

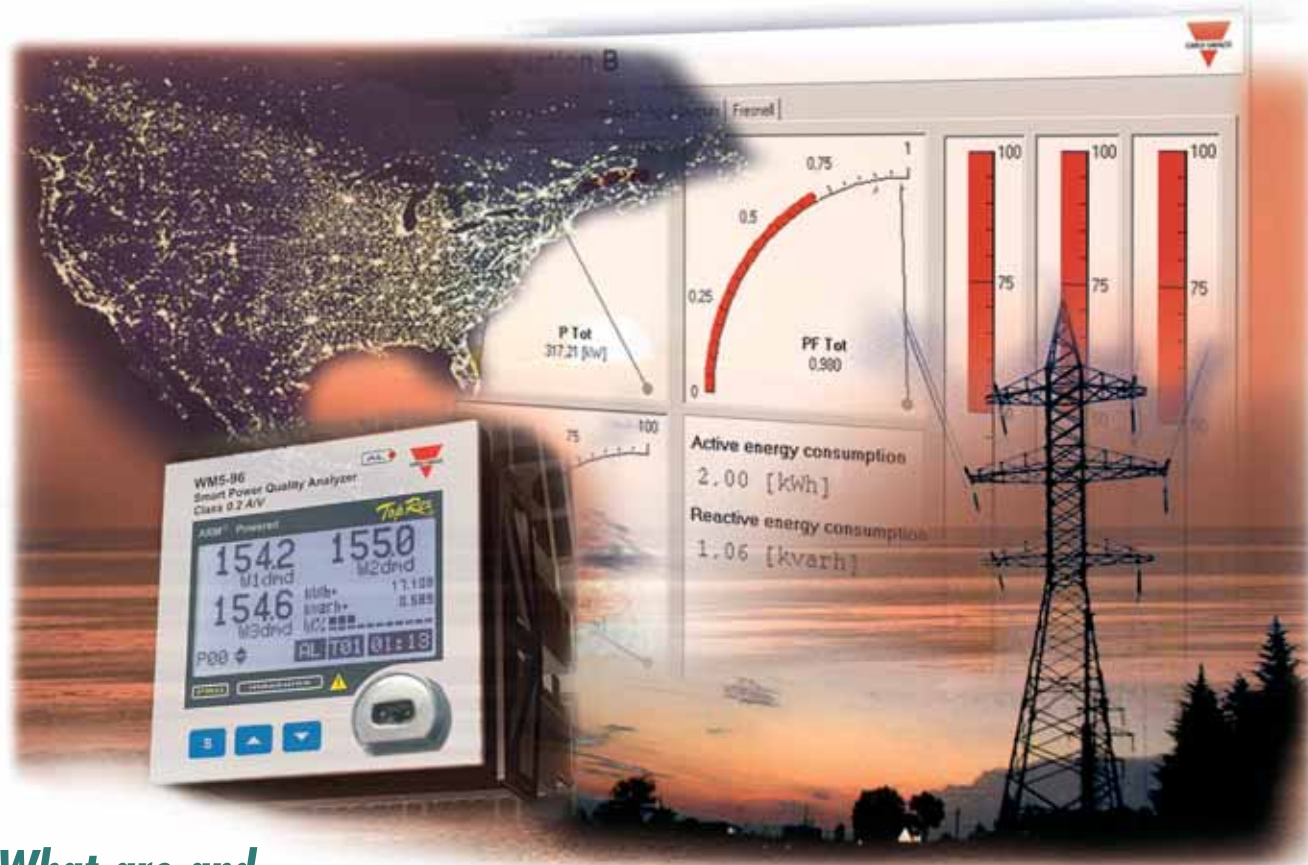
CARLO GAVAZZI
Automation Components



Solutions for Energy Management

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





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 exceeds

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 with external modem together with Wm4Soft or PqtSoft software.

- **Wireless communication:** if the high distances or specific applications are not allowing to use ordinary wired systems, the solution is called PqtKit with PqtSoft. A GSM/GPRS communication kit with a powerful network data download software.

- **Ethernet and Internet communication:** if it is needed to measure the variables exploiting the existing LAN, the solution is WM4 or PQT with AR1060 plug-in module or PowerSoft. It easily displays the variables, the consumptions and the trends in any enabled PC of the LAN. Moreover, using the WEB server capability of AR1060 or PowerSoft the same data can be shown outside the company.

- **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.



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, EM3, EM4, EM24, WM14, WM22, CPT, PQT

Panel mounting:

EM26, WM3, WM4, WM5, WM14, WM24.

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 Centres, 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



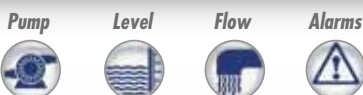
In the big and heavy industry as well as in the airports it is of fundamental importance to have a powerful control of the mains since medium voltage systems and very high currents are involved. Because of the type of loads, a low content of harmonics is crucial to let the installation work in a proper 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

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 installationsbus 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



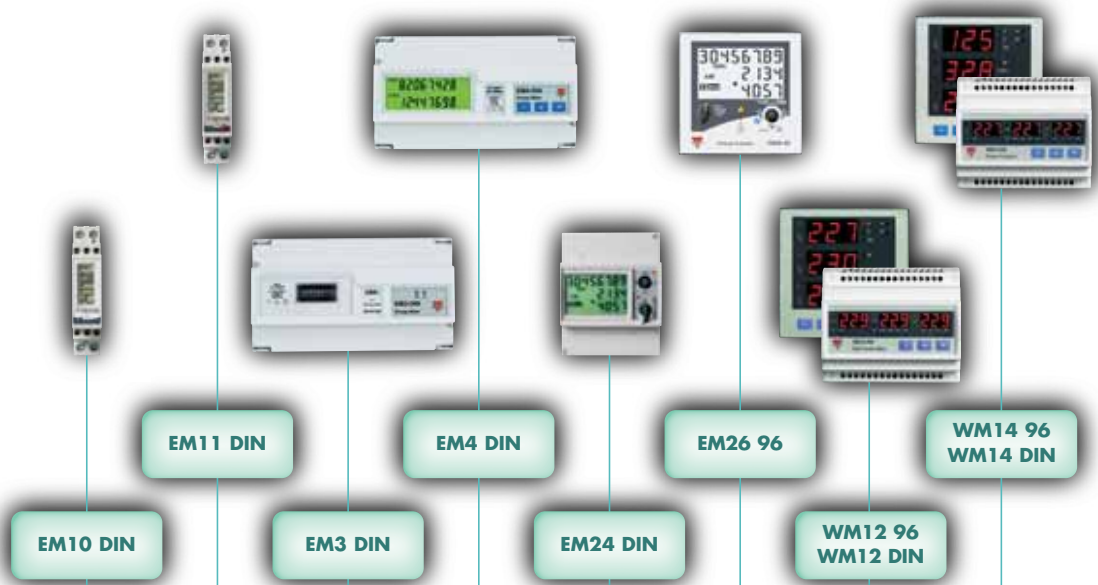
Telecom: Telecommunications



Telecom

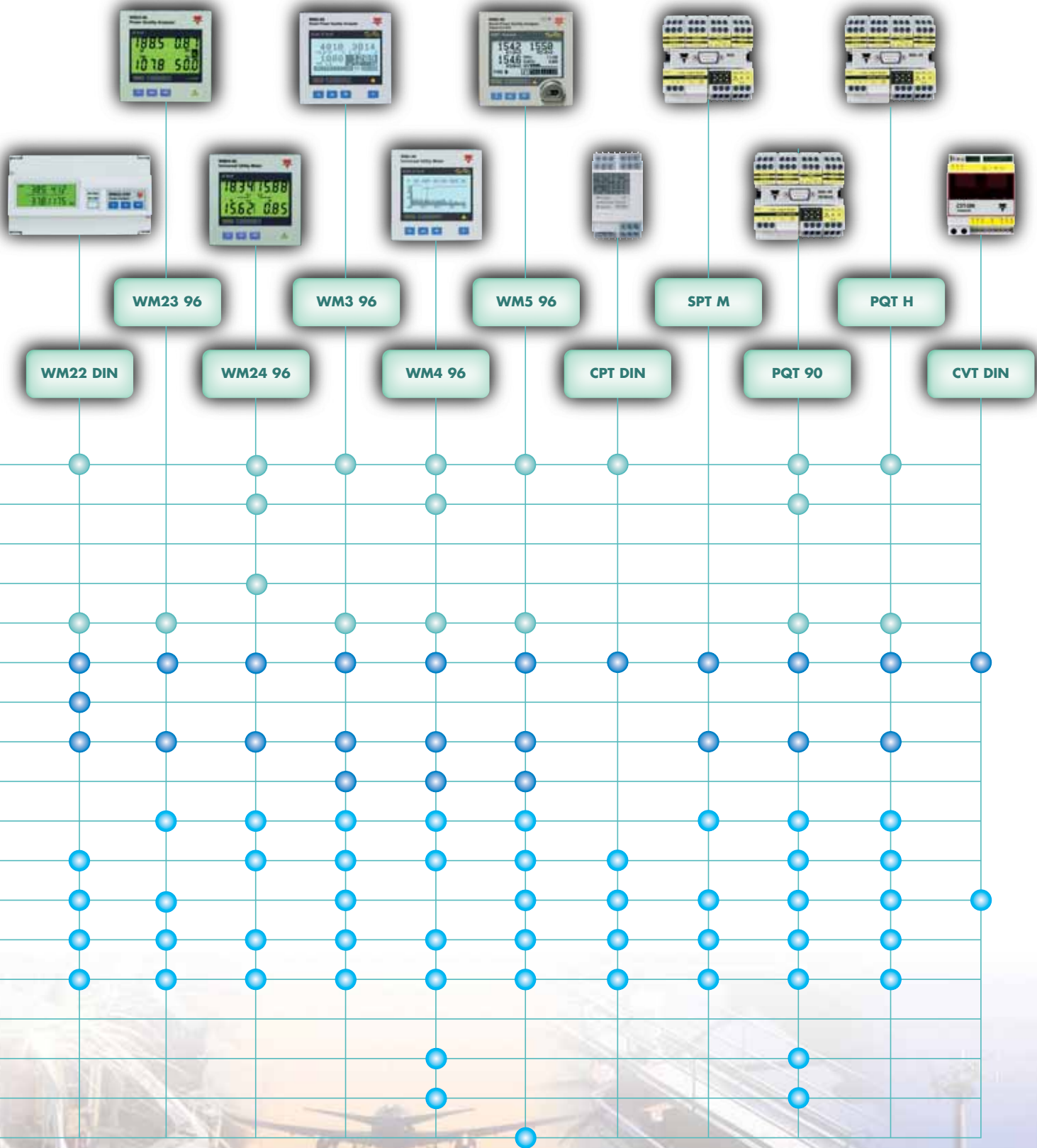
Everybody knows how important the mobile telecommunication is nowadays and will be even more in the future. The relevant antennas are installed in the field and have to grant the communication without problems. Since field telecommunication systems are not attended at all, it is needed to provide to 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 analysers.





Feature	EM10 DIN	EM11 DIN	EM3 DIN	EM4 DIN	EM24 DIN	EM26 96	WM12 96 WM12 DIN	WM14 96 WM14 DIN
Energy Metering	●	●	●	●	●	●	●	●
Gas and Water Metering				●	●	●		
Multi Function Metering							●	
Power 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								
Optical communication port								





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.

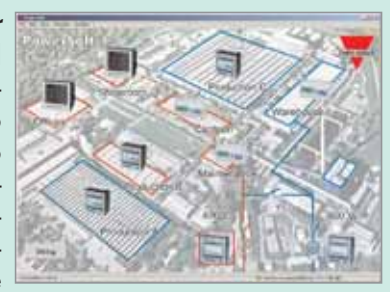
Direct variable page access
 by means of the front four-position selector programmable by the user.



Application oriented programming structure
 Selection of eight different applications like:
 Basic domestic - Shopping centres - 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 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 emails 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 the proper maintenance and to achieve cost reductions where possible.



EM3 DIN, EM4 DIN, EM24 DIN, WM22 DIN

Up to 100A available now

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



EM3 DIN, EM4 DIN, WM22 DIN

The sealing capability

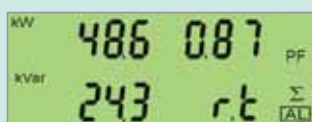
New tamper proof housing concept to grant a full connection and access to the programming parameters protection.



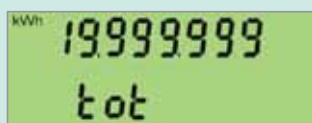
WM22 DIN

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.



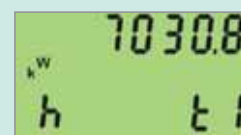
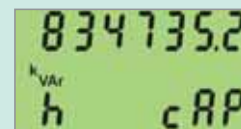
WM24 96

Four quadrants metering

that is imported inductive/capacitive kvar and exported inductive/capacitive kvar.

Tariff energy metering

based on t1-t2-t3-t4. Three input contacts can be used for tariff selection and/or as counter inputs to measure m³ of gas and water.



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, SPT M, PQT, PQT H, WM23, WM3, WM4, WM5

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.

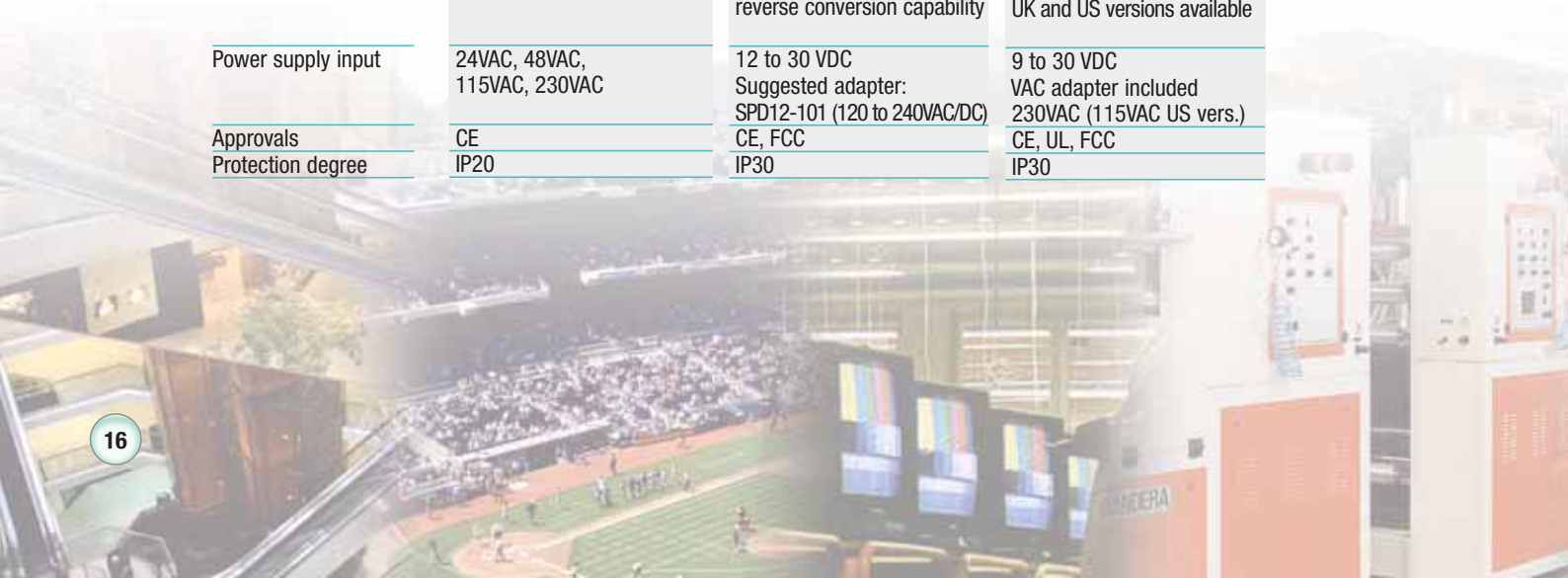


Communication Adaptor

Types



Description	RS485 to RS232 converter	RS422/RS485 to RS232 converter	Ethernet serial device server
Housing	Front: 142x80mm	Front: 100x67mm	Front: 100x67mm
Port 1	RS232	RS232	Ethernet, 10/100Mbps
Connections	9-pole, female	9-pole, female	RJ45
PIN assignment	2-TxD, 3-RxD, 5-GND	1-DCD, 2-TxD, 3-RxD, 4-DSR 5-GND, 6-DTR, 7-CTS, 8-RTS	
Port 2	RS485	RS422, RS485	RS232, RS422, RS485
RS485 working mode	4-wire communication only	2-wire and 4-wire communication	2-wire comm. (with automatic data direction control), RS485 4-wire communication
Line Bias	YES	NO	NO
Line termination	YES	NO	NO
Connections	Screw terminal block	Screw terminal block	9 pole, female
Baud rate	Max 19200 Baud	Max 230400 Baud	Max 230400 Baud
Protection	Port 1/Port 2/Power supply	Port 1/Port 2/Power supply	LAN/serial
Indication (by means of LEDs)	Power-on, Tx, Rx	Power-on, Tx, Rx	Power on, link, ready
Insulation	Port1/Port2: 2kV Port1/Port2 and power supply: 4kV	Port1/Port2: 2kV (option I) Port1/Port2 and power supply: 2kV (option I)	LAN/serial: 1.5kV
Operating temperature	0 to +50°C (R.H. ≤90% non condensing)	-20 to +60 °C (R.H. 90% to 95% N.C.)	0 to +55 °C (R.H. 90% to 95% N.C.)
Storage temperature	-10 to +60°C (R.H. ≤90% non condensing)	-20 to +85 °C (R.H. 90% to 95% N.C.)	-20 to +85 °C (R.H. 90% to 95% N.C.)
Included set	1.8m cable with 9-to-9-pole connectors, power supply cable	DIN-rail mounting kit, wiring diagrams	DIN-rail mounting kit, 9-pole serial cable, power supply adaptor, null modem 9-pole adaptor, software, quick guide
Other characteristics	Wrong-line connection and full overvoltage protection. Reverse conversion capability	ESD protection for serial signals: 15kV; power reverse protection; wall mountable; reverse conversion capability	ESD protection for serial signals: 15kV; wall mountable; reverse conversion capability UK and US versions available
Power supply input	24VAC, 48VAC, 115VAC, 230VAC	12 to 30 VDC Suggested adapter: SPD12-101 (120 to 240VAC/DC)	9 to 30 VDC VAC adapter included 230VAC (115VAC US vers.)
Approvals	CE	CE, FCC	CE, UL, FCC
Protection degree	IP20	IP30	IP30





EM1 DIN



Authorised User No. 00042



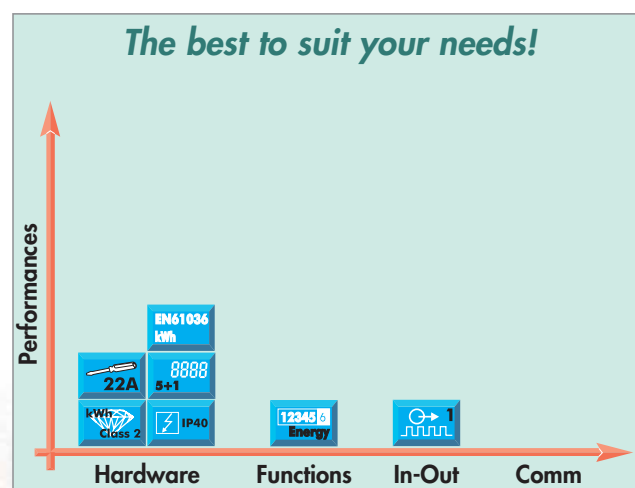
Energy Meter EM1 DIN

Housing (H x W x D)	89x35x58.5mm (2 DIN module)
Display type Var. on display	Mechanical YES
Instantaneous variables	N.A
Energy variables	5+1 DGT (0.1kW)
Accuracy	Class 2 (EN61036)
Temp. drift Refresh rate	≤200ppm/°C NA
System type	1-phase
Voltage inputs (Un)	230VAC
Current inputs (Ib/I_{max})	Ib:15A, I _{max} : 22.5AAC
Digital inputs	N.A.
Primary of CT/ VT	N.A.
Measurements:	TRMS method
Variables	kWh
Harmonic distortion	N.A.
Outputs:	
Pulse	1 (open collector)
Alarm	N.A.
Analogue	N.A.
Serial	N.A.
Digital filter	N.A.
Other characteristics	Start up current: 50mAAC
Approvals	CE
Power supply	Self power supply
Protection degree	IP40

EM1 DIN is an electromechanical space-saving solution: in only 2-DIN module housing there is a complete active energy meter.

EM1 DIN, can also be used as a remote unit to transmit the measured active energy to a PLC by means of the optional pulse output.

The best to suit your needs!





EM10 DIN EM11 DIN

EM10 DIN is a base 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 YES
Instantaneous variables	4 DGT (only EM11-DIN)
Energy variables	5 + 1 DGT
Accuracy	W-VA-PF:±(1% RDG+2DGT) var:±(2% RDG+2DGT) V LN-A:±(0.5% RDG+2DGT) Class 1 (kWh) EN62053-21 Class 2 (kvarh) EN62053-23
Temp. drift Refresh rate	≤200ppm/°C 1.5 times / s
System type	1-phase
Voltage inputs (Un)	230VAC
Current inputs (Ib/I_{max})	Ib: 5A, I _{max} : 32AAC
Digital inputs	N.A.
Primary of CT/ VT	N.A.
Measurements:	TRMS method.
EM11 Variables	V _{LN} , A, Hz, W, W _{dmd} , var, PF, kWh, kvarh
EM10 Variables	kWh
Harmonic distortion	N.A. EM10 variables kWh
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) with buzzer alert in case of over power. Alarm to be set on any available variable Start-up current: 20mAAC
Approvals	CE, EM10-DIN MID certification
Power supply	Self power supply
Protection degree	IP40

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.





Authorised User No. 00042



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.

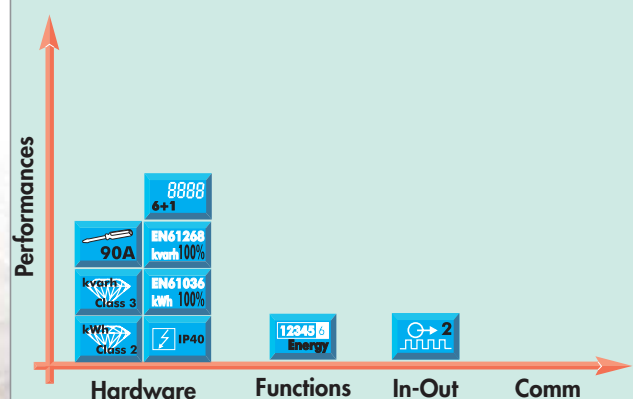


Modular Energy Meter EM3 DIN

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/I_{max})	Ib: 20A, I _{max} : 90AAC
Digital inputs	N.A.
Primary of CT/VT	N.A.
Measurements:	TRMS method
Variables	kWh or kvarh (selectable)
Harmonic distortion	N.A.
Outputs:	2 (open collector type)
Pulse	N.A.
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 more reliable.
- Direct connection up to 90A 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 Energy Meter EM4 DIN

Housing (H x W x D)	90x162.5x63 (9 DIN modules)
Display type	LCD (back lighted)
Variables on display	YES
Instantaneous variables	3 1/2 DGT
Energy variables	8 DGT + 7 1/2 DGT
Accuracy	Class 1 (EN61036) Class 2 (EN61268)
Temperature drift	≤200ppm°/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) 1 (open collector or relay)
Pulse	N.A.
Alarm	N.A.
Analogue	RS422/485 (Modbus)
Serial	kWh and kvarh data transmission, water (hot - cold) and gas inputs and relevant data transmission
Dupline	N.A.
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

- 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!

100A direct connection available now.

Hardware	Functions	In-Out	Comm
<ul style="list-style-type: none"> 100A 10A kvarh Class 2 kWh Class 1 	<ul style="list-style-type: none"> 8888 ENG1268 kvarh 100% ENG1036 kWh 100% IP40 	<ul style="list-style-type: none"> W W_{dmd} 1 4 12345 GAS 12345 H₂O 12345 Energy 	<ul style="list-style-type: none"> Dupline RS422 RS485



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.

Energy Analyzer EM24 DIN

Housing (H x W x D)	90x71x65mm (4 DIN modules)
Display type	LCD (STN technology)
Variables on display	YES
Instantaneous variables	3x 4 DGT
Energy variables	8 DGT
Accuracy	W-VA-PF:±(1% RDG+2DGT) var:±(2% RDG+2DGT) V LN-A:±(0.5% RDG+1DGT) V LL:±(1% RDG+1DGT) Class 1 (kWh) EN62053-21/EN50470-3 Class 2 (kvarh) EN62053-23
Temperature drift	≤200ppm/°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 60kA; VT up to 600kV
Measurements:	TRMS method
Variables	Sys: V _{LL} , V _{LN} , A _{dmd max} , var, VA, W _{dmd} , W _{dmd max} , VA _{dmd} , VA _{dmd max} , Hz, kWh, kvarh, h; single-phase: V _{LL} , V _{LN} , 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)
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 and MID certification
Protection degree	IP40

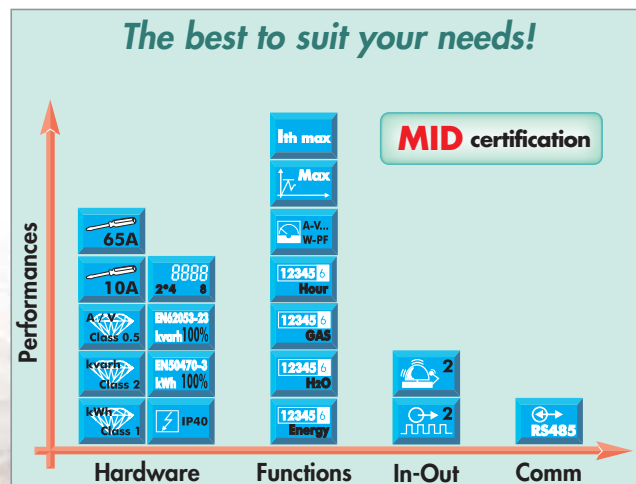


EM24 DIN can also be panel mounted by means of the front adaptor "4DIN96 Adapter".

The main advantages:

- Space saving on small switchgears 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 EN62053-23.
- 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!





EM26 96

EM26 96 is a panel mounting Energy Analyzer for three phase unbalanced systems capable to perform not only an extended consumption analysis but also keeping under control all the electrical parameters, Harmonics included.



Energy Analyzer EM26 96

Housing (H x W x D)	96x96x61.4mm
Display type	LCD (2-colour with back light STN technology)
Variables on display	YES
Instantaneous variables	3x 4 DGT
Energy variables	8 DGT
Accuracy	W-VA-PF: ±(1% RDG+2DGT) var: ±(2% RDG+2DGT) V LN-A: ±(0.5% RDG+1DGT) V LL: ±(1.5% RDG+1DGT) THD: ±(2% RDG+1DGT) Class 1 (kWh) EN62053-21/EN50470-3 Class 2 (kvarh) EN62053-23
Temperature drift	≤200ppm/°C
Refresh rate	1.5 times/s
System type	Unbalanced: 2-3-phase; bal.: 1-3-ph.
Voltage inputs (Un)	120/208VAC, 400/660VAC
Current inputs (In/Imax)	In: 1/5A, Imax: 10AAC
Digital inputs	3 independent (H ₂ O/gas counter or 4-time period selection)
Primary of CT/VT	Prog: CT up to 60kA; VT up to 600kV
Measurements:	TRMS method
Variables	Sys: VLL, VLN, An, A _{dmd max} , var, VA, W _{dmd} , W _{dmd max} , VA _{dmd} , VA _{dmd max} , Hz, kWh, kvarh, h; single-phase: VLL, VLN, A, W, var, VA, PF, %THD-V, %THD-A, kWh, kvarh
Harmonic distortion	THD up to 15th H (V and A)
Outputs:	Pulse: 3-open collector or 2-relay Alarm: 3-open collector or 2-relay Analogue: N.A. Serial: RS485 (2-wire, Modbus)
Digital filter	Action: on variables and outputs
Other characteristics	Phase sequence indication and control
Power supply	18 to 60VAC/DC, 90 to 260VAC/DC
Approvals	CE, cULus
Protection degree	IP50

The main advantages:

- Suitable to be mounted on any switch or control-gear by means of only 46 mm housing behind the panel.
- Wide angle variable readability by means of a sharp and two colour back lighted LCD display (STN technology).
- Better and more reliable energy measurements fulfilling both the new European standards EN50470-3 and EN62053-23.
- 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.
- Extended alarm control on any available variable by means of up to three digital outputs with display warning based on back light colour changing.
- Load failure prevention thanks to the harmonic analysis and control.
- Easy programming using the application oriented programming structure.
- Easy variable scrolling by means of the front joystick.
- Wide interfacing capability using up to 3 pulse outputs or the RS485 communication port.

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

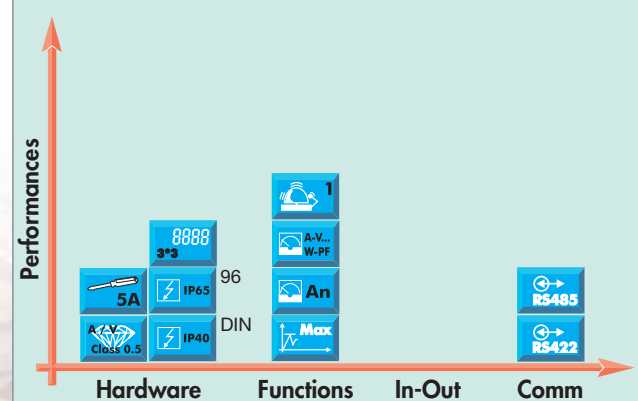
Housing (H x W x D)	90x107.5x64.5mm (6 DIN mod.) (WM12 DIN) 96x96x61.5mm (WM12 96)
Display type	LED
Variables on display	YES
Instantaneous variables	3 DGT
Energy variables	N.A.
Accuracy	W-VA: ±(1% F.S. +1DGT) var: ±(2% F.S. +1DGT) V _{LL} : ±(1.5% F.S. +1DGT) V _{LN} -A: ±(0.5% F.S. +1DGT)
Temperature drift	≤200ppm/°C
Refresh rate	1.5 times / s
System type	Unbalanced: 1-2-3-phase
Voltage inputs (U_n)	100/208VAC, 400/660VAC
Current inputs (I_n)	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 now 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
Variables on display	YES
Instantaneous variables	3 DGT
Energy variables	8+1 DGT
Hours	5+2 DGT
Accuracy	W-VA: ±(1% F.S. +1DGT) var: ±(2% F.S. +1DGT) V _{LL} : ±(1.5% F.S. +1DGT) V _{LN} -A: ±(0.5% F.S. +1DGT) kWh: d. 1(Adv), 2(Bas); kvarh: d. 2(Adv), 3(Bas) ≤200ppm/°C
Temperature drift	
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:	
Pulse	2 (open collector)
Alarm	16 with OR/AND function (2 relays)
Analogue	N.A.
Serial	RS422/485 (Modbus), Profibus DP V0
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



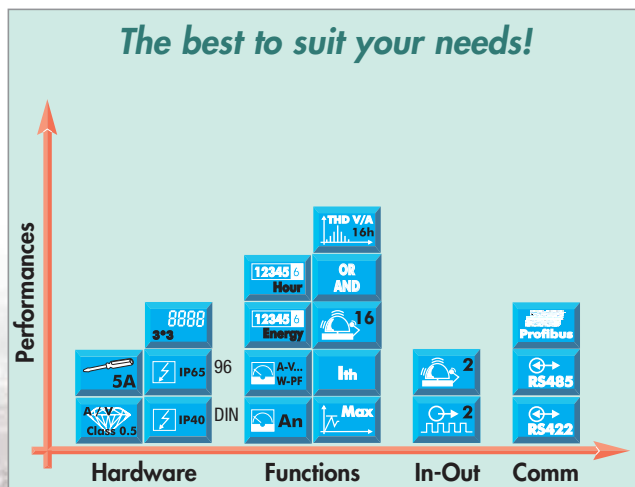
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- Basic version only
- Insulated current inputs
- Universal AC/DC power supply.

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 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-L.

The remarkable features of WM22 DIN

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



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Modular Power Analyzer WM22 DIN

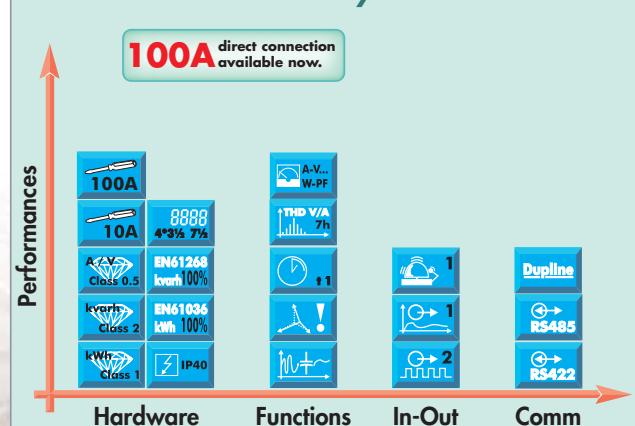
Housing (H x W x D)	90x162.5x63mm (9 DIN modules)
Display type	LCD (back lighted)
Variables on display	YES
Instantaneous variables	4x3 1/2 DGT
Energy variables	7 1/2 DGT
Accuracy	V _{in} -A: ±(0.5 RDG+1DGT) W-VA: ±(1% RDG+1DGT) Class 1 (EN61036) Class 2 (EN61268)
Temperature drift	≤200ppm/°C
Refresh rate	2 times/s
System type	Unbalanced: 3-phase
Voltage inputs (Un)	57/100VAC, 120/208VAC, 230/400VAC, 380/660VAC
Current inputs (In/lb/lmax)	In: 5A, lmax: 10AAC lb: 20A, lmax 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 _{amd} , VA _{amd} , PF, Hz, total Wh, total varh, partial Wh, partial varh. Single-phase: V _{LN} , A, W, var, VA, PF, THD.
Harmonic distortion	THD up to the 7th H (V and A)
Outputs:	
Pulse	2 (open collector)
Alarm	1 (open collector or relay)
Analogue	1 (20mADC, 10VDC)
Serial	RS422/485 (Modbus)
Dupline	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

- 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!





WM23 96

WM23 96 is a modular power quality analyzer that allows the operator to continuously monitor the mains. All measurements with a direct connection up to 830VAC (phase-phase), up to 20kV (VT connection) and up to 5.000A (CT connection) allow the operator to use WM23 96 in all the light and medium industry applications. This flexible instrument has a standard IP65 protection degree, a 0.5 accuracy class, an FFT analysis up to the 16th harmonics and, on



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Modular Power Quality Analyzer WM23 96

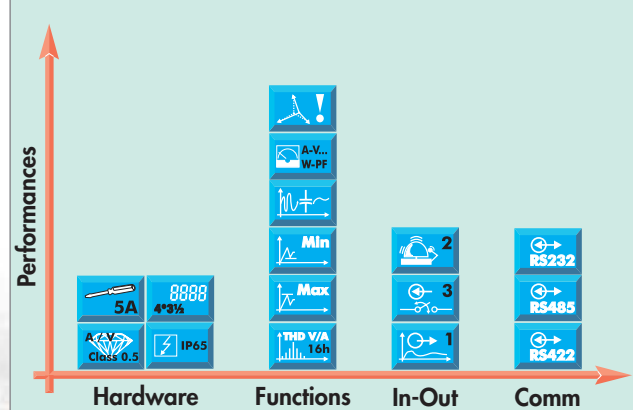
Housing (H x W x D)	96x96x124mm
Display type	LCD (back lighted)
Variables on display	YES
Instantaneous variables	4x3 1/2 DGT
Energy variables	N.A.
Accuracy	V _{LN} -A: ±(0.5% F.S.+2DGT) V _{LL} -W-VA: ±(1% F.S. +2DGT) var: ±(2% F.S. +2DGT) THD: ±(3% F.S. +2DGT)
Temperature drift	≤200ppm/°C
Refresh rate	1.5 times/s
System type	Unbalanced: 3-phase
Voltage inputs (Un)	57/100VAC, 120/208VAC, 230/400VAC, 380/660VAC
Current inputs (In)	5AAC
Digital inputs	2 for W _{dmd} and VA _{dmd} synchronization 1 for program lock
Primary of CT/VT Measurements:	Prog.: CT up to 5,000A; VT up to 20kV
Variables	TRMS method Sys: V _{LN} , V _{LL} , A _n , W, var, VA, W _{dmd} , VA _{dmd} , PF, Hz. Single-phase: V _{LN} , V _{LL} , A, W, var, VA, PF, THD. THD up to 16th H (V and A)
Harmonic distortion	N.A.
Outputs:	Pulse N.A. Alarm Up to 2 (relay or open collector) Analogue 1 (5mA, 10mA, 20mA, 1V, 5V, 10V DC) Serial RS485, RS232 (Modbus)
Digital filter	Action: on variables and outputs
Other characteristics	Modular concept, plug-in modules. Phase asymmetry control
Power supply	24, 48, 115, 230VAC; 18 to 60V AC/DC, 90 to 260VAC/DC
Approvals	CE, cURus, cCSAus
Protection degree	IP65, NEMA4x, NEMA12

request, up to 2 alarms, one analogue output and one RS422/485 or RS232 communication port.

WM23 96 can be equipped with different modules like the three digital input ones. Two of those inputs can be connected to the official Watt-hour meter to synchronise the W and VA demand calculation, while the last input can be used to lock the programming of the equipment.

This power quality analyzer is able to show the current and the voltage total harmonic distortion on which it is possible to connect an alarm output. The wide LCD display with a high contrast feature is able to show all the measurements and, in addition, the recording of the MAX active powers (W_{L1}, W_{L2}, W_{L3}, on request A_{L1}, A_{L2}, A_{L3} max value, W_{sys}, W_{dmd}) and the MIN power factors (PF1, PF2, PF3, PF_{sys}).

The best to suit your needs!





WM24 96

WM24 96 is a modular universal utility meter that allows the operator to continuously monitor the mains and measure energy, gas and water by total or partial metering. All measurements with a direct connection up to 830VAC (phase-phase), up to 20kV (VT connection) and up to 5.000A (CT connection) allow the operator to use WM24 96 in all the light and medium industry applications. This universal utility meter has a standard IP65 protection degree and the



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Modular Universal Utility Meter WM24 96

Housing (H x W x D)	96x96x124mm
Display type	LCD (back lighted)
Variables on display	YES
Instantaneous variables	4x3 1/2 DGT
Energy variables	7 1/2 DGT
Accuracy	V _{LN} -A: ±(0.5% RDG+1DGT) W-VA: ±(1% RDG+1DGT) Class 1 (EN61036) Class 2 (EN61268)
Temperature drift	≤200ppm/°C
Refresh rate	1.5 times/s
System type	Unbalanced: 3-phase
Voltage inputs (Un)	57/100VAC, 120/208VAC, 230/400VAC, 380/660VAC
Current inputs (In)	5AAC
Digital inputs	2 for time period management 1 for program lock
Primary of CT/VT	Prog.: CT up to 5,000A; VT up to 20kV
Measurements:	TRMS method
Variables	Sys: V _{LN} , V _{LL} , W, var, VA, W _{dmd} , VA _{dmd} , PF, Hz, total varh, partial Wh, partial varh, gas, H ₂ O. Single-phase: V _{LN} , A, W, var, VA, PF.
Harmonic distortion	N.A.
Outputs:	Pulse Up to 2 (open collector or relay) Alarm Up to 2 (relay or open collector) Analogue N.A. Serial RS485, RS232 (Modbus)
Digital filter	Action: on variables and outputs
Other characteristics	Modular concept, plug-in modules, phase asymmetry control, energy time period management
Power supply	24, 48, 115, 230VAC; 18 to 60V AC/DC, 90 to 260VAC/DC
Approvals	CE, cURus, cCSAus
Protection degree	IP65, NEMA4x, NEMA12

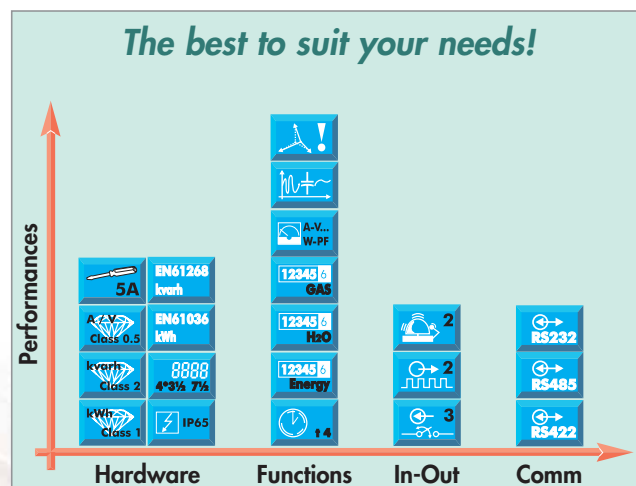
metering of energy is in compliance with “EN61036” (class 1) and “EN61268” (class 2).

WM24 96 is capable to measure and control, by means of the two optional alarm outputs, all the main variables and the maximum demanded power.

It is able to measure and display the total energies in the four quadrants (+kvar-L, -kvar-L, +kvar-C, -kvar-C). The access to the programming parameters can be locked in order to avoid undesired modifications.

Furthermore the measured energies can be managed by time/period tariffs: t1-t2-t3-t4 by means of two input contacts. Those contacts can be used, in alternative, as counter inputs to measure m³ of gas and water.

The best to suit your needs!





WM3 96

WM3 96 is a modular analyzer of power quality that, thanks to a 32-bit μ -Processor, allows the operator to continuously and completely monitor the mains. All measurements with a direct connection up to 830VAC (phase-phase), up to 600kV (VT connection) and up to 30kA (CT connection) allow the operator to use WM3 96 in any kind of installation. WM3 96 is a flexible and a powerful instrument that can be used in every situation, thanks to its mechanical and electrical features, such as for



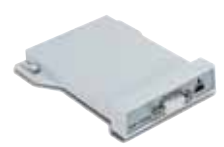
Modular Power Quality Analyzer WM3 96

Housing (H x W x D)	96x96x124mm
Display type	Graphic, back lighted LCD
Variables on display	YES
Instantaneous variables	Sel: 4x3 1/2 DGT or 4x4 DGT
Energy variables	4x9 DGT (total), 4x6 DGT (partial)
Accuracy	$V_{rms}-A: \pm(0.5 RDG+1DGT)$ Hz: $\pm 0.1\%$ F.S. THD: $\pm 1\%$ F.S. Class 1 (EN61036) Class 2 (EN61268)
Temperature drift	$\leq 200ppm/^{\circ}C$
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: $V_{Ln}, V_{Ll}, A, W, var, VA, PF, THD$. THD and single H up to the 50th H (V, A)
Harmonic distortion	
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.



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.

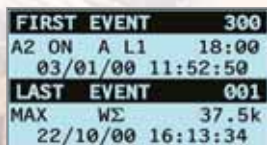
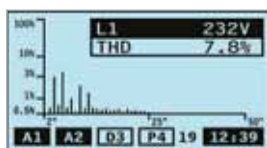
They are mainly due to the harmonic contents of currents and voltages.

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.



WM4 96



WM4 96 is an Universal Utility meter and Power Quality Analyzer. This high-tech instrument has been developed to meet the most advanced application needs. WM4 96 offers 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/M) with source detection and control; up to 4 alarms for a

Modular Universal Utility Meter WM4 96

Housing (H x W x D)	96x96x124mm
Display type	Graphic, LCD back lighted
Variables on display	YES
Instantaneous variables	Sel: 4x3 1/2 DGT or 4x4 DGT
Energy variables	4x9 DGT (total), 4x6 DGT (partial)
Accuracy	V _u -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	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} , An, 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	
Outputs:	Up to 4 (open collector or relay)
Pulse	Up to 4 (open collector or relay)
Alarm	N.A.
Analogue	RS485, RS232, (Modbus), Ethernet, Modem-GSM management
Serial	
Digital filter	Action: on variables and outputs
Other characteristics	Real time clock with alarms and variable recording (2Mb memory); 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	IP65, NEMA4x, NEMA12

powerful variable control; alarms logging and data stamping.

- Remote control facilities: up to 4 pulse outputs, RS485 port and RS232 port (Modbus RTU), Ethernet port.
- Load profile display to keep supply costs under control.
- Energy cost allocation with independent import/export kWh/kvarh and kWh/kvarh multi-tariff management.
- Water and gas metering and communication using the same instrument.

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



Ethernet capability
By AR1060 WEB server module (page 38)

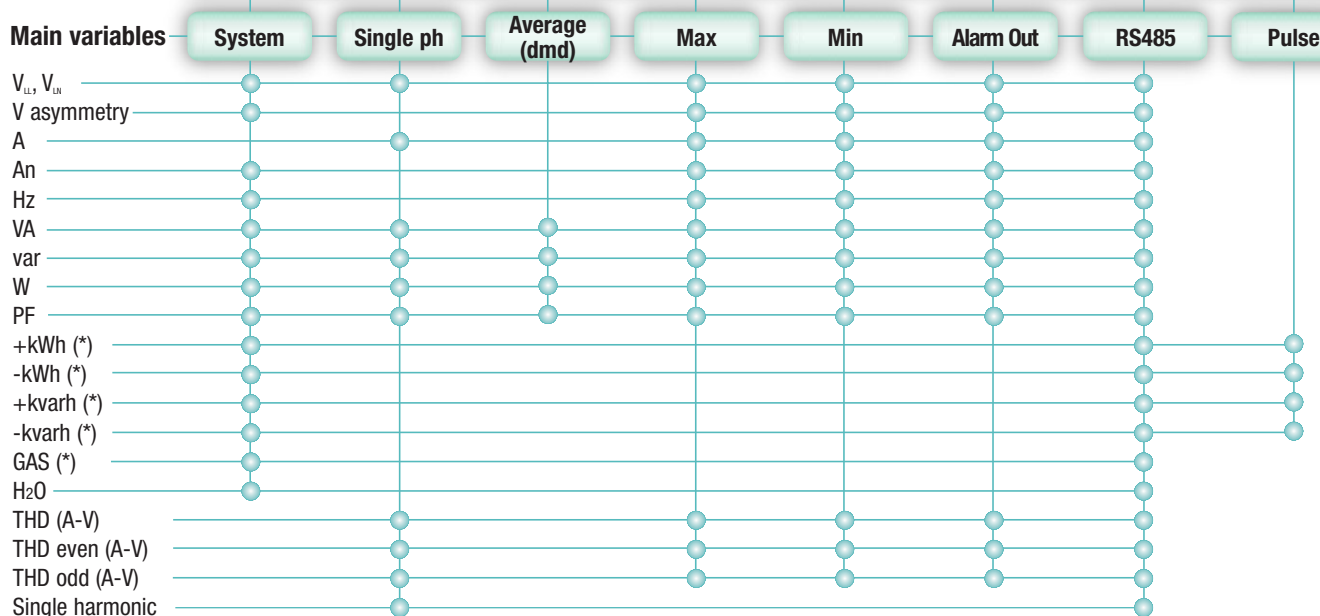
The best to suit your needs!

Performances ↑	5A	8888 4*4 9	THD V/A 50h	WEB SERVER
	Max Min	EN61268 1varh	12345 GAS	GSM
	Class 0.5	EN61268 2Mb	12345 HzO	Modem
	Class 2	EN61036 kWh	12345 Energy	4
Class 1	IP65	1 4	4	4
			6	6
				RS232
				RS485
				RS422

Hardware Functions In-Out Comm



Variables that can be monitored and displayed



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



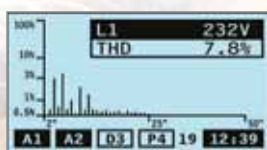
The 3 interfacing methods of WM4 96 with the official watt-hour meter are:

- 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).

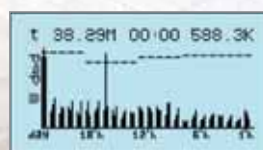
Powerful variable analysis and great communication capabilities: this is the strength of WM4 96



- 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 communication software to download, manually or automatically (via RS485-analogue modem-GSM modem), up to 2Mb data stored in WM4 96. This information can be simply plotted in an Excel spreadsheet.
- Continuous data stamping and communication: RS232, RS485, modem, GSM, or Ethernet/Internet port.
- Powerful data acquisition by means of Wm4Soft 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.



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 DGT; PQT H: 4 DGT format
Energy variables	4x9 DGT
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_{end} , V_{end} synchro. and others
Primary of CT/VT	Prog.: CT up to 60,000A; VT up to 600kV
Measurements:	TRMS method
Variables	Sys: $V_{L1}, V_{L2}, A_n, W, \text{var}, VA, PF, Hz, Wh, \text{varh}$, Single-phase: $V_{\text{eff}}, V_{\text{eff}}, A, W, \text{var}, VA, PF, THD$. All variables: min-max-dmd calcul.
Harmonic distortion	THD and single H up to the 63rd H (V, A)
Outputs:	Pulse: Up to 16 (open collector or relay) Alarm: Up to 16 (open collector or relay) Analogue: Up to 8 ($\pm 5\text{mA}$, $+20\text{mA}$, $+10\text{V DC}$) Serial: RS485/232 (Modbus), Ethernet 10/100 base TX
Digital filter	Action: on variables and outputs
Other characteristics	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

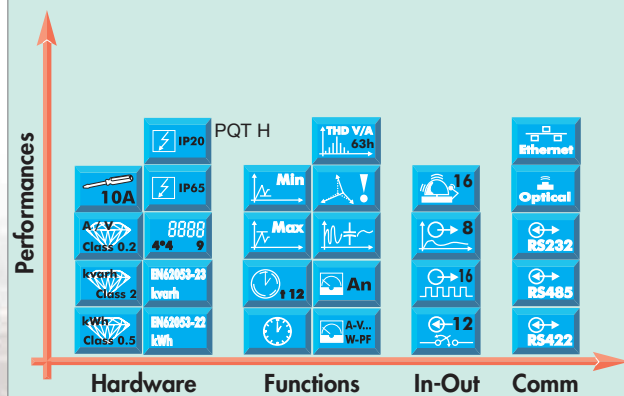
demanding applications. They offer many advantages and solutions that can be summarised in:

- 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 h) 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}	●	●	●	●	●	●	●		●
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



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.

The most important benefits in the advanced version are:

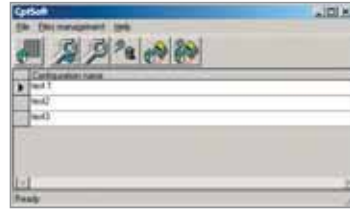
- Integrated and extended AC and DC power supply for full

Compact Power Transducer CPT DIN Basic and Advanced functions

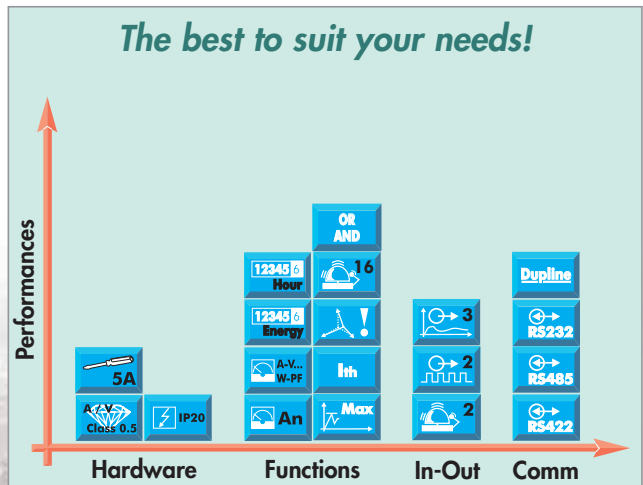
Housing (H x W x D)	83.5 x 45 x 98.5 mm
Variables on display	N.A.
Instantaneous variables	4 DGT format
Energy variables	8+1 DGT format
Hours	5+2 DGT format
Accuracy	W-VA: ±(1% F.S. + 1DGT) var: ±(2% F.S. + 1DGT) V _{LL} : ±(1.5% F.S. + 1DGT) V _{LN} -A: ±(0.5% F.S. + 1DGT) kWh: class 1 kvarh: class 2
Temperature drift	≤200ppm/°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} , A _n , 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) Dupline Active and reactive energies + 8 variables
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, cCSAus
Protection degree	IP20



- 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 histogram is related to the Advanced version.





SPT M

SPT M is a programmable “Smart” Transducer, for the measurement of all major characteristics of an electrical system including power, voltage, current, frequency and harmonics.

The SPT M series has a large number of functions available to the user.

Configuration, control and data reading can be done in field, interfacing the transducer at high levels as a remote unit.



Authorised User No. 00042



Modular Smart Power Transducer SPT M

Housing (H x W x D)	90x90x140mm
Display type	N.A.
Variables on display	N.A.
Instantaneous variables	3 1/2 DGT format
Energy variables	N.A.
Accuracy	V _{LN} -A: ±(0.5% F.S. +2DGT) V _{LL} -W-VA: ±(1% F.S. +2DGT) var: ±(2% F.S. +2DGT) THD: ±(3% F.S. +2DGT)
Temperature drift	≤200ppm/°C
Refresh rate	1.5 times/s
System type	Unbalanced: 3-phase
Voltage inputs (Un)	57/100VAC, 120/208VAC, 230/400VAC, 380/660VAC
Current inputs (In)	5AAC
Digital inputs	2 for W _{dmd} and VA _{dmd} synchronization
Primary of CT/VT	Prog.: CT up to 5,000A; VT up to 20kV
Measurements:	TRMS method
Variables	Sys: V _{LN} , V _{LL} , An, W, var, VA, PF, Hz, W _{dmd} , VA _{dmd} . Single-phase: V _{LN} , V _{LL} , A, W, var, VA, PF, THD. THD up to 16th H (V and A)
Harmonic distortion	N.A.
Outputs:	Pulse N.A. Alarm Up to 2 (relay or open collector) Analogue 1 (5mA, 10mA, 20mA, 1V, 5V, 10V DC) Serial RS485, RS232 (Modbus)
Digital filter	Action: on variables and outputs
Other characteristics	Modular concept, plug-in modules. Phase asymmetry control
Power supply	18 to 60VAC/DC, 90 to 260VAC/DC
Approvals	CE, cURus, cCSAus
Protection degree	IP20

The advantages

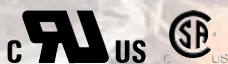
Compared to a traditional transducer, SPT M offers:

- TRMS measurements, that means reliable and true measurements not affected by distortion.
- Selection among many types of measurements without changing the transducer.
- Wide scaling capability solving the major field application problems.
- Recording of MAX active powers and MIN power factors for a better variable survey.
- Harmonics analysis with up to 2 local alarms for line/load failure prevention.



SptMSoft, programming and reading tool, see page 42.

The best to suit your needs!





PQT 90

PQT 90 is a Power Quality Transducer which offers to the user many advantages and solutions:

- Quick assembly and maintenance using Plug and Play modules.
- Load failure prevention: harmonic analysis (A/V) with 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, up to 4 analogue outputs, RS485, RS232 port, (Modbus RTU), Ethernet port.
- Energy cost allocation with independent import/export and multi-tariff active/reactive energy meters.
- Water and gas metering and communication using the same instrument.

Modular Power Quality Transducer PQT 90

Housing (H x W x D)	90x90x140mm
Display type	N.A.
Variables on display	N.A.
Instantaneous variables	4 DGT format
Energy variables	9 DGT format
Accuracy	V _u -A: ±(0.5%RDG+1DGT); Hz: ±0.1% F.S.; THD: ±1%F.S.; Class1 (EN61036); Class2 (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	Up to 6 independent for synchro and gas, H ₂ O meters
Primary of CT/VT	Prog to: CT 30,000A; VT 600kV
Measurements:	TRMS method
Variables	Sys: V _u , V _L , W, var, VA, PF, W _{dmd} , VA _{dmd} , VAR _{dmd} , PF _{dmd} , Hz, Wh, varh, gas, H ₂ O
Harmonic distortion	Single phase: V _u , V _L , A, W, var, VA, PF, THD.
Outputs:	Up to the 50th H (V and A)
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), Web Server, Modem-GSM management
Digital filter	Action: on variables and outputs
Other characteristics	Real time clock with alarms and Min/Avg/Max variable continuous recording (2Mb memory); energy time period and gas, H ₂ O management; official watt-hours meter interface.
Power supply	18 to 60VAC/DC, 90 to 260VAC/DC
Approvals	CE, cURus, CSA
Protection degree	IP20

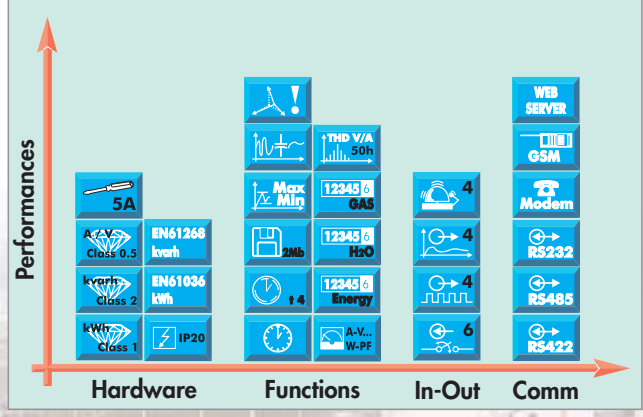
The main applications where PQT 90 can be fully exploited

- Electrical parameters analysis, control and utility metering in the medium and heavy industry.
- Electrical parameters analysis and utility metering in the public buildings and shopping centres, particularly when there is the need to collect the data from many buildings in different locations by means of PqtSoft.
- Electrical parameters analysis and local control in the unguarded sites with remote centralised supervision capability, using GSM communication and PqtSoft data acquisition system or Ethernet/Internet network.



By AR1060 WEB server module (page 38)

The best to suit your needs!



Power variable analysis and great communication capabilities: this is the strength of 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.
- PqtSoft Network communication software to download, manually or automatically (via RS485-analogue modem GSM modem), up to 2Mb data stored in PQT 90. This information can be plotted simply in an Excel spreadsheet.
- PqtSoft Remote to easily download or upload the programming parameters from PQT 90 to a PC and viceversa.
- Continuous data stamping and communication: RS232, RS485, modem and GSM.
- Powerful data acquisition by means of PqtSoft and mobile phones wherever you are.



Variables that can be managed by PQT 90

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 (*)	●	●						●	
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 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).



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.

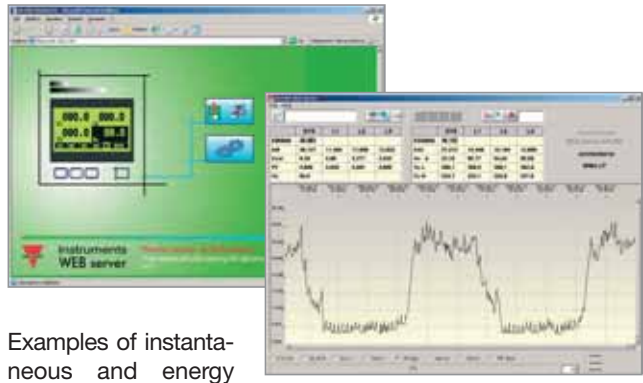
AR1060 as a WEB server allows the single WM4 and/or PQT to display, on every PC connected to the LAN and in a very easy way, the instantaneous variables and energy-water-gas being measured. The totalised energy-gas-water variables as well as the instantaneous electrical parameters are available in numerical 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 (fire-wall).

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.





CVT DIN

CVT DIN is a series of compact and simple transducers for the measurement of voltage, current and frequency. In a module which is 71.5 mm wide, suitable for DIN-rail mounting, it offers three basic hardware to measure: AC voltage and current; DC voltage and current; frequency. The current and voltage models allow to adjust the transducer calibration from 50 to 130 % of the rated inputs simply using a digital multimeter set on the resistance measurement.

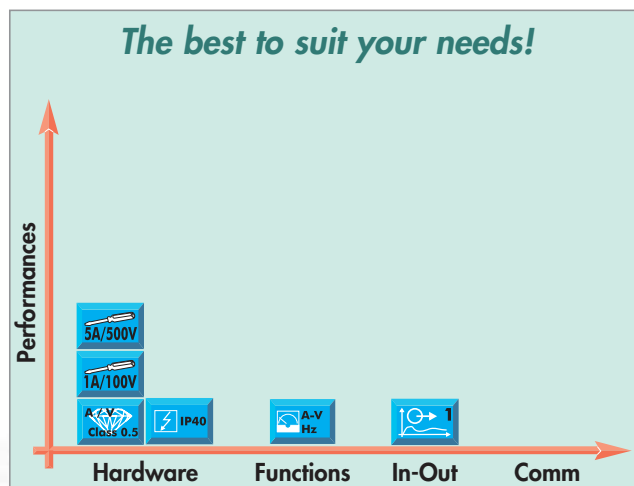
Transducer CVT DIN

Housing (H x W x D)	89x71.5x58.5mm
Display type	N.A.
Variables on display	N.A.
Instantaneous variables	N.A.
Energy variables	N.A.
Accuracy	V, A, Hz: $\pm 0.5\%$ F.S.
Temperature drift	≤ 200 ppm/ $^{\circ}$ C
Response time	≤ 300 ms
System type	1-phase
Voltage inputs (Un)	100VAC, 500VAC, 60mVDC, 10VDC, 200VDC
Current inputs (In)	1AAC, 5AAC, 1ADC
Digital inputs	N.A.
Primary of CT/VT	All
Measurements:	STD
Variables	VAC, VDC, AAC, ADC, Hz (45-55Hz, 55-65Hz, 350-450Hz)
Harmonic distortion	N.A.
Outputs:	
Pulse	N.A.
Alarm	N.A.
Analogue	0-20, 4-20mA; ± 1 V, 0-10VDC
Serial	N.A.
Digital filter	N.A.
Other characteristics	Current or voltage input in the same transducer. Field adjustment from 50 to 130% of the A/V input
Power supply	24VAC, 48VAC, 115VAC, 230VAC
Approvals	CE
Protection degree	IP40



Input	Formula	Example
5AAC	$R_{adj} = 5000 / A_{in}$ (A)	$A_{in} = 6A$ $R_{adj} = 2500\Omega$
500VAC	$R_{adj} = 1500000 / V_{in}$ (V)	$V_{in} = 250V$ $R_{adj} = 6000\Omega$
1AAC	$R_{adj} = 3000 / A_{in}$ (A)	$A_{in} = 0.9A$ $R_{adj} = 3333\Omega$
100VAC	$R_{adj} = 30000 / V_{in}$ (V)	$V_{in} = 80V$ $R_{adj} = 3750\Omega$
1ADC	$R_{adj} = 3000 / A_{in}$ (A)	$A_{in} = 0.9A$ $R_{adj} = 3333\Omega$
200VDC	$R_{adj} = 600000 / V_{in}$ (V)	$V_{in} = 190V$ $R_{adj} = 3157\Omega$
60mVDC	$R_{adj} = 180000 / V_{in}$ (V)	$V_{in} = 35mV$ $R_{adj} = 5142\Omega$
10VDC	$R_{adj} = 30000 / V_{in}$ (V)	$V_{in} = 6V$ $R_{adj} = 5000\Omega$

The best to suit your needs!

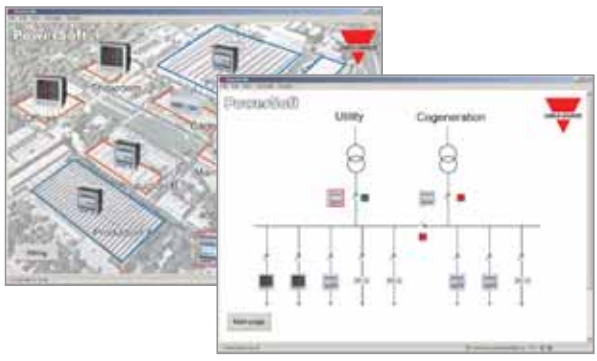




PowerSoft Energy Manager



PowerSoft is an analysis platform suitable for Win 98, 98SE, 2000 and XP, 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.



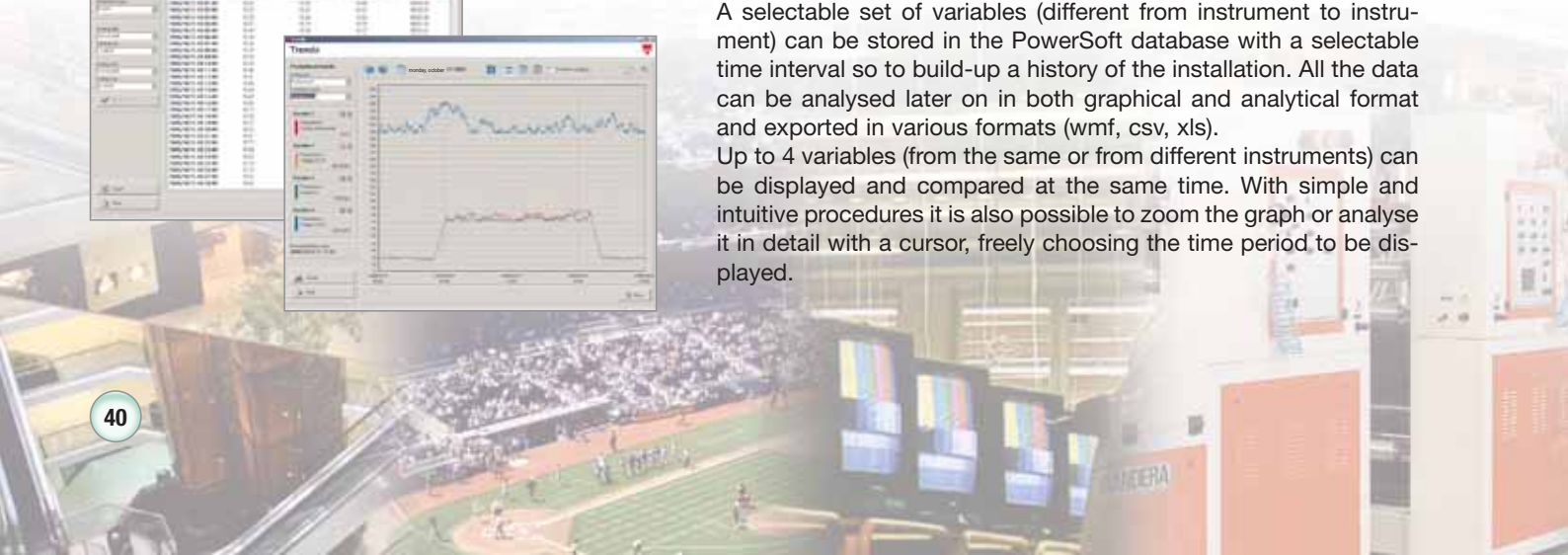
Real time display

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.

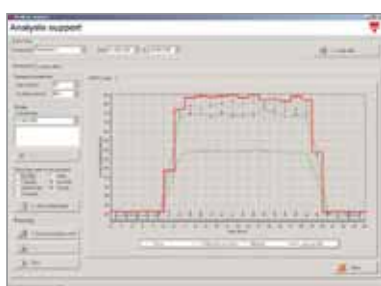




Costs estimation

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.

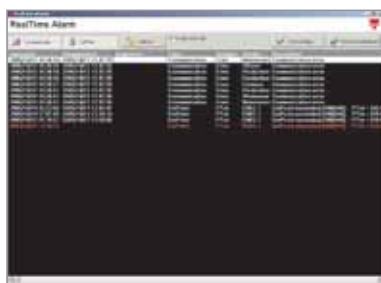
The above features are structured to manage a complex multi-tariff contract. The different tariffs during the day and the distribution of the typical-days among the year can be set according to the supplier tariff regulations in a very easy and extremely flexible way. Up to 12 tariffs, 24 tariff changes per day, 365 different typical-days per year can be simply configured.



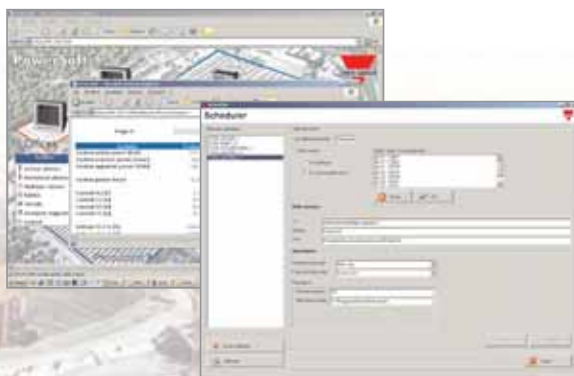
Statistical analysis

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

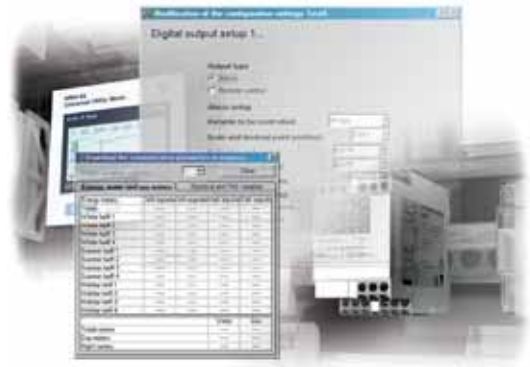
PowerSoft can manage an automatic e-mailing module, able to notify the electrical system status to one or more e-mail addresses. The e-mailing can be carried out on regular basis and/or as a consequence of a defined alarm or event.

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.

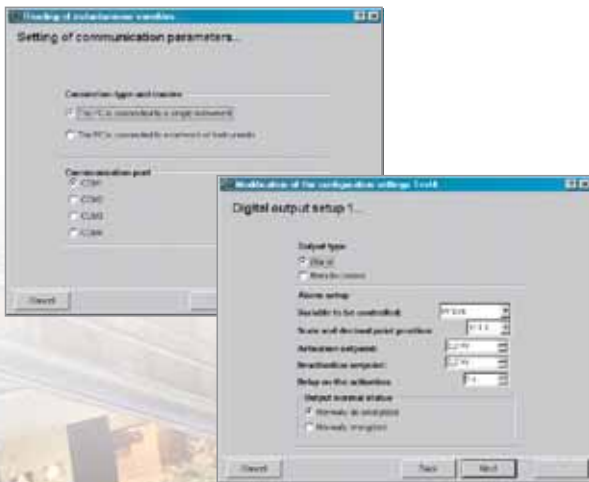
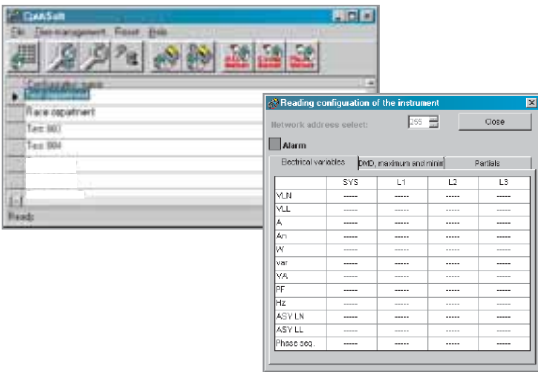
Specific instrument Software

CptBSoft, CptASoft, SptMSoft, Wm4Soft, PqtSoft, Wm5Soft, PqtHSoft

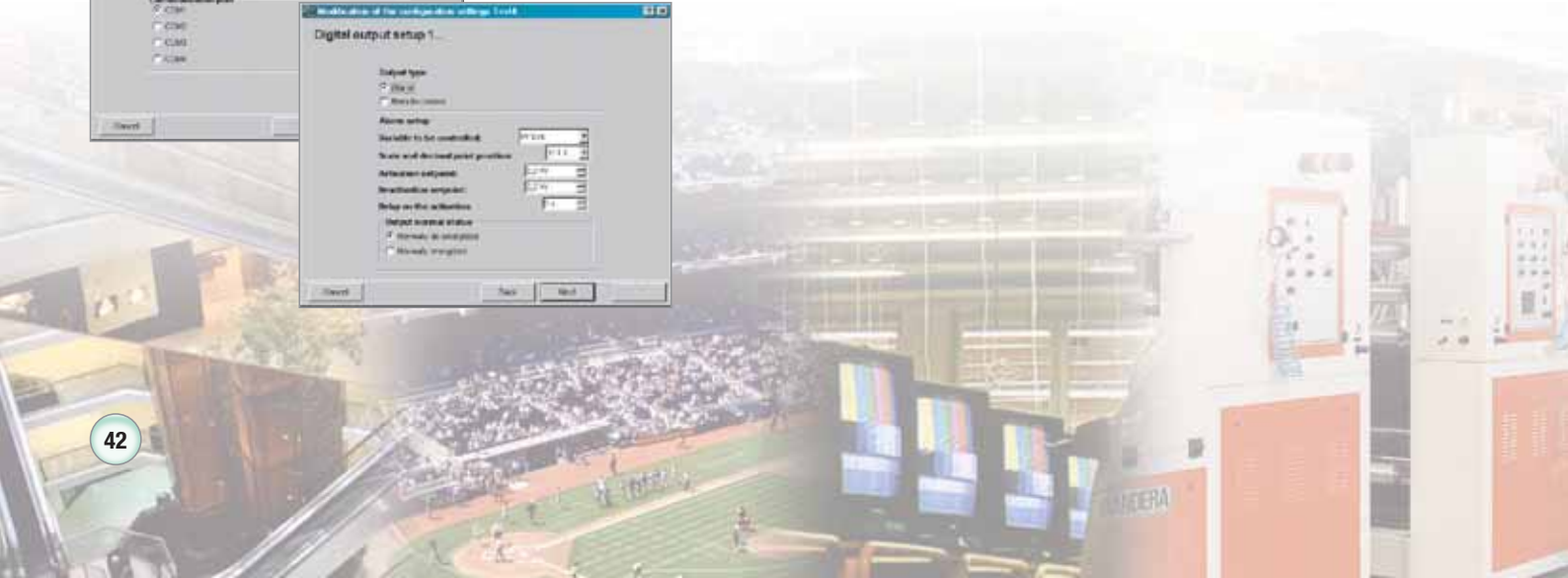


These user friendly specific instrument software are also a guidance to set-up the relevant power analyzers or transducers in a quick and reliable way. All the available parameters can be saved into a proper configuration file so to be easily downloadable from the PC to the instrument/transducer or to 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.

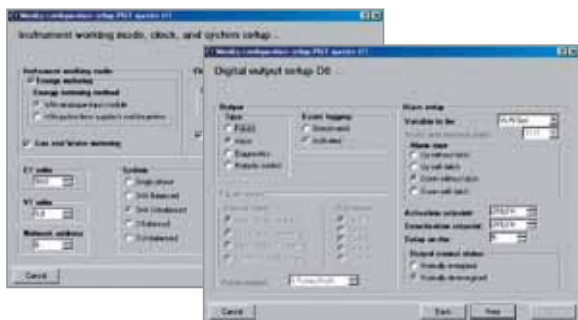
CptBSoft and CptASoft have been developed to program the parameters and read in real-time mode the variables of the compact power transducer (Basic and Advanced version respectively). The CPT transducers are equipped with an auxiliary serial port (RJ12 connection) in order to easily configure all the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



SptMSoft, connected via RS485 or RS232 to an SPT M or to a WM23 96, allows to fully configure the instruments and to read the realtime data acquired by all the meters of the connected network.

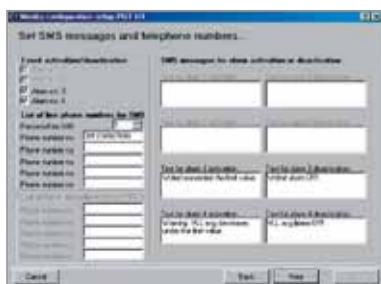


Wm4Soft Remote and PqtSoft Remote allow to configure the instrument, to choose the SMS alarms and to select the 8 variables to be logged in the 2Mb memory. A real-time table showing all the variables is available too. The PC where the software runs can be connected to the instrument by RS232, RS485 (also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

Split Core Current Transformers

Types	SCT74/30	SCT104/50	SCT140/80
Class	1/ 3/ 0.5 (on request)	1/ 3/ 0.5 (on request)	1/ 3/ 0.5 (on request)
Bus-bar size	31 x 26mm	51 x 51mm	81 x 51mm
Dimensions (HxWxD)	100 x 61 x 74 mm	128 x 56 x 104 mm	155 x 53 x 140 mm
Standards	BS3938, EN60044-1, DIN42600	BS3938, EN60044-1, DIN42600	BS3938, EN60044-1, DIN42600
Accuracy class depending on the burden output	Burden (VA) Class 0.5 1 3	Burden (VA) Class 0.5 1 3	Burden (VA) Class 0.5 1 3
Primary current at rated output current of 1A/5A	100 A - - 1.5 125 A - 1.5 - 150 A - - 2.5 200 A - 1.5 5 250 A - 1.5 5 300 A - 1.5 7.5 400 A 1.5 5 10	150 A - - 1.5 200 A - 1.5 - 250 A - 1.5 3.75 300 A - 1.5 5 400 A 1.5 2.5 5 500 A 2.5 5 10 600 A 2.5 5/7.5 15 750 A 3.75 5/7.5 - 800 A 5 5/10 15 1000A 5/10 5/10 10 E.g.: 5/10 5= standard 10= on request	400 A - - 5 500 A - 2.5 5 600 A 1.5 3.75 7.5 750 A 2.5 5/7.5 10 800 A 3.75 5/7.5 10 1000A 5 5 20 1200A 5/10 5/10/15 20 1250A 5/10 5/10/15 20 1500A 5/10/15 10/15/20 30 1600A 5/10/15 5/10/15/20 30 E.g.: 5/10 5= standard 10= on request
Secondary Current	5A (1A on request)	5A (1A on request)	5A (1A on request)
Types	SCT166/125	SCT166/165	SCT166/205
Class	1/ 3/ 0.5 (on request)	1/ 3/ 0.5 (on request)	1/ 3/ 0.5 (on request)
Bus-bar size	62 x 127mm	62 x 167mm	62 x 205mm
Dimensions (HxWxD)	248 x 50 x 166 mm	288 x 50 x 166 mm	328 x 50 x 166 mm
Standards	BS3938, EN60044-1, DIN42600	BS3938, EN60044-1, DIN42600	BS3938, EN60044-1, DIN42600
Accuracy class depending on the burden output	Burden (VA) Class 0.5 1 3	Burden (VA) Class 0.5 1 3	Burden (VA) Class 0.5 1 3
Primary current at rated output current of 1A/5A	500 A - 2.5 5 600 A - 2.5 5/7.5 800 A 1.5 5 10 1000A 2.5 5/10 15 1200A 5 5/10/15 20 1250A 5 5/10/15 20 1500A 5/10 5/10/15 20 1600A 5/10 5/10/15 20 2000A 5/10/15 5/10/15/20 - 2500A 5/10/15/20 5/10/15/30 - 3000A 5/10/15/30 5/10/15/30 - E.g.: 5/10 5= standard 10= on request	800 A - 5 7.5 1000A - 5/7.5 10 1250A 1.5 5/10 15 1500A 2.5 5/10/15 20 1600A 5 5/10/15 30 2000A 5/10/15 5/10/15/20 30 2500A - 5/10/15/20 30 3000A 5/10/15/30 5/10/15/30 - 4000A 5/10/15/30 5/10/15/30 - E.g.: 5/10 5= standard 10= on request	1000A - 5 7.5 1200A 1.5 5/7.5 10 1250A 1.5 1.5/2.5/10 5/15 1500A 2.5 5/10 15 2000A 5 5/10/15 20 2500A 5 5/10/15 20 3000A 5/10/15 5/10/15/20 30 4000A 5/10/15 5/10/15/20 30 5000A 5/10/15/30 5/10/15/30 - 6000A 5/10/15/30 5/10/15/30 - E.g.: 5/10 5= standard 10= on request
Secondary Current	5A (1A on request)	5A (1A on request)	5A (1A on request)

Note: all the products are CE marked.



Current Transformers

Types

	TADK	TADK2	TAD 2	TAD 3	TAD 4
Class	0.5	0.5	0.5/ 1/ 3	0.5/ 1	0.5/1
Bus-bar size / Cable diam.		25x5 mm	20x8 mm, Ø 22 mm	21x14 or 31x11 mm	32x16 or 41x11, Ø 32mm
Dimensions (HxWxD)	115.5x75x44 mm	115.5x75x44 mm	98.5x58x44 mm	98.5x58x44 mm	75x115.5x44 mm
Standards	IEC 60185/EN 60185	IEC 60185/EN 60185	IEC 60185/EN 60185	IEC 60185/EN 60185	IEC 60185/EN 60185
Accuracy class depending on the burden output	Burden (VA)	Burden (VA)	Burden (VA)	Burden (VA)	Burden (VA)
Primary current at rated output current of 1A/5A	Class 0.5 1 A 10 5 A 10 10 A 10 15 A 10 25 A 10 40 A 10	Class 0.5 1 A 10 5 A 10 10 A 10 15 A 10 25 A 10 40 A 10 50 A 10 60 A 10 80 A 10 100 A 10 150 A 10 200 A 10 250 A 10	Class 0.5 1 3 40 A 3 50 A 3 60 A 3 80 A 3 100 A 3 4 150 A 3 4 6 200 A 3 4 6 250 A 5 8 10 300 A 5 8 10	Class 0.5 1 100 A 3 150 A 3 4 200 A 3 4 250 A 5 8 300 A 5 8 400 A 6 10 500 A 6 10 600 A 6 10	Class 0.5 1 100 A 3 150 A 3 200 A 4 250 A 6 300 A 6 400 A 10 500 A 10 600 A 10 800 A 10

Types

	TAD 6	TAD 8	TAD 12	TACO 110	TACO 200
Class	0.5/1	0.5/1/5P10	0.5/1/5P10	0.5/1/5P10	0.5/1/5P10
Bus-bar size / Cable diam.	55x24 or 65x20, Ø 52 mm	82x32 or 65x34 mm	127x51 or 102x53 mm	Max Ø110 mm	Max Ø200 mm
Dimensions (HxWxD)	105x45x44 mm	140x120x55 mm	183x170x65 mm	183x170x65 mm	295x280x45 mm
Standards	IEC 60185/EN 60185	IEC 60185/EN 60185	IEC 60185/EN 60185	IEC 60185/EN 60185	IEC 60185/EN 60185
Accuracy class depending on the burden output	Burden (VA)	Burden (VA)	Burden (VA)	Burden (VA)	Burden (VA)
Primary current at rated output current of 1A/5A	Class 0.5 1 400 A 6 12 500 A 6 12 600 A 10 20 800 A 10 20 1000 A 20 40 1200 A 20 40 1500 A 30 60 2000 A 30 60	Class 0.5 1 5P10 400 A 4 8 5 500 A 6 12 5 600 A 10 20 5 800 A 15 30 5 1000 A 20 40 5 1200 A 30 50 5 1500 A 40 60 5 2000 A 50 80 5 2500 A 60 100 5	Class 0.5 1 5P10 800 A 15 30 10 1000 A 20 40 10 1200 A 30 60 10 1500 A 40 80 10 2000 A 50 100 10 2500 A 60 120 10 3000 A 80 160 10 4000 A 100 200 10	Class 0.5 1 5P10 800 A 15 30 10 1000 A 20 40 10 1500 A 40 80 10 2000 A 50 100 10 2500 A 60 120 10 3000 A 80 160 10 4000 A 100 200 10	Class 0.5 1 5P10 1000 A 15 30 10 1500 A 15 30 10 2000 A 15 30 10 2500 A 40 80 10 3000 A 40 80 10 4000 A 50 100 10 5000 A 50 100 10 6000 A 50 100 10

Cable/Bus-bar type AC current transformers; operating frequency: 40 to 60 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.



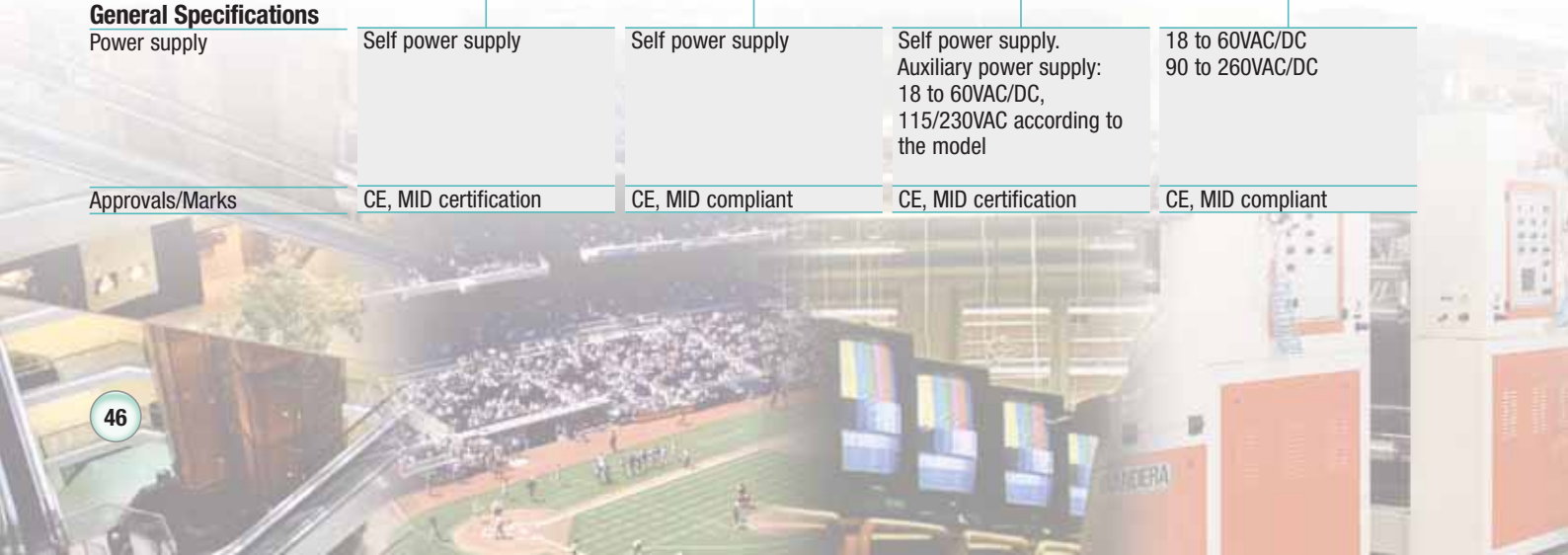
Energy Meter **Energy Analyzers**

Types

EM10 DIN **EM11 DIN** **EM24 DIN** **EM26 96**



Dimensions (mm) H x W x D	90 x 18 x 67	90 x 18 x 67	90 x 71 x 65	96 x 96 x 61.5
Description and measurements	1-phase energy meter kWh	1-phase energy analyzer V_{LN} , A, Hz, W, W_{dmd} , var, PF, kWh, kvarh TRMS method	3-phase energy analyzer Sys: V_{LL} , V_{LN} , var, VA, W_{dmd} , W, VA_{dmd} , VA, 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 Sys: 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
Input Specifications				
Voltages and currents	230VAC Ib: 5A, I _{max} : 32AAC; 1-phase	230VAC Ib: 5A, I _{max} : 32AAC; 1-phase	120/208V _{L-L} , 400V _{L-L} In: 1/5A, I _{max} : 10AAC; Ib: 10A, I _{max} : 64AAC; 3-phase unbal. load	120/208V _{L-L} , 400/660V _{L-L} In: 1/5A, I _{max} : 10AAC 3-phase unbal. load
Accuracy				
Active energy	Class 1 (EN62053-21)	±0.5% RDG (V, A) Class 1 (EN62053-21) Class 2 (EN62053-23)	±0.5% RDG (V, A) Class 1 (EN62053-21) Class 2 (EN62053-23)	±0.5% RDG (V, A) Class 1 (EN62053-21) Class 2 (EN62053-23)
Display	5+1 DGT (energy) LCD	4 DGT (inst. variables) 5+1 DGT (energies) LCD	3x4 DGT (inst. variables) 8 DGT (energies) LCD	3x4 DGT (inst. variables) 8 DGT (energies) LCD
Output Specifications				
Pulse	1-open collector	1-open collector	2-open collector	2-open collector
Alarm	None	1-relay	2-relay	2-relay
Analogue	None	None	None	None
Serial communication	None	None	RS485 (2-wire)	RS485 (2-wire)
Digital input	None	None	3 (W_{dmd} sync. tariff selec.)	3 (W_{dmd} sync. tariff selec.)
Dupline	None	None	None	None
General Specifications				
Power supply	Self power supply	Self power supply	Self power supply. Auxiliary power supply: 18 to 60VAC/DC, 115/230VAC according to the model	18 to 60VAC/DC 90 to 260VAC/DC
Approvals/Marks	CE, MID certification	CE, MID compliant	CE, MID certification	CE, MID compliant



Energy Meters

Multifunction Indicators

Power Analyzers

EM3 DIN

EM4 DIN

WM12 DIN/96

WM14 "B" DIN/96

WM14 "A" DIN/96



90 x 162.5 x 63	90 x 162.5 x 63	90 x 107,8 x 64,5 (DIN) 96 x 96 x 61.5	90 x 107,8 x 64,5 (DIN) 96 x 96 x 61.5	90 x 107,8 x 64,5 (DIN) 96 x 96 x 61.5
MODULAR 3-phase energy meter Direct connection up to 90 A	MODULAR 3-phase energy meter Direct connection up to 100A. Measurement of system and phase variables, energy by timeperiods, m ³ H ₂ O and m ³ GAS	3-phase multifunction indicator 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} , An, PF, W, var, VA, W _{dmd} , VA _{dmd} , Hz, kWh, kvarh, hour counter; Max: A, A _{dmd} , W _{dmd} . Single phase: V _{LL} , V _{LN} , A, A _{dmd} , 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
208V _{L-L} , 220V _{L-L} , 400V _{L-L} , 660V _{L-L} / Ib: 20A, Imax: 90AAC. 3-phase unbalanced load	100V _{L-L} , 208V _{L-L} , 400V _{L-L} , 660V _{L-L} / In: 5A, Imax: 10AAC; 208V _{L-L} , 220V _{L-L} , 400V _{L-L} , 660V _{L-L} / Ib: 20A, Imax: 100AAC	100/208V _{L-L} /5(6)AAC 400/660V _{L-L} /5(6)AAC	100/208V _{L-L} /5(6)AAC 400/660V _{L-L} /5(6)AAC	100/208V _{L-L} /5(6)AAC 400/660V _{L-L} /5(6)AAC
Class 2 (EN61036) Class 3 (EN61268) Electromechanical 6+1 DGT	Class 1 (EN61036) Class 2 (EN61268) 3 1/2 DGT backlighted LCD 8 DGT (energy)	±0.5% FS (V, A) 3x3 DGT LED	±0.5% FS (V, A) Class 2 (kWh) Class 3 (kvarh) 3x3 DGT 8+1 DGT (energy), LED	±0.5% FS (V, A) Class 1 (kWh) Class 2 (kvarh) 3x3 DGT, 8+1 DGT (energy), LED
2-open collector module	2-open collector module	None	None	2-open collector
None	1-open collector or relay module	None	None	2-relay (PLC-type, AND/OR control function on 16 variables)
None	None	None	None	None
None	RS422/485 module	RS485	RS485 Profibus DP V0	RS422/485
None	2 (W _{dmd} sync., tariff selec.) Active and reactive energies	None	None	None
None	None	None	None	None
Self power supply; Auxiliary power supply: 230VAC, 115VAC	Self power supply; Auxiliary power supply: 230VAC, 115VAC, 48VAC, 24VAC, 18 to 60VDC, 77 to 143VDC	24 VAC 48 VAC 115 VAC 230 VAC 18 to 60 VDC	24 VAC 48 VAC 115 VAC 230 VAC 18 to 60 VDC	18 to 60VAC/DC, 90 to 260VAC/DC
CE	CE	CE, cURus, cCSAus (WM12 96)	CE, cURus, cCSAus	CE, cURus, cCSAus

Power Analyzers

Types

WM22 DIN

WM23 96/SPT M

WM24 96

WM3 96



Dimensions (mm) H x W x D

90 x 162.5 x 63

96 x 96 x 124 (WM23)
90 x 90 x 140 (SPT M)

96 x 96 x 124

96 x 96 x 124

Description and measurements

MODULAR
3-phase power analyzer
Direct connection up to 100A
Sys: 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 (WM23)/
transducer (SPT M)
System: V_{LN} , V_{LL} , An,
W, var, VA, W_{dmd} , VA_{dmd} , PF, Hz
Single phase: V_{LN} , V_{LL} ,
A, W, var, VA, PF, %THD-V,
%THD-A;
Max: W (standard),
A (option)

MODULAR
3-phase universal
utility meter
Sys: V_{LN} , V_{LL} , W, var, VA, W_{dmd} ,
 VA_{dmd} , PF, Hz, total varh, partial
Wh, partial varh, gas, H₂O
Single-phase: V_{LN} , A, W, var, VA,
PF

MODULAR
3-phase power quality
analyzer
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-V, THD-A.
Max: up to 12 variables
Min: up to 8 variables

Input Specifications

Voltage and currents

100V_{L-L}, 208V_{L-L},
400V_{L-L}, 660V_{L-L} / In: 5A,
Imax: 10AAC; 208V_{L-L},
400V_{L-L}, 220V_{L-L}
660V_{L-L} / Ib: 20A, Imax: 100AAC

57/100V_{L-L}/5(6)AAC,
120/208V_{L-L}/5(6)AAC,
230/400V_{L-L}/5(6)AAC,
380/660V_{L-L}/5(6)AAC

57/100V_{L-L}/5(6)AAC,
120/208V_{L-L}/5(6)AAC,
230/400V_{L-L}/5(6)AAC,
380/660V_{L-L}/5(6)AAC

240/415V_{L-L}-1/5 AAC
400/690V_{L-L}-1/5 AAC

Accuracy

Active energy
Reactive energy
Display

±0.5% RDG (A,V)
Class 1 (EN61036)
Class 2 (EN61268)
4 x 3¹/₂ DGT istant. var.
7¹/₂ DGT energies var.

±0.5% FS (V, A)

±0.5% RDG (V, A)

±0.5% RDG (V, A)

Output Specifications

Pulse

2-open collector

None

Up to 2, made by: single or
dual open collector or relay
modules

Up to 4, made by: single,
dual or quadruple open
collector or relay modules

Alarm

1-open collector or relay
module

Up to 2, made by: single or
dual open collector or relay
modules

Up to 2, made by: single or
dual open collector or relay
modules

Up to 4, made by: single,
dual or quadruple open
collector or relay modules

Analogue

20mADC or 10VDC module

1 made by single/dual
(mA/V) output modules

None

Up to 4, made by single/dual
(mA/V) output modules

Serial communication

RS422/485 module

RS485 module
RS232 module

RS485 module
RS232 module

RS422/485 module
RS232 + RTC module

Digital input Dupline

None
Active and reactive energies

Up to 3 (W/VA_{dmd} sync.)
None

Up to 3 (tariff select)
None

Up to 3 (W_{dmd} sync.)
None

General Specifications

Power supply

Self power supply;
Auxiliary power supply:
230VAC, 115VAC, 48VAC,
24VAC, 18 to 60VDC,
77 to 143VDC






24 VAC
48 VAC
115 VAC
230 VAC
18 to 60 VAC/DC
90 to 260 VAC/DC
CE, cURus, cCSAus

24 VAC
48 VAC
115 VAC
230 VAC
18 to 60 VAC/DC
90 to 260 VAC/DC
CE, cURus, cCSAus

18 to 60 VAC/DC
90 to 260 VAC/DC
CE, cURus, CSA

Approvals/Marks

CE

Power Analyzers		Power Transducers		Transducer
WM4 96	WM5 96/PQT H	PQT 90	CPT DIN "B" "A"	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 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.	MODULAR Smart power quality analyzer (WM5) / transducer (PQT H). Sys: 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)	MODULAR 3-phase power quality analyzer. 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).	Compact "B" basic power transducer and "A" Advanced power transducer 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 "A" version.	Single phase transducer 1-phase AC, DC Measurements V, A, Hz
240/415V _{L-L} -1/5 AAC 400/690V _{L-L} -1/5 AAC	120/208V _{L-L} , 400/690V _{L-L} In: 1/5A, I _{max} : 10AAC	240/415 V _{L-L} -1/5 AAC 400/690 V _{L-L} -1/5 AAC	120/208V _{L-L} 400/690V _{L-L} 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 (EN62053-22) Class 2 (EN62053-23)	±0.5% RDG (V, A) Class 1 (EN61036) Class 2 (EN61260)	±0.5% RDG (A, V) Class 1 Class 2 None	±0.5% FS None
4x4 DGT backlighted graph LCD 4x9 DGT (energies)	4x4 DGT backlighted LCD (WM5) 4x9 DGT (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 None
RS 422/485 module, RS232 + RTC + 2MB data module; Internet/Ethernet comm. with WEB server capability module	RS422/485 module RS232+RTC module Optical port (ANSI C12.18/Modbus), Ethernet port 10/100 base TX	RS 422/485 module, RS232 + RTC+2MB data module; Internet/Ethernet comm. with WEB server capability module	RS422/485, RS232	None
Up to 6 (W_{dmd} sync., tariff selec.) None	Up to 12 (W_{dmd} , VA_{dmd} sync.) None	Up to 6 (W_{dmd} sync., tariff selec.) None	None Energies, 8 inst. variables	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	CE




























List of modules: Modular Panel Mounting

Type	Ch.	SPT M	PQT 90	WM23 96	WM3 96	WM24 96	WM4 96	WM5 96	PQT H	Ordering code
WM23-96 base 100VLL				•						AH2302
WM23-96 base 208VLL				•						AH2301
WM23-96 base 400VLL				•						AH2300
WM23-96 base 660VLL				•						AH2303
WM24-96 base 100VLL						•				AJ2402
WM24-96 base 208VLL						•				AJ2401
WM24-96 base 400VLL						•				AJ2400
WM24-96 base 660VLL						•				AJ2403
SPT-M base 400VLL 5A		•								AA2000
SPT-M base 208VLL 5A		•								AA2001
SPT-M base 100VLL 5A		•								AA2002
SPT-M base 660VLL 5A		•								AA2003
SPT-M base 400VLL 5A (Amax recording)		•								AA2000A
SPT-M base 208VLL 5A (Amax recording)		•								AA2001A
SPT-M base 100VLL 5A (Amax recording)		•								AA2002A
SPT-M base 660VLL 5A (Amax recording)		•								AA2003A
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
24VAC power supply				•		•				AP1025
48VAC power supply				•		•				AP1024
115VAC power supply				•		•				AP1023
230VAC power supply				•		•				AP1022
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 115200bps	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 without RTC	1	•		•		•				AR1093
RS232 port + RTC + 2MB data memory	1		•				•			AR1041
WEB server	1		•				•			AR1060
Internet/Ethernet port	1							•	•	AR1061

(*) Only for alarm purpose

List of modules: DIN-rail Mounting

Type	Power Supply	Ch.	EM3 DIN	EM4 DIN	WM22 DIN	Ordering code
EM3-DIN 400VL-L / 20(90)AAC	Self power supply		•			AE2000
EM3-DIN 208VL-L / 20(90)AAC	Self power supply		•			AE2001
EM3-DIN 660VL-L / 20(90)AAC	115VAC -15+10%		•			AE2002
EM3-DIN 660VL-L / 20(90)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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