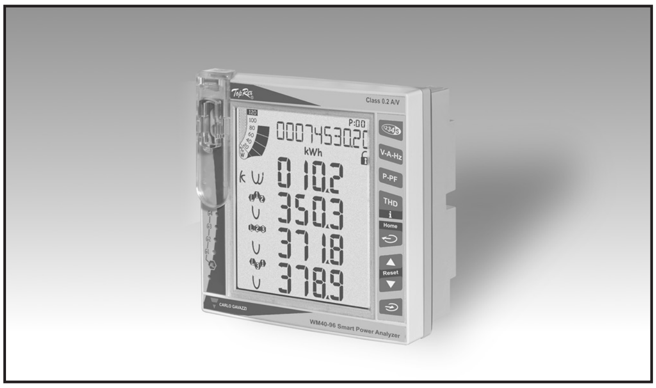
Energy Management
Smart Modular Power Analyzer
Type WM40 96

CARLO GAVAZZI



- Class 0.5S (kWh) according to EN62053-22
- Class 2 (kvarh) according to EN62053-23
- Accuracy ±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 phaseloss.
- Single phase variables: VLL, VLN, AL, An (calculated or real depending on the option), VA, W, var, PF
- Both system and singles 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).

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How to order

WM40-96 AV5 3 H R4 CT S1 XX

- **Model**
- **Range code**
- **System**
- **Power Supply**
- **A Inputs/Outputs**
- **B Inputs/Outputs**
- **Communication and data stamping**
- **Option**

Type Selection

Range codes

AV4: 3x220 (380)... 3x400(690)V 1(2)A
V_{LN}: 220 to 400
V_{LL}: 380 to 690

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

B Inputs/Outputs

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

System

3: balanced and unbalanced load: 3-phase, 4-wire; 3-phase, 3-wire; 2-phase, 3-wire; 1-phase, 2-wire

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

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)

Options

XX: none

A Inputs/Outputs

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

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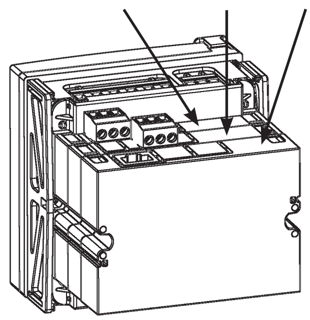
Position of modules and combination

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.



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Input specifications

Rated inputs	System type: 1, 2 or 3-phase
Current type	Galvanic insulation by means of built-in CT's
Current range (by CT)	AV5 and AV6: 5(6)A AV4 and AV7: 1(2)A
Voltage (by direct connection or VT/PT)	AV4, AV5: 3x220 (380)... 3x400 (690) V; AV6, AV7: 3x57.7 (100) ... 3x133(230) V
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
AV4 model	In: 1A, Imax: 2A; Un: 220 to 400VLN (380 to 690VLL)
AV5 model	In: 5A, Imax: 6A; Un: 220 to 400VLN (380 to 690VLL)
AV6 model	In: 5A, Imax: 6A; Un: 57.7 to 133VLN (100 to 230VLL)
AV7 model	In: 1A, Imax: 2A; Un: 57.7 to 133VLN (100 to 230VLL)
Current AV4, AV5, AV6, AV7 models	From 0.01In to 0.05In: ±(0.5% RDG +2DGT) From 0.05In to Imax: ±(0.2% RDG +2DGT)
Phase-neutral voltage	In the range Un: ±(0,2% RDG +1DGT)
Phase-phase voltage	In the range Un: ±(0.5% RDG +1DGT)
Voltage tolerance	Un -20%, Un +15%
Frequency	From 40 to 65 Hz ±(0.02% RDG + 1 DGT), From 65 to 340 Hz ±(0.05% RDG + 1 DGT). From 340 to 440 Hz ±(0.1% RDG + 1 DGT)
Active and Apparent power	From 0.01In to 0.05In, PF 1: ±(1%RDG+1DGT) From 0.05In to Imax PF 0.5L, PF1, PF0.8C: ±(0.5%RDG+1DGT)
Power Factor	±[0.001+0.5% (1.000 - "PF RDG")]
Reactive power	From 0.02In to 0.05In, senφ 1: ±(1.5%RDG+1DGT) From 0.05In to Imax, senφ 1: ±(1%RDG+1DGT) From 0.05In to 0.1In, senφ 0.5L/C: ±(1.5%RDG+1DGT) From 0.1In to Imax, senφ 0.5L/C: ±(1%RDG+1DGT)
Active energy	Class 0.5S according to EN62053-22, ANSI C12.20.
Reactive energy	Class 2 according to EN62053-23, ANSI C12.1.
Start up current AV5, AV6	5mA
Start up current AV4, AV7	1mA
Energy additional errors	
Influence quantities	According to EN62053-22, ANSI C12.20, according to EN62053-23, ANSI C12.1
Total Harmonic Distortion (THD)	±1% FS (FS: 100%) AV4: Imin: 5mARMS; Imax: 3A; Umin: 30VRMS; Umax: 679Vp AV5: Imin: 5mARMS; Imax: 15Ap; Umin: 30VRMS; Umax: 679Vp AV6: Imin: 5mARMS; Imax: 15Ap; Umin: 30VRMS; Umax: 204Vp AV7: Imin: 5mARMS; Imax: 3A; Umin: 30VRMS; Umax: 204Vp
Total Demand Distortion (TDD)	±1% FS (FS: 100%) Imin: 5mA RMS; Imax: 15Ap
K-Factor and factor K	±(0.5%RDG+1DGT)
Temperature drift	≤200ppm/°C
Sampling rate	3200 samples/s @ 50Hz, 3840 samples/s @ 60Hz
Measurements	See "List of the variables that can be connected to:"
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)

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Input specifications (cont.)

Current Overloads	
Continuous (AV5 and AV6)	6A, @ 50Hz/60Hz
Continuous (AV4 and AV7)	2A, @ 50Hz/60Hz
For 500ms (AV5 and AV6)	120A, @ 50Hz/60Hz
For 500ms (AV4 and AV7)	40A, @ 50Hz/60Hz
Voltage Overloads	
Continuous	1.2 Un
For 500ms	2 Un

Input impedance	
400VL-L (AV4 and AV5)	> 1.6MΩ
208VL-L (AV6 and AV7)	> 1.6MΩ
5(6)A (AV5 and AV6)	< 0.2VA
1(2)A (AV4 and AV7)	< 0.2VA
Frequency	40 to 440 Hz

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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
Insulation	See “Insulation between inputs and outputs” table
Static outputs (M O O2)	Opto-Mos type
Physical outputs	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	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), ≥ 30 ms (OFF), according to EN62053-31
Remote controlled outputs	The activation of the outputs is managed through the serial communication port
Insulation	See “Insulation between inputs and outputs” table

20mA analogue outputs (M O A2)	
Number of outputs	2 per module (max. 2 modules per instrument)
Accuracy (@ 23°C ±2°C)	±0.2%FS
Range	0 to 20mA
Configuration	By means of the front key-pad or UCS software
Signal retransmission	The signal output can be connected to any instantaneous variable available in the table “List of the variables that can be connected to”.
Scaling factor	Programmable within the whole range of retransmission.
Response time	≤400 ms typical (filter excluded)
Ripple	≤1% (according to IEC 60688, EN 60688)
Total temperature drift	≤500 ppm/°C
Load	≤600Ω
Insulation	See “Insulation between inputs and outputs” table

10VDC analogue outputs (M O V2)	
Number of outputs	2 per module (max. 2 modules per instrument)
Accuracy (@ 23°C ±2°C)	±0.2%FS
Range	0 to 10 VDC
Configuration	By means of the front key-pad or UCS software
Signal retransmission	The signal output can be connected to any instantaneous variable available in the table “List of the variables that can be connected to”.
Scaling factor	Programmable within

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Output specifications (cont.)

	the whole range of retransmission.
Response time	≤400 ms typical (filter excluded)
Ripple	≤1% (according to IEC 60688, EN 60688)
Total temperature drift	≤350 ppm/°C
Load	≥10kΩ
Insulation	See “Insulation between inputs and outputs” table
RS485 serial port (M C 485 232 on request)	
RS485	
Type	Multidrop, bidirectional (static and dynamic variables)
Connections	2-wire Max. distance 1000m, termination directly on the module
Addresses	247, selectable by means of the front key-pad
Protocol	MODBUS/JBUS (RTU)
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, 38.4k, 115.2k bit/s
Driver input capability	1/5 unit load. Maximum 160 transceivers on the same bus.
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.
Insulation	See “Insulation between inputs and outputs” table
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, 38.4k, 115.2k bit/s
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.
Insulation	See “Insulation between inputs and outputs” table
Module with data stamping and event recording memory (M C 485 232 M)	
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
Memory type	Data flash
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

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Output specifications (cont.)

Insulation	the data reading is allowed. See “Insulation between inputs and outputs” table
Module with data stamping and event recording memory (M C ETH M)	
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
Memory type	Data flash
BACnet-IP (on request)	
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)
BACnet-IP	
IP configuration	Static IP / Netmask / Default gateway
Port	Fixed: BAC0h
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.
Supported services	“I have”, “I am”, “Who has”, “Who is”, “Read (multiple) Property”
Supported objects	Type 2 (analogue value, including COV property), Type 5 (binary-value for up to 16 virtual alarm re-transmission) Type 8 (device)
IP configuration	Static IP / Netmask / Default gateway
Modbus TCP/IP	See “Ethernet/Internet port” above
Client connections	Modbus only: max 5 simultaneously
Connections	RJ45 10/100 BaseTX Max. distance 100m
Data	
Dynamic (reading only)	System and phase variables (BACnet-IP and Modbus): see table “List of variables”
Static (reading and writing only)	All the configuration parameters (Modbus only)
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.
Insulation	See “Insulation between inputs and outputs” table
Module with data stamping and event recording memory (M C BAC IP M)	
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
Memory type	Data flash
BACnet MS/TP (on request)	
Available ports	2: RS485 and Ethernet
RS485 port	
Type	Multidrop, mono-directional (dynamic variables)
Connections	2-wire Max. distance 1000m, termination directly on the module
Device object instance	0 to 9999 selectable by key-pad 0 to 2^22-2 = 4.194.302, selectable by means of programming software or by BACnet.
Protocol	BACnet MS/TP (for measurement reading purpose and to write object description)
Supported services	“I have”, “I am”, “Who has”,

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Output specifications (cont.)

	“Who is”, “Read (multiple) Property”
Supported objects	Type 2 (analogue value, including COV property), Type 5 (binary-value for up to 16 virtual alarm re-transmission) Type 8 (device)
Data (mono-directional)	
Dynamic	System and phase variables: see table “List of variables...”
Static	Not available
Data format	1 start bit, 8 data bit, no parity,1 stop bit
Baud-rate	Selectable: 9.6k, 19.2k, 38.4k kbit/s
Driver input capability	1/5 unit load. Maximum 160 transceivers on the same bus.
MAC addresses	Selectable: 0 to 127
Ethernet port	
Protocol	Modbus TCP/IP (for programming parameter purpose)
IP configuration	Static IP / Netmask / Default gateway
Modbus Port	Selectable (default 502)
Client connections	Modbus only: max 5 simultaneously
Connections	RJ45 10/100 BaseTX Max. distance 100m
Data	
Dynamic (reading only)	System and phase variables: see table “List of variables...”
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

Memory type	Data flash
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.
Insulation	See “Insulation between inputs and outputs” table
Approval	BTL
Profibus (MCPB)	
Available ports	2: USB and Profibus DP V0
USB	
Purpose	Programmable parameters setting
Connector	USB micro B
Protocol	Modbus RTU
Data format	1 start bit, 8 data bit, no parity,1 stop bit
Baudrate	autorange depending on the master (max 115200 bps)
Address	1
Profibus	
Purpose	Data reading (12 programmable profiles realtime selectable) ; remote output control ; remote tariff control ;
Modules Selectable:	output up to 4 bytes, input up to 62 words
Data format	totalizers : FLOAT or INT32; electrical variables : FLOAT or INT16 ; status variables : UINT16
Connector	RS485 DB9
Protocol	Profibus DP V0 slave
Baudrate	9.6 k to 12 Mbps (9.6, 19.2, 45.45, 93.75, 187.5, or 500 kbps; 1.5, 3, 6, or 12 Mbps)
Address	2-125 (default 126)
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.
Insulation	See “Insulation between inputs and outputs” table
Module with data stamping	

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Output specifications (cont.)

and event recording memory (MCPBM)	
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
Memory type	Data flash
Approval	PROFIBUS Nutzerorganisation e.V.
Relay Output and Digital Input (M F I6 R4 on request)	
Relay Outputs	
Physical outputs	4 (max. 1 module per instrument)
Purpose	For either pulse output or alarm output
Type	Relay, SPST type AC 1-5A @ 250VAC; AC 15-1A @ 250VAC
Configuration	Only by means of the programming software UCS. In this latter case using either the serial communication port or the front optical port.
Function	The outputs can work as advanced alarm outputs and as remote controlled outputs, or in any other combination.
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).
Advanced alarm modes	“OR” or “AND” or “OR+AND” functions (see “Alarm parameter and logic” page). Freely programmable on up to 16 alarms.
Controlled variables	The alarms can be connected to any 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 full scale
On-time delay	0 to 255s
Output status	Selectable: normally de-energized or normally energized
Min. response time	≤200ms, filters excluded. Set-point on-time delay: “0 s”.
Digital inputs	
Number of inputs	6 (voltage-free contacts)
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).
Input frequency	20Hz max, duty cycle 50%
Prescaler adjustment	From 0.1 to 999.9 m^3 or kWh/pulse
Open Contact voltage	≤3.3VDC
Closed Contact current	<1mADC
Contact resistance	≤300Ω closed contact ≥50kΩ open contact
Input voltage	0 to 0.5VDC: LOW 2.4 to 25VDC: HIG
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 (m^3) or WATER (hot/cold/m^3) 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 (m^3) or WATER (hot/cold/m^3) or remote heating (kWh)

CARLO GAVAZZI

Output specifications (cont.)

	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).
Insulation	By means of opto-mos See “Insulation between inputs and outputs” table.
Opto-mos Output and Digital Input (M F I6 O6 on request)	
Static Outputs	
Physical outputs	6 (max. 1 module per instrument)
Purpose	For either pulse output or alarm output
Type of outputs	Opto-Mos
Signal	VON: 2.5VDC/max.100mA VOFF: 42VDC
Function	The outputs can work as pulse outputs, but also as alarm outputs, remote controlled outputs, or in any other combination.
Signal retransmission	Total: +kWh, -kWh, +kvarh, -kvarh. Partial: +kWh, -kWh, +kvarh, -kvarh Tariff: +kWh, -kWh, +kvarh, -kvarh.
Pulse type	Programmable from 0.001 to 10.00 kWh/kvarh per pulse. Outputs connectable to the energy meters (kWh/kvarh)
Pulse duration	30 ms (ON), ≥ 30 ms (OFF), according to EN62053-31
Advanced tariff management	
No. of tariffs	Up to 6
No. of total energies	Up to 4 (+kWh, -kWh, +kvarh, -kvarh)
Data format	9-DGT for Total and partial/tariff, gas and water metering.

Digital inputs	
Number of inputs	6 (voltage-free contacts)
Purpose	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).
Input frequency	20Hz max, duty cycle 50%
Prescaler adjustment	From 0.1 to 999.9 m³ or kWh/pulse
Open Contact voltage	≤3.3VDC
Closed Contact current	<1mADC
Contact resistance	≤300Ω closed contact ≥50kΩ open contact
Input voltage	0 to 0.5VDC LOW 2.4 to 25VDC HIG
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

CARLO GAVAZZI

Output specifications (cont.)

	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).
Insulation	By means of opto-mos See “Insulation between inputs and outputs” table.
Temperature and Process signal inputs (M A T P on request)	
Temperature signal	
Number of inputs	1
Accuracy (Display + RS485)	See table “Temperature input characteristics”
Temperature drift	≤150ppm/°C
Temperature probe	Pt100, Pt1000
Number of wires	2 or 3-wire connection
Wire compensation	Up to 10Ω
Engineering unit	Selectable °C o °F
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 transformer
Transformer ratio	Up to 10kA (CT ratio 9999 max)
Crest factor	≤3 (3A max. peak)
Current Overloads	
Continuous	1.2A, @ 50Hz
For 500ms	10A, @ 50Hz
Input impedance	0.5Ω
Frequency	45 to 65 Hz

CARLO GAVAZZI

Temperature input characteristics

Probe	Range	Accuracy	Min Indication	Max Indication
Pt100	-60.0°C to +300.0°C	±(0.5%RDG +5DGT)	- 60.0	+ 300.0
Pt100	-76°F to+572°F	±(0.5%RDG +5DGT)	- 76.0	+ 572.0
Pt1000	-60.0°C to +300.0°C	±(0.5%RDG +5DGT)	- 60.0	+ 300.0
Pt1000	-76°F to+572°F	±(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	
Total	4 (up to 10 digit)
Partial	72 (up to 10 digit)
Tariffs	Up to 6
Time periods	Up to 3 year
Pulse output	Connectable to total and/or partial 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
"Total" energy meters	+kWh, +kvarh, -kWh, -kvarh.
"Standard Period" energy meters	Up to 2 ("P1" and "P2") which can be set by month and year each.
"Holiday Period" energy meters	Up to 10 ("H1 … H10"). As per standard period management every single one can be set by day/month/year.
"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.
Partial energy meters	+kWh, +kvarh, -kWh, -kvarh (basic unit without any module)

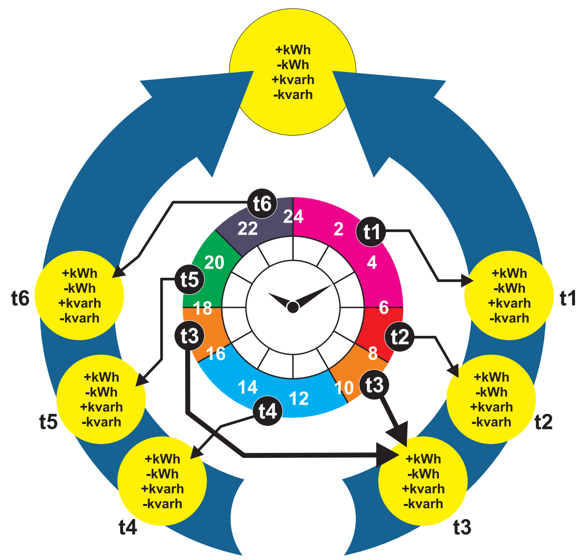
CARLO GAVAZZI

Tariff energy meters overall working scheme

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

Daily management

Fig. 1

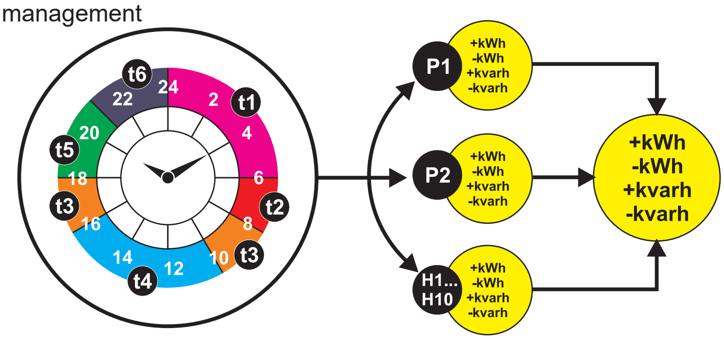


Where t1 to t6 are the “Tariffs”.

-1 kW 0 1 kW

Year management

Fig. 2



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 Partial	 4 (8+2, 9+1, 10 digit) 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 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 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 details	The harmonic spectrum so to built-up a graph is available only by means of the serial communication.

CARLO GAVAZZI

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.
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.
Function enabling	Activation: NO/YES
Stored data type	Alarms, max./min.
Number of events	Max. 10,000
Data reset	All events can be reset manually
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.
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.
Function enabling	Activation: NO/YES
Stored data type	All variables.
Storage interval	Programmable from 1 min. to 60 min.; all instantaneous variables can be selected (max 19 variables)
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.
Storage duration	Before overwriting, see “Historical data storing time table.
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
Load profiling	Only with communication module provided with data memory.
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.
Function enabling	Activation: NO/YES
Storage interval	Selectable: 5-10-15-20-30-60 minutes of Wdmd and VAdmd.
Storage duration	Before overwriting, 100 weeks: with recording interval of 5min; 300 weeks: with storing interval of 15min.
Data format	Wdmd variable value, minutes, day, month.
Data synchronisation	Based on internal clock
Other characteristics	As per Event and Data logging.

CARLO GAVAZZI

Display, LED's and commands

Display refresh time	≤ 250 ms
Display	4 lines, 4-DGT, 1 lines, 10-DGT
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).
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	
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

	time.
Virtual alarms	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.
Energy consumption	Red LED (only kWh)
kWh pulsating	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
Back position LEDs	
On the base	Green as power-on
On the communication modules	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;
2nd level	Password from 1 to 9999, all data are protected
System selection	
System 3-Ph.n unbalanced load	3-phase (4-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)

	and 3-phase to phase voltage measurements.
System 3-Ph.1 balanced load	3-phase (3-wire), one current and 3-phase to phase voltage measurements 3-phase (4-wire), one current and 3-phase to neutral voltage measurements.
System 3-Ph.2 balanced load	3-phase (2-wire), one current and 1-phase (L1) to neutral voltage measurement.
System 2-Ph	2-phase (3-wire)
System 1-Ph	1-phase (2-wire)

CARLO GAVAZZI

Main functions (cont.)

Transformer ratio	
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	9999 x 9999
Filter	
Operating range	Selectable from 0 to 100% of the input display scale
Filtering coefficient	Selectable from 1 to 32
Filter action	Measurements, analogue signal retransmission, serial communication (fundamental variables: V, A, W and their derived ones).
Displaying	
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	
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	Up to 16
Working mode	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 to blue backlight or to another available colour combination (fore more details see “Working mode of the display in a normal/ abnormal condition”)
Reset	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
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.
Clock	
Functions	Universal clock and calendar.
Time format	Hour: minutes: seconds with selectable 24H or 12H AM/PM format.
Date format	Day-month-year with selectable DD-MM-YY or MM-DD-YY format.
Battery life	10 years
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.

CARLO GAVAZZI

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
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
Installation category	Cat. III (IEC60664, EN60664)
Insulation (for 1 minute)	See “Insulation between inputs and outputs” table
Dielectric strength	4kVAC RMS for 1 minute
Noise rejection CMRR	100 dB, 48 to 62 Hz
EMC	
Immunity and emissions	According to EN62052-11

Standard compliance	
Safety	IEC60664, IEC61010-1 EN60664, EN61010-1 EN62052-11.
Metrology	EN62053-22, EN62053-23.
Pulse output	IEC62053-31
Approvals	CE, cULus “Listed” (cULus: max. 40°C, all modules i n all combinations)
Connections	Screw-type
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
Housing	
Dimensions (WxHxD)	Module holder: 96x96x50mm. “A” and “B” type modules: 89.5x63x16mm. “C” type module: 89.5x63x20mm.
Max. depth behind the panel	With 3 modules (A+B+C): 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

CARLO GAVAZZI

Insulation between inputs and outputs

	Power Supply	Measur-ing Input	Relay outputs (MOR2)	Relay outputs (MFR4I6)	Static outputs (MOO2)	Static outputs (MFO6I6)	Serial commu-nication	Ethernet port	Analogue output	Digital inputs	Neutral current input	20mA input	Tempera-ture 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 communica-tion	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).

CARLO GAVAZZI

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= ∑ (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= ∑ (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= ∑ (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= ∑ (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= ∑ (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= ∑ (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.

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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

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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
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 ∑	VL1	VL2	VL3	(1) (2) (3)				x	x	x	x
37		VLL ∑	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 ∑	AL1	AL2	AL3	(1) (2) (3)				x	x	x	x
41		W ∑	WL1	WL2	WL3	(1) (2) (3)				x	x	x	x
42		var ∑	var L1	var L2	var L3	(1) (2) (3)					x	x	x
43		PF ∑	PF L1	PF L2	PF L3	(1) (2) (3)					x	x	x
44		VA ∑	VA L1	VA L2	VA L3	(1) (2) (3)					x	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

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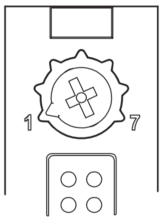
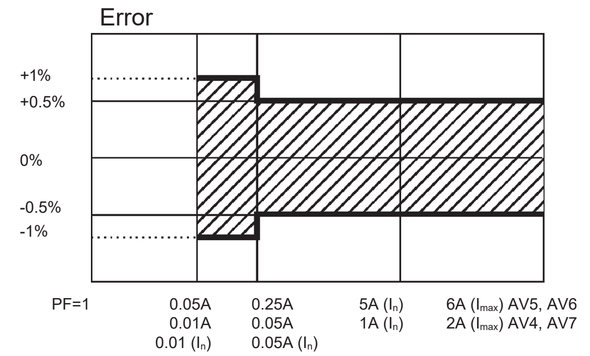
Back protection rotary switch

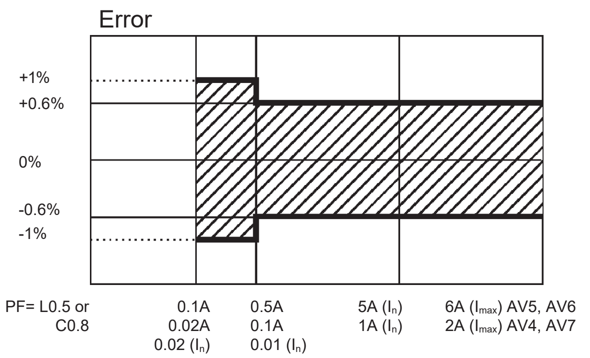


Function	Rotary switch position	Description
Unlock	1	All programming parameters are freely modifiable by means of the front key-pad and by means of the communication port.
Lock	7	The key-pad, as far as programming is concerned and the data through the serial communication cannot be changed (no writing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

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

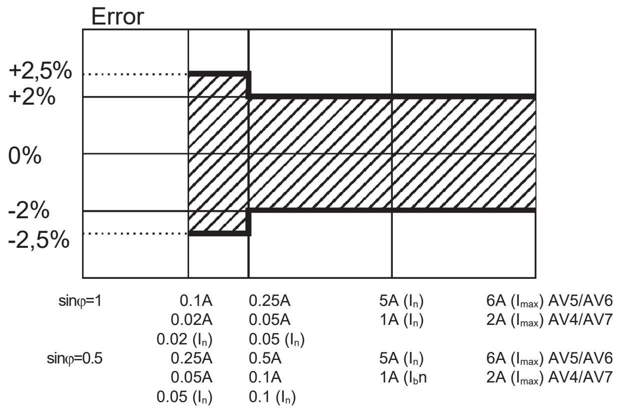
kWh, accuracy (RDG) depending on the current





Class 0.5S accuracy limits (Active energy)
Start-up current: 5mA (AV5-AV6), 1mA (AV4-AV7)

kvarh, accuracy (RDG) depending on the current



Class 2 accuracy limits (Reactive energy)
Start-up current: 5mA (AV5-AV6), 1mA (AV4-AV7)

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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

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

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

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

Three-phase active power

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

Three-phase apparent power

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

Total harmonic distortion

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

Three-phase power factor (TPF)

$$\cos\varphi_\Sigma = \frac{W_\Sigma}{VA_\Sigma}$$

Energy metering

$$k\,\mathrm{var}hi = \int_{t1}^{t2} Qi(t)\,dt \cong \Delta t \sum_{n1}^{n2} Qnj$$

$$kWhi = \int_{t1}^{t2} Pi(t)\,dt \cong \Delta t \sum_{n1}^{n2} Pnj$$

Where:

i= considered phase (L1, L2 or L3)
P= active power; **Q**= reactive power;
t_1, t_2 =starting and ending time points of consumption recording; **n**= time unit;
Δt= time interval between two successive power consumption;
n_1, n_2 = starting and ending discrete time points of consumption recording

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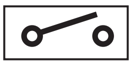
UCS parameter progr. and var. reading software

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.		- management of local RS232 (MODBUS); - management of local optical port (MODBUS); - management of a local RS485 network (MODBUS); - managed via TCP port.
		Data Storing	In pre-formatted CSV or Excel files).
Working mode	Four different working modes can be selected:	Data download	Manual.

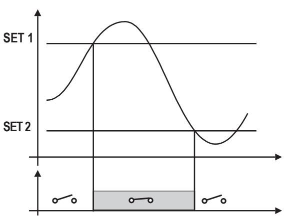
Alarm parameters and logic



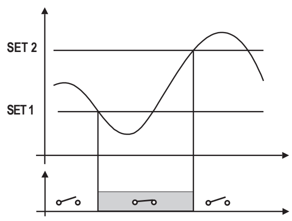
Each symbol includes all the settings described in the “alarm” paragraph and listed on the right:

- Enable.
- Variable
- Type
- Latch
- Disable
- Set 1
- Set 2
- OUT
- Delay on. Delay off.
- Function (and/or)

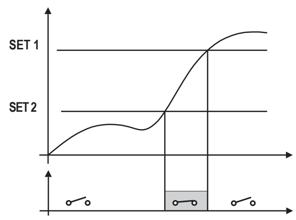
A, B, C... up to 16 locks to control parameters.



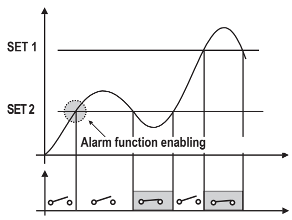
UP alarm
SET1 > SET2



DOWN alarm
SET2 > SET1

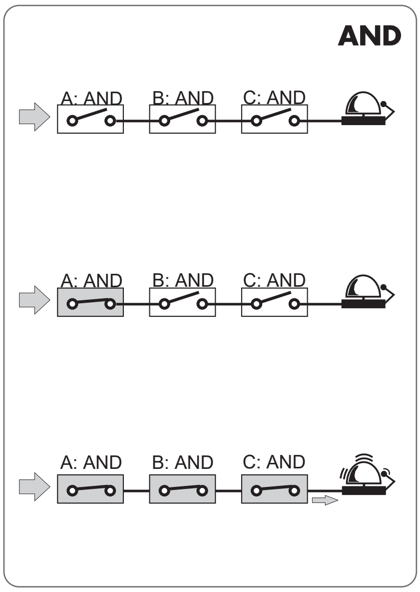


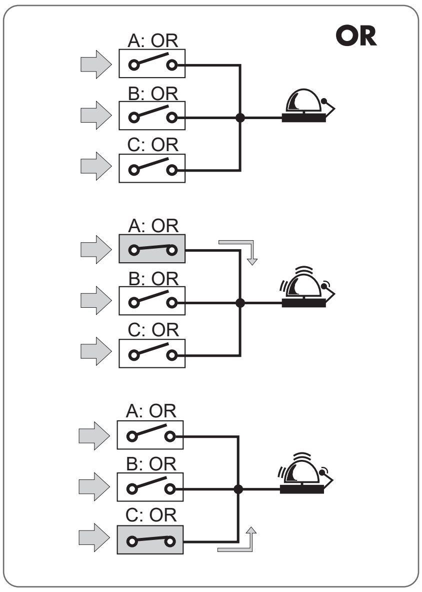
In-window alarm
Alarm is on when the value is between SET 1 and SET 2

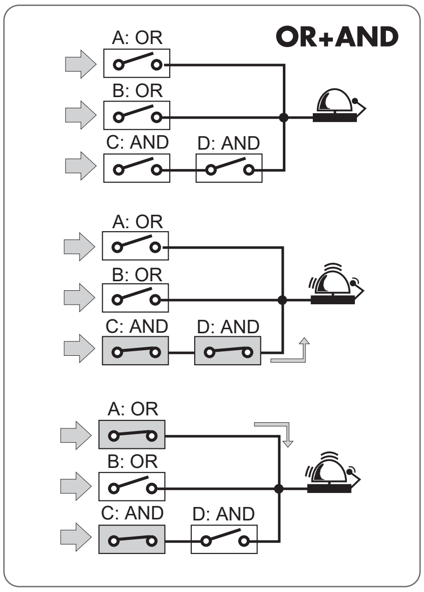


Ext. window alarm with disabling at power on
Alarm is on when value exceeds SET 1 or goes below SET 2

Example of AND/OR logic alarm:



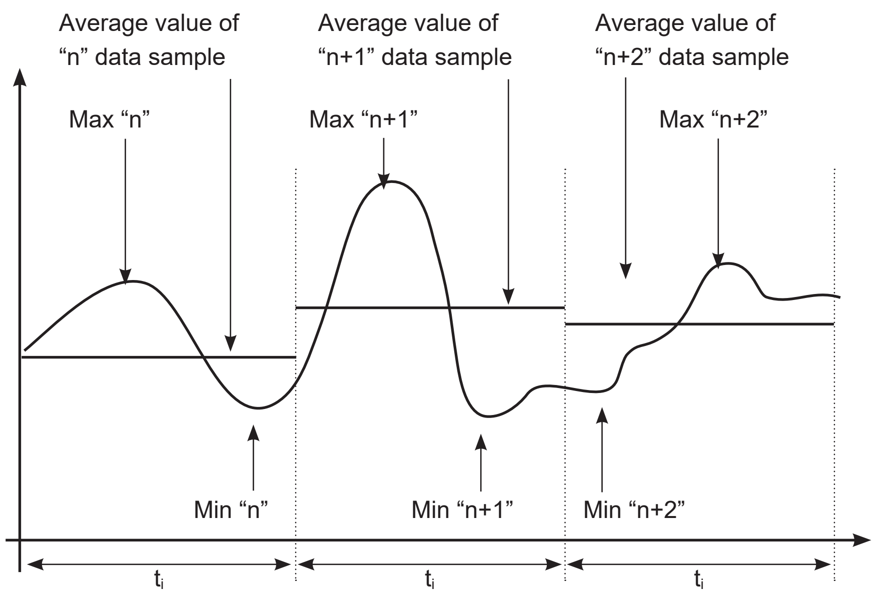




Historical data storing time table

Time interval (minutes)	4 selected variables Data storing time			8 selected variables Data storing time			12 selected variables Data storing time			19 selected variables 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

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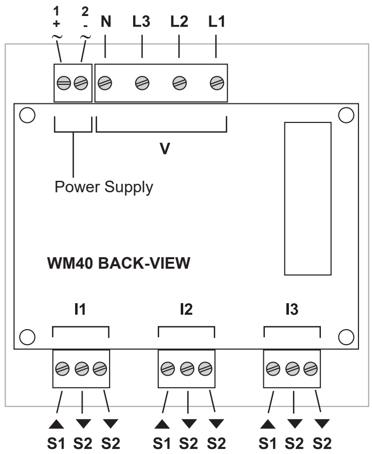
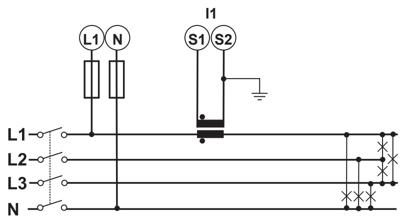
Wiring diagrams



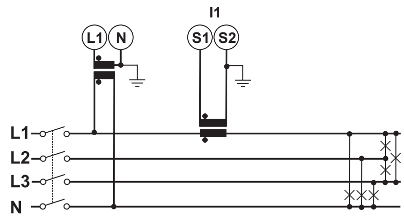
System type selection: 3-Ph.2

3-ph, 2-wire, balanced load **Fig. 1**



1-CT connection F=315 mA [T]

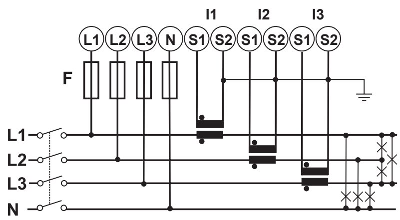
3-ph, 2-wire, balanced load **Fig. 2**



1-CT and 1-VT/PT connections

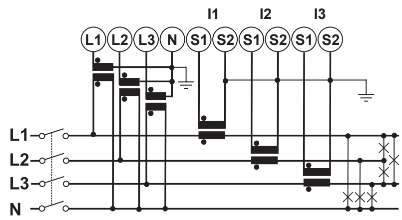
System type selection: 3-Ph.n

3-ph, 4-wire, unbalanced load **Fig. 3**



3-CT connection F=315 mA [T]

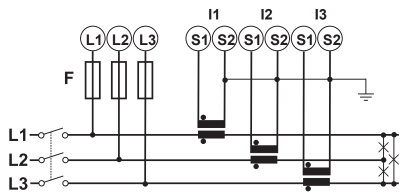
3-ph, 4-wire, unbalanced load **Fig. 4**



3-CT and 3-VT/PT connections

System type selection: 3-Ph

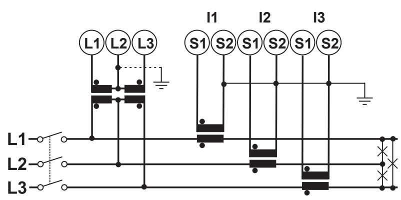
3-ph, 3-wire, unbalanced load **Fig. 5**



3-CT connection F=315 mA [T]

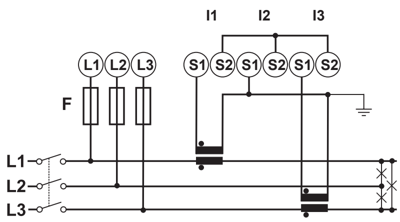
System type selection: 3-Ph (cont.)

3-ph, 3-wire, unbalanced load **Fig. 6**



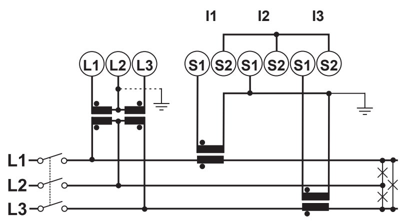
3-CT and 2-VT/PT connections

3-ph, 3-wire, unbalanced load **Fig. 7**



2-CT connections (ARON)
F=315 mA [T]

3-ph, 3-wire, unbalanced load **Fig. 8**



2-CT and 2-VT/PT connections ARON

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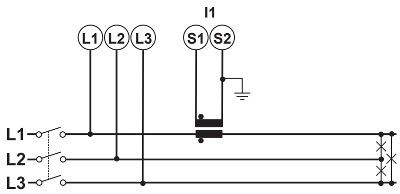
Wiring diagrams

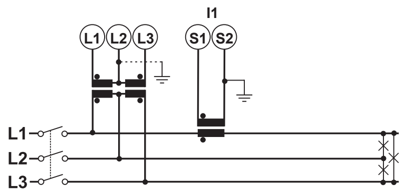
System type selection: 3-Ph.1

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



1-CT connections F=315 mA [T]

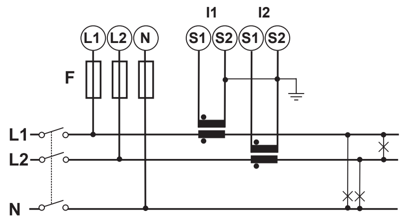
3-ph, 3-wire, balanced load **Fig. 10**



1-CT and 2-VT/PT connections

System type selection: 2-Ph

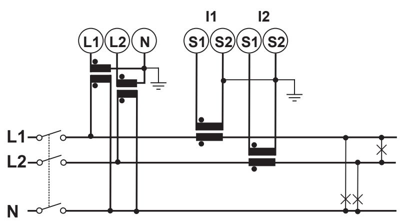
2-ph, 3-wire **Fig. 11**



2-CT connection

System type selection: 2-Ph (cont.)

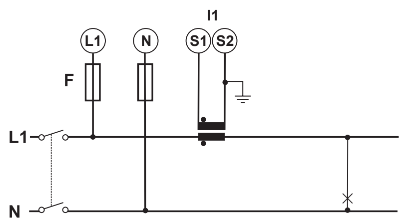
2-ph, 3-wire **Fig. 12**



2-CT and 2-VT/PT connections

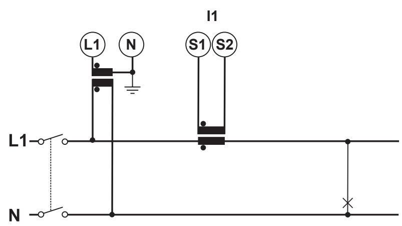
System type selection: 1-Ph

1-ph, 2-wire **Fig. 13**



1-CT connection F=315 mA [T]

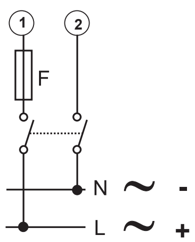
1-ph, 2-wire **Fig. 14**



1-CT and 1-VT/PT connections

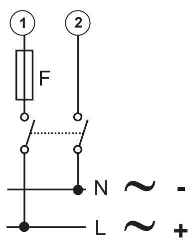
Power Supply

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

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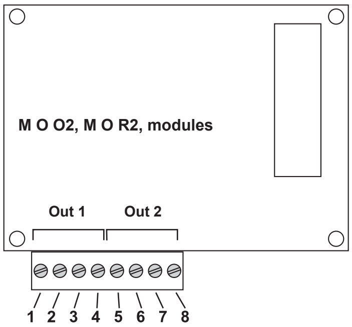
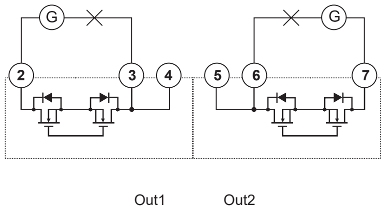
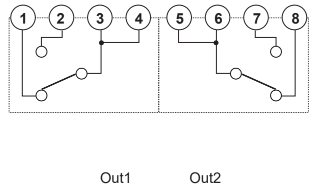
Static, relay, analogue out. and digital in. wiring diagrams

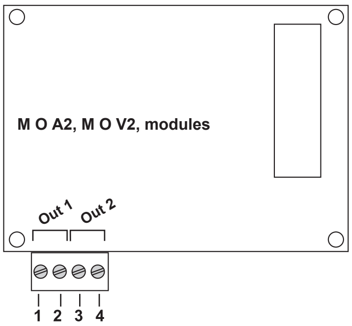


Opto-mosfet MOO2

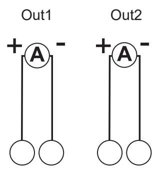


Relays MOR2

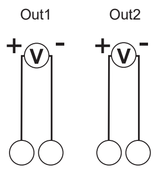


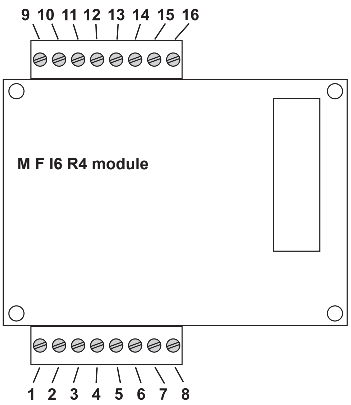


Analogue 20mA DC MOA2

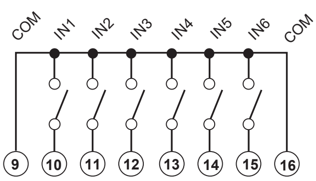


Analogue 10V DC MOV2

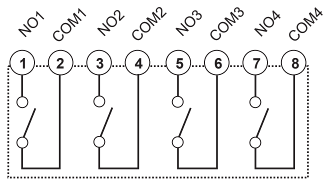


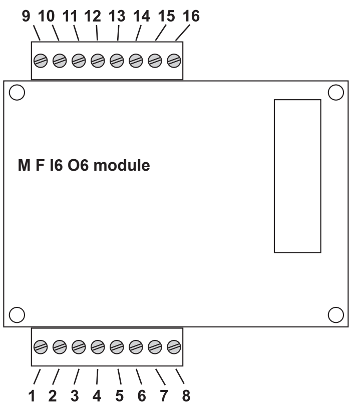


6 Digital inputs

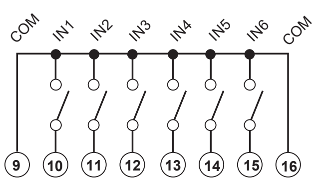


4 Relay outputs

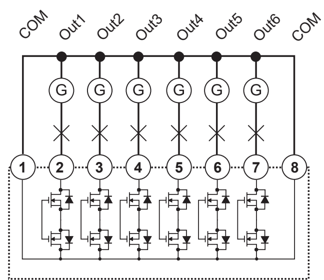




6 Digital inputs



6 Opto-mosfet outputs



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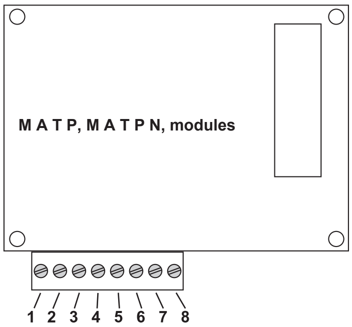
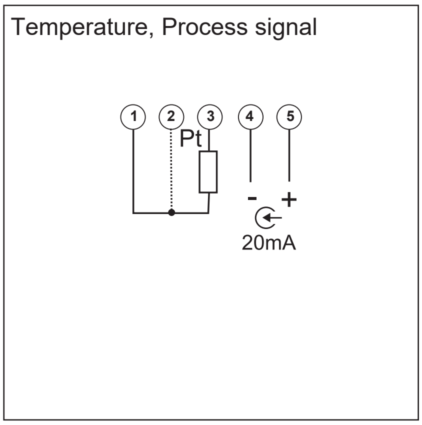
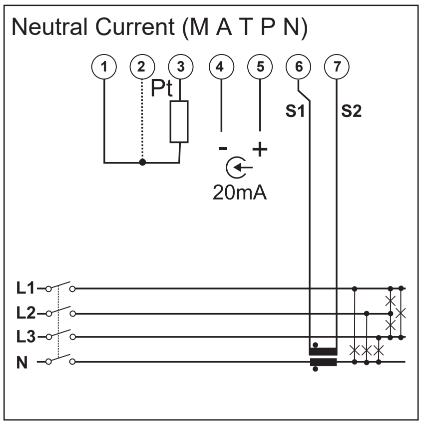
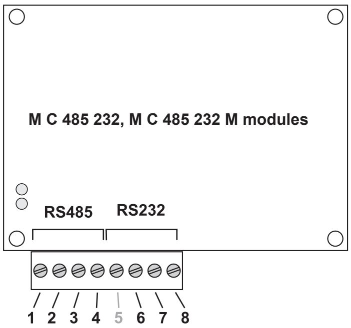
Temperature, process signal and true In wiring diagrams

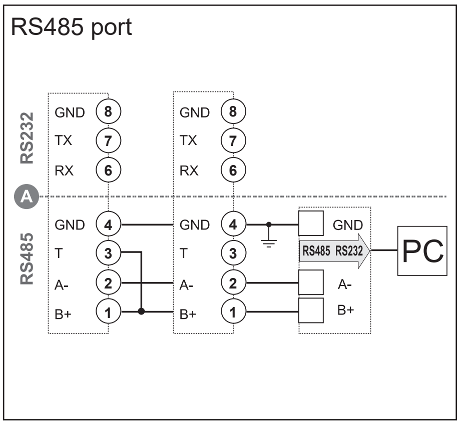


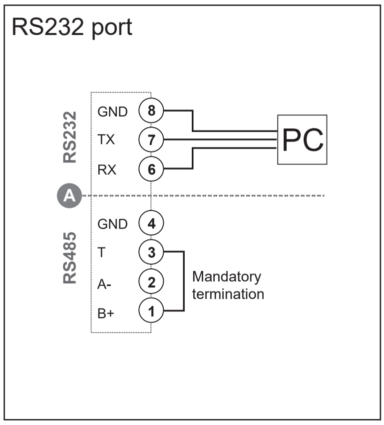

Temperature, Process signal


Neutral Current (M A T P N)

RS485 and RS232 wiring diagrams

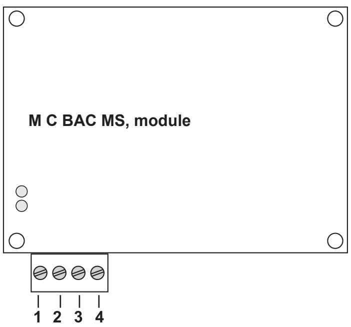


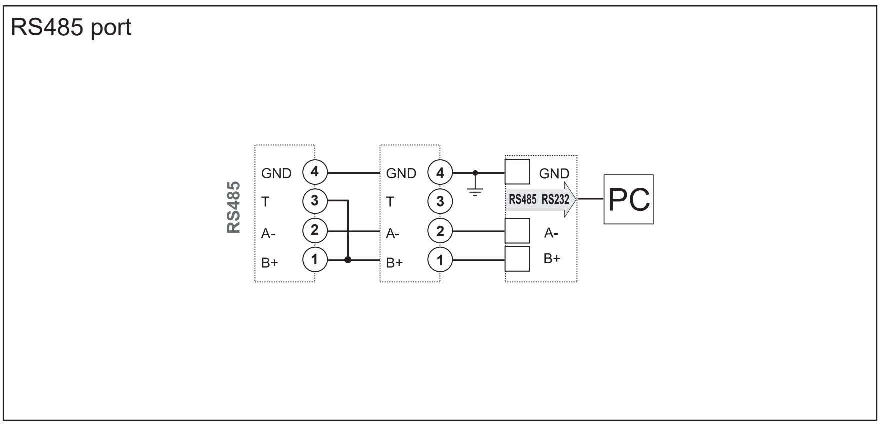

RS485 port


RS232 port

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 Ⓐ communication RS232 and RS485 ports **can't be** connected and used simultaneously.

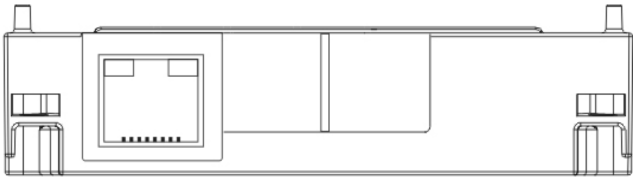
RS485 wiring diagram of Bacnet module




RS485 port

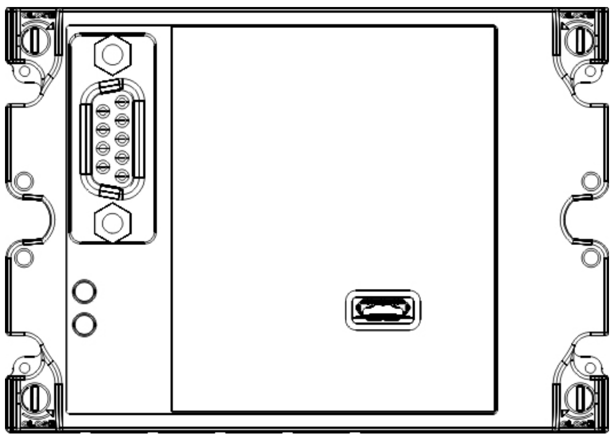
NOTE. RS485: additional devices provided with RS485 are connected in parallel. The termination of the serial output is carried out only on the last instrument of the network, by means of a jumper between (B+) and (T).

Ethernet and BACnet-IP connections



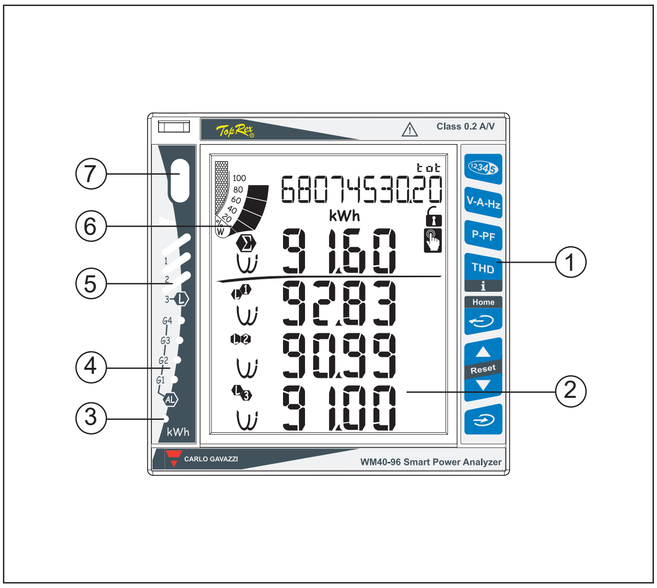
Connection to Ethernet or BACnet modules using the RJ45 connector.

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.

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Dimensions and Panel cut-out