

## TEMPERATURE SENSOR DESIGNERS



# PYROCONTROLE

The specialist for temperature measurement in industrial environments



For all thermal process industries, **PYROCONTROLE** designs high-accuracy sensors for severe environments and solutions adapted to meet their temperature measurement and control requirements.

A wide range of sensors and industrial process expertise built up over many years make **PYROCONTROLE** the ideal partner for the industries such as the nuclear sector, petrochemicals, glassmaking, metallurgy, etc.

## PYROCONTROLE's Advantages



### PROXIMITY

Present in many countries worldwide through its sales teams and its network of specialist agents, **PYROCONTROLE** stays close to your concerns.

Its temperature measurement and process control engineers inspect your installations in order to understand your needs and help you draft your technical specifications.



### PERFORMANCE

Alongside its R&D team with its industrial pyrometry expertise, **PYROCONTROLE** also has specialists in the regulations governing the Nuclear Industry.

Thanks to its long experience, **PYROCONTROLE** is capable of offering proven solutions adapted to handle your constraints. For the most restrictive environments, we propose to qualify prototypes according to the standards applied.



### CUSTOMIZATION

**PYROCONTROLE** designs new sensors every day. Our teams' extensive experience helps us to ensure that these new products comply with the severest requirements (temperature measurement range, withstand at very high pressures, explosive atmospheres, etc.).

**PYROCONTROLE** also offers the possibility of adjusting your supervision instruments (HMI) to suit your needs in terms of process control.



### LONG-TERM SUPPORT

With over 70 years' experience in pyrometry and 20 years in industrial process control, **PYROCONTROLE** provides incomparable continuity of service. We now also export our know-how to Africa, Latin America, the Middle East and Asia.

As part of the Chauvin Arnoux Group since 1997, **PYROCONTROLE** benefits from the support of a Group specialized in instrumentation and acknowledged worldwide.



# Our professions



## PYROMETRY

Drawing on more than 70 years' experience, PYROCONTROLE mainly designs temperature sensors for cutting-edge industries such as nuclear power, chemicals, petrochemicals, glassmaking, metallurgy, cement manufacturing and transport.



## INSTRUMENTATION

Any industrial thermal manufacturing process requires the implementation of measuring instruments and solutions to supervise and control the temperature and power.

The ranges of controllers, data recorders, power controllers and automatic control interfaces ensure that your processes function correctly.



## METROLOGY

Equipped with a COFRAC-accredited metrology laboratory, Pyrocontrol provides calibration services for temperature sensors and measuring instruments.

# Our key sectors



## Chemicals & petrochemicals

- **Explosive atmospheres**
- ATEX 94/9/ CE directives
- EN 60079-11
- **Pressurized equipment:**
  - Bored wells
  - Temperature measurement assemblies
  - PED 97/23/CE



## Nuclear power

- Sensors qualified for primary circuits
- Safety in extreme conditions (irradiation, earthquake, high temperatures and pressures)
- Quality documentation
- Traceability
- Reference documents / codes



## Glassmaking & ceramics

- Reduction of energy spending on processes
- Safety of melting furnaces and power control
- Ceramic temperature assemblies
- Dome and bottom thermocouples
- In-situ calibration

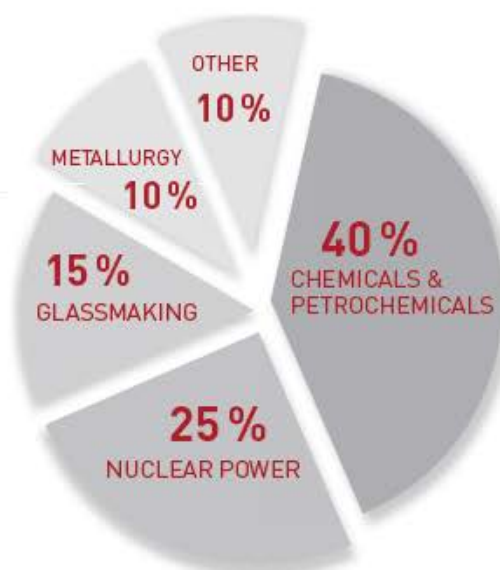


## Industries

- Iron & steel
- Health
- Agri-food
- Transport
- Aviation: AMS 27

# A few figures

- 80 staff
- 10 million euros in sales revenues
- Sales coverage of 70 countries





## About the CHAUVIN ARNOUX Group



Founded in 1893 by Raphaël Chauvin and René Arnoux, CHAUVIN ARNOUX is an expert in the measurement of electrical and physical quantities in the industrial and tertiary sectors.

Total control of product design and manufacturing in-house enables the Group to innovate constantly and to propose a very broad product and service offering meeting all its customers' needs.

The Group's quality policy ensures that the products delivered comply with its commitments and with both the national and international standards in terms of metrology, the environment and user safety.

### A few figures



**CHAUVIN ARNOUX is a major force on the measurement market in France and internationally.**

### Locations

#### 7 production sites

3 in Normandy (France)  
1 in Lyon (France)  
1 in Milan (Italy)  
1 in Dover (USA)  
1 in Shanghai (China)

#### 10 subsidiaries

Germany  
Austria  
China  
Spain  
Italy  
Lebanon  
Sweden  
Switzerland  
United Kingdom  
United States



## PYROCONTROLE

a CHAUVIN ARNOUX Group company

**CHAUVIN ARNOUX** draws on its Chauvin Arnoux® and Metrix® brands to offer a broad range of measuring instruments. The offering covers electrical measurement (testers, multimeters and current clamps), electrical safety testing, wattmeters and electrical network quality analysers. Its expertise also extends to oscilloscopes, instruments for testing electronic devices and measurement of physical quantities.

**Temperatures in industrial processes**

**Portable test and measurement instrumentation**



**Metering, measurement and energy performance**



**Metrology and regulatory testing**

**ENERDIS** designs measuring instruments for electrical switchboards and develops smart systems for electricity metering and control of energy flows in order to keep consumption under control.

**MANUMESURE** is the Chauvin Arnoux Group company specialized in metrology and regulatory testing. Its offering is structured around three major market segments: Industry, the Environment and Health.



# PYROCONTROLE

Our know-how

**Qualified temperature measurement** for refineries and chemical plants

## OUR EXPERTISE

PYROCONTROLE benefits from **acknowledged expertise** in the design of **temperature sensors suitable for sensitive industrial environments**: explosive atmospheres, high pressures, severe operating constraints.

**Designed on the basis of the customer's specifications**, these sensors can withstand any thermal stresses (fluid temperatures) or mechanical stresses (pressure, speed, weight) in accordance with the **ATEX**, **IECEX**, **Pressurized Equipment (PED)** or **SIL (Safety Integrity Level) Directives**.



## OUR OFFERING

- Measurement of flame, furnace or ambient temperatures: general-purpose temperature assemblies.
- Direct measurement in storage tanks: bimetallic or gas expansion thermometers, with digital display or dial.
- Contact measurement of surface temperatures: non-intrusive skin temperature sensors with in-situ method (the sensitive part of the sensor can be changed without detaching the support).
- Multi-temperature mapping: multi-point temperature assemblies for reactors and fractionating towers.
- Process temperature assemblies with thermowells fitted with HART transmitters.
- High-pressure temperature sensors for pressures up to 5,000 bars with a response time of less than one second.
- Bearing temperature sensors (motor/pump) to prevent overheating inside the pumps and motors.

**Temperature sensors and controllers** for glassmaking, metallurgy and cement manufacturing

## OUR EXPERTISE

PYROCONTROLE's sensors and controllers offering is based on long experience and thorough knowledge of the manufacturing processes in metallurgy and glassmaking: hollow ware, float glass and the specific heat treatments (bent, tempered or laminated glass), glass wool and glass fibre and ceramic or alumina protective materials. PYROCONTROLE's products are also used in the cement industry: in the mill, the preheating cyclone, waste gas chimneys, etc.



## OUR SENSORS OFFERING

- Measurement in the melting furnaces, chambers and working basins at the beginning of the glassmaking process: dome temperature assemblies.
- Temperature monitoring in the manufacturing process: accurate, resistant sole temperature assemblies inserted in the refractory of the furnace.
- Cadid temperature assemblies for floats, lehrs and heat treatments.
- Temperature mapping to monitor the viscosity of the glass flow: immersed multi-level feeder temperature assemblies, siphons and spouts.
- High-temperature sensors capable of withstanding nearly 1,800 °C equipped with protective sheaths made of steel, chrome or heat-resisting steel to withstand mechanical and chemical shocks.

## OUR POWER CONTROLLERS OFFERING

- Single or three-phase, from 16 A to 2,900 A: **THYRITOP power controllers** offer accuracy, flexibility and rugged design, particularly in furnaces and glassmaking processes.

**Qualified sensors** for nuclear power plants

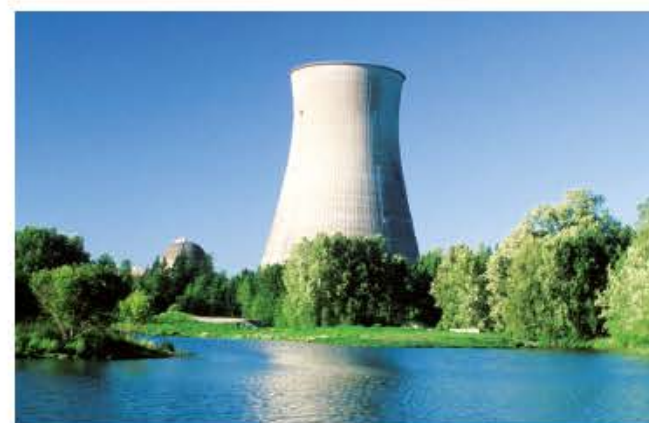
## OUR EXPERTISE

Alongside energy suppliers, operators, manufacturers, R&D teams, research institutes and nuclear safety authorities, PYROCONTROLE **develops unique expertise** backed by complete mastery of the qualification, production and testing processes.

At each strategic point in a nuclear installation, from the reactor building through the auxiliary buildings to the machine sets, **the sensors designed by PYROCONTROLE are qualified to withstand the most extreme conditions** in terms of irradiation, earthquake, temperature and pressure.

## OUR OFFERING

- For the REP 900 MW, 1300 MW and N4 Series and for the third-generation EPR power plants: temperature sensors qualified as K1, K2, K3 and NC.
- Accurate, instantaneous temperature measurements in the primary loop: fast-response sensors (DT034 / T038).
- Non-intrusive duct temperature measurement: surface sensors fitted on safety-critical systems such as the safety valves (DT115).
- Pool-bottom temperature measurement: IRWST and BK pool sensors on EPR Series protected by thermowells (DT114).
- Accurate temperature measurement from the pressurizer to the machine sets: multi-purpose sensors with standard response times (DT108 / DT088).
- Monitoring of overheating inside bearings of the primary and secondary pumps, the safety pumps and the lift pumps: motor or pump-bearing sensors (DT110/DT112).



**Sensors and temperature control solutions** for transport industries

## RAIL

Benefiting from its long experience in the transport sector, PYROCONTROLE's temperature sensors are used for multiple applications in the rolling stock, such as in the train batteries, the air-conditioning systems, gear motors and axle reducers, as well as in rail equipment manufacturing processes.



## AVIATION

A long-established supplier of the aviation industry, PYROCONTROLE has developed an offering dedicated to aviation specifications and standards (AMS 2750). Our products provide guaranteed performance and rugged design for all curing or specific heat-treatment processes.





# PYROCONTROLE

A complete offering with a solution for every requirement

With its thorough mastery of the thermal process chain, **PYROCONTROLE** proposes relevant, reliable solutions to meet each customer's needs and is constantly extending its offering by launching new products.

## TEMPERATURE MEASUREMENT

- From standardized sensors to tailored sensors operating from  $-268^{\circ}\text{C}$  to  $+1,800^{\circ}\text{C}$ .
- Temperature sensors: industrial thermocouples, temperature measurement assemblies, specific sensors, Pt100, etc



## SIGNAL PROCESSING

- C. A 3420 universal transmitter to condition all temperature and process signals.



## TEMPERATURE CONTROL

- STATOP® temperature controllers: analogue or digital, various formats, fixed or universal inputs, etc.



## SUPERVISION

- CPS Touch® range of touch Human-Machine Interfaces from 4.3 to 15 inches for intuitive, high-performance industrial supervision.
- PDM input/output modules: a comprehensive range of low-cost, modulatable converters.
- Pyrotracer® "plug and play" paperless recorders, making the data available instantaneously for immediate processing.



## POWER CONTROL

- Thyritop range of single or three-phase thyristor power controllers from 16 A to 2,900 A for resistive and inductive loads.
- Training and commissioning services: "Control process".



TOTAL  
CONTROL OF  
THE THERMAL  
PROCESS  
CHAIN



# PYROCONTROLE

Metrology Expertise



## Our skills at your disposal:

When used regularly, the metrological accuracy of even the best measuring instrument deteriorates. To check their performance and prevent any deterioration of measurement quality, calibration is essential. With its total mastery of the thermal process chain, **PYROCONTROLE** proposes a set of temperature sensor calibration services for all industrial sectors

## CALIBRATION SERVICE

**PYROCONTROLE** possesses its own **COFRAC**-accredited temperature metrology laboratory (accreditation no. 2-1385), allowing it to offer calibration of temperature sensors, whatever their brand.

Equipped with measuring instruments linked to the national and international standards, it performs high-quality calibration, in compliance with the applicable standards, from  $-40\text{ }^{\circ}\text{C}$  to  $+450\text{ }^{\circ}\text{C}$  for Pt100 probes and from  $-40\text{ }^{\circ}\text{C}$  to  $+1,550\text{ }^{\circ}\text{C}$  for thermocouples.

Two levels of service are available, depending on the requirements:



- Calibration with provision of a report for reliable measurements.
- COFRAC-accredited calibration for quality assurance purposes.

## CALIBRATION SYSTEMS AND EQUIPMENT

For industrial companies seeking to manage the temperature metrology of their measuring instruments in-house, **PYROCONTROLE** proposes reliable, high-performance calibration systems and equipment.

### REFERENCE-STANDARD TEMPERATURE SENSORS

Intended for industry and laboratories, these standard sensors are used for calibration by comparison. Depending on the required application, **PYROCONTROLE** manufactures both working standards and reference standards.

### FIXED-POINT CELLS

**PYROCONTROLE** offers a broad selection of EIT-90 and water triple-point fixed-point cells in miniature and traditional formats. Before delivery, each fixed-point cell is checked at the French National Metrology and Test Laboratory (LNE).

### FURNACES

- Fixed or portable sensor-calibration ovens offering an ideal solution for calibration by comparison from  $+50\text{ }^{\circ}\text{C}$  to  $+1,200\text{ }^{\circ}\text{C}$ .
- Holding ovens for fixed-point cells, available for medium and high temperatures.

### SURFACAL, A SOLUTION FOR SURFACE-TEMPERATURE CALIBRATION

Instrument covering the temperature range from  $+35\text{ }^{\circ}\text{C}$  to  $+300\text{ }^{\circ}\text{C}$ . Calibration method manufactured under licence from the French National Metrology and Test Laboratory (LNE).

### SENSOR WITH IN-SITU CALIBRATION

This patented in-situ calibration method developed by **PYROCONTROLE**'s engineers can be used to check the temperature without dismantling the sensor and without halting the process. This helps to save energy and boost productivity without losing quality, while also allowing calibration of the whole line.





# PYROCONTROLE

## COMMITTED TO QUALITY

PYROCONTROLE is a socially-responsible company with extensive expertise in pyrometry which has launched an extremely demanding quality programme. From design via production through to delivery of the finished product, PYROCONTROLE is committed to achieving the highest level of quality on a day-to-day basis at all levels of its industrial organization:

- qualification and training of the teams,
- traceability of procurement,
- control of the manufacturing process,
- structured documentation,
- recycling of waste precious metals.

PYROCONTROLE is certified ISO 9001 (Quality) and ISO 14001 (Environment).



### MADE IN FRANCE:

All PYROCONTROLE's products are designed and manufactured in France on our industrial site near Lyon. This total integration of production ensures mastery of the production line and the product quality inspections.



### Contact- us:

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Find out more about PYROCONTROLE at:  
**[www.pyrocontrole.com](http://www.pyrocontrole.com)**

The other 3 companies in the Group



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