CARLO GAVAZZI
Automation Components

CARLO GAVAZZI

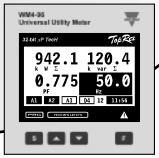
WM4-96: Modular Universal Utility Meter and Power Analyzer

Harmonic analysis; Energy meters; Load profile; Plug and play module system; SMS reception and transmission. These are only a few among many other functions performed by your WM4-96. 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****. Welcome in the Carlo Gavazzi world and compliments for your smart choice. Visit our website and evaluate our range of products:*

www.carlogavazzi.com

THANK YOU FOR CHOOSING CARLO GAVAZZI

Top performances by TopRex®



WM4-96 Instruction manual: INDEX

CARLO GAVAZZI
WM4-96, 32-bit µ-processor based modular universal utility meter and power analyzer
FW rev.C.01

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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 top of the current page ends.

This symbol indicates a particularly important subject or information.

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

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.

■ *WM4-96 PHILOSOPHY (IMPORTANT)*

WM4-96 is able to meet all the requirements in the field of energy management and of power quality analysis. WM4-96 can work, according to the needs, in three different operating modes, obtained by means of hardware and software configurations.

- direct measurements for monitoring the network quality and energy metering (LV or MT/HV connection).

- indirect power energy measurements by interfacing the meter of the energy supplier (LV or MV/HV connection);
- direct measurements for the instantaneous variables (LV connection) and indirect measurements for the energy variables (LV or MV/HV).

In all operating modes it's possible to add the management of water and gas meters and the tariff management of the energies both from the instrument and from external inferfacings. The easy management and flexibility of WM4-96 is possible thanks to the plug and play modular technology by Carlo Gavazzi and to a powerful 32-bit µProcessor. Also the analogue measuring input module can be adapted to the users' needs: the instrument acknowledges its presence adapting its electric features and its operating mode accordingly. The following icons will help the user to identify the instrument's modifications.

The menu, without measuring input module, is no more available

The menu, being without measuring input module, is modified.

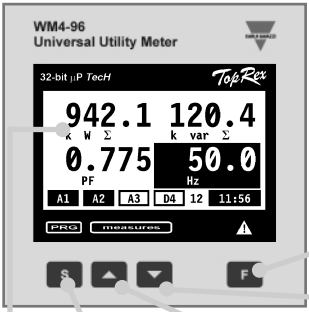
The manual describes the modification of the menu in case the measuring inputs module is not installed.

WM4-96: the connecting instrument.

WM4-96 "enjoys communicating":

- through the wide graphic display and the easily readable graphs such as the LOAD PROFILES or the harmonic distortion hystograms;
- through sending and receiving SMS messages by means of the GSM mobile network. For example, by sending an SMS message to a pre-defined mobile phone number, WM496 informs the user that an alarm has been enabled or disabled; the user himself can ask the instrument, by an SMS, information about the measured variables.

■ *Front panel description*



Exit from the menu and cancel the choice you have made.
It allows the user to access some functions relating to the displayed variables.

Scroll to the previous page

Access to programming or settings' confirmation.

Scroll to the next page

Alphanumeric indication by means of a 7-segment graphic LCD (128x64 dpi):
- of the measured variables;
- total number of energy meters: 4 (9 digits); partial: 48 (6 digits);
- time periods: 4 programmable within 24 hours;
- programmable seasons: 3 within 12 months.

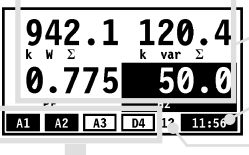
■ *Display contrast adjustment*

In order to get the best readability of the display, hold the keys ▲ and ▼ pressed simultaneously, until the desired readability is reached; the adjustment is cyclical.

The contrast can be adjusted only during the measuring phase (from page 00 to page 28).

Page “00”, Starting page

When the instrument is swtched on, the main page of variable displaying is shown. The first page, called page “00”, is the only one configurable by the user who can choose the variables to be displayed in the 4 displaying areas. In all the other pages the type of variables displayed in the four displaying areas is automatically selected and cannot be changed. In the table on page 59 you can see the contents of all the pages that can be displayed by WM4-96.



The bottom part of the display, where the status of the digital output is indicated in 4 specific sections, is common to all the pages. If the outputs are not present, only an empty black rectangular frame is shown, if the outputs are present, the display will show a letter followed by a number. Four different letters may appear:

“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 wire connection is missing. The alarm is active when the background is black, while the alarm is not active when the background is white.

“R” Remote control is activated (see Remote Control on page 49)

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

How to scroll the various pages

To scroll the various pages, use the ▲ and ▼ keys.

Pressing the S key in any one of the display pages, you access to the programming phase. The F key, on the contrary, has various functions depending on the selected page.

How the F key changes function depending on the display page.

❑ *Pages from "00" to "13" (00 only without measuring input module). Displaying of the variables*

F key enabled if the alarm latch function is activated, access to the reset of the latch alarms. To reset the latch alarm press the F key; after that the instrument will display: " WILL YOU RESET THE LATCH ALARMS?"; If you choose S you will enable the reset procedure, if you choose F there won't be any reset. The reset of the latch alarm is only available if the alarm event is finished.

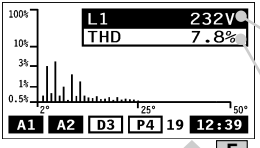
❑ *Pages from "14" to "18" (from 01 to 02 without measuring input module). Displaying of the "MIN" and "MAX" values.*

The F key is active, that means you have access to the reset function of the "MIN" and "MAX" values. To reset the "MIN/MAX" recording, proceed as follows: enter the function by pressing the F key, after that a message will appear: "WILL YOU RESET MIN/MAX VALUES? WILL YOU CONTINUE?"; if you choose F there won't be any reset, if you choose S the reset will not be made. The ▲ and ▼ keys allow you to select the range/value that you want to reset; to confirm the reset press the S key again. To exit the function press the F key again.

❑ *Pages from "19" to "24" (from 10 to 11 in single phase mode) Displaying of the harmonic analysis*

When the instrument is supplied, these pages are not enabled, see page 44 to enable them. The F key is active: access to the detailed analysis of the harmonics. After pressing the F key, a pointer appears along the horizontal axis (see figures below). To display the data relating to the single harmonics move along the histogram using the ▲ (moves from left to right) and ▼ (moves from right to left) keys. For each harmonic the instrument measures the % value with reference to the fundamental and the single harmonic angle between the "V" harmonic and the "A" harmonic of the same order.

SIMPLE ANALYSIS:



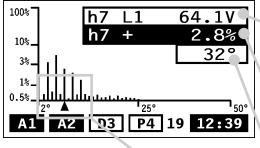
Line phase being measured and relevant voltage or current value (L1-L2-L3).

Total harmonic distortion and relevant value in percentage

F

F

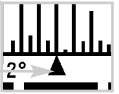
DETAILED ANALYSIS:



Harmonic order (h1 to h50), of the phase being measured (L1-L2-L3) and relevant absolute current or voltage value of the harmonic.

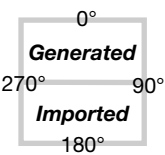
Harmonic order (h1 to h50), relevant conventional sign (- or +) and value of the harmonic given in percentage.

The pointer shows which harmonic is being measured



Phase angle between the voltage and current harmonic of the same order: a phase angle between 0° and 90° and between 270° and 360° corresponds to a generated harmonic; an angle between 90° and 180° and between 180° and 270° corresponds to an imported harmonic.

Harmonics:



This angle is displayed only if the measurements are taken in a three-phase system with neutral

❑ *Pages relating to the energy meters*

❑ *Page "25" (3 without measuring input module) Displaying of the total energy meters*

F key disabled.

❑ *Page "26" (4 without measuring input module) Displaying of partial energies*

F key is active; modification of tariff/displayed period.

By pressing the F key for the first time, the range relating to the season is highlighted. By using the ▼ and ▲ keys, it's possible to change the season displayed in that page. Pressing the F key once again, the range relating to the period is highlighted. Using the ▼ and ▲ keys, it's possible to change the tariff period within the displayed season.

Pressing the F key for the third time, you go back to the measuring page.

The changes of season and tariff period only refer to the displaying of the values stored in the corresponding season and period.

The changes carried out in this page do not have any influence on the method of tariff management of the instrument; they are only valid for display purposes.

❑ *Page "27" (5 without measuring input module)*

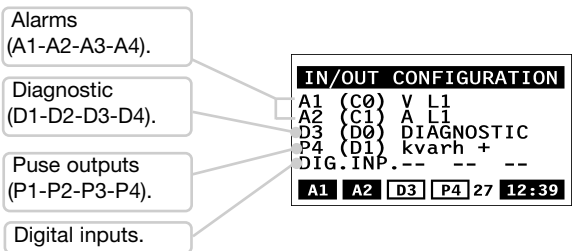
Display of Gas and Water meters

F keys disabled. Depending on the setting, the instrument may display one only of the following meter combinations: Gas; Gas with Gas in night tariff; Gas and Water. The water and gas meters are managed by the digital inputs.

❑ *Page "28" (6 without measuring input module)*

Displaying of instrument configuration

F key disabled. Page 28 shows the configuration of the main input (IN) and output (OUT).



The letters and numbers between parenthesis are referred to the relevant slots, while the text on their right shows the variable referred to the output. With reference to the digital inputs (DIG.INP.), the ON/OFF status of each one of them is shown.

❑ *Displaying of load profiles*

The load profiles are a simple graphic representation useful to highlight the trend of the load consumption (integrated power) with reference to the installed power (as per contract). *This function needs the serial module AR1041 to be installed.* The instrument calculates and displays the load profiles

Wdmd of the last integration period

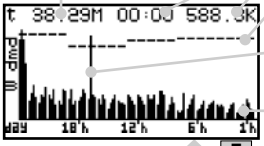
Time of the last integration

Installed power

Load profile of the installed power divided into hour time periods

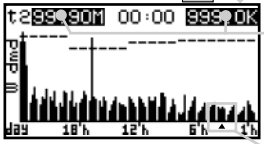
Example: the consumed power integrated in 15 minutes exceeds the installed power

Graphic representation of the consumptions



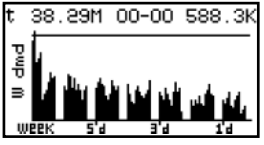
F

F

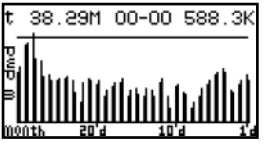


Daily graph:
15-minute resolution,
total time: 24 hours.

Pressing F, the instrument will display in detail the data indicated by the arrow that will appear on the abscissae axis. To scroll the single data use the F keys. To exit the detailed display mode press F.



Weekly graph:
2-hour resolution,
total time: 7 days.



Monthly graph:
12-hour resolution,
max. total time: 31 days.

depending on the acquired data, dividing them into: daily, weekly and monthly graph, as simplified by the figures shown above. Press the F key: you can display the single integration periods and the details relevant to the installed power

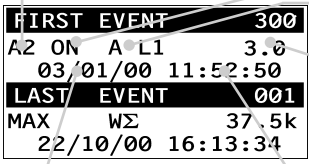
programmed for that hour time period, the storage time of the Wdmd sample and the relevant value. The data can be scrolled by means of the [▲] and [▼] keys and are relevant to the indication of the arrow that appears on the ascissae axis. To go back to the normal display, press the [F] key again.

If the instrument has not acquired enough data to cover the resolution of the graphs (day: at least 15 minutes; week: at least 2 hours; month: at least 12 hours) the latter are not displayed and the message: "NOT AVAILABLE" appears. When the data are enough for the graph to be displayed, wait a few seconds for the acquired data to be processed.

❑ Displaying with access to the Pass Code

❑ *Pass "1000": Displaying of recorded events*
(Only if the RS232 + RTC module + data memory is present)

Press the [S] key in any of the measuring page (excluded the "load profiles") when the instrument asks for PASS ? 0, set the value "1000" and confirm with [S]; the instrument shows you the page where the events are displayed and where the instrument stores, in a chronological order, the alarms that have occurred until that moment. To go back to the variable page press the [F] key. The **last** event has always the number 1 while the number corresponding to the **first** event varies, depending on the number of events that have been previously stored. The figure on the following page explains you the meaning of the displayed information.



Control type: alarm (e.g.: A2), diagnostics (e.g.: D1), maximum value (MAX), minimum value (MIN).

Only for alarms and diagnostics: detection of the abnormal condition (ON) or return to the normal condition (OFF)

Variable being controlled.

Alarms: value of the ON alarm; Max and Min logging: maximum and minimum measured values.

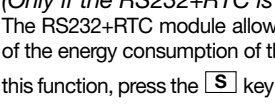
Date of the event.

Time of the event.

To reset all the events press the [S] key, to continue the reset procedure press the [S] key again: to exit from the reset procedure press the [F] key.

❑ *Pass "999": display of energy consumption storage (Only if the RS232+RTC is present)*

The RS232+RTC module allows the user to display the storage of the energy consumption of the previous two months. To enter this function, press the [S] key in any one of the measuring page (excluded the "load profiles"), when the instrument asks for the pass code [PASS ? 0], set the value "999": the instrument shows you the page where the energy values are stored.



Use the [▲] and [▼] keys to display the partial values; press the [F] key to exit.

❑ *Pass "998": display of the stored dmd variables (Only if the RS232 + RTC module is present)*

The stored dmd variables can be displayed by pressing the [S] key in any one of the measuring page (excluded the "load profile" pages): when the instrument asks for the PASS ? 0, enter the value "998": the instrument will display the values of the stored variables, the time (hours-minutes-seconds) and the date (day-month) of storage.

date	time	A L1
03/01	21:30:15	5
03/01	21:00:15	4
03/01	20:30:15	5
DATA NOT AVAILABLE		
DATA NOT AVAILABLE		

Use the [▲] and [▼] keys to scroll all the values; to exit press the [F] key. If the value has not been stored, the instrument displays "NOT AVAILABLE VALUE".

❑ *Pass "997": Reset of the Data Memory (only if the RS232+RTC module is available)*

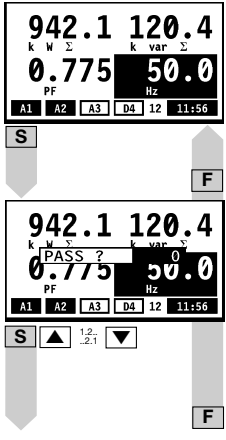
It's possible to reset all the information stored in the data memory. To enter this function press the [S] key in any one of the measuring pages (excluded the "load profile" pages), when the instrument asks for PASS ? 0 , enter the value "997" and confirm with [S], then press [S] to confirm the reset; press [F] not to execute the reset.

❑ *Pass "996": Reset of the load profiles*

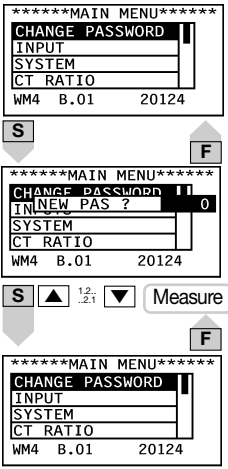
It's possible to reset all the information relating to the load profiles. To enter this function, press the [S] key in any one of the measuring pages (excluded the "load profile pages"), when the instrument asks for PASS ? 0 enter the value "996" and confirm with [S], then press [S] again to confirm the reset, press [F] not to execute the reset.

It is very important to verify that, every time the configuration of the instrument (modules and/or associated variables, electrical systems, etc.) changes, the setting of the parameters is according to the new configuration.

■ *Access to the main menu*



Press the S key to access to the programming menus from the measuring and displaying phase (you cannot access the main menu if the instrument is in the displaying pages of the load profiles); when the instrument asks for the password, enter its correct value by means of the ▲ and ▲ keys; then confirm it by pressing the S key again. If the password is correct (the default password is 0) you are allowed to access to the main menu of the programming phase. To reset your choice and go back to the measuring mode, press F .

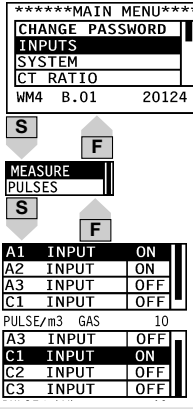


■ *Change Password*

This function allows you to choose the desired password value (from 0 to 500).

Press the [S] key and when the new password value is required, enter the desired value by means of the [▲] and [▼] keys; then press the [S] key to confirm the new value.

The instrument goes back to the main menu, as shown in the figure on the left. To reset your choices and go back to the main menu press [F].

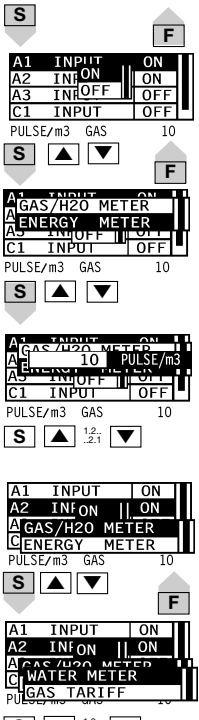


■ *Inputs*

Depending on the hardware configuration being used, the instrument works in two different operating modes:

❑ *With installed analogue measuring input module (AQ1018-AQ1019).*

The instrument carries out all the measures of: instantaneous, power, THD variables and energy metering. It's also possible to select the gas and water metering, as well as gas and night tar-



iff gas metering: to do this the AQ1042 digital inputs + aux module must be installed in slot A.

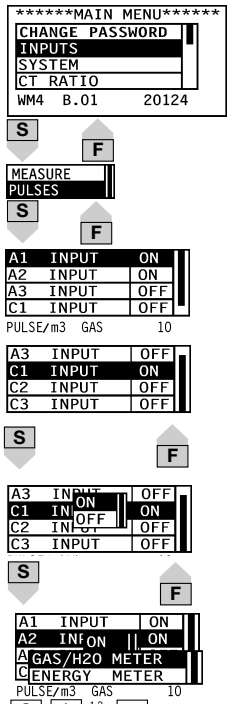
Choose the "INPUTS" function by means of the ▲ and ▼ keys and press S to enter in the sub-menu. Choose the "MEASURE" function by means of the ▲ and ▼ keys; press S to select the relevant operating mode and enter the relevant sub-menu where you can select the digital inputs (if present in slot A) connected to the gas, water and energy meters.

1- Choose the A1 INPUT (gas or kWh- meter) by means of the ▲ and ▼ keys (the description of the selected input function and the weight of the connected pulse can be seen under the scroll window); press S to confirm.

2- Once the ON/OFF window is displayed, choose "OFF" by means of the ▲ and ▼ keys to disable the metering and confirm with S; choose "ON" to enable the metering: the following window appears: selection between H_2O/GAS and kWh- (generated Kwh) "ENERGY METER"; choose the desired type of counter by means of ▲ and ▼, confirm with S (if you choose the kWh- metering, also the A2 input for counting the

kvarh- will be enabled).
3- Once the desired type of meter is confirmed, the instrument asks for the number of pulses to be associated to the unit increase (e.g. if you type the value 10 you will need 10 input pulses in order to make the instrument display 1 m^3).
4- A2 INPUT, enabling function of the water metering or of the kvarh- meter (generated kvarh); ENERGY METER" follow the operations described on paragraphs 1 and 2. If the H2O/GAS meter is selected, the window for the selection of the night gas tariff appears: GAS TARIFF or WATER METER for the water meter. Choose the desired option by means of the ▲ and ▼ keys and confirm with S. By choosing "WATER METER" or kvarh- meter (when the kvarh is chosen, automatically also the A1 input is enabled to count kWh-) the instrument shows the box where the increase pulses to be associated with the unit increase are to be entered (e.g. if you enter the value 10 you will need 10 input pulses for the instrument to display 1m^3). Press F to go back to the previous menus.
- A3 and C3 INPUTS: see "Enabling the remote control of the tariffs" on page 22.
- C1 and C2 INPUTS: not available.

Inputs A1 and A2 must both count either energies or m^3 (GAS/H2O); if for example you choose A1 as Wh- meter and then you select A2 as H2O meter, WM4 automatically changes the A1 input as GAS meter.



❑ *Analogue measuring input module NOT installed (AQ1018 - AQ1019).*

The instrument carries out only the following measures: W, var, W_{dmd}, var_{dmd}, PF_{dmd} using only the pulses acquired through the digital inputs. The "VA" power is always 0. It's possible to count and display the measurements of: water and gas, gas and gas night tariff, or Wh- and varh meter. In order to make the instrument carry out the above mentioned measures, it's necessary that both digital input modules are mounted (AQ1042+AQ1038 or 2x AQ1042). Choose the INPUT function by pressing the ▲ and ▼ keys, then press S to enter the relevant sub-menu. Choose the PULSE function by means of the ▲ and ▼ keys and press the S key to select the operating mode and enter the relevant sub-menu where you can select the digital inputs associated with the gas / water and kWh/kvarh meters. You can also enable the two digital inputs relevant to the remote selection of the tariffs. To select the water / gas metering or Wh- varh- metering, follow steps 1 to 4 on page 19 and 20. Please note the description of the selected input function and the weight of the associated pulse under the relevant window. To enable

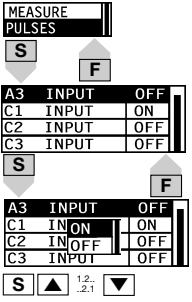
the counting of the “W” and “var” energies proceed as follows:

5- Choose the C1 INPUT function by the ▲ and ▼ keys (see the description of the selected input function and the weight of the associated pulse under the scrolling window); press S to confirm.

6- Once the ON/OFF window appears, choose “OFF” by the ▲ and ▼ keys to disable the counting of kWh’s and confirm with S; choose “ON” to enable the counting of kWh’s and confirm with S.

7- The instrument asks the user to enter the number of pulses to be associated to the unit increase (pulse/ kWh, ex.: entering the value 10 the instrument will need 10 input pulses to display 1kWh on the counter).

8- For the C2 INPUT, enabling function of the “kvarh” counting, follow steps 5 to 7. To go back to the previous menus, press F.



❑ *Enabling the tariffs remote control*

This function enables the control of the tariff phases of the energy counters by means of external pulses and not by means of the instrument’s clock. From the PULSE sub-menu select and enable the “A3 INPUT” and “C3 INPUT”. Select them one at a time by means of

the ▲ ▼ keys, confirm with S. When the ON/OFF window appears select ON by means of the ▲ ▼ keys to enable the INPUT or OFF to disable it, then confirm your choice by means of the S key. Press F to go back to the previous menus.

WM4-96 is able to recognize the presence of the analogue measuring input module (AQ1018-AQ1019). If you try to enter the MEASURING menu when the measuring input module is not installed, the instrument displays NOT AVAILABLE. There's a lower quantity of display pages in the configuration without measuring inputs, since there's a lower number of data that can be measured. **On the contrary the digital inputs are not recognized automatically by the instrument and it is therefore important to program them correctly: ON if they are to be used and OFF if they are not to be used, so as to avoid any wrong measures.** If WM4-96 is used in the PULSE operating mode, it needs a full scale to be set: therefore if the measuring module is not installed, the value to be set is in the SYSTEM menu (see SYSTEM on page 24). To sum up, here is the list of parameters to be set depending on the requirements (# Not available when analogue measuring input module is installed (AQ1018 or AQ1019):

A1 INPUT	(channel 1 slot A): enables gas counter.
A2 INPUT	(channel 2 slot A): enables water counter or gas night tariff.
A3 INPUT	*(channel 3 slot A): enables management of energy meters time periods*
C1 INPUT#	(channel 1 slot C): enables kWh meter.
C2 INPUT#	(channel 2 slot C): enables kvarh meter.
C3 INPUT	*(channel 3 slot C): enables* management of energy meters *time periods.*

TIME PERIODS SELECTION MODE		
CHANNEL 3 SLOT A	CHANNEL 3 SLOT C	ACTION
Open	Open	Tariff 4
Open	Close	2 Winter / 3 Summer *
Close	Open	1 Winter / 2 Summer**
Close	Close	Tariff 4
CHANNEL 2 SLOT A (if A2 enabled as GAS): Close = day-time tariff GAS is selected. Open = night-tariff GAS is selected.		

* WM4-96 associates to the meter tariff 2 in Winter and tariff 3 in Summer.

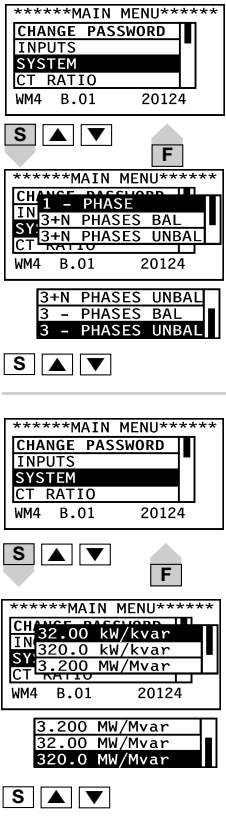
** WM4-96 associates to the meter tariff 1 in Winter and tariff 2 in Summer.

When the tariff mode managed by the digital inputs (A3 and C3 enabled "ON") is selected, the user can no longer select the tariffs in the energy meters menus, but only the seasons.

Example 1: measure of all the instantaneous variables, energies and gas + night gas. Proceed as follows: install the analogue measuring module (AQ1018 or AQ1019), select MEASURE in the INPUTS menu and enable the AQ1042 digital inputs module (that must be installed) by setting A1 ON, A2 ON (GAS TARIFF), A3 OFF.

Example 2: measure of energies, powers dmd and PF's dmd, as well as remote management of the tariff periods from the digital inputs. The instrument is to be equipped with 2 digital input modules (AQ1042 slot A and AQ1038 slot C or 2x AQ1042 slot A and C), while the analogue measuring module is not necessary; to enable the 2 modules, set the instrument as follows: A1 OFF, A2 OFF, A3 ON, C1 ON, C2 ON, C3 ON. Then, set the full scale in the SYSTEM menu according to your plant.

Every modification to the measuring mode will reset the meters.

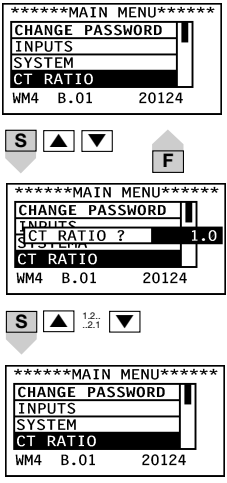


■ System

This function allows the user to select the type of electrical system by choosing among single phase (1-phase), balanced three-phase plus neutral (3+N phases bal.), unbalanced three-phase plus neutral (3+N phases unbal.), three phase balanced (3 phases bal) and three-phase unbalanced (3 phases unbal). Choose the SYSTEM function by means of the ▲ and ▼ keys, press S to confirm, then select the desired system by means of the ▲ and ▼ keys and confirm with S. To reset your choice and go back to the main menu, press the F key.

If the measuring input module is not present, the menu is to be modified by displaying the selectable full scale powers. Select the required full scale power by means of the ▲ and ▼ keys and confirm with S. To reset your choice and go back to the main menu, press the F key.

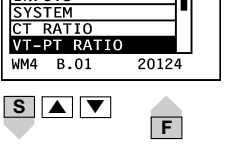
Any modification to the system settings will make the MIN/MAX values, the events and the energy meters reset.



■ *CT ratio*

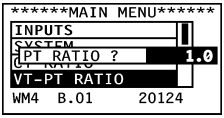
This function allows you to select the value of the CT ratio. Example: if the primary of the CT (current transformer) being connected is 300A and the secondary is 5A, the CT ratio corresponds to 60 (obtained from the calculation: 300/5). Choose the function CT RATIO by means of the ▲ and ▼ keys; press S to confirm then select the desired value by means of the ▲ and ▼ keys and confirm with S. To reset your choice and go back to the main menu, press F.

If the CT ratio is modified, then all the MIN/MAX values and the partial energy meters are reset.

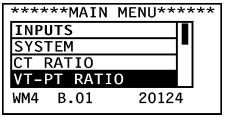


■ *VT-PT ratio*

This function allows the user to select the multiplier value of the VT. Example: if the primary of the VT (voltage transformer) being connected is 20kV and the secondary is 100V, the VT ratio will be 200 (given by 20000/100). If there is no VT, the ratio will be “1.0”.

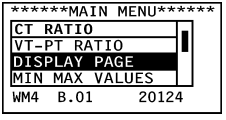


S ▲ 1.2.. ..2.1 ▼



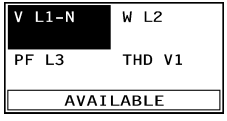
Choose the function VT-PT RATIO by means of ▲ and ▼; to confirm press S; then select the desired value by the ▲ and ▼ keys and confirm with S. To reset your choice and go back to the main menu, press F.

Changing the VT ratio, all the MIN/MAX values, all events and partial energy meters are reset.

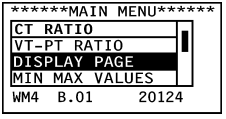


S ▲ ▼

F

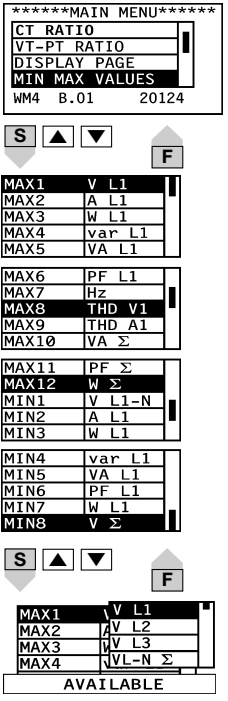


S ▲ ▼



■ *Display page*

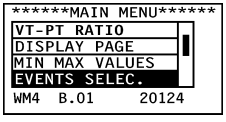
This function allows you to select the variables to be displayed on page 00.
Choose the DISPLAY PAGE function by means of the ▲ and ▼ keys; press S to confirm, then select the desired section of the display using the ▲ and ▼ keys; Press S; then select the variable to be displayed by means of the ▲ and ▼ keys and confirm it with S. To reset your choices and go back to the main menu press F.



■ *MIN MAX VALUES*

This function allows the user to associate some variables to the automatic recording of maximum values (from MAX1 to MAX12) and minimum values (from MIN1 to MIN8). To use this function, proceed as follows: select the MIN MAX VALUES function from the main menu using the ▲ and ▼ keys and confirm it with S.
A new window will appear showing you the list of the available memory locations: scroll the locations using the ▲ and ▼ keys, starting from MAX1 for the maximum values and MIN1 for the minimm values. Press S to open the secondary menu with the list of the available variables to be selected.
Scroll the list of the variables using the ▲ and ▼ keys; once you have selected the desired variable, confirm it using S . To reset your choices and go back to the main menu, press F.

Once you have confirmed the selection, the following message will appear: “YOUR CHOICE WILL RESET THE VARIABLE, WILL YOU CONTINUE? YES/NO”. Note: to enable the MIN/MAX recording function, read carefully the following paragraph, SELECTING THE EVENTS.



■ *EVENTS SELEC.*

This function allows the user to enable the events for data logging:

• **MAX** (logging of up to 12 different variables MAX1 to MAX12), see also: MIN MAX VALUES;

• **MIN** (logging of up to 8 different variables MIN1 to MIN8), see also MIN MAX VALUES;

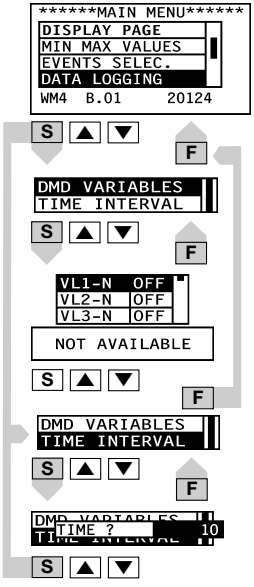
• **D** "diagnostics" (logging of up to 4 alarms: from D1 to D4), see also: DIAGNOSTIC DIGITAL OUTPUTS

• **R** "remote control" (up to 4 remotely controllable outputs: from R1 to R4), see also: REMOTE CONTROL DIGITAL OUTPUTS;

• **A** "alarms" (logging of up to 4 alarms: from A1 to A4), see also: ALARM DIGITAL OUTPUTS;

To use this function, select "EVENTS SELEC." from the main menu using the ▲ and ▼ keys and confirm it pressing S. Use the ▲ and ▼ keys to select where you want to enable the event (ON) or disable it (OFF). The function of the S ON-OFF-ON key is cyclical. To go back to the main menu press F.

When the measuring input module (AQ1018-AQ1019) is not present, the user can select only up to 8 events (even though the menu remains unchanged): from MAX 1 to MAX 4 and from MIN 1 to MIN 4. To select them, proceed as described above.



■ *Data logging*

This function enables the logging of the required variables in the data logging.

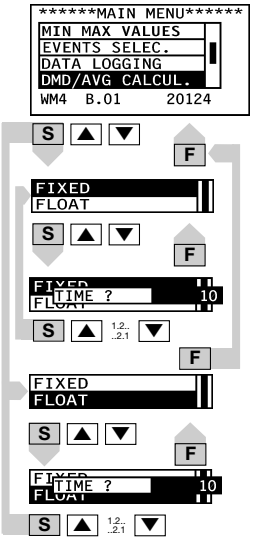
1) Choose the function DATA LOGGING by means of the ▲ and ▼ keys, press S to confirm;

2) select "DMD VARIABLES" by means of the ▲ and ▼ keys and confirm with S;

3) the display shows the window with the list of the available DMD variables: select the required available (ON) variable by means of the ▲ and ▼ keys and confirm with S. To go back to the main menu press F.

To select the integration time reapeat step 1; then select TIME INTERVAL by means of the ▲ and ▼ keys and confirm with S: the display shows the window for the selection of the TIME INTERVAL.; select the value (in minutes) with the ▲ and ▼ keys and then confirm with S. To go back to the main menu press F.

During the measurement the instrument takes a sample of the selected variables every 200ms approx.; When the selected time (from 1 to 60 min.) expires, the instrument will calculate the average of the samples and carry out the data logging. The **historical data** will therefore be guaranteed to be **highly accurate**.



DMD/AVG calcul.

This function allows you to select the calculation method of W-VA-PF. To enter these functions, select "DMD/AVG CALCUL" from the main menu using the ▲ and ▼ keys and confirm the selection with S. You can thus enter the DMD/AVG CALCUL. method: choose between the FIXED or FLOAT method using the ▲ and ▼ keys and confirm your choice with S. The display will show the window for setting the time in minutes, use the ▲ and ▼ keys to set the desired value, confirm with S. To reset your choices and go back to the main menu press F.

The FLOAT selection is not available without the measuring input module.

FIXED selection: if for example you select the value 15 minutes, the instrument calculates the average and updates the value every 15 minutes.

FLOAT selection: if for example you select the value "15 minutes", the instrument calculates the average and

updates its value at first after 15 minutes and afterwards every minute generating a window whose width corresponds to “15 minutes” and shifts by units of 1 minute.
On the following page you can see the diagram that shows the two operating methods.

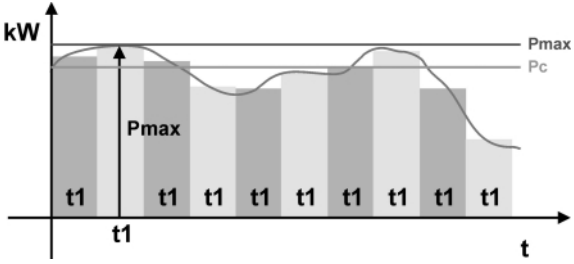
SYNCHRONIZATION OF THE FIXED OR FLOAT CALCULATION

The synchronization of the FIXED or FLOAT calculation can be carried out in three different ways:

- without DIGITAL INPUTS and RS232+RTC modules: the reset and the start of the synchronization is carried out when the instrument is switched on;
- with the DIGITAL INPUTS module installed: the synchronization begins when the A3 and C3 digital input modules change state (from ON to OFF or from OFF to ON). Any following change of state will make the synchronization reset and start all over again;
- with the RS232+RTC module: the synchronization begins at the exact hour that follows the “switch on” of the instrument (E.g.: if WM4-96 is switched on at 10:25, the synchronization will begin at 11:00).

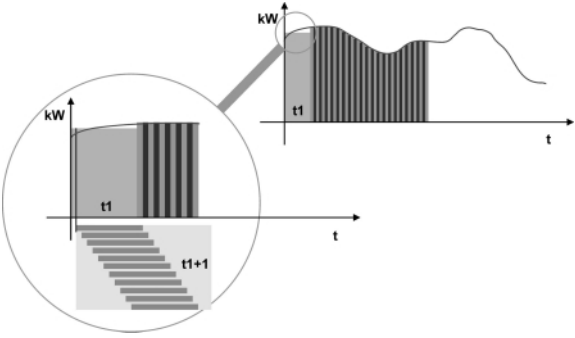
In case both modules are installed (that is digital inputs and RS232+RTC) the priority will be given to the digital inputs.

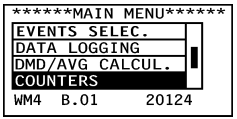
FIXED AVERAGE CALCULATION



Where: Pmax is the maximum measured power,
Pc is the contractual power,
t1 is the selected average period

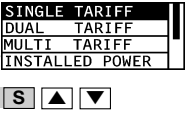
FLOAT AVERAGE CALCULATION





■ *Access to the Counters menu*

This function allows you to choose the type of management of the energy meters. Select "COUNTERS" from the main menu by means of the ▲ and ▼ keys; confirm with S to enter the specific sub-menu.



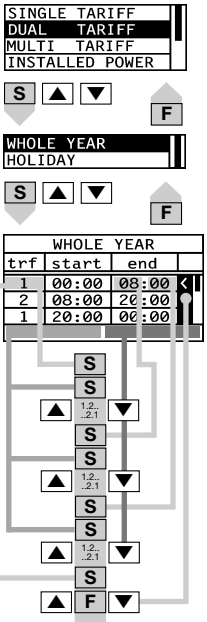
❑ SINGLE TARIFF *Counters Management*

This function allows you to choose the energy meters according to a single tariff which is the same for the whole year. Select SINGLE TARIFF by means of the ▲ and ▼ keys and confirm your choice with S.

When you change the type of management, and after the choice is confirmed, the instrument resets the meters and a buzzer sounds.

❑ *DUAL TARIFF counters management: Whole year*

This selection manages the energy meters with two different tariffs per day and two periods per year. Select DUAL TARIFF from the COUNTERS menu by means of the ▲ and ▼ keys and confirm your choice with S. Select WHOLE YEAR and confirm with S to enter the relevant menu; now you can enter the programming of the daily period as follows:



Proceed with the same principle for the following rows. To exit any item always use [F] .

1-press [S]: the first box (trf=tariff) is highlighted;

2-press [S] again: the TARIFF box will appear on the lower part of the display; now you can choose the tariff (from 1 to 4), e.g.: "1" by means of the [▲] and [▼] keys;

3-press the [S] key once more, the "end tariff" hour is highlighted;

4-press the [S] key once more; the HOURS box will appear on the lower part of the display; now you can choose the hours - e.g. 8 - by means of the [▲] and [▼] keys.

5-press the [S] key again; the "end tariff" minutes will be highlighted;

6-press the [S] key again: the MINUTES box will appear on the lower part of the display; now you can set the desired minutes - e.g. 10 - by means of the [▲] and [▼] keys.

7-after the confirmation of the last setting, press [S] and you are back to the selection of the first "trf" parameter you have highlighted.

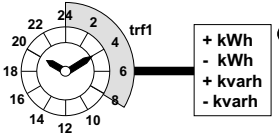
The "starting hour" of the following line becomes equal to the "end hour" you have just selected. Only when the "trf" parameter is highlighted, you can scroll the parameters and modify them: use the [S] key to access to the parame-

ters; use the ▲ key to move from the left to the right and the ▼ key to move from the right to the left.

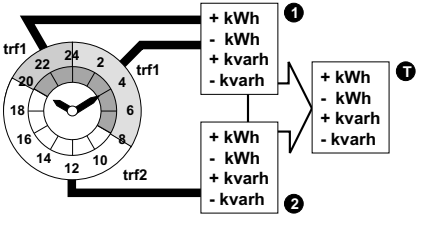
8- press F to exit the programming of the parameters of the relevant row (no boxes are to be highlighted);

9-press ▲ and ▼ to select one of the other programming lines; the pointer on the right shows the line where the user can modify the parameters (steps from 1 to 7);

a) the day can be divided into up to 8 different periods connected to up to 4 different tariffs according to the following working principle:



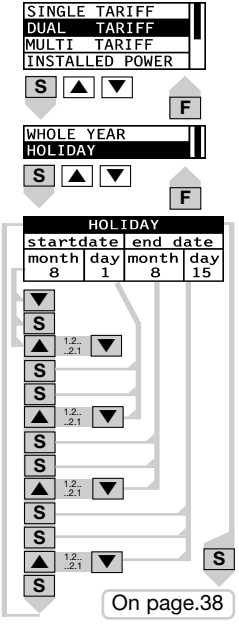
The measured energy (partial energy) is placed in TARIFF 1 when the time period is from midnight to 8:00, in TARIFF 2 when the time period is from 8:00 a.m. to 8:00 p.m. and again in TARIFF1 when the time period is from 08:00 p.m. to midnight. The total measured energy is the result of the sum of all the partial measures as shown in the figure below:



b) the starting point of the first time period is always 24:00 (midnight) and cannot be changed;

c) the starting point of the following period is always the end

hour of the previous time period;
d) the daily loop is closed by setting 24:00 as last hour of the last time period (to follow this procedure see step 4 on page 35), confirm the setting by pressing [S] and [F] to go back to the TARIFF SELECTION menu ("COUNTERS" submenu on page 34).
NOTE: selecting the A3 or C3 digital inputs as ON, the DUAL TARIFF is no more available.



❑ *Programming the HOLIDAY period*

To program the HOLIDAY period, proceed in the following way:
10-Choose HOLIDAY in the DUAL TARIFF menu by means of the [▲] and [▼] keys and confirm with [S]: the HOLIDAY window will be displayed;

11-press [▼]: the month corresponding to the start date will be highlighted;

12-press [S]: the box where the month can be set is enabled;

13-use the [▲] and [▼] key to select the desired month (from 1 to 12);

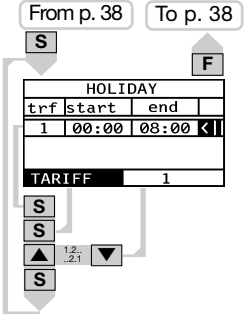
14-press the [S] key to confirm the selection and move to the next parameter: day setting;

15-press the [S] key again to open the box where the day is to be set,

16-use the [▲] and [▼] keys to select the desired day (from 1 to 31 depending on the previously selected month);

17-press the [S] key to confirm the selection and move to th next parameter.

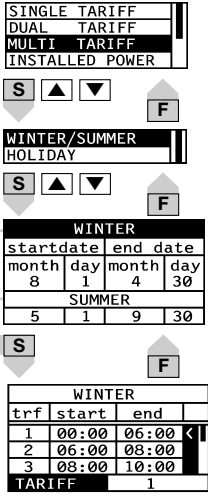
To program the “end date” follow the same procedure described above from step 11 to step 16. After confirming the “end” day by means of the [S] key, the HOLIDAY Box is highlighted to indicate the conclusion of the HOLIDAY period programming cycle. You can also use the [▲] (moves from right to left) and [▼] (moves from left to right) keys to scroll along the available parameters.



It’s possible to choose the tariff to be associated to the HOLIDAY period according to the following procedure: starting from the box on the previous page, step 10, press the [S] key again: the instrument will display the box shown on the left. Press [S]: the box relevant to the “trf” value is highlighted; press the [S] key again: the instrument will display on the lower section the box where the tariff is to be set. Select the desired tariff (from 1 to 4) by means of the [▲] and [▼] keys and confirm it with [S]. To reset your choices and/or exit the menus, use the [F] key.

❑ *MULTI TARIFF*

This function allows the management of the counters according to many periods per day and three periods per year: WINTER, SUMMER and HOLIDAY.

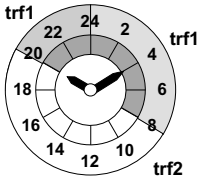


To program the parameters relating to the winter season, simply follow the same procedure (holidays) described on page 37 from Step 11 to Step 17. The parameters of the SUMMER season are automatically set by the instrument as a difference between the previous two periods of the Year. To enable the setting of the daily time periods, press [S] when the WINTER or SUMMER seasons are highlighted. The following settings are the same as the ones described from Step 1 to Step 9 on page 35 and 36. To reset your choices and/or go back to the previous menus, use the [F] key. To program the HOLIDAY period, follow the procedure on page 37 from step 11 to step 17.

The WINTER and SUMMER periods are conventional seasons mainly used to manage in the best way the different energy costs during the year.

The reminds at steps a), b), c), d) on page 36 and 37 are also valid for the MULTI TARIFF function. The next page shows a few examples of programming the various time periods.

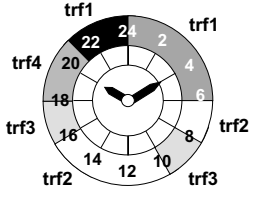
DUAL TARIFF management



WHOLE YEAR			
trf	start	end	
1	00:00	08:00	<
2	08:00	20:00	
1	20:00	00:00	
TARIFF		1	

As you can see on the figure above, there's a daily division into three periods with two different tariffs.

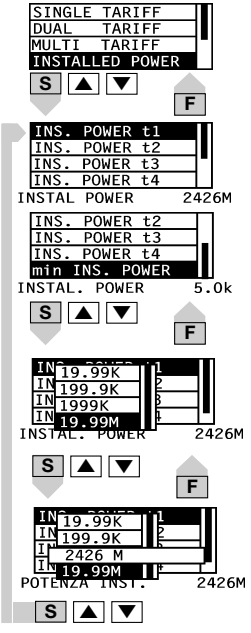
MULTI TARIFF management



WINTER			
trf	start	end	
1	00:00	06:00	<
2	06:00	08:00	
3	08:00	10:00	
TARIFF		1	

WINTER			
trf	start	end	
2	10:00	16:00	<
3	16:00	18:00	
4	18:00	21:00	
1	21:00	00:00	
TARIFF		2	

On the picture above you can see four different tariffs which are coupled to seven different periods of the day.



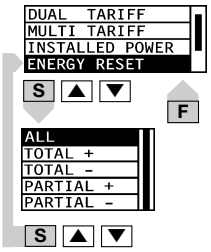
❑ *Installed power*

This function allows the user to set the maximum installed tariff power (as per contract). The set power is associated to the desired tariff (t1-t2-t3-t4) and it's displayed in the load profile graph (see also load profiles on page 12).

Select INSTALLED POWER from the main menu by means of ▲ and ▼ and confirm it with S to enter the relevant submenu. Then, select the required tariff (t1-t2-t3-t4) by means of the ▲ and ▼ keys and confirm with S. The full scale selection window appears: select the desired full scale value by means of the ▲ and ▼ keys and confirm with S; then, enter the desired power value by means of the ▲ and ▼ keys and confirm with the S key.

To reset your choices and go back to the main menu press F.

MINIMUM INSTALLED POWER: (MIN. INS. POWER) enables the user to set the beginning of the scale of the load profiles graphs thus optimizing its resolution. To set the value proceed as per "installed power".



❑ *Reset of the Energy Counters*

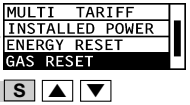
The "RESET" menu allows you to reset the energy counters. Press [S] to enter the menu and then use the [▲] and [▼] keys to select the desired type of reset.

Press [S] to enter the menu, then the instrument displays the following message:

PAY ATTENTION, ALL THE METERS WILL BE RESET!! WILL YOU CONTINUE?

To end the RESET procedure, press [S]; to go back to the TARIFF SELECTION menu (counters sub-menu), press [F].

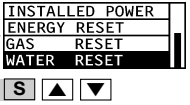
The reset procedure allows the user to choose among the following different choices:
ALL: reset of all the energy meters (imported/exported energies);
TOTAL + : reset of the imported energy counters (+kWh, +kvarh);
TOTAL - : reset of the exported energy counters (-kWh, -kvarh);
PARTIAL + : reset of the partial imported energy counters (+kWh, +kvarh);
PARTIAL- : reset of the partial exported energy counters (-kWh, -kvarh).



❑ *Gas Counters Reset*

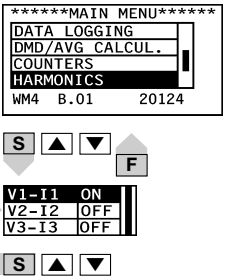
The GAS RESET menu allows the user to reset the gas counters. Select GAS RESET by means of the ▲ and ▼ keys and confirm with S. The instrument displays the following message: PAY ATTENTION, ALL THE GAS COUNTERS WILL BE RESET! WILL YOU CONTINUE?

To end the RESET procedure press S; to go back to the TARIFF SELECTION menu (counters sub-menu), press F.



❑ *Water Counter reset*

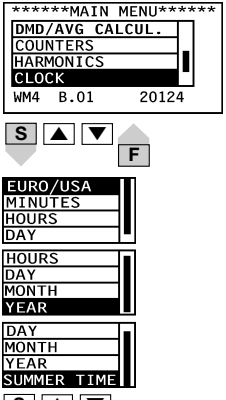
The WATER RESET menu allows the user to reset the water counter.
Select WATER RESET by means of the ▲ and ▼ keys and confirm with S. The instrument displays the following message:
PAY ATTENTION, THE WATER COUNTER WILL BE RESET!
WILL YOU CONTINUE? If you press S you end the RESET procedure, if you press F you go back to the tariff selection menu (counters sub-menu).



■ *Harmonics analysis*

This function enables the display of the windows relating to the harmonics analysis.

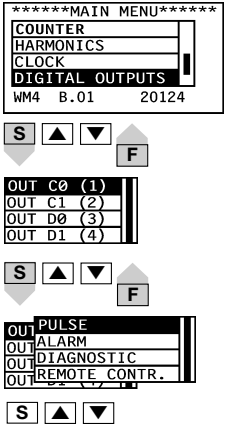
Press [S] to enter the HARMONICS menu: then, use the [▲] and [▼] keys to select the phase where you want the harmonic analysis to be enabled. The [S] key allows the user to enable (ON) or disable (OFF) the displaying (the function is cyclical: ON-OFF-ON). To go back to the main menu, press [F].



■ *Clock setting*

This function enables the user to set the data relating to date and time. Select CLOCK from the main menu by means of the [▲] and [▼] keys; then press [S] to enter the menu. Choose the desired function by means of the [▲] and [▼] keys; Enter the desired sub-menu with [S]. Then set the desired value by means of the [▲] and [▼] keys and confirm the value with [S]. To reset the choices and go back to the main menu, press [F].

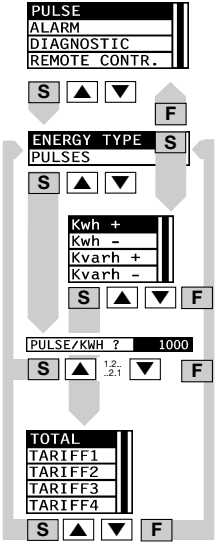
The EURO/USA function allows the user to display the date and time according to the EUROPEAN (EURO, date: day/month/year; time: 24 hours) or AMERICAN (USA, date: month/day/year; time: 12 hours / AM and PM) format.



■ *Digital Outputs*

This function enables the user to connect the type of digital output to the slot at the beginning. The instrument indicates if the module is not in the slot with the message "NOT AVAILABLE"; whereas if the module is in the slot, the instrument automatically goes to the digital output menu, where the user can set four different types of output: PULSE, ALARM, DIAGNOSTIC, REMOTE CONTR. To enter these functions, choose DIGITAL OUTPUT from the main menu using the ▲ and ▼ keys, then confirm with S.
The instrument shows a window where the various slots (OUT C0, OUT C1, etc.) and output channels (1, 2, etc.) are shown. Select the desired slot using the ▲ and ▼ keys and confirm with S to enter the output function menu (if the module is not in the slot, the instrument displays NOT AVAILABLE). To reset the choices and go back to the main menu, press F.

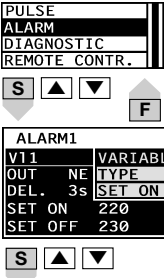
The meaning of the symbols on the display is the following:
OUT C0 (1): digital output SLOT C0, channel 1
OUT C1 (2): digital output SLOT C1, channel 2
OUT D0 (3): digital output SLOT D0, channel 3
OUT D1 (4): digital output SLOT D1, channel 4



❑ *Pulse output*

This function allows the user to set the parameters of the pulse output. The output can be connected to a specific energy and this energy can be connected to the desired tariff. The measured energy is re-transmitted by means of the pulse output (the pulses/energy ratio of which is programmable). Use ▲ and ▼ to select PULSE from the list of available outputs; then confirm with S and choose from the submenu ENERGY TYPE the energy to be retransmitted using ▲ and ▼: consumed active energy (kWh +), generated active energy (kWh -), consumed reactive energy (kvarh +), generated reactive energy (kvarh -), press the S key to open the menu of energy/pulse output management. There are five possible selections: TOTAL, output connected to the total energy meter; TARIFF, output connected to the desired tariff

type. Confirm with [S] and go back to the digital output menu. To reset the choices and go back to the main menu, press [F]. The multiplyer of the measuring unit (kW, MW) automatically changes according to the CT or VT ratio set by the user.

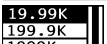


❑ *Alarms*

This function allows the activation of a static or relay output when an alarm condition is detected. Select ALARM from the DIGITAL OUTPUT menu by means of the [▲] and [▼] keys, then press [S] to enter the display window of all the alarm parameters:

Select the desired variable by means of the [▲] and [▼] keys, press [S] to confirm and enter the sub-menus dedicated to the various parameters.

•**Variable:** variables to be coupled to the alarm: you can choose among all the available ones (see on page 59); scroll the variables by means of the [▲] and [▼] keys and confirm the selection with [S]. The availability (or non-availability) of the variable is clearly indicated on the display. When you select Wdmd, it's necessary to program also the reference tariff (t1-t2-t3-t4 or TOTAL) .

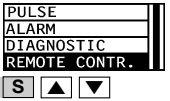


The display will show the box on the left: select the desired resolution by means of the [▲] and [▼] keys: press [S] to confirm.

•**Type:** type of alarm: up alarm (MAX); down alarm (MIN); up alarm with latch (UP L): in this case the reset of the output can only be manual; down alarm with latch (D.L.): in this case the reset of the output can only be manual; down alarm with disabling at power ON (D.DO). Choose the desired alarm type by means of the ▲ and ▼ keys and confirm it with S.
•**Set on:** ON-alarm set-point. Select the value of the variable by means of the ▲ and ▼ keys and confirm it with S.
•**Set off:** OFF-alarm set-point. Select the value of the variable by means of the ▲ and ▼ keys and confirm it with S.
•**Out:** Normally energized alarm (NE) or normally de-energized alarm (ND). Choose the desired function by means of the ▲ and ▼ keys and confirm it with S.
•**Delay:** delay on alarm activation. Select the desired delay value in seconds by means of the ▲ and ▼ keys and confirm it with S.

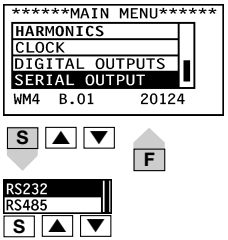
❑ *Diagnostic*

In a 3-phase unbalanced-load system, this function controls the presence of the neutral connection. If the connection to the neutral is not detected, the instrument activates an alarm. Select "DIAGNOSTIC" by means of the ▲ and ▼ keys, then press S to confirm it. To reset your choice and go back to the main menu, press F.



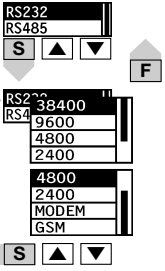
❑ *Remote control*

This function enables the control of the digital outputs by means of the RS485/RS232 communication port instead of using the instrument's alarm. The outputs can be activated by a PC or PLC by sending special commands. Select the REMOTE CONTR. function by means of the ▲ and ▼ keys and confirm pressing the S key: the instrument will go back to the DIGITAL OUTPUT menu. To reset your choice and go back to the main menu, press F.



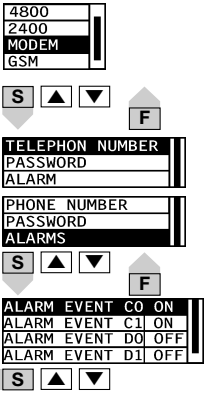
■ *Serial output*

This function enables the user to set the parameters of the serial output. Choose "SERIAL OUTPUT" from the main menu by means of the ▲ and ▼ keys and confirm with S. Then, select the type of serial output to be used.



❑ *RS 232*

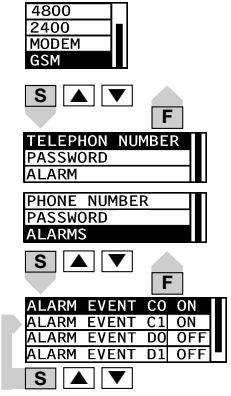
Select RS232 by means of the ▲ and ▼ keys and confirm with S. You enter the baud-rate selection window. Use the ▲ and ▼ keys to select the required baud rate value and confirm with S.



❑ *Modem*

The instrument communicates with a remote PC by an analogue modem.
Select MODEM from the RS232 sub-menu by means of the ▲ and ▼ keys and confirm with S. The window with the modem settings appears:
1- PHONE NUMBER: select it using the ▲ and ▼ keys and confirm it with S. Then, select the required quantity of pre-set phone numbers to be managed (from 1 to 5) by the ▲ and ▼ keys and confirm it with S.
2- PASSWORD: not available.
3- ALARMS: enables the user to prepare an alarm message and send it to a remote PC, when an alarm changes status (activation or deactivation) among the selected ones. Select ALARMS by means of the ▲ and ▼ keys and confirm it with S. The window with the available alarms appears: select the alarm that is to be activated (ON) or deactivated (OFF) by means of the ▲ and ▼ keys and confirm it with S. Selecting the modem function, the management of the analogue modem is enabled as "passive" mode (WM4 answers to a request from the remote PC) or as "active" mode (WM4 signals the change of status of one of the alarms to the remote PC). To enable the "active" mode, it's necessary to activate the alarms to be transmitted and set how many phone numbers are to be

managed for each call. The subsequent calls are managed by priority: if the first phone number is engaged, the instrument calls the second and so on; when a phone number answers the call, then the alarm message is forwarded and the calls are finished. The phone numbers to be dialled and the messages coupled to the type of alarm message are stored in the flash memory of the RTC+Data Memory module (AR1041) of WM4 by means of the WM4SOFT programme (see Technical characteristics on page 80).



❑ *GSM*

The instrument sends and receives short text messages (SMS) to/from a mobile phone by GSM modem. Select "GSM" from the RS232 menu by means of the ▲ and ▼ keys and confirm with S: the GSM setting window is displayed:

1- PHONE NUMBER: select the number by means of the ▲ and ▼ keys and confirm with S . Then select the quantity of pre-set phone numbers to be managed, from 1 to 5, by means of the ▲ and ▼ keys and confirm with S .

2- PASSWORD: it's a 3-dgt numeric address (0 to 255) which is useful, in a network of instruments, to identify the WM4-96 from which the message is sent or to which the SMS are to be sent. Select PASSWORD by means of the ▲ and ▼

keys and confirm it by [S]. Then, select the desired numeric code by means of the [▲] and [▼] keys and confirm with [S].
3- ALARMS: it enables the transmission of SMS alarm messages to GSM mobile phones when one of the selected alarms changes status (activation or deactivation). Select ALARMS by means of the [▲] and [▼] keys and confirm with [S] :
The window with the available alarms is shown on the display; select the alarm that is to be activated (ON) or deactivated (OFF) by means of the [▲] and [▼] keys and confirm with [S].

When you select "GSM" you enable the transmission and reception of short text messages. The WM4 is to be connected to the previously configured GSM modem. The phone numbers to be called for the transmission of the SMS (maximum 5) and the messages coupled to the type of alarm notification (maximum 8 messages of 60 characters) are stored in the flash memory of the RTC + Data memory module of WM4 by means of the WM4SOFT programme. The user must enable the alarms to be notified (in the WM4) and the phone numbers to which the messages are to be sent (all numbers receive the messages).

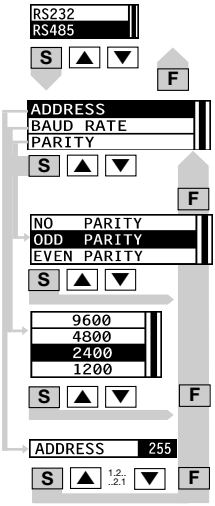
❑ *How to use the SMS*

Once the instrument has been enabled to send and receive messages, you can ask for the instantaneous variables, the last available variables of the data logging, the energy meters and the status of the alarms. In the next page, you find a table that identifies the codes to be dialled on the mobile phone in order to receive the required information. Generic text to be sent for the request to the instrument:
"WM4. [instrument's password]. [information to be requested]" confirm the message and send it (according to the instructions of the mobile phone).

Required Information	Request Code	Reply Text
V_{L1}, V_{L2}, V_{L3}, $V_{L-N\Sigma}$	WM4.xxx.VN	WM4.xxx:[info]
V_{L1-2}, V_{L2-3}, V_{L3-1}, $V_{L\Sigma}$	WM4.xxx.VL	WM4.xxx:[info]
A_{L1}, A_{L2}, A_{L3}, A_{Σ}	WM4.xxx.A	WM4.xxx:[info]
W_{L1}, W_{L2}, W_{L3}, W_{Σ}	WM4.xxx.W	WM4.xxx:[info]
VA_{L1}, VA_{L2}, VA_{L3}, VA_{Σ}	WM4.xxx.VA	WM4.xxx:[info]
var_{L1}, var_{L2}, var_{L3}, var_{Σ}	WM4.xxx.VAR	WM4.xxx:[info]
PF_{L1}, PF_{L2}, PF_{L3}, PF_{Σ}	WMA.xxx.PF	WM4.xxx:[info]
W_{dmd}, VA_{dmd}, var_{dmd}, PF_{avg}	WM4.xxx.DMD	WM4.xxx:[info]
Log1, Log2, Log3, Log4, Log5, Log6, Log7, Log8	WM4.xxx.LOG	WM4.xxx:[info]
Total kWh+, kvarh+, kWh-, kvarh-	WM4.xxx.TOTAL	WM4.xxx:[info]
Winter kWh+, kvarh+, kWh-, kvarh-	WM4.xxx. WINTER	WM4.xxx:[info]
Summer kWh+, kvarh+, kWh-, kvarh-	WM4.xxx. SUMMER	WM4.xxx:[info]
Holiday kWh+, kvarh+, kWh-, kvarh-	WM4.xxx. HOLIDAY	WM4.xxx:[info]
Alarm status	WM4.xxx. ALARM	WM4.xxx:[info]

"xxx": they represent the access password for reading the variables by means of the SMS (see PASSWORD SMS on page 51).
"Log1...Log8": they represent the last integrated variables stored in the flash memory (the variables must have been enabled and programmed to be read)

Example: you want to ask for info on the dmd variable; message of request: WM4.255.DMD; answer message: WM4.255: 12.45KWdmd, 16.04KVA dmd, 3.45kvar dmd, 0.79PF dmd



❑ *RS 485*

Select SERIAL OUTPUT from the main menu, then select RS485 by means of the ▲ and ▼ keys and confirm with S. Select the parameter to be set from the available sub-menus with the ▲ and ▼ keys and confirm it with S. The configurable parameters are:

• **ADDRESS** of the instrument: from 1 to 255.

• **BAUD RATE**: 1200, 2400, 4800 and 9600 bit/s.

• **PARITY**: no parity, even parity and odd parity.

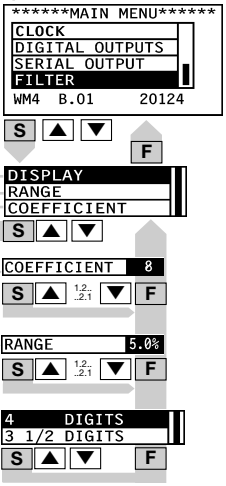
To exit from any of the menus or reset a choice, press F.

■ *Digital Filter*

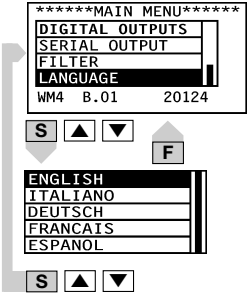
Select FILTER by means of the ▲ and ▼ keys and confirm it with S . Select the function to be set from one of the submenus with the ▲ and ▼ keys and confirm it with S . There are three possible choices:

• **DISPLAY**, to select the display of the 4-digit (max 9999) or 3 1/2-digit (max 1999) instantaneous variables.

• **RANGE**, to set the operating range of the digital filter. The value is expressed as % of the full scale.



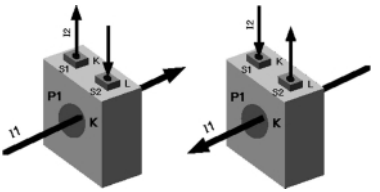
• **COEFFICIENT**, to set the filtering coefficient of the instantaneous measurements.
Increasing the value, also the stability and the settling time of the measurements are increased. Once one of the three parameters has been selected, set the desired value by means of the ▲ and ▼ keys and confirm it with S. To exit the "FILTER" menu, press F. For any other info, see "Useful Info" on page 56.



■ *Language*

Select LANGUAGE from the main menu by means of the ▲ and ▼ keys and confirm with S. Select the language to be set from the submenu with the ▲ and ▼ keys and confirm the selection with S. To exit from any of the menus or cancel a selection, press F.

The variables measured by the instrument are correct if the inputs have been connected according to the right polarities (see figure below). Should the connection not be conforming to the right polarities, measuring and retransmission errors may occur, both due to the wrong direction of the current flowing in the primary/secondary of the ammeter transformer being connected.



Application example of the digital filter

It's necessary to stabilize the value of the displayed V_{L-N} variable, that varies between 222V and 228V, maintaining a 4-dgt indication. The parameters of the digital filter must be set as follows:

- DISPLAY: 4 digits
- RANGE: the variable may have variations within the average amplitude value equal to ±1.3% of the rated value of this variable which is obtained as follows: [(228-222) / 2 = ±3V, then ±3*100/231V= ±1.3% where 231V is the rated phase-neutral value of an input at 400V)].

The "range" parameter, that is the action range of the digital filter, will be set at a value which is slightly higher than the percentage amplitude of the fluctuation: for example 1.5%.

- COEFFICIENT: if the new value acquired by the instrument is within the action range of the filter, the new displayed value is calculated by summing (algebraically) to the previous value the variation divided by the filtering coefficient. As a consequence, a

higher value of this coefficient results in a higher settling time, that means a higher stability. The best result is generally obtained by setting the filtering coefficient at a value equal to at least 10 times the value of the range parameter. Considering the example above: 1.5*10=15. To enhance the stability, you may also increase the filtering coefficient (values within 1 and 255 only).

■ *What is ASY*

The ASY variable allows you to control the symmetry of the star / delta voltages (for systems without neutrals) and star voltages (for systems with neutral). The variable is calculated as follows:

$$ASY_{L} = 100\frac{\left[MAX(V_{L1\text{-}2}, V_{L2\text{-}3}, V_{L3\text{-}1}) - MIN(V_{L1\text{-}2}, V_{L2\text{-}3}, V_{L3\text{-}1})\right]}{V_{L-L}}$$

$$ASY_{L\text{-}N} = 100\frac{\left[MAX(V_{L1}, V_{L2}, V_{L3}) - MIN(V_{L1}, V_{L2}, V_{L3})\right]}{V_{L-N\Sigma}}$$

where the first formula is to be applied with delta systems, while the minimum value calculated between the two is to be used for the star systems.

It's very important, as a general rule, to plug in and extract the optional modules only when the instrument is switched off.

LIST OF THE DISPLAYED VARIABLE PAGES				
No	1ST variable	2ND variable	3RD variable	4TH variable
0	Selectable	Selectable	Selectable	Selectable
1	V L1	V L2	V L3	V L-N Σ
2	V L1-2	V L2-3	V L3-1	V L Σ
3	A L1	A L2	A L3	AΣ
4	W L1	W L2	W L3	W Σ

No	1st variable	2nd variable	3rd variable	4th variable
5	var L1	var L2	var L3	var Σ
6	VA L1	VA L2	VA L3	VA Σ
7	PF L1	PF L3	PF L4	PF Σ
8	V L1	A L1	PF L1	W L1
9	V L2	A L2	PF L2	W L2
10	V L3	A L3	PF L3	W L3
11	V Σ	PF Σ	var Σ	W Σ
12	A Σ	PF Σ	Hz	W Σ
13	W dmd	var dmd	PF avg	VA dmd
14	MAX1	MAX2	MAX3	MAX4
15	MAX5	MAX6	MAX7	MAX8
16	MAX9	MAX10	MAX11	MAX12
17	MIN1	MIN2	MIN3	MIN4
18	MIN5	MIN6	MIN7	MIN8
19	Hystogram FFT V1 (THD, THDo, THDe, Single Harmonic)			
20	Hystogram FFT A1 (THD, THDo, THDe, Single Harmonic)			
21	Hystogram FFT V2 (THD, THDo, THDe, Single Harmonic)			
22	Hystogram FFT A2 (THD, THDo, THDe, Single Harmonic)			
23	Hystogram FFT V3 (THD, THDo, THDe, Single Harmonic)			
24	Hystogram FFT A3 (THD, THDo, THDe, Single Harmonic)			
25	kWh + TOT	kWh- TOT	kvarh+ TOT	kvarh- TOT
26	kWh+	kWh-	kvarh+	kvarh-
27	m^3 GAS	m^3 WATER or m^3 GAS night tariff		

The configuration shown in the table above is only valid for connections to 3-phase systems with neutral and FFT enabled. In case of any other system, the type and quantity of the displayed variables will vary.

List of the available variables:

V L1	AΣ	VA L3	THD_I V2	THD_{II} A3
V L1	W L1	VA Σ	THD V3	THD_I A3
V L3	W L2	PF L2	THD_{II} V3	AΣ dmd
V L-N Σ	W L3	PF L3	THD_I V3	VA dmd
V L1-2	W Σ	PF Σ	THD A1	PF avg
V L2-3	var L1	Hz	THD_{II} A1	W dmd
V L3-1	var L2	THD V1	THD_I A1	ASY
V LΣ	var L3	THD_{II} V1	THD A2	
A L1	var Σ	THD_I V1	THD_{II} A2	
A L2	VA L1	THD V2	THD_I A2	
A L3	VA L2	THD_{II} V2	THD A3	

The availability of the variables depends on the type of electrical system being selected.

Installation

Preliminary operations

Before switching the instrument on, make sure that the power supply voltage corresponds to what is shown on the side label of the relevant module. Example:
AP1020, Universal power supply
input range: 100V...240V DC/AC (50Hz -60Hz)
power consumption: 12W / 30VA 1 PHASE
serial number: S/N 002700/20345

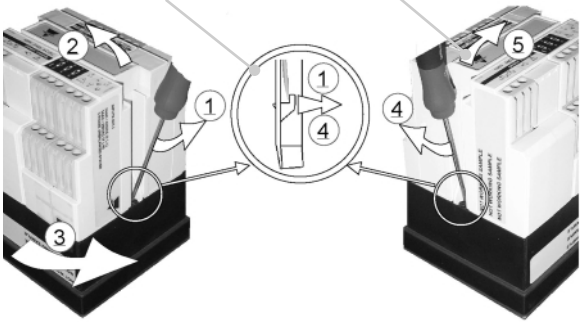
Before mounting the modules

Each module (input, output and power supply) must be mounted in the proper slot: each module has been con-

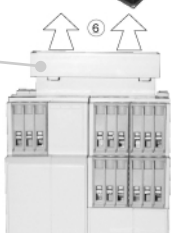
ceived to be mounted in one slot only. To know in which slot every module is to be mounted, refer to the figure on page 62. For a correct mounting of the instrument, insert the modules in the relevant slots, then, at the end, enter the central module, which can be a blind type module or an RS232 communication module. The central module will help fixing also the other modules in the relevant slots. To remove the modules use a screwdriver as shown in the picture below:

1 Gently depress the two fixing tabs. Directions 1-4.

2 Remove the central module from its slot: press your thumb towards points 2-5.

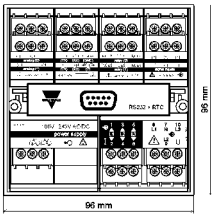


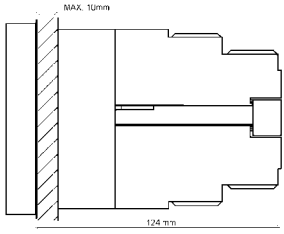
3 Extract the central module.

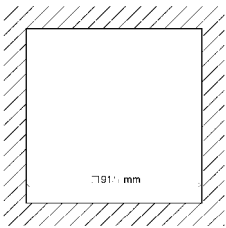


Any other slots that you haven't used must be filled with the relevant blind plug modules supplied with the instrument.

Overall dimensions and panel cut-out

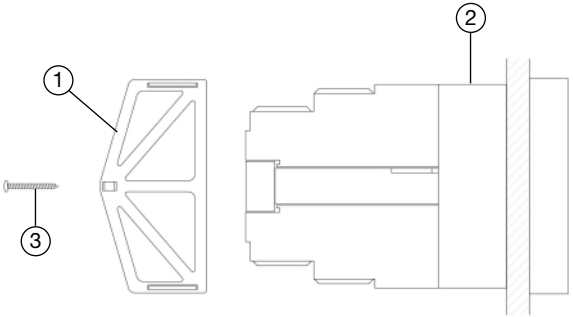




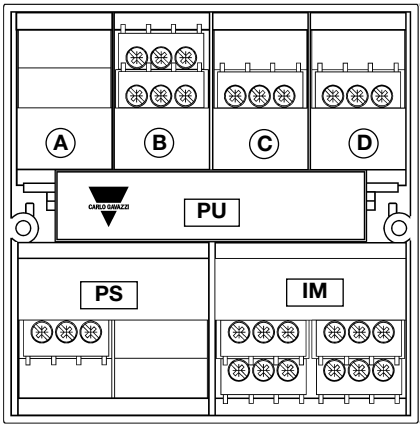


❑ *Mounting*

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

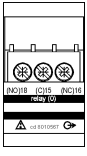


■ *Position of the slots and relevant modules*

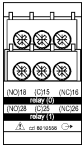


■ *Available modules*

❑ *Relay digital output modules*



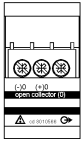
AO1058
Single relay
output



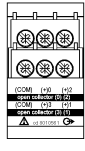
AO1035
Dual relay
output

DESCRIPTION	A	B	C	D	PU	PS	IM
RS485 Serial output		✓					
RS232 Serial output + RTC+Data Memory					✓		
Single relay output			✓	✓			
Single open collector output			✓	✓			
Dual relay output			✓	✓			
Dual open collector output			✓	✓			
Four open collector output				✓			
3 digital inputs			✓				
3 digital inputs +AUX	✓		✓				
Power supply						✓	
Inputs							✓

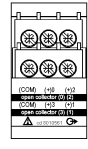
❑ *Open collector digital output modules*



AO1059
Single open collector output

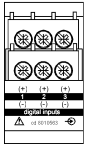


AO1036
Dual open collector output

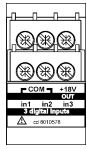


AO1037
4 open collector output

❑ *Digital input modules*

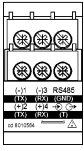


AQ1038
3 digital
inputs



AQ1042
3 digital inputs+
aux power supply

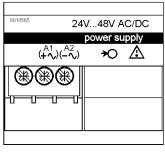
❑ *Serial output modules*



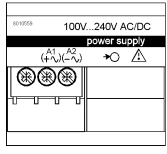
AR1034
RS485
Interface

AR1041
RS232 Interface + RTC +
Data memory

❑ *Power supply modules*



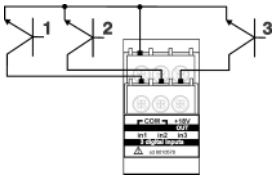
AP1021
18-60 VAC/DC
Power supply



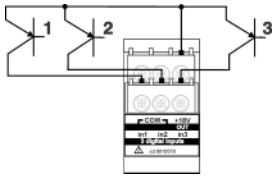
AP1020
90-260 VAC/DC
Power supply

■ *Optional modules connection*

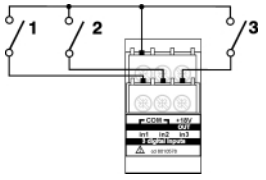
❑ *Digital inputs*



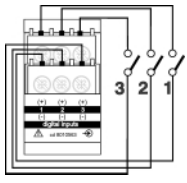
Connection by means of NPN transistor. AQ1042 digital input module



Connection by means of NPN transistor. AQ1042 digital input module.

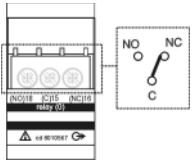


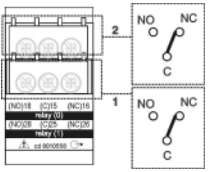
Connection by means of contacts. AQ1042 digital input module.



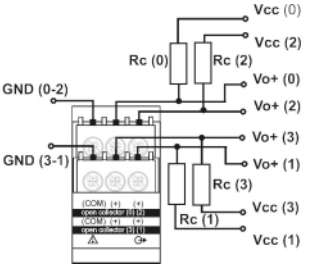
Connection by means of contacts. AQ1038 digital input module.

❑ *Relay output*



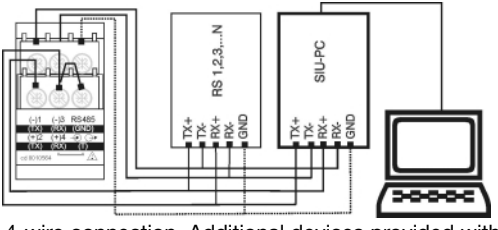


❑ *Open collector outputs*

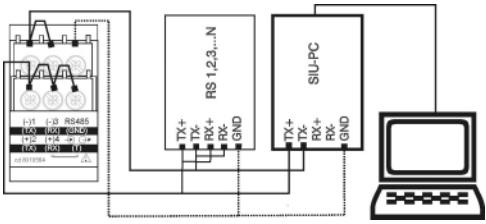


This diagram is valid also for the open collector modules with a lower number of outputs. The value of the load resistances (Rc) must be chosen so that the short-circuit current is lower than 100mA; the VDC voltage must be lower than or equal to 30 VDC.

❑ *RS485 serial port*



4-wire connection. Additional devices provided with RS485 (that is RS 1,2,3...N) are connected in parallel.

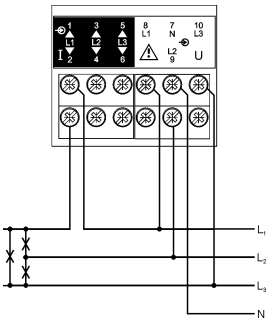


2-wire connection. Additional devices provided with RS485 (that is RS 1, 2, 3 ...N) are connected in parallel.

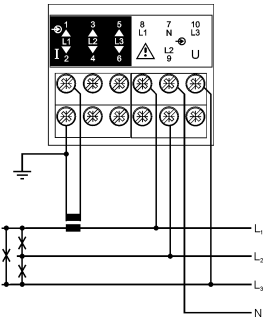
The termination of the serial output is carried out only on the last instrument of the network, by means of a jumper between (Rx+) and (T). We recommend you to use the 4-wire connection: by means of the serial port the data are exchanged faster.

■ *Electrical connection diagrams*

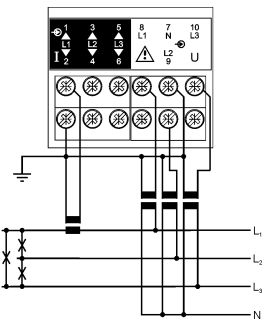
❑ 3/4-wire *three-phase connection, balanced load*



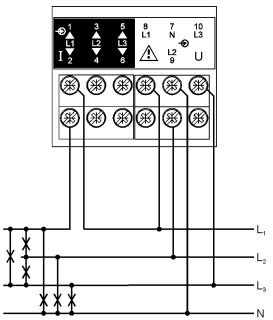
Direct connection
(3-wire system)



Direct connection
(3-wire system)

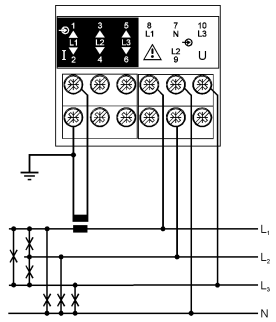


CT and VT connection
(3-wire system)

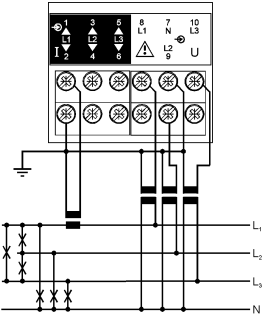


CT and VT connection
(4-wire system)

❑ *Three-phase, 4 wires, balanced load*

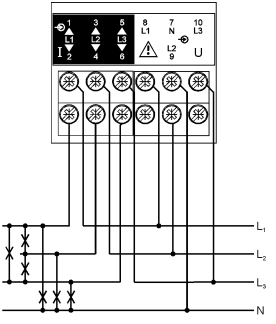


CT connection
(4-wire system)

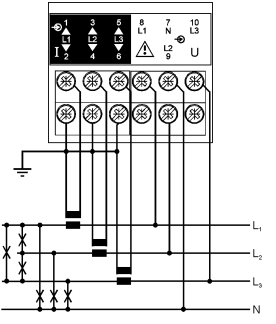


CT and VT connection
(4-wire system)

❑ *Three-phase, 4 wires, Unbalanced load*

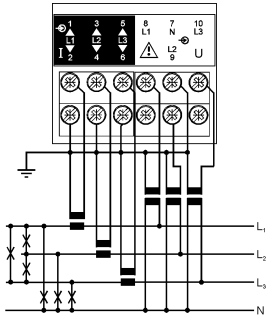


Direct connection
(4-wire system)

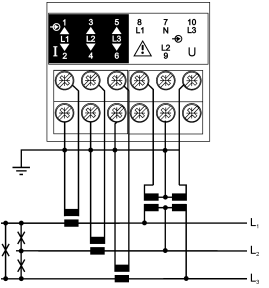


CT connection
(4-wire system)

❑ *3/4-wire, three-phase connection, Balanced load*

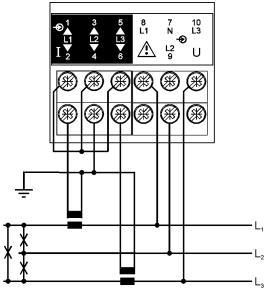


CT and VT connection
(4-wire system)

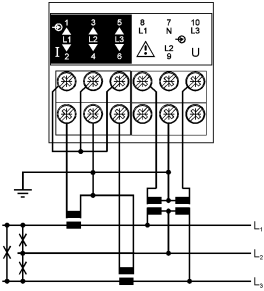


CT and VT connection
(4-wire system)

❑ *3-phase / 3-wire ARON connection, Unbalanced load*

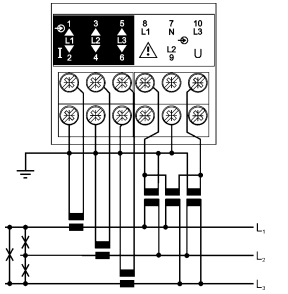


CT connection
(3-wire system) ARON



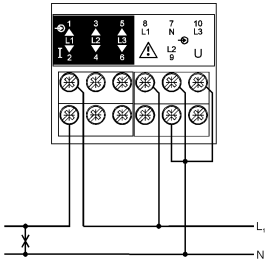
CT and VT connection
(3-wire system) ARON

❑ *3-phase / 3-wires conn.*



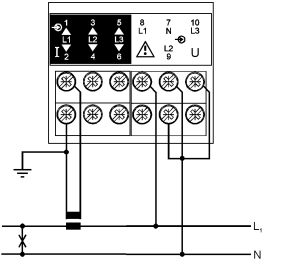
3-CT and 3 VT connection
(3-wire system)

❑ *Single-phase connection*

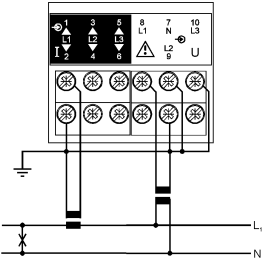


Direct connection

❑ *Single-phase connection*



CT connection



CT and VT connection

Input features

Number of analogue inputs

Current: 1 (single-phase; system: 3).
4 (three-phase; system: 3)

Voltage: 1 (single-phase; system: 3).
4 (three-phase; system: 3).

Digital inputs

AQ1038

Number of inputs: 3 (free of voltage).

Use: synchronization of W-VA dmd measurements

Interfacing: GMC/GME. Counting of m^3 gas / water, tariff selection.

Reading current: <8mA/ 17.5 to 25VDC.

AQ1042

Number of inputs: 3 + input power supply.

Input frequency: Max 20 Hz, duty cycle 50%.

Output voltage: 16V<+Aux<24VDC.

Output current: Max 15mA.

Contact reading current: 15mA.

Close contact resistance: Max 1kΩ.

Open contact resistance: Min 100kΩ.

Insulation: 4000VRMS.

Maximum number of inputs: 6 in the configuration AQ1038+AQ1042 or 2xAQ1042

Accuracy

Display, RS232, RS485

In: 5A, If.s.: 6A, Vn: 240V_{L-N}, Vf.s.: 300V_{L-N}.

Current: (A_{L1}, A_{L2}, A_{L3}): ±0.5% rdg (0.2 to 1.2 In), ±5mA (0.02 to 0.2 In).

Voltage: range AV5: ±0.5% rdg (48 to 300V_{L-N})
range AV7: ±0.5% rdg (80 to 480V_{L-N}) included the following influences: frequency, output load power supply.
Frequency: ±0.1% rdg (40 to 440 Hz).
Active power (@ 25°C ± 5°C, R.H. ≤ 60%):
±0.5% (rdg + fs) (PF 0.5 L/C, 0.1 to 1.2 In, range AV5).
±1% rdg (PF 0.5 L/C, 0.1 to 1.2 In, range AV5).
Reactive power (@ 25°C ± 5°C, R.H. ≤ 60%):
±0.5% (rdg + fs) (PF 0.5 L/C, 0.1 to 1.2 In, range AV5).
±1% rdg (PF 0.5 L/C, 0.1 to 1.2 In, range AV5).
Apparent power (@ 25°C ± 5°C, R.H. ≤ 60%):
±0.5% (rdg + fs) (0.1 to 1.2 In, range AV5).
±1% rdg (0.1 to 1.2 In, range AV5).
Energies (@ 25°C ± 5°C, R.H. ≤ 60%):
active: class 1 according to EN61036 and
reactive: class 2 according to EN61268
Ib: 5A, Imax: 6A, 0.1Ib: 500mA.
Start-up current: 20mA, Un: 240V (AV5), 400V (AV7).
Harmonic distortion (@ 25°C ± 5°C, R.H. ≤ 60%)
1% fs (fs: 100%), phase: ±2°; Imin: 0.1Arms.
Imax: 15Ap; Umin: 50V_{RMS}.
Umax: 500Vp.
Sampling frequency: 6400 samples/s @ 50Hz.

■ *Additional errors:*

Humidity: ≤ 0.3% rdg, 60% to 90% R.H.
Input frequency: ≤ 0.4% rdg, 62 to 400 Hz.
Magnetic field: ≤ 0.5% rdg @ 400 A/m.
NOTE: all accuracies are referred to measurements carried out with the analogue input module.

Temperature drift: ≤ 200ppm/°C.

Sampling: 6400 samples/s @ 50Hz.
Display: graphic back-lighted LCD (128x64 dots).
Selectable read-out for the instantaneous variables: 4x4 digit or 4x3$^1/_2$ digit. **Total energies:** 4x9 digit.
Partials: 4x6 digit.
Max. and min. indication:
Max. 9999 (999999999).
Min. -9999 (–999999999).

■ *Measurements*

Curent, voltage, power, energy, power factor, frequency, harmonic distortion (see display specs). TRMS measurement of distorted sine waves.
Coupling: direct.
Crest factor: ≤ 3, (max. 15Ap/500Vp ("AV5" V L-N), 15Ap/800Vp ("AV7" V L-N).

■ *Input impedance*

AV5: 58/100 V (> 500 kΩ) - 1 AAC (≤ 0.3 VA); 58/100 V (> 500 kΩ) - 5 AAC (≤ 0.3 VA); 240 V/415 V (> 500 kΩ) -1AAC (≤ 0.3 VA); 240 V/415 V (> 500 kΩ) - 5 AAC (≤ 0.3 VA).
AV7: 100/170 V (> 500 kΩ) -1 AAC (≤ 0.3 VA); 100/170 V (> 500 kΩ) - 5 AAC (≤ 0.3 VA); 400/690 V (> 500 kΩ) -1 AAC (≤ 0.3 VA); 400/690 V (> 500 kΩ) - 5 AAC (≤ 0.3 VA).

■ *Frequency*

40 to 440 Hz.

■ *Overload*

Permanent: voltage/current: AV5: 300V_{L-N} / 500V_{L-L} / 6A; AV7: 480V_{L-N} / 830V_{L-L} / 6A
For 1s: voltage/current: AV5: 600V_{L-N}/1040V_{L-L}/120A; AV7: 960V_{L-N}/1660V_{L-L}/120A

Output specifications

RS422/RS485 (on request)

Bidirectional multidrop (static and dynamic variables)

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

Addresses: from 1 to 255, key-pad programmable.

Protocol: RTU MODBUS/JBUS.

Data (bidirectional) dynamics (reading only): all displayable variables.

Statics (reading only): all the configuration parameters, energy reset, activation of digital outputs.

Data format: 1 start-bit, 8 data-bit, no parity/even parity/odd parity, 1 stop bit.

Baud rate: 1200, 2400, 4800 and 9600bit/s selectable.

Insulation**:** by means of optocouplers, 4000 V_{RMS} between output and measuring input, 4000 V_{RMS} between output and power supply input.

RS232 (on request)

Bidirectional (static and dynamic variables)

Connections: 3 wires, max. distance 15m.

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

Baud rate: 2400, 4800, 9600, 38400 bit/s.

Protocol: MODBUS RTU (JBUS).

Other features: as per RS422/485.

Communication by means of modem

Analogue modem for the remote communication of all the data measured and managed by WM4.

Recommended external communication modem: US Robotics.

GSM modem for the transmission of SMS messages: of data logging and energy meters. The alarms can be sent also automatically while the variables can be recalled by means of special SMS question codes (see "How to use the SMS" on page 52).

GSM kit type-tested for WM4: Siemens kit (external) model "TC35 TERMINAL" included GSM module, antenna and 230 power supply.

■ *Digital Outputs (on request)*

To be used as alarms and/or retransmission of the energy, gas, water metering and/or outputs remotely controlled by means of the serial communication port. The outputs are completely programmable independently of the type of module being used.

■ *Pulse outputs (on request)*

Number of outputs: up to 4.

Type: from 1 to 1000 pulses programmable for K-M-G Wh, K-M-G varh, open collector (NPN transistor).

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

Outputs connectable to total and/or partial meters.

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

Insulation: by means of optocouplers, 4000 V_{RMS} between output and measuring inputs, 4000 V_{RMS} between output and power supply input.

Notes: the outputs can be open collector type or relay type (for the relay output refer to the characteristics described in the "alarm outputs" section).

■ *Alarm outputs (on request)*

Number of set-points: up to 4, independent.

Alarm type: up alarm, down alarm, with or without latch, phase asymmetry, phase loss, neutral loss.

Monitoring of the variables: all the variables listed in the paragraph “List of the connectable variables”.

Set-point adjustment: 0 to 100% of the electrical scale.

Hysteresis: 0 to 100% of the electrical scale.

On-time delay: 0 to 255 s.

Relay status: selectable: normally de-energized or 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: ≤ 150 ms, filters excluded, FFT excluded, set-point on-time delay: ”0s”.

Insulation: 4000 V_{RMS} output to measuring inputs, 4000 V_{RMS} output to power supply input. Notes: the outputs can be either open collector type or relay type (for the relay output refer to the specifications described in the “alarm outputs” section).

■ *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. Note: by entering in the programming mode by means of password, the measurement is inhibited.

Operating mode selection: direct measurements for the

power quality analysis (LV or MV/HV connection). Indirect energy and power measurements by means of watt-hour meters (LV or MV/HV connection); Direct measurements for the instantaneous variables (LV connection) and indirect measurements for the energy variables (LV or MV/HV). It's possible to add the management of gas and water metering to all of these working modes.

Pulse weight: water/gas meter inputs: from 1 to 10000 pulses/m^3, energy from 0.01 to 10000.00 pulses/kWh/kvarh/kWh-/kvar-

Transformer ratio
CT up to 30000 A; VT up to 600 kV.

■ *Filters*

Filter operating range: 0 to 99.9% of the input electrical scale.
Filtering coefficient: 1 to 255.
Filter action: display, alarms, serial outputs (fundamental variables: V, A, W and their derived ones).
Event logging: RS232 + RTC + data memory.
Type of data: alarms and max./min. (max. 480 events) stored with date (dd:mm:yy) and hour (hh:mm:ss) reference, data logger and load profile.

Sampling management: only for data logger and load profile. The sample stored within the selected time interval results from the continuous average of the measured values. The average is calculated (min. sample) with an interval within two following measurements of approx. 200ms.

Data management type

Type: FIFO.

Memory size: 2Mb.

Battery life: 10 years

Data logger function

The data are stored at time intervals from 1 to 60 min.; up to 8 instantaneous variables can be selected.

Historical data storing time: 3 weeks with storing time interval of 1 min. for four variables.

90 weeks (approx 2 years): with storing time interval of 60 minutes for eight variables.

Data format: date: day, month; time: hours, minutes, seconds, type of stored variable: variable value. Number of sampled variables available by serial port.

Load profile

Storage at time intervals of 5-10-15-20-30 min. of Wdmd.

Historical data storing time: 30 weeks: with recording interval of 5 min.; 90 weeks: with storing interval of 15 min.

Data format: Wdmd variable value, minutes, seconds, day, month.

Displaying: 4 variables per page, 1 configurable page, 30 fixed pages.

Energy meters: up to 12 pages depending on the selected tariff mode. Displaying of the consumed energy up to two months preceding the current one by means of password (depending on the selected tariff mode).

Water and gas meters: 1 page with two displaying modes depending on the selected one: water and gas m^3 or daytime and night gas m^3.

Stored events: 240 pages, display by means of password. **Data logger:** display of the data by means of password with reset function of the relevant memory section.

Load profile: 3 pages, daily, weekly and monthly graphic display. Reset function of the relevant memory section by means of password.

Display language: selectable; Italian, English, French, German, Spanish.

Wm4Soft: software to transfer memory data

Main features: English language software to transfer memory data and write messages to be coupled to the SMS alarms plus modem communication management. The program runs under Windows 95/98/98SE/2000/XP.

Data storing: in pre-formatted XLS files (Excel data base).

Data Transfer: manual or automatic at programmable timings.

Modem communication: phone book management (save up to 100 numbers). Each number is associated to a modem that corresponds to the single instrument.

Data access: by means of RS232 serial port to be coupled to a GSM or ANALOGUE modem. RS485 (also multi-drop avail.).

Other functions: remote programming of WM4.

■ *General specifications*

Operating temperature: 0 to +50°C (32 to 122°F)
(R.H.< 90% non-condensing).
Storage temperature: -10 to +60°C (14 to 140°F)
(R.H. < 90% non-condensing).
Insulation reference voltage: 300 VRMS to ground (AV5 input).
Insulation: 4000 VRMS between all inputs / outputs to ground.
Dielectric strength: 4000 VRMS for 1 minute
Noise rejection: CMRR 100 dB, 48 to 62 Hz.
EMC: EN 50081-2, EN 50082-2.
Other standards: safety: IEC 61010-1, EN 61010-1.
Product: Energy measurements: EN61036, EN61268.
Pulse output: DIN43864.
Approvals: CE, UL, CSA.
Connector Screw-type
max. 2.5 mm^2 wires(2x1.5mm^2).
Housing
Dimensions 96x96x140 mm.
Material: ABS, self-extinguishing: UL 94 V-0.
Protection degree: front, IP65.
Weight: approx. 600 g (packing included).

■ *Supply specifications*

AC/DC voltage: 90 to 260V (standard)
18 to 60V (on request).
Energy consumption: ≤ 30VA/12W (90 to 260V)
≤ 20VA/12W (18 to 60V).

■ *Harmonic analysis*

Analysis principle: FFT.

Harmonic measurement: current, up to the 50th harmonic; voltage, up to the 50th harmonic.

Type of harmonics:
THD (VL1) THD odd (VL1) THD even (VL1).
The same is for the other phases:
L2, L3. THD (AL1) THD odd (AL1) THD even (AL1).
The same is for the other phases: L2, L3.

Harmonic phase angle: the instrument measures the angle between the single harmonic of "V" and the single harmonic of "I" of the same order. According to the value of the electrical angle, it is possible to know if the distortion is absorbed or generated.
Note: if the system has 3 wires the angle cannot be measured.

Harmonic details: the harmonic contents is displayed as a graph showing the whole harmonic spectrum.
This value is also given as a numerical information:
THD % / RMS value; THD odd % / RMS value; THD odd % / RMS value / single harmonics in % / RMS value.
System: the harmonic distortion can be measured in single-phase, 3-wire or 4-wire systems. Tw: 0.02.

■ *Time period management (energy, water and gas metering)*

Time periods: Energy. Selectable: single time, dual time and multi-time.
Single time: Energy, water, gas
Number of meters: total: 4 (9-digit) (no partial meters)

Dual time: Energy, gas
Number of meters: total: 4 (9-digit); partial: 8 (6-digit).
Time periods: 2, programmable within 24 hours.

Multi-time: Energy
Number of meters: total: 4 (9-digit); partial: 48 (6-digit).
Time periods: 4, programmable within 24 hours.
Time seasons: 3, programmable within 12 months.

Pulse output: connectable to total and/or partial meters (dual time, multi-time periods).

Energy metering recording: Energy consumption history, recording of energy metering by months, oldest data: 2 months before current date. Recording of total and partial energy metering. Energy metering recording (/EEPROM). Max.999.999.999 kWh/kvarh.

Name: . . . . . .Surname: . . . . . .
Company name: . . . . . .
WM4-96 Serial number: . . . . . .
Password: . . . . . .

Instrument's settings:

Pulse value for gas meters: . . . . . .water: . . . . . .
Pulse value for kWh meters: . . . . . .kvarh: . . . . . .
Tariff check by means of digital inputs: YES ☐ NO ☐
System: . . . . . .
Full scale power YES ☐: . . . . . .
CT ratio: . . . . . .VT: . . . . . .

Max/min values, events *(tick in case of on-event)*

MAX1: . . . . . .☐.MAX2: . . . . . ☐ .MAX3: . . . . . .☐
MAX4: . . . . . .☐.MAX5: . . . . . ☐ .MAX5: . . . . . .☐
MAX6: . . . . . .☐.MAX7: . . . . . ☐ .MAX8: . . . . . .☐
MAX9: . . . . . .☐.MAX10: . . . . . ☐ .MAX11: . . . . . .☐
MAX12: . . . . . .☐.MIN1: . . . . . ☐ .MIN2: . . . . . .☐
MIN3: . . . . . .☐.MIN4: . . . . . ☐ .MIN5: . . . . . .☐
MIN6: . . . . . .☐.MIN7: . . . . . ☐ .MIN8: . . . . . .☐
D1: . . . . . .☐.D2: . . . . . ☐ .D3: . . . . . .☐
D4: . . . . . .☐.R1: . . . . . ☐ .R2: . . . . . .☐
R3: . . . . . .☐.R4: . . . . . ☐ .A1: . . . . . .☐
A2: . . . . . .☐.A3: . . . . . ☐ .A4: . . . . . .☐

Tariffs

Single time ☐ Dual time ☐ Multi time ☐
Whole year . . . . . .from: . . . . . .to: . . . . . .
Winter . . . . . .from: . . . . . .to: . . . . . .
Summer . . . . . .from: . . . . . .to: . . . . . .
Holiday . . . . . .from: . . . . . .to: . . . . . .
Trf 1: . . . . . .Trf 2: . . . . . .
Trf 3: . . . . . .Trf 4: . . . . . .

Hardware configuration

Slot A: . . . . . .Slot B: . . . . . .
Slot C: . . . . . .Slot D: . . . . . .
Alarm set-point: VAR: . . . . . .ON: . . . . . .OFF: . . . . . .