WM15

Power analyser for three-phase systems

USER MANUAL

Summary

Information property

Safety messages

The following section describes the warnings related to user and device safety included in this document:

NOTICE: *indicates obligations that if not observed may lead to damage to the device.*

CAUTION! Indicates a risky situation which, if not avoided, may cause data loss.

IMPORTANT: provides essential information on completing the task that should not be neglected.

General warnings

This manual is an integral part of the product and accompanies it for its entire working life. It should be consulted for all situations tied to configuration, use and maintenance. For this reason, it should always be accessible to operators.

NOTICE: *no one is authorized to open the analyzer. This operation is reserved exclusively for CARLO GAVAZZI technical service personnel.*
Protection may be impaired if the instrument is used in a manner not specified by the manufacturer.

Service and warranty

In the event of malfunction, fault, requests for information or to purchase accessory modules, contact the CARLO GAVAZZI branch or distributor in your country.
Installation and use of analyzers other than those indicated in the provided instructions void the warranty.

Download

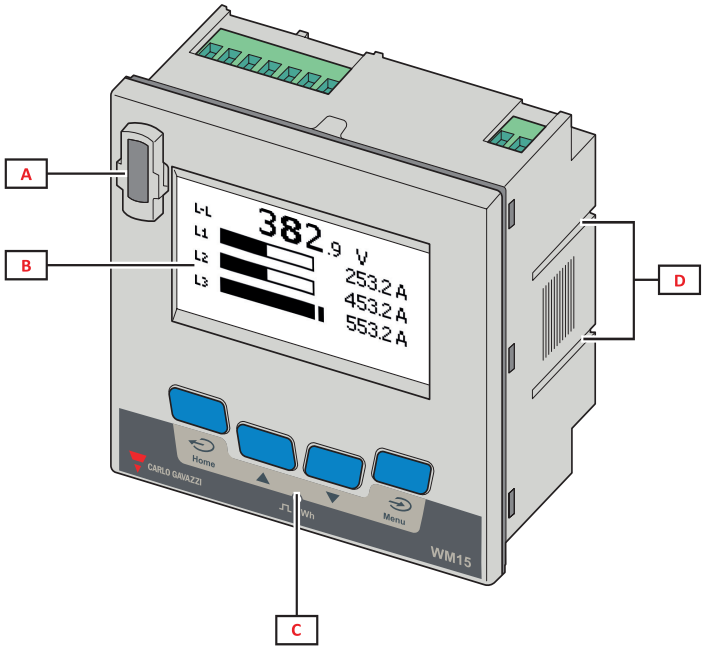
This manual	www.productselection.net/MANUALS/UK/WM15_im_use.pdf
Installation instructions - WM15	www.productselection.net/MANUALS/UK/WM15_im_inst.pdf
UCS software	www.productselection.net/Download/UK/ucs.zip

WM15

Introduction

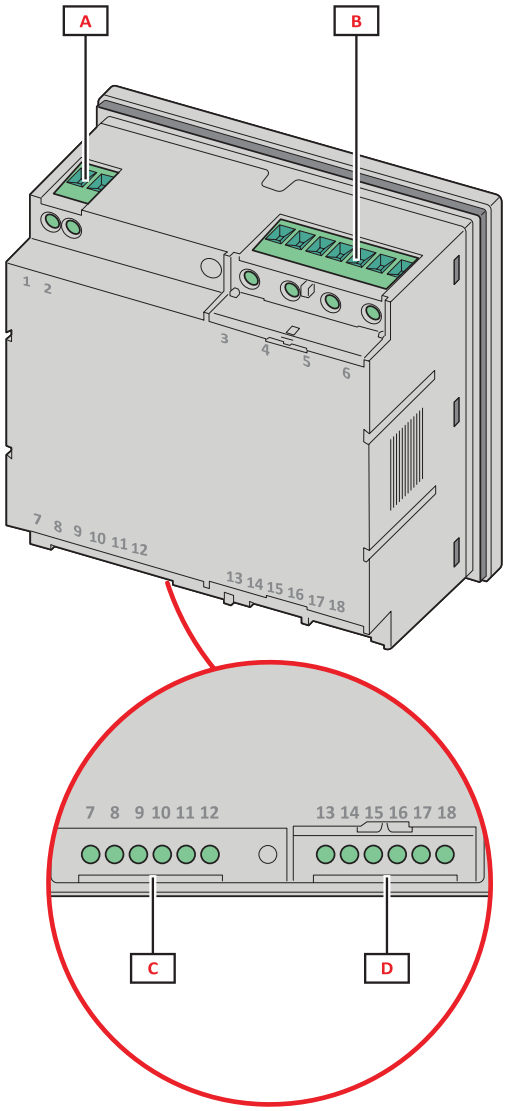
WM15 is a power analyser for single-, two- and three-phase systems. MID models can be used for fiscal metrology in three-phase systems.
Depending on the model, WM15 is equipped with a static output (pulse or alarm), with a static output and a Modbus RTU communication port or with a static output and a M-Bus port.
The self-powered version can be installed on systems with voltage up to 415 V L-L (400 V L-L for MID models), while the version with auxiliary power supply can be installed on systems with voltage up to 600 V L-L.

Description



Front

Part	Description
A	Optical port for easy programming and diagnostics through Optoprog
B	Matrix LCD display
C	Mechanical keys
D	Grooves for side brackets



Rear

Part	Description
A	Power supply (version with auxiliary supply)
B	Three-phase voltage inputs
C	RS485 or M-Bus port + digital output
D	Three-phase current inputs

Available versions

Code	Description
WM1596AV53XOSX	Self power supply, 415 V L-L. Digital output and RS485, not MID
WM1596AV53XOSPFB	Self power supply, 400 V L-L. Digital output and RS485, MID
WM1596AV53XOXX	Self power supply, 415 V L-L. Digital output, not MID
WM1596AV53XOXPFB	Self power supply, 400 V L-L. Digital output, MID
WM1596AV53HOSX	Auxiliary supply, 600 V L-L. Digital output and RS485, not MID
WM1596AV53XOMX	Self power supply. Voltage inputs 415 V LL. Digital output and M-Bus, not MID
WM1596AV53XOMPFB	Self power supply. Voltage inputs 400 V LL. Digital output and M-Bus, MID

UCS (Universal Configuration Software)

UCS is available in desktop and mobile versions.
It may connect to WM15 via RS485 (RTU protocol, desktop version only) or through OptoProg (via Bluetooth).
UCS allows to:
• set up the WM15 unit (online or offline);
• display the system state for diagnostic and setup verification purposes

Overview of the UCS functions:

• Setting up the system with WM15 connected (online setup)
• Defining the setup with WM15 non connected, then applying it at a later time (offline setup)
• Displaying the main measurements
• Displaying the state of inputs and outputs
• Displaying the state of the alarms
• Recording the measurements of selected variables (UCS Desktop version only)
• Displaying the quick help on installing WM15 and connecting with OptoProg (UCS Mobile version only)

Use of WM15

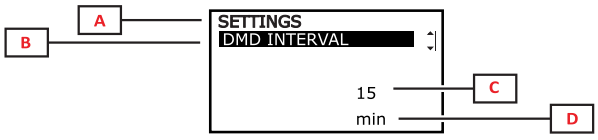
Interface

Introduction

WM15 is organised into two menus:

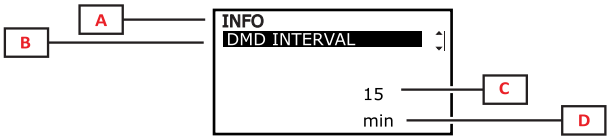
- Main menu, divided into three sub-menus:
  - » SETTINGS: pages allowing to set the parameters
  - » INFO: pages displaying general information and the set parameters
  - » RESET: pages allowing to reset the partial counters and the dmd calculation, or to restore the factory settings
- Measurement pages: pages allowing to display the meters and the other electrical variables

SETTINGS menu display



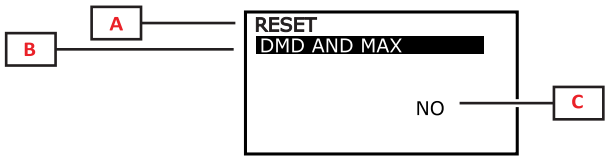
Part	Description
A	Menu title
B	Sub-menu title, see “SETTINGS menu” on page 16
C	Parameter
D	Current parameter information

INFO menu display



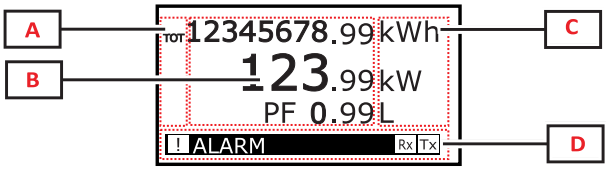
Part	Description
A	Menu title
B	Sub-menu title, see “INFO menu” on page 17
C	Parameter
D	Current parameter information

RESET menu display



Part	Description
A	Menu title
B	Sub-menu title, see “RESET menu” on page 17
C	YES/NO

Measurement page display



Part	Description
A	Variable type
B	measured values/data
C	unit of measurement ***Note:*** *for the “power factor” the unit indicates whether the value is inductive (L) or capacitive (C)*
D	information and diagnostics

Note: *all the variables calculated by the meter are referred to the primary current of the current transformer.*

Information and warnings

Symbol	Description
	Alarm icon: • blinking icon + ALARM ON: alarm active • steadily ON icon + WIRING: wiring error
	Serial or optical communication state (reception / transmission)
	Virtual wiring correction: the terminal-phase association was modified by UCS (only non MID models)

Commissioning

Preliminary settings

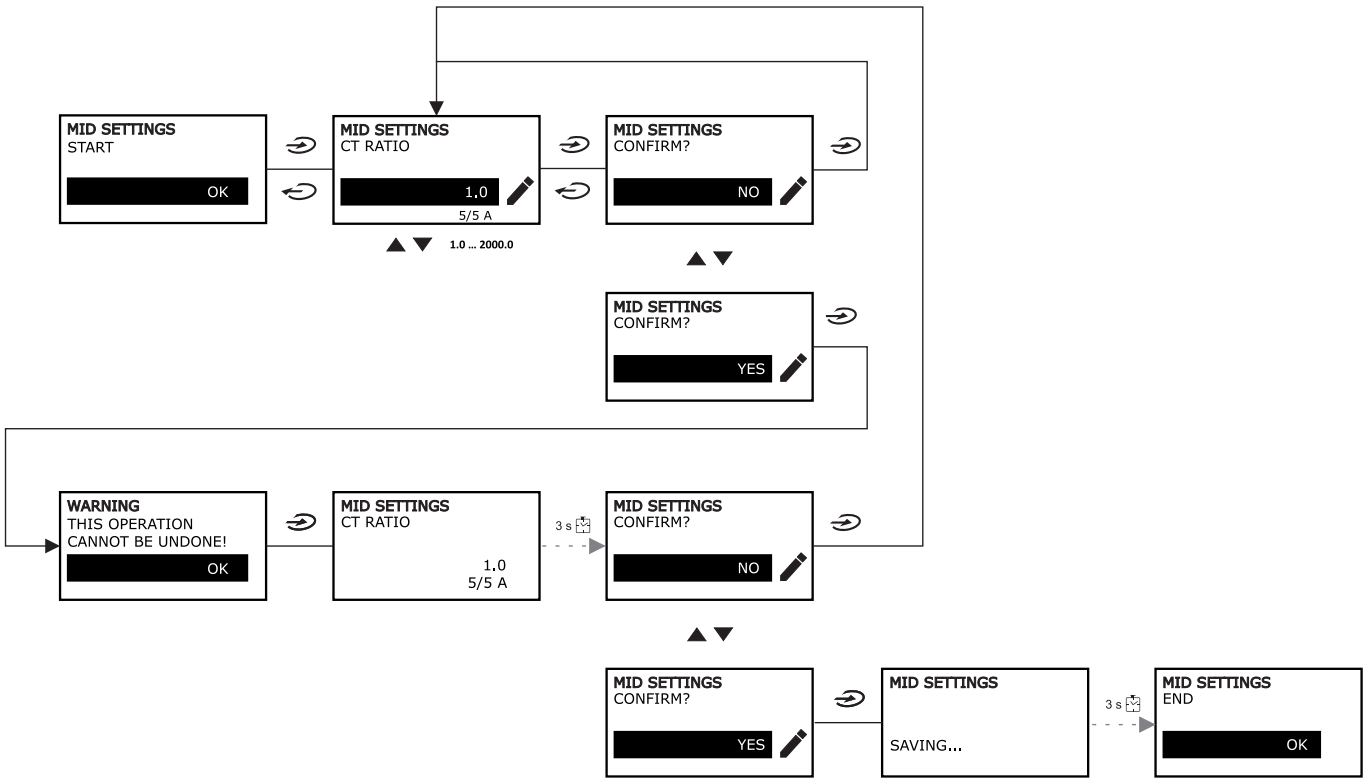
At switch-on, the device displays three preliminary setting menus:

- MID SETTINGS, for MID models only
- QUICK SETUP
- CHECK WIRING

MID SETTINGS menu

This procedure, only available in MID models, allows to program the current transformer ratio (CT ratio).

Note: *after the first setting the CT ratio can be changed again as long as the meter has not reached 1.00 kWh.*



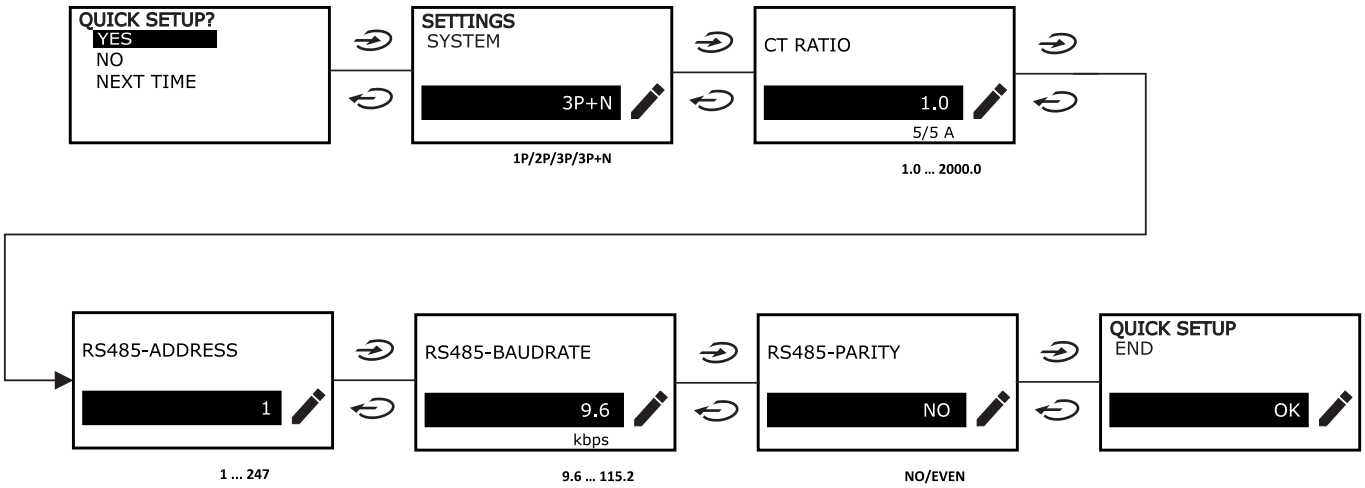
QUICK SETUP menu

This procedure is available when the instrument is switched on for the first time.

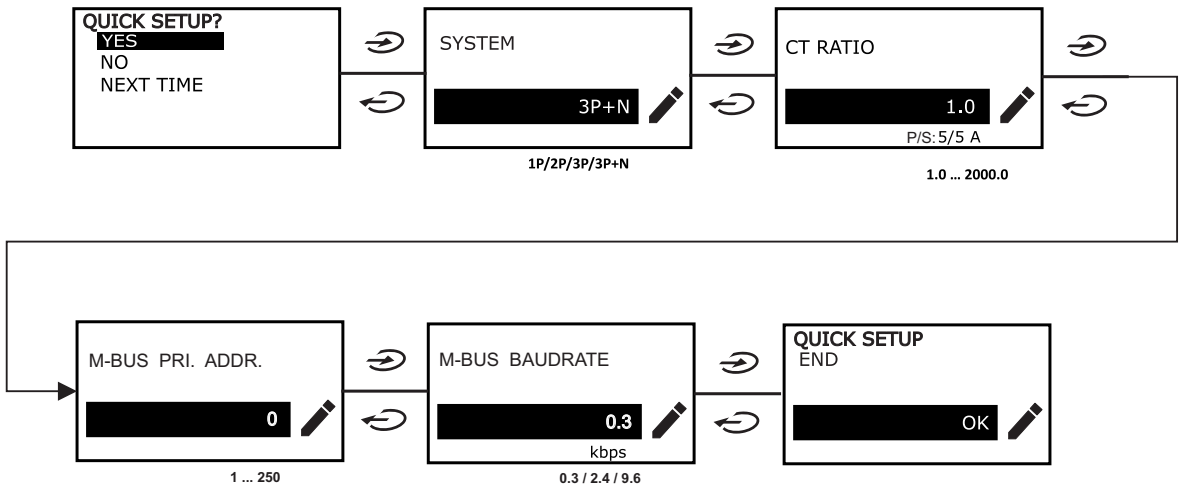
Note: *the available parameters depend on the model.*

In the “QUICK SETUP?” starting page

Select...	To...
YES	run the QUICK SETUP procedure
NO	skip the procedure and no longer display the QUICK SETUP menu
NEXT TIME	skip the procedure and display the QUICK SETUP menu at the next switch-on



M-Bus models (OM)



WIRING CHECK menu

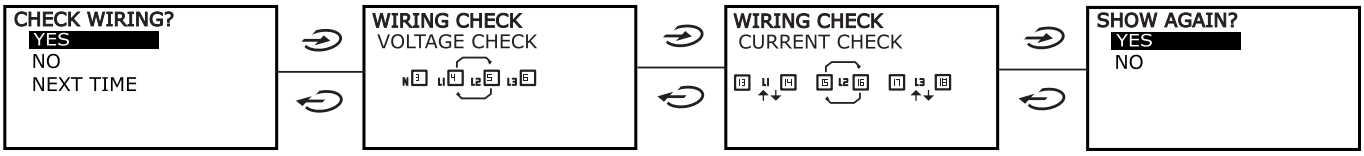
This procedure is available if the set system is 3P+N, and allows to check and correct the connections, see “WIRING CHECK function” on page 21.

In the “CHECK WIRING?” starting page

Select...	To...
YES	run the WIRING CHECK procedure
NO	skip the procedure and no longer display the WIRING CHECK menu
NEXT TIME	skip the procedure and display the WIRING CHECK menu at the next switch-on

In the “SHOW AGAIN?” end page

Select...	To...	And...
YES	correct the error detected by WM15. Actions: • switch off the instrument • correct the wiring (follow the graphical indications)	display the WIRING CHECK menu again for the final check
NO	No longer display the menu (WM15 has detected no wiring errors)	-



Working with WM15

Working with the measurement pages

Operation	Button
Return to the Home page	
Scroll through the pages	
Enter the Main menu	

Working with the SETTINGS menu

Operation	Button
Return/Cancel the operation	
Scroll through the menu, edit the parameters	
Enter the sub-menu to edit and confirm the operation	

Working with the INFO menu

Operation	Button
Return to the main menu	
Scroll through the menu	

Working with the RESET menu

Operation	Button
Return/Cancel the operation	
Scroll through the menu	
Enter the sub-menu to edit and confirm the operation	

Menu description

Measurement pages

The displayed pages depend on the selected system. All the variables calculated by the meter are referred to the primary current of the current transformer.

Page	Displayed measurements	Description
1	TOT kWh kW PF	Imported active energy (TOTAL) System active power System power factor
2	TOT kWh TOT kvarh+ TOT kvarh-	Imported active energy (TOTAL) Imported reactive energy (TOTAL) Exported reactive energy (TOTAL)
3	TOT kWh TOT kVAh TOT hh:mm+	Imported active energy (TOTAL) Apparent energy (TOTAL) Positive energy run hour meter* (TOTAL) ***NOTE:** it increases when the active system power is positive.*
4	kWh- TOT kVAh TOT h- TOT	Exported active energy (TOTAL) Apparent energy (TOTAL) Exported energy run hour meter* (TOTAL) ***NOTE:** it increases when the active system power is negative.*
5	L1 kWh L2 kWh L3 kWh	Active energy phase 1 Active energy phase 2 Active energy phase 3
6	PAR kWh kW sys PF sys	Imported active energy (PARTIAL) System active power System power factor
7	PAR kWh PAR kvarh+ PAR kvarh-	Imported active energy (PARTIAL) Imported reactive energy (PARTIAL) Exported reactive energy (PARTIAL)
8	PAR kWh+ PAR kVAh PAR hh:mm+	Imported active energy (PARTIAL) Apparent energy (PARTIAL) Imported energy run hour meter* (PARTIAL) ***NOTE:** it increases when the active system power is positive.*
9	PAR kWh- PAR kVAh PAR hh:mm-	Exported active energy (PARTIAL) Apparent energy (PARTIAL) Exported energy run hour meter* (PARTIAL) ***NOTE:** it increases when the active system power is negative.*
10	kW sys kvar sys kVA sys	System active power System reactive power System apparent power
11	kW sys kW sys DMD kW sys DMD MAX	System active power System active power DMD System active power MAX DMD
12	kVA sys kVA sys DMD kVA sys DMD max	System apparent power System apparent power DMD System apparent power MAX DMD
13	L1 kW L2 kW L3 kW	Phase 1 active power Phase 2 active power Phase 3 active power
14	L1 kvar L2 kvar L3 kvar	Phase 1 reactive power Phase 2 reactive power Phase 3 reactive power
15	L1 kVA L2 kVA L3 kVA	Phase 1 apparent power Phase 2 apparent power Phase 3 apparent power
16	L1 PF L2 PF L3 PF	Phase 1 power factor Phase 2 power factor Phase 3 power factor
17	L-N V sys L-L V sys Hz sys	System line-neutral voltage System line-line voltage Frequency

18	L1 A L2 A L3 A	Phase 1 current Phase 2 current Phase 3 current
19	L1 A DMD L2 A DMD L3 A DMD	Phase 1 DMD current Phase 2 DMD current Phase 3 DMD current
20	L1 A DMD max L2 A DMD max L3 A DMD max	Phase 1 current DMD MAX Phase 2 current DMD MAX Phase 3 current DMD MAX
21	L1-N V L2-N V L3-N V	Phase 1 voltage Phase 2 voltage Phase 3 voltage
22	L1-2 V L2-3 V L3-1 V	Phase 1-phase 2 voltage Phase 2-phase 3 voltage Phase 3-phase 1 voltage
23	L1-N THD V % L2-N THD V % L3-N THD V %	THD of phase 1 voltage THD of phase 2 voltage THD of phase 3 voltage
24	L1-2 THD V % L2-3 THD V % L3-1 THD V %	THD of phase 1-phase2 voltage THD of phase2-phase3 voltage THD of phase3-phase1 voltage
25	L1 THD I % L2 THD I % L3 THD I %	THD of phase 1 current THD of phase 2 current THD of phase 3 current
26	V L-L sys L1 A L2 A L3 A	System Phase-phase voltage Phase 1 current (bar graph) Phase 2 current (bar graph) Phase 3 current (bar graph)

Note: *pages 1, 10, 13, 16, 17, 21, 22 and 26 are included in the default filter; see "Page filter" on page 20.*

Note: *total imported active energy (kWh TOT) is the only MID certified meter.*

SETTINGS menu

This menu allows to set the parameters.

Page title	Sub-menu	Description	Values	Default values
SYSTEM	-	System	3P+N 3P 2P 1P ***Note:*** *in MID models only 3P+N and 3P systems are available. The selection of the different systems (3P + N or 3P) has no effect on the measurement and therefore the value of the MID meters is not affected.*	3P+N
CT RATIO*	-	(CT) current transformer ratio	1.0 to 2000	1.0
DMD INTERVAL	-	dmd interval	1 to 60 min	15 min
RS485	ADDRESS	Address	1 to 247	1
	BAUDRATE	Baudrate	9.6 to 115.2 kbps	9.6 kbps
	PARITY	Parity	NO/EVEN	NO
M-BUS	PRIMARY ADDRESS	Primary address	1...250	0
	BAUDRATE	Baudrate	0.3 / 2.4 / 9.6 kbps	2.4 kbps
ALARM	ENABLE	Enable	YES/NO	NO
	VARIABLE	Monitored variable	kW kVA kvar PF A V L-N V L-L	kW
	SET POINT 1	Activation threshold	-15000 to 15000	0.00
	SET POINT 2	Deactivation threshold	-15000 to 15000	0.00
	ACTIVATION DELAY	Activation delay	0 to 3600 s	0
DIGITAL OUTPUT	FUNCTION	Function	DISABLED ALARM PULSE	DISABLED
	OUTPUT STATUS (ALARM)	Output state	NO (normally open) NC (normally closed)	NO
	PULSE WEIGHT	Pulses weight	0.001 to 10 kWh/pulse	1
	PULSE DURATION	Pulse duration	30/100 ms	30 ms
DISPLAY	BACKLIGHT TIME	Timer for backlight switch-off	ALWAYS ON 1 min 2 min 5 min 10 min 20 min 30 min 60 min	ALWAYS ON
	SCREENSAVER*	Screensaver enabling, see “Screensaver” on page 20	ON/OFF	ON
	PAGE FILTER	Measurement page filter enabling, see “Page filter” on page 20	ON/OFF	OFF
	WIRING CHECK	Icon enabling	ON/OFF	ON
PASSWORD		Password enabling for the SETTINGS and RESET menu	0000 (not protected) to 9999	0000 (NOT PROTECTED)
EXIT	-	Exit	-	-

***Note:** non MID models only.*

On MID models after the first setting, the CT ratio can be changed again as long as the meter has not reached 1.00 kWh.

INFO menu

This menu allows to display the set parameters.

Page	Page title	Description
1	WIRING CHECK	Display of wiring check icon enabled/disabled
2	SYSTEM	System type
3	CT RATIO	(CT) current transformer ratio
4	LED PULSE	Pulses weight
5	DMD INTERVAL	dmd interval
6	RS485	Address, baudrate, parity
7	M-BUS	Primary address, baudrate, secondary address
8	ALARM	Alarm function
9	DIGITAL OUTPUT	Digital output function
10	DISPLAY	Backlight, screensaver, page filter and WIRING CHECK function
11	V CONNECTIONS	Terminal- phase association for voltage inputs
12	I CONNECTIONS	Terminal-phase association for current inputs
13	CHECKSUM	FW Checksum for MID certification
14	SERIAL NUMBER	Serial number
15	SECONDARY ADDR	M-Bus secondary address for use with VMU-B

RESET menu

This menu allows to reset the following settings:

Page	Page title	Description
1	PARTIAL	It resets the partial meters
2	DMD AND MAX	It resets the dmd calculation
3	FACTORY RESET*	It restores the factory settings

***Note:** in MID models, it restores to factory settings only non MID relevant parameters, leaving CT ratio to the value set at first power on.*

Input, output and communication

Digital output

The digital output can perform two functions:

Function	Description	Parameters
Alarm	Output associated with the alarm	Output state when no alarm is active
Pulse output	Pulse transmission output for imported active energy consumptions.	• Pulse weight • Pulse duration

Modbus RTU port (OS version)

Modbus RTU communication port is used to transmit data to a Modbus master (Carlo Gavazzi UWP3.0 or any SCADA, PLC, BMS, etc).
For further information about Modbus RTU communication refer to the communication protocol.

M-Bus port (OM version)

M-Bus communication port is used to transmit data to a M-Bus master (Carlo Gavazzi SIU-MBM or any third party M-Bus master).
For further information about M-Bus communication refer to the communication protocol.

Optical port and OptoProg

The optical port allows to set up the WM15 unit and to read the data through UCS (from PC) or mobile UCS (da smartphone Android) without connecting to the communication network to which the analyser is connected. You need to purchase OptoProg, the Carlo Gavazzi optical interface device for communication via micro USB or via Bluetooth.

Essential information

dmd values

Average value calculation (dmd)

WM15 calculates the average values of the electrical variables within a set integration interval (15 min by default).

Integration interval

The integration interval starts at switch-on or when the reset command is issued. The first value is displayed at the end of the first integration interval.

Example
The following is a sample integration:
- reset at 10:13:07
- set integration time: 15 min.

The first value displayed at 10:28:07 refers to the interval from 10:13:07 to 10:28:07.

Alarms

Introduction

WM15 manages a measured variable alarm. To set the alarm, define:
• the variable to be monitored (**VARIABLE**)
• alarm activation threshold value (**SET POINT 1**)
• alarm deactivation threshold value (**SET POINT 2**)
• alarm activation delay (**ACTIVATION DELAY**)

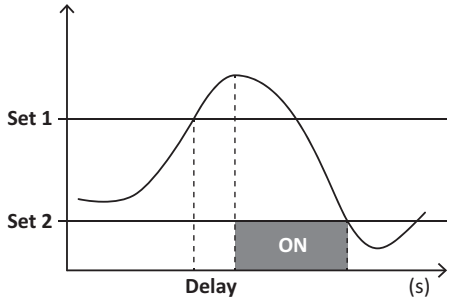
Variables

The unit can monitor one of the following variables:
• system active power
• system apparent power
• system reactive power
• system power factor
• phase-neutral voltage (OR logic)
• phase-phase voltage (OR logic)
• current (OR logic)

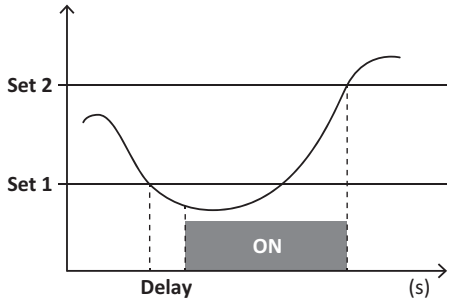
Note: *if you select a current or a voltage, WM15 simultaneously monitors all the phases available in the set measurement system and triggers the alarm when at least one of the phases is in alarm (OR logic)*

Alarm types

Up alarm (Set point 1 ≥ Set point 2)
The alarm activates when the monitored variable exceeds the Set 1 value for a time equal to the activation delay (**Delay**) and deactivates when the values drops below Set 2.



Down alarm (Set point 1 < Set point 2)
The alarm activates when the monitored variable drops below the Set 1 value for a time equal to the activation delay (**Delay**) and deactivates when it exceeds Set 2.



LCD display

Home page

The unit may display the default measurement pages when the Home button is pressed (starting from any measurement page) or after no operation has been performed for five minutes, if the screensaver is enabled and the screensaver type is set by UCS to “Home page” (default value).

Notes: *if you select a page that is not available in the set system, the unit displays as its home page the first available page. In MID models the home page cannot be changed and displays the active energy meter.*

Backlight

The WM15 unit is equipped with a backlight system. You can set whether the backlight shall always be ON or whether it should automatically switch off after a given interval has elapsed since a button was pressed (1 to 60 minutes).

Screensaver

If the SCREENSAVER function is enabled (default setting), after 5 minutes have elapsed since a button was pressed the unit will display the home page if the screensaver type is “Home page” (default setting), or it shall activate the slideshow function, which displays the selected pages on a rotating basis

Notes: *the screensaver type and the slideshow function with the relevant pages can only be set up through the UCS software or the UCS Mobile app. In MID models the screensaver setting is “Homepage” and cannot be changed.*

Page filter

The page filter makes it easier to use and browse the measurement pages. When you use the ▲ / ▼ buttons, the unit shall only display the pages you are most interested in, which can be selected through the UCS software or the UCS Mobile app.

Note: *to display all the pages without using the UCS software or app, you can disable the page filter from the SETTINGS MENU (DISPLAY → PAGE FILTER → OFF). By default, the pages included in the filter are: 1, 10, 13, 16, 17, 21, 22, 26, see “Measurement pages” on page 14.*

Restoring the factory settings

Restoring the settings using the RESET menu

From the RESET menu you can restore all the factory settings. At start-up the QUICK SET-UP and WIRING CHECK menu shall be available again.

Notes: *meters are not reset. In MID models you cannot reset the CT current transformer ratio (CT RATIO).*

Restoring the settings using the reset button

Press for at least five seconds the reset button (located near the current inputs) to access the menu, restore all the factory settings and reset

all meters (total and partial).

Note: *in MID models the reset can only be performed if the energy meter has not exceeded 1 kWh. Before sealing the terminal, you can then correct any CT current transformer setting errors (CT ratio), reactivating the MID programming menu at the next switch-on.*

WIRING CHECK function

Introduction

The WIRING CHECK function allows to check and correct the connections.
For it to work properly, the following three conditions must be met:

1. the set system must be “3P+N”,
2. all voltages must be connected,
3. All currents must be greater than zero, with an offset ranging between a 45° lag and a 15° lead (power factor > 0.7 inductive or > 0.96 capacitive)

Display check

WM15 verifies the connections and analyses the measured dimensions. In case of wiring errors it suggests the changes through a graphical interface.
During operation, if a wiring error is detected the alarm icon will light up.
If the three conditions fail to be met, the following indications shall be displayed in the VOLTAGE CHECK and CURRENT CHECK pages:

- V MISSING: at least one voltage is missing
- I MISSING: at least one current is missing
- PF OUT OF RANGE: the current-voltage offset is out of range.

Check from UCS software or UCS Mobile

By connecting to WM15 through the UCS software or UCS Mobile, you can verify the connections and perform the steps required to correct the wiring error.

Virtual correction from UCS software or UCS Mobile

The virtual correction function allows to calculate the wiring error solution and to modify the association of the physical connections with the measurement references.
Example
if the connections of terminals 5 and 6 are inverted (voltage 2 and voltage 3), by accepting the proposed solution, voltage 2 shall be the one measured with reference to terminal 6, while voltage 3 shall be the one referring to terminal 5.

The unit shall display the  icon, signalling that the association was modified via software and referring to the info pages to check the phase-terminal associations set by UCS.

Note: *the function is not available in MID models*

Maintenance and disposal

Troubleshooting

Note: *in case of other malfunctions or of any failure, please contact the CARLO GAVAZZI branch or the distributor for your country*

Measuring problems

Problem	Cause	Possible solution
The 'EEEE' indication is displayed instead of a measurement	The analyser is not used within the prescribed measuring range; as a consequence, the measurement exceeds the maximum permitted value or is the result of a calculation with at least one measurement in error.	Uninstall the analyser
	The analyser has just been switched on and the interval defined for the calculation of the average power values (default: 15 min) has not expired yet.	Wait. If you wish to change the interval, access the Dmd page of the Settings menu
The displayed values are not the expected ones	Electrical connections are incorrect	Verify the connections
	The current transformer settings are incorrect	Check the set current transformer ratio

Alarms

Problem	Cause	Possible solution
An alarm is triggered, but the measurement has not exceeded the threshold value	The value with which the alarm variable is calculated is in error	Check the set current transformer parameters
	The analyser is not used within the prescribed measuring range	Uninstall the analyser
The alarm is not activated and deactivated as expected	The alarm settings are incorrect	Check the set parameters

Communication problems

Problem	Cause	Possible solution
No communication can be established with the analyser	Communication settings are incorrect	Check the set parameters
	Communication connections are incorrect	Verify the connections
	The settings of the communication device (third-party PLC or software) are incorrect	Check the communication with the UCS software

Display problem

Problem	Cause	Possible solution
You cannot display all measurement pages	The page filter is enabled	Disable the filter, see "Page filter" on page 20

Download

WM15 installation manual and datasheet	www.productselection.net
UCS Desktop	www.productselection.net/Download/UK/ucs.zip
UCS Mobile	**Google Play Store**

Cleaning

To keep the display clean, use a slightly wet cloth. Never use abrasives or solvents.

Responsibility for disposal

Dispose of the unit by separately collecting its materials and bringing them to the facilities specified by government authorities or by local public bodies. Proper disposal and recycling will help preventing potentially harmful consequences for the environment and for people.

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