News > Measurement

2014

years of history



ENERIUM

n° 28

EDITORIAL



Chauvin Arnoux, 120 years of design and creation.

Chauvin Arnoux is celebrating 120 years of existence and is still eager to conquer all!

Founded in 1893 by Raphaël Chauvin and René Arnoux, Chauvin Arnoux, a family-owned French company of entrepreneurs and designers, has in 120 years become an international corporation which generates sales of approximately 100 million euros annually and counts nearly a thousand employees. Most of them (800) are in France, in the R&D departments and production sites in the Normandy and Rhône-Alpes regions, where 80% of our products are made. Control of our production, all in-house, enables

us to maintain the high quality of our measuring products and precision metrological instruments.

On the electrical and physical measurement market, our firm has become a major player known worldwide, while remaining close to you for the development of your projects. **Celebrating this anniversary with you -** self-employed electricians, technicians, decision leaders, industrialists, professors, researchers in electricity and electronics - is for us an honour.

Proud to be French, our company started its development in the domestic market, followed by the European, American, Asian and now the world markets, always relying on the expertise of the **R&D** departments, of which we now have six spread across the world (Paris, Antony, Annecy, Lyon, Dover, Milan) and investing every year nearly **11% of sales in the development of new technologies** and new concepts: 350 patents filed.

Since the first galvanometers in 1893 and Chauvin Arnoux's invention of the multimeter in 1927, there have always been innovations. In 2013, the Qualistar[®] range of electric network analysers from Chauvin Arnoux[®] has constantly been enriched with new capabilities, data analysis software and accessories such as clamps and flexible sensors which can be adapted to the need of each customer. The same is true of the PEL loggers and the Metrix[®] Handscope oscilloscope, which can be held in one hand thanks to miniaturization of the components and other innovations. The Elog data concentrator from Enerdis[®], for its part, is just as smart in the interpretation of data, whatever their source and the in-situ, multi-point and high-pressure temperature sensors from Pyrocontrole are rich with expertise.

Among the important events that have marked the markets and the firm, it is undoubtedly Chauvin Arnoux's campaign in the 1990s to buy out its main French competitors, such as Metrix, Enerdis, Pyrocontrole, Oritel, Normandie Mesure, etc. These acquisitions favoured the development of our product offering, helping us to complete our lines and introduce new technologies in our areas of expertise. For our Manumesure subsidiary, it was another step forward with the addition of new metrological services and development in the environmental and medical markets, for example.

Today, we are continuing our international growth through our ten subsidiaries (USA (AEMC[®]), Italy (Amra[®]), Spain, UK, Germany, Austria, Switzerland, Sweden, Lebanon and China), to which may be added the work of our export departments and the networks of distributor-partners throughout the world.

As in the creation of its products, Chauvin Arnoux has been able to preserve, in action, an ability to give meaning to its development: from the start, this has meant a business ethic, the pooling of expert knowledge and **teamwork by women and men who have remained enthusiastic about their respective professions,** fully aware that **the skills of each contribute to building the strength and sustainability of Chauvin Arnoux and its subsidiaries.**

Our values have remained the same: **innovation**, **quality**, **durability**, openness, free discussion and, most important of all, **respect of our customers**. For free enterprise to exist, there must be a team and loyal customers and we pay homage to both.

Chauvin Arnoux is now 120 years old.

120 years of a baton passed from René Arnoux to André Arnoux to Daniel Arnoux to Axel Arnoux, with the fifth generation already in the wings. **This occasion is also the anniversary of a great 180-year** industrial and family adventure which began in around 1833 in the railway business, with locomotive design and the construction of a rail line between Paris and Sceaux by Jean-Claude Arnoux.

Axel Arnoux President

CONTENTS_

Company news	1
120 years of industrial development	2-3
The evolution of CHAUVIN ARNOUX's Test & Measurement devices	4-5
Aviation application	6
Industry market	7
ENERDIS energy performance	10
Energy market	11
PYROCONTROLE temperature measurement	12-13
120 years of communication	14-15
Education market	16
MANUMESURE's expertise	17
History of the subsidiaries	18-19
Rail market	20
Kiosk	21

Technical Information Journal

190 rue Championnet 75876 Paris Cedex 18 - France Tel. : +33 (0)1 4485 4485 Fax : +33 (0)1 4627 7399 www.chauvin-arnoux.com info@chauvin-arnoux.com

Free distribution, all rights reserved. For more information, contact your local agency or your export department in France.

Issue no. 28-2013

Print run: 7,000 copies

Editorial Director

Marlyne EPAULARD

Fulya HUET

Editorial Board Axel ARNOUX Sandrine ALA Didier BISAULT Sibylle DE BEAUCÉ Marlyne EPAULARD Fulya HUET Barbara SCHWARTZ

Translation

ACT'L / Thomas Landon

Layout

CHROMATIQUES www.chromatiques.fr

CHAUVIN ARNOUX Test & Measurement Catalogue

High-quality portable measuring instruments to meet the needs of



self-employed electricians, installers, troubleshooters, consulting and maintenance teams, industrial companies, energy distributors, etc.

Reader service no.8 (164 pages)

Pyrocontrole Temperature Sensor Catalogue

60 pages including:

- help in choosing a temperature sensor

- technical reminders

- 1.200 references of standard sensors



Reader service no. 11 (120 pages)

Programmable digital panel meters

Enerdis has rationalized the µDIGI 2 range, which now counts only 2 references! These two multi-function digital panel make it simpler for electricity professionals to make their choice. Discover the whole range.



Reader service no.14 (4 pages)

ENERDIS 2014 General Catalogue

KIOSK

400 pages of products, information and advice. Get acquainted with them in this new edition where

energy efficiency still

takes pride of place.

Find a complete range

of fixed equipment

for measurement,

network and energy

systems supervision

as you browse in this

and

metering



catalogue.

Reader service no.9 (400 pages)

T&D

Drawing on expertise acknowledged by purchasers in the energy sector, Enerdis has produced a new document to highlight its complete offering in this sector. The highlight of this sales brochure is the drawing in the middle allowing you to locate the Enerdis offering at 3 levels:

- Energy production companies: nuclear,



thermal or hydroelectric power plants and wind or solar farms - power transmission and distribution networks, which are operated, maintained

and developed continuously Industrial, tertiary, infrastructure and residential sectors.

Reader service no. 12 (4 pages)

CHAUVIN ARNOUX Earth/Ground **Measurement Guide**

How is an earth measurement performed? Which instruments should be used in a given environment? This guide spells out the various methods according



to the applicable standards.

General Catalogue Oscilloscopes, analysers, recorders, multimeters, power supplies or generators:



METRIX

a large number of measuring instruments for your applications in the laboratory, research and development, education,... and even in the field!

Reader service no. 10 (120 pages)

Everything for measuring and monitoring temperatures in glassmaking

In a new brochure aimed at the glass industry, Pyrocontrole® presents temperature sensors and power



controllers qualified for this environment and their essential functions at each stage in the process, from melting to cooling of the glass.

Reader service no. 13 (4 pages)

Temperature measurement in explosive environments!

Comprising a thermowell, the process temperature assembly from Pyrocontrole is characterized by its interchangeable temperature measurement element. This specific assembly is doubly interesting: as well as



Reader service no. 16

protecting the sensing element and extending its life span, it can be used for maintenance inspections without halting the process. Compliant with ATEX/ IECEx, this sensor meets the needs of the Chemicals and Petrochemicals sectors.

Reader service no. 15 (32 pages)

COMPANY NEWS

2013 Electro Magazine trophies: Chauvin Arnoux wins the top prize! -

This was the first edition of these **trophies awarded by Electro Magazine** (France) for the electrical sector to honour innovative products launched on the market. Six major product families were chosen for these trophies (Measurement/Tooling, Lighting, Connection Technology, Switchboard Equipment, etc.). The jury of key figures from the industry was headed by Nicolas Maillet Avenet, Chairman of Qualifelec and included representatives from the top management of Promotelec, Capeb, Fedelec and FFIE. Chauvin Arnoux was competing in the Tooling category. Mr Axel Arnoux (Chairman) and Mr Winthrop Smith (CEO) were present



to receive the Gold Trophy for the PEL Power and Energy Loggers and the Bronze Trophy for the Digiflex sensor at an evening event in Paris in front of an audience of professionals.

Really Made in France

Chauvin Arnoux designs and manufactures 80% of its products in the Group's own R&D departments and production sites. A family-owned French company, Chauvin Arnoux is one of the rare industrialists in the market to have kept all production

in-house, ensuring control of the production chain Upstream, nearly 11% of sales revenue is invested technological leadership and its status as a designer (Vire, Villedieu-les-Poêles and Pont l'Évêque) and the boards, mechanical parts and temperature sensors,



and of the stages of quality control for its products. in R&D every year to maintain the Group's and constant innovator. The three sites in Normandy Meyzieu site near Lyon manufacture electronic circuit as well as assembling the measuring devices for

all the Group's brands. A "Conception & Fabrication Française" (French Design & Production) label that amply justified the creation and use of a specific logo.

Eco-Design



Continuing the Chauvin Arnoux Group's commitment to the ISO 14001 environmental standard (environmental management system) and ISO 9001 (quality management), the firm has created its own EcoConception

(Eco-Design) label. It rewards the determination of each of the Group's member companies to adopt an approach aimed at reconciling protection of the environment and economic necessity. Environmental considerations are taken into account in our products from the design stage, in the choice of materials and components and with allowance for their ultimate dismantling, with one constraint: product quality is not sacrificed.

The EcoConception logo on the documentation of our products supports and highlights this determined approach.

The silver "Trophée d'Excellence" awarded by the SNCF (French National Railways)



To reward the performance level attained by certain suppliers, SNCF's Equipment Division and Purchasing Division award trophies that "bear witness to industrial excellence which attains or even exceeds the objectives set by SNCF". As suppliers of equipment and in particular relays, the Chauvin Arnoux Group was awarded the silver trophy in the Parts and Services category in the presence of Jean-Marc Larivoire, SNCF's Assistant Equipment Director, Pierre Pelouzet, SNCF's Purchasing Director and Alain Picard, SNCF's Assistant General Manager, Finance. Well-deserved recognition of the Group's expertise in this market and of the quality of these products, in particular the Chauvin Arnoux railway relays, while also acknowledging the value of the work done by the inhouse teams.

Top-quality work by Chauvin Arnoux's teams and experts and the Group's member companies which Messrs Smith and Yaicle praised in their words of thanks.

A history of technical and

1893, Montmartre...

Montmartre, Chauvin Arnoux's original neighbourhood, is rich with cultural and artistic history, as well as agricultural history with its famous vineyard. In this celebrated area in 1893, René Arnoux and Raphaël Chauvin created and invested in the field of electrical metrology, a new-born technology at the time. Inventors and manufacturers, they founded the Chauvin & Arnoux company in the grounds of a house in what was then a Paris suburb, at 188 Rue Championnet, with a garden and small sheds which served as the first research laboratory. This was the beginning of a story with measurement as its theme. The company, made up of two engineers and a few skilled and qualified journeymen, specialized in the production of galvanometers and temperature sensors. Wattmeters, potentiometers, measurement bridges and megohmmeters using an electrical process were soon developed as well. The customers in 1893 were engineers and scientists, such as Pierre and Marie Curie, and came to Rue Championnet to discuss with René Arnoux devices that could help them in their research. By 1912, the company was more than 20 people strong.

Know-how: imagine and produce

Beginning in 1918, André Arnoux, the founder's son, organized all the production work into specialized workshops. The products' success was up to expectations. Large series of devices were created, such as the SIS switchboards, leading in 1927 to rethinking of the production process, which was automated by splitting up the assembly operations for the sake of faster technical execution and higher quality, based on in-house metrological criteria, but most important of all on the customers' judgement.

The first materials used, not only for the measurement techniques but also for the housings and accessories of the instruments, were magnets, balance springs, shellac (used to balance the galvanometer, the well-known "boudinette"), copper, silver, gold, lead, tin, glass, black ink, wood, black ebonite and brass. Beginning in 1927, wood was replaced by stamped, treated and painted steel sheet. Later, thermosetting plastics made their appearance and plastic injection moulding techniques allowed the creation of more complex shapes and new designs.

On the electrical and then the electronic side, manual wiring and soldering, with various mechanical components, gave way to printed circuits, first single-layer, then multilayer. Today, robotic control of the installation of surface mount devices ensures high-speed production consistent with the new needs of the business. In this way, the period from the late nineteenth century, with its highly technical galvanometer, up to the middle of the twentieth century, was followed by the introduction of digital display units in the 1960s, then the use of transistors, integrated circuits, chips and ever smaller, lighter, more precise components. Software,

integrated as firmware or running on computers, completed this extraordinary evolution of techniques and human ingenuity.

One raison d'être: measuring to find out.

Designing and producing are among the fundamentals at Chauvin Arnoux. Thus, beginning in 1893, a multitude of innovations, cutting-edge at the time, were created and many patents were filed. For example, the first Universal Testers in 1928, "Cellophot" photovoltaic measurements for cameras, transformer clamps in 1930, Cos phi measurement in 1934, TOP then RIP temperature controllers, magneto ohmmeters delivering constant electrical signals and more.

This rate of creation continued after the war, with the appearance of our world "stars": **the MONOC universal tester in 1959** (nearly a million sold altogether), **the OK cut-off relay in 1961** (more than 50 million), **STATOP electronic temperature controllers in 1965** (nearly a million) **and the Miniclamps** (more than a million). Measuring is fine... but what about recording?

The firm early on developed recorders such as the Electroplume and the Rectigraphe, which "record and print" the data. In the decades from 1980 to 2000, there were the COMPA 2010 multimeters and their "multimeasurement" adapters, CDA testers and multimeters, ISO TER megohmmeters, IFELEC plotting tables, Prowatt wattmeters, C.A 5220 multimeters and then, among so many other products, the first earth/ ground clamps in the C.A 6400 series.



industrial development

Alongside these creations and largescale industrial productions came the development of custom devices in the Special Developments workshop, in response to customers' needs: instruments for the national weather bureau, shock-resistant measurement relays, command-control stations for the Navy and power generation and transmission systems and equipment for the rail sector. Filled with innovations, Chauvin Arnoux's history shows **more than 350 patents filed in 120 years!**

More than 30 different trades!

In order to control its production completely in terms of metrological quality and delivery times, the firm brought various trades in-house: mechanisms, machining, electrolytic treatment, fabrication of moulds and press tools, plastics processing, bare circuits, SMD wiring and wave soldering, assembly and calibration, quality control and logistics. Computing is everywhere: CAD/CAM came to the R&D departments and CAMM is used for all logistics. Payroll and general, cost and budget accounting software reinforces all the usual management tools with coordinations and correlations among the various systems. All these technologies are used to design products which are ever lighter and more compact, as required by our customers.

With 16,000 square meters of offices and production sites in the heart of Paris in 1960, the Chauvin Arnoux company was led to set up its production units in Normandy, then in the Rhône-Alpes region, as the company grew. Today there are 39 sites in France and abroad with a total building area of more than 40,000 square meters and a thousand employees, including 800 in France.

Quality, maintenance, & operations on site.

A customer who acquires a device bearing one of the Group's brand names can count on customer service over the long term. The company is still repairing instruments made several decades ago. It's a question of knowledge and organization. Due to its accelerating growth, in 1969 Chauvin Arnoux founded Manumesure to provide complete metrology services to all users of measuring instruments of all makes, including those linked to the environment and medicine. But that's not all: Manumesure is also organized to enable its customers to establish or restore the conformity of their instrument fleets. Today, 12 local agencies in France provide metrological services and regulatory testing under Cofrac certification.

Did you know?

1833/1850, presence in rail: The Paris to Sceaux rail line and the design of new "articulated" locomotives and wagons were the work of the engineer Jean-Claude Arnoux. These innovations, patented at the time, facilitated the development of France's rail networks (they allowed a significant reduction of the radius of curvature of the rails).

Development in France and abroad

In France, this means ever more presence and ongoing relations with all the customers with whom we have been working faithfully since 1893 through all our companies and in all our businesses. Internationally, the Group is preparing to open subsidiaries while maintaining its presence in approximately a hundred countries thanks to the commitments of its distributors, both generalists and specialists. The twenty-first century is under way!





Opening of the Chauvin

site at Meyzieu, near Lyon.

Arnoux Group's new industrial

Chauvin Arnoux is the first French manufacturer of assuring instruments to be equipped with an anechoic chamber to measure the electromagnetic compatibility of its products.

Acquisition of **Enerdis** and the Measurement division of **Oritel**. Reorganization of the Group into **4 business units**. Inauguration of the Group's web site. Acquisition by the Group of a Chinese trading company based in Shanghal.

Opening of a **subsidiary in Lebanon** to cover the Middle East.

Chauvin Arnoux celebrates its first hundred years, inaugurates a new logo and sponsors the **Grand Prix de la Mesure** awarded by the Académie des Sciences in Paris. Takeover of **Metrix**, no. 2 in the French market for portable measuring instruments. Acquisition of **Pyro-Contrôle** from the American company Engelhard.

Acquisition of Normandie Mesures by Manumesure: **air pollution monitoring** and **dimensional metrology**. Buyout of the Chinese company *Puji Wung* and merger with the Chinese subsidiary. Opening of a **subsidiary in Sweden** to cover Scandinavia. "Électron d'Or" and "Électron de Bronze" prizes for the PEL 100 and DigiFlex years of major products and innovations

Evolution of Test & Measurement instruments

HAUVIN ARNOUX is the leading specialist in electrical measurement, responsible as early as 1927 for an invention like the universal tester, the ancestor of the multimeter which is today the key tool for electrical measurements. In 1937, Chauvin Arnoux invented the transformer clamp, the first current clamp. A precursor in earth measurements, too: 1994 witnessed the introduction of a new, simpler and more effective measurement method for testing earth loops. As for METRIX, the introduction in 1950 of the electro-clamp made it possible to measure high currents with one hand or voltages without disconnecting. All measuring instruments have evolved to reflect the needs of the end-users. One problem quickly encountered is that of processing the results of measurements made in the field, storing and recovering data via a system of communication between instruments.

Communication built into measuring devices

Measuring instruments have evolved as needs in the field have changed. The devices have become portable, thanks in particular to miniaturization of the components and the use of ever lighter materials. The measurements thus made and stored in the field have led to a new requirement for communicating products.

Users have to be able to recover the data in the device in order to process it or to track the measurements in real time. A second factor which has driven the development of communication by the products is viewing measurement results on instruments without display units, such as loggers.

In terms of communication, the 1990s witnessed the development of communication via serial links. RS232 & RS485 came into widespread use during this period. At the end of the 1990s, RS232 serial links were gradually replaced by USB links. Device-to-device communication could also be used to configure instruments, in particular those without display units.

One of the first CHAUVIN ARNOUX devices to communicate via an RS232C link was the PROWATT 3 programmable power analyser, designed in 1993. At the time, it communicated with a printer and a PC running specialized processing software and could in addition control relay alarms. The C.A 100 logger uses the RS232 for a direct link with a PC or a modem.

Following the introduction of Ethernet, the first measuring instrument equipped with this link was the OX2000 digital oscilloscope.

The 2000s saw the development of remote wireless communication. Bluetooth is a standard communication system which is very simple to implement and is used to transmit measurements a short distance to a PC. Wifi makes it possible to connect a measuring instrument to an Ethernet network, thereby enabling the user to monitor and collect data remotely from several measuring devices.

Marketed in 2012, PEL 100 power and energy loggers are equipped for many communication modes: Bluetooth, Ethernet, USB. This ensures access to the measurements in real time or to the recorded results in all circumstances.

DataView software now makes it possible to connect to, monitor, acquire and process measurements from a large number of Chauvin Arnoux measuring instruments via the various standard means of communication available on laptop computers.

CHAUVIN ARNOUX GROUP

A

A CONTRACT OF A			
C MAR LOT N MAN			·····································
			"Électron d'Or" awarded
		2013 —	to the PEL 100 loggers.
	Major innovation: TrueInrush to measure	·	to the LOCAT-N cable locator.
	100 power loggers and the smallest field		
	oscilloscope, the HANDSCOPE.	- 2012	
* QY90-		E State Stat	SCOPIX oscilloscopes acquire
		2010	communication via FTP server.
	New C.A 6116 electrical		
	installation tester compliant	- 2009	
	with the new standards.		
20		2008 —	Ihe QUALISIAR+ network
	5 pour ID67 multimators for difficult		
	environments, including	- 2007	
9	the ATEX-certified MX57Ex.	=	
		2006 —	Marketing of the METRIX OX6000 Series
- My Have	Major innovation in oscilloscopy:		laboratory oscilloscopes.
in in	troduction of the SCOPIX portable METRIX	- 2004	
A DECEMBER OF A	oscilloscopes with isolated channels.	<u> </u>	
100 maline		2002 —	Introduction of the first 12-bit SCOPIX
	Introduction of the Qualistar family		
	of three-phase electrical	- 2001	
	lightning arrester tester	·	Marketing of the PX110 & PX120
0000	0 0	2000 —	- wattmeters with IR transmission
	New range of specialized	······	for data transfer.
ONONOT	Simple Loggers™.	- 1999	
mataix	,		
Intelierx.		1998 —	Marketing of the rugged C.A 8310
			for severe industrial environments.
	3 simple, self-contained earth testers:	- 1997	"Prix du Design" for the MN miniclamps.
	C.A 0421, C.A 0423 & C.A 0425.		
Android applications	The C.A 6411 & C.A 6413 earth clamps		
	indugurate a new concept:	— 1994	
The widespread use of smartphones	of interconnected earth loops.		
and tablets running the Android		1985 —	Design and marketing of the IERCA
system opens up new possibilities when		<u> </u>	giouria lesiel.
measurements are made in the field.		1082	Creation of a Hall-effect clamp
As they are equipped with Bluetooth		= =	to measure direct currents.
and Wifi for wireless communication,	Introduction of our first	- 1972	
in this context these devices can serve as	digital multimeter.		Introduction of the STATOP temperature
terminals for presentation and processing		1968 —	controller, the standard for several
of the measurements, with much		=	generations of heat engineers.
improved ergonomics, while creating	Creation of the high-safety	- 1962	
an ideal electrical safety barrier between	cul-oil feidy with magnetic blowour.	·	Invention of the Monoc universal tester,
the measurement functions and the user		1960 —	with a single switch and dial.
interface.		=	of electricians.
Chauvin Arnoux has begun developing		=	
Android applications specific to these		E	The Cellaphot, an ultra-liahtweight
measuring devices, for example:		1952 —	exposure meter, was built into cameras.
• The C.A 6417 earth clamp	Remote temperature measurement		
F4U//F6U/ power clamps	with the Pyroptique disappearing- filament optical thermometer	1947	STAR STAR
METRIX oscilloscopes The Average lange			Invention of the first
Ine Anaroia application developed		1936 —	
for the C.A 6417 earth clamp, for	Invention of the transformer clamp,	1024	which would evolve
example, allows real-time alsolay of	the first current clamp.	- 1934	into the exposure meter.
deter and even the CPC searchington		1022	Introduction of the first industrial
adia and even the GPS coordinates		1933	needle-contact temperature
the measurement site immediately.	Invention		controller.
there data can then be transmitted by	and patenting	1927	
amail using standard Android functions	of the universal		ohmmeter. In 1923,
email using signadra Android Tunctions.	tester, the ancestor	1905 —	— the measurement was
	or the multimeter.	·····	made independent
		=	of the magneto.
		=	

APPLICATIONS

Aviation Installations: special installations operating at 400 Hz

he commonest frequencies of industrial AC power supplies are 50 Hz (Europe, Asia, Africa) and 60 Hz in North America. But some electrical applications use a different fundamental frequency. For example, 400 Hz is used in military and civil aviation. Transformers and motors operating at 400 Hz, designed for these applications, are much lighter and more compact than those using 50 or 60 Hz.

At such frequencies, the current cannot be transmitted over long distances at the lowest possible cost. For these economic reasons, the use of 400 Hz is generally limited to vehicles and buildings / ships.

The main advantage of equipment and motors operating at 400 Hz lies in their compactness and light weight, whence their special value to aviation. In addition, 400 Hz applications generally have a power of a few hundred kW and relatively low short-circuit currents, rarely reaching as much as 4 times the rated current.

Even at 400 Hz. there are harmonics...

The current consumed by loads connected to the power grid rather has a waveform which is no longer a pure sine wave. This distortion of the current causes a distortion of the voltage which also depends on the source impedance.

The disturbances called harmonics are caused by connection to the network

Did you know?

A pioneer in the development of "flying wing" aircraft, the French aeronautical engineer René Arnoux developed a rectangular wing with a stabilizing device. His first biplane, built in 1909, was followed in 1912 by a monoplane; the wing profile is self-stabilizing with a raised trailing edge.

At the 1913 Paris Air Show, René Arnoux exhibited a monoplane named "Stablavion", a low-wing two-seater propelled by a 55hp pusher motor.

In 1919/1920, he built a tailless biplane powered by a 130hp engine and, in 1922, there were several successful flights of this biplane with its single

of nonlinear loads such as equipment including power electronics, switching power supplies, variable speed drives, etc. The consequences can be instantaneous on some electronic devices: functional disturbances (synchronization, switching), untimely tripping, measurement errors on energy meters, etc. Worse and more costly, the additional heating induced can shorten the life of rotating machines, capacitors, transformers and neutral conductors in the medium term. In order to stop this situation from arising, regular preventive maintenance is implemented.

At 400 Hz, some disturbances are amplified...

When an aircraft is stopped on the tarmac, it is recharged either via the loading bridges or by a mobile generating set. When supply is via the loading bridge, with a 400 Hz converter upstream, additional disturbances introduced by the earth bonding may occur.

On a source with a 400 Hz fundamental, the harmonics will engender strong earth leakage currents due to the spurious capacitances that exist between equipment or a conductor and the earth. They provide



a possible path for leakage currents which may cause untimely tripping of RCDs, among other symptoms.

The heating of cables carrying harmonic currents occurs even more rapidly in all parts of the installation. Since the power levels of 400 Hz sources are generally low, the levels of their harmonics are even higher.

Even though there are specific cables for these applications, it is essential to set up solutions to filter out the harmonics, after the necessary measurement campaigns. The proper sizing of these filters will depend on which harmonic frequencies are found and what their amplitudes are.

How are these measurements made?

F407 & F607 clamps are used for maintenance of installations on electrical networks with 50, 60, 400 and 800 Hz fundamentals. They are ideal for all the necessary measurements: power values, the harmonics with their decomposition, Min/Max values, etc.

Reader service no. 1



CHAUVIN® Tel.: +33 (0)1 4485 4485 ARNOUX Info@chauvin-arnoux.fr www.chauvin-arnoux.fr

vertical stabilizer. This success with the Service Technique de l'Aéronautique



led to the founding of the "Société des Avions Simplex" with a view to developing other machines.

Discouraged by the crashes of the first biplane and monoplane to leave the plants during test flights, René Arnoux suspended his investigations. However, among all the types of flying wing, the one designed by René Arnoux still counts as an aerodynamic success and a FLYING WING, the AV-22, was baptized the "René Arnoux" by Charles Fauvel in 1950 to honour this pioneer.

INDUSTRY

Inclustry, a major consumer of measuring instruments



eople's safety, energy efficiency, maintenance or diagnostics to avoid production stoppages: these are the leading concerns of the players in today's industry.

The safety of property and people

Ensuring the safety of individuals and machinery remains an important issue in industry. To achieve it, diagnostic and monitoring operations are defined by standards. These operations include



measurements and must be performed in compliance with the standards in force, such as NF C15-100 in France.

Installation testers, earth testers and megohmmeters are used to check the effectiveness of earthing, the electrical continuity of the protection offered by chassis earths, the quality of insulating materials, etc.

Just as it is for electrical installations, the safety of electrical machines and panels is governed by regulations intended to ensure safety in particular. European standards, such as EN 60205 or EN 61439, define the mandatory tests and checks. Machine testers are used to make these measurements.

Reducing energy consumption



Energy efficiency is also a major concern in industry. The ISO 50001 standard includes recommendations concerning the methodology to be used. Measurements establish a precise diagnostic of the situation and an analysis of the consumption under the different headings. The measurements made with PEL 100 loggers or Qualistar+ power and energy analysers yield precise information on the consumption in each area. Analysis of the measurements establishes load profiles and identifies energy-hungry areas. Improvement solutions are then implemented: redesign of the transformer, installation of filtering systems, replacement of faulty equipment, etc.

Verifying the effectiveness of these actions entails more measurements, followed up over time. The environmental measurements also serve to target other improvements concerning the temperature, air flows, light, etc. Thermography is essential for establishing an energy assessment of the building. Thermal bridges, missing or incorrectlypositioned insulation, infiltrations, etc., are all easy to identify with a thermal camera, for example the RayCAm.

Thermography can in fact determine whether maintenance is needed and avoid any risk of fire, damage to equipment or production stoppages.

Maintenance

Because any malfunction reduces productivity, our measuring instruments are there to ensure proper maintenance, thereby reducing unplanned downtime and ensuring that an installation or a machine functions correctly.

As in any other sector, the use of

a voltage absence tester is essential before any work is done on an electrical installation. In industry, the quantity and variety of devices connected to the electrical network lead to harmonic disturbances which affect the quality of the energy and may damage the machines.

Electrical network or harmonic analysers, such as the Qualistar+, are then essential to quantify all harmonics present in the network and find an appropriate solution to deal with them.

Concerning the command-control systems of the machines, specialized SCOPIX digital oscilloscopes for field maintenance and process loggers allow analysis of most of the signals which may be encountered. In the presence of motors, maintenance technicians will also use tachometers.

Thermography, meanwhile, can be used for both preventive and corrective maintenance.

The requirements in terms of measuring instruments are very broad and varied, depending on the industrial activity. For example,

in heavy industry and in difficult and explosive environments, the products must be ATEX-certified, like the MX57Ex multimeter.



Reader service no. 2



CHAUVIN® Tel.: +33 (0)1 4485 4485 ARNOUX Info@chauvin-arnoux.fr www.chauvin-arnoux.fr



From Measuring electricity to managing energy performance

anaging begins with metering. And in the field of metering, Enerdis has proven itself for more than sixty years since its distinguished origins (Schlumberger, Cie de Compteurs, Enertec). For sub-meters and billing meters, concentrators and power monitors, Enerdis has always been a reference in panel-mounted equipment to meter, display, analyse and manage the electrical parameters of an installation.

Metering, an evolving concept

The main concern of an energy consumer, whatever their field of activity,

has always been to obtain an accurate idea of the energy consumption by a site, a workshop or an application. The purpose of this is to ensure fair allocation of the costs. Since 1995, Enerdis has marketed a full line of sub-meters, both single-phase (CMMe and CMMi) and three-phase (CMT2 and CMT2i), to cover the many sub-metering applications. These electronic meters gradually became the standard in new installations. Ancestors of the present-day ULYS meters, these meters already incorporated multiple rates and a pulse output for remote data transmission.

Today, more compact (2 modules) and more accurate (class 1),

the new-generation meters incorporate multiple measurements and are fully communicating, whatever the communication protocol (Ethernet, RS485, M-bus, KNX). They now include energy performance measurement functions, a far cry from simple metering. In step with its times, ULYS allows direct reading of the measurements via integrated web pages and a summary of several weeks' consumption via a simple web browser.

Display... but that's not all

A display on a control panel must allow rapid viewing of the values and trends of the quantities measured. In France in 1989, Enerdis launched the first display module, a casing capable of holding 9 to 11 display units. It was an unprecedented success with industrial



customers, who found it the ideal solution for efficiently displaying the key indicators of each process.

Beginning in 1995, Enerdis subsequently developed the Recdigit range, a family of display modules which could advantageously replace the usual approaches at the time, based on combinations of galvanometers, transducers, switches and so on. This was the first step towards a market focused more on energy management, with the gradual introduction of power monitors (Nodus Q, Nodus D) which could also display instantaneous values, store 10- or 15-minute mean active and reactive power values and energy values in 6 time ranges.

In 2006, Enerdis further consolidated its position as leader in this field by marketing its Enerium line of power monitors, concentrated technology fully focused on multi-energy management, installation surveillance and energy quality.

JLYS

Analyse to optimize

The concept of metering has evolved towards the optimization of consumption. Today, it takes the analytical power and flexibility of a computer to provide a global energy management solution.

At the end of the 1990s, there were remote management systems, often small (in terms of the number of inputsoutputs managed), which made it possible to process the data from a installation using a simple Minitel terminal with a printer. This amounted to the aggregation of electrical information read out in the form of a data listing which the operator then had to translate and compile in order to obtain analytical tables. Not really child's play! The introduction of Enerdis's "THOR" software in 1998 made energy management the heart of the metering system, with functions which had not previously been automated: remote reading with no risk of errors, already in the form of tables ready for analysis, management of overshoots, monitoring of consumption by billing heading, generation of curves showing the evolution

of consumption, analytical assessments, etc. A tool henceforth essential for any operator concerned with accurately optimizing its energy consumption while keeping its installation functioning optimally.

Ten years later, Enerdis went even further with its E.online software, which can be used as it stands via the web for multi-site, multi-user and multi-energy applications. Dashboards which can be entirely customized, analyses, energy and financial reports generated on demand,



calculations of energy performance and economic indices (kWhoe or €/m/year, kWh or €/part made, kWh/UDD, TCO2 eq, etc.), management of alerts for any threshold overshoots, detailed description of the alert. Software specialized solely in energy performance, specially designed for the control, tracking, management and surveillance of all consumption. We have gone far beyond the simple management of electricity!



From pulses to multi-energy, climatic and process data

The basic historical solution for remote reading of a device (electricity meter, power monitor) involves transmitting the energy data measured by means of pulse outputs

from the measuring instrument to a pulse concentrator.

As early as 2003, Enerdis marketed its CCT concentrator, which not only reads the data via an RS485 link but also stores the measurement points temporarily - for up to a month. The big advantage of the CCT was that it gave a communication capability to products which until then did not have any.

In 2013, after more than 3 years of in-house research and development, Enerdis once again revolutionized the market with the **ELOG web-box data logger**, which not only reads the metering data of an installation but also records them, stores them and, most important of all, makes them accessible from

any computer, tablet or smartphone with a web browser. The great strength of this **smart concentrator** is its ability to collect data of any kind (water, gas, temperature, etc.), in any form (pulses, RF, Ethernet, etc.), whatever the equipment connected.

With products and solutions which have become even more innovative over the years, Enerdis has demonstrated its ability to anticipate operators' needs, whatever their field of activity. The brand of reference with the leading players in the energy sectors both in France and internationally, **Enerdis** has been a consistent winner with equipment of acknowledged **high quality made in France.** Industrial companies too have trusted the company for decades. That is why, after being a pioneer in the field of energy management more than sixty years ago, Enerdis still maintains a lead over its competitors. A lead it quite intends to maintain for a long time to come.



years of major products and innovations

Collecting and recording energy data in an HQE® building with ELOG®, the new smart concentrator from Enerdis®

ustainable energy management is a major societal issue for the future. For building operators, the primary goal is to reduce consumption by saving as much energy as possible through increased efficiency in buildings. An ecologically-responsible approach highlighted by HQE® Operation certification which guarantees healthy, comfortable buildings whose impacts on the environment, as assessed over the whole life cycle, are as well controlled as possible.

Simplifying operation

The installations comprise equipment performing many functions (meters, power monitors, PLCs, etc.), often of many different makes. In addition, the data to be collected are totally heterogeneous in type and/or format. An additional difficulty that becomes a real headache when it comes to collecting energy consumption data simply and efficiently. Deployed in a fleet on several floors of the building, the ELOG® web-box data logger is a smart data concentrator which simplifies operation of the installations by converting all data from the equipment into a homogeneous, intelligible format. This means that ELOG® is totally self-contained and has no need of a language or communication gateway to collect all the data from the installation.

Cutting the costs of integration

Cost control involves the integration of open processing applications, using universal access to the information. Because of its design (integrated web pages, Ethernet output, Excel macro, etc.), the ELOG® web-box data logger frees the operator from programming language constraints (Java, JavaScript, Python, etc.) by processing the information collected and recorded in a wide variety of web applications (android, ios, web browser, etc.). This clearly makes ELOG® profitable whenever there is direct use of the data by the various energy performance, analysis, tracking and improvement software and applications on the market.

Product advantages

- 5 pulse inputs for processing of multi-utility meters (electricity, water, gas, etc.)
- 2 RS485 Modbus ports and 1 Ethernet Modbus TCP port for remote communication with all the equipment on the installation (meters, power monitors, PLCs, probes, etc.)
- Library of **Modbus drivers** from all manufacturers integrated by ELOG (up to 100 drivers)
- Up to 100 devices per ELOG
- Up to **50 variables recorded** per ELOG



ENERDIS

Enerdis and the energy market

rom 1950 to the 2000s, the French power grid, the most efficient in Europe, grew to keep pace with the growing consumption of electricity. F EDF, alone at the time, encompassed all parts of the energy business, from production through transmission to distribution throughout France. Enerdis supplies it with low-voltage current transformers, automation relays, transducers and graphic recorders, all products developed to meet EDF's very strict specifications.

At the beginning of the 1980s, Enerdis equipped hydroelectric, thermal and nuclear power plants with automation relays which satisfy the very severe environmental constraints imposed by EDF. This was the beginning of extensive cooperation with increasingly specific products. Europont graphic recorders, Normeurope analogue panel meters, current transformers, T82 measurement transducers and, of course, billing meters.

It was in 1989 that the first EDF-approved electronic energy meter for industrial customers, the Trimaran 1, was introduced. Especially innovative for its time, with its built-in remote reading and remote programming system, Trimaran 1 heralded a small technological revolution in billing metering: it was the first time that an energy meter, designed for EDF's billing system, incorporated services for users providing them with information they could use to control their energy costs.

Ten years later, with some 20,000 Trimaran 1 meters installed, Enerdis launched Trimaran 2, a billing energy meter built around EDF's PRISME concept. A response to new needs, not only for ever more accurate metering, but also for an indication of the quality of the energy

RIMARAN 2

supplied. A totally new approach in 2000 which has since become a standard. Now, in addition to its metrological

functions, Trimaran 2 incorporates quality measurement functions and is today a standard for distributors and consumers of electrical energy.

A special relationship with EDF and, more recently, with ERDF also developed for the supply of current transformers. As early as 1973, Enerdis became one of the main suppliers of three-phase current transformers for billing metering with the TRI-500, a range of pre-wired current transformers from 50 to 500 A. The TRI-600 in 1990, then the JVP-1045 and JVP-1145S, the JVO-40-100 and JVO-40-100-S and finally, this year, the TRI-700-S, a Class 0.2s two- and three-rating current transformer.

Lastly, there are many references in EDF-qualified automation relays (RE3000, RTS, REB, OKB-184) which have been installed for more than thirty years in the power plants of the legacy energy supplier in France. In a constantly-changing energy market, Enerdis continues to build



very special ties with **ERDF** and **RTE** by offering ever more innovative products. For many years, Enerdis has

also been active in the energy market internationally, with qualifications by such players as ENEL and TERNA in Italy.

Enerdis and wind energy!

For more than 30 years, Enerdis has been a leader in a speciality less familiar to its customers: meteorology. For a long time only of interest to the weather bureau and the transport and defence sectors, wind measurements are also important for many professionals in agriculture, tourism and leisure, public works, etc. As early as 1983, our wind systems, designed at the request of the French Navy, were in use on all its warships. TAVID anemometervane units have been installed in the observation stations of the national weather bureau. They are also used by EDF and the French Atomic Energy Commission at nuclear plants, in the pollution prevention systems of the installations. And the SNCF uses them on high-speed lines to protect large parabolic antennas when there are storms.





www.enerdis.fr

years of major products and innovations

Innovation at the core of Pyrocontrole's strategy

s a manufacturer of sensors and industrial temperature measurement and control systems, both customized and standard, Pyrocontrole has been designing effective products incorporating the new technologies in response to demand from customers ever since it was founded in the 1950s.

1945 Pyrocontrole is founded

1997 Pyrocontrole becomes part of the Chauvin Arnoux Group 2013 Pyrocontrole enters the automation market with the new CPS Touch(R) range of HMIs

1993 The calibration laboratory earns COFRAC accreditation

Founded in 1945, the Lyon-based company quickly sets people talking. With its own research centre and a production unit, Pyrocontrole distinguishes itself by making cutting-edge tailored sensors for industry and nuclear applications.

1993: Pyrocontrole offers a new service to its customers. Set up 15 years before, Pyrocontrole's metrology department earns COFRAC accreditation (no. 2-1385) - Calibration by comparison.

1997: Pyrocontrole becomes part of the Chauvin Arnoux Group. In this way, Pyrocontrole can significantly expand its product offering, with Chauvin Arnoux's controllers, panel meters, transducers, recorders, industrial thermometers, calibrators, etc.

Largely complementary, the activities of the two entities benefit from a new synergy giving them the means to undertake new developments.

2007: to sustain its development and modernize its production facilities, Pyrocontrole moves to an allnew industrial site at Meyzieu. This new space is also home to the local sales agencies of Enerdis, Chauvin Arnoux Test & Measurement and Manumesure. A concentration of the Group's Rhône valley activities to favour the complementarity of their expertise and synergy of the local teams.

2007: Pyrocontrole files a new patent for its method of in-situ calibration for temperature sensors. This patent describes an innovative in-situ calibration

Patent filed for in-situ calibration method for temperature sensor assemblies Pyrocontrole moves to an all-new 3,400-m² industrial site at Meyzieu, near Lyon

method in which the sensor is not removed so production is not halted, an offering which yields large savings for the customer by allowing production to continue.

2013: innovation is still the leitmotiv at Pyrocontrole, with new developments over its whole range: temperature sensors, power controllers and even new expertise in industrial process control interface, the HMI. And this is only the next step...

New performance features for the high-pressure temperature sensor

Used to measure temperature in highpressure environments, this qualified sensor measures fluid temperatures reliably and accurately. Developed for the petrochemical industry, it now offers unprecedented performance. Capable of withstanding pressures up to 4,700 bars, it has a response time of less than one second and resists shocks and vibrations in compliance with the ATEX/IECEx regulations for severe environments. This sensor is also characterized by its small size: it measures only 3 mm in diameter.

Skin temperature sensor: important innovations

2007

Measuring a surface temperature is a difficult operation, subject to numerous errors and requiring many precautions. This contact temperature sensor, designed to withstand severe environments, is capable of measuring the surface temperature of a pipe very accurately and use the result to determine the temperature of the fluid flowing in it.

This measurement has improved over the years, becoming increasingly reliable and selective, reducing thermal transfers to achieve exceptional accuracy.

Today, there are major improvements to be noted: interchangeability, for example. It uses exclusive technology making it possible, if necessary, to replace the sensitive part of the sensor without removing it from its support. It complies with the ATEX standard and its measurement reproducibility is excellent up to 1,100°C.



CONTOCT Special 120th Anniversary issue

PYROCONTROLE

First-rate performance from the fast-response sensor

Designed for the nuclear market, this is used to accurately measure the primary circuit temperature of pressurized water reactors (PWRs). This sensor exceeds the requirements of the current standards. Accurate to +/-0.3°C, it has a response time close to one second.

Qualified as K1 according to RCC-E, it combines technology and rugged design, withstanding the most extreme conditions in terms οf irradiation, seismic disturbances, temperature and pressure.

New power controllers: Thyritop 300 The success story continues

The thyristor power controller family continues to grow with the latest model: the Thyritop 300.

This new generation of power controllers has an extended voltage range, from 24 V to 600 V, and current ranges from 16 A to 1,500 A. It is available in single-phase and three-phase versions with single or two-phase control. Connections can be made to the top and/or the bottom, simplifying installation of the Thyritop 300.

A choice of wiring which technicians will appreciate. Equipped with the latest technologies, it has a graphic touch interface for advanced intuitive control of the unit. In order to make it easier



to configure the devices, there are Ethernet and USB ports in addition to the standard interfaces.

Comprehensive and easy to master, the Thyritop 300 series is used in many sectors of activity.



Pyrocontrole enters the automation market Designed to simplify and improve the day-to-day

experience of operators in the supervision of industrial processes, Pyrocontrole's new CPS Touch® range of touchscreen human-machine interfaces centralizes all the data for an application on a single screen. With 5 highperformance models ranging in size from 4.3 to 15 inches, there is a CPS Touch® for every supervision requirement.

A ready-to-use solution... The cutting-edge technical features of its CPS Studio programming software is also available to facilitate the design and management of custom projects: library of advanced graphic symbols and objects, advanced functions (management of alarms, recipes, user scripts, trend curves, multiple languages, scheduler, etc.). With offline and online project simulation on PC, development times and costs are substantially reduced.

Concerning data and application security, CPS Touch®® HMIs are compliant with the strict regulations of FDA 21 CFR Part 11. These rugged instruments benefit from IP 65 and even IP 66k protection. A major advantage is the fact that the interface can be controlled remotely via the Ethernet connection. Usable with a variety of connection technologies and protocols, CPS Touch® HMIs adapt to all types of applications.

Concurrently, in order to propose a comprehensive automation offering, Pyrocontrole has developed a new range of 14 remote I/O modules: PDM. Radio and power supply modules, analogue and digital modules, temperatures: a broad range of high-performance, low-cost, modulatable signal converters.

* CPS: Control Panel Systems PDM: Pvro Distributed I/O Modules

Reader service no. 6



PYRO Tel.: +33(0)4 72 14 15 40 CONTROLE info@pyro-controle.tm.fr www.pyro-controle.com Q years of communication



Having knowledge but lacking the power to express it clearly is no better than never having any ideas at all Quotation credited to Pericles, approximately 450 BCE.

Inspired by this illustrious adage, the Chauvin Arnoux Group has always attached great importance to its communication. Internal communication with the staff, but also external communication with partner distributors and customers. For 120 years, surfing on the wave of new technologies and communication media, as in the development of its products, Chauvin Arnoux has innovated and evolved.

The creation of a visual identity

The graphic charter and logo are a firm's ID card, ideally as unique as a **fingerprint** or **DNA**. Capitalizing on the names of the two co-founders, René Arnoux and Raphaël Chauvin, the company created its logo a few decades ago, introducing **in 1992 the "Chauvin Arnoux" logo we now know**, combining the Group's two colours: yellow and black. Two colours echoing the yellow of the amber, brass, varnished wood and copper of the very first measuring instruments and the black of the bakelite and plastics of the reading zones and needles. A colour code which was already in use in 1927 in the creation of the corporate logo and is echoed on the magnificent original entrance gate of the Paris production site, today preserved in the entrance hall the Rue Championnet headquarters.

ontact/

CONTOCT

actualité

Creation of the customer magazine: <u>Contact Measurement News</u>

It was in October 1980 that the Contact Measurement News customer ntact magazine was created. Originally a collection of technical information about actualité measurement instrumentation, its main objective was to deliver information which was regular, rigorous and of high quality. Published monthly in black Contact ... and white with a print run of nearly 100,000 copies, it subsequently appeared every other month in a more tabloid-like format close to that of daily newspapers. In 1984, the customer magazine became an 8-page publication in booklet format, still in black and white, and then changed to a two-colour process before being simultaneously upgraded to twelve pages and full colour in December 1988. Increasingly motivated by the satisfaction of its subscribers, Contact News continued to evolve, both in the richness of its content and in its appearance, becoming "Contact Measurement News" and in 1991 adding an English-language version, soon followed by a German version, reflecting the growth of the international markets. Today sent directly to 48,000 readers and circulated through the distribution networks worldwide, Contact Measurement News is translated into three languages and has greatly evolved in its editorial thrust and its sections to maintain both the pertinence of the information and the modernity of its communication. It continues to be a primary source of technical information and news concerning the Group's member companies, with more than 30 pages on glossy paper, in colour, to satisfy the requirements of its keen readers.

N 40

CONTOCT n°28

ONTAC

ONTAC

CHAUVIN ARNOUX GROUP



More than 13 years of "<u>Les Cahiers</u> <u>de l'Instrumentation</u>" and still going strong...

The first issue of the annual magazine (in French only) for educational professionals, <u>Les Cahiers de l'Instrumentation</u>, appeared in November 2000. The 12th issue has just come off the presses on the occasion of the Educatec salon, a large annual gathering of educators and industrial companies proposing educational solutions or training equipment. Not a year has gone by without the publication of these 20 colour pages, which underwent a facelift in November 2007 but remain faithful to the original editorial policy; grouping practical exercises highlighting solutions or the use of measuring, testing or energy management instruments devices to create a bridge between students and the world of the business.

Sharing the life of the company: <u>Action Communication</u>, the Group's in-house newsletter, stays fresh.

In April 2000, the editorial of Chauvin Arnoux's very first in-house newsletter announced its creation and its objective **"our desire and our determination are to help you share in the company's progress"**.

There followed 2, 3, even 4 issues a year. Action Communication received a first face-lift in March 2004 and became bilingual in order to include the subsidiaries in the life of the firm, taking its current form of a small bound newsletter with versions in French and English with issue 24.

And Branch Branc

The new communication tools: product launch sites and new web site.

"New communication tools" means the web. The Group's web site is currently being redesigned both graphically and in terms of presentation of the information. The aim of this new web site is to clarify our global corporate strategy, our companies' messages, our international locations and our product offering.

The first was created in 2000 and used the custom development technology; the new site expresses the group dimension, the specific nature of each company's product offering and the transversality of expertise, using open-source computing environments: Drupal for the text part of the site (presentation of the company, news, calendar, training, HR area, etc.) and Magento for organization of the Chauvin Arnoux, Pyrocontrole and Enerdis

product offerings. major new feature, the "faceted search engine", makes it possible to go straight to the choice of products closest to the customer's expectations. Coming soon.

Our product launch sites

www.pel100.com

www.handscope.chauvin-arnoux.com www.multimetrix.chauvin-arnoux.com http://qualistar.chauvin-arnoux.com www.chauvin-arnoux.com/scopix www.enerdis.com/eonline www.compteur-electrique.enerdis.com www.enerium.enerdis.com



Chauvin Arnoux, a partner of Education

aking advantage of its close, privileged ties to the French national education system, the Chauvin Arnoux Group supports the actors in education by participating in many events, publishing Les Cahiers de l'Instrumentation and of course manufacturing measuring instruments suitable for educational use.

2013: a year rich in "Education" events

Chauvin Arnoux supports many initiatives and events designed to promote technical and scientific education, by loaning measuring instruments, participating as a member of juries and by supplying prize lots, etc.

CETSIS 2013 – The 10th colloquium on Teaching Information Technology, Science and Systems. From 20th to 22nd March 2013 on the Campus II site at Caen (France). Presentation of new products from Chauvin Arnoux[®] and Metrix[®] for use in EEA training (electronics, electrical engineering and automation) and discussions with university professors.



EducEco 2013 – A motor race where the winner is the team with the lowest fuel consumption, held for the first time on an urban circuit. From 9th to 11th May 2013, at Colomiers, near Toulouse. Judging panel chaired by Chauvin Arnoux, with assessment of the performance and educational aspects of the vehicles entered by more than a hundred participating teams.

Les Cahiers de l'Instrumentation

More than 13 years ago, the Club du Mesurage launched "Les Cahiers de l'Instrumentation", published

at the end of November for each EDUCATEC trade fair. The magazine is also distributed to many people involved in technical and scientific education. 10,000 copies are sent out free of charge at the beginning of each year. The magazine focuses on measurement in all its forms: news, practical exercises for high schools, tutorial articles, press reports, etc.

USB Lister of Control of Control

UDPPC – 61st Congress of Physics and Chemistry Teachers. From 27th to 30th October 2013 at Orléans. Presentation of new Chauvin Arnoux[®] and Metrix[®] products useful for training in physics and discussions with teachers.

CGM 2013 - General professional competition - Electrical engineering. From 22nd to 24th May 2013 at Cholet. Written tests and practical exercises to identify the best students and reward their work. Chauvin Arnoux® and Metrix® instruments were provided to each contestant for the practical exercises. **Engineering Sciences Olympics -** National competition for projects by science students (Series S, option SI and STI2D. National final on 22nd May 2013 at Les Mureaux. Chauvin Arnoux was a member of the jury to assess and reward experimental projects, promoting a spirit of initiative and a taste for research.

AFDET 93 – French Association for the Development of Technical Education. Meeting of the Seine-Saint-Denis chapter on 19th March 2013 at Lycée François Rabelais in Dugny. Award of prizes to the winners in the Industrial Maintenance, Engineering Technical Assistant and Industrial and Service Network Computing categories.

The Club du Mesurage

The Club du Mesurage was founded in 2000 with the primary objective of pooling requirements to teach measurement techniques and adapting measuring instrumentation to match the syllabus changes in high schools, universities and engineering schools. The members of the club: General and Regional Inspectors from the French Ministry of Education and managers from the Chauvin Arnoux Group.

MANUMESURE

Metrological Verification and regulatory testing

ore than 12 national technical agencies close to customers to provide metrological services and the possibility of working on site.



Health, a key sector developed by MANUMESURE, the Chauvin Arnoux Group company specializing in metrology and regulatory testing, accounts for more than 30% of the company's total business, behind industry and ahead of the environment.

MANUMESURE has focused its offering on these three market segments:

- INDUSTRY intended for manufacturers of computing, electronic and electrical products and for the agrifood, mechanical, transport, energy and telecoms industries, etc.
- **HEALTH** in the fields specific to hospital centres, analytical laboratories, pharmacy and cosmetics.
- **THE ENVIRONMENT** with a more specific focus on petrochemicals, quarrying, foundry work, incineration, glassmaking and local government.

With a network of **twelve technical centres, five fixed laboratories accredited by** COFRAC for Calibration, giving access to the COFRAC On-Site Calibration and Testing accreditations, and a team of travelling experts, MANUMESURE



functions as a local service provider to customers who request work on site to reduce the downtime of their instruments.

The services performed by MANUMESURE include:

- Metrological verification and maintenance of fleets of measuring instruments, whatever their type and make.
- **Computerized management** of these fleets of instruments.
- **Regulatory testing** regarding electrical inspections, thermography, atmospheric pollutants, water and noise.

- Industrial maintenance on site (power factor correction cabinets, etc.).
- **Training** the industrial players in quality and metrology.

MANUMESURE's technical offering covers:

- Electricity and magnetism
- Time/frequency-rotation
- Temperature
- Hygrometry
- Climate
- Dimensional measurements
- Microbiological safety cabinets
- Weighing
- Forces
- Pressure
- Volumes (micropipettes)
- Flow rates (gas, water, air, intrusive and non-intrusive)
- Physics (pH-meter, conductivity meter, etc.)
- Low and high frequencies
- Telecommunications & Computing

To be able to respond even better to its customers' expectations, MANUMESURE continues its technical development in the fields of physical measurements and regulatory testing, which lead to many opportunities and innovations. MANUMESURE has for example just this

year earned 4 new COFRAC Calibration accreditations: for Frequency (26 GHz), on-Site Temperature (-20°C/+150°C), Centrifuges and Inspection for buildings open to the public.





[•] Etc.

Opening up to the World...

or 50 years, the history of the subsidiaries has been a formidable adventure involving people, opportunities and the unshakeable determination of management. Today, the Chauvin Arnoux Group has a strong international presence thanks to the combined action of the export department and its ten subsidiaries, all bearing the same vision of "shared success constantly serving the customer". New projects, creation of products, brand recognition, certifications, etc.: the success of the subsidiaries continues, constantly pushing back the limits of what is possible. Here, we look at four examples of this growth.

The second subsidiary after Poland (1936), the **German subsidiary** was opened in 1965 at Bonn, then the capital of the German Federal Republic. It was in the geopolitical context then prevailing, when customs barriers were still very present, that the German subsidiary was set up and had to face the competition. On the strength of Chauvin Arnoux's know-how, it made a place for itself and won large government contracts, including one with the German research and technology centre, the FTZ.

20,000 universal voltage testers were thus manufactured for the German market. These contracts served as references, enabling the subsidiary, Chauvin Arnoux GmbH, to establish a position as a major player in the German measurement market.

Today located at Kehl, just across the Rhine from Strasbourg, the subsidiary continues its development thanks to a professional team. The history of AMRA, the acknowledged leader in Italy in the field of relays, began in 1975 with the production of relays for the OK series. The beginnings were modest, but the initial efforts were quickly rewarded. The strong growth of the first five years led to improvements: the teams were expanded, the premises enlarged and a new series of POK relays was launched on the market.



1996: AMRA continued its growth by buying out its Italian competitor, relay manufacturer MTI.

2000: AMRA's relays expertise crossed the ocean: a contract was signed with a Brazilian partner for the production of relays under licence.

2010-2013: AMRA continued its rise by earning certification from ENEL (the Italian power company) and developing portable products especially well suited to the Italian market: the "FTV" line of measuring devices for photovoltaic applications.

In the last ten years, thanks to its committed staff, AMRA has never deviated from the approach it chose at the outset: keeping an eye on the horizon in relays and developing portable products to consolidate its success.

CHAUVIN ARNOUX GROUP



In the middle of the 1970s, it was decided to open an **American subsidiary** in Boston, the technology capital of the east coast and a point of entry for transatlantic flights at the time. Success was not long in coming.

1983: to fill local orders, a finishedproduct manufacturing plant was set up in Dover, New Hampshire. It has continued to expand over the years.

1998: the R & D department was set up. This was a major strategic decision allowing the development of specialized products for the American market while simultaneously creating for the Chauvin Arnoux Group.

This department was the originator among other things of the well-known Simple Logger® range of recorders, regularly renewed and enriched, the DTR-8510 ratiometer and the DataView[®] software. **2013:** the Chauvin Arnoux Inc. teams are split between two sites: Foxborough, MA, for R & D, sales and marketing, Dover, NH, for production and logistics. In addition to North and South America, it also covers Australia and New Zealand.



Chauvin Arnoux opened its fifth **subsidiary, in Spain, in 1988.** Based on the success of a

distributor, the first years focused on the sale of portable measuring instruments, powered by the buoyant and fastgrowing real estate market.

In 2005, to ensure a stronger presence throughout Spain, an office was opened in Madrid. That same year, expansion also continued abroad with the development of the Portuguese and Cuban markets. In Cuba, a collaboration was established with plants processing sugar cane, as one of the coproducts is the generation of electricity.

Since 2008, given the difficult economic climate in Spain, the Spanish subsidiary has reinvented itself and turned to other markets. Drawing on the expertise of the Chauvin Arnoux Group's three companies, Chauvin Arnoux Ibérica went after new customers: energy companies, R&D and engineering departments, etc. It is a particularly dynamic company, with an approach to social networks which makes it one of the most "web-savvy" subsidiaries.

RAIL MARKET

The rail market. a partnership of long standing

resent in the rail sector from the beginning of the French industrial revolution, the Chauvin Arnoux Group has over the years become one of the major players in measurement for professionals in the sector. Rolling stock, infrastructure, sub-stations, network power supply stations, metrological tracking of fleets: the Group's measurement offer is constantly enriched and adapted to the international technical and normative constraints.



An offering based on decades of experience and expertise...

The first traces of the Group in the rail sector date back to 1838, when Jean-Claude Arnoux invented the "Arnoux system", the very first articulated train with radial axles for greater stability in tight curves. This patent was put into commercial use in 1840 on the line which would become the Ligne de Sceaux.

At the beginning of the 20th Century, buses, trains and trams were equipped with Chauvin Arnoux measuring instruments: meters, panel meters, recorders, etc. Companies like the "Chemins de Fer de l'État", the ancestor of the SNCF and the "Compagnie Française des Tramways Électriques" in Paris, Marseille and even Shanghai were major customers of Chauvin Arnoux.



At the beginning of the 1960s, spurred by the SNCF and the RATP, a standard was defined for rail relays. This was the birth of Chauvin Arnoux's FOK relay, still used in many trains.



locomotive no. 2

CHAUVIN® Tel.: +33 (0)1 44 85 44 85 Info@chauvin-arnoux.fr ARNOUX www.chauvin-arnoux.fr

2012: Chauvin Arnoux receives the "Excellence d'Argent" Trophy

In the mid-1970s, the production of relays takes off with the creation of AMRA, the Group's Italian subsidiary, specialized in the manufacture of relays.

Today, through its 4 brands, the Chauvin Arnoux Group offers a unique array of solutions for players in the rail sector.

Solutions

Solutions dedicated to testing and electrical safety

Chauvin Arnoux® proposes a set of portable measuring instruments for infrastructure and rolling stock, such as earth, resistivity, insulation and electrical installation testers, used to check the operation of signalling equipment and track equipment.

Fixed measuring equipment solutions

Enerdis®, an expert in automation relays and a specialist in energy management, proposes a full range of products and services for rail applications: automation relays for control cabinets and for power supply sub-stations, power quality analysers, meters, display modules, etc.

Computerized management and maintenance solution for fleets of measuring instruments

Specializing in industrial metrology and regulatory testing, Manumesure[®] manages and maintains fleets directly on site or in the laboratory.

Temperature measurement solutions

From temperature sensors for use on board rolling stock to curing processes used in the production of rail equipment, Pyrocontrole[®], an expert in temperature measurement, proposes a varied range of temperature measuring and monitoring instruments.

