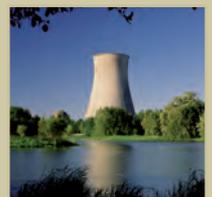
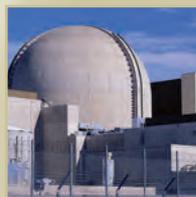


# Temperature **sensors** for **nuclear** power plants

Safety  
reliability  
performance



Measuring your requirements

# CA PYROCONTROLE

## the expertise of a trailblazer

CA Pyrocontrole began manufacturing temperature sensors for the nuclear industry in the late 1970s and has continued to grow ever since.

Alongside the energy suppliers, operators, builders, engineers, research institutes and nuclear safety authorities, CA Pyrocontrole has developed unique expertise, backed by comprehensive mastery of the qualification, production and control processes, acknowledged in France and worldwide.

### Support at every stage of your project

CA Pyrocontrole supports you at every stage of your project, from definition of your requirement for a new installation or modernization through to after-sales support, including engineering and implementation of the qualification programmes.

### An exceptional quality approach

To meet the safety requirements specified by its customers, CA Pyrocontrole has set up a rigorous quality approach specific to this

cutting-edge industry at all levels of its industrial organization:

- qualification and training of its teams,
- traceability of procurement,
- control of the manufacturing processes,
- structured documentation.

### Standards

QN100/QN200/QN300

RCC-E

RCC-M

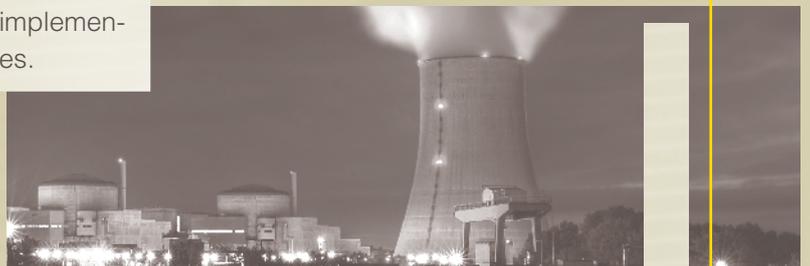
Code ASME

Atex

IEC 60751

ISO 9001

ISO 14001





### **Reliability and performance at the heart of each power plant**

At the strategic points in a nuclear installation – from the reactor building to the machine sets and the auxiliary buildings – our sensors are qualified to withstand the most extreme conditions in terms of radiation, earthquake, temperature and pressure, and enable you to check the temperature very reliably in all circumstances.

### **Operation**

Our K1, K2 and K3 qualified temperature sensors, as well as NC sensors, are installed on the PWR 900 MW, 1300 MW, N4 series in the 3rd generation and HUALONG EPR power plants.

### **French know-how**

CA Pyrocontrôle proposes to meet your temperature measurement needs by contributing its extensive experience, acquired from the development of the very first French nuclear power plants through to the present day.

Equipment machining, assembly and testing are entrusted to experienced, qualified teams in order to guarantee quality and reliability.

### **References**

- EDF
- FRAMATOME
- FRAMATOME JSPM
- GE POWER
- CGNPC
- Man Diesel
- SPX Clyde Union
- Leroy Somer
- LNE
- CNAM-INM
- CEA

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### **Present worldwide**

As part of the Chauvin Arnoux Group, CA Pyrocontrôle is present worldwide via a network of ten subsidiaries and its Export Department.

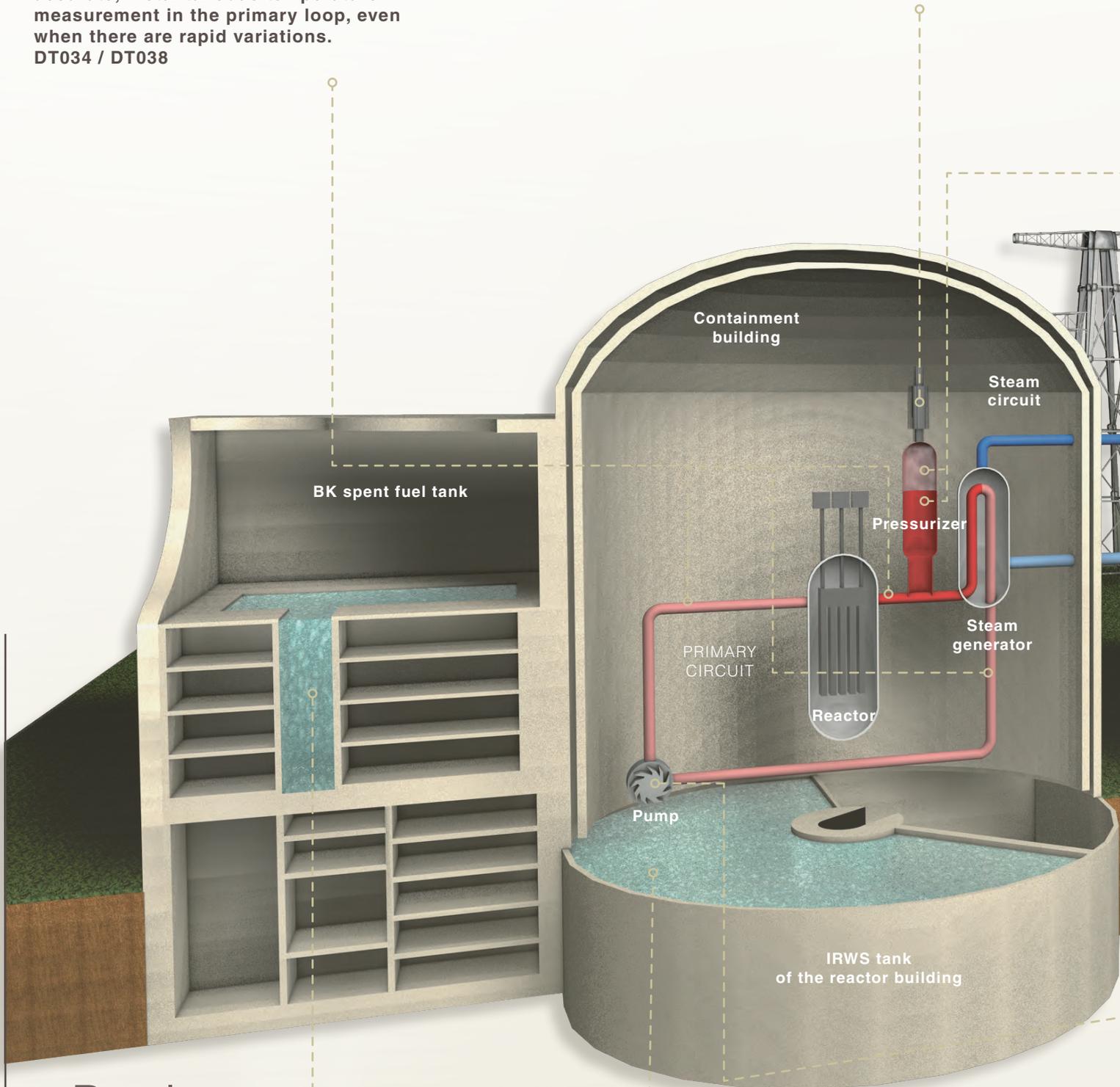
Sales and technical teams based in China enable us to respond quickly to requirements all over Asia, driven by a high-performance strategy.

## Fast-response sensors

Their advanced technology ensures accurate, instantaneous temperature measurement in the primary loop, even when there are rapid variations.  
DT034 / DT038

## Surface sensors

Our surface sensors are fitted on the essential safety systems, such as the safety valves, and measure the duct temperatures (non-intrusively).  
DT115



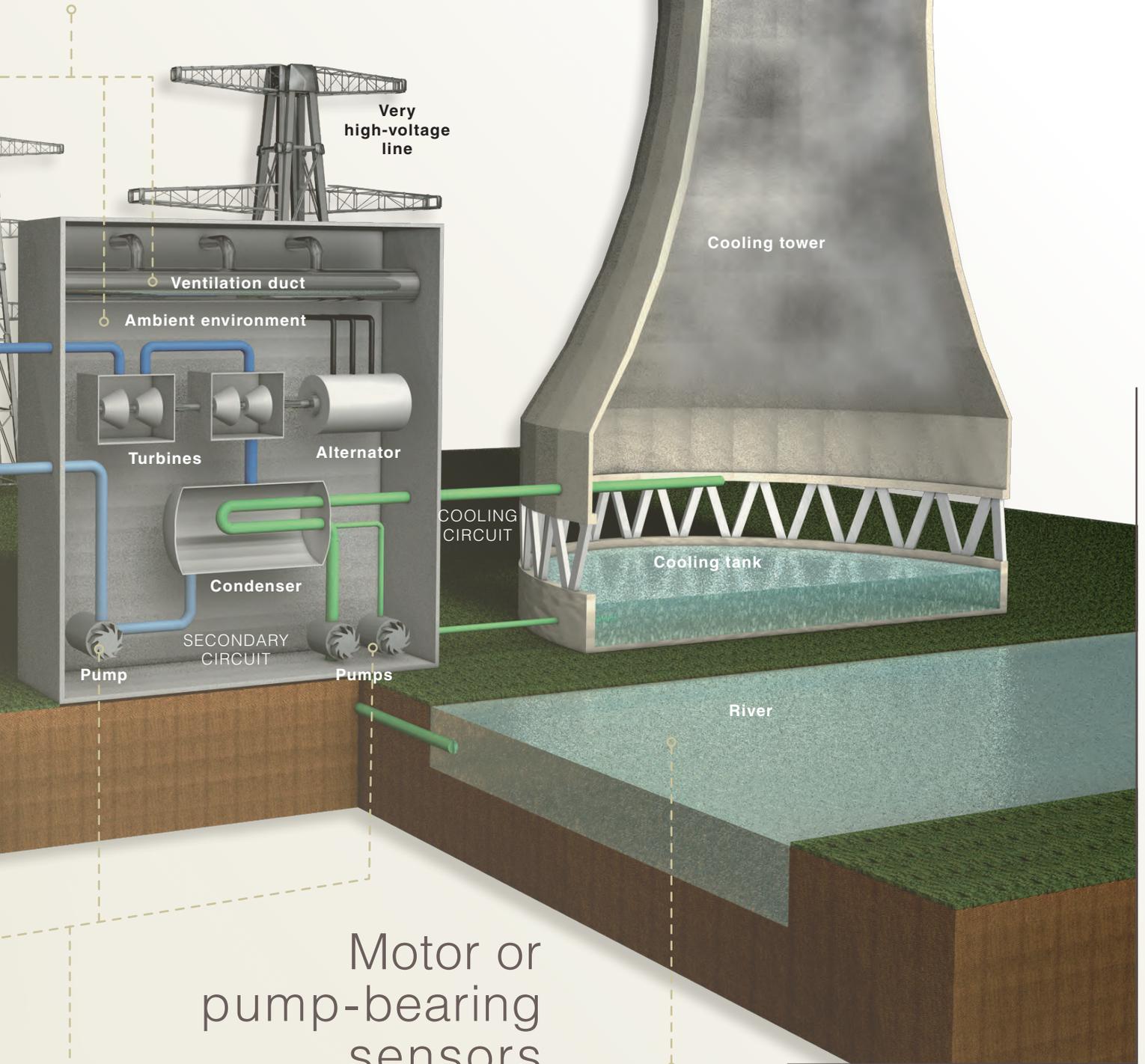
## Pool sensors

Our sensors are installed in the IRWST and BK pools of EPR reactors. They are protected by a thermowell and are used to measure the temperature at the bottom of the pool. DT114

# Sensors with standard response times

Part of a particularly versatile range, these measure the relevant temperatures extremely accurately, from the pressurizer to the machine sets.

DT108 / DT088



Motor or pump-bearing sensors

These are used to monitor heating inside your primary and secondary pump bearings, as well as in your safety pumps and lift pumps. DT110 / DT112

Sensors in river

# Fast-response sensors

## DT034

- Mounted in a thermowell directly on the primary circuit and on the pump seals
- Fast response (< 3.7 sec. in nominal operating conditions)
- Fitted on the N4 and EPR series
- K1 qualification according to RCC-E
- Shielded, single-piece design
- One 4-wire Pt 100 element
- Temperature range: 0 / + 400 °C
- Test pressure: 250 bars

## DT038

- Mounted directly on the primary-circuit bypass
- Fast response (< 1.5 sec. in nominal operating conditions)
- Fitted on the 900 and 1300 MW series
- K1 qualification according to RCC-E
- One 4-wire Pt 100 element or two 4-wire Pt 100 elements
- Temperature range: 0 / + 400 °C



# Sensors with standard response times

## DT088

- Thermowell measurement, ambient measurement, measurement in ventilation ducts or explosive atmospheres
- Fitted on the 900 MW, 1300 MW, N4 and EPR series
- Standard response time (< 120 sec. in nominal operating conditions)
- NC (normal conditions) or K3ad qualification according to RCC-E
- One 4-wire Pt 100 element
- Temperature range: - 50 / + 200 °C (depending on the variant)



## DT108

- Thermowell measurement or surface temperature measurement
- Fitted on the 900 MW, 1300 MW, N4 and EPR series
- Standard response time (< 120 sec. in nominal operating conditions)
- K1 or K2 qualification according to RCC-E
- One 4-wire Pt 100 element
- Temperature range: 0 / + 400 °C (depending on the variant)



# Motor or pump-bearing sensors

## DT110

- Semi-rigid
- Mounted on the primary pump bearings of EPR series
- K2 qualification according to RCC-E
- One 4-wire Pt 100 element
- Temperature range: 0 / + 150 °C

## DT112

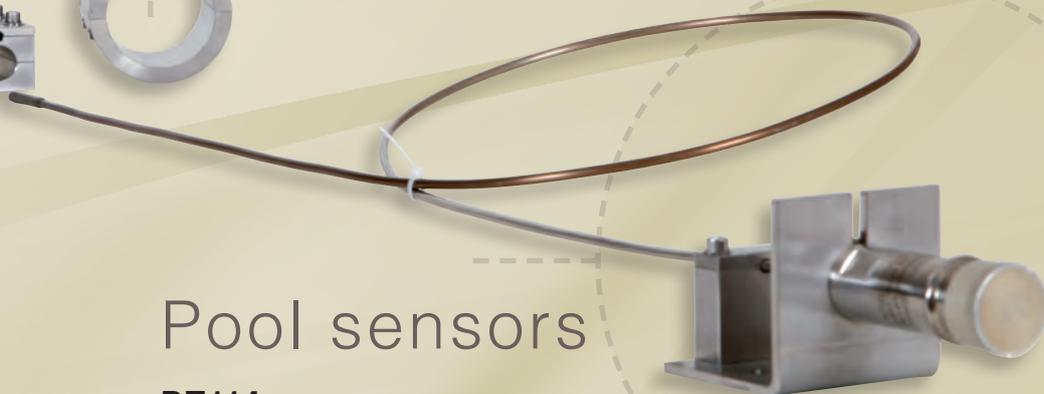
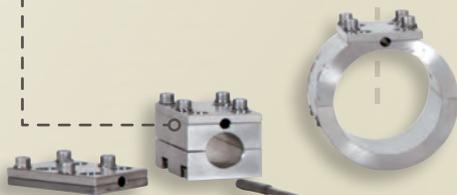
- Mounted on the secondary pump bearings of EPR series
- NC or K3ad qualification according to RCC-E
- One 4-wire Pt 100 element or two 3-wire Pt 100 elements
- Temperature range: 0 / + 150 °C



# Surface sensors

## DT115

- Semi-rigid
- Mounted on the valves of the pressurizer or on the outer surface of ducts
- K2 qualification according to RCC-E
- One 4-wire Pt 100 element
- Temperature range: + 35 / + 300 °C



# Pool sensors

## DT114

- Semi-rigid
- Mounted in a flanged thermowell on the IRWT and BK tank of EPR reactors
- Length: 7500 mm or 9000 mm
- K1 or K3 ad qualification according to RCC-E
- One 4-wire Pt 100 element
- Temperature range: 0 / + 160 °C

With its six expert measurement companies - Chauvin Arnoux, CA Manumasure, CA Pyrocontrole, CA Energy, CA Indatech, CA Spectralys - the Chauvin Arnoux Group is positioned among the European leaders in electrical measurement, focusing in particular on energy performance, industrial thermometry and metrological services.

The arrival of CA Pyrocontrole, which it took over in 1997, enabled the Chauvin Arnoux Group to become an expert in the design and manufacture of industrial temperature measurement and control systems.

From made-to-measure solutions to standard products manufactured in series, CA Pyrocontrole offers suitable responses covering each customer's specific needs, as well as all general temperature measurement issues.

Its commitment to thorough knowledge of the whole thermal process chain makes it an ideal partner for particularly demanding industries: nuclear power, chemicals, petrochemicals, steel, automotive industry, aviation, aerospace, agri-food industry, railways, electronics, pharmacy, etc.

To maintain its technological leadership, the company benefits from investment by the Chauvin Arnoux Group, which devotes 11 % of its turnover to research and development every year.

CA Pyrocontrole is backed by a solid technical a sales team in France and is also present internationally via the Chauvin Arnoux Group's ten subsidiaries in Europe, the USA, the Middle East and China.

Your contact:

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Evidence of CA Pyrocontrole's high-precision expertise is provided by its quality labels, its HAF 604 and ISO 9001 (2008 edition) certification, the Cofrac accreditation of its metrology laboratory (scope available on request) and the qualification of its sensors for the nuclear power industry.

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