Measurement›News
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Winter 2004

SPECIAL REPORT

Industrial networks: wireless communication

News

New-generation hand-held oscilloscopes with 4 isolated channels: the OX SCOPIX

Company focus

www.promomesure.com
the on-line bargain site

n°20

CHAUVIN ARNOUX GROUP

ELEC 2004

With nearly **112,000 visitors**, 14,000 of them from abroad, and 2000 companies present in 2002, the ELEC industry show is **the world venue for offerings in the field of electricity, automation, heating, air-conditioning, and lighting.**

Professionals in energy, industry, and tertiary and residential building all get together at this show, held every two years at Paris.

Chauvin Arnoux, often present at this important exhibition, chose once again to take part in the five days of the show, from 6 to 10 December. **ELEC** is, as it happens, **one venue where our customers, partners, and distributors, both French and foreign, can be found in the same place at the same time.**

This makes the Chauvin Arnoux booth a place for greeting and meeting, for technological demonstrations, and for asserting our corporate identity through an extension of our historic visual identity. This year, we have chosen to do this by concentrating on our trades: Chauvin Arnoux Test & Measurement, Pyro-Contrôle, Enerdis, and Manumesure, all together in a congenial setting.

Our booth reflects our strategic positioning as a group - the complementarity of our businesses. It highlights the values that characterise us: *savoir-faire*, technology, quality, the combination of design and manufacturing, innovation, etc. I invite you to have a look at our booth on page 2.

It also serves to clarify our product offer, our technical *savoir-faire*, and the plurality of our services.

At ELEC, this year, we present our new products: **a world first in the OX 7104, the only hand-held oscilloscope with 4 isolated channels on the market** (see our article on page 8), and the new line of hand-held OX 7000s under the Metrix® brand name. Our expertise in the quality of electric energy, with the MAP line of network quality analyzers from Enerdis. We are also taking this show as an opportunity to highlight our sales and marketing success in the field of Qualistar® network analyzers from Chauvin Arnoux, with the C.A 8334 and the C.A 8350/52.

All of Chauvin Arnoux's teams take this opportunity to wish you a happy New Year!

Axel Arnoux
Chairman

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Qualistar® partners Ford to power quality

Ford Motor Company Ltd, one of the world's foremost automotive manufacturers, is the latest to use Chauvin Arnoux's versatile energy power quality analyser- the Qualistar®.

Ford's UK engine plants at Dagenham and Bridgend, together with its research centre at Dunton, are already equipped with wall-to-wall monitoring of every parameter imaginable. However, despite all this automation there was still a need for the 'human' touch.

Now both Bridgend and Dagenham plants have purchased portable Qualistar® analysers. Engineers can examine and display individual machines in the never ending search to reduce power costs, instead of hundreds of seemingly mindless displays.

An individual machine can be examined in detail to check whether it is working to its most energy efficient design parameters and potential problems can be eliminated before they affect production.

From the data collected within both manufacturing plants, comparisons can be made of each engine line, thus increasing the effectiveness of identifying areas for opportunities to reduce costs in power usage.

Cost savings also include reduced circuit breaker and fuse sizes for future machines, hence reduced cable sizes and, also, the down-sizing of motors, servo drives etc.

Chauvin Arnoux's earth testers are flying high

The C.A 6410s

Following extensive tests at several front line Royal Air Force stations, the C.A 6410s hand-held earth testers have been recommended for use in earth testing for explosives storage facilities.

With so much potential risk involving explosives and fuel the non invasive nature of the 6410s earth tester was a major factor in gaining this approval.

The Royal Air Force were also impressed by the ease of use, repeatability and accuracy of the instrument and even more impressed by the time savings gained when taking measurements. Instead of having to carry bags full of cables and earthing spikes the technician can easily slip the battery operated 6410s into his pocket and be on his way.

A fact much appreciated by the test personnel involved.

In today's modern Air Force where seconds can count the C.A 6410s can play a vital role in reducing test time whilst at the same time placing safety top of the list.

Airbus A380 safer with Chauvin Arnoux's Help

Sensors used to monitor the performance of the new Airbus A380 are being installed with the help of the C.A 6541 Insulation Tester.

The wheatstone bridge sensors connected to the planes' fuselage to monitor stresses and strains during its Flight Tests, are installed with the help of the Chauvin Arnoux Insulation Tester. It is used to check that there is a high level of insulation from the adhesives to ensure there is little or no interference from contact with the planes body.

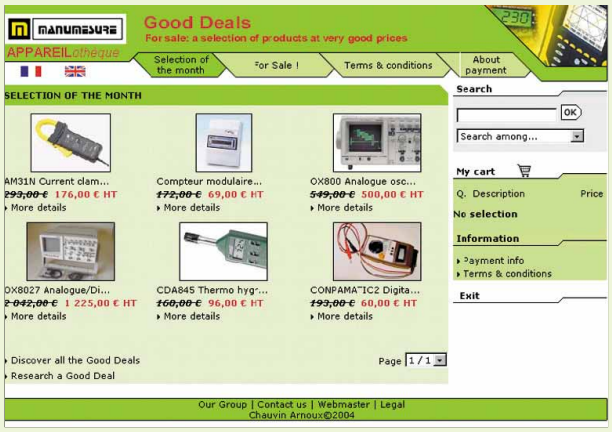
Because the C.A 6541 Tester can give accurate resistance readings of up to 2 TΩ even on its lowest range of 50 V, Flight Test Engineers can install the monitoring devices and ensure the insulation is at least 20 GΩ; ideally 200-300 GΩ can be achieved and seen clearly on the instrument.

The sensors are used to monitor the pressures put on the plane at key points on the wings and fuselage where joints are made. These already have been calculated with computer simulation, but until the plane is in the air they cannot be sure exactly how they will perform. Data collected from the sensors is logged via onboard computers and the results analysed by the aircraft builders.

So with the help of small sensors and an advanced insulation tester, they can be safe in the knowledge the plane has been designed and built to the most exacting standards.

The on-line **bargain** site

This site, under the Manumesure name, in French and English, proposes a variety of measuring instruments of different brands - Metrix®, Chauvin Arnoux®, and Enerdis®. These are used, display, and discontinued items at attractive prices, as much as 60% off the original price. The saving is easy to evaluate, because the old price is clearly indicated. All of the instruments are covered by a one-year warranty.



En French or English, access to the selection of the month is direct.

A search can be run by category of instrument. The difference between the original price and the "bargain" price is clearly shown.

The Promomesure.com home page opens on a monthly selection of devices. A tab on the same page gives access to the complete product offer, broken down by category:

> Testers, multimeters,
> Current measurement,
> Power and energy measurement
> Installation testers,
> Oscilloscopes, generators,
> Instrumentation for teaching,
> Physical measurements,
> Indicators, display units, etc.

Sales are made directly on the net. Payment is on-line, by bank card, and totally secure (BNP Mercanet bank partnership); it is however also possible to pay for your purchases by cheque.

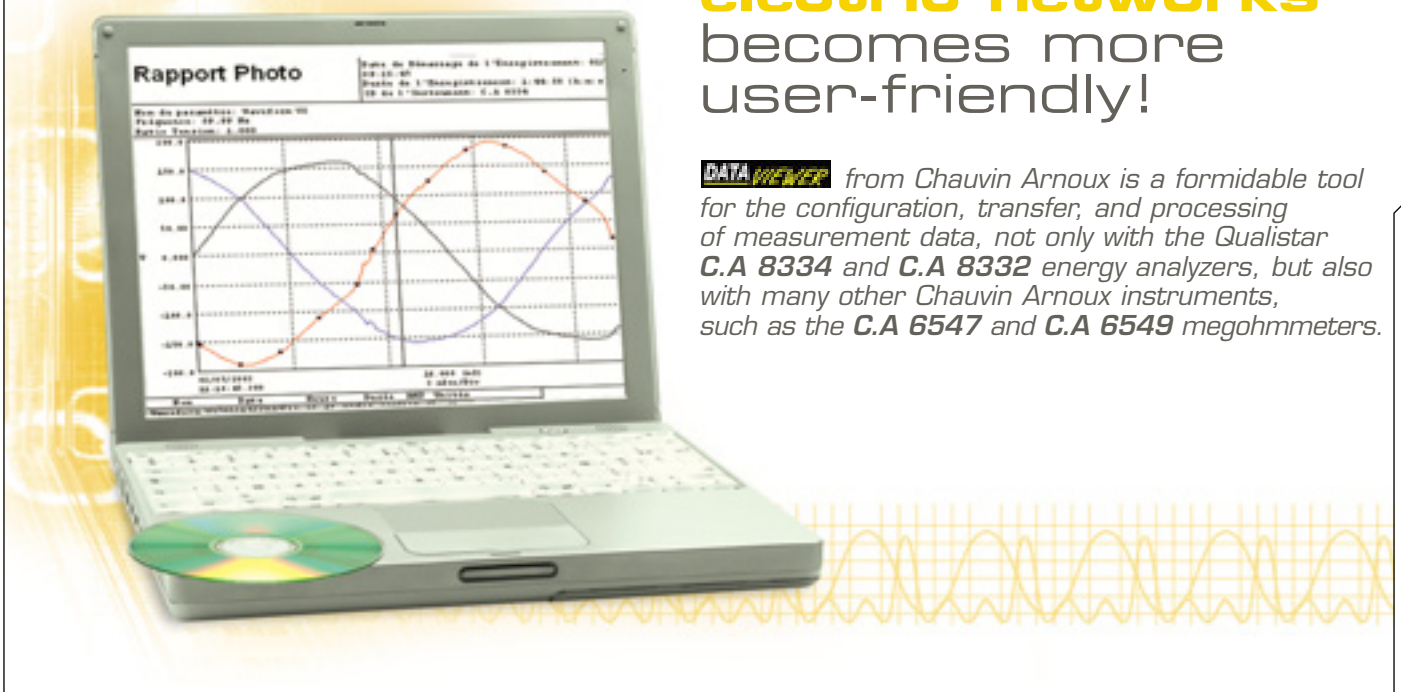
Since the products are in stock, delivery is rapid once payment is received.

The site's address is www.promomesure.com; the site can be also reached from the Chauvin Arnoux group's web site.

CHAUVIN ARNOUX GROUP

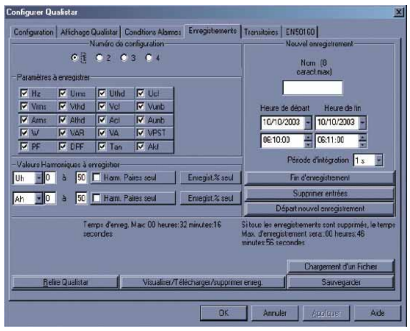
DATA VIEWER *PC Data processing software*

The analysis of electric networks becomes more user-friendly!



DATA VIEWER *from Chauvin Arnoux is a formidable tool for the configuration, transfer, and processing of measurement data, not only with the Qualistar* ***C.A 8334*** *and* ***C.A 8332*** *energy analyzers, but also with many other Chauvin Arnoux instruments, such as the* ***C.A 6547*** *and* ***C.A 6549*** *megohmmeters.*

The Qualistar® network analyzer has been an unmistakable success since its release, because it is very user-friendly and provides many network testing and analysis modes. Today, its capabilities are further extended by the addition, via an RS 232 link, of **Data*Viewer* Pro®** operating software. This professional software displays, "on line", in real time, on any computer, the waveforms and measurements transmitted by the Qualistar®.



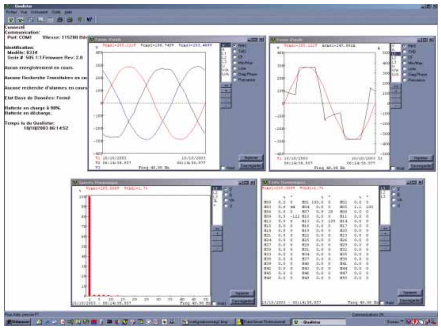
Configuration of general measurement parameters

Data*Viewer* Pro® brings many other strengths to the products it accompanies:

> the user can configure the instrument by choosing among the measurement parameters proposed and rapidly transferring the data directly from the PC,

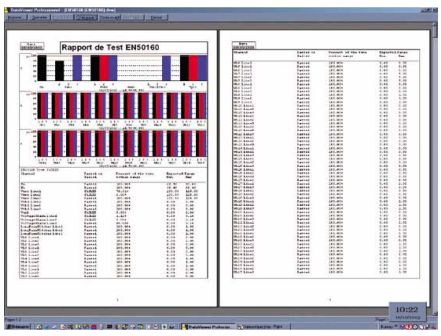
> measurement reports are generated automatically, and customised reports can be created on demand,

> a predefined report, in the form of a summary table of the parameters of the EN 50160 standard, is available to help the user validate the compliance of a network with this standard point by point.



Real-time display of data

This tool provides many additional functions for the user's convenience and for more critical analyses: a zoom on graphs; display of various recorded parameters on demand; exports of stored data to Excel; object linking and embedding (OLE).



Data processing

Data*Viewer* Pro® is also destined to become the **sole software platform** for all Chauvin Arnoux product lines.

A new service

All recognized holders of DATA VIEWER software can henceforth update and enrich it on Chauvin Arnoux's software support site. This is more than just a download platform - it is a place for exchanges and services, where your questions will be welcome.

Reader service n° 1

Air, hot, cold under control!

Chauvin Arnoux's "Physical Measurement" line, which already counts many specialised instruments for measurements of physical quantities (temperature, relative humidity, level of carbon monoxide, noise and illumination levels, air speed and pressure), adds three new models.
Specially designed for technicians in charge of adjusting and testing aeraulic, heating, and cooling installations, they share with their predecessors such qualities as compact size, simplicity of use, and ruggedness, to mention only a few.

Did you know?

The **dew point*** is a direct measure of the quantity of water vapour in the air. In meteorology, the difference between the dry-bulb temperature and the dew point or wet-bulb temperature provides information about the moisture content or humidity of the ambient air. The drier the air, the larger the temperature difference between the air and the dew point. Air that is cooled may therefore reach a temperature at which it can no longer support the quantity of water vapour it contains. The water vapour then condenses and the air expels its surplus water in liquid form. The air is said to have reached the dew point.

The two new **thermoanemometers** with remoted sensors, the **C.A 824** (revolving-vane sensor for measurements of medium and high speeds) and **C.A 826** (hot-wire sensor, for measurements of low speeds), measure air speeds from 0.01m/s to 35m/s. They usefully complete the line of thermoanemometers by providing flowrate measurements from 0 to 65,000m³/h, depending on the model. Various highly practical accessories - straight, bent, and telescopic extensions and flow measurement cones - are available with these two thermoanemometers.

C.A 824 revolving-vane thermoanemometer

C.A 848 thermohygrometer

The remoted sensor of the new **C.A 848 thermohygrometer**, with its handle, makes it easy to manipulate; its telescopic extension facilitates access to exhaust openings at a height. The C.A 848 enriches the line of thermohygrometers with a dew point measurement*.

The magnetised impact-resistant housing and the double display unit make these instruments easy to use and user-friendly.

Reader service n° 2

Insulation fault **location** without stopping the installation!

Insulation faults and the untimely tripping of residual current devices can endanger an installation, or even the user. These phenomena are often caused by leakage currents, which are difficult to detect. To locate these faults, even anticipate them, without having to shut down the electrical installation, Chauvin Arnoux® proposes three new professional clamps - one sensor and two clamp-on multimeters - to complete the existing line.

Simpler to use, the **B102** voltage-output clamp-on ammeter is dedicated to the measurement of leakage currents to earth. It can be used with any type of multimeter or recorder. Designed to detect weak fault currents in low-voltage circuits, it is the perfect tool for upgrading electrical installations to comply with the NF-C 15 100 and CEI 60304 standards. The measurements are possible on any type of installation: single-phase, 3- or 4-wire three-phase, balanced or unbalanced, with the neutral earthed or impedant.

The **F62** and **F65** (RMS) leakage current multimeters feature outstanding resolution - 10 µA - and high immunity to spurious currents (70 dB). They are especially well suited to measuring leakage currents that trip residual current devices through imbalances between the phase currents or the current flowing to earth. Their harmonic filter, which can be disengaged, facilitates the search for faults in perturbed systems.

Reader service n° 3 (B102) - N° 6 (F62/F65)

A new generation of testers for easy and reliable upgrading of electrical installations to compliance with standards

*Innovative and very user-friendly, **the C.A 6454 loop tester**, **the C.A 6030 RCD tester**, and **the C.A 6456 UNIVERSAL (earth/loop) earth tester** deliver optimum convenience of use and real metrological performance for upgrading electrical installations to compliance with today's national and international standards, notably the IEE 16th.*

C.A 6456 Universal earth tester

From the standpoint of convenience and simplicity of use, these three devices are distinguished by their immediate connection, with no risk of error, via their mains cord, their large backlit LCD screens with two lines displaying 4,000 points and many symbols, their alarm and date-stamped storage functions (100 measurements). Their light weight and compact size allow hands-free use, with the help of the "necklace" bag supplied as standard. For communication, they have an optical output for direct printing on a serial printer or export of measurement files from the tester's memory to a PC using the TransferView data transfer software also supplied as a matter of course with the testers.

The **C.A 6030** residual current device tester performs a non-tripping test and measures the time and exact current of tripping of RCDs from 6 to 650 mA. It can also perform a live test of earth resistance by an earth loop measurement, with or without an auxiliary rod.

The **C.A 6454** tests all loop impedances of the installation (L-PE, L-N, and L-L) and the earth with one auxiliary rod.

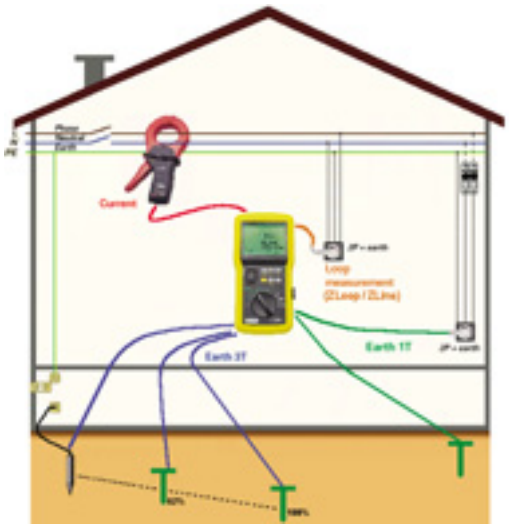
The **C.A 6456, the only universal earth tester on the market**, measures the resistance of the earth electrode for any configuration of the installation: non-current-carrying earth by the conventional methods with rods, live earth with or without a rod, and without tripping of the RCDs.

The measurement functions the three products share are: automatic check of the voltage and frequency of the installation upon connection, current and leakage current measurement by clamp, and calculation of the short-circuit current from loop measurements.

Reader service n° 4

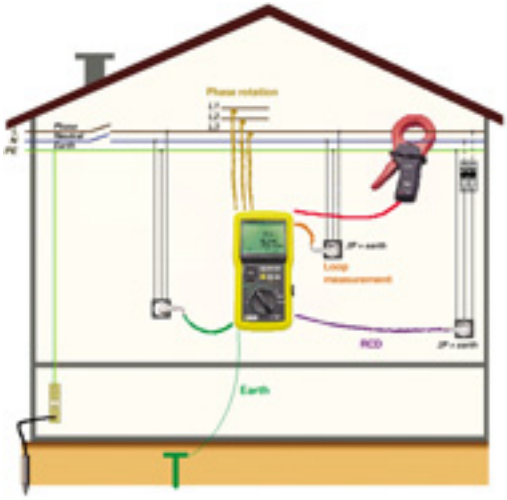
C.A 6456 - UNIVERSAL

- *Live or non-current-carrying measurement of earth electrode resistance.*
- *Selective earth measurement by clamp.*
- *Measurement of line impedance and calculation of short-circuit current.*
- *Current and leakage current measurement by clamp*



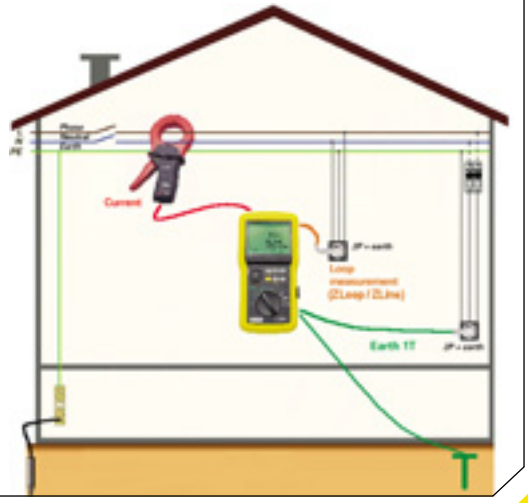
C.A 6030

- *Test on RCDs: 5 predefined ranges (10-500mA) and one adjustable range (from 6 to 650mA)*
- *Non-tripping test.*
- *Time and exact current of tripping by sweep mode.*
- *Earth loop measurement.*
- *Current and leakage current measurement by clamp*
- *Test of direction of phase rotation*



C.A 6454

- *Measurement of earth resistance on a live installation, "Rearth" with an auxiliary rod and "Zloop" without a rod.*
- *Loop measurement with or without tripping.*
- *Selective earth measurement by clamp.*
- *Measurement of loop impedances N-L or L-L and calculation of short-circuit current "Zline".*
- *Current and leakage current measurement by clamp*



C.A 650 Pyrotracer video:
the traceability of production batches, no more and no less

*Pyrocontrole® is marketing a "plug and play" paperless recorder with an **18-bit converter for extremely precise measurements and a polling time of only 200ms per channel!** With its outstanding display quality (6.1" TFT screen) and 18 universal measurement channels, isolated from one another, the Pyrotracer Video meets the needs of the most demanding thermal process industries.*

You should know:

Screen:
256 colours, 640 x 480 pixels

18-bit measurement **resolution**

Polling time: 200 ms per channel

Power supply: 230 V and 24 V

Two models:
> flush-mounting (144 x 144)
> with carrying handle

The advantages of replacing conventional recorders by paperless recorders are legion:

> Simpler maintenance through the elimination of wearing parts and spares;

> The benefits of replacing electromechanical precision with digital precision;

> The new possibility of processing the data on a computer, using a link to a PC;

> Remote adjustments and configuration using the field bus;

> The elimination of distance, since processing can be done locally or remotely - **both on and off site.**

In industry - food processing, laboratories and hospitals, chemicals, metallurgy, steel-making, petrochemicals, glass-making - these instruments acquire, record, and display the physical quantities of a process for purposes as varied as traceability (at the request of quality departments); checking or calibration; analyses for the development of a process or to trouble-shoot and maintain a process.

The various "plug and play" boards make using the Pyrotracer Video simple, and it is also totally secure, thanks notably to the 18 fully isolated channels and the encryption of the files, which are tamper-proof. The data are recorded in the memory of the product (8 Mbytes) and automatically transferred to the "memory card" (up to 128 Mbytes) when the product memory is 95% full.

While the recorder is perfect for stand-alone use, thanks to its memory capacity, its very-high-definition screen, its Windows CE® user interface, and its analysis and data representation capabilities are greatly enhanced by processing on a PC.

This is why an Ethernet link and remote data analysis software are supplied as standard. It is also possible to access the data using a field bus connected to an RS 232 or RS 485 link.

Each measurement channel has a "process tag" identifier, a display colour, and two alarms.
The menus are in five languages: English, French, German, Spanish, and Italian.

Reader service n° 5

New offer from Enerdis®: automatic synchronisation of a generating set to the network

*Intended for installers of control cabinets connecting electrical networks in parallel, **Enerdis's synchrocoupler** completes the existing line of **synchronoscopes**.*

A single device in 96 x 96 format combines a synchronisation command, a regulation command, and three synchronisation command modes. Dedicated to the automatic synchronisation of a generating set to the network, this digital-technology synchrocoupler not only measures the phase, frequency, and voltage, but also includes such command functions as adjusting the speed of the generator and ordering the coupling of two electrical networks.

Its use is simplified, just like its operation: the device is programmed from its front panel, and all parameters can be configured and viewed, thanks to the digital indicator. Access can be protected by a password.

Another strength of the device, and not the least, is its advantageous price, which goes hand in hand with its ease of use and its low installation cost.

The Synchrocoupler is an electronic device that communicates: it has a digital display unit, a diode-based analogue indicator, and check lights for the following numerical values: voltage, frequency, phase. Access to the menu and to the tripping of the relay is also from the front panel.

Reader service n° 6

A new low-cost energy meter from Enerdis®: MEMO3, energy to spare!

*MEMO3 is the new low-cost energy metering solution from Enerdis® **to facilitate the management of fleets of holiday rental housing**. The meter keeps track of each customer's exact consumption of electricity, on a single-phase network. This makes billing simpler.*

With a mechanical display unit that ensures ruggedness, the MEMO3 meter provides class 1 precision, as required by the CEI 61036 standard.

MEMO3 is ideal for the switch boxes or terminals of campgrounds, marinas, and rental housing:

> through its small size - the largest module is only 17.5 millimetres wide,

> through its ease of installation, thanks to its DIN rail mounting system and its current inputs (up to 20A) that are direct.

The meter has a pulse transmitter and can be used in conjunction with the **CCT** pulse concentrator and **WinThor** energy management software from Enerdis. Energy consumption figures can be uploaded to a remote PC and consumption reports edited automatically in order to ensure fair sharing among the consumers.

Reader service n° 7

SCOPIX®: innovation revolutionises hand-held oscilloscopy!

Metrix® has just marketed a line of digital oscilloscopes - 40 MHz, 2 channels with total digital isolation for industrial maintenance; and 100 MHz, 2 or 4 channels for electronic maintenance - including the* ***first self-contained hand-held oscilloscope with four isolated 600 V Cat. III channels on the market*** *- the OX 7104. A perfect illustration of what might be called "pluri-instruments", the SCOPIXs combine five complementary devices in one and feature original functions, outstanding legibility, and remarkable performance, thanks in particular to their 12-bit/1 GS/s converter, all in a minimum footprint. These* ***oscilloscopes, multimeters, FFT analyzers*** *(standard),* ***harmonic analyzers****, and* ***recorders*** *(optional) are capable of operating four hours between charges, and technicians and engineers can take them everywhere, so they always have the right analysis tool at hand.*

The stakes in hand-held oscilloscopy are large... inversely proportional to the size of the components used. The challenge was to deliver maximum functionality, power, security, and ergonomy for the smallest possible volume, weight, and energy consumption, while at the same time innovating usefully and providing original functions that will soon be perceived as necessary.

Here are three concrete examples of innovation - technological exploits; patents have been filed for two of them, just like the digital isolation of the channels!

To give these instruments power, precision, and speed, two specific integrated circuits were developed.

The first digital component is capable of sampling at a rate of **1 GS/s with 12-bit resolution**. This conversion yields outstanding resolution and precision on this type of instrument:

> extreme vertical precision on all measurements, whether automatic or manual; on the channels (typically 1%), and a coherent resolution of 10,000 points.
> the possibility of a vertical zoom on the trace (x16)
> an FFT with a larger dynamic, 79 dB rather than 49 dB, on 8 bits
> on the multimeter, a precision of 0.5%, specified uncertainties up to 45 kHz

The component also performs the following functions:

> Complex trigger
> Vernier
> Digital time base and hold off
> Interface with the digital isolation barrier and the ADC of the channel

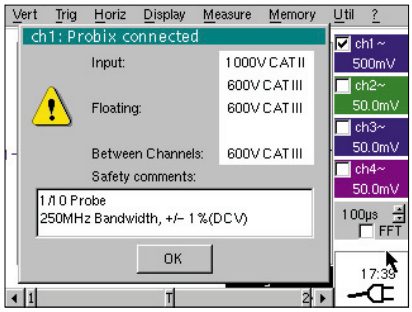
The second component is dedicated to the management of analogue inputs:

> impedance matching and coupling with the input,
> scaling of the input signal from 2.5 mV/div to 200 V/div (amplification or attenuation and offset)
> TRIGGER sampling and filtering,
> capacitance meter
> ohmmeter

To facilitate using the SCOPIX®, especially in the field, Metrix® has developed the patented PROBIX® system of smart accessories. These are probes and sensors that are supplied directly by the oscilloscope and recognised by the instrument as soon as they are connected.

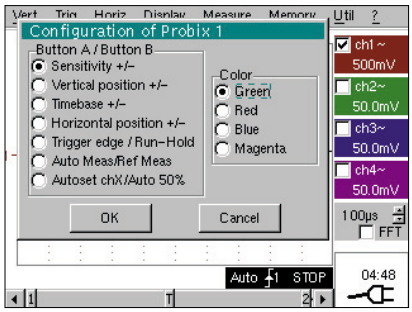
The user's safety is actively managed as soon as the **PROBIX®** accessory is recognised.

This automatic management also concerns the scales, coefficients, and units of the sensors and the configuration of the channels. It is possible to calibrate the colour of the trace to match the colour of the probe, marked by an interchangeable plastic collar. The set-up is applied directly by the oscilloscope.



The screen displays information about the type of accessory connected, the channel used, and the various safety categories: floating inputs; category III; 600 V assigned phase/earth; 600 V between channels; 1000 V on the inputs.

The first two control buttons on the probes provide some of the front-panel functions of the oscilloscope, freeing the user's hands to make the measurement. The third button is specific to the accessory. For example, on the voltage probes, it controls the illumination of the measurement zone. At the time of connection, all preferred parameters stored in the accessories are reactivated. They can then be modified using the pop-up window below.

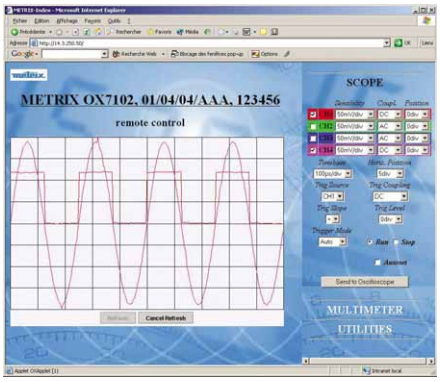


With only one interface, SCOPIX® oscilloscopes - the OX 7042, 7102, and 7104 - provide three communication solutions:

> the 10 Mb Ethernet link, local or remote, universal and rapid;
> the more traditional RS 232 link,
> and the Centronics interface for the printing of hard copies.

Ethernet communication is ideal in the field and for long-distance links. Simply specify the IP address of the Instrument in your customary browser to set up the link. This makes it possible, even on the road, to print results, exchange files between the OX and a PC, display traces in real time, and operate the oscilloscope from the control panel.

Whether local or remote, transfer and exchange operations are simple and rapid (10 Mb/s) and do not require special software on the computer, thanks to the WEB server.



Unrivalled effectiveness with no need to install software on the PC, whether local or remote

With its SCOPIX® digital oscilloscopes, Metrix® has broken new ground in portable instrumentation. Compact, powerful instruments, manipulation in complete safety thanks to the patented PROBIX® system of smart accessories that communicate, and also, via the WEB server, elimination of the customary problems of printing, backing up, and documenting the traces. The distance between the troubleshooting site and the office becomes "virtual".

SCOPIX® instruments are also available in a metallic carrying case version, a good way to protect and stow the instrument and its accessories.

For compatibility without fail, BNCs and standard cords can always be connected using the safety adapters provided.

The SCOPIX® line comprises:

The OX 7104
4 channels, 100 MHz, colour screen

The OX 7102
2 channels, 100 MHz, colour screen

The OX 7042
2 channels, 40 MHz, colour or monochrome screen

***Digital isolation** is a guarantee of the quality of the signal, which is not altered before its conversion. This technology, patented by Chauvin Arnoux, makes the design more complex, in the synchronisation of the channels, but achieves a quality of transmission of the signal across the isolation barrier that is impossible with analogue techniques.*

Thanks to the performance of its digital isolation device, METRIX® can use the same input terminals and acquisition chains for the oscilloscope and multimeter modes of its SCOPIX®. This makes it possible to change from one instrument to the other without changing the measurement connection, and, more important, to provide as many multimeters as the Oscilloscope has channels (2 or 4 depending on the model).

Reader service n° 8

Industrial networks: wireless communication

Bluetooth™ *wireless communication:* ***innovation and functionality.***

What is Bluetooth® technology?

Originally, a simple chip, small enough to be incorporated in any digital device, for wireless communication over a limited range. Today, **Bluetooth® technology is a local digital radio network standard** that can be used without paying royalties and without a licence in the 2.45 GHz ISM (Industrial Scientific Medical) band. This frequency has the advantage of being less crowded than the 433MHz band. The new technology uses fast frequency hop spread spectrum transmission, which provides very high immunity to external electromagnetic interference. **It is a low-consumption technology, and so a logical choice for incorporation in portable equipment.** It uses authentication and data encryption algorithms to ensure data security and confidentiality. The net exchange throughput between two devices can reach 721 kbits/s. The range is more than 100 metres with suitable antennas. Bluetooth® technology is standardised by the IEEE (Institute of Electrical and Electronics Engineers) (1) and can be used anywhere in the world. In France, the ART (Autorité de Régulation des Télécommunications) monitors compliance with the legislation.

Did you know?

Bluetooth® technology takes its name from a tenth-century Viking king whose communication skills enabled him to unify Denmark.

(1) The site of the IEEE world standardisation organisation http://www.ieee.org.

(2) That of the Autorité de Régulation des Télécommunications http://www.art-telecom.fr

A technology at the heart of innovation

All-new possibilities, inconceivable with existing technologies, are henceforth available thanks to Bluetooth®. This wireless technology does away with technical, economic, and installation time constraints on the creation of new communication networks between industrial devices. This was previously inconceivable. For example, the simple presence of a cable in a damp or hazardous area could lead to prohibitive installation costs and require special improvements of the site (impervious sheaths, other protection, etc.). Today, nothing could be simpler than installing Bluetooth® equipment. There is no direct contact with the damp or hazardous area to worry about. Another example is the installation of equipment in a space without direct visibility. **Bluetooth® technology uses the microwave band; the signals pass through some obstacles**, such as partitions, and are reflected from metallic surfaces. This often makes it possible to link instruments without there being a direct line of sight between them. **Bluetooth® technology can also connect up to 8 devices at once**, thereby constituting veritable multipoint networks. The discovery functions, which search for another accessible device (within range and Bluetooth® compatible) and recognise its functionality, can be used to create links instantaneously between devices in the field. Pairing, a process that creates a confidential link between two devices, secured by the exchange of secret keys, then favours the transmission of data between the two devices thus "virtually" connected. This process prevents an unknown device from connecting and monopolising the resource. At each subsequent power-up, the devices connect immediately.

Bluetooth® technology is now proven and reliable, and its very wide dissemination results in costs per product that are often lower than with other digital radio technologies.

Varied areas of application

Bluetooth® technology opens the way to many industrial applications, such as the replacement of cables between industrial equipment and computers, communication with portable terminals, or again the creation of networks of remoted sensors and PLCs.
There are many possible applications, far more than originally anticipated. In mobile computing, consumer electronics, medicine, instrumentation, and now even in industry.

Here are a few examples:

> Wherever installing a cable is difficult or impossible
> Rotary machines
> Processes in movement - elevating bridges, cranes
> Zones of strong interference by electromagnetic pollution
> Laboratories
> Hospitals
> Treatment plants
> Mobile measurements

There are emerging needs both in the replacement of existing installations and in the building of new installations at the lowest possible cost. Installing the equipment is relatively easy in simple cases. The application may, however, be such as to require an audit on site to assess the influence of the environment and evaluate the number of Bluetooth devices needed to cover a given zone, and so define the best locations for the equipment.

Bluetooth® in figures...

More than 2,000 companies are developing Bluetooth® or use it.

The current version of this standard is the third.

More than **1,000 different products** now on the market use this technology.

7 billion dollars is the forecast of the American firm ON World for the wireless sensors market in 2010.

By the end of 2004, **140 million** Bluetooth® chips will have been sold in France.

Bluetooth® in dates...

1994 : Ericsson begins its investigations of a radio interface between the mobile telephone and its accessories.

1997 : invention of the Bluetooth® process by Jaap Haartsen (1)

February 1998 : creation of the Special Interest Group (SIG) Consortium charged with standardising and promoting a technology based on the work of Jaap Haartsen. Chauvin Arnoux understands the merits of this new technology and quickly decided to work with the consortium.
That same year : Nokia, IBM, Toshiba, and Intel join with Ericsson to standardise and promote this technology, then baptised Bluetooth®.

1999 : the first specifications (version 1) are published.

(1) A Danish scientist, doctor of electrical engineering and graduate of the Delft University of Technology in the Netherlands.

Comparative table of the 4 main technologies

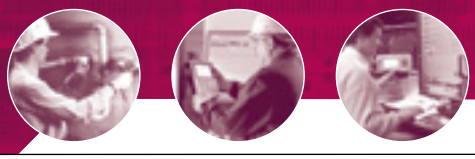
	BLUETOOTH 1.1 IEEE 802.15.1 for low layers	WI-FI IEEE 802.11g	433 MHz ETS 300220	ZIGBEE IEEE 802.15.4
Frequency band	2.4 GHz	2.4 GHz	433 MHz	2.4 GHz and 868/915 MHz
Coding technique	FHSS (frequency hops)	OFDM (frequency division multiplexing)	FSK	DSSS (spread spectrum)
Theoretical max. net throughput [1]	723 kbits/s	54 Mbits/s (11 Mbits for 802.11b)	38,4 kbits/s	255 kbits/s
Theoretical max. range [2]	100 m	100 m	500 m	100 m
Compatibility	Bluetooth V1.2	802.11.b (wireless Ethernet)		
Cost	Reduced	Moderate	Low	N/A
Security	Excellent	Good	Poor	N/A
Quality of service [3]	Excellent	Average	Poor	Good
Latency [4]	Very low	Average	Average	Average
Consumption of electricity [5]	Low	Average	Very low	Very low
Mature technology	Yes	Yes	Yes	No
Applications	Communication within and between production machines (supports voice and data)	Local industrial networks	Alarm, opening of doors, data transmission	Industrial supervision and control

1 In point-to-point mode
2 In free field
3 Data integrity
4 Transmission delay
5 Depends on range and latency

Wi-fi technology or Bluetooth® technology?

Wi Fi™ WLAN (Wireless LAN) and its WI-FI variant are alternatives to wired Ethernet or fibre optic networks. WLAN uses the same ISM band as Bluetooth® technology. Several transmission techniques are thus possible, the commonest being the direct sequence spread spectrum. With this technique, WLANs reach communication rates of 11 and 54Mb/s (some even 108 Mb/s). The range at these speeds is a few tens of metres. At lower speeds (1 to 2 Mb/s), WLAN can reach 100 metres. The trade-off for this high speed is less robustness and reliability than with Bluetooth technology: WLAN networks are more readily disrupted by external interference. WLANs are more complex than Bluetooth®, because they have functions like roaming (dynamic hand-off between cells), and so are more expensive to implement. They consume more energy, and take more space than Bluetooth® technology when implanted in equipment. Their complexity also shows up in the price of the equipment - more expensive than Bluetooth® equipment for the same functionality. This extra cost is most often pointless in the case of communication between industrial devices, which rarely need to communicate at such high speeds (most often, they need no more than 115.2kb/s). In short, WLAN and Bluetooth® are not really rivals, because they meet very different needs: WLAN is used to add wireless access points to conventional hard-wired computer networks. Bluetooth® is used to create wireless local networks between portable or industrial devices. For Chauvin Arnoux's purposes, Bluetooth® technology is a good fit to the requirements of the world of industry and to the constraints of measuring devices: maturity, reliability, range, adequate throughput, low consumption, and reasonable cost.

(1) world standardisation organisation based in the USA.



An application of Bluetooth® technology in the field of industrial networks: **Bluetop100®**

The demanding process industries were waiting for a proven solution:
a way of setting up a local wireless network for reliable, secure data transmission.
With the Bluetop 100®, a radio modem that uses the Bluetooth® wireless communication technology developed by Pyro-Contrôle, this is now a reality.

The Bluetop 100® is designed to work in an industrial environment, in a point-to-point link; it replaces RS485 and RS232 links over distances of 100 metres or more. This solution has many advantages over conventional wired versions:

The first is **cutting the costs of wiring** in severe or sensitive industrial environments: in such contexts, the cost of installing and maintaining an RS485 cable network is growing higher and higher, for technical as well as security reasons.

Secondly, the Bluetop 100® ensures reliable, **secure data transmission**. It uses FHSS digital radio technology ("fast frequency hop spread spectrum"), operating at 2.45 GHz, recognised for its security and its immunity to electromagnetic interference.

Thanks to this wireless technology, difficult passages of cables and mechanical connection problems are solved in mobile environments like travelling cranes, rotary furnaces, etc.

The transmission distance depends on the choice of antenna. The range is ten metres with the built-in antenna, a hundred metres with the istropic antenna, and as much as one kilometre with the directional antenna.

The Bluetop 100® is a "plug and play" product, quickly installed and very simple to use: upon starting up, the typical connection time between two modems is 1 second. The device is mounted on a DIN rail and uses 230V mains power, drawing less than 2VA.

To meet different needs, the device is sold in two forms: a single Bluetop 100® modem, which must be configured, or two Bluetop 100® modems already "paired" and ready to go. The product is delivered with its PC configuration software (in French and English) to adapt it to its environment: pairing of two devices, data encryption, etc.

Open and resolutely communicating, Bluetooth® technology ensures the "interoperability" of the Bluetop 100® with Bluetooth® modules from other manufacturers. In addition, the Bluetop 100® is compatible with common industrial protocols, in particular Modbus/Jbus.

It also features an open-ended design concept to allow for future needs: multipoint applications, evolution of the Bluetooth® standard, OEM applications, etc.

Reader service n° 9

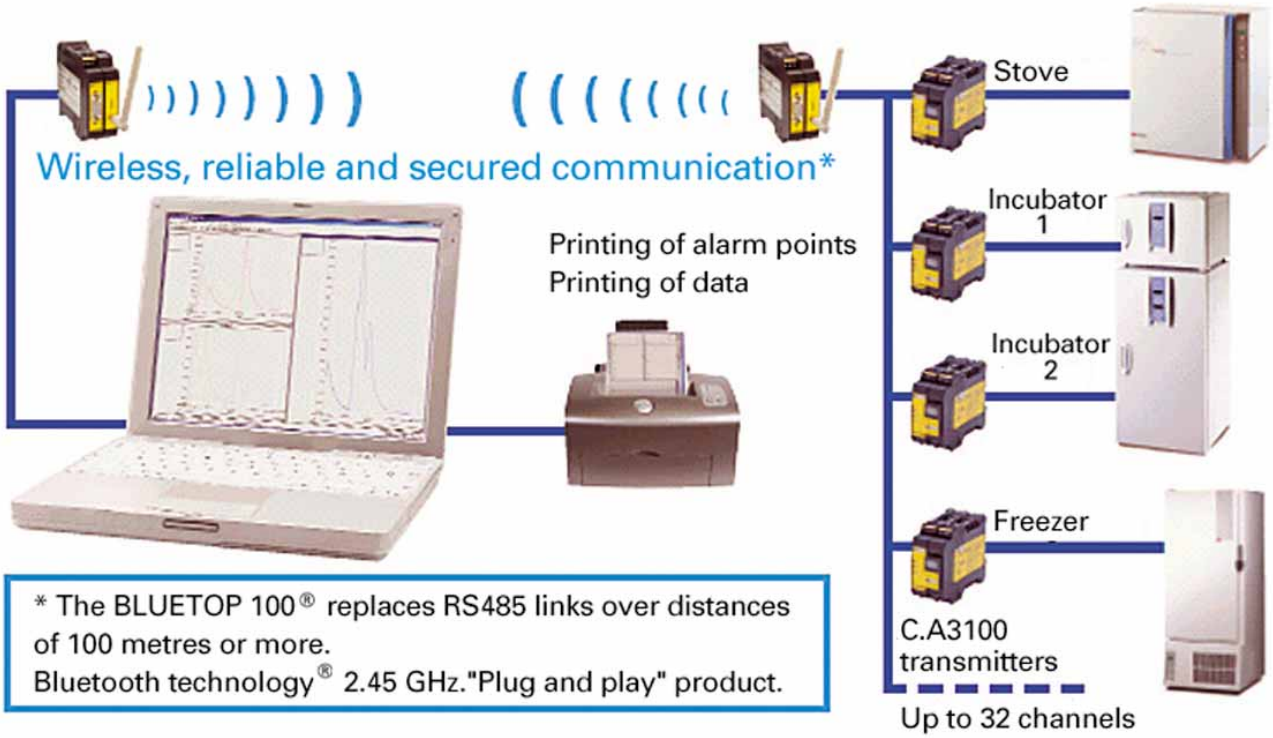
A response to the need to control the temperatures of stoves and incubators in **medical environment**

*In the medical and pharmaceutical environment, it is essential **to control the temperatures** of stoves, incubators, and freezers. Pyrocontrole® proposes **modular temperature recording systems** for PCs.*

The system adapts simply to all configurations found in medical and pharmaceutical applications: depending on the customer's configuration, the **PYROTRACER®** has from 1 to 32 digital transmitters with C.A 3100 universal inputs, software - available in 8-, 16-, and 32-channel versions -, plus two Bluetop modems, for wireless communication.

Recording may be either continual (up to a maximum of 18,000 measurements per channel) or at programmed times. In both cases, the time interval between two measurements can be varied. Overshoots of alarm points can be printed as they occur, and the data, tamper-proof, are exported directly to an Excel spreadsheet for processing.

Reader service n° 10



CHAUVIN ARNOUX GROUP

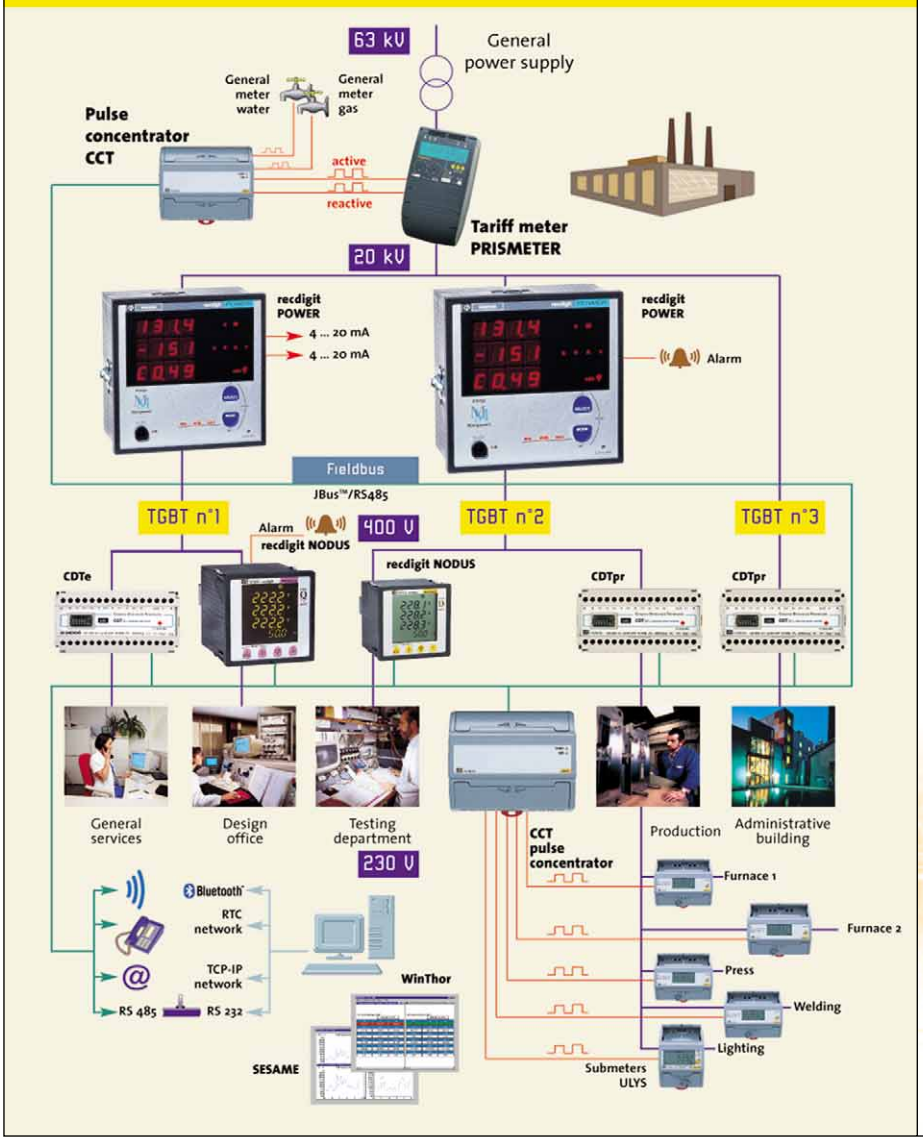
Why and how install an energy management system?

For industrialists, managing energy depends on knowing and controlling consumption profiles. WinThor is a ***complete, modulable system for point-by-point analysis of the electric network*** *that makes it possible, thanks to the associated software, to determine exhaustive energy balances - water, gas, and electricity.*

The objectives of automated global energy management are to achieve direct or indirect savings and/or to obtain customised energy balances rapidly and automatically in order to proceed to a precise analysis of consumption.

Schematically, **an energy management system is made up of smart individual meters with digital outputs connected to a communication network**. All of the metering information is automatically transmitted at regular intervals, via the PSTN (Public Switched Telephone Network), Ethernet (TCP IP), and/or RS 485 pair to a **database** in which the information is organised and saved. **The energy management software** then uses this base to prepare the statistics, reports, and balances needed for decision-making and corrective actions.

WinThor
Electrical networks and energy management and supervision system



Metering and management of electricity

Practical exercises for use by educators

Three practical exercise themes using WinThor software have been developed by a BUSINESS/EDUCATION partnership; they concern the metering and supervision of energy.

The data used are actual consumption records provided by a recdigit POWER type remote reading system.

Students thus work on data that are real and fresh, which reinforce the pedagogic interest. For direct access to the practical exercises, which you can download free of charge, simply visit our site:

Exercise n°. 1: using a device to storage energy consumption values

Exercise n°. 2: subscribed demand vs overshoot - Study of the compromise

Exercise n°. 3: reconstitution of the electricity bill

Reader service n° 11

Certify your LAN networks in a few steps

Any local network - computer or telephone, copper or optical - must be certified, by very specific procedures, after it is installed. ***The CERTILAN C.A 7050 network analyzer*** *measures the performance of a local network and attests to its compliance with the international standards in force.*

Commonly called **the LAN Tester**, the network analyzer must deliver technical performance, of course, but also extended battery life in the field. Comprising two modules - a meter and a responder - stowed in a carrying case with a set of accessories essential for connection to the networks, the **CERTILAN** is easy to transport and satisfies the performance and battery life constraints perfectly. The **LAN Tester**, with a measurement frequency band up to 300MHz, precisely indicates the compliance of LAN networks with the international certification standards **TIA/EIA 568 up to category 6, ISO 11801 and EN 50173 up to class E for copper networks**.

Simplified parameterizing

The testing procedure is very simple. The METER is connected to one end of the link and makes all of the measurements, in one of two operating modes - automatic or manual - according to the installer's needs. The RESPONDER, connected to the far end, implements all loopbacks needed for the measurements. The C.A 7050 can also be used in a configuration with one meter and several responders. The tests performed correspond to the specific characteristics of the multipair or coaxial transmission lines used in computer communication networks: NEXT (near-end crosstalk), Elfext (far-end crosstalk), attenuation, ACR, return loss (matching), skew (difference in propagation time), length of lines, loop resistance, mapping (wiring), and fault location. The device tests the continuity and measures the attenuation of single- and multi-mode optical fibres. Before starting any measurement, it automatically detects any spurious voltages in the line.

Everything in memory

There is enough memory **to store up to 1,700 complete tests**, even in category 6 tests, which require many criteria. Curves can also be saved. Highly user-friendly with its browse and selection keys, the **CERTILAN** also offers the user menus in a choice of languages (French, English, German, Italian, or Spanish). Its graphic liquid-crystal screen is back-lit for ease of reading. The microphone built into each module enables technicians to communicate across the network for remote measurements.

Transfer and printing in a twinkling of an eye

The efficacy of the tests is matched by the quality of the certification reports issued. The **C.A 7050** includes **CERTISOFT** PC certification software as standard, to import in a few clicks the test results stored by the meter. Two ope
"graphic"
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ronment.

All accessories needed are stowed in a carrying case with the two components of the LAN Tester

Reader service n° 17

Manumesure trade presentation brochure

An overview of the palette of service offers from Manumesure, in the biomedical, nuclear, industrial, environmental, and other fields. Manumesure's businesses range from repairing measuring devices (all makes) through carrying out the measurements and inspections required by regulations to the complete management of fleets of instruments.

Pyro-Contrôle trade presentation brochure

This document is a way to get to know our temperature measurement product offer, from temperature sensors to the latest technologies for the retrieval and analysis of transmitted data. It is also an opportunity to judge the breadth of Pyro-Contrôle's expertise in the industrial thermal process chain.

Enerdis trade presentation brochure

This brochure describes Enerdis's four major skill areas in detail: measuring instruments for the surveillance and protection of MV and LV electrical networks; energy management by remote meter reading; energy supply quality; electrical energy reconditioning equipment.

Test and Measurement trade presentation brochure

An overview of Chauvin Arnoux's competence in measuring instrumentation, from the simple socket outlet tester to the latest-generation hand-hold oscilloscope, in response to the requirements of each market: artisans, installers, manufacturing companies, energy, education, laboratories, government agencies, the tertiary sector, etc.

B102 clamp-on leakage current meter

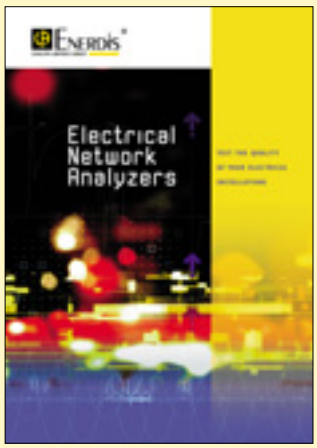
The applications of the B102 clamp-on leakage current meter, dedicated to detecting and locating faults, are described here. The B102 is the ideal tool for upgrading electrical installations to conformity with the NF-C 15 100 and CEI 60304 standards.

Scopix®: the new self-contained portable digital oscilloscopes from Metrix®

The all-new SCOPIX® line of oscilloscopes is described at length in this documentation. The many innovations that make these oscilloscopes unique are discussed. The ample space devoted to illustrations of screens makes it easy to understand the intuitive operation of these devices.

Certify your LAN networks

The CERTILAN C.A 7050 network analyzer measures the performance of any local network and guarantees its compliance with the international standards in force. Get to know all the capabilities of this network analyzer and learn how simple it is to operate.



Check the quality of your electrical installations

Enerdis's complete network analyzer offer is grouped in a single document. There are selection aids to help in choosing between the MAP line and NRGCenter products, and two pages of information about the nature of the perturbations found in electrical networks and their causes and consequences.