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11 new clamps from Chauvin Arnoux

CHAUVIN ARNOUX GROUP

EDITORIAL

Active Energy Management

Patrick Kauffmann is the Managing Director of ENERDIS, a company in the Chauvin Arnoux Group which designs and markets measuring equipment for controlling electricity distribution and operating electrical installations and also offers energy management solutions. In his capacity as Chairman of Gimelec* Division A6, which focuses on "Monitoring and management of electrical installations", he discusses the work involved in developing and implementing the new version of Gimelec's Measurement Index.

In the Gimelec trade association, I chair a group of experts including the French leaders in electrical measurement working on both policy definition and operational missions. The goal that we defined was to design a method and a software tool to make it easier to meet users' needs with the definition of a product suitable for the various performance levels required on an electrical installation. This tool also had to allow expert channels to draft the technical specifications of the instrument thus defined in a neutral manner so that they can subsequently be included in broader specifications. This led to the Measurement Index, comparable in principle to the "Service Index" widely used by the profession to characterize electrical switchboards.

Drawing on feedback from the users (switchboard operators, engineering departments, installation operators), the initial version of the Measurement Index has been reviewed this year. Version 2 of the Index, still based on [1] energy management, [2] electrical network monitoring and [3] power supply quality applications, includes significant modifications aimed at simplifying use of the tool, in particular by making the different performance levels easier to distinguish. Each field is now defined in terms of a level of requirements graded from 0 (none) up to 3. Depending on the levels selected via the software's assistance system, all the requirements and necessary functions are summarized by an "IM xxx" rating, e.g. IM 321.

The Measurement Index is therefore a genuine response to the statement of a requirement so that a product can be defined in relation to a performance level, facilitating dialogue between engineering departments, expert channels, integrators and the operators of measurement and metering systems. This joint work also enabled the members of Division A6 to structure their offerings better so that they more closely meet the needs of measuring instrument and system users. ENERDIS, meanwhile, has produced a comprehensive selection guide drawing on the depth and breadth of its product ranges, positioning it as a metering specialist and a leader in the field of energy management.

This year, the Ulys range of meters has been enhanced with new functions and communication capabilities (RS 485 Modbus, Ethernet, MBus) and has been awarded MID certification in the context of the relevant European Directives (see our article on page 16). At the same time, the Enerium family of power monitors has been broadened at both ends of the range with the arrival of the Enerium 300 (IM 333) for network analysis requirements (EN 50160) and the Enerium 30 (IM 111 to IM 221) for more basic uses.

In addition to metering products, ENERDIS also provides complete solutions for monitoring and optimizing multi-energy, multi-utility performance on industrial and tertiary sites. Our expertise in this area also includes defining and proposing the whole communication architecture between installed metering points and the E.online® energy supervision solution. This global expertise covering the whole information chain guarantees long-term, high-performance operation of the entire supervision system.

Patrick Kauffmann
Managing Director, Enerdis

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Systems for analysing the quality of all electrical networks compliant with the IEC 61000-4-30 standard, Class A

From capturing the measurements through to processing the information, our **MAP analyzers** measure and analyse all the parameters of MV/HV electrical networks:

> active, reactive, apparent and distorting power values;
> energy values;
> cos phi;
> power factor;
> THD-U and THD-I;
> harmonics up to the 50th order and interharmonics.

Via related software, they provide continuous, detailed, comprehensive analysis of power supply quality according to the applicable standards, voltage variations (dips, overvoltages and outages) and rapid EMS current and voltage variations (transients, flicker).

The products in the MAP range are available in two versions:

> permanent analysers (MAP 610, 620, 640 and Compact);
> non-intrusive analysers for measurement campaigns (MAP 612-NI, 620-NI and 670-NI).

Two management and analysis **software products** are available: **E.Qual-Premium** and **E.Qual-Premium Server.**

For the **MAP Compact**, there is the **Qual-SRTc** software for configuration and real-time display and the **Qual-View** software for analysing measurement campaigns.

MAP Compact network quality analyser with EN50160 template monitoring

Eco Conception: the Chauvin Arnoux Group commits to Eco-Design!

A precursor in this field, Chauvin Arnoux has already set up a voluntary Eco-Design initiative (called **Eco Conception** in French) in the context of the ISO 14000 standard.

The aim is to reduce the environmental impact of the Group's products. From the design phase in our R&D units in Paris and Annecy through to recycling after use, the life cycle of Chauvin Arnoux's products already complies with the requirements in terms of:

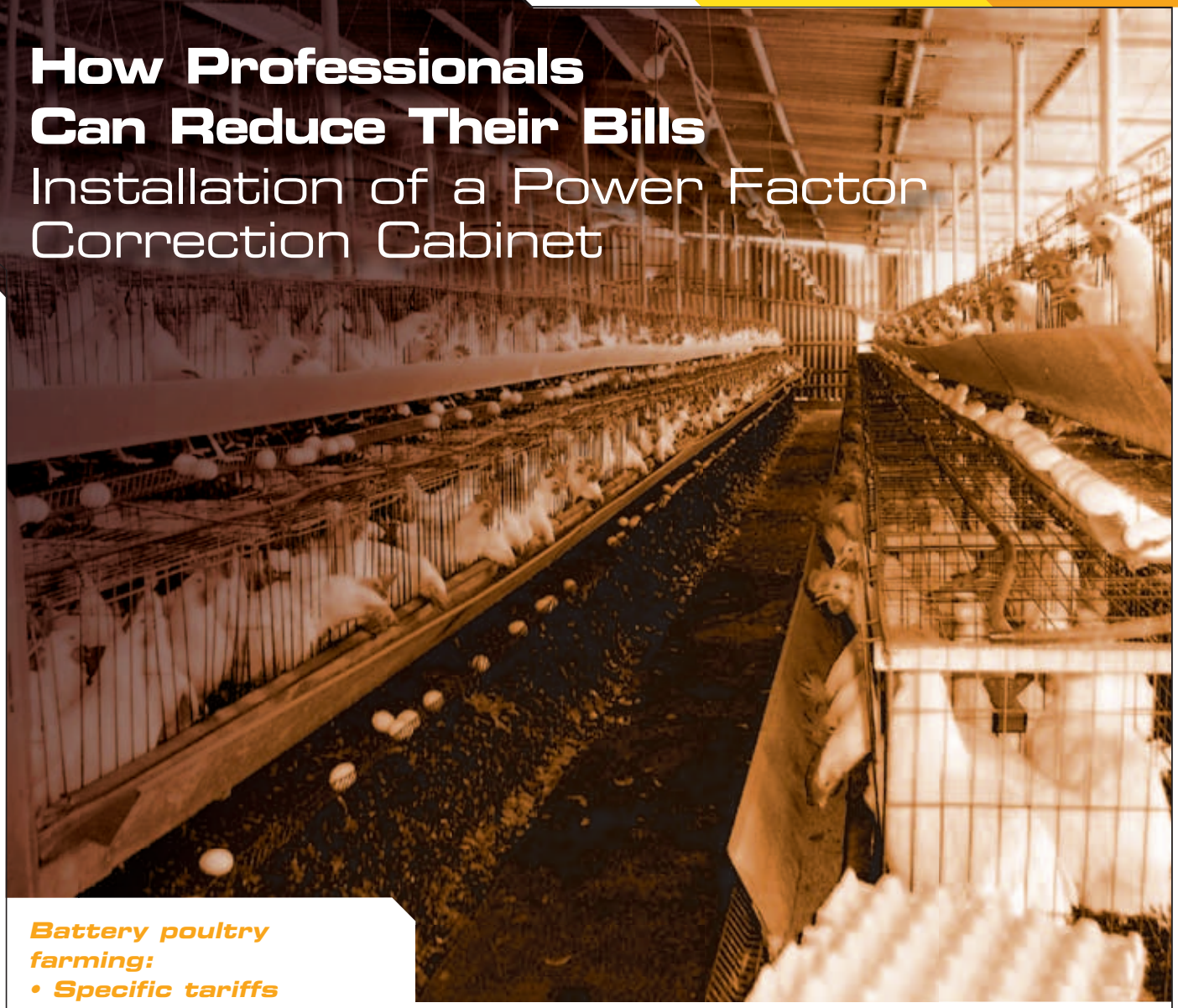
> choice of recyclable and recoverable materials;
> reduction of consumption by the products;
> printed circuit-board size reduction, thus reducing the amounts of raw materials needed.

This environmental commitment by the **Chauvin Arnoux Group** is as important as the functional, metrological and safety features of the measuring instruments designed. However, **the need to maintain our products' quality and price levels remains one of our core concerns.** This approach is formalized by an environmental file (conformity, dismantling sheet, etc.) accompanying each measuring instrument.

Eco Conception

How Professionals Can Reduce Their Bills

Installation of a Power Factor Correction Cabinet



Battery poultry farming:
• Specific tariffs
• Savings
• Power measurements

A poultry farmer in western France has seen his energy requirements rise significantly. The site's specific-tariff power supply ("Tarif Jaune": 252 kVA for long-term uses) is no longer sufficient to deal with his electrical energy needs.

On this installation, consumption is due to:

> the water treatment plant, equipped with 2 variable speed drives

> the poultry shed, fitted in particular with infrared heating lamps for the chicks

> the buildings: offices (computers, printers, etc.), housing, etc.

According to the management documents covering the last two years, the maximum power reached was 293 kVA. The overrun time for the year was 159 hours, which meant annual penalties of nearly € 2,050. To solve the power overrun problems and enable the customer to achieve substantial savings, Chauvin Arnoux and Enerdis provide a tailored solution: installation of a Power Factor Correction cabinet.

Phase 1: Billing Analysis

Before any measurements on site, it is important first to examine the energy bills for the last two years in order to find the best compromise enabling the customer to remain within the subscribed power limits.

This phase helps to gain a rough idea of the power rating of the cabinet that needs to be installed. This optimization is carried out on the basis of the Displacement Power Factor (cos φ / DPF) which remains unknown. The energy bills do not include this crucial information.

EDF's Special Tariff ("Tarif Jaune")

In France, the electricity supplier EDF applies different rates for business customers.

This special tariff is suitable for customers requiring power levels between 36 kVA and 252 kVA.

It includes a fixed annual premium depending on:

> the subscribed power

> the type of use

> the electricity consumption measured in kWh

The price per kWh varies according to:

> the time of year (winter or summer)

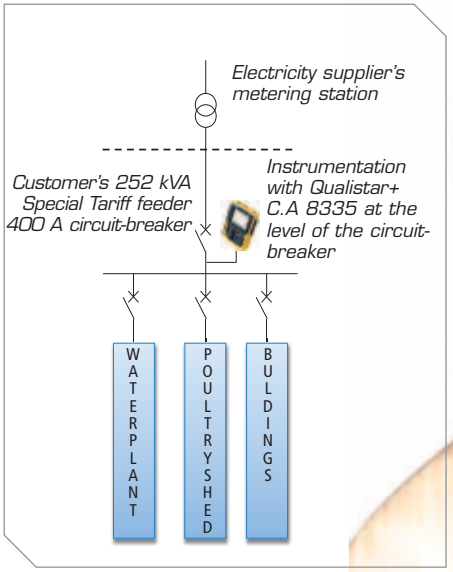
> the period of use during the day (off-peak hours, peak hours)

> the type of use (medium or long)

Phase 2 : On-site Measurements with a Qualistar+ C.A 8335

On-site measurements and audits help to determine the type of equipment involved and how it is used.

The instrumentation is set up on the main feeder to measure all the power consumed by the installation with the shortest possible integration time.



Performed with a Qualistar+ C.A 8335 three-phase network and energy analyser, this measurement helps to identify :

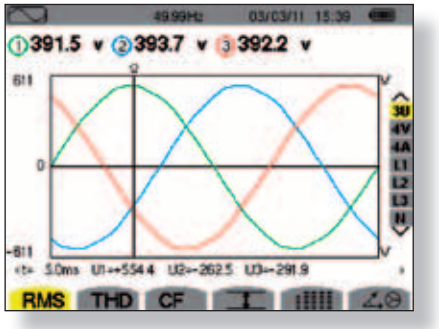
> Polluting loads
> The maximum power level reached during the recording period
> Rapid power and current variations
> The Power Factor Correction requirements

The measurements are only valid if the operating cycle of the load conditions is representative of the electrical network.

Real Time

By hooking up the instrument to the installation's circuit-breaker, we can clearly see that there are not many polluting loads on the network (just a few variable speed drives in the water treatment plant). The levels of harmonics on the network are therefore negligible, so there is no need for correction.

However, the measurements also clearly indicate that Power Factor Correction is necessary *(see Fig. 2)*: **the cos φ can be improved.**



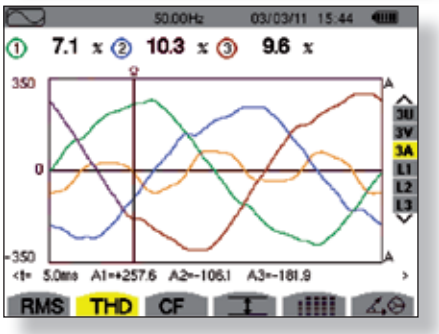


Fig. 1 – Capture of Voltage and Current waveforms

Fig. 2 – Displacement Power Factor (cos φ)

Monitoring

Consumption is monitored to produce a power profile. The recordings are made with a 1 s integration period.

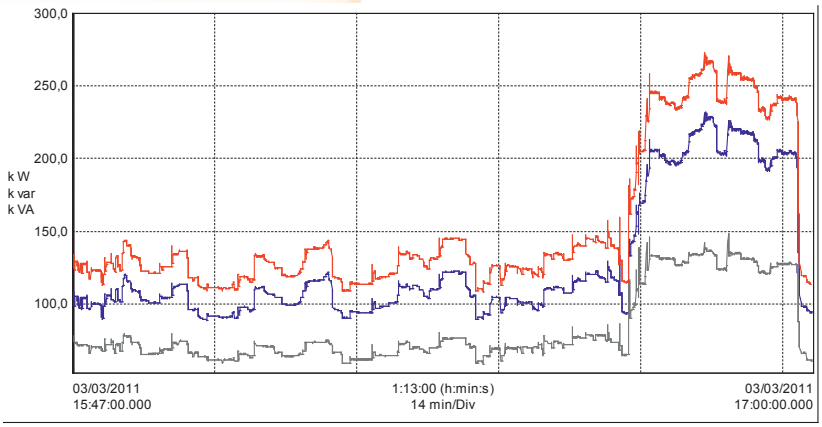


Fig. 3 – Recording of power profile

The recordings *(Fig. 3)* clearly show that the contract is exceeded during the recording period.

The power profile shows the reactive power (grey curve). This can be eliminated by installing a Power Factor Correction cabinet to ensure that the consumed apparent power is equal to the active power (< 252 kVA specified in the contract).

Phase 3: Definition of the ENERDIS® Power Factor Correction cabinet

More detailed analysis shows that installation of a Power Factor Correction cabinet would make it possible to supply the necessary reactive power instead of the power supplier.

To achieve the best gain, compensation should be implemented so that cos φ (DPF) = 1 (i.e. tan φ = 0).

The average cos φ on the installation is approximately 0.833 and the worst value is 0.743.

The Power Factor Correction cabinet must be sized as accurately as possible because it is crucial to avoid overcompensation. Indeed, overcompensation means injecting reactive or capacitive power which would be counted in the apparent power.

To define the capacitor bank correctly, we compare the recorded data (power and phase offset) with the energy bills.

Smax = 293 kVA (energy billing data)

Cos φ (DPF) = 0.743 (data from the Qualistar+ C.A 8335)

S (kVA)	293
kW with cos φ = 0.743	217.70
kvar with cos φ = 0.743	196.10
kvar target value (tan φ = 0)	196.1
Capacitor bank at 400 Vac (kvar)	207
Final kVA value with cos φ = 0.743	218

On the basis of these measurements, the capacitor bank that we define will have a power of 207 kvar (at 400 Vac) for a power of 196.1 kvar consumed by the installation. The target for the theoretical apparent power is 218 kVA (< 252 kVA).

The capacitor bank will neutralize the reactive energy consumed by the installation while benefiting from the maximum available power.

Phase 4: Installation of the PFC cabinet and measurement of its efficiency the results are convincing

When the cabinet is started up, it successfully reduces the reactive power consumed by the installation. The recording in *Fig. 4* shows that the reactive power has been brought down to a negligible level close to 0. The cos φ value is now 1 *(see Fig. 5)*.

Did you know?

Reactive energy is consumed by electrical appliances and lighting. Consumption of this energy reduces the available output power. By having this energy produced by Power Factor Correction cabinets, you can therefore recover output power and thus avoid overruns. Another effect of installing a PFC cabinet is that it helps to reduce heating in the cables. For customers, a poor DPF value leads to voltage dips in cables, losses due to the Joule effect during transmission of the electrical energy and, in the case shown here, higher electricity bills (penalties).

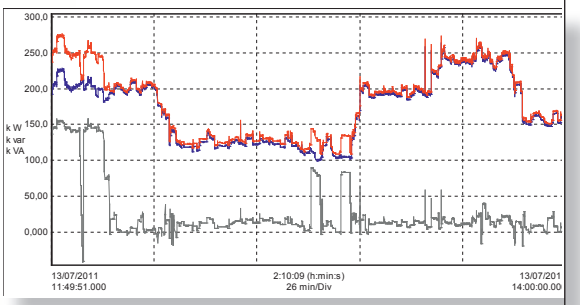


Fig. 4 – Recording of the power profile with the capacitor bank

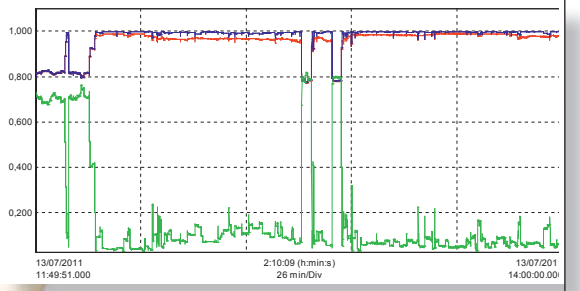


Fig. 5 – Recording of the cos φ (DPF), PF and tan φ profiles

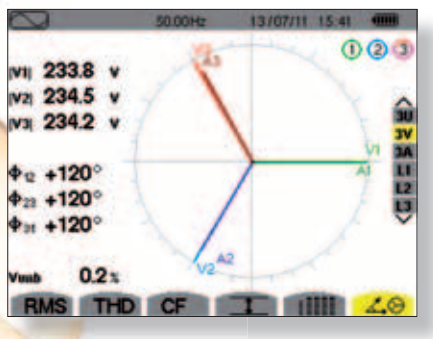


Fig. 6 – Fresnel diagram after Power Factor Correction

Conclusion

With the ENERDIS® Power Factor Correction solution, the customer has successfully returned within the limits for the special tariff package while also avoiding costly investments: change of tariff with installation of a transformer + transformer maintenance and repairs (total investment of approximately € 40,000).

Furthermore, despite occasional overruns, the customer will save € 2,000 annually.

The customer is ensured that the installation will function correctly while controlling energy consumption.

The cos φ or Displacement Power Factor (DPF)

Appliances and motors equipped with magnetic circuits and operating on AC current absorb active energy and reactive energy, with a corresponding active current and reactive current, respectively.

> in the case of resistive loads, such as incandescent lamps, the cos φ is optimum as it is equal to 1
> in the case of inductive loads, the cos φ is degraded and usually requires correction.

Examples:

> Uncompensated fluorescent lamps: cos φ ≈ 0.5
> Asynchronous motors with 50% load: cos φ ≈ 0.73

Product advantages

QUALISTAR+

Power and Energy Quality Analyser

> Recording of all the selected parameters with graphic display
> Power measurement: W, VA, var, PF, DPF, cos φ, tan φ
> Recording of all the parameters at the maximum sampling rate for up to 1 month
> Simple to use with intuitive operation
> IEC 61010 1000 V CAT III 600 V CAT IV

www.chauvin-arnoux.com/qualistar

ENERcap

Automatic Power Factor Correction Cubicles

> Standard cublicles from 10 to 1,000 kVAr at 400 Vac
> Also available H (reinforced voltage) and SAH (with inductance) types
> Equipped with ENERPHI+ controller with RS485 port as standard feature
> Switch as a standard feature
> Substantial savings on energy bills
> Tailored solutions adapted to handle any project

Key figures :

> Elimination of overrun penalties (€ 2,000) and maintenance of the apparent power within the range stipulated by the contract
> Payback time < 2 years
> Saving on investment in a transformer (approximately € 40,000)
> Consumption cut by 3 to 5%
> CO_2 emissions avoided: 2.75 tonnes of CO_2

Reader service no. 1

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Multi-Zone Furnaces:

Optimize the Overall Load on Your Electrical Network

*Pyrocontrole is proposing a new power control solution. Based around **Thyritop Power Manager**, it enables you to control the quality of your products while optimizing the overall load on your electrical network and **helping you to comply with your tariff commitments**.*

The multi-zone furnaces used in certain process industries are equipped with independent heating areas whose **temperature profiles and electrical power levels must be kept under perfect control to ensure product quality.**

Power controllers: thermal stability

These multi-zone furnaces are equipped with power controllers for controlling the electrical power transmitted to the resistors on the basis of a set point. Slaved in this way, the heating power is protected against possible variations of the network voltage or the resistance values, giving the system high thermal stability to guarantee quality.

In "full wave switch" mode, over a one-second period of reference, each controller adapts the power transmitted to the heating element by adjusting the ratio between conduction times and non-conduction times. This operating mode is particularly suitable for loads with high thermal inertia and has the advantage of not generating harmonics on the network. However, it may cause load impacts which disturb electrical networks, notably if several heating zones are connected to the same network.

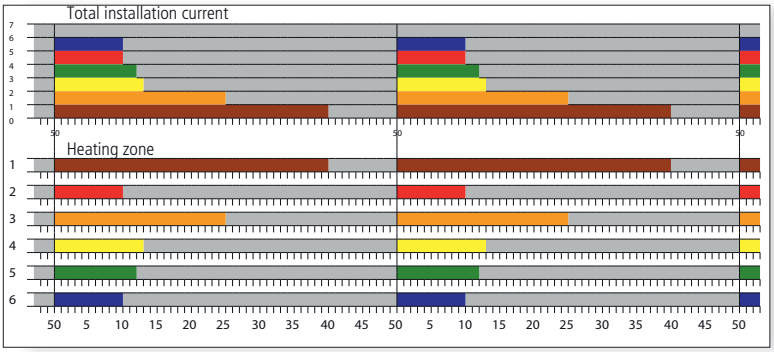
Power Manager: the solution for optimization

When used with our Thyritop 30 power controllers, the Power Manager module can optimize the overall load on your network by staggering the activation of the different power control zones. The wave train conduction mode does not generate any harmonics and, thanks to Power Manager, load impacts are minimized.

The effect on the total current consumed is visible immediately:

> the load impacts are reduced, as they are limited to the activation of a single zone each time,
> the peak current absorbed is lower,
> the power factor is significantly better,
> tariff overruns are avoided.

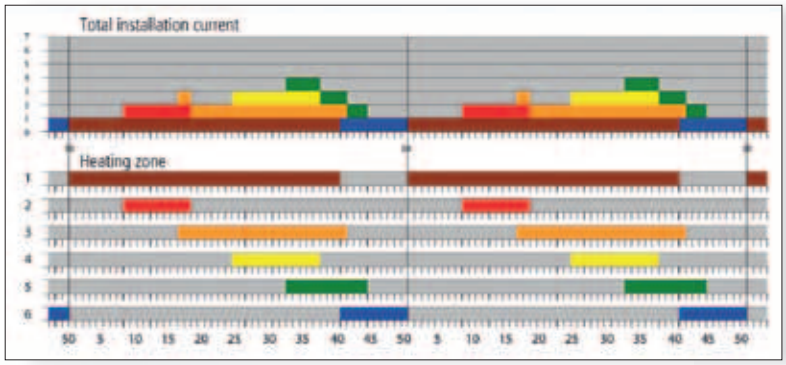
6-zone furnace without synchronization



RMS current: 3.05 x Io – Maximum current: 6 x Io – Power factor: 0.72

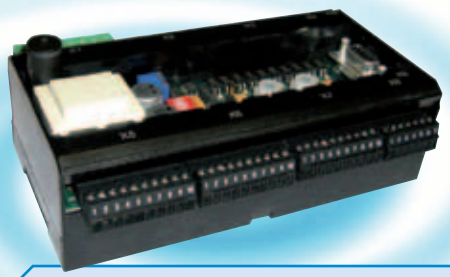
The control in each zone is independent, so each conduction time is different. In the worst-case scenario, all the zones may start their period of reference at the same time, at T0. The effect of this is to create a very heavy overall load impact, causing the total current absorbed by the installation to vary considerably. The average power factor will therefore be quite poor.

6-zone furnace with automatic static synchronization with Power Manager



RMS current: 2.40x Io – Maximum current: 4 x Io – Power factor: 0.92

The Power Manager module can be used to offset the periods of reference for each Thyritop. Thus, zone 1 starts at T0, zone 2 at T0+T/6, zone 3 at T0+2T/6, etc. The effect on the total current consumed is visible immediately. Power Manager can also be programmed manually. This is particularly recommended for multi-zone furnaces with known, stable conduction times.



The Thyritop Power Manager module combines several measurement and interface functions.

As well as optimizing the network load, the instrument can be used to measure:

> 3 AC currents or voltages,
> power and consumption of the installation (single-phase),
> the mains voltage,
> the values of 3 DC analogue inputs.

Built-in monitoring functions can be used to indicate any operating anomalies:

> overvoltage or undervoltage on the network,
> faulty mains frequency,
> parameter setting error,
> temperature fault.

CHAUVIN ARNOUX GROUP

Insulation Measurement at 10 kV or 15 kV, a Job for Experts!

With their test voltage of up to 10 kV or 15 kV, the C.A 6550 and C.A 6555 megohmmeters are top-quality tools for safe, accurate insulation testing on High-Voltage equipment in accordance with the most recent recommended practices and future modifications to them.

Applications

With a **measurement range up to 30 TΩ**, these two insulation testers are ideal for **preventive maintenance** on equipment such as:

> rotating machinery at up to 12 kV or higher;
> transformers;
> cables;
> medium-voltage rotating machinery and generators;
> high-voltage generators;
> surge suppressors, spark suppressors, measurement transducers, etc.

For professionals in the Electricity Transmission and Distribution (T&D) sector, They also cover applications on overhead and underground transmission and distribution networks.

Ergonomics

The **C.A 6550** and **C.A 6555** let you check at a glance on the execution of the tests by displaying details of the test in progress in graphic form. Users can view the R(t) + V(t) and I(t), I(u) curves on the LCD screen, a very useful feature for semi-conductor tests in particular.

Their memory capacity is so large that you can transfer a whole measurement campaign onto a PC and then produce a comprehensive analysis of the results using the DataView® software.

The C.A 6550 and C.A 6555 are delivered ready to use with a bag for the 1,000 V CAT IV accessories.

Safety

Because measurements at high voltages can be dangerous, the C.A 6550 and C.A 6555 benefit from a level of safety which complies with the **IEC 61010 1,000 V CAT IV** standard!

Among the precautions necessary when measuring high insulation values, you need to use protective earth cables which are also rated 1,000 V CAT IV. For the C.A 6550 and C.A 6555, these are delivered with the testers.

Functions

There are two levels of diagnostics available on these testers:

> "Go/No go" tests for quick insulation testing;
> qualitative measurements for preventive maintenance purposes.

The test voltage can be set from **40 V to 10,000 V** with the C.A 6550 and up to **15,300 V** with the C.A 6555. The multiple test modes make it possible to assess the quality of the insulation by non-destructive testing, using the "I-limit" and "early-break" modes to test varistors, for example. In addition, they allow users to investigate insulant ageing problems using specimens ("burn mode"). The "Step" and "Ramp" functions also provide temperature-independent results for detecting cracking and ageing insulants.

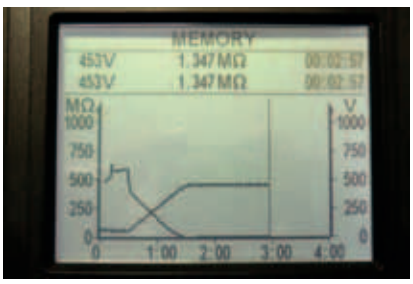
Communication

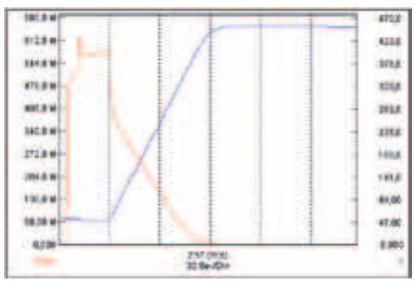
The DataView® software recovers the data stored in the instrument, plots the trend curve R(t), prints out customized test protocols and creates files for spreadsheet software.

DataView® configures and controls the instrument via an optically-isolated link compatible with USB and RS232.

Insulation Resistance Testing Guide

As an expert in insulation measurement, Chauvin Arnoux has produced a comprehensive guide to answer any questions that you may have on the subject. This guide covers theoretical and practical aspects, diagrams, measuring instruments, etc.





Example of graphic views of a test on a non-linear resistor provided by the graphic screen of the C.A 6550 / C.A 6555 and DATAVIEW® analysis software. We can see that the voltage flattens out and the resistance falls as soon as the surge-suppressor semi-conductor starts conducting.

Reader service no. 3

CHAUVIN ARNOUX® CHAUVIN ARNOUX GROUP
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The new on-site oscilloscopes from METRIX which fit in one hand.

OX 5042 with 40 MHz bandwidth

HandScope, the new handheld digital oscilloscopes designed and developed by Metrix, are ideal for use in the field.

Particularly simple to use, the HandScope fits comfortably in one hand. The elastomer casing is shockproof and benefits from IP54 protection.

All the command keys are easily accessible on the instrument's front panel, even when you are wearing safety gloves.

By simply pressing a button, you can access the various instruments, select the channels, modify the settings, use the functions or call up the integrated help.

The 3.5" colour LCD screen with a resolution of 320x240 pixels, is backlit by LEDs to limit energy consumption while ensuring that it remains very easy to read.

The HandScope is equipped with two 600 V CAT III channels totally isolated from one another which benefit from metal BNC connections that comply with the safety standards.

There are 2 HandScope models: the **OX 5022** with a bandwidth of 20 MHz, and the **OX 5042** with a bandwidth of 40 MHz, which is the only difference between them.

Oscilloscope

All the functions of a high-performance oscilloscope equipped with 19 automatic measurements are provided.

The sampling rate is 2 GS/s in repetitive mode and 50 MS/s in one-shot mode on each channel.

More complex functions, such as the MATH function with automatic scaling and cursor measurements, are also available.

Two 8,000-count trms digital multimeters...

The HandScope is equipped with 2 independent multimeters for measuring:

> AC, DC and AC+DC voltage and current,
> resistance, continuity,
> capacitance,
> frequency,
> temperature with K thermocouple or infrared probe
> motor rotation speed with optical tachometer
> diode and component tests

...with power analyser

The HandScope can also measure power.

This is done by combining two measurement channels to measure the single-phase and balanced three-phase active power values, with or without a neutral.

Harmonic analyser

Harmonic analysis is performed on both channels up to the 31st order, with a fundamental frequency between 40 and 450 Hz. At the same time, the HandScope measures the total TRMS voltage, the THD and the selected harmonic order. For better analysis, the frequency of the fundamental can be selected, a very useful feature when the level of a harmonic order is higher than the level of the fundamental.

The HandScope communicates via an isolated optical USB interface with a PC equipped with the SX-METRO software delivered with the product.

It offers multiple functions:

> displaying curves in real time,
> viewing stored curves,
> controlling the oscilloscope,
> transferring data and curves into an Excel spreadsheet.

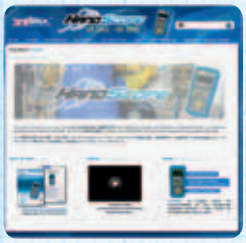
The HandScope are ideal for operations on electrical installations and general maintenance in the field.

Their isolated channels allow measurement in total safety.

The long time base is useful for checking synchronization.

Examples of use:

> verification of process synchronization
> checking of machine-tool operation
> industrial truck maintenance



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HandScope.

Reader service no. 4

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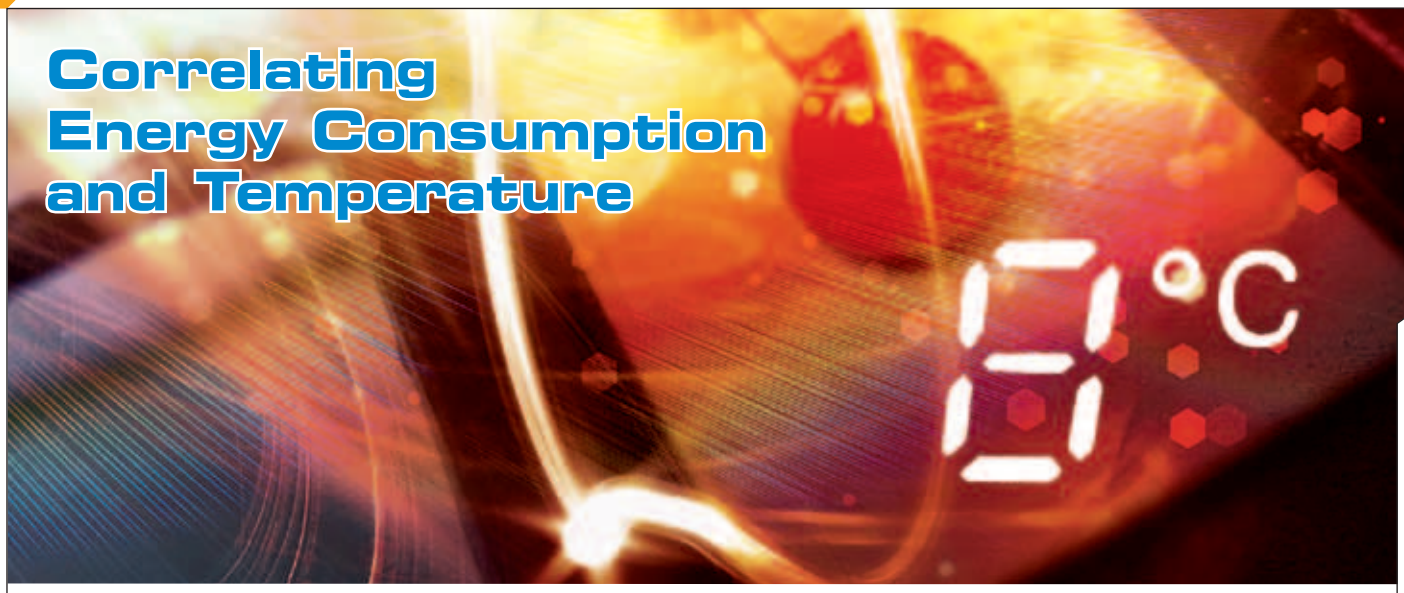
www.chauvin-arnoux.fr

Correlating Energy Consumption and Temperature



At a time when energy saving is an integral part of corporate strategy, this paper manufacturer wants to ***reduce energy consumption due to heating / air-conditioning by 10%*** *by adjusting the operating parameters linked to the temperature setpoints in the technical building management system, but without altering the level of comfort for the building's occupants. This means* ***encouraging the personnel*** *not to exceed certain temperature setpoints by providing* ***easily-comprehensible indicators.***

The strategy proposed by Enerdis

The first phase involves analysing the influence of the temperature on consumption due to heating and air-conditioning for precise **energy mapping** of the offices and production site. For this, you need to **measure and record** the electrical power consumption due to heating and air-conditioning, then compare these data over a period of several weeks, months or even years and, finally, **implement software** for retrieval, analysis and automatic distribution of the data.

The Enerdis solution chosen

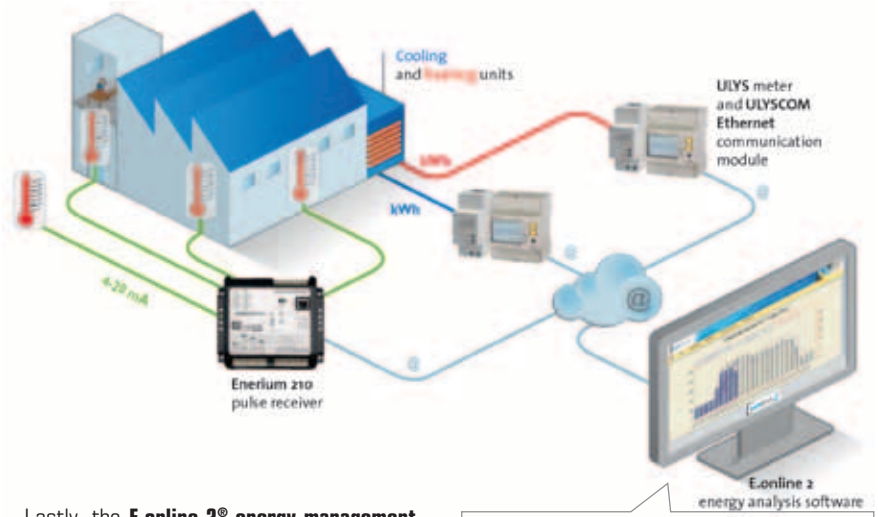
To meet the requirements stated by this manufacturer, Enerdis has installed:

> **ULYS energy meters with an Ethernet communication module** on each electrical feeder linked to heating and air-conditioning;

> A Pt100 probe with a 4-20 mA output outside the buildings;

> Three temperature probes, each equipped with a 4-20 mA output inside the buildings.

All the analogue outputs of the utility meters (gas, electricity, water) have been connected to a pulse receiver equipped with an Ethernet link to record the temperature trends over time and retrieve the results via the communication network.



Lastly, the **E.online 2® energy management software** has been rolled out on the site for automatic data retrieval and analysis of all the temperatures and all the electrical consumption.

Benefits for the manufacturer

Implemented very quickly, this global solution achieved **payback within only two years,** while **cutting energy bills by 10%**. Logging of all the data has naturally helped to measure the return on investment of the energy efficiency initiatives. With the graphs and dashboards in the E.online 2® software, it has been possible to **raise the staff's awareness** of the energy efficiency initiatives set up and then to gradually draw them in to **play an active role** in the company's energy policy.

- Energy surveys (T°- kWh) sent automatically by email every day, every week, or at the end of each month.
- SMS text alarm messages sent in the event of overruns every week or at the end of each month.
- Calculation of economic and energy performance indices (kWhoe/m²/year, kWh/items manufactured, etc.).

Reader service no. 5

ENERDIS
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Multi-Protocol Communication and MID Certification **for ULYS energy meters**

RS485, M-Bus and Ethernet: communication is natural with the new range of ULYS submeters from the Enerdis brand. The compact, innovative ULYS meters and associated ULYSCOM communication modules are easy to implement. For energy rebilling applications, our ULYS meters are also available in MID versions.

Communication via infrared link

The ULYSCOM communication modules communicate with the ULYS meters (MD80, TDA80, TTA) via an infrared link to simplify and speed up implementation. The communication modules **recognize** the meters **automatically**.

Compatible with the single-phase and three-phase meters in the ULYS range, the ULYSCOM communication modules allow remote retrieval of all the quantities measured by the meters.

ULYSCOM RS485 Modbus for direct interfacing between the meters and the E.online® energy management software or any type of supervising PLC used for CTM/TBM.

ULYSCOM M-Bus is delivered with the free M-Bus MASTER software for configuration and display.

ULYSCOM Ethernet for reading the measurements directly via integrated web pages on a PC, **Smartphone** or tablet. This module allows you to view the log of consumption over a period of several years and to export the measurement data into spreadsheet software such as Excel.

A MID-certified range

Imposed in 2006 by the European Measuring Instrument Directive (2004/22/CE), MID certification of a meter is mandatory in the event of **rebilling on private networks**. The whole ULYS meter range is available in **both MID and IEC versions**.

Technological innovations and improved performance

Single-phase, three-phase, with direct inputs up to 80 A or on 1 or 5 A CT, the new ULYS meters are ideal for measuring energy **performance**. Programming and operation are **simple**, using one (single-phase ULYS) or two (three-phase ULYS) navigation keys.

Although they are **compact**, comprising only 2 modules (single-phase) or 4 modules (three-phase) to save space on the switchboard, ULYS meters offer all the functions needed to meet professionals' requirements:

- > 2 pulse outputs as standard features, assignable to P, Q, S;
- > metering in all 4 quadrants;
- > 1 tariff-change input as a standard feature (2 tariffs);
- > multiple measurements, P, Q, S, total and partial energy indices and, via ULYSCOM: V, U, I, PF, F;
- > energy balance between energy consumed and energy produced;
- > indication of connection errors on front panel;
- > Accuracy Class 1 or MID Class B for rebilling.

Reader service no. 6

ENERDIS CHAUVIN ARNOUX GROUP
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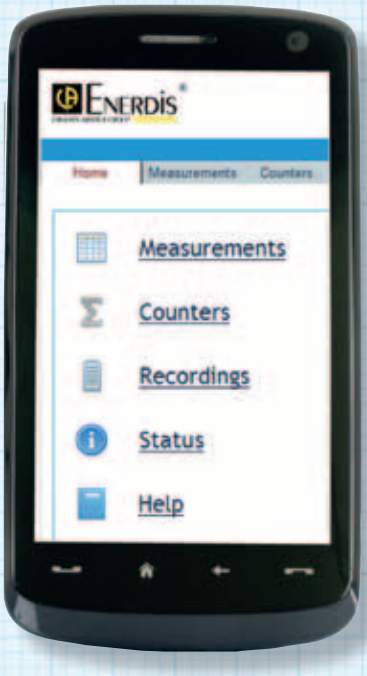
Read the measurements directly on your smartphone

It is now possible to read the quantities measured by ULYS meters directly via integrated web pages with the ULYSCOM Ethernet communication module.



CHAUVIN ARNOUX GROUP

11 Unrivalled TRMS Clamps!

1,000 V CAT IV, IP 54, *up to* ***2,000 A_{AC}, 3,000 A_{DC}*** *and* ***1,000 $V_{AC/DC}$,*** *clamping diameter up to* ***60 mm***, **True*Inrush*** *function, automatic AC/DC detection,* ***power and harmonics****... The new* ***Chauvin Arnoux®*** *multimeter clamps have arrived!*

Safe and rugged

1,000 V CAT IV: an **unprecedented level of safety** for multimeter clamps!

And these new clamps comply with the safety requirements of the IEC 61010 standards as well.

Their **exceptional IP54 protection rating** means that they are protected against water and dust, guaranteeing that safety is maintained over time and thus extending their life span.

The mechanical design of these clamps, also equipped with a shockproof protective band, enables them to resist falls of up to **2 metres** in the **standard fall tests**.

Another safety feature on all the models is the **automatic AC/DC detection** function, available on currents, voltages and power values.

F201 F603 F205

Ergonomics

Their design makes them comfortable to hold and simple to handle, even when wearing safety gloves. **With just one hand,** users can connect the clamp, select the measurement and choose the functions. For maximum clarity, each measurement corresponds to one switch position.

Depending on the models, these clamps are equipped with large 6,000 to **10,000-count backlit LCD** screens.

The concept of **"1 key equals one function"** makes them **even simpler to use**.

Various clamping diameters are available **up to 60 mm**, in order to cover the widest possible range of requirements in the best possible conditions.

A particularly comprehensive product range

The product range comprises 3 Series, each containing 3 or 4 models equipped with different specific features for professionals in the electricity market.

The product range is first of all divided up according to the current measurement range:

> F200 for measurements up to 600 AAC and 900 ADC;
> F400 up to 1,000 AAC and 1,500 ADC;
> F600 up to 2,000 AAC and 3,000 ADC.

The specific models then depend on their uses:

> F201, F401 and F601 for AC applications;
> F203, F403 and F603 for AC or DC applications;
> F205, F405 and F605 for mixed AC+DC applications, analyses or surveys;

F203.

> F407 and F607 for mixed AC+DC applications, analyses or surveys, plus recording and harmonic analysis up to the 25th order.

Measurements

The fast **12-bit TRMS digital acquisition** system ensures excellent measurement quality. The large bandwidth and **high crest factor** help to improve the correctness and accuracy of the measurements, whatever the type of signal.

Classic measurements:

> AC, DC and AC+DC voltage up to 1,400 V;
> AC, DC and AC+DC current up to 2,000 AAC and 3,000 ADC;
> as well as resistance, audible continuity, diode test, frequency and temperature measurements (depending on the model).

F607

True*InRush*

To size an electrical installation correctly (main switch, relays, fuses, etc.), it is crucial to know the inrush current. This "starting current" may reach up to 20 times the rated steady-state current, so suitable protective devices must be used.

Whereas other instruments measure the Inrush from the moment when the installation is powered up, the clamps in the F Series measure all the Inrush currents, even those due to load increases on installations already operating.

The clamp automatically determines the type of signal and the level of current in the installation and then adapts the algorithm to capture a new overcurrent.

This capability means you can obtain the following values:

- instantaneous current value,
- maximum instantaneous current value,
- RMS value of the half-cycle of the current to which the sensor is connected,
- maximum RMS half-cycle current value,
- motor inrush start and end times.

Additional measurements:

> the F205, F405 and F605 clamps include **phase rotation** measurement;

> the F407 and F607 also **measure single-phase and total three-phase power values** (active, reactive and apparent power, PF and DPF) as well as offering **harmonic analysis**, THDf and THDr.

Functions

New from Chauvin Arnoux, the **True*Inrush* function** allows you to measure the motor inrush of a single machine or a group of machines while they are running.

The **ΔRel function** is applicable to all the measurements and to all analysis functions (Min, Max, Peak- and Peak+). This allows you to instantly compare the measurement with a reference value.

High-performance functions depending on the model:

> TRMS measurement of the Min and Max values **calculated over 100 ms**;

> Peak+ and Peak- over **1 ms** and on each function;

> Extended HOLD to store the complete status of the measurements and functions in progress;

> Measurement of the **THD** in accordance with IEC 61000-4-7;

> Recording of up to **1,000 measurements** from several sessions;

> **Bluetooth** communication for data export.

Applications

From electricity production to electricity consumption, Chauvin Arnoux's new F Series of clamps covers the whole range of low-voltage applications.

The **F200 Series clamps** are ideal for low and medium-power LV applications such as maintenance of tertiary or industrial electrical installations and groups of machines, power supply diagnostics and/or sizing, commissioning of air-conditioning and heating systems, work on electric vehicles, etc.

The **F400 Series**, for medium-power LV applications, is used in low-voltage electricity production and distribution, industry, railways, etc. It is also suitable for lift/elevator technicians and other lifting and transport-equipment specialists. The main applications of the clamps in this series are maintenance, testing, monitoring, diagnostics and connection.

The **F600 Series** is dedicated to the high-power LV market, including:

> HV/LV electrical power distribution;

> Chemical and petrochemical industries;

> Metallurgy, transport, etc.;

> Maintenance, testing, monitoring, diagnostics, sizing, connection, etc.

There are clamps to suit every user in this new range. Delivered in a bag with the Multifix mounting system and the necessary measurement leads, each clamp is supplied ready-to-use.

Reader service no. 7

CHAUVIN ARNOUX®
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CHAUVIN ARNOUX GROUP

ENERIUM® 30: Simplicity and Performance

ENERIUM® 30 entry-level power monitor

Enerdis**, the expert in energy management and electrical network supervision, is replacing its **Enerium®** range with a new **power monitor which is easy to use and offers high performance.

Quick programming and intuitive navigation

ENERIUM® 30 power monitors can be programmed without a computer in less than five minutes. Specially designed for easy programming, it offers simple, effective navigation with just two buttons on the front panel.

The ENERIUM® 30 also offers gauge displays for simpler load-factor monitoring.

Performance

The latest model in the **ENERIUM®** range of power monitors, with functions long-acknowledged on the market, the **ENERIUM® 30** provides switchboard operators with an effective solution for monitoring electrical power consumption according to the **EN 61557-12** and **IEC 62053-22** standards.

> energy measurement in all 4 quadrants,
> measurement of all the electrical network data with 1s, min, max and average values,
> one on-off output and one alarm/pulse output,
> RS485 communication output,
> a special kit is proposed for mounting on a DIN rail or plate.

Reader service no. 8

ENERDIS CHAUVIN ARNOUX GROUP
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Don't forget the related software!

Specially developed for the Enerium® range, the **E.Set, E.View and E.View+** software products can be used for remote configuration, remote viewing or remote data retrieval.

The **E.Set** software allows **remote configuration** of the power monitors in the ENERIUM range via the RS485 network, the Ethernet network or the optical head.

With **E.Set**, it is possible to **program** at any time the products' communication parameters (address, speed, parity, etc.) and the configuration parameters (CT ratio, VT ratio, alarm thresholds, etc.).

E.View enables the inputs and outputs of the ENERIUM power monitors to be **controlled** remotely. E.View also allows **display** of the electrical parameters and retrieval in .txt format of the recordings of the load curves, the trend curves and the alarm log.

In addition, **E.View+** offers **automatic elementary tables**, bargraphs and curves.

Functionality	E.Set	E.View	E.View+
Description	✔	✔	✔
Status	✔	✔	✔
Configuration	✔	✔	✔
Diagnosis		✔	✔
Display		✔	✔
Graphs			✔

www.enerium.enerdis.com

This new website in English presents the very latest functions on our Enerium® power monitors specially designed for energy management and energy efficiency.

You can also download free of charge a library of technical and sales documents (case studies, operating manuals, guides, catalogues, instructions, etc.), as well as product photos.

Check out all the latest news on our Enerium® power monitors at **www.enerium.enerdis.com**

Chauvin Arnoux® Calibrators

Competitive, Compact and Accurate

Need to calibrate your temperature sensors, resistive probes or process signals? To generate, simulate and measure all the low-level signals encountered in industry very accurately, Chauvin Arnoux has launched a new range of 3 calibrators: the ***C.A 1621****,* ***C.A 1623 and C.A 1631****.*

Ergonomics

With their compact design, rugged construction and comfortable handling, these calibrators are ideal for use in the field. Their large LCD display is particularly easy to read in all circumstances.

These battery-powered calibrators are independent and offer a long battery life. The optional mains adapter is very practical for laboratory use, when calibrating a whole series of sensors, for example.

Functions

These calibrators have two functions: simulating and generating. Upstream of the system to be tested, the calibrator **simulates and generates** the signal on the basis of clearly-defined values. The second function, **measurement of the signal** emitted during calibration, is applied at the other end of the line. If the line is terminated by a panel meter, all you have to do is compare the value read with the value provided by the calibrator. If no panel meter is included, the simulated input value is compared with the signal measured by the calibrator.

Applications

These calibrators can be used for a wide variety of applications, including maintenance operations, commissioning, verification, on-site calibration, measurement line development and verification.

They are ideal for the needs of engineers, technicians and installers in many sectors of activity:

> heating and air-conditioning;
> processing industries (chemicals, petrochemicals, plastics, agri-food industry, etc.);
> certification organizations;
> laboratories and education;
> hospitals;
> public works.

Functions

These calibrators provide 2 main functions: simulation and measurement. because they recognize a wide variety of sensor types, these instruments can be used for all your applications.

C.A 1621 for calibrating thermocouple probes (J, K, T, E, R, S, B, N):

> temperature measurement and simulation from -250 °C to +1,800 °C;
> millivolt measurement and simulation from -10 to 100 mV.

C.A 1623 for calibrating Pt10, Pt50, Pt100, Pt200, Pt500, Pt1000 and Pt1000 (JIS) resistive probes:

> temperature measurement and simulation from -200 °C to +800 °C;
> resistance measurement and simulation from 0000 to 3,200 Ω.

C.A 1631 for calibrating process signals (voltage and current):

> measures and supplies a DC voltage from 0 to 20 V (accuracy: ± 0.02%);
> measures and supplies a DC current loop from 0 to 24 mA (accuracy: 0.015%);
> these calibrators offer high performance and multiple functions: display in °C or °F, deactivatable automatic power-off, etc.

These **practical** calibrators are delivered **ready to use** with a soft case and accessories as standard.

Reader service no. 9

CHAUVIN ARNOUX® GROUP
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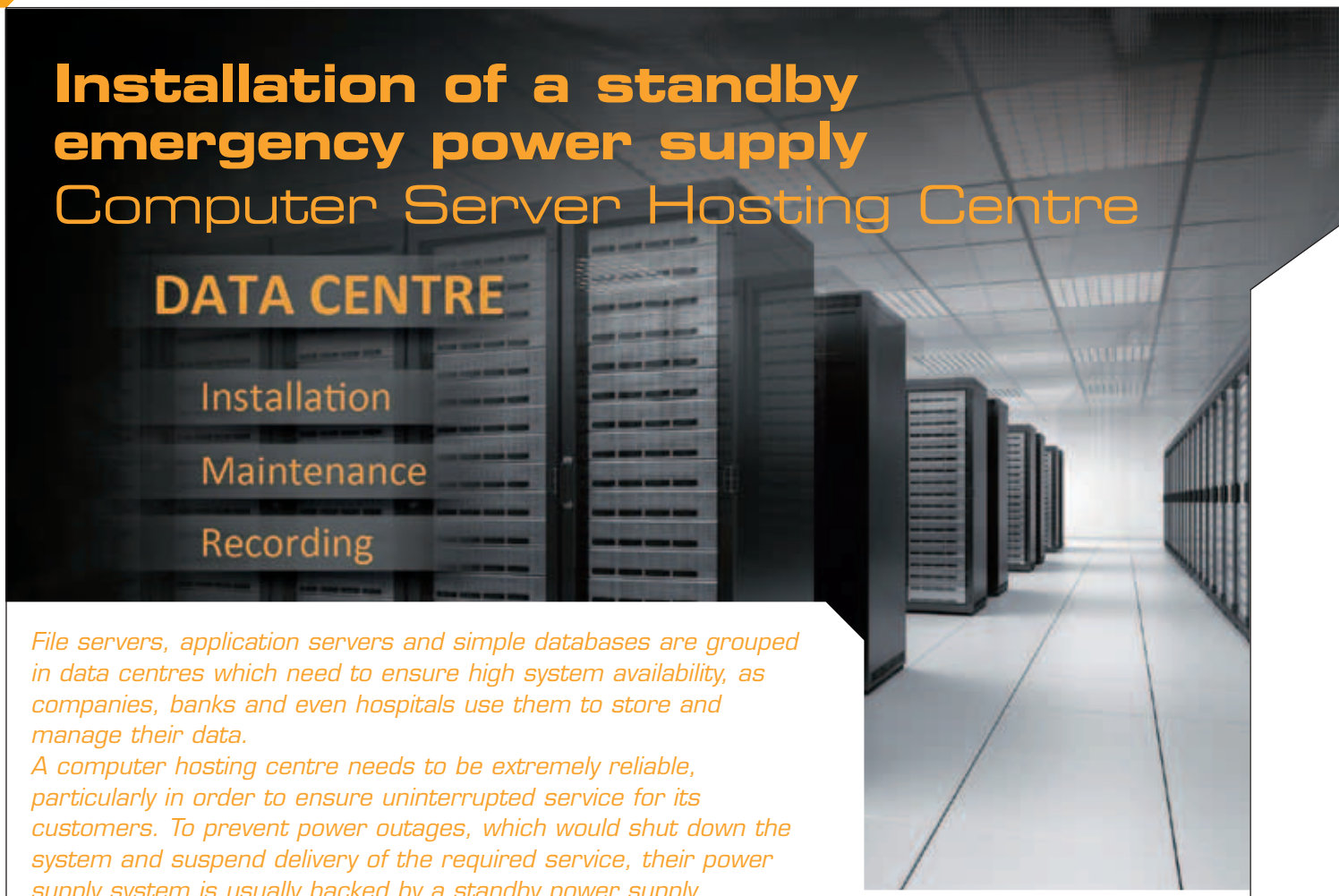
Installation of a standby emergency power supply
Computer Server Hosting Centre

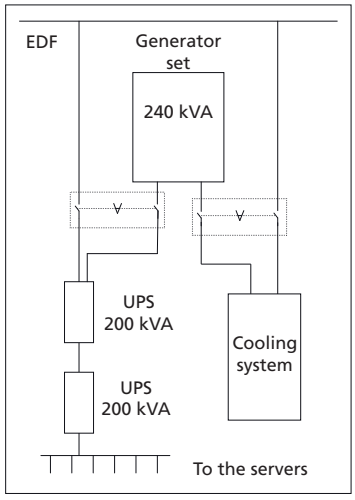


File servers, application servers and simple databases are grouped in data centres which need to ensure high system availability, as companies, banks and even hospitals use them to store and manage their data.
A computer hosting centre needs to be extremely reliable, particularly in order to ensure uninterrupted service for its customers. To prevent power outages, which would shut down the system and suspend delivery of the required service, their power supply system is usually backed by a standby power supply.

In the case considered here, the computer room is equipped with 2 uninterruptible power supplies (UPS) and an air-conditioning system operating constantly to cool the ambient air.

The two 200 kVA uninterruptible power supplies operate in "1+1" redundant mode. Thus, if one of the UPSs fails, the second can handle the whole load on its own. To optimize the installation's reliability, the customer decides to add a 240 kVA generator set. Once installation is complete, the customer needs to check that the whole standby emergency system reacts satisfactorily if the main power network fails.

Measurements taken with a Qualistar+ during generator-set load-takeover tests will then confirm the installation's reliability.



First series of measurements: no-load test of the generator set

The first measurements concern operation of the generator set without a load.

On the generator-set output, it is important to check any interference or losses which the generator set may cause on the power supply, thus reducing its quality.

By connecting the Qualistar+ below the generator-set output, we can therefore capture the voltage and current waveforms, in particular during start-up (inrush). The voltage levels are well balanced and as expected, with low distortion (approximately 2%), and remain between 230 V and 233 V once the signal has stabilized. *(Fig. 1)*

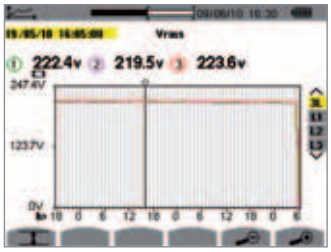


Fig. 1 – RMS values of the phase-neutral voltages on the 3 phases (min, average, max)

Did you know?

Usually, a generator set mainly comprises a petrol or diesel engine, an alternator and a speed-control system.
Important: an electrical generator set can instantaneously supply only one third of its rated power, so a 240 kVA generator set will only supply 80 kVA when it starts up and will only achieve its rated power when it has reached its full operating speed.

However, the frequency of the generator-set output voltages is subject to variations (average frequency 49.60 Hz). These variations may prevent proper operation of the UPSs and eventually damage them. *(Fig. 2)*

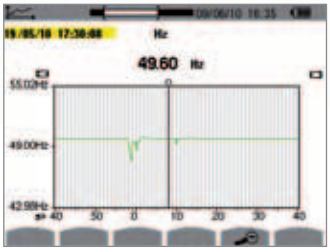


Fig. 2 – Frequencies (min, avg, max)

In the illustration showing the frequencies, the time necessary for the generator set to stabilize is clearly visible.

The apparent power consumed on the output of the generator set is 130 kVA (measurement taken during recharging of the UPS batteries), so the generator set operates at 60% capacity in this context. *(Fig. 3)*

Further measurements are now taken at the same point as before, revealing a significant deterioration of the voltage, with a THD of around 20%!

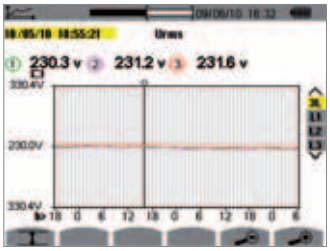


Fig. 3

Analysis of the current waveforms shows a THD of around 35% on the current, even though the levels are balanced on the 3 phases.

It is clear that the 11th and 13th-order harmonics have a lower amplitude than the 5th-order harmonics.

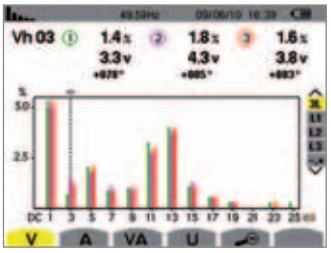


Fig. 4

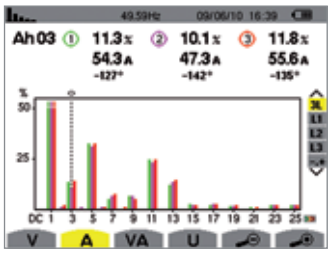


Fig. 5

	Without active compensation	With active compensation
Current drawn on the phases	187 A, 183 A,184 A	319 A, 311 A, 320 A
Generator-set apparent power	130 kVA	239 kVA
RMS phase-neutral voltages	230 V and 233 V	227 V and 234 V
THD U	20%	Between 10 and 12%
Value H5	32 V	15 V
THD	35%	10%

At the same time, we take measurements on the outputs of the UPSs where there are frequency variations of approximately 0.5 Hz/s.

Comparison of the measurements shows:

> a significant deterioration of the voltage;
> the influence of the generator-set's source impedance, which is inductive.

It is clear that the generator set's source impedance has a direct effect on the harmonics of currents drawn by the load.

The standby system in its present form does not ensure reliable operation if the main power network fails. The solution planned involves requalifying the generator set so that the effects of the current harmonics on the load are attenuated. There are several ways of doing this:

> passive filters: these help to reduce the harmonic impedance of the network by means of filters (usually capacitors or inductors);
> active filters: these inject harmonics with the same amplitude as those present, but in phase opposition, thus cancelling them out.

The customer has chosen the solution involving active harmonic compensation. 3 active filters are installed to compensate 30 distorting Amperes each, giving 90 distorting Amperes in total.

In this second series of tests, the total apparent power consumed at the generator-set output reaches a maximum of 239 kVA. This power level corresponds to the maximum load that the generator set is capable of supplying (240 kVA).

By taking the same measurements as before, we can draw up the following comparative table.

Conclusion

The active harmonic compensation set-up is satisfactory and can be used to requalify the voltages supplied by the generator set in a maximum-load situation. *(Fig. 3)*

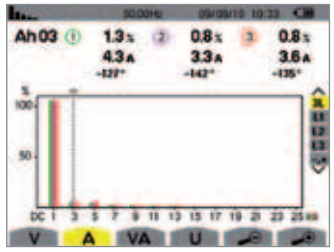


Fig. 6

This type of installation can be found in server farms, production industries and even hospitals. The quality of the UPSs is also an important factor. Indeed, to avoid oversizing the generator set, the UPSs must also have a low THD rating.

The Qualistar is used for all these measurements, from the initial survey before installation to the verifications afterwards, as well as for determining whether the installation needs to be resized.

Did you know?

According to the NF C 15 100 standard, there are several pollution levels corresponding to the THD level on the network:

- THDU < 5% and THDI < 10%
  No significant consequences
- 5% < THDU < 8% or 10% < THDI < 50%
  Pollution with possibility of problems depending on the equipment
- THDU > 8% and THDI > 50%
  High pollution, probable malfunctions

PORTABLE CALIBRATORS

Simple-to-use portable calibrators for calibrating thermocouple probes, platinum resistance thermometers, voltage and current process signals, etc.

Reader service no. 3 (4 pages)

ENVIRONMENTAL MEASUREMENTS

Temperature measurement, thermography, humidity measurement, verification of mechanical ventilation systems: a comprehensive range to improve your comfort while reducing your energy losses.

Reader service no. 17 (8 pages)

UNPRECEDENTED CLAMPS

A major innovation! Eleven new Chauvin Arnoux® multimeter clamps have been launched with important new functions. A must-see!

Reader service no. 7 (8 pages)

INSULATION AT 15 KV

For insulation measurement experts, the C.A 6550 and C.A 6555 are 2 new high-performance testers at 10 kV and 15 kV.

Reader service no. 3 (4 pages)

HANDSCOPE ON-SITE OSCILLOSCOPES

2 new METRIX® oscilloscopes that fit in one hand. With their 2 totally-isolated channels, they are ideal for work in the field.

Reader service no. 4 (120 pages)

CHAUVIN ARNOUX CATALOGUE

The 2012 edition filled with new products and innovative measuring instruments to cover all your applications.

Reader service no. 20 (164 pages)

ULYS 2

New range of communicating meters (Modbus, M-Bus and Ethernet). Available in a MID version for rebilling on private networks. Recover the measurements directly on your smartphone!

Reader service no. 1 (4 pages)

ENERIUM 30

The ENERIUM 30 entry-level power monitor combines quick programming, an intuitive user interface and high performance for effective energy consumption monitoring.

Reader service no. 8 (2 pages)

NEW PYROCONTROLE® BROCHURE DEVOTED TO NUCLEAR POWER

Pyrocontrole® has just published a new brochure presenting its range of temperature sensors for nuclear power stations. One of the highlights of this document is the 3D cutaway drawing of a nuclear power station, showing in concrete terms where each sensor is installed and what its function is.

Reader service no. 12 (8 pages)