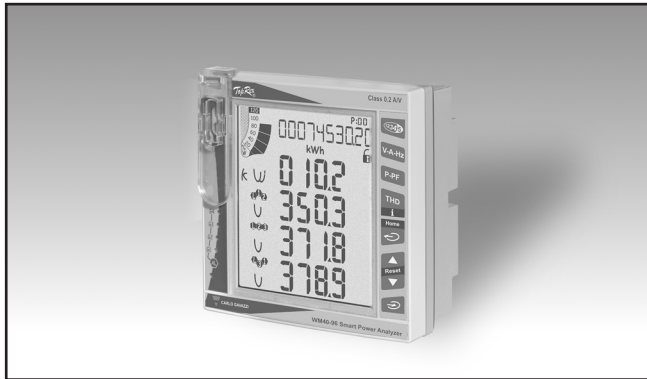


Energy Management Smart Modular Power Analyzer Type WM40 96

CARLO GAVAZZI



- Class 0.5S (kWh) according to EN62053-22
 - Class 2 (kvarh) according to EN62053-23
 - Accuracy $\pm 0.2\%$ RDG (current/voltage)
 - Instantaneous variables readout: 4x4 DGT
 - Energies readout: 9+1 DGT
 - System variables: VLL, VLN, A, VA, W, var, PF, Hz, phase-sequence, phase-asymmetry and phase loss.
 - Single phase variables: VLL, VLN, AL, An (calculated or real depending on the option), VA, W, var, PF
 - Both system and single phase variables with average, max and min calculation
 - Direct neutral current measurement (on request)
 - Harmonic analysis (FFT) up to the 32nd harmonic (current and voltage) with harmonics source detection (imported/exported, only via serial port)
 - Energy measurements (imported/exported): total and partial kWh and kvarh (inductive and capacitive) or based on 6 different tariffs (on request)
 - Energy measurements according to ANSI C12.20, CA 0.5, ANSI C12.1
 - Gas, cold water, hot water, remote heating measurements (on request)
 - Run hours counter (8+2 DGT)
 - Real time clock function
 - Data stamping of up to 10,000 events: alarm, min, max, digital input status, digital output status, resets, programming changing (on request)
 - Application adaptable display and programming procedure (Easyprog function)
 - Universal power supply:
24-48 VDC/AC, 100-240 VDC/AC
 - Front dimensions: 96x96 mm
 - Front protection degree: IP65, NEMA4x, NEMA12
- Optical front communication port (ANSI type 2)
 - Up to one RS232 and RS485 port (on request)
 - Communication protocol: MODBUS-RTU
 - MODBUS TCP/IP Ethernet port (on request)
 - BACnet-IP over Ethernet port (on request)
 - BACnet MS/TP over RS485, BTL approved (on request)
 - Profibus DP V0 port, PROFIBUS Nutzerorganisation e.V. approved (on request)
 - Up to 6 digital inputs for tariff selection, "dmd" synch, gas/water (hot-cold) and remote heating metering (on request)
 - Up to 8 static outputs (pulse, alarm, remote control) (on request)
 - Up to 6 relay outputs (pulse, alarm, remote control) (on request)
 - Up to 16 freely configurable alarms with OR/AND logic linkable with up to either 4 relay outputs or up to 6 static outputs (on request)
 - Up to 4 analogue outputs (+20mA, +10VDC) (on request)

Product Description

Three-phase smart power analyzer with built-in application configuration system and LCD data displaying. Particularly recommended for the measurement of the main electrical variables.

WM40 is based on a modular housing for panel mounting with IP65 (front) protection degree. Moreover the analyzer can be provided with digital outputs that can be either for pulse proportional to the active and reactive total, partial and tariff energy being measured or/and for alarm outputs.

The instrument is equipped with optical communication port, further I/O's such as: RS485/RS232, Ethernet, BACnet-IP, BACnet MS/TP or Profibus DP V0 communication ports, pulse and alarm outputs and 6 digital inputs or analogue outputs are available on request. Parameters programming and data reading can be easily performed by means of UCS (Universal Configuration Software).



How to order

Model

Range code

System

Power Supply

A Inputs/Outputs

B Inputs/Outputs

Communication and data stamping

Option

WM40-96

AV5

3

H

R4

CT

S1

XX

Type Selection

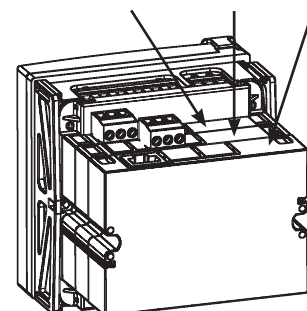
Range codes	System	Power supply	A Inputs/Outputs
AV4: 3x220 (380)... 3x400(690)V 1(2)A V _{LN} : 220 to 400 V _{LL} : 380 to 690	3: balanced and unbalanced load: 3-phase, 4-wire; 3-phase, 3-wire; 2-phase, 3-wire; 1-phase, 2-wire	H: 100-240 +/-10% (90 to 255) VDC/AC (50/60 Hz) L: 24-48 +/-15% (20 to 55) VDC/AC (50/60 Hz)	XX: none R2: Dual channel relay output O2: Dual channel static output A2: Dual channel 20mADC output V2: Dual channel 10VDC output R4: Advanced six channel digital inputs + four channel relay outputs + OR/AND alarm logic management O6: Advanced six channel digital inputs + six channel static outputs + OR/AND alarm logic management
AV5: 3x220(380)... 3x400(690)V 5(6)A V _{LN} : 220 to 400 V _{LL} : 380 to 690			
AV6: 3x57.7(100)... 3x133(230)V 5(6)A V _{LN} : 57.7 to 133 V _{LL} : 100 to 230			
AV7: 3x57.7(100)... 3x133(230)V 1(2)A V _{LN} : 57.7 to 133 V _{LL} : 100 to 230	Communication and data S.		
	XX: none S1: RS485/RS232 port S3: RS485/RS232 port with data stamping E2: Ethernet / Internet port E3: Ethernet / Internet port with data stamping B1: BACnet (IP) over Ethernet B2: BACnet (IP) over Ethernet with data stamping B3: BACnet (MS/TP) over RS485 B4: BACnet (MS/TP) over RS485 with data stamping P1: Profibus DP/V0 port P2: Profibus DP/V0 port with data stamping	Options	
B Inputs/Outputs		XX: none	
XX: none A2: Dual channel 20mADC output V2: Dual channel 10VDC output TP: One temperature and one process signal input CT: Direct neutral current measurement + One temperature and one process signal input			

Position of modules and combination

Ref	Description	Main features	Part number	Pos. A	Pos. B	Pos. C
1	WM40 base provided with display, power supply, measuring inputs, optical front communication port.	• Inputs/system: AV5.3 • Power supply: H	WM40 AV5 3 H			
2		• Inputs/system: AV6.3 • Power supply: H	WM40 AV6 3 H			
3		• Inputs/system: AV4.3 • Power supply: H	WM40 AV4 3 H			
4		• Inputs/system: AV7.3 • Power supply: H	WM40 AV7 3 H			
5		• Inputs/system: AV5.3 • Power supply: L	WM40 AV5 3 L			
6		• Inputs/system: AV6.3 • Power supply: L	WM40 AV6 3 L			
7		• Inputs/system: AV4.3 • Power supply: L	WM40 AV4 3 L			
8		• Inputs/system: AV7.3 • Power supply: L	WM40 AV7 3 L			
9	Dual relay output (SPST)	• 2-channel • Alarm or/and pulse output	M O R2	X		
10	Dual static output (AC/DC Opto-Mos)	• 2-channel • Alarm or/and pulse output	M O O2	X		
11	Dual analogue output (+20mADC)	• 2-channel	M O A2	X	X	
12	Dual analogue output (+10VDC)	• 2-channel	M O V2	X	X	
13	RS485 / RS232 port module	• Max. 115.2 Kbps	M C 485 232			X
14	Ethernet/TCP IP port module	• RJ45 10/100 BaseT	M C ETH			X
15	BACnet-IP port module	• Based on Ethernet bus	M C BAC IP			X
16	BACnet MS/TP port module	• Over RS485	M C BAC MS			X
17	BACnet MS/TP port module	• Over RS485 • Data Stamping	M C BAC MS M			X
18	Combined digital inputs and Relay outputs (SPST)	• 6-input channels • 4-output channels • Complex tariff management • OR/AND logic management	M F I6 R4		X	
19	Combined digital inputs and Static outputs (AC/DC Opto-Mos)	• 6-input channels • 6-output channels • Complex tariff management. • OR/AND logic management	M F I6 O6		X	
20	RS485 / RS232 port module with integrated Memory	• Max. 115.2 Kbps • Data stamping	M C 485 232 M			X
21	Ethernet port module with integrated Memory	• RJ45 10/100 BaseT • Data Stamping	M C ETH M			X
22	BACnet over IP port module with integrated Memory	• Based on Ethernet bus • Data Stamping	M C BAC IP M			X
23	Temperature + Process signal measurements (°C/°F)	• "Pt" type input • 20mA input	M A T P		X	
24	Direct neutral current measurement + Temperature + Process signal measurements (°C/°F)	• As above + signal input like a common current input (CT ratio etc.)	M A T P N		X	
25	Profibus module	• Profibus DP V0 • Over RS485	M C P B			X
26	Profibus module with integrated memory	• Profibus DP V0 • Over RS485 • Data stamping	M C P B M			X

NOTE: The position of the modules shall respect the sequence A-B-C. Possible arrangements are M, M-A, M-B, M-C, M-A-B, M-A-C, M-B-C and M-A-B-C where "M" is the basic module (WM40-96).

It is possible to use the WM40-96 without any additional module as a simple indicator.



Input specifications

Rated inputs	System type: 1, 2 or 3-phase	Reactive power	From 0.02In to 0.05In, senφ 1: $\pm(1.5\%RDG+1DGT)$
Current type	Galvanic insulation by means of built-in CT's		From 0.05In to I _{max} , senφ 1: $\pm(1\%RDG+1DGT)$
Current range (by CT)	AV5 and AV6: 5(6)A AV4 and AV7: 1(2)A		From 0.05In to 0.1In, senφ 0.5L/C: $\pm(1.5\%RDG+1DGT)$
Voltage (by direct connection or VT/PT)	AV4, AV5: 3x220 (380)... 3x400 (690) V; AV6, AV7: 3x57.7 (100) ... 3x133(230) V	Active energy	From 0.1In to I _{max} , senφ 0.5L/C: $\pm(1\%RDG+1DGT)$
Accuracy (Display + RS485) (@23°C ±2°C, R.H. ≤60%)	0.01In=0.05A (AV5, AV6 - kWh, PF=1) 0.01In=0.01A (AV4, AV7 - kWh, PF=1) 0.05In=0.25A (AV5, AV6 - kWh, PF=1) 0.05In=0.05A (AV4, AV7 - kWh, PF=1) In: see below, Un: see below	Reactive energy	Class 0.5S according to EN62053-22, ANSI C12.20.
AV4 model	In: 1A, I _{max} : 2A; Un: 220 to 400VLN (380 to 690VLL)	Start up current AV5, AV6	Class 2 according to EN62053-23, ANSI C12.1.
AV5 model	In: 5A, I _{max} : 6A; Un: 220 to 400VLN (380 to 690VLL)	Start up current AV4, AV7	5mA
AV6 model	In: 5A, I _{max} : 6A; Un: 57.7 to 133VLN (100 to 230VLL)	Energy additional errors	1mA
AV7 model	In: 1A, I _{max} : 2A; Un: 57.7 to 133VLN (100 to 230VLL)	Influence quantities	According to EN62053-22, ANSI C12.20, according to EN62053-23, ANSI C12.1
Current AV4, AV5, AV6, AV7 models	From 0.01In to 0.05In: $\pm(0.5\% RDG + 2DGT)$ From 0.05In to I _{max} : $\pm(0.2\% RDG + 2DGT)$ In the range Un: $\pm(0.2\% RDG + 1DGT)$	Total Harmonic Distortion (THD)	$\pm 1\%$ FS (FS: 100%) AV4: I _{min} : 5mARMS; I _{max} : 3A; U _{min} : 30VRMS; U _{max} : 679Vp AV5: I _{min} : 5mARMS; I _{max} : 15Ap; U _{min} : 30VRMS; U _{max} : 679Vp AV6: I _{min} : 5mARMS; I _{max} : 15Ap; U _{min} : 30VRMS; U _{max} : 204Vp AV7: I _{min} : 5mARMS; I _{max} : 3A; U _{min} : 30VRMS; U _{max} : 204Vp
Phase-neutral voltage	In the range Un: $\pm(0.5\% RDG + 1DGT)$	Total Demand Distortion (TDD)	$\pm 1\%$ FS (FS: 100%) I _{min} : 5mA RMS; I _{max} : 15Ap
Phase-phase voltage	In the range Un: $\pm(0.5\% RDG + 1DGT)$	K-Factor and factor K	$\pm(0.5\%RDG+1DGT)$
Voltage tolerance	Un -20%, Un +15%	Temperature drift	≤200ppm/°C
Frequency	From 40 to 65 Hz $\pm(0.02\% RDG + 1 DGT)$, From 65 to 340 Hz $\pm(0.05\% RDG + 1 DGT)$. From 340 to 440 Hz $\pm(0.1\% RDG + 1 DGT)$	Sampling rate	3200 samples/s @ 50Hz, 3840 samples/s @ 60Hz
Active and Apparent power	From 0.01In to 0.05In, PF 1: $\pm(1\%RDG+1DGT)$ From 0.05In to I _{max} PF 0.5L, PF1, PF0.8C: $\pm(0.5\%RDG+1DGT)$	Measurements	See "List of the variables that can be connected to:"
Power Factor	$\pm[0.001+0.5\% (1.000 - "PF RDG")]$	Method	TRMS measurements of distorted wave forms.
		Coupling type	By means of CT's
		Crest factor	AV5, AV6: ≤3 (15A max. peak) AV4, AV7: ≤3 (3A max. peak)

Input specifications (cont.)

Current Overloads

Continuous (AV5 and AV6)
 Continuous (AV4 and AV7)
 For 500ms (AV5 and AV6)
 For 500ms (AV4 and AV7)

6A, @ 50Hz/60Hz
 2A, @ 50Hz/60Hz
 120A, @ 50Hz/60Hz
 40A, @ 50Hz/60Hz

Voltage Overloads

Continuous
 For 500ms

1.2 Un
 2 Un

Input impedance

400VL-L (AV4 and AV5)
 208VL-L (AV6 and AV7)
 5(6)A (AV5 and AV6)
 1(2)A (AV4 and AV7)

> 1.6MΩ
 > 1.6MΩ
 < 0.2VA
 < 0.2VA

Frequency

40 to 440 Hz

Output specifications

Relay outputs (M O R2)

Physical outputs	2 (max. 1 module per instrument)
Purpose	For either alarm output or pulse output
Type	Relay, SPST type AC 1-5A @ 250VAC; AC 15-1A @ 250VAC
Configuration	By means of the front key-pad or UCS software
Function	The outputs can work as alarm outputs but also as pulse outputs, remote controlled outputs, or in any other combination.
Alarms	Up alarm and down alarm and windows alarm (in and out) linked to the virtual alarms, other details see Virtual alarms
Min. response time	≤200ms, filters excluded. Set-point on-time delay: "0 s".
Pulse	
Signal retransmission	Total: +kWh, -kWh, +kvarh, -kvarh. Partial: +kWh, -kWh, +kvarh, -kvarh.
Pulse type	Programmable from 0.001 to 10.00 kWh/kvarh per pulse. The above listed variables can be connected to any output.
Pulse duration	30 ms (ON), ≥ 30ms (OFF), according to EN62053-31
Remote controlled outputs	The activation of the outputs is managed through the serial communication port See "Insulation between inputs and outputs" table
Insulation	

Static outputs (M O O2)

Physical outputs	Opto-Mos type 2 (max. 1 module per instrument)
Purpose	For either pulse output or alarm output
Signal	V _{ON} : 2.5VAC/DC/max. 100mA V _{OFF} : 42VDC max.
Configuration	By means of the front key-pad or UCS software
Function	The outputs can work as alarm outputs but also as pulse outputs, remote controlled outputs, or in any other combination.
Alarms	Up alarm and down alarm linked to the virtual alarms, other details see Virtual alarms
Min. response time	≤200ms, filters excluded. Set-point on-time delay: "0 s".
Pulse	

Signal retransmission

Pulse type

Pulse duration

Remote controlled outputs

Insulation

20mA analogue outputs (M O A2)

Number of outputs

Accuracy

(@ 23°C ±2°C)

Range

Configuration

Signal retransmission

Scaling factor

Response time

Ripple

Total temperature drift

Load

Insulation

10VDC analogue outputs (M O V2)

Number of outputs

Accuracy

(@ 23°C ±2°C)

Range

Configuration

Signal retransmission

Scaling factor

Total: +kWh, -kWh, +kvarh, -kvarh.

Partial: +kWh, -kWh, +kvarh, -kvarh.

Programmable from 0.001 to 10.00 kWh/kvarh per pulse. The above listed variables can be connected to any output.

30 ms (ON), ≥ 30 ms (OFF), according to EN62053-31

The activation of the outputs is managed through the serial communication port
See "Insulation between inputs and outputs" table

2 per module (max. 2 modules per instrument)

±0.2%FS

0 to 20mA

By means of the front key-pad or UCS software
The signal output can be connected to any instantaneous variable available in the table "List of the variables that can be connected to".

Programmable within the whole range of retransmission.

≤400 ms typical (filter excluded)

≤1% (according to IEC 60688, EN 60688)

≤500 ppm/°C

≤600Ω

See "Insulation between inputs and outputs" table

2 per module (max. 2 modules per instrument)

±0.2%FS

0 to 10 VDC

By means of the front key-pad or UCS software
The signal output can be connected to any instantaneous variable available in the table "List of the variables that can be connected to".

Programmable within

Output specifications (cont.)

Response time	the whole range of retransmission. ≤400 ms typical (filter excluded)	Note	38.4k, 115.2k bit/s With the rotary switch (on the back of the basic unit) in lock position the modification of the programming parameters and the reset command by means of the serial communication is not allowed. In this case just the data reading is allowed. See "Insulation between inputs and outputs" table
Ripple	≤1% (according to IEC 60688, EN 60688)		
Total temperature drift	≤350 ppm/°C		
Load	≥10kΩ		
Insulation	See "Insulation between inputs and outputs" table	Insulation	
RS485 serial port (M C 485 232 on request)			
RS485 Type	Multidrop, bidirectional (static and dynamic variables)	Module with data stamping and event recording memory	
Connections	2-wire Max. distance 1000m, termination directly on the module	(M C 485 232 M) Event stamping Type of data	Alarm, min, max, digital input status, digital output status as remote control, resets.
Addresses	247, selectable by means of the front key-pad	Stamping format	Date (dd:MM:yy) and hour (hh:mm:ss) reference.
Protocol	MODBUS/JBUS (RTU)	Number of events	Up to 10,000
Data (bidirectional)		Data management type	FIFO
Dynamic (reading only)	System and phase variables: see table "List of variables..."	Data stamping Type of data	Any measured variable can be stored in the memory.
Static (reading and writing only)	All the configuration parameters.	Stamping format	Date (dd:MM:yy) and hour (hh:mm:ss) reference.
Data format	1 start bit, 8 data bit, no/ even/odd parity, 1 stop bit	Number of variables	Up to 19 different type of variables can be stored.
Baud-rate	Selectable: 9.6k, 19.2k, 38.4k, 115.2k bit/s	Time interval	From 1 minute up to 60 minutes.
Driver input capability	1/5 unit load. Maximum 160 transceivers on the same bus.	Data management type	FIFO
Note	With the rotary switch (on the back of the basic unit) in lock position the modification of the programming parameters and the reset command by means of the serial communication is not allowed. In this case just the data reading is allowed. See "Insulation between inputs and outputs" table	Memory type	Data flash
Insulation		Ethernet/Internet port (M C ETH on request)	
		Protocols	Modbus TCP/IP
		IP configuration	Static IP / Netmask / Default gateway
		Port	Selectable (default 502)
		Client connections	Max 5 simultaneously
		Connections	RJ45 10/100 BaseTX
			Max. distance 100m
		Data (bidirectional)	
		Dynamic (reading only)	System and phase variables: see table "List of variables..."
		Static (reading and writing only)	All the configuration parameters.
		Note	With the rotary switch (on the back of the basic unit) in lock position the modification of the programming parameters and the reset command by means of the serial communication is not allowed. In this case just
RS232 port (on request)			
Type	Bidirectional (static and dynamic variables)		
Connections	3 wires. Max. distance 15m		
Protocol	MODBUS RTU /JBUS		
Data (bidirectional)			
Dynamic (reading only)	System and phase variables: see table "List of variables..."		
Static (reading and writing only)	All the configuration parameters		
Data format	1 start bit, 8 data bit, no/ even/odd parity, 1 stop bit		
Baud-rate	Selectable: 9.6k, 19.2k,		

Output specifications (cont.)

Insulation	the data reading is allowed. See "Insulation between inputs and outputs" table	Dynamic (reading only)	System and phase variables (BACnet-IP and Modbus): see table "List of variables"
Module with data stamping and event recording memory		Static (reading and writing only)	All the configuration parameters (Modbus only)
(M C ETH M)		Note	With the rotary switch (on the back of the basic unit) in lock position the modification of the programming parameters and the reset command by means of the serial communication is not allowed anymore. In this case just the data reading is allowed.
Event stamping	Alarm, min, max, digital input status, digital output status as remote control, resets.		See "Insulation between inputs and outputs" table
Type of data			
Stamping format	Date (dd:MM:yy) and hour (hh:mm:ss) reference.		
Number of events	Up to 10,000		
Data management type	FIFO		
Data stamping		Insulation	
Type of data	Any measured variable can be stored in the memory.	Module with data stamping and event recording memory	
Stamping format	Date (dd:MM:yy) and hour (hh:mm:ss) reference.	(M C BAC IP M)	
Number of variables	Up to 19 different type of variables can be stored.	Event stamping	
Time interval	From 1 minute up to 60 minutes.	Type of data	Alarm, min, max, digital input status, digital output status as remote control, resets.
Data management type	FIFO		Date (dd:MM:yy) and hour (hh:mm:ss) reference.
Memory type	Data flash		Up to 10,000
BACnet-IP (on request)			FIFO
Protocols	BACnet-IP (for measurement reading purpose and to write object description) and Modbus TCP/IP (for measurement reading purpose and for programming parameter purpose)	Stamping format	Any measured variable can be stored in the memory.
		Number of events	Date (dd:MM:yy) and hour (hh:mm:ss) reference.
		Data management type	Up to 10,000
		Data stamping	FIFO
		Type of data	Any measured variable can be stored in the memory.
		Stamping format	Date (dd:MM:yy) and hour (hh:mm:ss) reference.
		Number of variables	Up to 19 different type of variables can be stored.
		Time interval	From 1 minute up to 60 minutes.
		Data management type	FIFO
		Memory type	Data flash
BACnet-IP		BACnet MS/TP (on request)	
IP configuration	Static IP / Netmask / Default gateway	Available ports	2: RS485 and Ethernet
Port	Fixed: BAC0h	RS485 port	
Device object instance	0 to 9999 selectable by key-pad 0 to 2 [^] 22-2 = 4.194.302, selectable by programming software or by BACnet.	Type	Multidrop, mono-directional (dynamic variables)
Supported services	"I have", "I am", "Who has", "Who is", "Read (multiple) Property"	Connections	2-wire Max. distance 1000m, termination directly on the module
Supported objects	Type 2 (analogue value, including COV property), Type 5 (binary-value for up to 16 virtual alarm re-transmission) Type 8 (device)	Device object instance	0 to 9999 selectable by key-pad
IP configuration	Static IP / Netmask / Default gateway		0 to 2 [^] 22-2 = 4.194.302, selectable by means of programming software or by BACnet.
Modbus TCP/IP	See "Ethernet/Internet port" above	Protocol	BACnet MS/TP (for measurement reading purpose and to write object description)
Client connections	Modbus only: max 5 simultaneously	Supported services	"I have", "I am", "Who has",
Connections	RJ45 10/100 BaseTX Max. distance 100m		
Data			

Output specifications (cont.)

Supported objects	“Who is”, “Read (multiple Property)” Type 2 (analogue value, including COV property), Type 5 (binary-value for up to 16 virtual alarm re-transmission) Type 8 (device)	Memory type Note	Data flash With the rotary switch (on the back of the basic unit) in lock position the modification of the programming parameters and the reset command by means of the serial communication is not allowed. In this case just the data reading is allowed. See “Insulation between inputs and outputs” table
Data (mono-directional) Dynamic	System and phase variables: see table “List of variables...”	Insulation	BTL
Static	Not available	Approval	
Data format	1 start bit, 8 data bit, no parity, 1 stop bit	Profibus (MCPB) Available ports	2: USB and Profibus DP V0
Baud-rate	Selectable: 9.6k, 19.2k, 38.4k kbit/s	USB Purpose	Programmable parameters setting USB micro B Modbus RTU 1 start bit, 8 data bit, no parity, 1 stop bit autorange depending on the master (max 115200 bps) 1
Driver input capability	1/5 unit load. Maximum 160 transceivers on the same bus.	Connector Protocol Data format	
MAC addresses	Selectable: 0 to 127	Baudrate	
Ethernet port Protocol	Modbus TCP/IP (for programming parameter purpose) Static IP / Netmask / Default gateway	Address Profibus Purpose	
IP configuration	Selectable (default 502)	Modules Selectable:	
Modbus Port	Modbus only: max 5 simultaneously	Data format	
Client connections	RJ45 10/100 BaseTX Max. distance 100m	Connector Protocol Baudrate	
Connections		Address Note	
Data		Insulation	
Dynamic (reading only)	System and phase variables: see table “List of variables...”	Module with data stamping	
Static (reading and writing only)	All the configuration parameters (Modbus only).		
Bacnet MS/TP + event recording memory			
Event stamping Type of data	Alarm, min, max, digital input status, digital output status as remote control, resets.		
Stamping format	Date (dd:MM:yy) and hour (hh:mm:ss) reference.		
Number of events	Up to 10,000		
Data management type	FIFO		
Data stamping Type of data	Any measured variable can be stored in the memory.		
Stamping format	Date (dd:MM:yy) and hour (hh:mm:ss) reference.		
Number of variables	Up to 19 different type of variables can be stored.		
Time interval	From 1 minute up to 60 minutes.		
Data management type	FIFO		

Output specifications (cont.)

and event recording memory (MCPBM)			
Event stamping		Controlled variables	alarms. The alarms can be connected to any variable available in the table "List of the variables that can be connected to"
Type of data	Alarm, min, max, digital input status, digital output status as remote control, resets.	Set-point adjustment	From 0 to 100% of the display scale
Stamping format	Date (dd:MM:yy) and hour (hh:mm:ss) reference.	Hysteresis	From 0 to full scale
Number of events	Up to 10,000	On-time delay	0 to 255s
Data management type	FIFO	Output status	Selectable: normally de-energized or normally energized
Data stamping		Min. response time	≤200ms, filters excluded. Set-point on-time delay: "0 s".
Type of data	Any measured variable can be stored in the memory.		
Stamping format	Date (dd:MM:yy) and hour (hh:mm:ss) reference.	Digital inputs	
Number of variables	Up to 19 different type of variables can be stored.	Number of inputs	6 (voltage-free contacts)
Time interval	From 1 minute up to 60 minutes.	Purpose	Contact status reading. "dmd" measurements synchronisation and clock synchronisation. Energy tariff selection. Utility meter counters. Trip counter. Interfacing with external energy meters (+kWh, +kvarh, -kWh, -kvarh).
Data management type	FIFO		20Hz max, duty cycle 50%
Memory type	Data flash		From 0.1 to 999.9 m³ or kWh/pulse
Approval	PROFIBUS Nutzerorganisation e.V.		≤3.3VDC
Relay Output and Digital Input (M F I6 R4 on request)			≤300Ω closed contact
Relay Outputs			≥50kΩ open contact
Physical outputs	4 (max. 1 module per instrument)	Input frequency	0 to 0.5VDC: LOW
Purpose	For either pulse output or alarm output	Prescaler adjustment	2.4 to 25VDC: HIGH
Type	Relay, SPST type AC 1-5A @ 250VAC; AC 15-1A @ 250VAC	Open Contact voltage	
Configuration	Only by means of the programming software UCS. In this latter case using either the serial communication port or the front optical port.	Closed Contact current	
Function	The outputs can work as advanced alarm outputs and as remote controlled outputs, or in any other combination.	Contact resistance	
Standard alarm modes	Up alarm, down and window alarm. There is also the possibility to remote the control of the outputs: the activation of the outputs is managed through the serial communication port (in this case the local alarms are disabled).	Input voltage	
Advanced alarm modes	"OR" or "AND" or "OR+AND" functions (see "Alarm parameter and logic" page). Freely programmable on up to 16	Working mode	• Total and partial energy meters (kWh and kvarh) without digital inputs; • Total and partial energy meters (kWh and kvarh) managed by time periods (t1-t2-t3-t4-t5-t6), W dmd synchronisation (the synchronisation is made every time the tariff changes) and GAS (m³) or WATER (hot/cold/m³) or remote heating (kWh) meters; • Total and partial energy meters (kWh and kvarh) managed by time periods (t1-t2), W dmd synchronisation (the synchronisation is made independently of the tariff selection) and GAS (m³) or WATER (hot/cold/m³) or remote heating (kWh)

Output specifications (cont.)

Insulation	meters; • Total energy (kWh, kvarh) and GAS, WATER (hot-cold m³) and remote heating meters (3 choices only). • Remote alarm reset. • Trip counter of installation protection. • Direct measurements for the power quality analysis (LV or MV/HV connection); • Indirect energy and power measurements by means of external energy 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). By means of opto-mos See “Insulation between inputs and outputs” table.	Data format	+kvarh, -kvarh) 9-DGT for Total and partial/tariff, gas and water metering.
		Digital inputs Number of inputs Purpose	6 (voltage-free contacts) Contact status reading. “dmd” measurements synchronisation and clock synchronisation. Energy tariff selection. Utility meter counters. Trip counter. Remote input. Interfacing with external energy meters (+kWh, +kvarh, -kWh, -kvarh). 20Hz max, duty cycle 50% From 0.1 to 999.9 m³ or kWh/pulse
		Input frequency Prescaler adjustment Open Contact voltage Closed Contact current Contact resistance	≤3.3VDC <1mADC ≤300Ω closed contact ≥50kΩ open contact
		Input voltage	0 to 0.5VDC LOW 2.4 to 25VDC HIG
Opto-mos Output and Digital Input (M F I6 O6 on request) Static Outputs Physical outputs Purpose Type of outputs Signal Function		Working mode • Total and partial energy meters (kWh and kvarh) without digital inputs; • Total and partial energy meters (kWh and kvarh) managed by time periods (t1-t2-t3-t4-t5-t6), W dmd synchronisation (the synchronisation is made every time the tariff changes) and GAS (m³) or WATER (hot/cold/m³) or remote heating (kWh) meters; • Total and partial energy meters (kWh and kvarh) managed by time periods (t1-t2), W dmd synchronisation (the synchronisation is made independently of the tariff selection) and GAS (m³) or WATER (hot/cold/m³) or remote heating (kWh) meters; • Total energy (kWh, kvarh) and GAS, WATER (hot-cold m³) and remote heating meters (3 choices only). • Remote alarm reset. • Remote input channel status. • Trip counter of installation	
Signal retransmission			
Pulse type			
Pulse duration			
Advanced tariff management No. of tariffs No. of total energies			
Up to 6 Up to 4 (+kWh, -kWh,			

Output specifications (cont.)

Insulation	protection. • 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 by external energy meters (LV or MV/HV). By means of opto-mos See "Insulation between inputs and outputs" table.	Transformer ratio	transformer
		Crest factor	Up to 10kA (CT ratio 9999 max)
		Current Overloads	≤3 (3A max. peak)
		Continuous	1.2A, @ 50Hz
		For 500ms	10A, @ 50Hz
		Input impedance	0.5Ω
		Frequency	45 to 65 Hz
Temperature and Process signal inputs (M A T P on request)			
Temperature signal	1		
Number of inputs	See table "Temperature input characteristics"		
Accuracy (Display + RS485)	≤150ppm/°C		
Temperature drift	Pt100, Pt1000		
Temperature probe	2 or 3-wire connection		
Number of wires	Up to 10Ω		
Wire compensation	Selectable °C o °F		
Engineering unit			
Process signal			
Number of inputs	1		
Accuracy (Display + RS485)	±(0,2%RDG+2DGT) da 0% a 25% FS;		
	±(0,1%RDG+2DGT) da 25% a 110% FS.		
Temperature drift	≤150ppm/°C		
Process signal input	-20mA to +20mADC		
Signal overload	Continuous: 50mADC		
	For 1 s.: 150mADC		
Input impedance	<12Ω		
Min. and Max. indication	-9999 to +9999 fully programmable scaling with decimal point positioning.		
Module with true neutral current input (M A T P N)	In: 1A		
Accuracy (Display + RS485)	From 0.01In to 0.05In: ±(0,5% RDG +2DGT)		
	From 0.05In to 1.2In: ±(0,2% RDG +2DGT)		
Temperature drift	≤150ppm/°C		
Measuring input type	To be connected to external current		

Temperature input characteristics

Probe	Range	Accuracy	Min Indication	Max Indication
Pt100	-60.0°C to +300.0°C	$\pm(0.5\%RDG + 5DGT)$	- 60.0	+ 300.0
Pt100	-76°F to +572°F	$\pm(0.5\%RDG + 5DGT)$	- 76.0	+ 572.0
Pt1000	-60.0°C to +300.0°C	$\pm(0.5\%RDG + 5DGT)$	- 60.0	+ 300.0
Pt1000	-76°F to +572°F	$\pm(0.5\%RDG + 5DGT)$	- 76.0	+ 572.0

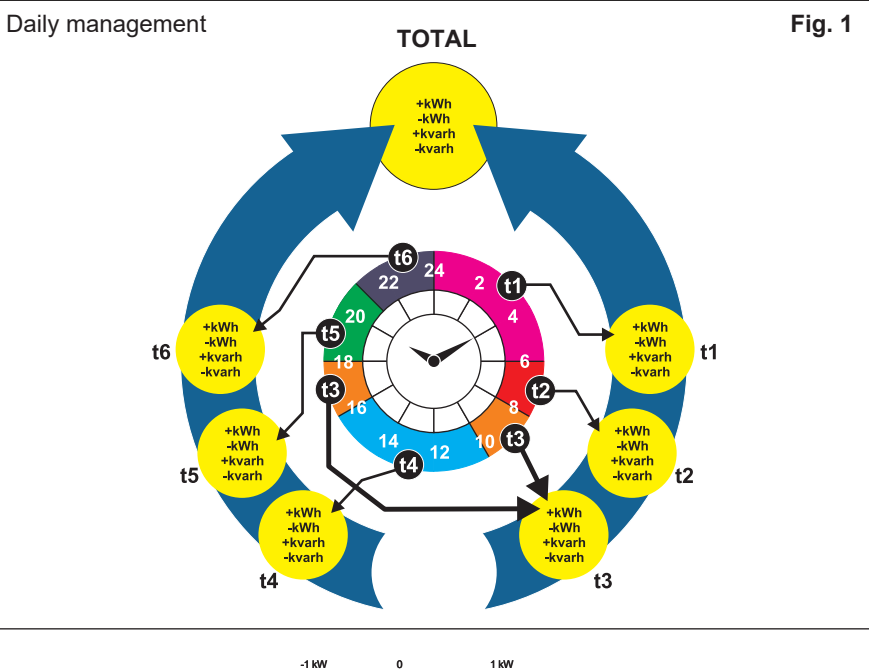
Tariff energy meters and time period management

NOTE: only in case of M F I6 R4 and M F I6 O6 modules.

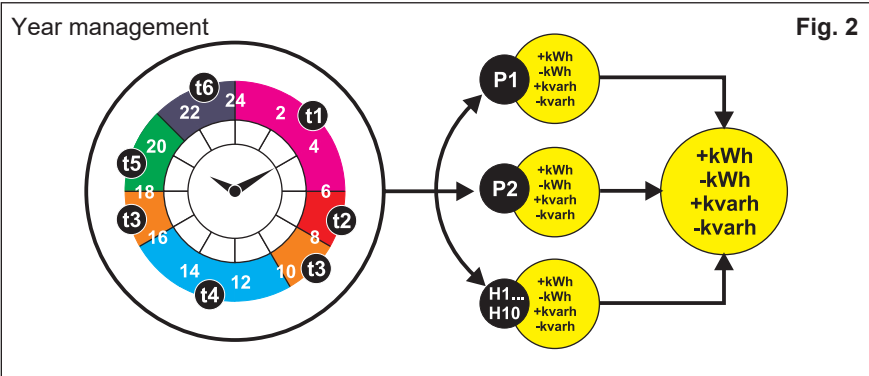
Meters		“Holiday Period” energy meters	Up to 10 (“H1 ... H10”). As per standard period management every single one can be set by day/month/year.
Total	4 (up to 10 digit)		
Partial	72 (up to 10 digit)	“Tariff” energy meters	Up to 6 per period (P1/ P2 and H1 ... H10). Every tariff is daily based and is called “t1” ... “t6”. The single tariff can be set as “Hours and minutes”. Every single tariff “t” may has an independent start and stop which may be different also from period to period “P1 and P2”. Every single tariff manages an independent energy meter which is split according the measured energy in: +kWh, -kWh, +kvarh, -kvarh, -kWh, -kvarh (basic unit without any module)
Tariffs	Up to 6		
Time periods	Up to 3 year		
Pulse output	Connectable to total and/or partial meters	Partial energy meters	
Storage	Consumption history by storing the monthly energy meters (12 previous months) into the EEPROM. Storage of total and partial energy meters. Energy meter storage format (EEPROM) Min. -9,999,999,999 kWh/kvarh Max. 9,999,999,999 kWh/kvarh		
Energy Meters	Base on digital inputs and clock management +kWh, +kvarh, -kWh, -kvarh.		
“Total” energy meters	Up to 2 (“P1” and “P2”) which can be set by month and year each.		
“Standard Period” energy meters			

Tariff energy meters overall working scheme

NOTE: only in case of M F I6 R4 and M F I6 O6 modules.



Where t1 to t6 are the “Tariffs”.



Where P1 and P2 are the “Standard Periods” and H1 ... H10 Holiday periods which are identified by a defined day (non working day), by a vacation period or by a season period.

Note: the displaying of every single energy tariff is relevant only to the period being used. Other periods are available through the communication port.

Energy meters

Meters	
Total	4 (8+2, 9+1, 10 digit)
Partial	4 (8+2, 9+1, 10 digit)
Pulse output	Connectable to total and/or partial meters
Energy meter recording	Storage of total and partial energy meters. Energy meter storage format (EEPROM) Min. -9,999,999,999 kWh/kvarh Max. 9,999,999,999 kWh/kvarh.

Energy Meters	
Total energy meters	+kWh, +kvarh, -kWh, -kvarh
Partial energy meters	+kWh, +kvarh, -kWh, -kvarh

Management of the digital inputs

NOTE: only in case of M F I6 R4 and M F I6 O6 modules.

Function	Note	Digital inputs					
		1	2	3	4	5	6
Synch (dmd)	(1)	YES					
Tariff change	(2)	YES	YES	YES			
Hot Water	(3)				YES	YES	YES
Cold Water	(3)				YES	YES	YES
Gas	(3)				YES	YES	YES
Remote heating	(3)				YES	YES	YES
Remote alarm reset	(4)				YES		
Trip counter of protection	(5)				YES		
Remote input channel status	(6)	YES	YES	YES	YES	YES	YES
kWh counting (-)	(7)			YES			
kWh counting (+)	(7)				YES		
kvarh counting (+)	(7)					YES	

Note: every single digital input can be configured according to the table above.

(1) At each status change of digital signal (from OFF to ON) the instrument synchronises the DMD calculation. It also synchronises the clock to the multiple of the integration time nearest to the current time.

(2) It is used to select by means of the logic of three inputs up to 6 different tariffs: t1-t2-t3-t4-t5-t6. Every time the tariff changes, it starts also the synchronisation of the “dmd” calculation.

(3) It is used to count the pulses coming from different Utility meters like: cold water, hot water, gas and remote heating.

(4) It is used to remotely reset the alarms (In case of latch alarm).

(5) It is used to count how many times an external protection device trips.

(6) This function is available only in case of serial communication. It allows to detect the status of the digital input. The status is displayed on the display as well.

(7) The energy is metered by means of pulses coming from a external energy meter. This meter can be provided with up to 3 outputs (for imported active and reactive energy and for exported active energy). Note: the pulses counted from the watt-hour meter replaces the standard measurement of energy and the relevant displaying (total, partial and tariff), all other measurements (eg: V-A-W-VA-var, THD and so on) are still performed and displayed.

Harmonic distortion analysis

Analysis principle	FFT	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 without neutral the angle cannot be measured.
Harmonic measurement Current Voltage	Up to the 32nd harmonic Up to the 32nd harmonic		
Type of harmonics	THD (VL1 and VL1-N) THD odd (VL1 and VL1-N) THD even (VL1 and VL1-N) TDD The same for the other phases: L2, L3. THD (AL1) THD odd (AL1) THD even (AL1) The same for the other phases: L2, L3.	Harmonic details	The harmonic spectrum so to built-up a graph is available only by means of the serial communication.

Event logging, data logging and load profiling

NOTE: only in case of M C 485 232 M, M C ETH M, M C BAC IP M, M C BAC MS M, M C PB M and M C EI M modules

Event logging	Only with communication module provided with data memory.	Storage duration	Before overwriting, see "Historical data storing time table".
Data displaying	The data are available on the display limited to the last 99 events. All events can be both checked and downloaded using any available communication port in combination with UCS software.	Number of variables	See "Historical data storing time table".
		Data format	Variable, date (dd:mm:yy) and time (hh:mm:ss)
		Storage method FIFO	
		Memory type	Flash
		Memory size	4Mb
		Memory retention time	10 years
Function enabling	Activation: NO/YES	Load profiling	Only with communication module provided with data memory.
Stored data type	Alarms, max./min.		
Number of events	Max. 10,000		
Data reset	All events can be reset manually	Data displaying	The data are not available on the display but they can be both checked and downloaded using any available communication port in combination with UCS software.
Data format	Event, date (dd:mm:yy) and time (hh:mm:ss)		
Storage method FIFO			
Memory type	Flash		
Memory retention time	10 years		
Data logging	Only with communication module provided with data memory.	Function enabling	Activation: NO/YES
		Storage interval	Selectable: 5-10-15-20-30-60 minutes of Wdmd and VAdmd.
Data displaying	The data are not available on the display but they can be both checked and downloaded using any available communication port in combination with UCS software.	Storage duration	Before overwriting, 100 weeks: with recording interval of 5min; 300 weeks: with storing interval of 15min.
Function enabling	Activation: NO/YES	Data format	Wdmd variable value, minutes, day, month.
Stored data type	All variables.	Data synchronisation	Based on internal clock
Storage interval	Programmable from 1 min. to 60 min.; all instantaneous variables can be selected (max 19 variables)	Other characteristics	As per Event and Data logging.
Sampling management	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. 100 ms.		

Display, LED's and commands

Display refresh time	≤ 250 ms		
Display	4 lines, 4-DGT, 1 lines, 10-DGT	Virtual alarms	time. 4 red LED available in case of virtual alarm (ALG1-AL G2-AL G3-AL G4), every LED groups 4 alarms. Note: the real alarm is just the activation of the proper static or relay output if the proper module is available.
Type	LCD, dual colour backlight (selectable)		
Digit dimensions	4-DGT: h 11 mm; 10-DGT: h 7 mm		
Instantaneous variables read-out	4-DGT		
Energies variables read-out	Imported Total/Partial/ Tariff: 8+2DGT, 9+1DGT or 10DGT; Exported Total/ Partial/ Tariff: 8+2DGT, 9+1DGT or 10DGT (with “-“ sign).	Energy consumption kWh pulsating	Red LED (only kWh) 0.001 kWh/kvarh by pulse if the Ct ratio by VT ratio is ≤7 0.01 kWh/kvarh by pulse if the Ct ratio by VT ratio is ≥7.1 ≤70.0 0.1 kWh/kvarh by pulse if the Ct ratio by VT ratio is ≥70.1 ≤700.0 1 kWh/kvarh by pulse if the Ct ratio by VT ratio is ≥700.1 ≤7000 10 kWh/kvarh by pulse if the Ct ratio by VT ratio is ≥7001 ≤70.00k 100 kWh/kvarh by pulse if the Ct ratio by VT ratio is >70.01k Max frequency: 16Hz, according to EN 62052-11
Gas-water-remote heating read-out	8+2DGT, 9+1DGT or 10DGT		
Run Hours counter	8+2 DGT (99.999.999 hours and 59 minutes max)		
Overload status	EEEE indication when the value being measured is exceeding the “Continuous inputs overload” (maximum measurement capacity)		
Max. and Min. indication	Max. instantaneous variables: 9999; energies: 9 999 999 999. Min. instantaneous variables: 0.000; energies 0.00		
Front position LEDs		Back position LEDs	
Bar-graph	Three groups of 3-LED (green-red) split by phase L1-L2-L3 and level of measurement. The full scale (100%) is referred to a programmable value which is corresponding to the variable being measured and displayed by the instrument at the	On the base On the communication modules	Green as power-on Two LEDs: one for TX (green) and one for RX (amber).
		Key-pad	For variable selection, programming of the instrument working parameters reset, “dmd”, “max”, total energy and partial energy and event.

Main functions

Password	Numeric code of max. 4 digits; 2 protection levels of the programming data:		
1st level	Password “0”, no protection;	System 3-Ph.1 balanced load	and 3-phase to phase voltage measurements. 3-phase (3-wire), one current and 3-phase to phase voltage measurements
2nd level	Password from 1 to 9999, all data are protected		3-phase (4-wire), one current and 3-phase to neutral voltage measurements.
System selection		System 3-Ph.2 balanced load	3-phase (2-wire), one current and 1-phase (L1) to neutral voltage measurement.
System 3-Ph.n unbalanced load	3-phase (4-wire)		2-phase (3-wire)
System 3-Ph. unbalanced load	3-phase (3-wire), three currents and 3-phase to phase voltage measurements, or in case of Aaron connection two currents (with special wiring on screw terminals)	System 2-Ph System 1-Ph	1-phase (2-wire)

Main functions (cont.)

Transformer ratio		Reset	to blue backlight or to another available colour combination (fore more details see “Working mode of the display in a normal/ abnormal condition”) By means of the front key-pad or the configuration software. It is possible to reset the following data: - all the min, max, dmd, and dmd-max values. - total energies: kWh, kvarh; - partial energies and tariffs: kWh, kvarh; - gas, water and remote heating; - latch alarms; - all the events; - all the load profiling; - all data logging
VT (PT)	1.0 to 999.9 / 1000 to 9999.		
CT	1.0 to 999.9 / 1000 to 9999 (up to 10kA in case of CT with 1A secondary current and up to 50kA in case of CT with 5A secondary current).		
Maximum CT ratio x VT ratio			
Filter		Harmonic analysis	Up to the 32nd harmonics on current and voltage including also “odd” and “even” THD. In case of communication module availability (any type) every single information is available in the communication protocol.
Operating range	Selectable from 0 to 100% of the input display scale		
Filtering coefficient Filter action	Selectable from 1 to 32 Measurements, analogue signal retransmission, serial communication (fundamental variables: V, A, W and their derived ones).		
Displaying		Clock	Universal clock and calendar. Hour: minutes: seconds with selectable 24H or 12H AM/PM format. Day-month-year with selectable DD-MM-YY or MM-DD-YY format. 10 years
Number of variables	Up to 5 variables per page. See “Front view”. Many different set of variables available (see “Display pages”) according to the application being selected. One page is freely programmable as combination of variables.		
Backlight	The backlight time is programmable from 0 (always on) to 255 minutes		
Virtual alarms		Easy programming function	The displayed energy is always “imported” with the only exception of “C”, “D”, “E” and “G” types (see “display pages” table). For those latter selections the energies can be either “imported” or “exported” depending on the current direction.
Working condition	In case of basic unit or with the addition of M O R2, M O O2 , M F I6 R4 or MF I6 O6.		
No. of alarms Working mode	Up to 16 Up alarm and down alarm and windows alarm (IN/ OUT).		
Controlled variables	The alarms can be connected to any instantaneous variable available in the table “List of the variables that can be connected to”.		
Set-point adjustment	From 0 to 100% of the display scale		
Hysteresis	From 0 to 100%		
On-time delay	0 to 255s		
Min. response time	≤ 200ms, filters excluded. Set-point on-time delay: “0 s”.		
Alarm highlight	In case of alarm and if the relevant function is enabled, the display changes the colour from white backlight		

General specifications

Operating temperature	-25°C to +55°C (-13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C) according to EN62053-21, EN62053-23	Standard compliance	
Storage temperature	-30°C to +70°C (-22°F to 158°F) (R.H. < 90% non-condensing @ 40°C) according to EN62053-21, EN62053-23	Safety	IEC60664, IEC61010-1 EN60664, EN61010-1 EN62052-11.
Installation category	Cat. III (IEC60664, EN60664)	Metrology Pulse output	EN62053-22, EN62053-23. IEC62053-31
Insulation (for 1 minute)	See "Insulation between inputs and outputs" table	Approvals	CE, cULus "Listed" (cULus: max. 40°C, all modules in all combinations)
Dielectric strength	4kVAC RMS for 1 minute	Connections	Screw-type
Noise rejection CMRR	100 dB, 48 to 62 Hz	Cable cross-section area	max. 2.5 mm ² . min./max. screws tightening torque: 0.4 Nm / 0.8 Nm. Suggested screws tightening torque: 0.5 Nm
EMC		Housing	
Immunity and emissions	According to EN62052-11	Dimensions (WxHxD)	Module holder: 96x96x50mm. "A" and "B" type modules: 89.5x63x16mm. "C" type module: 89.5x63x20mm. With 3 modules (A+B+C): 81.7 mm
		Max. depth behind the panel	81.7 mm
		Material	Polycarbonate/ABS/Nylon PA66, self-extinguishing: UL 94 V-0
		Mounting	Panel mounting
		Protection degree	
		Front	IP65, NEMA4x, NEM12
		Screw terminals	IP20
		Weight	Approx. 420 g (packing included)

Power supply specifications

Auxiliary power supply	H:100-240 +/-10% (90 to 255) VDC/AC (50/60 Hz) L: 24-48 +/-15% (20 to 55) VDC/AC (50/60 Hz)	Power consumption	AC: 20 VA; DC: 10 W
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Insulation between inputs and outputs

	Power Supply	Measuring Input	Relay outputs (MOR2)	Relay outputs (MFR4I6)	Static outputs (MOO2)	Static outputs (MFO6I6)	Serial communication	Ethernet port	Analogue output	Digital inputs	Neutral current input	20mA input	Temperature input
Power Supply	-	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV
Measuring Input	4kV	-	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV
Relay outputs (MOR2)	4kV	4kV	2kV	4kV	-	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV
Relay outputs (MFR4I6)	4kV	4kV	4kV	2kV	4kV	-	4kV	4kV	4kV	4kV	4kV	4kV	4kV
Static outputs (MOO2)	4kV	4kV	-	4kV	2kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV
Static outputs (MFO6I6)	4kV	4kV	4kV	-	4kV	0kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV
Serial communication	4kV	4kV	4kV	4kV	4kV	4kV	-	-	4kV	4kV	4kV	4kV	4kV
Ethernet port	4kV	4kV	4kV	4kV	4kV	4kV	-	-	4kV	4kV	4kV	4kV	4kV
Analogue output	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV*	4kV	4kV	4kV	4kV
Digital inputs	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	0kV	4kV	4kV	4kV
Neutral current input	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	-	0kV	0kV
20mA input	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	0kV	-	0kV
Temperature input	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	0kV	0kV	-

*: 4kV respect another module 4kV, in the same module 0kV.

0kV: not isolated.

-: combination not allowed.

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

List of the variables that can be connected to:

- Communication port (all listed variables)
- Analogue outputs (all variables with the only exclusion of “totalizers” and “run hour counter”)
- Pulse outputs (only “energies”)
- Alarm outputs (“totalizers”, “hour counter” and “max” excluded)

No.	Variable	1-ph. sys (1P)	2-ph. sys (2P)	3-ph. 3-wire balanced sys (3P.1)	3-ph. 2-wire balanced sys (3P.2)	3-ph. 3-wire unbal. sys (3P)	3-ph. 4-wire unbal. sys (3P.n)	Notes
1	VL-N sys	O	X	X	X	#	X	sys= system= $\sum (1)(2)(3)$
2	VL1	X	X	X	X	#	X	(1)(2)(3)
3	VL2	O	X	H	H	#	X	(1)(2)(3), (H)=VL1
4	VL3	O	O	H	H	#	X	(1)(2)(3), (H)=VL1
5	VL-L sys	#	#	X	X	X	X	sys= system= $\sum (1)$
6	VL1-2	#	X	X	P	X	X	(1)(2)(3), (P)=VL1*1.73
7	VL2-3	#	O	X	P	X	X	(1)(2)(3), (P)=VL1*1.73
8	VL3-1	#	O	X	P	X	X	(1)(2)(3), (P)=VL1*1.73
9	Asys	O	X	O	O	X	X	
10	An	#	X	O	O	O	X	
11	AL1	X	X	X	X	X	X	(1)(2)(3)
12	AL2	O	X	R	R	X	X	(1)(2)(3), (R)=AL1
13	AL3	O	O	R	R	X	X	(1)(2)(3), (R)=AL1
14	VA sys	O	X	X	X	X	X	sys= system= $\sum (1)(2)(3)$
15	VA L1	X	X	X	X	O	X	(1)(2)(3)
16	VA L2	O	X	U	U	O	X	(1)(2)(3) U=VAL1
17	VA L3	O	O	U	U	O	X	(1)(2)(3) U=VAL1
18	var sys	X	X	X	X	X	X	sys= system= $\sum (1)(2)(3)$
19	var L1	X	X	X	X	O	X	(1)(2)(3)
20	var L2	O	X	V	V	O	X	(1)(2)(3) V=VARL1
21	var L3	O	O	V	V	O	X	(1)(2)(3) V=VARL1
22	W sys	O	X	X	X	X	X	sys= system= $\sum (1)(2)(3)$
23	WL1	X	X	X	X	O	X	(1)(2)(3)
24	WL2	O	X	S	S	O	X	(1)(2)(3), (S)=WL1
25	WL3	O	O	S	S	O	X	(1)(2)(3), (S)=WL1
26	PF sys	O	X	X	X	X	X	sys= system= $\sum (1)$
27	PF L1	X	X	X	X	O	X	(1)(2)(3)
28	PF L2	O	X	T	T	O	X	(1)(2)(3), (T)=PFL1
29	PF L3	O	O	T	T	O	X	(1)(2)(3), (T)=PFL1
30	Hz	X	X	X	X	X	X	(1)(2)(3)
31	Phase seq.	O	O	X	O	X	X	

(X) = available; (O) = not available; (#) Not available (the relevant page is not displayed)

(1) Min. and Max. value with data storage; (2) “dmd” calculation and data storage; (3) “dmd-max” calculation and data storage; (5) On 4 quadrants (ind/cap); (6) C1, C2 and C3 may be set as either cold water, hot water, remote heating or gas depending on the input configuration.

List of the variables that can be connected to (cont.):

- Communication port (all listed variables)
- Analogue outputs (all variables with the only exclusion of “energies” and “run hour counter”)
- Pulse outputs (only “energies”)
- Alarm outputs (“energies”, “hour counter” and “max” excluded)

No.	Variable	1-ph. sys (1P)	2-ph. sys (2P)	3-ph. 3-wire balanced sys (3P.1)	3-ph. 2-wire balanced sys (3P.2)	3-ph. 3-wire unbal. sys (3P)	3-ph. 4-wire unbal. sys (3P.n)	Notes
32	Asy VLL	O	O	X	O	X	X	Asymmetry
33	Asy VLN	O	X	O	O	O	X	Asymmetry
34	Run Hours	X	X	X	X	X	X	
35	kWh (+)	X	X	X	X	X	X	Total
36	kvarh (+)	X	X	X	X	X	X	Total (5)
37	kWh (+)	X	X	X	X	X	X	Partial or by tariff
38	kvarh (+)	X	X	X	X	X	X	Partial or by tariff (5)
39	kWh (-)	X	X	X	X	X	X	Total
40	kvarh (-)	X	X	X	X	X	X	Total (5)
41	kWh (-)	X	X	X	X	X	X	Partial
42	kvarh (-)	X	X	X	X	X	X	Partial (5)
43	C1 (input 4)	X	X	X	X	X	X	Total (6)
44	C2 (input 5)	X	X	X	X	X	X	Total (6)
45	C3 (input 6)	X	X	X	X	X	X	Total (6)
46	Trip counter	X	X	X	X	X	X	Total
47	kWh Water	X	X	X	X	X	X	Total
48	A L1 THD	X	X	X	X	X	X	(2) (3) (4)
49	A L2 THD	O	X	F	F	X	X	(2)(3)(4), (F)=AL1THD
50	A L3 THD	O	O	F	F	X	X	(2)(3)(4), (F)=AL1THD
51	V L1 THD	X	X	X	X	O	X	(2)(3)(4)
52	V L2 THD	O	X	X	G	O	X	(2)(3)(4), (G)=VL1THD
53	V L3 THD	O	O	X	G	O	X	(2)(3)(4), (G)=VL1THD
54	V L1-2 THD	#	X	X	#	X	X	(2) (3) (4)
55	V L2-3 THD	#	O	X	#	X	X	(2) (3) (4)
56	V L3-1 THD	#	O	X	#	X	X	(2) (3) (4)
57	A L1 TDD	X	X	X	X	X	X	(2) (3) (4)
58	A L2 TDD	O	X	X	X	X	X	(2) (3) (4)
59	A L3 TDD	X	X	X	X	X	X	(2) (3) (4)
60	K-Factor	O	O	X	X	X	X	(2) (3) (4)

(X) = available; (O) = not available; (#) Not available (the relevant page is not displayed); (2) “dmd” calculation and data storage; (3) “dmd-max” calculation and data storage; (4) Odd and Even THD’s;

List of selectable applications

	Description	Notes
A	Cost allocation	Imported energy metering (Easy connection)
B	Cost control	Imported and partial energy metering and utilities (Easy connection)
C	Complex cost allocation	Imported/exported energy (total, partial and tariff) and utilities
D	Solar	Imported and exported energy metering with some basic power analyzer function
E	Complex cost and power analysis	Imported/exported energy (total and partial) and power analysis (Easy connection)
F	Cost and power quality analysis	Imported energy and power quality analysis
G	Advanced energy and power analysis for power generation	Complete energy metering and power quality analysis

Display pages

No.	Line 1 Variable Type	Line 2 Variable Type	Line 3 Variable Type	Line 4 Variable Type	Line 5 Variable Type	Note	Applications						
							A	B	C	D	E	F	G
0	Total kWh (+)						x	x	x	x	x	x	x
1	Total kvarh (+)						x	x	x		x	x	x
2	Total kWh (-)								x	x	x		x
3	Total kvarh (-)								x		x		x
4	kWh (+) partial							x	x		x	x	x
5	kvarh (+) part.							x	x		x	x	x
6	kWh (-) partial								x	x	x		x
7	kvarh (-) part.								x		x		x
8	Run Hours (99999999.99)								x	x	x	x	x
9	kWh (+) t1								x		x		x
10	kvarh (+) t1								x		x		x
11	kWh (-) t1								x		x		x
12	kvarh (-) t1								x		x		x
13	kWh (+) t2								x		x		x
14	kvarh (+) t2								x		x		x
15	kWh (-) t2								x		x		x
16	kvarh (-) t2								x		x		x
17	kWh (+) t3								x		x		x
18	kvarh (+) t3								x		x		x
19	kWh (-) t3								x		x		x
20	kvarh (-) t3								x		x		x
21	kWh (+) t4								x		x		x
22	kvarh (+) t4								x		x		x
23	kWh (-) t4								x		x		x
24	kvarh (-) t4								x		x		x
25	kWh (+) t5								x		x		x
26	kvarh (+) t5								x		x		x
27	kWh (-) t5								x		x		x
28	kvarh (-) t5								x		x		x
29	kWh (+) t6								x		x		x
30	kvarh (+) t6								x		x		x
31	kWh (-) t6								x		x		x
32	kvarh (-) t6								x		x		x
33	C1					(5)		x	x		x		x
34	C2					(5)		x	x		x		x
35	C3					(5)		x	x		x		x
36		VLN Σ	VL1	VL2	VL3	(1) (2) (3)				x	x	x	x
37		VLL Σ	VL1-2	VL2-3	VL3-1	(1) (2) (3)				x	x	x	x
38		An	AL1	AL2	AL3	(1) (2) (3)				x	x	x	x
39		Hz	"ASY"	VLL sys (% asy)	VLN sys (% asy)	(1) (2) (3)				x	x	x	x
40		A Σ	AL1	AL2	AL3	(1) (2) (3)				x	x	x	x
41		W Σ	WL1	WL2	WL3	(1) (2) (3)				x	x	x	x
42		var Σ	var L1	var L2	var L3	(1) (2) (3)					x	x	x
43		PF Σ	PF L1	PF L2	PF L3	(1) (2) (3)						x	x
44		VA Σ	VA L1	VA L2	VA L3	(1) (2) (3)						x	x
45				Process sig.	Temperature	(1) (2) (3)						x	x
46			THD V1	THD V2	THD V3	(1) (2) (3)						x	x
47			THD V12	THD V23	THD V31	(1) (2) (3)						x	x
48			THD A1	THD A2	THD A3	(1) (2) (3)						x	x
49			THD V1 odd	THD V2 odd	THD V3 odd	(1) (2) (3)						x	x
50			THD V12 odd	THD V23 odd	THD V31 odd	(1) (2) (3)						x	x
51			THD A1 odd	THD A2 odd	THD A3 odd	(1) (2) (3)						x	x
52			THD V1 even	THD V2 even	THD V3 even	(1) (2) (3)						x	x
53			THD V12 even	THD V23 even	THD V31 even	(1) (2) (3)						x	x
54			THD A1 even	THD A2 even	THD A3 even	(1) (2) (3)						x	x
55			TDD A1	TDD A2	TDD A3	(1) (2) (3)						x	x
56			k-FACT L1	k-FACT L2	k-FACT L3	(1) (2) (3)						x	x

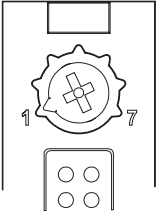
Note: the table refers to system 3P.n.

(1) Also Minimum value (no EEPROM storage). (2) Also Maximum value (no EEPROM storage). (3) Also Average (dmd) value (no EEPROM storage). (5) C1, C2 and C3 may be set as either cold water, hot water, remote heating or gas depending on the digital inputs configuration.

Additional available information on the display

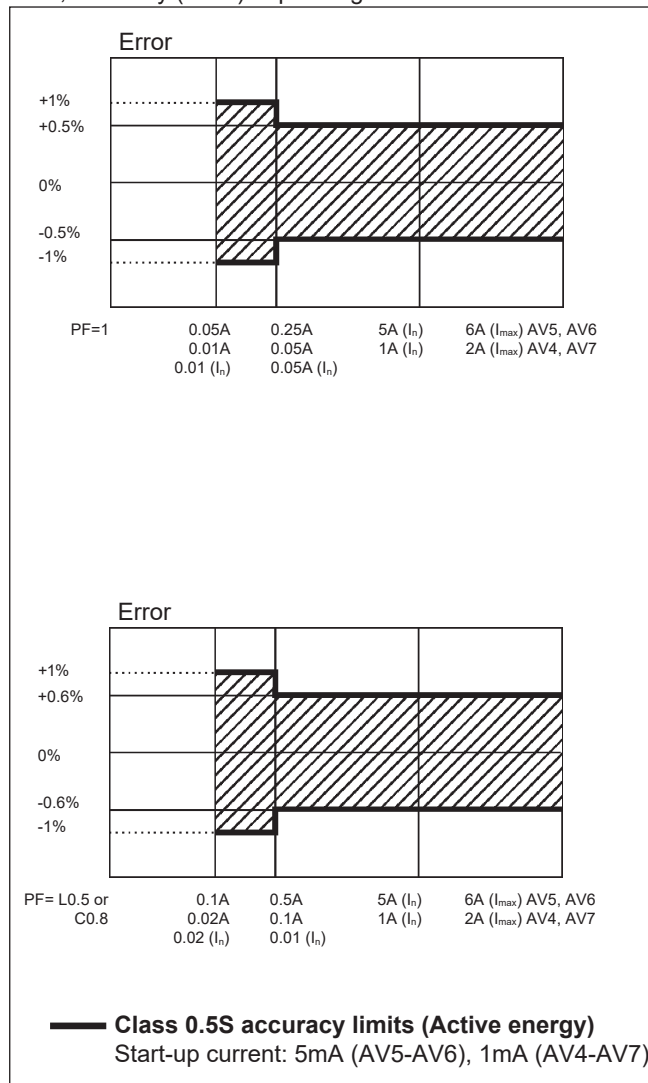
No.	8 Line 1	Line 2	Line 3	Line 4	Line 5	Applications						
						A	B	C	D	E	F	G
1	Lot n. (text) xxxx	Yr. (text) xx	rEL	X.xx	1...60 (min) "dmd"	x	x	x	x	x	x	x
2	Conn. xxx.x (3ph.n/3ph/3ph.1/ 3ph.2/1ph/2ph)	CT.rA (text)	1.0 ... 99.99k	PT.rA (text)	1.0...9999	x	x	x	x	x	x	x
3	LED PULSE (text) kWh	xxxx kWh per pulse				x	x	x	x	x	x	x
4	PULSE out1 (text) kWh/kvarh	xxxx kWh/kvarh per pulse	+/- tot/PAr/ tAr 1-2-3-4			x	x	x	x	x	x	x
5	PULSE out2 (text) kWh/kvarh	xxxx kWh/kvarh per pulse	+/- tot/PAr/ tAr 1-2-3-4			x	x	x	x	x	x	x
6	PULSE out3 (text) kWh/kvarh	xxxx kWh/kvarh per pulse	+/- tot/PAr/ tAr 1-2-3-4			x	x	x	x	x	x	x
7	PULSE out4 (text) kWh/kvarh	xxxx kWh/kvarh per pulse	+/- tot/PAr/ tAr 1-2-3-4			x	x	x	x	x	x	x
8	PULSE out5 (text) kWh/kvarh	xxxx kWh/kvarh per pulse	+/- tot/PAr/ tAr 1-2-3-4			x	x	x	x	x	x	x
9	PULSE out6 (text) kWh/kvarh	xxxx kWh/kvarh per pulse	+/- tot/PAr/ tAr 1-2-3-4			x	x	x	x	x	x	x
10	PULSE out7 (text) kWh/kvarh	xxxx kWh/kvarh per pulse	+/- tot/PAr/ tAr 1-2-3-4			x	x	x	x	x	x	x
11	PULSE out8 (text) kWh/kvarh	xxxx kWh/kvarh per pulse	+/- tot/PAr/ tAr 1-2-3-4			x	x	x	x	x	x	x
12	Remote out.	Out 1 (text)	on/oFF	Out 2 (text)	on/oFF	x	x	x	x	x	x	x
13	Remote out.	Out 3 (text)	on/oFF	Out 4 (text)	on/oFF	x	x	x	x	x	x	x
14	Remote out.	Out 5 (text)	on/oFF	Out 6 (text)	on/oFF	x	x	x	x	x	x	x
15	Remote out.	Out 7 (text)	on/oFF	Out 8 (text)	on/oFF	x	x	x	x	x	x	x
16	AL1 OUTx NE/ND	Variable link L 1/2/3	Set1	Set2	(Measurement)				x	x	x	x
17	AL2 OUTx NE/ND	Variable link L 1/2/3	Set1	Set2	(Measurement)				x	x	x	x
18	AL3 OUTx NE/ND	Variable link L 1/2/3	Set1	Set2	(Measurement)				x	x	x	x
19	AL4 OUTx NE/ND	Variable link L 1/2/3	Set1	Set2	(Measurement)				x	x	x	x
20	AL5 OUTx NE/ND	Variable link L 1/2/3	Set1	Set2	(Measurement)				x	x	x	x
21	AL6 OUTx NE/ND	Variable link L 1/2/3	Set1	Set2	(Measurement)				x	x	x	x
22	AL7 OUTx NE/ND	Variable link L 1/2/3	Set1	Set2	(Measurement)				x	x	x	x
23	AL8 OUTx NE/ND	Variable link L 1/2/3	Set1	Set2	(Measurement)				x	x	x	x
24	AL9 OUTx NE/ND	Variable link L 1/2/3	Set1	Set2	(Measurement)				x	x	x	x
25	AL10 OUTx NE/ND	Variable link L 1/2/3	Set1	Set2	(Measurement)				x	x	x	x
26	AL11 OUTx NE/ND	Variable link L 1/2/3	Set1	Set2	(Measurement)				x	x	x	x
27	AL12 OUTx NE/ND	Variable link L 1/2/3	Set1	Set2	(Measurement)				x	x	x	x
28	AL13 OUTx NE/ND	Variable link L 1/2/3	Set1	Set2	(Measurement)				x	x	x	x
29	AL14 OUTx NE/ND	Variable link L 1/2/3	Set1	Set2	(Measurement)				x	x	x	x
30	AL15 OUTx NE/ND	Variable link L 1/2/3	Set1	Set2	(Measurement)				x	x	x	x
31	AL16 OUTx NE/ND	Variable link L 1/2/3	Set1	Set2	(Measurement)				x	x	x	x
32	Analogue 1	Hi:E	0.0 ... 9999	Hi.A	0.0 ... 100.0%				x	x	x	x
33	Analogue 2	Hi:E	0.0 ... 9999	Hi.A	0.0 ... 100.0%				x	x	x	x
34	Analogue 3	Hi:E	0.0 ... 9999	Hi.A	0.0 ... 100.0%				x	x	x	x
35	Analogue 4	Hi:E	0.0 ... 9999	Hi.A	0.0 ... 100.0%				x	x	x	x
36	Optical	bdr (text)	9.6/19.2/ 38.4/115.2			x	x	x	x	x	x	x
37	COM port	Add (text)	xxx (address)	bdr (text)	9.6/19.2/ 38.4/115.2	x	x	x	x	x	x	x
38	IP address	XXX	XXX	XXX	XXX	x	x	x	x	x	x	x
39	xx.xx.xx xx:xx	Date	Time			x	x	x	x	x	x	x
40	Event page Date Time								x	x	x	x

Back protection rotary switch

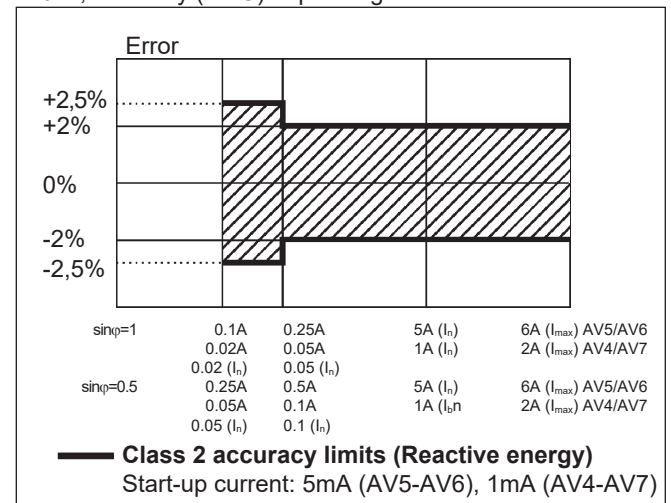
	Function	Rotary switch position	Description
	Unlock	1	All programming parameters are freely modifiable by means of the front key-pad and by means of the communication port.
	Lock	7	The key-pad, as far as programming is concerned and the data through the serial communication cannot be changed (no writing into meter allowed). Data reading is allowed.

Accuracy (According to EN62053-22 and EN62053-23)

kWh, accuracy (RDG) depending on the current



kvarh, accuracy (RDG) depending on the current



Used calculation formulas

Phase variables

Instantaneous effective voltage

$$V_{1N} = \sqrt{\frac{1}{n} \cdot \sum_1^n (V_{1N})_i^2}$$

Instantaneous active power

$$W_1 = \frac{1}{n} \cdot \sum_1^n (V_{1N})_i \cdot (A_1)_i$$

Instantaneous power factor

$$\cos \varphi_1 = \frac{W_1}{VA_1}$$

Instantaneous effective current

$$A_1 = \sqrt{\frac{1}{n} \cdot \sum_1^n (A_1)_i^2}$$

Instantaneous apparent power

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

Instantaneous reactive power

$$\text{var}_1 = \sqrt{(VA_1)^2 - (W_1)^2}$$

System variables

Equivalent three-phase voltage

$$V_\Sigma = \frac{V_1 + V_2 + V_3}{3} \cdot \sqrt{3}$$

Voltage asymmetry

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

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

Three-phase reactive power

$$\text{var}_\Sigma = (\text{var}_1 + \text{var}_2 + \text{var}_3)$$

Three-phase active power

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

Three-phase apparent power

$$VA_\Sigma = \sqrt{W_\Sigma^2 + \text{var}_\Sigma^2}$$

Total harmonic distortion

$$THD_N = 100 \sqrt{\frac{\sum_{n=2}^N |X_n|^2}{|X_1|^2}}$$

Three-phase power factor

$$\cos \varphi_\Sigma = \frac{W_\Sigma}{VA_\Sigma} \quad (\text{TPF})$$

Energy metering

$$k \text{ var hi} = \int_{t_1}^{t_2} Qi(t) dt \cong \Delta t \sum_{n1}^{n2} Qnj$$

$$kWhi = \int_{t_1}^{t_2} Pi(t) dt \cong \Delta t \sum_{n1}^{n2} Pnj$$

Where:

i= considered phase (L1, L2 or L3)
P= active power; **Q**= reactive power;
t₁, t₂=starting and ending time points
of consumption recording; **n**= time unit;
Δt= time interval between two successive power consumption;
n₁, n₂ = starting and ending discrete time points of consumption recording

UCS parameter progr. and var. reading software

UCS software

Multi-language software (Italian, English, French, German, Spanish, Danish, Czech, Chinese) for variable reading and parameters programming (both online and offline). The program runs under Windows 7 and following versions. Four different working modes can be selected:

Data Storing

Data download

- management of local RS232 (MODBUS);
- management of local optical port (MODBUS);
- management of a local RS485 network (MODBUS);
- managed via TCP port.

In pre-formatted CSV or Excel files).
Manual.

Working mode

Alarm parameters and logic

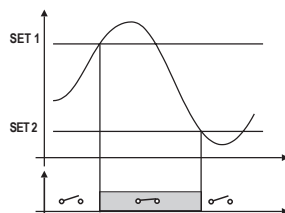


Each symbol includes all the settings described in the "alarm" paragraph and listed on the right:

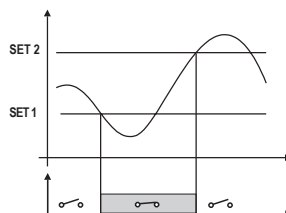
- Enable.
- Variable
- Type
- Latch
- Disable
- Set 1

- Set 2
- OUT
- Delay on. Delay off.
- Function (and/or)

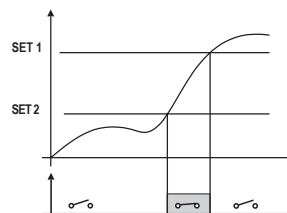
A, B, C... up to 16 locks to control parameters.



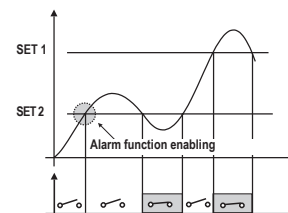
UP alarm
SET1 > SET2



DOWN alarm
SET2 > SET1

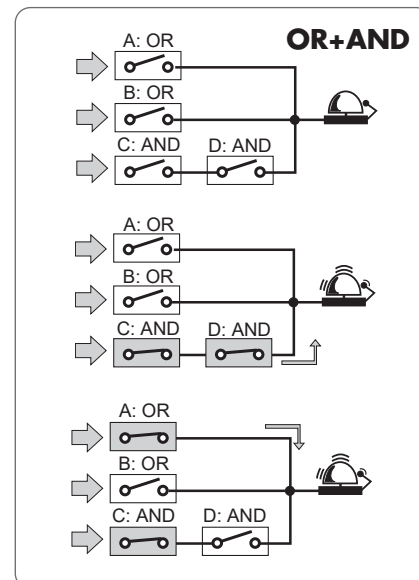
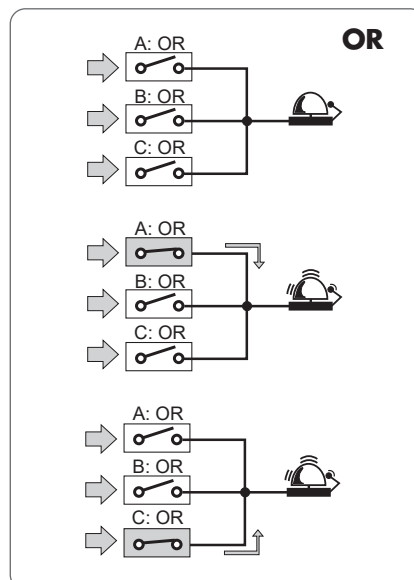
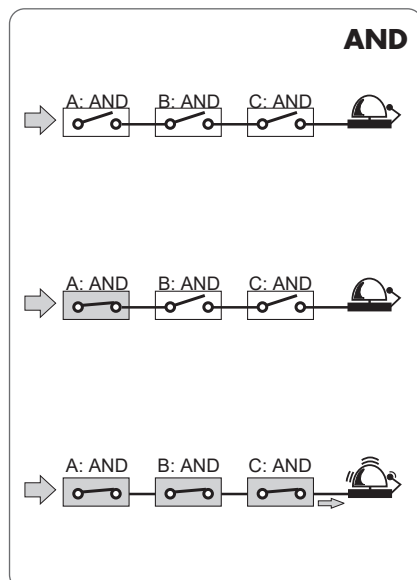


In-window alarm
Alarm is on when the value is between SET 1 and SET 2



Ext. window alarm with disabling at power on
Alarm is on when value exceeds SET 1 or goes below SET 2

Example of AND/OR logic alarm:

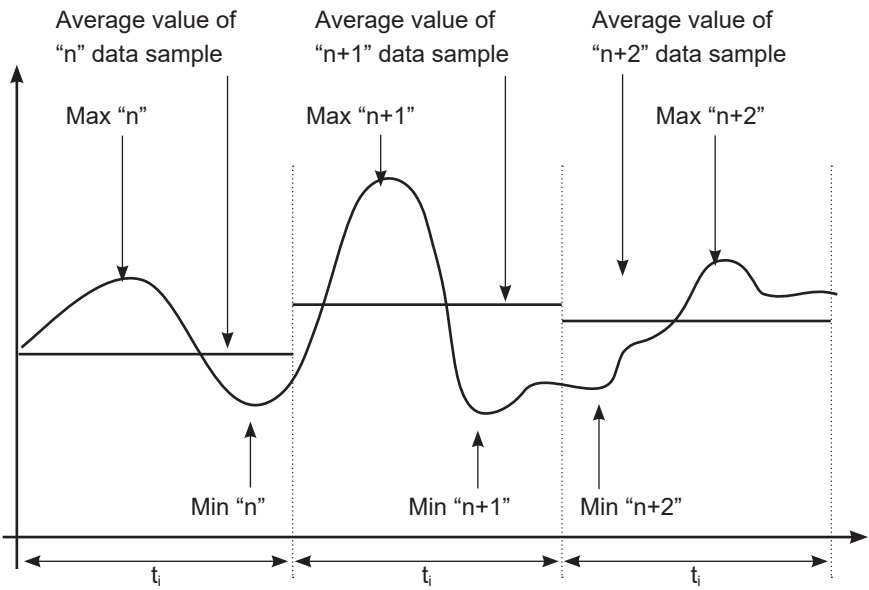




Historical data storing time table

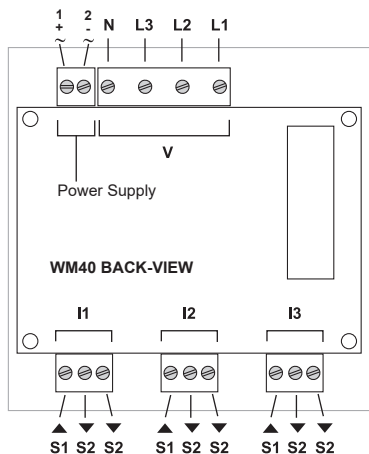
Time interval (minutes)	4 selected variables			8 selected variables			12 selected variables			19 selected variables		
	Data storing time			Data storing time			Data storing time			Data storing time		
	Days	Week	Year	Days	Week	Year	Days	Week	Year	Days	Week	Year
1	32	5	-	19	3	-	15	2	-	8	1	-
5	161	23	-	97	14	-	73	10	-	40	6	-
10	323	46	-	194	28	-	145	21	-	81	12	-
15	484	69	1.3	291	42	-	218	31	-	121	17	-
20	646	92	1.8	388	55	1.1	291	42	-	161	23	-
30	969	138	2.7	581	83	1.6	436	62	1.2	242	35	-
45	1453	208	4	872	125	2.4	654	93	1.8	363	52	1
60	1938	277	5.3	1163	166	3.2	872	125	2.4	484	69	1.3

The working of data logging

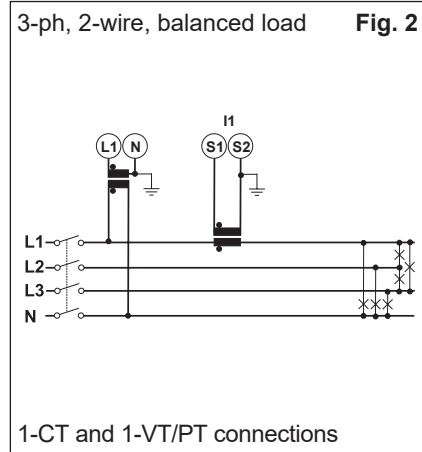
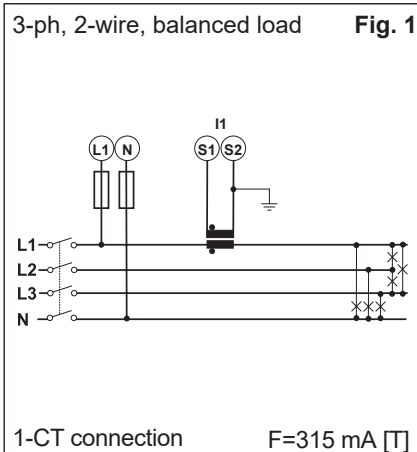


t_i= time interval

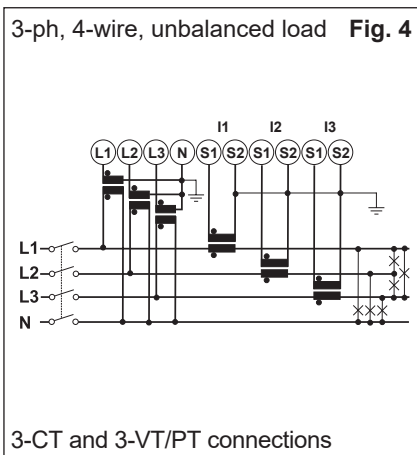
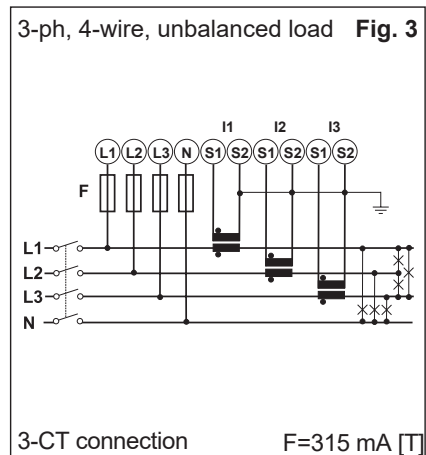
Wiring diagrams



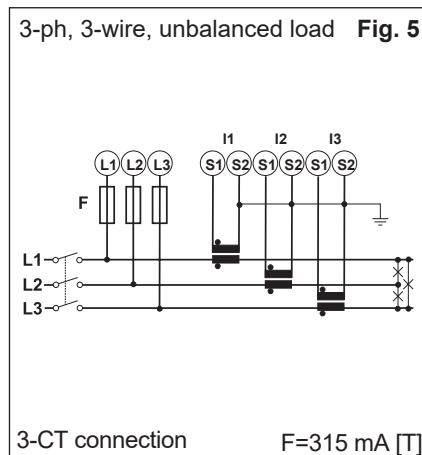
System type selection: 3-Ph.2



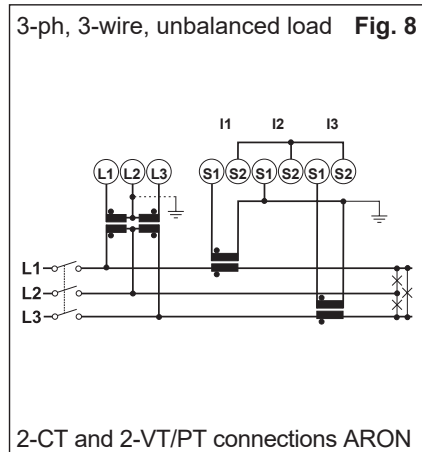
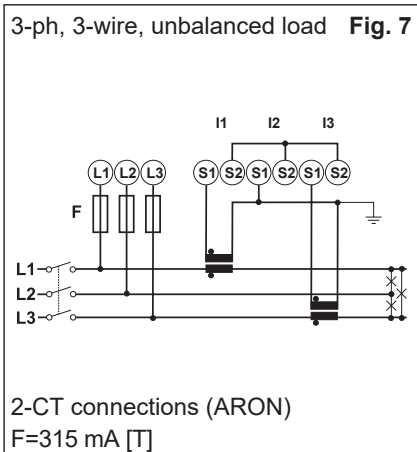
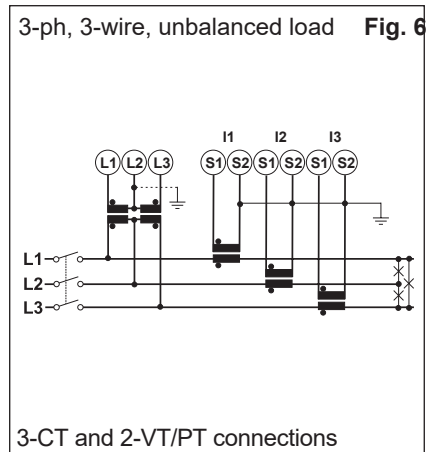
System type selection: 3-Ph.n



System type selection: 3-Ph



System type selection: 3-Ph (cont.)



System type selection: 3-Ph.1

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

L1 L2 L3

S1 S2

H

L1 L2 L3

1-CT connections $F=315 \text{ mA IT}$

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

1-CT and 2-VT/PT connections

2-ph, 3-wire **Fig. 11**

L1
L2
N

F

I1 I2

S1 S2 S1 S2

2-CT connection

2-ph, 3-wire

Fig. 12

The diagram illustrates a 2-phase, 3-wire system with three main horizontal lines: L1, L2, and N. The L1 and L2 lines are equipped with two CTs each, labeled S1 and S2. The N line is grounded at the right end, indicated by three 'X' marks. Two VT/PTs are connected across the L1 and L2 lines. The diagram shows the internal wiring and grounding for these components.

L1
L2
N

S1 S2 S1 S2

2-CT and 2-VT/PT connections

[illegible]

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

The diagram shows a 1-phase, 2-wire system with a main horizontal line and a neutral line below it. On the left, a switch labeled 'L1' is connected to the main line, and a switch labeled 'N' is connected to the neutral line. A dashed line connects the 'L1' switch to a transformer labeled 'L1'. The transformer has a primary winding connected to the main line and a secondary winding connected to a terminal labeled 'N', which is grounded. To the right, a transformer labeled 'I1' has a primary winding connected to the main line and a secondary winding connected to terminals 'S1' and 'S2'. A cross 'X' is marked on the neutral line to the right of the 'I1' transformer.

1-CT and 1-VT/PT connections

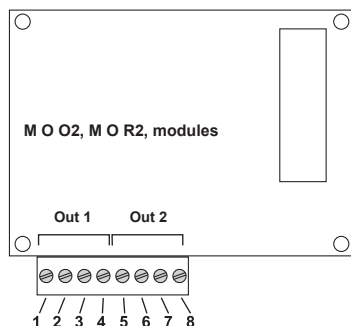
90 to 260VAC/DC (H option) **Fig. 15**

F = 250V [T] 630mA

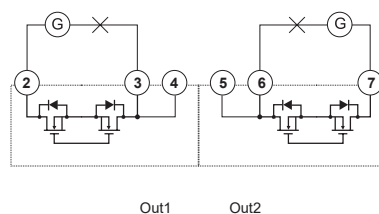
18 to 60VAC/DC (L option) **Fig. 16**

F = 250V [T] 3,15A

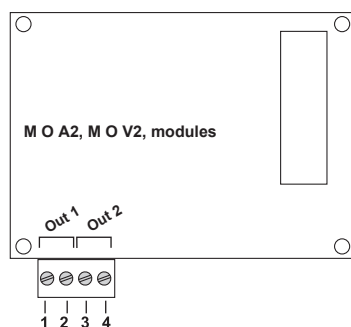
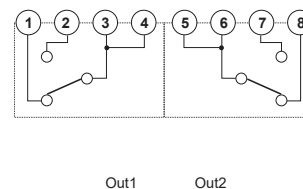
Static, relay, analogue out. and digital in. wiring diagrams



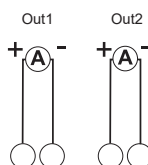
Opto-mosfet MOO2



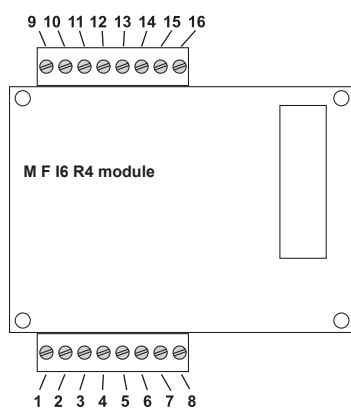
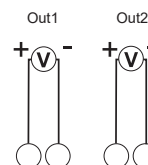
Relays MOR2



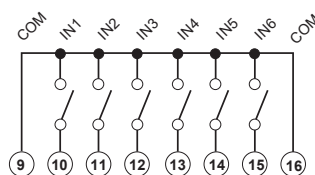
Analogue 20mA DC MOA2



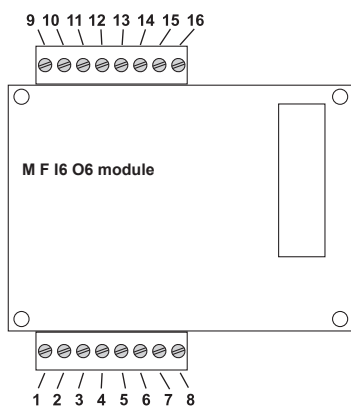
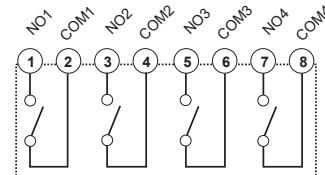
Analogue 10V DC MOV2



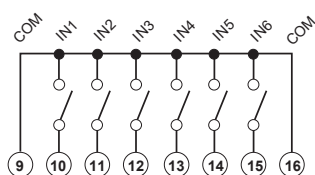
6 Digital inputs



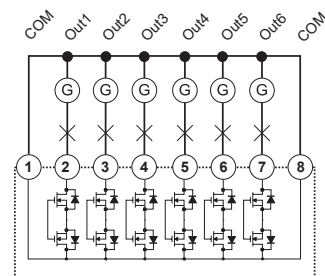
4 Relay outputs



6 Digital inputs

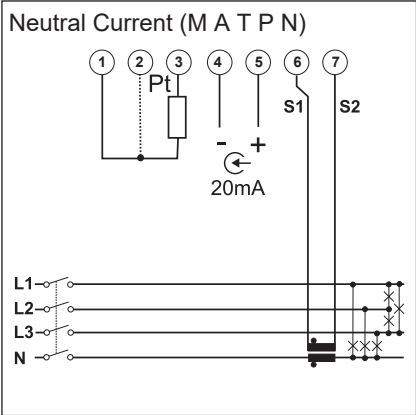
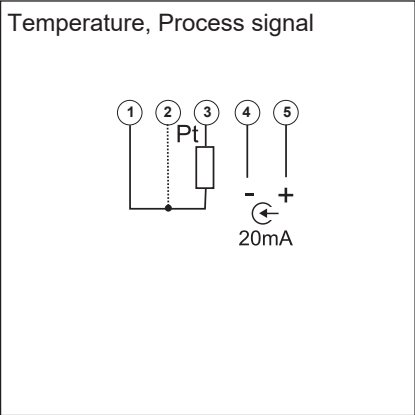
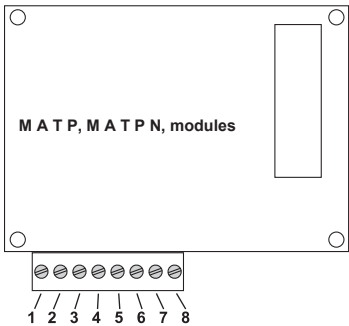


6 Opto-mosfet outputs

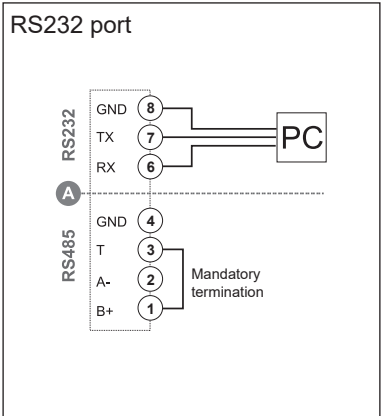
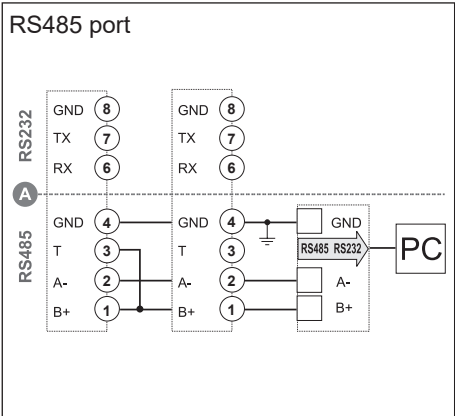
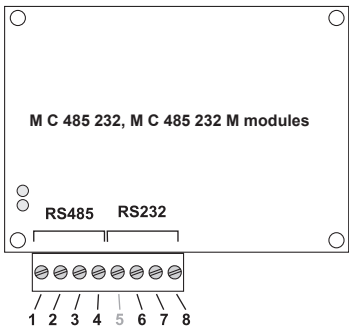




Temperature, process signal and true In wiring diagrams

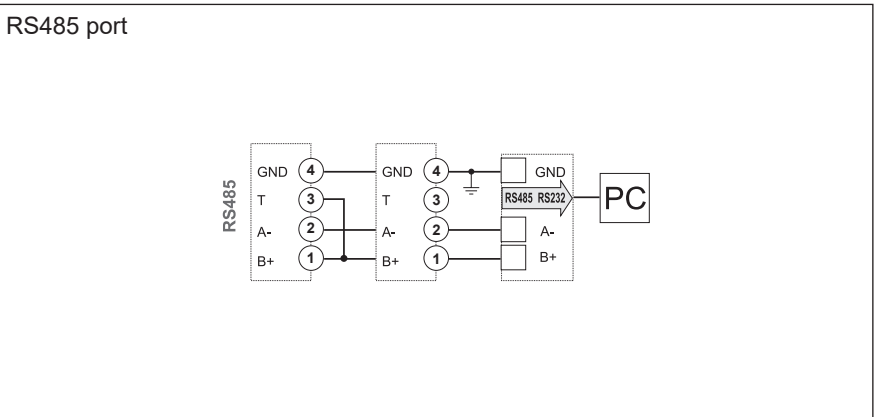
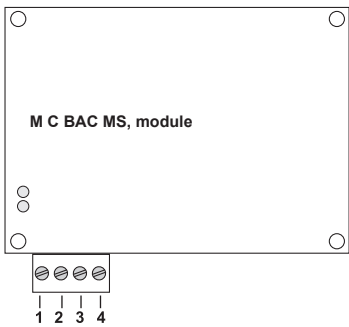


RS485 and RS232 wiring diagrams



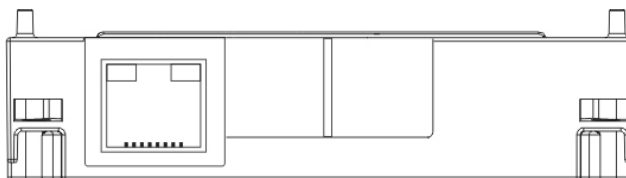
NOTE. RS485: additional devices provided with RS485 are connected in parallel. The termination of the serial output is carried out only on the last instrument of the network, by means of a jumper between (B+) and (T). The **A** communication RS232 and RS485 ports **can't be** connected and used simultaneously.

RS485 wiring diagram of Bacnet module



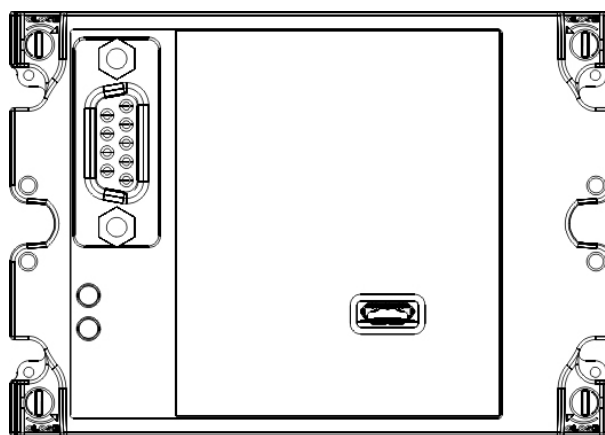
NOTE. RS485: additional devices provided with RS485 are connected in parallel. The termination of the serial output is carried out only on the last instrument of the network, by means of a jumper between (B+) and (T).

Ethernet and BACnet-IP connections



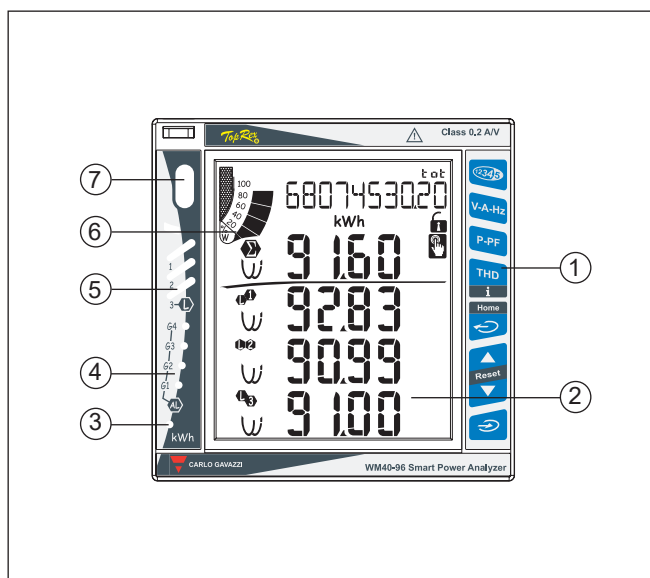
Connection to Ethernet or BACnet modules using the RJ45 connector.

Profibus module connections



Connection to the Profibus module using USB micro type B (Modbus RTU) and RS485 DB9 (Profibus DP-V0).

Front panel description



1. **Key-pad**
To program the configuration parameters and scroll the variables on the display.
2. **Display**
LCD-type with alphanumeric indications to:
 - display configuration parameters;
 - display all the measured variables.
3. **kWh LED**
Red LED blinking proportional to the energy being measured.
4. **Alarm LED's**
Red LED's light-on when virtual alarms are activated.
5. **Multiple bar-graph**
To show at a glance the status of the single phases L1-L2-L3.
6. **Main bar-graph**
To display the power consumption versus the installed power.
7. **Optical communication port**
To program the working parameters, to read the measurements and to download the stored data.



Dimensions and Panel cut-out

