protection key using the  and  keys; confirm it using the  key.




If the RS232/RTC module is present, by setting the value "1000", you go to the page where the events are displayed and where the instrument stores, in a chronological order, the alarms that have occurred until that moment.

If the password is correct, you access to the main menu of the programming phase.

```

**** MAIN MENU ****
CHANGE PASSWORD
SYSTEM
CT RATIO
VT RATIO
REV. P0.00
  
```




### General Statement

Use the  and  keys to select the desired menu, then press .

Press the  key to exit the programming phase.

### TO CHANGE THE PASSWORD

**CHANGE PASSWORD** **NEW PASS ?** 

Set the new password value using the  and  keys and confirm it with .

TO SELECT THE TYPE OF ELECTRICAL SYSTEM

SYSTEM	
1 - PHASE	
3+N PHASES BAL.	
3+N PHASES UNBAL	
3+N PHASES UNBAL	
3 PHASES BAL.	
3 PHASES UNBAL	

Select the type of electrical system using the ▲ and ▼ keys and confirm it with S.

TO SELECT THE CT RATIO

CT RATIO	
CT RATIO ?	1.0

Set the value using the ▲ and ▼ keys and confirm it with S.

TO SELECT THE VT RATIO

VT RATIO	
VT RATIO ?	1.0

Se the value using the ▲ and ▼ keys and confirm it with S.

TO SELECT THE VARIABLES TO DISPLAY IN THE MAIN PAGE

Select the desired section of the display using the ▲ and ▼ keys and then press S. Scroll the available variables by means of the ▲ and ▼ keys and then confirm the variable you have chosen using the S key. Press the F key to go back to the main menu.

DISPLAY PAGE

A L1	V L1
W L1	VA L1



TO SELECT THE MIN AND MAX VARIABLES




MIN MAX VALUES

MAX1	V L1-N
MAX2	A L1
MAX3	W L1
MAX4	var L1
MAX5	VA L1
MAX6	PF L1
MAX7	Hz
MAX8	THD V1
MAX9	A dmd
MAX10	VA dmd
MAX11	TPF avg
MAX12	W dmd
MIN1	V L1-N
MIN2	A L1
MIN3	W L1
MIN4	var L1
MIN5	VA L1
MIN6	PF L1
MIN7	A dmd
MIN8	VA dmd

Use the ▲ and ▼ keys to select the MAX (from 1 to 12) or MIN (from 1 to 8) position, then press the S key to enter the list of variables to be coupled to the position. Using the ▲ and ▼ keys, select the desired variable and confirm it by means of the S key. To exit the secondary menu without making any selection, press the F key.

### TO SELECT THE CALCULATION METHOD OF THE POWER AVERAGE VALUE

Use the  and  keys to select the required method.





Press the  key and then set the integration time period. Confirm the time using . To exit from the secondary menu without making any selection, press the  key.

POWER dmd	FIXED
	FLOAT

#### NOTE:





the selections made in this menu are valid for W-VA-A-PF.

### TO SELECT THE TYPE OF MANAGEMENT OF THE ENERGY METERS

Use the  and  keys to select the required type of management or "reset" to reset all the energy meters. Press  to confirm your selection and access to the menus to set the time period and the seasonal periods. Exit the menus to go back to the main page using the  key.

ENERGY METERS	SINGLE TIME
	DUAL TIME
	MULTI TIME
	RESET






### TO ENABLE THE HARMONIC ANALYSIS ON THE PHASES

Select the time period using the  and  keys and enable/disable the analysis by means of the  key. To exit this menu, press the  key.

key .




HARMONICS	V1-I1	OFF
	V2-I2	OFF
	V3-I3	OFF

### PROGRAMMING OF THE CLOCK PARAMETERS




Move to the menu parameter that you want to modify using the  and  keys and press the  key to confirm it. Set the desired value and confirm the selection with the  key. Exit this menu to go back to the previous one using the  key.

CLOCK	MINUTES	HOURS
	HOURS	DAY
	DAY	MONTH
	MONTH	YEAR

### TO SELECT THE DIGITAL OUTPUT TYPE

Select the required output type using the  and  keys, then press  to enter in the relevant menu. You can choose among three output types: pulse output, alarm output, diagnostic output.

DIGITAL OUTPUTS	OUT C0 (0)
	OUT C1 (2)
	OUT D0 (1)
	OUT D1 (3)

Select the type of output using the  and  keys, then press . Depending on the selection, the instrument will display a configu-

ration window of the relevant parameters:



**Pulse output**

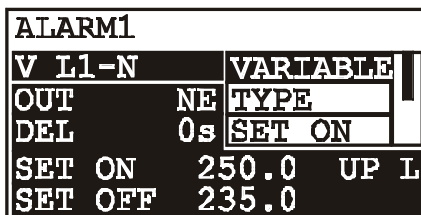
Select the type of energy to be coupled to the output, by entering the menu "energy meter":



The following energy types are available: consumed active energy (kWh +), generated active energy (kWh -), consumed reactive energy (kvarh +), generated reactive energy (kvarh -), then select the output pulse number per kWh/kvar, by means of the "pulse number" menu. To exit the menus type **F**.

**Alarms**

Select the parameter to be set by means of the **▲** and **▼** keys, then press **S**:



- **Variable:** variable to be coupled to the alarm.
- **Type:** alarm type [UP alarm (UP) or DOWN alarm (DOWN), UP alarm with latch (UP L), down alarm with latch (D.L.), down alarm with disabling at power on (D. DO)].

- **Set on:** on-set-point.
- **Set off:** off-set-point.
- **Out:** normally energized alarm (NE) or normally de-energized alarm (ND).
- **Delay:** delay on alarm.

Confirm the selection by means of the **S** key.

To exit any of these menus, press **F**.

**Diagnostics**

Select the "diagnostic" parameter by means of the **▲** and **▼** keys, then press **S**.

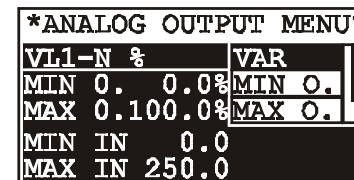
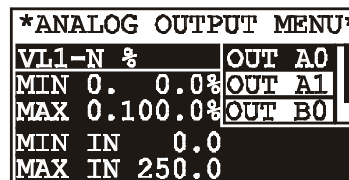


**TO SELECT THE ANALOGUE OUTPUTS**

Select the output to be set by means of the **▲** and **▼** keys and press **S** to enter the relevant menu.

**ANALOG OUTPUTS**

Once you have selected the output, you will enter the menu where you can set the relevant parameters.



Use the **▲** and **▼** keys to scroll the parameters and **S** to set them. The parameters are the following:

- **Var:** to select the variable to be coupled to the output.
- **Min O:** value expressed as % of the output range (0-20mA, 0-10V, etc.) to be generated by the minimum measured value (Min In).
- **Max O:** value expressed as % of the output range (0-20mA, 0-10V, etc.) to be generated in correspondence with the maximum measured value (Max In).
- **Min In:** minimum value of the variable input range.
- **Max In:** maximum value of the variable input range.

To exit anyone of these menus, press .

### TO SELECT THE SERIAL OUTPUT (RS485 ONLY)

Select the variable to be set by means of the  and  keys and confirm the selection with .



Set the desired value and confirm it using the  key.

The configurable variables are:

- **Address** of the instrument: 1 to 255.
- **Baud rate:** 1200, 2400, 4800 and 9600 bauds.
- **Parity:** no parity, even parity and odd parity.

To exit the menu, press .

### TO SELECT THE DIGITAL FILTER

Select the menu parameter using the  and  keys and confirm it with .



There are three available selections:

- **Display**, to select the display of the measurements of the instantane-

ous variables at 4 digits or 3 1/2 digits.

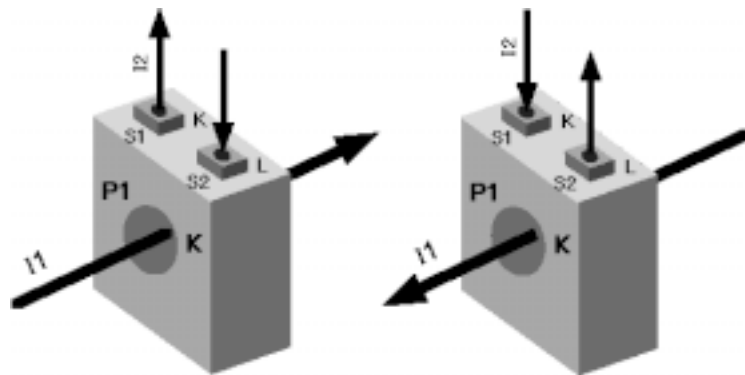
- **Range**, to set the operating range of the digital filter. The value is expressed as % of the full scale value.
- **Coefficient**, to set the filtering coefficient of the instantaneous measurements. Increasing the value, also the stability and the settling time of the measurements are increased.

Once any of the three parameters has been selected, set the desired value by means of the  and  keys and confirm it with .

To exit the "Filter" menu, press .

## USEFUL INFORMATION

The instrument can retransmit the current/power/energy that has been measured according to the direction of the current that flows in the primary/secondary of the connected current transformer (where available), as illustrated in the following figures:



**It is very important to respect the polarity of the measuring inputs, otherwise the instrument will not work properly. A wrong connection of the current inputs will not allow any retransmission of signals from the output 0 to 20mA, 0 to 10V, etc.**

However, it is possible to measure and retransmit currents/powers according to the direction of their flow using correctly the parameters "Min O./ Max O." and Min IN/ Max IN".

For example, it is necessary to measure a power up to 100kW considering that this power can be consumed or generated by the system:

### Example 1:

If the output signal is 0-20 mA, the scaling parameters can be set as follows:

"Min IN" must have a value of 0(kW) and "Max IN" of 100(kW), therefore "Min O." is 50.0(%) (10mA) and "Max O." is 100.0(%) (20mA).

When the power is -100kW (generated power), the output is 0mA, when the power is "0" the output current is 10mA and when the power is 100kW

(consumed power) the output current is 20mA.

**Example 2:** if the output signal is  $\pm 10\text{VDC}$ , the scaling parameters can be set as follows:

"Min IN"= -100(kW), "Max IN"= 100(kW) therefore "Min O." must be 0.0(%) (0V) and "Max O." must be 100.0(%) (+10VCC), that is to say, when the power is -100(kW), the output is -10V, when it is "0", the output is 0V and when the power is 100kW the output voltage is +10VDC.

List of the display pages in case of connection to a system with 3 phases and neutral lines

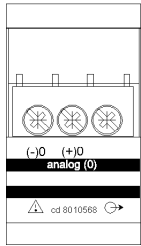
N ∞	1st variable	2nd variable	3rd variable	4th variable
00	selectable	selectable	selectable	selectable
01	VL1-N	VL2-N	VL3-N	VL-N Σ
02	VL1	VL2	VL3	V Σ
03	AL1	AL2	AL3	A Σ
04	WL1	WL2	WL3	W Σ
05	var L1	var L2	var L3	var Σ
06	VA L1	VA L2	VA L3	VA Σ
07	PF L1	PF L2	PF L3	PF Σ
08	VL1-N	AL1	PFL1	WL1
09	VL2-N	AL2	PFL2	WL2
10	VL3-N	AL3	PFL3	WL3
11	V Σ	PF Σ	var Σ	W Σ
12	A Σ	PF Σ	Hz	W Σ
13	A avg	VA avg	PF avg	W dmd
14	MAX1	MAX2	MAX3	MAX4
15	MAX5	MAX6	MAX7	MAX8
16	MAX9	MAX10	MAX11	MAX12

N ∞	1st variable	2nd variable	3rd variable	4th variable
17	MIN1	MIN2	MIN3	MIN4
18	MIN5	MIN6	MIN7	MIN8
19	HYSTOGRAM FFT V1			
20	HYSTOGRAM FFT I1			
21	HYSTOGRAM FFT V2			
22	HYSTOGRAM FFT I2			
23	HYSTOGRAM FFT V3			
24	HYSTOGRAM FFT I3			
25	kWh + TOT	kWh - TOT	kWh + TOT	kWh - TOT
26	kWh +	kWh -	kvarh +	kvarh -

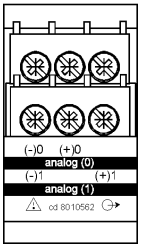


**AVAILABLE MODULES:**

**Analogue output modules**



Single output

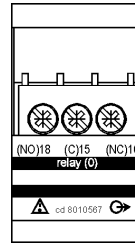


Dual output

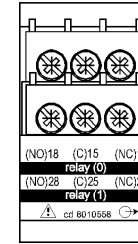
- AO1050** (20mADC)
- AO1051** (10VDC)
- AO1052** ( $\pm 5$ mADC)
- AO1053** ( $\pm 10$ mADC)
- AO1054** ( $\pm 20$ mADC)
- AO1055** ( $\pm 1$ VDC)
- AO1056** ( $\pm 5$ VDC)
- AO1057** ( $\pm 10$ VDC)

- AO1026** (20mADC)
- AO1027** (10VDC)
- AO1028** ( $\pm 5$ mADC)
- AO1029** ( $\pm 10$ mADC)
- AO1030** ( $\pm 20$ mADC)
- AO1031** ( $\pm 1$ VDC)
- AO1032** ( $\pm 5$ VDC)
- AO1033** ( $\pm 10$ VDC)

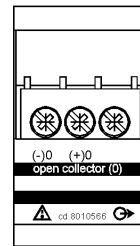
**Digital output modules**



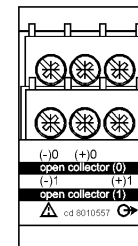
**AO1058**  
Single relay output



**AO1035**  
Dual relay output

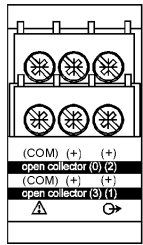


**AO1059**  
Single open collector output

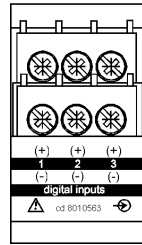


**AO1036**  
Dual open collector output

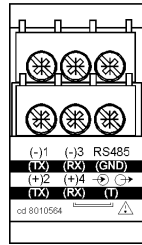
Other input / output modules



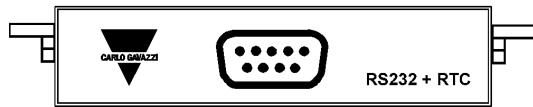
**AO1037**  
4 open collector outputs



**AQ1038**  
3 digital inputs

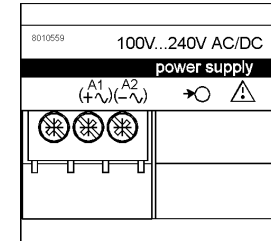


**AR1034**  
RS485 output

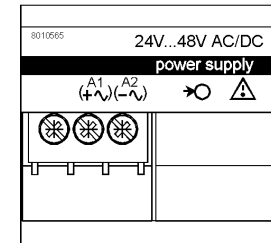


**AR1039**  
RS232 + RTC output

Power supply modules



**AP1020**  
90 - 260 VAC/DC power supply



**AP1021**  
18 - 60 VAC/DC power supply