

CARLO GAVAZZI
Automation Components

CARLO GAVAZZI

Innovation for Energy Management

*Multifunction Meters
Power and Quality Analyzers
Transducers
AC Energy and Utility Meters
DC Energy Meters
Software
Accessories*

Control



Carlo Gavazzi Creations: Distinctive Features

As with all objects created by mankind, they can be identified by qualities inspired by man, such as an unmistakable genetic mark handed down by their creator.

Details: Every detail is conceived for providing maximum efficiency and availability.

Performance: Skillful use of new technologies makes a product offering more powerful and effective.

Passion: Attention to detail and meticulous work are the distinguishing marks of people who love their profession.

Design: For an instrument to be complete, it must also be alluring, because beauty makes life more exciting.

Details, performance, passion and design:
The unmistakable style of Carlo Gavazzi!

Innovation Always





WM3-96 introduces the modular philosophy in the panel mounting analysers.

year _____

2000



EM4-DIN implements the modular concept in the DIN-rail analysers and energy meters.

year _____

2002



WM5-96 adds to WM3 new advanced control and data retransmission features.

year _____

2005



CPT-DIN achieves a new dimension in the world of 3-phase advanced power transducers.

year _____

2006



EM24 DIN energy analyzer allows in the most compact housing to measure up to 65A as a direct connection. Its unique application oriented programming procedure allows an easy and fast installation.

year _____

2006



EM26 96 with joystick and short cut display page selector together with 2-colour back light alarm warning revolutionises the panel mounting energy analyzer panorama.

year _____

2007



EM21 72D the only combined meter in the market with detachable display. One product, three installation modes: DIN-rail mounting energy meter, panel mounting energy meter and transducer.

year _____

2008



ROG400 the most integrated split-core active current sensor, represents the ideal solution for retrofit applications.





What are and Why use the Energy Management Components

Green levies, tighter operating margins and profits are a few economic drivers forcing operators to use more intelligent power management strategies. Real-time measurements of electrical parameters, such as voltage variations or distortions, can be transmitted via networks to operators, warning of breaches in threshold limits. And, the power quality information improves on-site efficiency and eases negotiation with utility companies and energy authorities. For starters, several utility meters or power analysers should be located at the service entrance and at strategic points throughout the site. Data can be transmitted to a host PC over a serial link. Meanwhile, an energy management software improves real-time data from several networked nodes so to work out a power profile. Large commercial or industrial electricity consumers have to deal with fixed energy charges related to the power demand of one or more sites as well as the charge per unit of energy consumed. If the business exceed

the agreed power demand or "installed power" then it is forced to pay extra costs. To make matters worse, utilities can also impose higher installed power tariffs that can often represent up to 60% of a commercial consumer's total utility charge. So clearly, a small mistake that leads to a brief excess power demand can cost many thousands of euro. Carlo Gavazzi supplies Energy Management systems that provide information so that operators can identify consumption trends and take corrective actions. Analysing the power profile operators can also aggregate loads and so negotiate more favourable terms with the utility company. Real time power consumption monitoring also allows a site manager to anticipate overloads conditions that would, for example, trip a circuit breaker. Alarm thresholds can be set to warn managers if preset limits are reached, and armed with the adequate system loading and status information having time to organise remedial actions.

Why different buses and solutions

- **RS422-RS485 communication in a local network:** all the measurements made by single instruments can be gathered through a standard Modbus to a PLC or a PC in order to carry out specific variable analysis and control (PowerSoft).

- **Modem/RS232 communication:** if the measuring devices are spread in a wide area or in different countries with the need to collect the local data for centralised analysis, the right answer is WM4 or PQT 90 with external modem together with Wm4Soft or PqtSoft software.

- **Web-server capability:** if it is needed to read the variables and download the logged data exploiting the existing LAN, the solution is WM4 or PQT 90 with AR1060 plug-in module. It easily displays the variables, the consumptions and the trends in any enabled PC of the LAN, (or connected to the internet) simply using a browser.

- **Ethernet communication:** all the data acquired or stored by any instrument can easily be transmitted via Ethernet over the LAN (or internet) to a Modbus TCP SCADA or management software or PowerSoft. The Ethernet port is on-board (WM5 or PQT H) or available using an external accessory (VCP DIN or SIU TCP).

- **Dupline communication:** if the load consumptions and alarms are to be monitored together with a powerful building automation system, the unique solution is called Carlo Gavazzi Dupline installation bus. Everything under control using only one bus system.



Energy Management and Dupline Field Bus . . . making energy metering easy in very noisy plants

When an idea becomes a great idea ...

The introduction of the Climate Change Levy (CCL) is affecting consumers of energy in one way or another. The basic outcome is that users who are inefficient in their use of energy will pay more than efficient users. There are several ways to avoid or reduce the extra costs of the CCL but most of them involve some major investments in plants or new technologies such as CHP, wind power or other renewable energy sources. The easiest way to offset these extra costs is to control your consumption of energy.

The fundamental questions you have to ask in order to find a solution to save energy and money

- How much energy is consumed?
- Is there any energy waste?

... and the answers?

- Find an easy way to measure it
- For sure, there are loads that are running even if it is not necessary. For instance, lights and extractor fans when the building is empty. Therefore a smart system to automatically turn the loads ON and OFF is needed.

Dupline[®]
Fieldbus Installationbus

The unlimited efficient solution possibilities provided by the Dupline Field Bus

- Light control, switching ON/OFF and dimming lights.
- Temperature control, detecting signals from infrared remote controls or PIR sensors and acting on heating elements and/or valves.
- Ventilation control, measure of room and outdoor temperature.
- Monitoring of doors, locks and windows.
- Monitoring of fire alarms from smoke detectors.
- Water leakage detection using proper sensors.
- And many others ...

Main application advantages

- Free topology for a fast, flexible and easy to build step-by-step installation; the system can be easily adapted to new unexpected requirements.
- User friendly: easy to code addresses and test, easily accessible data from a PC/PLC.
- High electrical noise immunity; no shielded cables are needed, therefore existing cable/conduit/pipe can be exploited.
- Data communication up to 10 km; no signal repeaters are needed.
- Integration of the metering system with the Dupline door-light-intrusion-remote controls and load switching.
- Cost-effective solution when compared with the ordinary systems.



Energy Management

The other Fieldbus compatible instruments:

DIN-rail mounting: EM10, EM11, EM3, EM4, EM21, EM23, EM24, WM14, WM22, CPT, PQT

Panel mounting:

EM21, EM26, WM3, WM4, WM5, WM14.

The main Bus devices

Individual counter

G 4420 74014 inputs for: 4*kWh meters
2*kWh + 2*kvarh meters; reset feature;
data retention in case of power failure.

Master channel generator

G 3890 0014 G 3800 0015 Power supply:
115V, 230VAC or 10 to 30VDC.

The data acquisition system

Dupline DDE Server: to
acquire the information from
the Energy meters through
the Dupline field Bus system.

Displays and accessories

LCD text display, LED display,
coding units, repeater.

Bus-Powered Sensors

Inductive-magnetic proximity switches,
PIR-sensors, temperature sensors.

Analogue I/O Modules

1 or 4*20mA/10VDC inputs,
1 or 4*20mA/10VDC outputs.

Digital I/O Modules

1 to 8 contact inputs, 1 to 8
outputs, combined I/O modules.

Gateways and Interfaces

Profibus-DP, Devicenet, LonWork,
Interbus-S, ModBus.
PLC direct interfaces, Modem.

The new Dupline-Online M2M solution offers a complete
HW and SW package for automatic monitoring and
control of remote facilities via Internet or GSM.



The Energy Management components for . . .

Commercial Buildings: Shopping Malls, Resorts, Supermarkets, Restaurants

Services and Infrastructures: Schools, Hospitals, Stadiums



The Dupline Solution

Lighting

Heating

Conditioning

Alarms

Billing

Commercial Buildings

In many commercial buildings as a matter of fact the need to control and measure the energy consumption by single user is becoming more and more important because of the need to save money or issue the energy bill when needed. Since the criterion is “the higher the energy consumption the lower the price” instead of having a supply contract for every shop/owner with a low consumption (higher energy cost), there is only one contract with high consumption (lower energy cost) whose sub-metering can be easily carried out using our energy meters and power analysers. Moreover the intelligent installationsbus Dupline can be common to our energy metering system and our Building Automation system. It allows, using proper Dupline sensors (temperature, light) and I/O modules, to manage the lighting system as well as the heating and air conditioning system so to achieve further energy cost savings. In the services and infrastructures, in addition to the building automation system already mentioned above, there is also the need to have a full electrical parameters control. In those places the reliability of power supply and therefore the safety conditions are of vital importance. Dupline can be exploited to gather and manage the alarms coming from our power analysers so to notify abnormal conditions in order to let the maintenance personnel act in a due time.

Services and Infrastructures



Production Facilities: Cost Allocation



The Dupline Solution



Since the cost pressure on production is becoming higher and higher, the energy consumption measured by type of production allows to allocate and control the costs in a proper and more accurate way.

Our Building Automation system based on Dupline bus and relevant modules in combination with our energy metering system allows to manage the lighting system as well as other loads so to achieve further energy cost savings.

Production Facility



Light and Medium Industry: Load Control



Light and Medium Industry

In the past just simple measuring systems like current-voltage-power and power factor were available to keep the mains under control. More complex solutions were available as well but in many cases requesting higher investments. Nowadays more and more sophisticated machines and loads like computers, switching-mode power supplies and drives are used in the production facilities thus increasing significantly the complexity of loads and of problems. Carlo Gavazzi is capable to provide different levels of solution:

- WM12, a powerful and compact unit replacing the ordinary set of three ammeters, one voltmeter and one rotary-switch.
- A more advanced system which includes in addition to the power analysers also a powerful supervision software with the aim to build-up an installation and load history so to prevent with a planned maintenance scheme load failures and production stops.



The Energy Management components for . . .

Big and Heavy Industry: Steel, Shipyards, Mines,
Wood, Car Plants



Transportation: Airports



**The Dupline
Solution**

Lighting



Heating



Ventilation



Alarms



In the big and heavy industry as well as in the airports it is of fundamental importance to have a powerful control of the mains since medium voltage systems and very high currents are involved. Because of the type of loads, a low content of harmonics is crucial to let the installation work in a proper and reliable way. Stops of productions are not allowed at all because they will significantly impact in the finance of the company or service. Two levels of solutions can be provided:

- Power analysers with integrated harmonics analysis and a supervision software with the aim to build-up an installation and load history so to prevent with planned maintenance load failures and production stops.
- Our intelligent installationsbus Dupline that, using proper sensors (temperature, light) and I/O modules, can manage the lighting system as well as the heating and air conditioning system so to achieve energy cost savings. The same bus is also used to gather and manage alarms coming from our power analysers so to notify abnormal conditions and react in a proper way.

Big and Heavy Industry / Transports



Water: Drinkable Water Plants, Water Distribution Plants



The Dupline Solution

Pump



Level



Flow



Alarms



A water treatment and distribution system is very hard to manage, because of the dimensions of plants, distances among the various pumping stations and parameters to be involved. The Carlo Gavazzi Dupline installations bus with its up to 10 km transmission distance, its free topology and the variety of analogue and digital I/O modules is capable to gather all the level, flow and alarm signals and the pumps start and stop in order to manage the whole system in a reliable and cost effective way.

Last but not least, the monitoring of mains and working of pumps with local power analysers and fully integrated data logging system is crucial to grant a continuous load control that with GSM modem and SMS transmission capability, alerts service staff on their mobile phones as soon as an abnormal condition occurs.

Water treatment and Distribution



Telecom: Telecommunications



Telecom

Everybody knows how important the mobile telecommunication is nowadays and will be even more in the future.

The relevant antennas are installed in the field and have to grant the communication without problems.

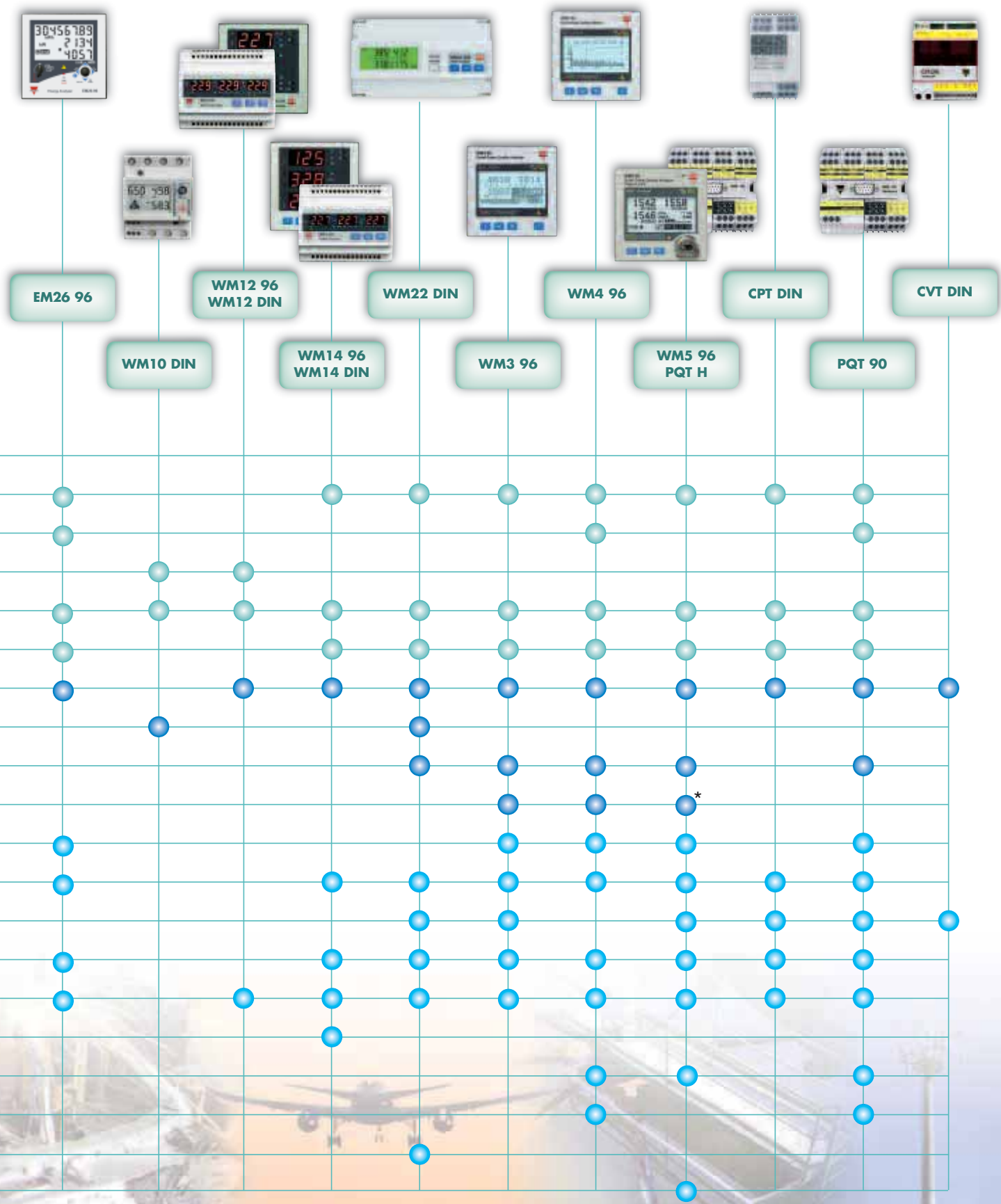
Since field telecommunication systems are not attended at all, it is needed to provide to the mobile phone company information related to the voltage, current, power and in some cases also energy consumptions.

Carlo Gavazzi is able, with different levels of instrument complexity, to provide the requested electrical parameters using, according to the installation needs, compact or modular power and energy analysers.





	VMU-E VMU-X	EM10 DIN	EM11 DIN	EM3 DIN	EM4 DIN	EM21 72D	EM23 DIN	EM24 DIN
DC Energy Metering	●							
AC Energy Metering		●	●	●	●	●	●	●
Gas and Water Metering					●			●
Multi Function Metering								
Variables Analysis	●		●			●		●
Power Quality Analysis								
CT connections					●	●		●
Direct high-current connections	●	●	●	●	●		●	●
Modular housing	●			●	●			
Graphic Display								
Digital Inputs					●			●
Pulse Outputs	●	●	●	●	●	●	●	●
Analogue Outputs								
Alarm Outputs	●		●		●			●
Serial Communication	●				●	●		●
Profibus DP								
Internet-Ethernet Communication								
GSM/SMS Management								
Dupline					●			●
Optical communication port								



* WM5-96 only



The Features and Benefits for today's and tomorrow's demands

EM24 DIN

Tamper proof and revenue approval for billing purpose

Tamper proof capability using proper covers thus protecting all inputs/outputs screw terminals. Lockable programming access using a password and a seal on the front selector.



EM24 DIN, EM26 96

Easy variables scrolling

by means of the front joystick. Time saving installation system using self-power supply and automatic phase detection.

Direct variable page access

by means of the front four-position selector programmable by the user.



Application oriented programming structure

Selection of eight different applications like:
Basic domestic - Shopping malls - Advanced domestic - Multi domestic (also camping and marinas) - Solar - Industrial - Advanced industrial - Advanced industrial for power generation, providing only the needed programming parameters and the display variables thus simplifying the installation and the display readout.

PowerSoft

The Energy Manager

Energy, gas and water consumption analysis, also by multi-tariff, so to have a statistical basis either to renegotiate the contract or to choose a cheaper supplier. All meter-variables control and anomaly logging by activating also hardware alarms and sending out e-mails to automatically alert the maintenance staff. LAN or Internet variables information spread simply using the standard browser of any PC.



EM11 DIN

Power analyzer features into an ultra compact energy meter

New solution providing a full parameters control, saving also space in the small switch panels. Relay output to switch OFF a non priority load thus preventing a line overload condition.



AR1060 Module

Web-server capability on board of WM4 and PQT 90

Module to easily read through the LAN or the WEB the instantaneous variables, energy, water and gas being measured. Logged variables downloadable and displayable to evaluate parameters, consumption trends and related costs helping the users to plan a proper maintenance and to achieve cost reductions where possible.



EM24 DIN, EM3 DIN, EM4 DIN, WM22 DIN**65A and 100A available**

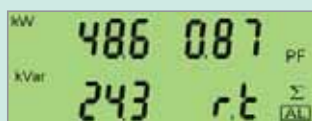
Connections for cables with cross-section area from 6 to 35mm² instead of passing-by types assuring a "contactor type" wiring and connection protection.

**VMU-E, VMU-X****Modular DC energy analyzer with built-in 6 digit display.**

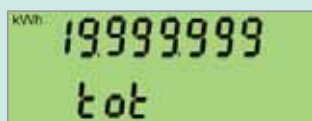
The analyzer is the combination of two modules where VMU-E is the metering unit while VMU-X is the universal power supply unit, according to the model can become also a digital output or an RS485 port.

**WM22 DIN****All information available at a glance**

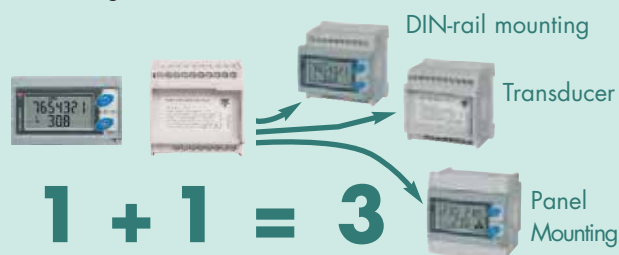
Example of variables displayed with serial communication diagnostics: r.t (Rx/Tx).



Example of 7 1/2 digit energy displaying.

**EM21 72D****One product, 3 different installation modes**

Detachable display to carry out up to 3 installation modes from the same instrument: DIN-rail, panel mounting or transducer.

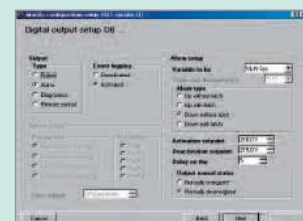
**WM5 96****Easy infrared communication**

Front optical port for an easy and fast communication with a PC or a laptop without the need to open the switch-gear where the instrument is installed, granting the highest safety level for the user. Availability of additional functions through the optical port like the instrument programming, the measured data and logged events reading.

**Software as programming tools**

for CPT, PQT, WM4, WM5, WM14, EM21, EM24 and EM26

Tools allowing the user to configure the instruments using the PC and the RS485, the RS232, or the optical (WM5 and PQT H only) ports, making the programming job easier and faster.



Authorised User No. 00042





A new concept of Modularity

In addition to the obvious need to improve the performances of the measuring instruments in order to keep them up-to-date with the state-of-the-art technology, it is more and more important to offer user-friendly instruments being easily and quickly adaptable to the applications and management needs of the customers.

These needs resulted in a new and modern range of instruments which, according to various criteria of signal processing and displaying, can be turned into:

- transducers (only 96 series)
- indicators
- controllers





Technical Advantages and Cost Benefits

- PLUG and PLAY modules common to all models; maximum in-field flexibility.
- Possibility to expand the number and the kind of outputs according to new application needs without replacement of the instruments in-field.
- Small number of models in-house, with a high offer of possible combinations at the same time.
- Investments in the instrumentation only limited to the present needs with the possibility to expand it in the future for any additional requirements.





Communication Adaptor

Types

SIU-PC2

SIU-PC3

SIU-TCP

VCP-DIN



Description	RS422/RS485 to RS232 converter	RS422/RS485 to USB converter	Ethernet to RS232/485 Modbus Gateway	Ethernet serial device server
Housing	Front: 100x67mm	Front: 60x37,5mm	Front: 100x67mm	Front: 100x67mm
Port 1	RS232	USB type A	Ethernet, 10/100Mbps RJ45	Ethernet, 10/100Mbps RJ45
Connections	9-pole, female			
PIN assignment	1-DCD, 2-TxD, 3-RxD, 4-DSR, 5-GND, 6-DTR, 7-CTS, 8-RTS			
Port 2	RS422, RS485	RS422, RS485	RS232, RS485	RS232, RS422, RS485
RS485 working mode	2-wire and 4-wire communication	2-wire communication	2-wire communication	2-wire communication (with automatic data directional control)
Line Bias	NO	NO	NO	NO
Line termination	NO	NO	NO	NO
Connections	Screw terminal block	Screw terminal block (with adapter)	9 pole, male	9 pole, female
Baud rate	Max 230.4 kBaud	Max 921.6 kBaud	Max 230.4 kBaud	Max 230.4 kBaud
Protection	Port 1/Port 2/Power supply	Port 1/Port 2	LAN/serial	LAN/serial
Indication (by means of LEDs)	Power-on, Tx, Rx	Power-on, Tx, Rx	Power on, link, ready	Power on, link, ready
Insulation	Port1/Port2: 2kV (option I) Port1/Port2 and power supply: 2kV (option I)	Port1/Porta: not insulated	LAN/serial: 1.5kV	LAN/serial: 1.5kV
Operating temperature	-20 to +60 °C (R.H. 90% to 95% N.C.)	0 to +55 °C (R.H. 5% to 95% N.C.)	0 to +55 °C (R.H. 90% to 95% N.C.)	0 to +55 °C (R.H. 90% to 95% N.C.)
Storage temperature	-20 to +85 °C (R.H. 90% to 95% N.C.)	-20 to +70 °C (R.H. 5% to 95% N.C.)	-20 to +85 °C (R.H. 90% to 95% N.C.)	-20 to +85 °C (R.H. 90% to 95% N.C.)
Included set	DIN-rail mounting kit, wiring diagrams	screw/ 9-pole connector adapter	DIN-rail mounting kit, 9-pole serial cable, power supply adapter, software, quick guide	DIN-rail mounting kit, 9-pole serial cable, power supply adaptor, null modem 9-pole adaptor, software, quick guide
Other characteristics	ESD protection for serial signals: 15kV; power reverse protection; wall mountable; reverse conversion capability	Self power supply from USB. ESD protection for serial signals: 15kV.	ESD protection for serial signals: 15kV; wall mountable; reverse conversion capability UK and US versions available	ESD protection for serial signals: 15kV; wall mountable; reverse conversion capability UK and US versions available
Power supply input	12 to 30 VDC Suggested adapter: SPD12-101 (120 to 240VAC/DC)		9 to 30 VDC. VAC adapter included (100 to 240 VAC). US, Euro plugs incl.	9 to 30 VDC VAC adapter included 230VAC (115VAC US vers.)
Approvals	CE, FCC	CE, FCC	CE, cULus, TÜV	CE, UL, FCC
Protection degree	IP30	IP30	IP30	IP30



EM10 DIN EM11 DIN

EM10 DIN is a simple energy meter while EM11 DIN is an ultra compact Energy Analyzer for one-phase systems which introduces, first in the market, the basic features of a power analyzer into an energy meter for one-phase applications.

Energy meter EM10 DIN Energy Analyzer EM11 DIN

Housing (H x W x D)	90x18x67mm (1-DIN module)
Display type Var. on display	LCD, h: 7mm YES
Instantaneous variables	4 DGT (only EM11-DIN)
Energy variables	5 + 1 DGTs
Accuracy	W-PF: $\pm(1\% \text{ RDG} + 2\text{DGT})$ var: $\pm(2\% \text{ RDG} + 2\text{DGT})$ $V_{LN}-A$: $\pm(0.5\% \text{ RDG} + 2\text{DGT})$ Class 1 (kWh) EN62053-21 Class B (kWh) EN50470-3 Class 2 (kvarh) EN62053-23
Temp. drift Refresh rate	$\leq 200\text{ppm}/^{\circ}\text{C}$ 1.5 times / s
System type	1-phase
Voltage inputs (Un)	230VAC
Current inputs (Ib/Imax)	Ib: 5A, Imax: 32AAC
Digital inputs	N.A.
Primary of CT/ VT	N.A.
Measurements:	TRMS method.
EM10 Variables	kWh
EM11 Variables	V_{LN} , A, Hz, W, W_{dmd} , var, PF, kWh, kvarh
Harmonic distortion	N.A.
Outputs:	Pulse 1 (open collector), 1000imp/kWh Alarm 1 (relay) only EM11-DIN Analogue N.A. Serial N.A.
Digital filter	N.A.
Other characteristics	Load controller (on kW) in case of over power or other alarm to be set on any available variable Start-up current: 20mAACCE, CE, MID certification on request
Approvals	
Power supply	Self power supply
Protection degree	IP40



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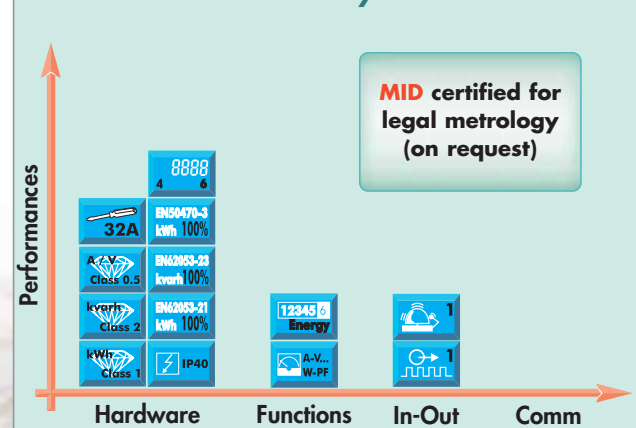
Certifications on request:

- EC Type examination, Annex B of MID (option "P")
- MID Annex B+F (option "PF") for legal metrology

The main advantages

- Better variable readability thanks to a wide LCD display. Only EM11-DIN:
- Not only the usual active and reactive energy consumption information but also the status of the power supply giving to the user an overview of all the electrical parameters.
- Active power alarm notifying an overload condition by means of an internal buzzer.
- Variable control with alarm activation on any available variable
- Switching off a non priority load (with a relay output) thus preventing an overload condition and avoiding the trip of the overload protection downstream the official watt-hour meter.

The best to suit your needs!





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EM3 DIN

EM3 DIN is an energy meter that has been developed to meet the requirements of those applications where a very simple and reliable instrument is needed.

The main advantages

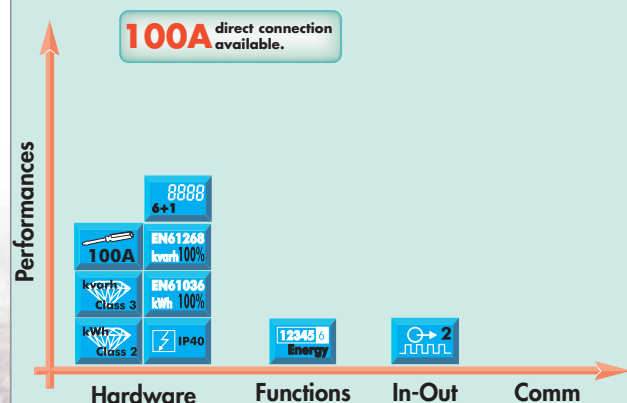
- Electromechanical display allowing the user to read the consumed energy even when the load or the meter is not power supplied.

Modular Energy Meter EM3 DIN

Housing (H x W x D)	90x162.5x63mm (9-DIN modules)
Display type	Mechanical
Variables on display	YES
Instantaneous variables	N.A.
Energy variables	6+1 DGT
Accuracy	Class 2 (EN61036) Class 3 (EN61268)
Temperature drift	≤250ppm/°C
Refresh Rate	N.A.
System type	Unbalanced: 3-phase
Voltage inputs (Un)	120/208VAC, 230/400VAC, 380/660VAC
Current inputs (Ib/Imax)	Ib: 20A, Imax: 100AAC
Digital inputs	N.A.
Primary of CT/VT	N.A.
Measurements:	TRMS method
Variables	kWh or kvarh (selectable)
Harmonic distortion	N.A.
Outputs:	Pulse: 2 (open collector type) Alarm: N.A. Analogue: N.A. Serial: N.A.
Digital filter	N.A.
Other characteristics	Start-up current: 80mAAC
Power supply	Self power supply, 115VAC, 230VAC
Approvals	CE
Protection degree	IP40

- Easy installation avoiding any programming set-up.
- Self power supply making the installation easier and quicker.
- Direct connection up to 100A allowing the user to save the costs of external current transformers and of relevant wiring.
- Dual pulse output transmitting to a PLC or other equipment the active and reactive energy simultaneously.
- Wall mounting avoiding any other protection enclosure.

The best to suit your needs!





EM4 DIN

EM4 DIN is an advanced utility meter capable to measure not only the usual consumed energies but also gas and water by means of the optional dual contact inputs module.

The main advantages

- High accuracy and resolution for a fine cost calculation.
- Simultaneous indication of both active and reactive energy allowing the user to read the variables at a glance.

Modular Utility Meter EM4 DIN

Housing (H x W x D)	90x162.5x63 (9-DIN modules)
Display type	LCD (back lighted), h: 8.5mm
Variables on display	YES
Instantaneous variables	3 1/2 DGTs
Energy variables	8 DGTs + 7 1/2 DGTs
Accuracy	Class 1 (EN61036) Class 2 (EN61268) $V_{LN-A}: \pm(0.5\% RDG + 2DGT)$
Temperature drift	$\leq 200ppm/^{\circ}C$
Refresh rate	2 times/s
System type	Unbalanced: 3-phase
Voltage inputs (Un)	57/100V, 120/208V, 230/400V, 380/660VAC
Current inputs (In/Ib/Imax)	In: 5A, Imax: 10AAC Ib: 20A, Imax: 100AAC
Digital inputs	2 independent (H ₂ O/gas counter or 4-time period selection)
Primary of CT/VT	Prog: CT up to 5,000A; VT up to 200kV
Measurements:	TRMS method
Variables	Total: kWh, kvarh, H ₂ O, gas; t1-t2-t3-t4: kWh, kvarh; t1-t2: gas; $W_{L1}, W_{L2}, W_{L3}, W_{dmd}$
Harmonic distortion	N.A.
Outputs:	2 (open collector type)
Pulse	1 (open collector or relay)
Alarm	N.A.
Analogue	N.A.
Serial	RS422/485 (Modbus)
Dupline	kWh and kvarh data transmission, water (hot - cold) and gas inputs and relevant data transmission
Digital filter	N.A.
Other characteristics	Modular concept, plug-in modules
Power supply	Self power supply, 24, 48, 115, 230VAC; 18 to 60VDC, 73 to 143VDC
Approvals	CE
Protection degree	IP40

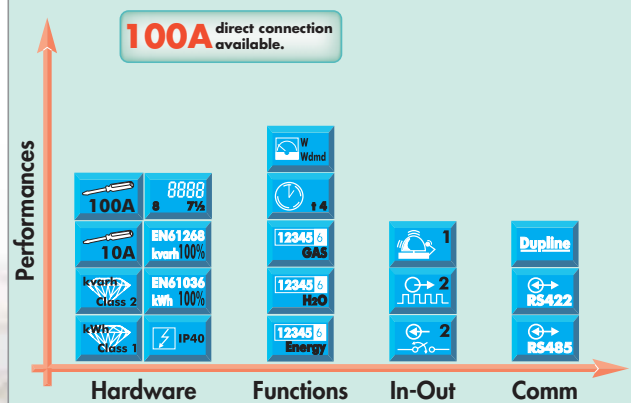


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- Displaying of the active power demand with manual or external synchronisation. The fixed power supply costs are calculated with the same system used by the electricity board.
- Management of the pulses from gas and water meters based on single or dual tariff calculation and energy multi-tariff management (by means of two selection contact inputs) giving more flexibility and meeting the application needs.
- Metering of energy, water and gas in the same instrument allowing the data transmission by means of the same communication port. Now available also via Dupline.
- Effective control of phase sequence, serial communication and wrong connection of the current inputs status making the instrument installation: easy, fast and free of wiring errors.
- Self power supply working even in case of one phase line failure granting continuous metering of energy.

The best to suit your needs!





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EM21 72D

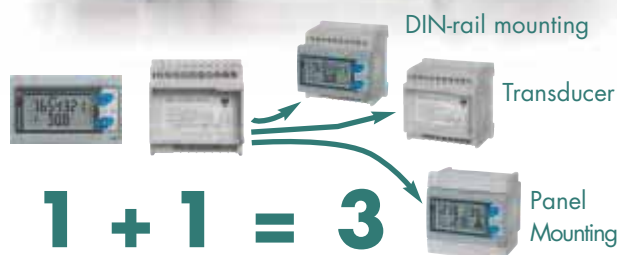
EM21-72D is an innovative, cost-effective and compact energy meter: it is the first on the market to have a detachable display allowing it to be mounted either on a panel with just 72x72 mm or on a DIN-rail in only 4 modules with neither any adaptor or external accessory.

Certifications on request:

- EC Type examination, Annex B of MID (option "P")
- MID Annex B+F (option "PF") for legal metrology

Energy Meter EM21 72D

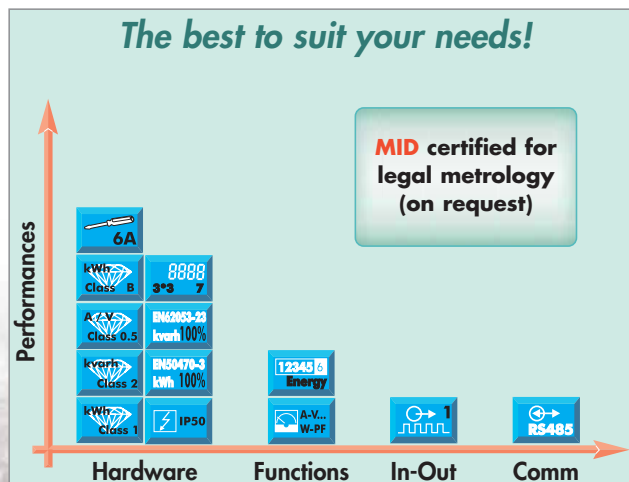
Housing (H x W x D)	72x72x65mm (4-DIN modules)
Display type	2 lines LCD, h: 7mm
Variables on display	YES
Instantaneous variables	3x3 DGTs
Energy variables	6+1 DGTs
Accuracy	Class 1 (kWh) EN62053-21 Class B (kWh) EN50470-3 Class 2 (kvarh) EN62053-23 $V_{LN}-A: \pm(0.5\% RDG+2DGT)$
Temperature drift	$\leq 200ppm/^{\circ}C$
Refresh rate	1s
System type	3-phase + neutral
Voltage inputs (Un)	120/230VAC, 400VAC
Current inputs (In/Imax)	In: 5AAC; Imax: 6AAC
Digital inputs	N.A.
Primary of CT/VT	Prog: CT up to 60k; VT up to 6.00k
Measurements:	TRMS method
Variables	Sys: W, var, PF, Phase-sequence, Hz, kWh, kvarh. Single-phase: V_{L1} , V_{L2} , A, PF.
Harmonic distortion	N.A.
Outputs:	1 (static opto-mosfet)
Pulse	N.A.
Alarm	N.A.
Analogue	N.A.
Serial	RS485 (2-wire, Modbus)
Digital filter	N.A.
Other characteristics	Phase sequence indication and control
Power supply	Self power supply
Approvals	CE, cULus, MID certification on request
Protection degree	IP50



The main advantages:

- Detachable display allowing three installation modes: DIN-rail energy meter, panel mounting energy meter and transducer.
- Space saving on panel boards by means of its compact housing.
- Energy measurement fulfilling both the new European standard EN50470-3 and the international standards IEC62053-21 and IEC62053-23.
- Time saving installation system exploiting self-power supply, automatic phase detection and application oriented programming procedure.
- Pulsing output for easy and quick data transmission to PC/PLC for full load control.
- RS485 communication port for full BMS integration.

The best to suit your needs!





EM23 DIN

EM23-DIN is a very simple, compact and easy-to-install energy meter, the most compact on the market allowing a 3-phase direct connection up to 65A.

Certifications on request:

- EC Type examination, Annex B of MID (option "P")
- MID Annex B+F (option "PF") for legal metrology

Energy Meter EM23 DIN

Housing (H x W x D)	71x90x65mm (4-DIN modules)
Display type	LCD, h: 9mm
Variables on display	YES
Instantaneous variables	2 lines 1x7 DGTs; 3x3 DGTs
Energy variables	6+1 DGTs
Accuracy	Class 1 (kWh) EN62053-21 Class B (kWh) EN50470-3 Class 2 (kvarh) EN62053-23 $V_{UN}-A: \pm(0.5\% RDG + 2DGT)$
Temperature drift	$\leq 200ppm/^{\circ}C$
Refresh rate	750 ms
System type	3-phase
Voltage inputs (Un)	400VAC
Current inputs (Ib/Imax)	Ib: 10A, Imax: 65AAC
Digital inputs	N.A.
Primary of CT/VT	N.A.
Measurements:	TRMS method
Variables	Sys: W, var; single-phase: A kWh, kvarh
Harmonic distortion	N.A.
Outputs:	1 (open collector)
Pulse	N.A.
Alarm	N.A.
Analogue	N.A.
Serial	N.A.
Digital filter	N.A.
Other characteristics	Phase sequence indication
Power supply	Self power supply
Approvals	CE, MID certification on request
Protection degree	IP50



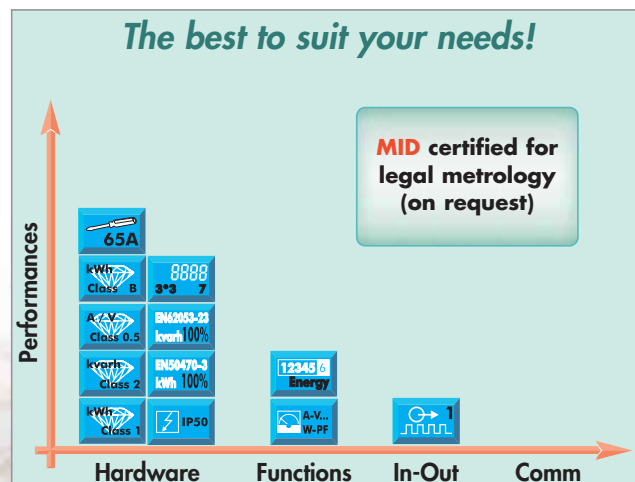
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Some benefits are:

- Compact size, only 4-DIN modules, for space saving also in panel boards.
- Direct connection up to 65 A to save the cost of three external current transformers.
- Energy measurement fulfilling both the new European standard EN50470-3 and the international standards IEC62053-21 and IEC62053-23.
- Displaying of the system active and reactive power and single phase currents for an immediate consumption analysis.
- No programming required and warning message in case of reverse phase sequence, for an easy and fast installation.
- Pulsing output for an easy and quick energy retransmission to a PLC for a load priority management program.

The best to suit your needs!





EM24 DIN

EM24 DIN is a compact Energy Analyzer for three phase unbalanced systems. This new meter is capable to measure in the most compact housing not only the traditional active and reactive energies but also gas, hot-water, cold-water and remote heating consumptions.

Certifications on request:

- EC Type examination, Annex B of MID (option "P")
- MID Annex B+F (option "PF") for legal metrology

Energy Analyzer EM24 DIN

Housing (H x W x D)	90x71x65mm (4-DIN modules)
Display type	LCD (STN technology), h: 7mm
Variables on display	YES
Instantaneous variables	3x4 DGTs
Energy variables	8 DGTs
Accuracy	W-VA-PF: $\pm(1\% \text{ RDG} + 2\text{DGT})$ var: $\pm(2\% \text{ RDG} + 2\text{DGT})$ $V_{UN}-A$: $\pm(0.5\% \text{ RDG} + 1\text{DGT})$ V_{LL} : $\pm(1\% \text{ RDG} + 1\text{DGT})$ Class 1 (kWh) EN62053-21/B EN50470-3 Class 2 (kvarh) EN62053-23
Temperature drift	$\leq 200 \text{ ppm}/^\circ\text{C}$
Refresh rate	1.5 times / s
System type	Unbalanced: 2-3-phase; bal.: 1-3-ph.
Voltage inputs (Un)	120/208VAC, 400VAC
Current inputs (In/Ib/Imax)	In: 1/5A, Imax: 10AAC; Ib: 10A, Imax: 65AAC
Digital inputs	3 independent (H ₂ O/gas counter or 4-time period selection)
Primary of CT/VT	Prog: CT up to 60k; VT up to 6000
Measurements:	TRMS method
Variables	Sys: V_{LL} , V_{UN} , $A_{dmd \text{ max}}$, var, VA, $W_{dmd \text{ max}}$, VA_{dmd} , $VA_{dmd \text{ max}}$, Hz, kWh, kvarh, h. Single-phase: V_{LL} , V_{UN} , A, W, var, VA, PF, kWh, kvarh
Harmonic distortion	N.A.
Outputs:	Pulse 2 (open collector or relay) Alarm 2 (open collector or relay) Analogue N.A. Serial RS485 (2-wire, Modbus) Dupline 6 counters, 8 instantaneous variables, 2 alarms, 1 digital input
Digital filter	Action: on variables and outputs
Other characteristics	Phase sequence indication and control
Power supply	Self power sup., 18 to 60VAC/DC, 115/230VAC according to the model
Approvals	CE, MID certification on request
Protection degree	IP40



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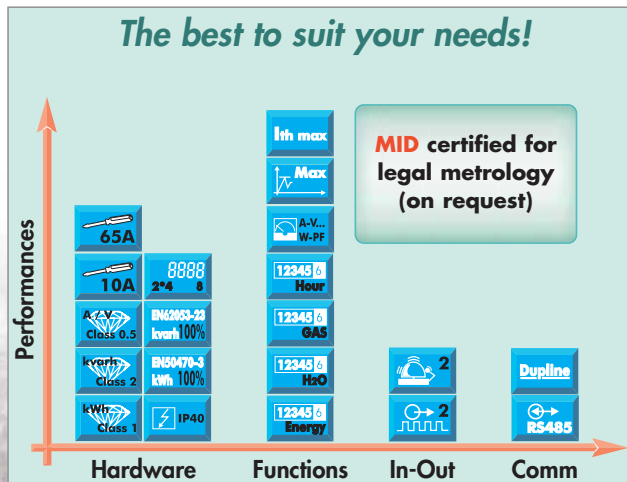


EM24 DIN can also be panel mounted by means of the front adaptor "4DIN96 Adapter".

The main advantages:

- Space saving on panel boards by means of its compact housing.
- Wide angle variable readability by means of a sharp LCD display (STN technology).
- Energy measurements fulfilling both the new European standards EN50470-3 and the international standard IEC62053-23.
- Gas, hot-water, cold-water and remote heating measurements thanks to its three digital inputs.
- Extended energy measurements using total/partial or total/multi-tariff metering.
- Money saving by means of the integrated current transformers allowing to measure currents up to 65A.
- Extended alarm control on any available variable by means of up to two digital outputs.
- Time saving installation system using self-power supply, automatic phase detection and application oriented programming structure.
- Easy variable scrolling by means of the front joystick.
- Wide interfacing capability using up to 2 pulse outputs or the RS485 communication port.

The best to suit your needs!





WM10 DIN

WM10-DIN is a 3-phase multifunction meter simple, easy-to-install and extremely compact, allowing a direct connection up to 65A in only 4-DIN modules. It measures and monitors all the parameters of an electrical installation, line or load.

Multifunction meter WM10 DIN

Housing (H x W x D)	71x90x65mm (4-DIN modules)
Display type	LCD, h: 9mm
Variables on display	YES
Instantaneous variables	2 lines, 3x3 DGTs
Energy variables	N.A.
Accuracy	0.5% RDG (voltage/current)
Temperature drift	≤200ppm/°C
Refresh rate	750 ms
System type	3-phase
Voltage inputs (Un)	400VAC
Current inputs (Ib/Imax)	Ib: 10A, Imax: 65AAC
Digital inputs	N.A.
Primary of CT/VT	N.A.
Measurements:	TRMS method
Variables	Sys: W, var, PF, Hz. Single-phase: A, V _{LN} , V _{LL} , W, var.
Harmonic distortion	N.A.
Outputs:	
Pulse	N.A.
Alarm	N.A.
Analogue	N.A.
Serial	N.A.
Digital filter	N.A.
Other characteristics	Phase sequence indication
Power supply	Self power supply
Approvals	CE
Protection degree	IP50



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The main advantages:

- Space saving on panel boards.
- The three external current transformers are not needed because of the high-current direct connection.
- Measurement of the main system and single phase variables to perform a full load control.
- Time saving installation system (just connect it, and it measures) and no programming required.

The best to suit your needs!





WM12 96 WM12 DIN

WM12 DIN and WM12 96 are general purpose multi function meters that allow to monitor all the mains parameters of an electrical line or load. The compact housings combined with a complete selection of measurements allow the instruments to be mounted in all the switch and control gears as local indicators, instead of the classical single function analogue or digital panel meters.

Multifunction Meters WM12 DIN WM12 96

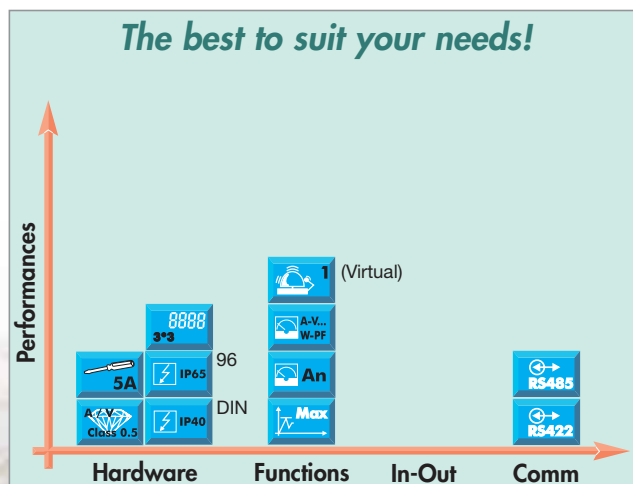
Housing (H x W x D)	90x107.5x64.5mm (6-DIN mod.) (WM12 DIN) 96x96x61.5mm (WM12 96)
Display type	LED, h: 14mm
Variables on display	YES
Instantaneous variables	3 DGTs
Energy variables	N.A.
Accuracy	W-VA: $\pm(1\% \text{ F.S.} + 1\text{DGT})$ var: $\pm(2\% \text{ F.S.} + 1\text{DGT})$ V _{LL} : $\pm(1.5\% \text{ F.S.} + 1\text{DGT})$ V _{LN} -A: $\pm(0.5\% \text{ F.S.} + 1\text{DGT})$
Temperature drift	$\leq 200\text{ppm}/^{\circ}\text{C}$
Refresh rate	1.5 times / s
System type	Unbalanced: 1-2-3-phase
Voltage inputs (Un)	100/208VAC, 400/660VAC
Current inputs (In)	5AAC Shunts (not insulated inputs)
Primary of CT/VT	Prog.: CT up to 5,000A; VT up to 10kV
Measurements:	TRMS method
Variables	Sys: V _{LL} , An, W, var, VA, W _{dmd} , W _{dmd peak} , VA _{dmd} , Hz Single-phase: V _{LL} , V _{LN} , A, W, var, VA, PF
Harmonic distortion	N.A.
Outputs:	Pulse: N.A. Alarm: N.A. Analogue: N.A. Serial: RS422/485 (Modbus)
Digital filter	Action: on variables and outputs
Other characteristics	Over neutral current and under/over voltage indication (warning signal)
Power supply	24, 48, 115, 230VAC; 18 to 60VDC
Approvals	CE, cURus, cCSAus (only WM12 96)
Protection degree	IP40 (WM12 DIN); IP65 (WM12 96) NEMA4x, NEMA12



The unit is provided with some unique installation visual status functions like:

- The window control of the mains 3-phase voltage notifying the user, at a glance, if the mains is supplied out of the requested power supply tolerance.
- The neutral current control showing immediately any load or installation anomaly, due to high harmonic distortion or load insulation loss (high earth leakage current).

The best to suit your needs!





WM14 96

WM14 DIN

WM14 DIN and WM14 96 available as Basic and Advanced power analyzers can be used in all the applications where it is needed to measure and control the main electrical parameters and to transmit them by pulses, by serial communication or Profibus DP to a PLC or a PC. WM14 is compact and is available either for panel mounting or DIN-rail mounting.

WM14 is the natural evolution of WM12. It maintains the same advantages and measurement capabilities of the

Power Analyzers WM14 DIN WM14 96 Basic and Advanced functions

Housing (H x W x D)	90x107.5x64.5mm (WM14 DIN) (6-DIN mod.) 96x96x61.5mm (WM14 96)
Display type	LED, h: 14mm
Variables on display	YES
Instantaneous variables	3 DGTs
Energy variables	8+1 DGTs
Hours	5+2 DGTs
Accuracy	W-VA: $\pm(1\% \text{ F.S.} + 1\text{DGT})$ var: $\pm(2\% \text{ F.S.} + 1\text{DGT})$ $V_{LL}: \pm(1.5\% \text{ F.S.} + 1\text{DGT})$ $V_{LN}-A: \pm(0.5\% \text{ F.S.} + 1\text{DGT})$ kWh: cl. 1(Adv), 2(Bas); kvarh: cl. 2(Adv), 3(Bas)
Temperature drift	$\leq 200\text{ppm}/^{\circ}\text{C}$
Refresh rate	1.5 times/s
System type	Unbalanced: 2-3-phase; bal.: 1-3-ph.
Voltage inputs (Un)	100/208VAC; 400/660VAC
Current inputs (In)	5AAC; Basic: shunts or CT's depending on the model. Advanced: shunts
Primary of CT/VT	Prog.: CT up to 5,000A; VT up to 10kV
Measurements:	TRMS method
Variables	Sys: V_{LL} , An, W, var, VA, W_{dmd} , $W_{dmd \max}$, VA_{dmd} , Hz Wh, varh, h. Single-phase: V_{LL} , V_{LN} , A, W, var, VA, PF, A_{dmd} , $A_{dmd \max}$
Harmonic distortion	THD up to the 16th harmonics (V and A)
Outputs:	2 (open collector)
Pulse	16 with OR/AND function (2 relays)
Alarm	N.A.
Analogue	RS422/485 (Modbus), Profibus DP V0
Serial	
Digital filter	Action: on variables and outputs
Other characteristics	Basic version: with Profibus on request Adv. vers.: with pulses or alarms on req.
Power supply	Basic: 24, 48, 115, 230VAC; Adv.: 18 to 60VAC/DC, 90 to 260VAC/DC
Approvals	CE, cURus, cCSAus
Protection degree	IP40 (WM14 DIN); IP65 (WM14 96) NEMA4x, NEMA12



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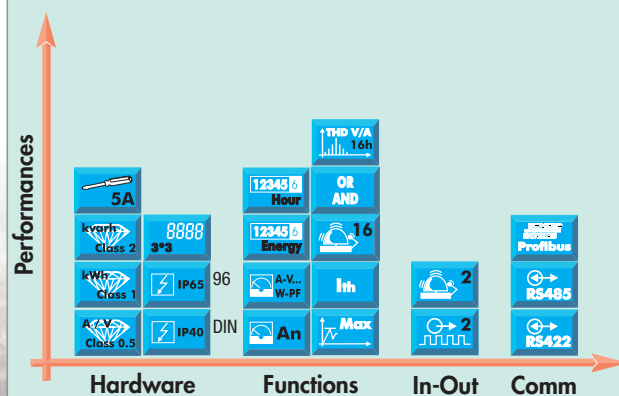


- Basic version only
- Insulated current inputs
- Universal AC/DC power supply.

multi function meter providing the following additional features and benefits:

- Metering of both total and partial active and reactive energies with pulse outputs in order to survey not only the typical load parameters but also the consumptions.
- Measurement of the thermal current, by single phase, and recording of the maximum demands. This information will let the maintenance people know if the over current protections (fuses, automatic switches, etc.) are adequately preset and in case of trip which is their real current.
- Hour counter meter function. On board of a machine or a generating-set, the instrument shows how long those machines are being used saving also the cost of an external classical hour counter meter. A proper "machine usage" cost and/or mechanical maintenance can be estimated and planned.
- OR/AND control of up to 16 selected variables so to grant an extended load or line control through 2 digital outputs.

The best to suit your needs!



The histogram is related to the "Advanced" version.





WM22 DIN

WM22 DIN is a modular power analyzer that allows to monitor all the mains parameters of an electrical line or load and to control one of them. The amazing design of the housing combined with outstanding performances makes WM22 DIN an instrument to be used in all the applications up to 5000A and up to 200kV_{LL}.

The remarkable features of WM22 DIN

- Direct measurement of up to 100A: no external current transformer needed.

Modular Power Analyzer WM22 DIN

Housing (H x W x D)	90x162.5x63mm (9-DIN modules)
Display type	LCD (back lighted), h: 8.5mm
Variables on display	YES
Instantaneous variables	4x3 1/2 DGTs
Energy variables	7 1/2 DGTs
Accuracy	V _{LL} -A: ±(0.5 RDG+1DGT) W-VA: ±(1% RDG+1DGT) Class 1 (EN61036) Class 2 (EN61268)
Temperature drift	≤200ppm/°C
Refresh rate	2 times/s
System type	Unbalanced: 3-phase
Voltage inputs (Un)	57/100VAC, 120/208VAC, 230/400VAC, 380/660VAC
Current inputs (In/Ib/Imax)	In: 5A, Imax: 10AAC Ib: 20A, Imax 100AAC
Digital inputs	N.A.
Primary of CT/VT	Prog.: CT up to 5,000A; VT up to 200kV
Measurements:	TRMS method
Variables	Sys: V _{LL} , W, var, VA, W _{cmd} , VA _{cmd} , PF, Hz, total Wh, total varh, partial Wh, partial varh. Single-phase: V _{LL} , A, W, var, VA, PF, THD. THD up to the 7th H (V and A)
Harmonic distortion	
Outputs:	2 (open collector) 1 (open collector or relay) 1 (20mADC, 10VDC) RS422/485 (Modbus) kWh and kvarh data transmission, water and gas inputs and relevant data transmission
Digital filter	Action: on variables and outputs
Other characteristics	Modular concept, plug-in modules, phase asymmetry control
Power supply	Self power supply, 24, 48, 115, 230VAC; 18 to 60 VDC, 73 to 143 VDC
Approvals	CE
Protection degree	IP40



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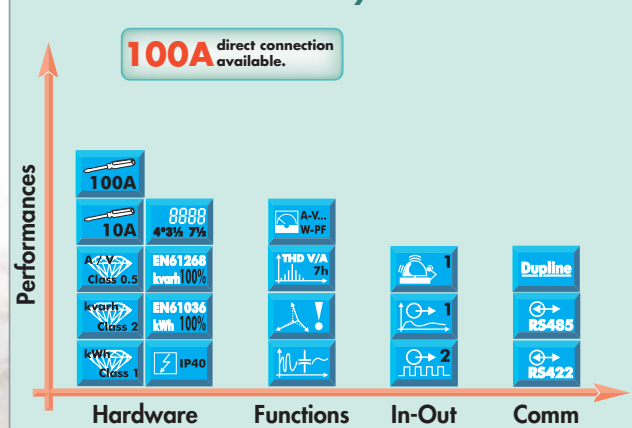


- Simultaneous display of four variables: information available at a glance.
- A full range of measurements available: everything under control.
- Plug and play output modules: easy interfacing to external devices.

The main advantages

- Total harmonic analysis of both current and voltage notifying potential load failures.
- Phase asymmetry control notifying line failures.
- Dual pulse output, analogue output, RS485 or Dupline port providing the communication to PLC's, to PC's and to Dupline building automation system.
- Serial communication and wrong connection of the current input status indications making the instrument installation easy, fast and out of wiring errors.
- Self power supply working even in case of one phase line failure granting the measurement of all the variables all the time.

The best to suit your needs!





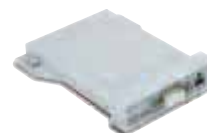
Modular Power Quality Analyzer WM3 96

Housing (H x W x D)	96x96x124mm
Display type	Graphic, back lighted LCD
Variables on display	YES
Instantaneous variables	Sel: 4x3 1/2 DGTs or 4x4 DGTs
Energy variables	4x9 DGTs (total), 4x6 DGTs (partial)
Accuracy	V _{IN} -A: ±(0.5 RDG+1DGT) Hz: ±0.1% F.S. THD: ±1% F.S. Class 1 (EN61036) Class 2 (EN61268)
Temperature drift	≤200ppm/°C
Refresh rate	10 times/s
System type	Bal.: 1-3 phase; Unbal.: 3-phase
Voltage inputs (Un)	Autoranging 240/415VAC, 400/690VAC
Current inputs (In)	Autoranging 1/5AAC
Digital inputs	3 for W _{dmd} and VA _{dmd} synchronization
Primary of CT/VT	Prog.: CT up to 30,000A; VT up to 600kV
Measurements:	TRMS method
Variables	Sys: V _{LN} , V _{LL} , An, W, var, VA, PF, Hz, W _{dmd} , VA _{dmd} , An _{dmd} , PF _{dmd} , Wh, varh. Single-phase: V _{LN} , V _{LL} , A, W, var, VA, PF, THD.
Harmonic distortion	THD and single H up to the 50th H (V, A)
Outputs:	Pulse Up to 4 (open collector or relay) Alarm Up to 4 (open collector or relay) Analogue Up to 4 (5mA, 10mA, 20mA, 1V, 5V, 10V DC) Serial RS485, RS232 (Modbus)
Digital filter	Action: on variables and outputs
Other characteristics	Real time clock with alarms and Min/Max variable recording, W, VA, PF and An integration time programming, energy time period management.
Power supply	18 to 60VAC/DC, 90 to 260VAC/DC
Approvals	CE, cURus, CSA
Protection degree	IP65, NEMA4x, NEMA12

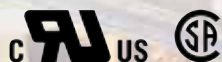
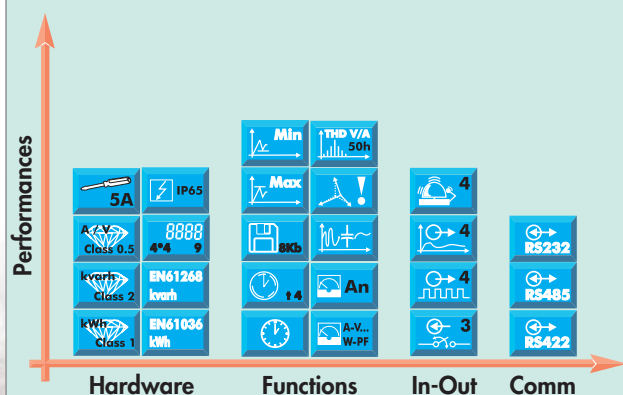
instance: 0.5 accuracy class, 10 samplings/second, FFT analysis up to the 50th harmonic, tariff management and automatic logging of the alarms together with the availability of any kind of input/output interfaces.



The already powerful performances of WM3 96 and becomes outstanding with the addition of the RS232+RTC module.



The best to suit your needs!



Analysis of the power quality and control of the electrical parameters

The problems that more frequently occur in electrical systems with:

- inverters and power converters;
- switching power supplies for computer and communication system applications;

are the following:

- failures on compensation capacitors;
- blowing of capacitor fuses;
- overheating of power supply transformers with a load current below the rated value;
- overheating of motors and frequent failures;
- high neutral conductor currents;
- problems on electronic motor controls.

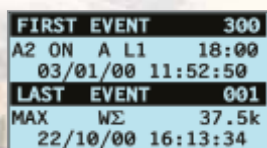
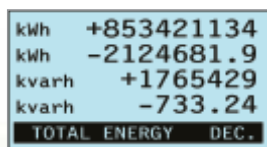
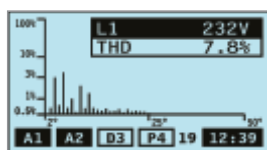
They are mainly due to the harmonic contents of currents and voltages.

The best solution is WM3 96 that allows to continuously monitor the harmonic contents of currents and voltages together with all other electrical parameters. The control of more than one electrical parameter by means of alarm set-points and the automatic recording of events allow the operator to monitor any anomaly of the installation and of the loads in real time, so as to promptly decide and plan any maintenance actions, thus avoiding possible damages to the loads and/or expensive stopping of the machinery.

Variables that can be monitored and displayed

Main variables	System	Single ph	Average (dmd)	Max	Min	Alarm Out	RS485	Pulse	Analogue out
V_{LL}, V_{LN}									
V asymmetry									
A									
An									
Hz									
VA									
var									
W									
PF									
+kWh (*)									
-kWh (*)									
+kvarh (*)									
-kvarh (*)									
THD (A-V)									
THD even (A-V)									
THD odd (A-V)									
Single harmonic									

(*) Total and time-period energies



- Histogram displaying of the harmonic contents relating to every single phase for A and V
- Complete harmonic analysis up to the 50th harmonic
- Numerical displaying as an absolute and percentage value of the single harmonic
- Four-quadrant displaying of the harmonic phase with source detection (generated harmonics and imported harmonics)
- Energy consumption storage. The RS232+RTC module allows the storage of the energy consumption of the previous two months.
- It is possible to record up to 480 events that can be the combination of alarms, diagnostics, minimum and maximum values, with reference to: date, time and variable being controlled.



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WM4 96

PQT 90

WM4 96 is an Universal Utility meter and Power Quality Analyzer and PQT 90 is a transducer having the same feature. These high-tech instruments have been developed to meet the most advanced application needs. WM4 96 and PQT 90 offer to the user many advantages and solutions that can be summarised in:

- Quick assembly and maintenance using Plug and Play modules.
- Load failure prevention: harmonic analysis (A/V) with

Modular Universal Utility Meter WM4 96 Modular Universal Utility Transducer PQT 90

Housing (H x W x D)	96x96x124mm (WM4); 90x90x140 (PQT)
Display type	Graphic, LCD back lighted (WM4 only)
Variables on display	YES (WM4); NO (PQT)
Instantaneous variables	WM4: Sel: 4x3 1/2 DGTs or 4x4 DGTs PQT: 4 DGTs format
Energy variables	4x9 DGTs (total), 4x6 DGTs (partial)
Accuracy	V _u -A: $\pm(0.5 \text{ RDG} + 1 \text{ DGT})$ Hz: $\pm 0.1\%$ F.S. THD: $\pm 1\%$ F.S. Class 1 (EN61036), Class 2 (EN61268)
Temperature drift	$\leq 200 \text{ ppm}/^\circ\text{C}$
Refresh rate	10 times/s
System type	Bal.: 1-3 phase; Unbal.: 3-phase
Voltage inputs (Un)	Autoranging 240/415VAC, 400/690VAC
Current inputs (In)	Autoranging 1/5AAC
Digital inputs	Up to 6 independent for time period synchronization, Gas and H ₂ O meters
Primary of CT/VT	Prog.: CT up to 30,000A; VT up to 600kV
Measurements:	TRMS method
Variables	Sys: V _{LN} , V _{LL} , A _n , W, var, VA, PF, W _{dmd} , var _{dmd} , VA _{dmd} , PF _{dmd} , Hz, Wh, varh, gas, H ₂ O. Single-phase: V _{LN} , V _{LL} , A, W, var, VA, PF, THD. THD and single H up to the 50th H (V, A)
Harmonic distortion	Up to 4 (open collector or relay)
Outputs:	Up to 4 (open collector or relay)
Pulse	Up to 4 (5, 10, 10mA; 1, 5, 10VDC) PQT only
Alarm	RS485 and RS232. (Modbus); Ethernet
Analogue	(WEB-server); Modem-GSM management
Serial	
Digital filter	Action: on variables and outputs
Other characteristics	Real time clock with alarms and variable recording (2Mb memory); Min/Avg/Max recording (PQT only) energy time period, gas and H ₂ O management; official watt-hour meter interface.
Power supply	18 to 60VAC/DC, 90 to 260VAC/DC
Approvals	CE, cURus, CSA
Protection degree	WM4: IP65, NEMA4x, NEMA12. PQT: IP20

source detection and control; up to 4 alarms for a powerful variable control; alarms logging and data stamping.

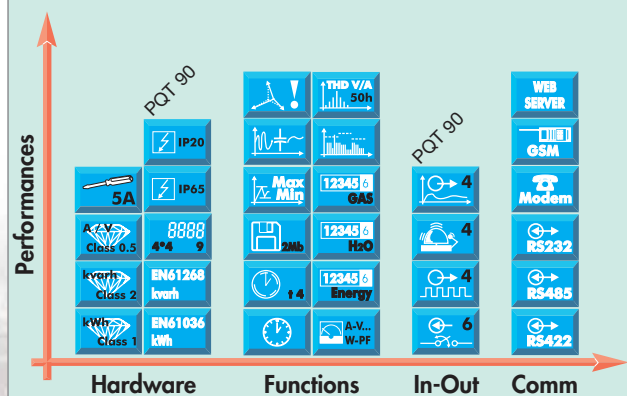
- Remote control facilities: up to 4 pulse outputs, RS485 port and RS232 port (Modbus RTU), WEB-server module.
- Load profile to keep supply costs under control.
- Energy cost allocation with independent import/export and multi-tariff active/reactive energy meters.
- Water and gas metering and communication using the same instrument.

RS232 serial communication port provided with a 2Mb data memory.



By AR1060 WEB server module (page 36)

The best to suit your needs!



Variables that can be monitored and displayed (Displayed only by WM4 96)

Main variables	System	Single ph	Average (dmd)	Max	Min	Alarm Out	RS485	Pulse	Analogue Out PQT 90 Only
V_{LL}, V_{LN}									
V asymmetry									
A									
An									
Hz									
VA									
var									
W									
PF									
+kWh (*)									
-kWh (*)									
+kvarh (*)									
-kvarh (*)									
GAS (*)									
H ₂ O									
THD (A-V)									
THD even (A-V)									
THD odd (A-V)									
Single harmonic									

(*) Total and time-period energies, daily and night gas.



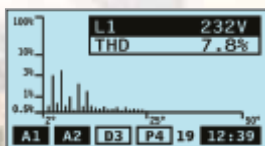
The 3 interfacing methods of WM4 96 and PQT 90 with the official watt-hour meter are:

- Direct measurement for the power quality analysis (LV or MV/HV connection).
- Indirect energy and power measurements by means of official Watt-hour meters (LV or MV/HV connection).
- Direct measurements of the instantaneous variables (LV connection) and indirect measurements of the energy variables (LV or MV/HV connection).

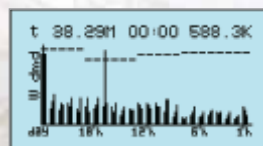
Powerful variable analysis and great communication capabilities: this is the strength of WM4 96 and PQT 90



- Energies-water-gas and instantaneous variables readable on the display of any GSM mobile phone giving maximum control freedom, saving time and money.
- Alarms transmitted as soon as they occur via GSM or analogue modem notifying the plant abnormal conditions.
- Data logging and stamping of up to 8 programmable instantaneous variables for a time duration up to 90 weeks with date and time references to build up the history of the electrical installation.
- Wm4Soft Network/PqtSoft Network communication software to download, manually or automatically (via RS485-analogue modem-GSM modem), up to 2Mb data stored in WM4 96 or PQT 90. This information can be simply plotted in an Excel spreadsheet.
- Continuous data stamping and communication: RS232, RS485, modem, GSM, or Ethernet/Internet port (for web-server module).
- Powerful data acquisition by means of Wm4Soft or PQT 90 and mobile phones wherever you are.



Mains quality analysis because the harmonics are cause of load failures and production stop.



Load profile display with alarms to keep the energy consumption and power cost under full control.



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WM5 96 PQT H

WM5 96 is a Smart Power Quality Analyzer, while PQT H is its corresponding transducer version. Both of them are powered with ARM technology which improves significantly the signal processing and the communication speed compared to any other standard analyzer. The superior features of these new meters are the right answer to those applications where performances and high accuracy are a MUST. Both WM5 96 and PQT H are modular and flexible so to be suitable to the most

Modular Smart Power Quality Analyzer WM5 96 Modular Smart Power Quality Transducer PQT H

Housing (H x W x D) mm	96x96x129 (WM5); 90x90x140 (PQT H)
Display type	Graphic, back lighted LCD (WM5 only)
Variables on display	WM5 96: YES; PQT H: NO
Instantaneous variables	WM5 96: 4x4 DGTs; PQT H: 4 DGTs format
Energy variables	4x9 DGTs
Accuracy	V_{in} -A: $\pm(0.2 \text{ RDG} + 1 \text{ DGT})$ Hz: $\pm 0.1\%$ F.S. THD: $\pm 1\%$ F.S. Class 0.5 (ANSI C12.20, EN62053-22) Class 2 (ANSI C12.1, EN62053-23)
Temperature drift	$\leq 200 \text{ ppm}/^\circ\text{C}$
Refresh rate	10 times/s
System type	Bal.: 1-3 phase; Unbal.: 3-phase
Voltage inputs (Un)	Autoranging 120/208VAC, 400/690VAC
Current inputs (In)	Autoranging In: 1/5AAC; Imax: 10AAC
Digital inputs	Up to 12 for W_{md} , VA_{md} synchro. and others
Primary of CT/VT	Prog.: CT up to 60,000A; VT up to 600kV
Measurements:	TRMS method
Variables	Sys: V_{Ln} , V_{LL} , An, W, var, VA, PF, Hz, Wh, varh, Single-phase: V_{in} , V_{LL} , A, W, var, VA, PF, THD. All variables: min-max-dmd calcul.
Harmonic distortion	THD and single H up to the 63rd H (V, A)
Outputs:	Up to 16 (open collector or relay) Up to 16 (open collector or relay) Up to 8 ($\pm 5 \text{ mA}$, $+20 \text{ mA}$, $+10 \text{ V DC}$)
Digital filter	RS485/232 (Modbus), Ethernet 10/100 base T
Other characteristics	Action: on variables and outputs Real time clock with alarms, Min/Max, digital input status, reset data stamping; dmd integration time programming, energy time period management (up to 12 tariffs).
Power supply	18 to 60VAC/DC, 90 to 260VAC/DC
Approvals	CE, cURus, CSA, Revenue Approval
Protection degree	WM5: IP65 NEMA4x NEMA12; PQT H: IP20

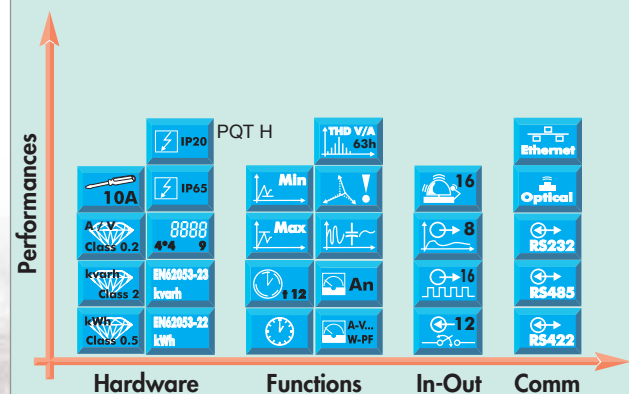
demanding applications. They offer many advantages and solutions that can be summarised in:

- Revenue grade and revenue approval to be used also for billing purposes thanks to their 0.2 accuracy class and the compliance to ANSI/IEEE C12.20-1998 and CAN3-C17-M84;
- Real powerful cost control: complex and complete tariff management (12 tariffs by 24 time periods/day);
- Extended load or line control with asymmetry, phase sequence and phase loss functions: on up to 16 selected variables linkable to up to 16 independent or OR/AND/OR+AND logic controlled alarms;
- Complete interfacing capability: up to 12 digital inputs, up to 16 pulse outputs, up to 8 analogue outputs, RS232, RS485, or optical communication.



By AR1061 module (Modbus over TCP/IP)

The best to suit your needs!



Measurement Canada
An Agency of Industry Canada
WM5 96: Revenue Approval n° AE-1507

Analysis of the power quality and control of the electrical parameters

The problems that more frequently occur in electrical systems with inverters and power converters, switching power supplies for computer and communication system applications are the following:

- failures on compensation capacitors;
- blowing of capacitor fuses;
- overheating of power supply transformers with a load current below the rated value;
- overheating of motors and frequent failures;
- high neutral conductor currents;
- problems on electronic motor controls.

They are mainly due to the harmonic contents of currents and voltages.

The best solution is WM5 96 or PQT H that allows to continuously monitor the harmonic contents (up to the 63rd harmonics) of currents and voltages together with all other electrical parameters.

The control of up to 16 different electrical parameters by means of alarm set-points with a specific logic (OR/AND) and the automatic recording of up to 10 000 events (alarm, min, max, digital input status, reset) allow the operator to monitor any anomaly of the installation and of the loads in real time, so as to promptly decide and plan any maintenance actions, thus avoiding possible damages to the loads and/or expensive stopping of the machinery.

Easy and fast communication



A front optical communication port based on ANSI C12.18 and Modbus protocols can be used to carry out an easy and fast communication with a PC or laptop. The proper Wm5Soft (for WM5 96) or PqtHSoft (for PQT H) software allows the user, through a multi level login procedure to:

- Read the measurement data and show them as a matrix on the monitor;
- Program all the parameters to quickly and easily adapt the instrument to the application needs;
- Download the stored events (alarm, min, max, digital input status, reset) in a XLS format to easily build up an installation history;
- Recalibrate the instrument, when needed, directly from a local support;
- Upgrade the instrument firmware improving its characteristics and therefore adding more and more value.

Variables that can be monitored and displayed

Main variables	System	Single ph	Average (dmd)	Max	Min	Alarm Out	RS485/232 Optical	Pulse	Analogue Out
V_{LL}, V_{LN}	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
V asymmetry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
An	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hz	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
var	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
W	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
+kWh (*)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-kWh (*)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
+kvarh (*)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-kvarh (*)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
THD (A-V)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
THD even (A-V)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
THD odd (A-V)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Single harmonic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(*) Total and time-period energies

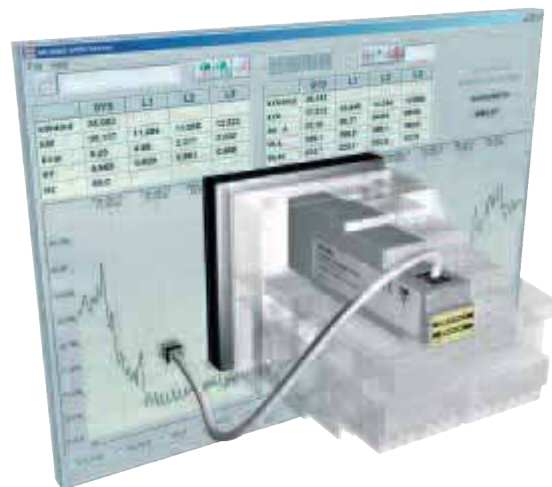


AR1060 WEB server

The "96 series" modular system can be equipped with an Ethernet/Internet module with WEB server capability. This module can be used in combination to our high-end instruments WM4 96 and PQT 90.

AR1060 is used instead of the RS485 communication module and improves significantly the already high communication and data logging capability of WM4 and PQT adding the possibility to connect those instruments to a LAN (local area network) or, according to the needs, to the WEB.

AR1060 as a WEB server allows the single WM4 and/or PQT to display, on every PC connected to the LAN and in a very easy way, the instantaneous variables and energy-water-gas being measured. The totalised energy-gas-water variables as well as the instantaneous electrical parameters are available in numerical format and shown in dedicated tables. The same data are also available by means of Internet through a local server so to grant a full data protection (firewall).

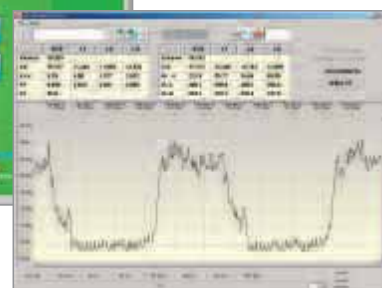


Up to 8 selectable and logged variables can be downloaded from the instruments also via WEB and are displayed, one at a time, in a graph with zoom and cursor features. Those parameters, together with energy-gas-water totalised consumptions which are available as 12 TXT monthly files, can be furthermore worked out in an Excel spread sheet so to evaluate parameters, consumption trends and related costs. That information will help the users to plan a proper maintenance scheme and to achieve cost reductions where possible.

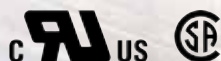
WEB server software is downloadable from the WEB server home page.

Ethernet/Internet Module AR1060

Description	Ethernet/Internet communication module with WEB server capability. Compatible with WM4-96 and PQT-90
Displayable variables	All the instantaneous single phase and system variables of WM4 and PQT, except for the harmonics, are displayed in numeric format. All the 8 logged variables are displayed one at a time, as a graph.
Downloadable variables	All the 8 logged variables of WM4 and PQT to TXT format (Excel spread-sheet)
Protocols	IP/ TCP/ HTTP/ TFTP
WEB page memory	512kbyte
Connection	RJ45, 10 Base T
Approvals	CE, cURus, CSA
Other characteristics	The module firmware can be upgraded by LAN or point to point connection



Examples of instantaneous and energy variables displayed by AR1060 WEB server.





CPT DIN

CPT DIN is a compact transducer available as a Basic version for measurement and data retransmission and as an Advanced version with many kinds of outputs and PLC type control functions suitable to be used also for critical applications. This unit for 3-phase and single-phase systems is recommended for the measurements of both main electrical variables in electrical distribution systems and on board of machines as working survey equipment. Moreover it represents an excellent compromise among price, value and features.

Compact Power Transducer CPT DIN Basic and Advanced functions

Housing (H x W x D)	83.5 x 45 x 98.5 mm
Variables on display	N.A.
Instantaneous variables	4 DGTs format
Energy variables	8+1 DGTs format
Hours	5+2 DGTs format
Accuracy	W-VA: $\pm(1\% \text{ F.S.} + 1\text{DGT})$ var: $\pm(2\% \text{ F.S.} + 1\text{DGT})$ V _{LL} : $\pm(1.5\% \text{ F.S.} + 1\text{DGT})$ V _{LN} -A: $\pm(0.5\% \text{ F.S.} + 1\text{DGT})$ kWh: class 1 kvarh: class 2
Temperature drift	$\leq 200\text{ppm}/^{\circ}\text{C}$
Refresh rate	1.5 times/s
System type	Unbalanced: 2-3-phase; bal.: 1-3-ph
Voltage inputs (Un)	100/208VAC, 400/660VAC
Current inputs (In)	1/5AAC
Digital inputs	N.A.
Primary of CT/VT	Prog.: CT up to 300kA; VT up to 600kV
Measurements:	TRMS method
Variables	Sys: V _{LN} , An, W, var, VA, W _{dmd} , W _{dmd max} , VA _{dmd} , Hz Wh, varh, h. Single-phase: V _{LL} , V _{LN} , A, A _{dmd} , A _{dmd max} , W, var, VA, PF.
Harmonic distortion	N.A.
Outputs:	Pulse 2 (open collector or relay) Alarm 16 with OR/AND function (2 relays) Analogue Up to 3 (20mA, 10V DC) Serial RS422/485, RS232 (Modbus)
Digital filter	Action: on variables and outputs
Other characteristics	Diagnostic function on available outputs with dual colour LED indication
Power supply	18 to 60VAC/DC, 90 to 260VAC/DC
Approvals	CE; cURus, CSA
Protection degree	IP20

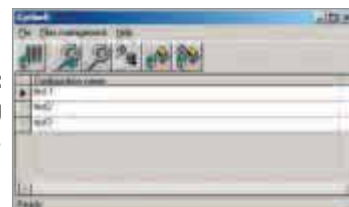


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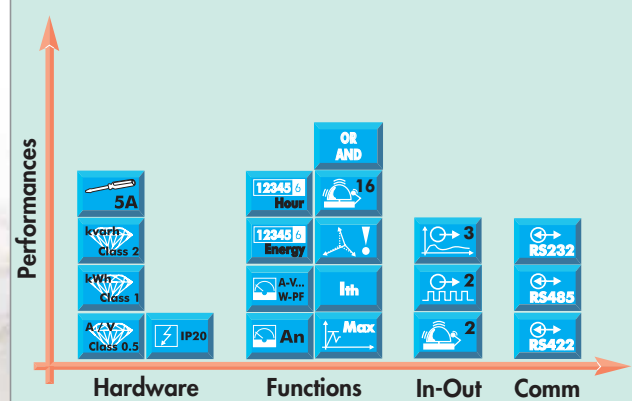
The most important benefits in the advanced version are:

- Integrated and extended AC and DC power supply for full application coverage.
- Metering of both total and partial active and reactive energies in order to survey both load parameters and consumptions.
- Hour counter function for machine maintenance planning.
- RS485 communication port (with iFIX SCADA compatibility) for data transmission to PC, or pulse or analogue outputs to PLC. All of them for remote monitoring and control of the variables.
- Dupline bus compatibility for full Building automation integration.
- OR, AND, OR+AND control of up to 16 selected variables to grant together with the asymmetry, phase sequence and phase loss functions an extended load or line control by means of 2 digital outputs.
- Combination of RS485 port and 1 digital output

CptASoft, CptBSoft:
programming and reading
tools, see page 42.



The best to suit your needs!



The histogram is related to the Advanced version.



WM14 A204 and ROG400

ROG400 is a split core AC TRMS current sensor whose "4 to 20mA DC" output signal is proportional to the current being measured. The sensor has to be fixed directly around the main cable. WM14 A204 is a 4-channel ammeter which requires "4 to 20mA DC" input signals. WM14 is capable to measure and display, for each channel (3 phases and neutral), the instantaneous and thermal currents and the relevant peak values. It is equipped with 2 relay outputs: the first is connected to an AND



combination of programmable setpoints on each channel; the second one is a diagnostic alarm providing overrange or damaged-sensor warnings. WM14 A204 and ROG400 are the ideal solution for retro-fit applications.

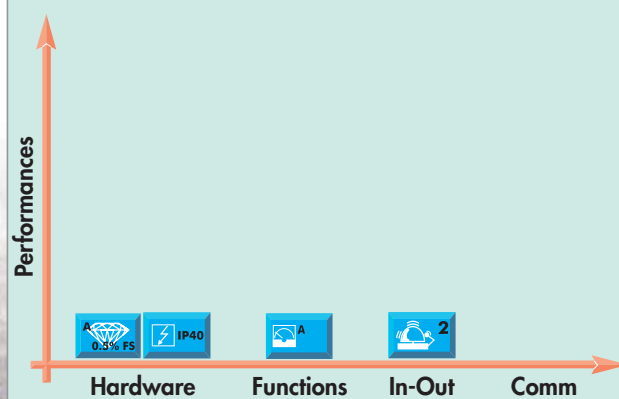
4-Channel Ammeter WM14 A204

Housing (H x W x D)	90x107.5x64.5mm (6-DIN modules)
Display type	LED, h: 14mm
Variables on display	YES
Instantaneous variables	2x 3 DGTs
Energy variables	N.A.
Accuracy	A: $\pm(0.5\% \text{ FS} + 1\text{DGT})$
Temperature drift	$\leq 200\text{ppm}/^\circ\text{C}$
Refresh rate	1.5 times / s
System type	Unbalanced: 3-phase.
Voltage inputs (Un)	N.A.
Current inputs	4-20mA DC
Digital inputs	N.A.
Measurements:	
Variables	single-phase: A, A_{dmd} , A_{max} , $A_{\text{dmd max}}$
Harmonic distortion	N.A.
Outputs:	
Pulse	N.A.
Alarm	2 (relay)
Analogue	N.A.
Serial	N.A.
Digital filter	Action: on variables and outputs
Power supply	90 to 260 VAC/DC
Approvals	CE
Protection degree	IP40

Split Core Current Sensor ROG 400

Housing (H x W x D)	54x29x17mm
Cable size	40mm max
Accuracy Class	1% FS
Primary	0 to 400 AAC
Output	4 to 20 mA DC
Power supply	10 to 30 VDC

The best to suit your needs!





VMU-E and VMU-X

This energy analyzer is a modular combination of two modules VMU-E and VMU-X for DC V, A, W and kWh metering.

VMU-E is provided with a 6 digit LCD display and one front push-button for easy parameters programming.

VMU-X is the power supply unit which provides to the VMU-E unit, according to the module, either a RS485 serial



communication port or a digital output. The output works as a pulse retransmission output proportional to the energy being measured or an alarm output.

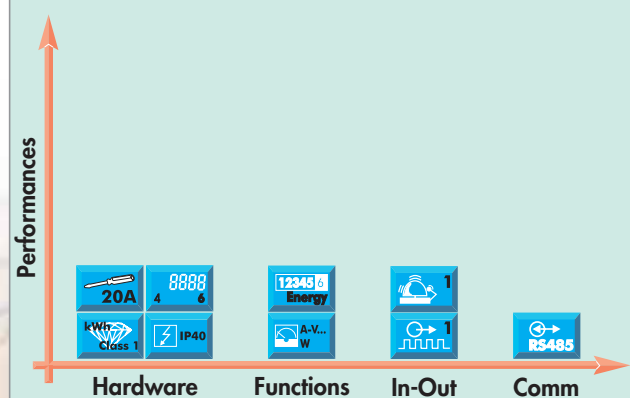
DC Energy Analyzer VMU-E, VMU-X

Housing (H x W x D)	90x18x67mm (1-DIN module)
Display type	LCD, h: 7mm
Var. on display	YES
Instantaneous variables	4 DGT
Energy variable	6 DGTs
Accuracy	A-V: ± 0.5 RDG Class 1 (kWh)
Temp. drift	$\leq 200 \text{ ppm}/^{\circ}\text{C}$
Sampling time	$\leq 150 \text{ s}$
System type	1-phase
Voltage inputs	0 to 400VDC
Current inputs	0 to 20ADC (direct)
Shunt input	0 to 120mVDC (1000A with external shunt)
Digital inputs	N.A.
Measurements:	V, A, W, kWh
Harmonic distortion	N.A.
Outputs:	Pulse: 1 (opto-mosfet) Alarm: 1 (opto-mosfet) Analogue: N.A. Serial: RS 485
Digital filter	N.A.
Other characteristics	Scaling of external shunt
Approvals	CE
Power supply	38 to 265 VAC/DC (VMU-X)
Protection degree	IP40

The main advantages

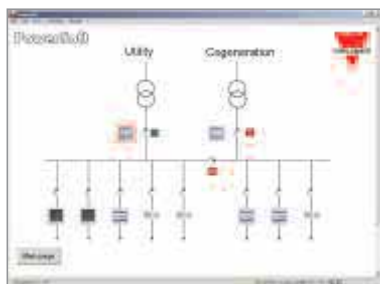
- Compact size: 1+1 DIN module.
- Measurement of direct current up to 20A; or by means of an external shunt up to 1000A.
- Universal AC/DC power supply.
- Easy to be connected to a PLC or local alarm by means of digital output.
- Quick data transmission to remote acquisition system by means of the RS485 port.
- Local variable control by means of the alarm digital output.

The best to suit your needs!



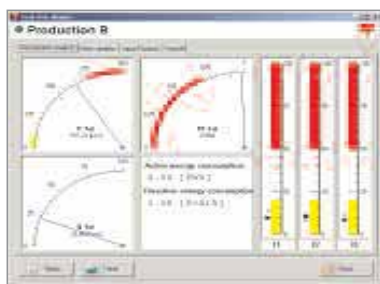
PowerSoft Energy Manager

PowerSoft is an analysis platform suitable for Win 98, 98SE, XP and Vista, which has been specifically developed to interface, by means of the Modbus protocol (RTU and TCP/IP), with the Carlo Gavazzi products for Energy Management. Consisting of a main core and of a series of optional plug-in modules, it allows to correctly and efficiently manage an electrical distribution system, mainly considering the cost reduction point of view. This aim is achieved monitoring the consumptions, checking the demanded power peaks and adopting accurate analysis and data processing tools.



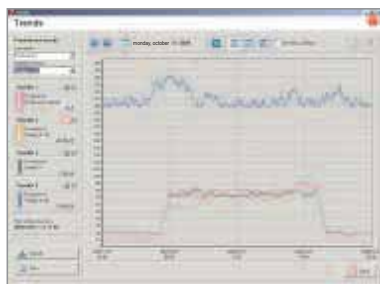
Interactive synoptics

A fully customisable set of animated interactive synoptics allows to browse the monitored electrical distribution system and to see any alarm condition at a glance. A series of links allows to access the real time data of each instrument or to pass on to other synoptics.



Real time display

Each instrument has a 4-page section where its real time data can be examined in different ways: as analogue indicators; analytically in a complete table including all the variables and the utility meters; by means of a Fresnell diagram. It is possible to check the status of the digital inputs and check or switch the digital output for test purposes or to remotely act on an external device. A table which displays at the same time all the data from up to 5 instruments per page is available, allowing the user to carry out a simple and immediate data comparison.



Trends

A selectable set of variables (different from instrument to instrument) can be stored in the PowerSoft database with a selectable time interval so to build-up a history of the installation. All the data can be analysed later on in both graphical and analytical format and exported in various formats (wmf, csv, xls). Up to 4 variables (from the same or from different instruments) can be displayed and compared at the same time. With simple and intuitive procedures it is also possible to zoom the graph or analyse it in detail with a cursor, freely choosing the time period to be displayed.



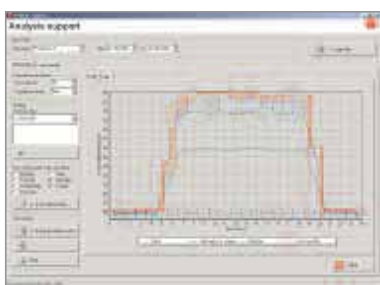
The Waves module

Through this new module PowerSoft can display the measured signal (VL1-n, VL2-n, VL3-n, I1, I2, I3) and graphically represent the relative waveforms (up to 10 cycles before the trigger signal), Powersoft also represents the harmonic spectrum (up to the 63th harmonic) of every cycle and moreover it makes available the graphic representation of the harmonic in the 10 analyzed cycles. This function allows a more thorough analysis of the event that generated the trigger command. This new analysis module is able to "capture" and to display the 10 previous cycles under the trigger command that is determined automatically (if there is a preset alarm on the instrument) or in a manual way (if there is a directed command of the operator); a third option is also available and it activates the display of the waveforms in continuous mode carrying out a simil-oscilloscope function and displaying the waveform of the analysed signal in real time. All the graphically represented data are saved and can be recalled at any time the user wants. The Waves module can be used only with the WM5 power quality analyzer, when the serial communication is via the Ethernet port on the AR1061 module.



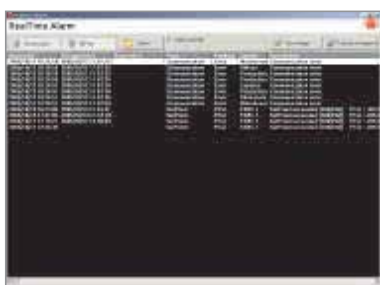
Costs estimation

According to the utility contract parameters, the software allows to estimate the costs, relevant to a selected period, due to the energy, water and gas consumption. This is useful to perform the cost allocation among the monitored lines, to display the daily trend of the consumption or to identify the reasons of any penalty. The above features are structured to manage a complex multi-tariff contract. The different tariffs during the day and the distribution of the typical-days among the year can be set according to the supplier tariff regulations in a very easy and extremely flexible way. Up to 12 tariffs, 24 tariff changes per day, 365 different typical-days per year can be simply configured.



Statistical analysis

PowerSoft carries out statistical analysis on the power trends and energy consumption by extrapolating the demand of each day of the week, the week-based consumption trends and the estimation of the ideal installed power for each tariff, calculated with a selectable confidence level. All this information is aimed to build-up an optimised load profile so to negotiate a better contract with the utility supplier. To improve the reliability of the analysis, any data with abnormal consumptions due to external events can be filtered and removed, as well as the weekends and the holidays.



Alarms and events

An active alarms window (that automatically pops up in any case of alarm) advises the user if a setpoint has been exceeded or if a communication error is present; it allows the qualified users to acknowledge the selected alarm. A proper database allows to access the list of the events (login, logout, startup, alarm acknowledgment, etc.) and of the alarms (setpoints, communication errors, missing data storage, etc.) and to carry out filter-based searches. The setpoint alarms can be associated to both an up and a down threshold on all the variables measured by all the instruments of the network. The alarm can be software, being displayed in the Active alarms windows and stored in the Alarms and events log, or hardware-based, being stored as above and switching the digital output of the instrument that are pointing out the anomaly. This powerful tool allows the operator to monitor any anomaly of the installation and of the loads in real time, so as promptly decide and plan any maintenance actions, thus avoiding possible damages to the loads and/or expensive stopping of the machinery.



Internet connectivity

PowerSoft can manage an automatic e-mailing module, able to notify the electrical system status to one or more e-mail addresses. The e-mailing can be carried out on regular basis and/or as a consequence of a defined alarm or event.

In cost-sharing applications, the energy/utility bill of each final user can be sent to his e-mail box, while the administrator can receive the consumptions summary of all the customers.

The web-server module allows to remotely access PowerSoft, using a standard browser without additional licenses, in order to access all the realtime information and historical data from wherever you are.

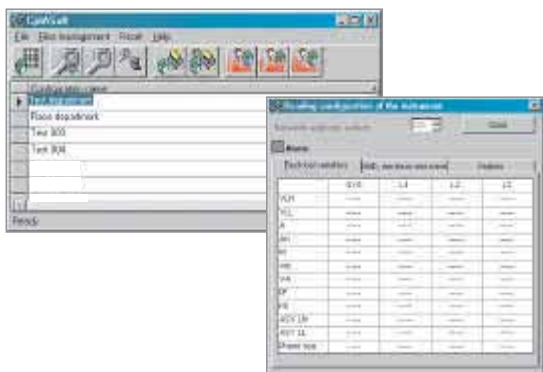


Specific instrument Software

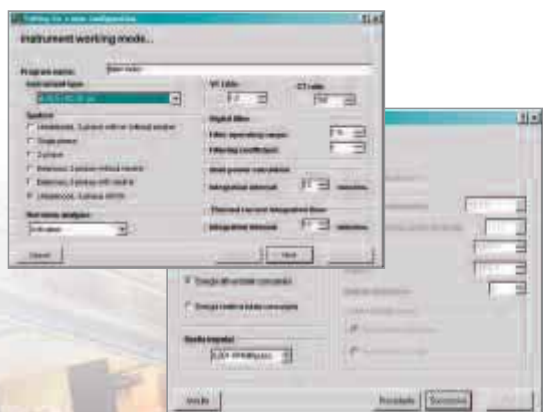
CptBSoft, CptASoft, Wm14ASoft, Em21Soft, Em2426Soft, Wm4Soft, PqtSoft, Wm5Soft, PqtHSoft



These user friendly specific instrument software are also a guidance to set-up the relevant power analyzers or transducers in a quick and reliable way. All the available parameters can be saved into a proper configuration file so to be easily downloadable from the PC to the instrument/transducer or to be up-loadable from the instrument/transducer to the PC. Such a procedure, as a cost effective solution, can also be used to build up an instrument set up archive where every single file, if needed, can be sent as an e-mail attachment to whoever is in field for installation or maintenance purpose making the job easier and faster.

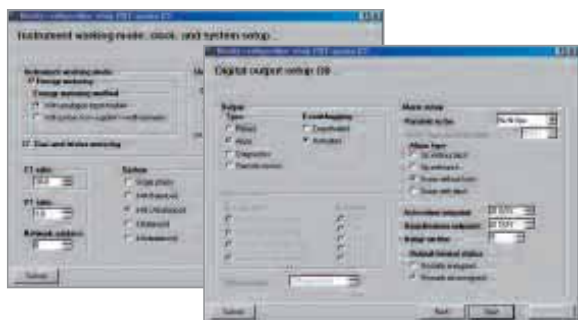


CptBSoft and CptASoft have been developed to program the parameters and read in real-time mode the variables of the compact power transducer (Basic and Advanced version respectively). The CPT transducers are equipped with an auxiliary serial port (RJ12 connection) in order to easily configure all the models.



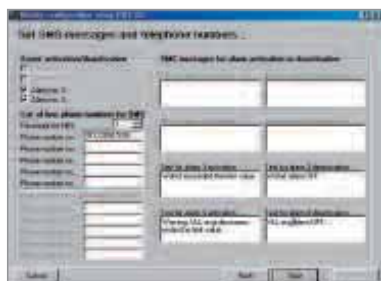
Wm14ASoft, Em21Soft and Em2426Soft, connected via RS485 to a WM14 Advanced, an EM24-DIN, an EM21-72D, or an EM26-96, allow to fully configure the instruments and to read the realtime data acquired by all the meters of the connected network.

Wm4Soft Remote and PqtSoft Remote allow to configure the instrument, to choose the SMS alarms and to select the 8 variables to be logged in the 2Mb memory. A real-time table showing all the variables is available too. The PC where the software runs can be connected to the instrument by RS232, RS485 (also multi-drop), analogue or GSM modems.



Instrument configuration

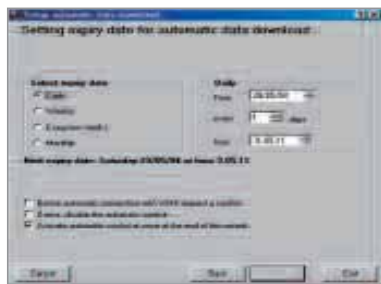
All the working parameters of the instrument can be uploaded according to its module composition and to the system to be monitored.



SMS setting

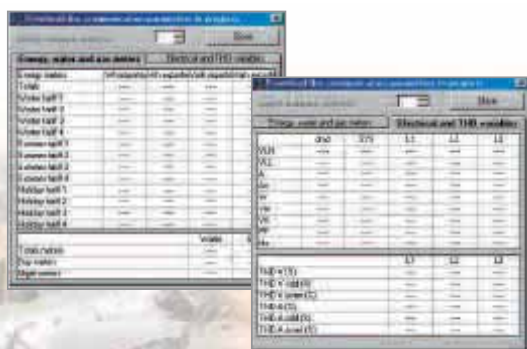
Up to 8 different SMS can be sent from the instrument to up to 5 phone numbers in case of alarm activation or deactivation.

Wm4Soft Network and PqtSoft Network allow the manual or automatic data download from the 2Mb memory module plugged in the instrument and the selection of the alarm SMS. A real-time table showing all the variables is available too. The PC where the software runs can be connected to the instrument by RS232, RS485 (also multi-drop), analogue or GSM modems. A phone book is available to call up to 100 instruments located in different places.



Data download

It is possible to manually or automatically download the logged data from up to 100 remote networks composed by maximum 10 WM4 96 or 255 PQT 90 each. The time period between two consecutive automatic downloads is fully configurable from 1 day to 1 month. The downloaded data are available for the users in a TXT format so to be used in an Excel spread-sheet for a full analysis.



Real-time variables

The real-time function allows the display of all the instantaneous variables measured by the instrument and of the total and partial energy, gas and water.



Current Transformers

Types

Class
Bus-bar size/Cable diam.
Dimensions (H x W x D)
Standards
Accuracy class
depending on the
burden output
Accuracy class

NOTE: Cable/Bus-bar
type AC current trans-
formers; operating fre-
quency: 48 to 62 Hz;
max system voltage:
0.72 kV; rated insulation
level: 3kV/1min @ 50Hz;
security factor: ≤5; rated
secondary current: 5A
standard (1A on
request); DIN-rail or
panel mounting. All the
products are CE marked.

TADK

0.5
max 115.5x75x44 mm
IEC60185 / EN60185
Burden (VA)
Class 0.5
1A 10
5A 10
60A 10
10A 10
15A 10
25A 10
40A 10

TADK2

0.5
25X5 mm
115.5x75x44 mm
IEC60185 / EN60185
Burden (VA)
Class 0.5
1A 10
5A 10
60A 10
10A 10
15A 10
25A 10
40A 10
50A 10
60A 10
80A 10
100A 10
150A 10
200A 10
250A 10

CTD-1X

0.5
max Ø 23 mm
65x44x44 mm
EN 60044-1
Burden (VA)
Class 0.5 1 3
50A 1 1.25
60A 1 1.25
70A 1.5 1.75
75A 1 1.25 1.75
80A 1.25 1.5 2
100A 1.5 1.75 2.25
120A 1.75 2 2.5
125A 2 2.25 2.75
150A 2.25 2.5 3
160A 2.5 2.75 3.25
200A 3 3.25 3.75
250A 4.5 4.75 5.25
300A 5 5.5 6

CTD-2X

0.5
max 32x5mm; Ø 24mm
86x56x42 mm
EN 60044-1
Burden (VA)
Class 0.5 1 3
40A 1.25
50A 1.5
60A 2
70A 2.5
75A 1.75 2.5
80A 2 2.75
100A 2.5 3
120A 2.75 3.75
125A 2 2.75 3.75
150A 3 4 5
160A 3 4 5
200A 4 5 6.5
250A 5.5 7 8
300A 7 8.5 9.5
400A 12 13.5 14.5
500A 14 15.5 16.5
600A 17.5 19 20

CTD-3X

0.5
max 51x15mm; Ø 41mm
109x77x42 mm
EN 60044-1
Burden (VA)
Class 0.5 1 3
50A 1.75
60A 2
70A 2.5
75A 3
80A 3
100A 2 3.5
120A 2.25 4
125A 2.5 4.5
150A 2.25 3 6
160A 2.5 3.5 6.5
200A 3 4.5 8.5
250A 3.5 6.5 10.5
300A 7 10 13
400A 9 14 17
500A 14 18 21
600A 17 21 24
700A 22 26 29
750A 24 28 31
800A 25 29 32
1000A 35 39 42
1200A 40 44 47

Types

Class
Bus-bar size/Cable diam.
Dimensions (H x W x D)
Standards
Accuracy class
depending on
the burden output
Primary current at
rated output
current of 1A/5A

NOTE: Cable/Bus-bar
type AC current trans-
formers; operating fre-
quency: 48 to 62 Hz;
max system voltage:
0.72 kV; rated insulation
level: 3kV/1min @ 50Hz;
security factor: ≤5; rated
secondary current: 5A
standard (1A on
request); DIN-rail or
panel mounting. All the
products are CE marked.

CTD-4X

0.5
max 64x20mm; Ø 51mm
113x90x42 mm
EN 60044-1
Burden (VA)
Class 0.5 1 5P5
150A 2.5 C13 5
200A 3.25 C13 6
250A 2.5 4.5 2
300A 3 4 3
400A 6 9 3
500A 10 12.5 4
600A 11 13.5 4
700A 12.5 15 5
750A 13 15.5 5
800A 14 16.5 5
1000A 17.5 20 6
1200A 20 22.5 6
1250A 20 22.5 6
1500A 27.5 30 8
1600A 27.5 30 8

CTD-8V CTD-8H

0.5
81x31mm
132.9x87x60 mm
EN 60044-1
Burden (VA)
Class 0.5 1 3
150A 2
200A 4
250A 5
300A 2 6
400A 3 5 8
500A 5 7 0
600A 6 0 2
700A 6 0 2
750A 8 2 5
800A 8 2 5
1000A 0 5 20
1200A 2 5 20
1250A 2 5 20
1500A 5 20 25
1600A 5 20 25
2000A 20 25 30
2500A 25 30 40

CTD-9V CTD-9H

0.5
126x36 mm
177.9x91.7x60 mm
EN 60044-1
Burden (VA)
Class 0.5 1 3
400A 3 6
500A 2 4 8
600A 4 6 10
700A 4 8 10
750A 4 8 10
800A 4 8 10
1000A 6 10
1200A 8 12
1250A 8 12
1500A 10 15
1600A 10 15
2000A 15 20
2500A 20 25
3000A 25 30
3200A 25 30
4000A 25 30

CTD-10V CTD-10H

0.5
126x51 mm
177.9x106.7x60 mm
EN 60044-1
Burden (VA)
Class 0.5 1 3
400A 1 7 10
500A 3 10 14
600A 5 12 17
700A 8 15 20
750A 10 15 20
800A 10 15 20
1000A 12 20 25
1200A 15 25 30
1250A 15 25 30
1500A 20 30 40
1600A 20 30 40
2000A 25 40 50
2500A 30 50 60
3000A 30 50 60
3200A 30 50 60
4000A 30 50 60

TACO 200

0.5
max Ø 200 mm
295x280x45 mm
IEC60185 / EN60185
Burden (VA)
Class 0.5 1 5P10
1000A 15 30 10
1500A 15 30 10
2000A 15 30 10
2500A 40 80 10
3000A 40 80 10
4000A 50 100 10
5000A 50 100 10
6000A 50 100 10

Split Core Current Transformers

Types

Class
Bus-bar size
Dimensions (H x W x D)
Standards
Accuracy class
depending on
the burden output
Primary current

CTD-5S

Class	1		
Bus-bar size	27x32 mm		
Dimensions (H x W x D)	93.9x83x60 mm		
Standards	EN60044-1		
Accuracy class depending on the burden output	Burden (VA)		
	Class	1	3
Primary current	100A		1.5
	125A	1.5	1.5
	150A	1.5	2.5
	200A	1.5	5
	250A	1.5	5
	300A	2.5	7.5
	400A	5	10

NOTE: operating frequency: 48 to 62 Hz; max system voltage: 0.72 kV; rated insulation level: 3kV/1min @ 50Hz; security factor: ≤ 5 ; rated secondary current: 5A standard (1A on request); DIN-rail or panel mounting. All the products are CE marked.

CTD-6S

Class	1		
Bus-bar size	52x51mm		
Dimensions (H x W x D)	113.9x107x60 mm		
Standards	EN60044-1		
Accuracy class depending on the burden output	Burden (VA)		
	Class	1	3
Primary current	150A		1.5
	200A	1.5	2
	250A	1.5	3.75
	300A	1.5	5
	400A	2.5	5
	500A	5	10
	600A	7.5	15
	700A	7.5	15
	750A	7.5	15
	800A	10	15
	1000A	10	15

CTD-8S

Class	1		
Bus-bar size	81x31 mm		
Dimensions (H x W x D)	132.9x87x60 mm		
Standards	EN60044-1		
Accuracy class depending on the burden output	Burden (VA)		
	Class	1	3
Primary current	150A		1.5
	200A		1.5
	250A		2
	300A		2
	400A	3	5
	500A	5	7
	600A	6	10
	700A	6	10
	750A	8	12
	800A	8	12
	1000A	10	15
	1200A	12	15
	1250A	12	15
	1500A	15	20
	1600A	15	20
	2000A	20	25
	2500A	25	30

Types

Class
Bus-bar size
Dimensions (H x W x D)
Standards
Accuracy class
depending on
the burden output
Primary current

CTD-9S

Class	1		
Bus-bar size	126x36 mm		
Dimensions (H x W x D)	177.9x91.7x60 mm		
Standards	EN60044-1		
Accuracy class depending on the burden output	Burden (VA)		
	Class	1	3
Primary current	400A		3
	500A	2	4
	600A	4	6
	700A	4	8
	750A	4	8
	800A	4	8
	1000A	6	10
	1200A	8	12
	1250A	8	12
	1500A	10	15
	1600A	10	15
	2000A	15	20
	2500A	20	25
	3000A	25	30
	3200A	25	30
	4000A	25	30

NOTE: operating frequency: 48 to 62 Hz; max system voltage: 0.72 kV; rated insulation level: 3kV/1min @ 50Hz; security factor: ≤ 5 ; rated secondary current: 5A standard (1A on request); DIN-rail or panel mounting. All the products are CE marked.

CTD-10S

Class	1		
Bus-bar size	126x51 mm		
Dimensions (H x W x D)	177.9x106.7x60 mm		
Standards	EN60044-1		
Accuracy class depending on the burden output	Burden (VA)		
	Class	1	3
Primary current	400A	1	7
	500A	3	10
	600A	5	12
	700A	8	15
	750A	10	15
	800A	10	15
	1000A	12	20
	1200A	15	25
	1250A	15	25
	1500A	20	30
	1600A	20	30
	2000A	25	40
	2500A	30	50
	3000A	30	50
	3200A	30	50
	4000A	30	50





ROG400

Class	1% FS		
Bus-bar size	40mm max		
Dimensions (H x W x D)	54x29x17mm		
Standards			
Accuracy class depending on the burden output	Power supply: 10 to 30 VDC.		
Primary current	Primary current: 0 to 400 ADC.		
Output	Output: 4 to 20 mADC		

Split core CTD series

ROG400



Types	DC Energy Analyzer	Energy Analyzers	Energy Meters	
	VMU-E/VMU-X	EM10/EM11 DIN	EM21 72D	EM23 DIN
				
Dimensions (mm) H x W x D	90 x 18 x 67	90 x 18 x 67	72 x 72 x 65	90 x 71 x 65
Description and measurements	Modular DC energy analyzer V, A, W, kWh	EM10: 1-phase energy meter kWh EM11: 1-phase energy analyzer V_{LN} , A, Hz, W, W_{dmd} , var, PF, kWh, kvarh TRMS method	3-phase energy meter W, var, PF, Phase-sequence, V_{LL} , V_{LN} , A TRMS method	3-phase energy meter W, var, A, kWh, kvarh TRMS method
Input Specifications				
Voltages and currents	0 to 400VDC 0 to 20ADC (0 to 120mV/ 0 to 1000A with external shunt)	230VAC Ib: 5A, Imax: 32AAC; 1-phase	120/230VAC, 400V _{L-L} AC In: 5A, Imax: 6A; 3-phase	400V _{L-L} AC Ib: 10A, Imax: 65AAC 3-phase
Accuracy	±0.5 RDG (V, A) Class 1 (kWh)	±0.5% RDG (V, A) Class 1 (EN62053-21) Class B (EN50470-3) Class 2 (EN62053-23)	±0.5% RDG (V, A) Class 1 (EN62053-21) Class B (EN50470-3) Class 2 (EN62053-23)	±0.5% RDG (A) Class 1 (EN62053-21) Class B (EN50470-3) Class 2 (EN62053-23)
Reactive energy	4 DGTs (inst. variable) 5+1 DGTs (energie) LCD	4 DGTs (inst. var. EM11 only) 5+1 DGTs (energies) LCD	3 x 3 DGTs (inst. variables) 6+1 DGTs (energies) LCD	3 x 3 DGTs (inst. variables) 6+1 DGTs (energies) LCD
Output Specifications				
Pulse	1 static opto-mosfet	1-open collector	1 static opto-mosfet	1-open collector
Alarm	1 static opto-mosfet	1-relay (EM11 only)	None	None
Analogue	None	None	None	None
Serial communication	RS485 (2-wire, Modbus)	None	RS485 (2-wire, Modbus)	None
Digital input	None	None	None	None
Dupline	None	None	None	None
General Specifications				
Power supply	38 to 265 VAC/DC (VMU-X)	Self power supply	Self power supply	Self power supply
Approvals/Marks	CE	CE, cULus, MID certification*	CE, MID certification*	CE, MID certification*

***Certifications on request:**

EC Type examination, Annex B of MID (option "P")
MID Annex B+F (option "PF") for legal metrology

Energy Analyzers

Energy Meters

Multifunction Meter

EM24 DIN



EM26 96



EM3 DIN



EM4 DIN



WM10 DIN



90 x 71 x 65	96 x 96 x 61.5	90 x 162.5 x 63	90 x 162.5 x 63	90 x 71 x 65
3-phase energy analyzer System: V_{LL} , V_{LN} , var, VA, W_{dmd} , W, VA_{dmd} , Hz, kWh, kvarh, hour counter. Max: A_{dmd} , W_{dmd} , VA_{dmd} . Single-phase: V_{LL} , V_{LN} , A, W, var, VA, PF, A_{dmd} , kWh, kvarh. TRMS method	3-phase energy analyzer System: V_{LL} , V_{LN} , An, var, VA, W W_{dmd} , VA_{dmd} , VA, Hz, %THD-V, %THD-A, kWh, kvarh, hour counter. Max: A_{dmd} , W_{dmd} , VA_{dmd} . Single-phase: V_{LL} , V_{LN} , A, W, var, VA, PF, A_{dmd} , kWh, kvarh; TRMS method	MODULAR 3-phase energy meter Direct connection up to 100 A	MODULAR 3-phase utility meter Direct connection up to 100A. Measurement of system and single-phase variables, energy by timeperiods, $m^3 H_2O$ and $m^3 GAS$	3-phase multifunction meter W, var, PF, Hz, A, V_{LN} , V_{LL} TRMS method
120/208V _{L-L} , 400V _{L-L} In: 1/5A, I _{max} : 10AAC; Ib: 10A, I _{max} : 65AAC; 3-phase unbalanced load	120/208V _{L-L} , 400/660V _{L-L} In: 1/5A, I _{max} : 10AAC 3-phase unbalanced load	208V _{L-L} , 220V _{L-L} , 400V _{L-L} , 660V _{L-L} / Ib: 20A, I _{max} : 100AAC. 3-phase unbalanced load	100V _{L-L} , 208V _{L-L} , 400V _{L-L} , 660V _{L-L} / In: 5A, I _{max} : 10AAC; 208V _{L-L} , 220V _{L-L} , 400V _{L-L} , 660V _{L-L} / Ib: 20A, I _{max} : 100AAC	400V _{L-L} AC Ib: 10A, I _{max} : 65AAC 3-phase
±0.5% RDG (V, A) Class 1 (EN62053-21) Class B (EN50470-3) Class 2 (EN62053-23) 3 x 4 DGTs (inst. variables) 8 DGTs (energies) LCD	±0.5% RDG (V, A) Class 1 (EN62053-21) Class B (EN50470-3) Class 2 (EN62053-23) 3 x 4 DGTs (inst. variables) 8 DGTs (energies) LCD	Class 2 (EN61036) Class B (EN50470-3) Class 3 (EN61268) Electromechanical 6+1 DGTs	±0.5% RDG (V, A) Class 1 (EN61036) Class B (EN50470-3) Class 2 (EN61268) 3 1/2 DGTs backlighted LCD 8 DGTs (energy)	±0.5% RDG (V, A) 3 x 3 DGTs (inst. variables) LCD
2-open collector	2-open collector	2-open collector module	2-open collector module	None
2-relay	2-relay	None	1-open collector or relay module	None
None	None	None	None	None
RS485 (2-wire)	RS485 (2-wire)	None	RS422/485 module	None
3 (W_{dmd} sync. tariff selec.) 6 counter, 8 inst. variables, 2 alarms, 1 digital input	3 (W_{dmd} sync. tariff selec.) None	None None	2 (W_{dmd} sync., tariff selec.) Active and reactive energies	None None
Self power supply. Auxiliary power supply: 18 to 60VAC/DC, 115/230VAC according to the model	18 to 60VAC/DC 90 to 260VAC/DC	Self power supply; Auxiliary power supply: 115VAC, 230VAC	Self power supply; Auxiliary power supply: 24VAC, 48VAC, 115VAC, 230VAC 18 to 60VDC, 77 to 143VDC	Self power supply
CE, MID certification*	CE, cULus, MID certification*	CE	CE	CE

*Certifications on request:

EC Type examination, Annex B of MID (option "P")

MID Annex B+F (option "PF") for legal metrology



Types

Multifunction Meter

WM12 DIN/96



Power Analyzers

WM14 DIN/96 Basic & Advanced



WM22



WM3 96



Dimensions (mm) H x W x D	90 x 107,8 x 64,5 (DIN) 96 x 96 x 61.5 (96)	90 x 107,8 x 64,5 (DIN) 96 x 96 x 61.5 (96)	90 x 162.5 x 63	96 x 96 x 124
Description and measurements	3-phase multifunction meter System: V_{LL} , An, W, var, VA, W_{dmd} , VA_{dmd} , PF, Hz. Max: A, W_{dmd} . Single phase: V_{LL} , V_{LN} , A, W, var, VA, PF	3-phase power analyzer System: V_{LL} , V_{LN} , An, PF, W, var, VA, W_{dmd} , VA_{dmd} , Hz, kWh, kvarh, hour counter; Max: W_{dmd} , VA_{dmd} . Single phase: V_{LL} , V_{LN} , A, A_{dmd} , PF, W, var, VA, %THD-V, %THD-A; Max: V_{LN} , A, A_{dmd} , W. Min: V_{LN} , A, PF	MODULAR 3-phase power analyzer Direct connection up to 100A System: V_{LL} , W, var, VA, W_{dmd} , VA_{dmd} , PF, Hz, total Wh, total varh, partial Wh, partial varh. Single-phase: V_{LN} , A, W, var, VA, PF, %THD-V, %THD-A.	MODULAR 3-phase power quality analyzer System: V_{LN} , V_{LL} , An, W, var, VA, PF, Hz, W_{dmd} , VA_{dmd} , An $_{dmd}$, PF $_{dmd}$, Wh, varh Single-phase: V_{LN} , V_{LL} , A, W, var, VA, PF, THD-V, THD-A. Max: up to 12 variables Min: up to 8 variables
Input Specifications				
Voltage and currents	100/208 V_{LL} -1/5(6)AAC 400/660 V_{LL} -1/5(6)AAC	100/208 V_{LL} -1/5(6)AAC 400/660 V_{LL} -1/5(6)AAC	100 V_{LL} , 208 V_{LL} , 400 V_{LL} , 660 V_{LL} / In: 5A, Imax: 10AAC; 208 V_{LL} , 400 V_{LL} , 220 V_{LL} , 660 V_{LL} / Ib: 20A, Imax: 100AAC	240/415 V_{LL} -1/5 AAC 400/690 V_{LL} -1/5 AAC
Accuracy	±0.5% FS (V, A)	±0.5% FS (V, A)	±0.5% RDG (V, A)	±0.5% RDG (V, A)
Active energy		Class 1 (Advanced only)	Class 1 (EN61036)	Class 1 (EN61036)
Reactive energy		Class 2 (Advanced only)	Class 2 (EN61268)	Class 2 (EN61268)
Display	3 x 3 DGTs LED	3 x 3 DGTs, 8+1 DGTs (energy), LED	4 x 3 1/2 DGTs instant. var. 7 1/2 DGTs energies var.	4 x 4 DGTs backlighted graph LCD 4 x 9 DGTs (energies).
Output Specifications				
Pulse	None	2-open collector (Basic and Advanced)	2-open collector	Up to 4, made by: single, dual or quadruple open collector or relay modules
Alarm	None	2-relay (PLC-type, AND/OR control function on 16 variables) (Advanced only)	1-open collector or relay module	Up to 4, made by: single, dual or quadruple open collector or relay modules
Analogue	None	None	20mADC or 10VDC module	Up to 4, made by single/dual (mA/V) output modules
Serial communication	RS485	RS422/485	RS422/485 module	RS422/485 module RS232 + RTC module
Digital input	None	None	None	Up to 3 (W_{dmd} sync.)
Dupline	None	None	Active and reactive energies	None
General Specifications				
Power supply	24 VAC 48 VAC 115 VAC 230 VAC 18 to 60 VDC	18 to 60VAC/DC, (Advanced) 90 to 260VAC/DC (Advanced) 24 VAC (Basic) 48 VAC (Basic) 115 VAC, 230 VAC (Basic) 18 to 60 VDC (Basic)	Self power supply; Auxiliary power supply: 24VAC, 48VAC, 115VAC, 230VAC, 18 to 60VDC, 77 to 143VDC	18 to 60 VAC/DC 90 to 260 VAC/DC
Approvals/Marks	CE, cURus, cCSAus (WM12 96)	CE, cURus, cCSAus	CE	CE, cURus, CSA

Power Analyzers

Power Transducers

Transducer

WM4 96



WM5 96/PQT H



PQT 90



CPT DIN Basic & Advanced



CVT DIN



96 x 96 x 124	96 x 96 x 124 (WM5); 90 x 90 x 140 (PQT H)	90 x 90 x 140	83.5 x 45 x 98.5	89 x 71.5 x 58.5
MODULAR	MODULAR	MODULAR	Compact Basic power transducer and Advanced power transducer	Single phase transducer
Universal utility meter and power analyzer. Load profile indication. Alarm outputs, SMS messages (with external GSM terminal). Measurement of all instantaneous variables (like WM3). Energy, water and gas metering.	Smart power quality analyzer (WM5) / transducer (PQT H). System: V_{LN} , V_{LL} , An, W, var, VA, PF, Hz, kWh, kvarh. Single-phase: V_{LN} , V_{LL} , A, W, var, VA, PF, THD-V, THD-A. THD and single H up to the 63rd H (V, A)	3-phase power quality transducer. Alarm outputs, SMS messages (with external GSM terminal). Measurement of all instantaneous variables (like WM3). Energy, water and gas metering. 2MB memory + Real time clock (on request).	Sys: V_{LL} , V_{LN} , An, PF, W, var, VA, W_{dmd} , VA_{dmd} , Hz, kWh, kvarh, hour; Max: W_{dmd} , VA_{dmd} . Sing. ph: V_{LL} , V_{LN} , A, A_{dmd} , PF, W, var, VA, THD (A/V); Max: V_{LN} , A, A_{dmd} , W. Min: V_{LN} , A, PF, hour counter. Note: the characteristics are referred to the "Adv" version.	1-phase AC, DC Measurements V, A, Hz
240/415V _{LL} -1/5 AAC 400/690V _{LL} -1/5 AAC	120/208V _{LL} , 400/690V _{LL} In: 1/5A, I _{max} : 10AAC	240/415 V _{LL} -1/5 AAC 400/690 V _{LL} -1/5 AAC	120/208V _{LL} 400/690V _{LL} 1AAC and 5AAC	1A/100VAC; 60mVDC/10VDC 5A/100VAC; 5A/500VAC 200VDC/1ADC; 45 to 55Hz 55 to 65Hz; 350 to 450Hz
±0.5% RDG (V, A) Class 1 (EN61036) Class 2 (EN61260)	±0.2% RDG (V, A) Class 0.5 (EN62053-21) Class 2 (EN62053-23)	±0.5% RDG (V, A) Class 1 (EN61036) Class 2 (EN61260)	±0.5% RDG (V, A) Class 1 Class 2	±0.5% FS (V, A)
4 x 4 DGTs backlighted graph LCD 4 x 9 DGTs (energies)	4 x 4 DGTs backlighted LCD (WM5) 4 x 9 DGTs (energy) (WM5)	None	None	None
Up to 4, made by: single, dual or quadruple open collector or relay modules Up to 4, made by: single, dual or quadruple open collector or relay modules None	Up to 16, made by: single, dual or quadruple open collector or relay modules Up to 16, made by: single, dual or quadruple open collector or relay modules Up to 8, made by single/dual (mA/V) output modules	Up to 4, made by: single, dual or quadruple open collector or relay modules Up to 4, made by: single, dual or quadruple open collector or relay modules Up to 4, made by single/dual (mA/V) output modules	2-open collector 2-relay (PLC-type, AND/OR control function on 16 variables) Up to 3: 20mADC or 10VDC	None None 0 to 20 mA; 4 to 20 mA 0 to 10 V; ±1 VDC
RS 422/485 module, RS232 + RTC + 2MB data module; Internet/Ethernet communication with WEB server capability module Up to 6 (W_{dmd} sync., tariff selec.) None	RS422/485 module RS232+RTC module Optical port (ANSI C12.18/Modbus), Ethernet port 10/100 base T Up to 12 (W_{dmd} , VA_{dmd} sync.) None	RS 422/485 module, RS232 + RTC+2MB data module; Internet/Ethernet communication with WEB server capability module Up to 6 (W_{dmd} sync., tariff selec.) None	RS422/485, RS232 None None	None None
18 to 60 VAC/DC 90 to 260 VAC/DC	18 to 60VAC/DC, 90 to 260VAC/DC	18 to 60 VAC/DC 90 to 260 VAC/DC	18 to 60VAC/DC, 90 to 260VAC/DC	24 VAC 48 VAC 115 VAC 230 VAC
CE, cURus, CSA	CE, cURus, CSA	CE, cURus, CSA	CE, cURus, CSA	CE



List of modules: Modular Panel Mounting

Description	Channel	WM3 96	WM4 96	PQT 90	WM5 96	PQT H	Part Number
WM3-96 base		•					AD1016H
WM4-96 base			•				AD1040
PQT-90 base				•			AD1047
WM5-96 base with optical port					•		AD2001
WM5-96 base without optical port					•		AD2000
PQT H base						•	AD2020
240/415V-1/5AAC input for WM3/4, PQT-90		•	•	•			AQ1018
400/690V-1/5AAC input for WM3/4, PQT-90		•	•	•			AQ1019
240/415V-1/5AAC (10A) input for WM5, PQT H					•	•	AQ2030
120/208V-1/5AAC (10A) input for WM5, PQT H					•	•	AQ2031
18-60VAC/DC power supply		•	•	•	•	•	AP1021
90-260VAC/DC power supply		•	•	•	•	•	AP1020
20mADC analogue output	1	•		•			AO1050
10VDC analogue output	1	•		•			AO1051
±5mADC analogue output	1	•		•			AO1052
±10mADC analogue output	1	•		•			AO1053
±20mADC analogue output	1	•		•			AO1054
±1VDC analogue output	1	•		•			AO1055
±5VDC analogue output	1	•		•			AO1056
±10VDC analogue output	1	•		•			AO1057
20mADC analogue output	2	•		•			AO1026
10VDC analogue output	2	•		•			AO1027
±5mADC analogue output	2	•		•			AO1028
±10mADC analogue output	2	•		•			AO1029
±20mADC analogue output	2	•		•			AO1030
±1VDC analogue output	2	•		•			AO1031
±5VDC analogue output	2	•		•			AO1032
±10VDC analogue output	2	•		•			AO1033
20mADC analogue output	2				•	•	AO2050
10VDC analogue output	2				•	•	AO2051
±5mADC analogue output	2				•	•	AO2052
RS485 port	1	•	•	•	•	•	AR1034
RS485 port 115.2 kbps	1				•	•	AR2040
Relay output (pulse/alarm)	1	•	•	•	•	•	AO1058
Relay output (pulse/alarm)	2	•	•	•	•	•	AO1035
Open collector output (pulse/alarm)	1	•	•	•	•	•	AO1059
Open collector output (pulse/alarm)	2	•	•	•	•	•	AO1036
Open collector output (pulse/alarm)	4	•	•	•	•	•	AO1037
Digital inputs	3	•	•	•	•	•	AQ1038
Digital inputs + Aux	3		•	•	•	•	AQ1042
RS232 port + RTC	1	•			•	•	AR1039
RS232 port + RTC + 2MB data memory	1		•	•			AR1041
WEB server	1		•	•			AR1060
Internet/Ethernet port	1				•	•	AR1061

(*) Only for alarm purpose



List of modules: Modular DIN-rail Mounting

Description	Power Supply	Ch.	EM3 DIN	EM4 DIN	WM22 DIN	Part Number
EM3-DIN 400VL-L / 20(100)AAC	Self power supply		•			AE2000
EM3-DIN 208VL-L / 20(100)AAC	Self power supply		•			AE2001
EM3-DIN 660VL-L / 20(100)AAC	115VAC -15+10%		•			AE2002
EM3-DIN 660VL-L / 20(100)AAC	230VAC -15+10%		•			AE2003
EM4-DIN 400VL-L / 20(100)AAC	Self power supply			•		AG2200
EM4-DIN 208VL-L / 20(100)AAC	Self power supply			•		AG2201
EM4-DIN 400VL-L / 20(100)AAC	230VAC, 50-60Hz			•		AG2202
EM4-DIN 208VL-L / 20(100)AAC	230VAC, 50-60Hz			•		AG2203
EM4-DIN 660VL-L / 20(100)AAC	230VAC, 50-60Hz			•		AG2204
EM4-DIN 400VL-L / 20(100)AAC	115VAC, 50-60Hz			•		AG2205
EM4-DIN 208VL-L / 20(100)AAC	115VAC, 50-60Hz			•		AG2206
EM4-DIN 660VL-L / 20(100)AAC	115VAC, 50-60Hz			•		AG2207
EM4-DIN 400VL-L / 5(10)AAC	230VAC, 50-60Hz			•		AG2214
EM4-DIN 208VL-L / 5(10)AAC	230VAC, 50-60Hz			•		AG2215
EM4-DIN 660VL-L / 5(10)AAC	230VAC, 50-60Hz			•		AG2216
EM4-DIN 400VL-L / 5(10)AAC	115VAC, 50-60Hz			•		AG2217
EM4-DIN 208VL-L / 5(10)AAC	115VAC, 50-60Hz			•		AG2218
EM4-DIN 660VL-L / 5(10)AAC	115VAC, 50-60Hz			•		AG2219
EM4-DIN 100VL-L / 5(10)AAC	230VAC, 50-60Hz			•		AG2226
EM4-DIN 100VL-L / 5(10)AAC	115VAC, 50-60Hz			•		AG2227
EM4-DIN 400VL-L / 20(100)AAC	18-60VDC			•		AG2230
EM4-DIN 400VL-L / 5(10)AAC	18-60VDC			•		AG2233
EM4-DIN 100VL-L / 5(10)AAC	18-60VDC			•		AG2236
WM22-DIN 400VL-L / 20(100)AAC	Self power supply				•	AF2100
WM22-DIN 208VL-L / 20(100)AAC	Self power supply				•	AF2101
WM22-DIN 400VL-L / 20(100)AAC	230VAC, 50-60Hz				•	AF2102
WM22-DIN 208VL-L / 20(100)AAC	230VAC, 50-60Hz				•	AF2103
WM22-DIN 660VL-L / 20(100)AAC	230VAC, 50-60Hz				•	AF2104
WM22-DIN 400VL-L / 20(100)AAC	115VAC, 50-60Hz				•	AF2105
WM22-DIN 208VL-L / 20(100)AAC	115VAC, 50-60Hz				•	AF2106
WM22-DIN 660VL-L / 20(100)AAC	115VAC, 50-60Hz				•	AF2107
WM22-DIN 400VL-L / 5(10)AAC	230VAC, 50-60Hz				•	AF2114
WM22-DIN 208VL-L / 5(10)AAC	230VAC, 50-60Hz				•	AF2115
WM22-DIN 660VL-L / 5(10)AAC	230VAC, 50-60Hz				•	AF2116
WM22-DIN 400VL-L / 5(10)AAC	115VAC, 50-60Hz				•	AF2117
WM22-DIN 208VL-L / 5(10)AAC	115VAC, 50-60Hz				•	AF2118
WM22-DIN 660VL-L / 5(10)AAC	115VAC, 50-60Hz				•	AF2119
WM22-DIN 100VL-L / 5(10)AAC	230VAC, 50-60Hz				•	AF2126
WM22-DIN 100VL-L / 5(10)AAC	115VDC, 50-60Hz				•	AF2127
WM22-DIN 400VL-L / 20(100)AAC	18-60VDC				•	AF2130
WM22-DIN 400VL-L / 5(10)AAC	18-60VDC				•	AF2133
WM22-DIN 100VL-L / 5(10)AAC	18-60VDC				•	AF2136
0-20mADC analogue output		1			•	AO2920
0-10VDC analogue output		1			•	AO2921
Open collector output (pulse/ alarm)		2	•	•	•	AO2900
One relay+one o. collector (pulse/al.)		2	•	•	•	AO2910
Digital inputs + AUX		2		•		AQ2940
RS485 port		1		•	•	AR2950

Accuracy of the main variables



Standard-compliant energy metering



Housing front protection degree



Max measured current in case of direct connection



Display digit-number



Harmonic analysis



Asymmetry control



Max and/or minimum signal detection and storage



Data logging



Internal clock



Energy metering by time period



Load profile displaying and recording



Digital filter with action on display and signals output



Energy, gas, water metering, hour counter



Instantaneous variables metering



Thermal current



Digital inputs for gas/water metering or Wdmd synchronisation



Pulse outputs for energy retransmission



Analogue outputs for variable retransmission



Alarm outputs for variable control



Communication port



Management of external analogue modem



Management of external GSM modem and SMS messages



Logic control on alarms



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