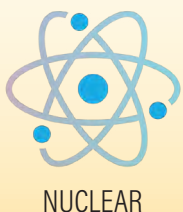


# TEMPERATURE SENSORS FOR NUCLEAR POWER PLANTS



**NUCLEAR**



*Measure up*





### Pyrocontrole, acknowledged know-how for long-term support

Pyrocontrole has been an acknowledged expert in the Nuclear industry for more than 50 years; designing and manufacturing temperature sensors compliance with the demanding standards for this harsh environment.

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

### Reference standards, certifications and accreditations

QN100/QN200/QN300 | RCC-E | RCC-M | Code ASME | IEC 60751 | ISO 9001 | ISO 14001

## SUPPORT AT EVERY STAGE OF YOUR PROJECT

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

## AN EXCEPTIONAL QUALITY APPROACH

To meet the nuclear safety requirements, 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,
- follow-up of suppliers,
- control of the manufacturing processes,
- structured documentation
- fight against CFSI (Counterfeit, Fraudulent and Suspect Items).



**Chauvin Arnoux Energy**, a French company in the Chauvin Arnoux Group, meets the specific needs of the nuclear sector by contributing its experience built up over more than forty years.

From the design phase through to final inspection of the equipment, we entrust the manufacture of our products to our French factories, whose experience and qualification guarantee quality, reliability and durability.

Our flagship ranges of K3-qualified products for nuclear environments: auxiliary relays, analog panel meters and analog transducers.



Visit CA Energy at  
[www.chauvin-arnoux-energy.com](http://www.chauvin-arnoux-energy.com)



+33 1 75 60 10 30

[CAEnergy@chauvin-arnoux.com](mailto:CAEnergy@chauvin-arnoux.com)

## RELIABILITY AND PERFORMANCE AT THE HEART OF THE 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, K3, K3ad and NC qualified temperature sensors are installed on the PWR 900 MW, 1300 MW and N4 series in the 3rd generation and HUALONG EPR power plants.



## FRENCH KNOW-HOW

Pyrocontrole 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.



## PRESENT WORLDWIDE

Pyrocontrole relies on a solid sales and technical team in France and is present worldwide via the Chauvin Arnoux Group's ten international subsidiaries and its Export department.

## REFERENCES

EDF | FRAMATOME | FRAMATOME JEUMONT | NNB | MAN ENERGY SOLUTIONS | CELEROS CLYDE UNION | LEROY SOMER | LNE | CNAM-INM | CEA | SNEF POWER | SYSTEM | MIRION | ACTENIUM | EIFFAGE | SPIE

## QUALITY LABELS

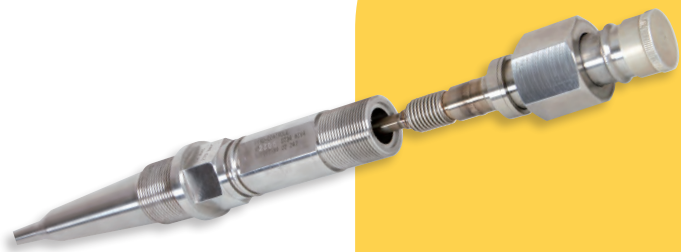
Evidence of Pyrocontrole's high-precision expertise is provided by its quality labels, its HAF 604, ISO 9001 and ISO 140001 certification, the Cofrac accreditation of its metrology laboratory (scope available on request) and the qualification of its sensors for the nuclear power industry.



## 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, EPR and Hualong series
- K1 qualification according to RCC-E
- Shielded, single-piece design
- One 4-wire Pt100 element
- Temperature range: 0 / + 400 °C
- Test pressure: 250 bars
- Rex of 40 years and MTBF of 60 years



## SENSORS WITH STANDARD RESPONSE TIMES

### 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 Pt100 element
- Temperature range: 0 / + 400 °C (depending on the variant)



### DT088

- Thermowell measurement, ambient measurement, measurement in ventilation ducts or explosive atmospheres
- Concrete tank
- 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 Pt100 element
- Temperature range: - 50 / + 200 °C (depending on the variant)





# Qualified temperature sensors

## FAST-RESPONSE SENSORS

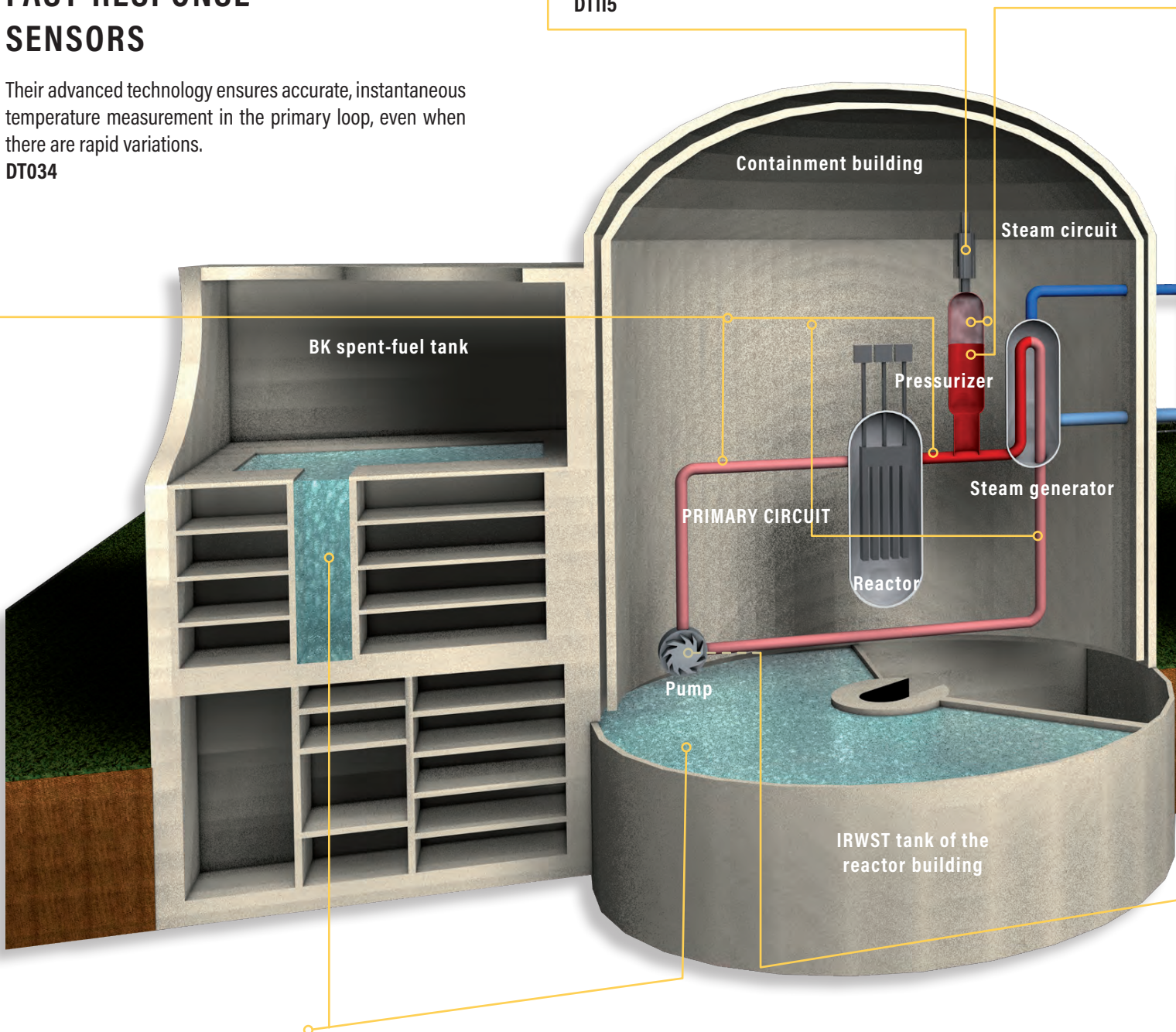
Their advanced technology ensures accurate, instantaneous temperature measurement in the primary loop, even when there are rapid variations.

**DT034**

## 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 tanks of EPR reactors. They are protected by a thermowell and are used to measure the temperature at the bottom of the pool.

**DT114**

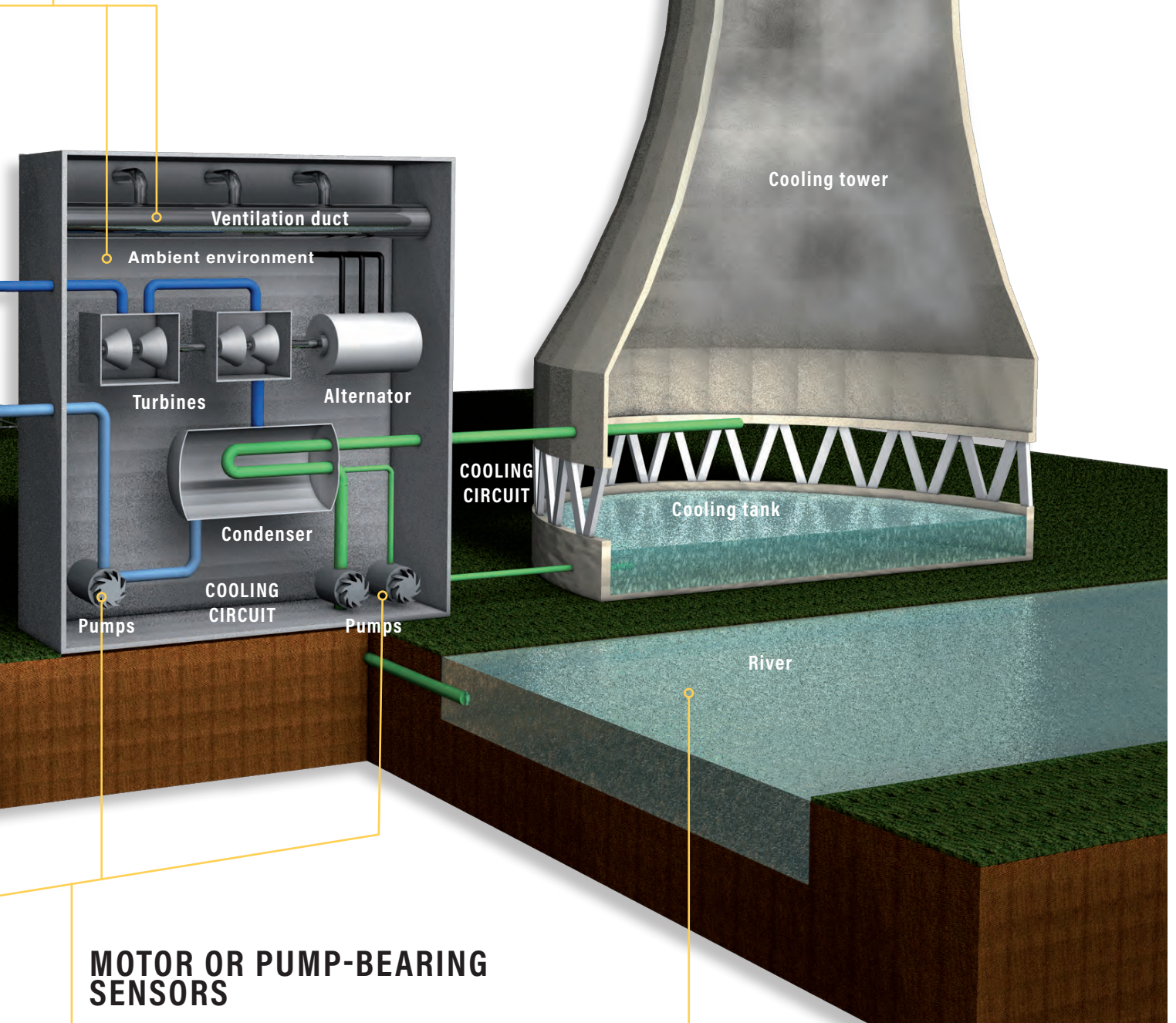


# for pressurized water reactors

## 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

## **MOTOR OR PUMP-BEARING SENSORS**

### **DT110**

- Semi-rigid
- Mounted on the primary pump bearings of EPR reactors
- K1 qualification according to RCC-E
- One 4-wire Pt100 element
- Temperature range: 0 / + 150 °C

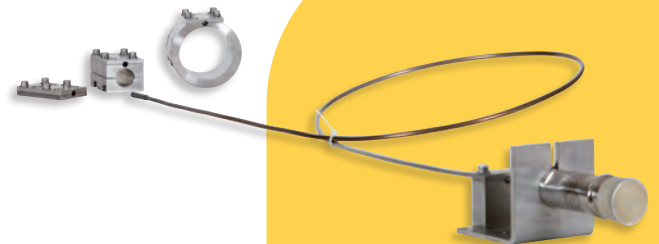
### **DT112**

- Mounted on the secondary pump bearings of EPR reactors
- NC or K3ad qualification according to RCC-E
- One 4-wire Pt100 element or two 3-wire Pt100 elements
- Temperature range: 0 / + 150 °C

## **SURFACE SENSORS**

### **DT115**

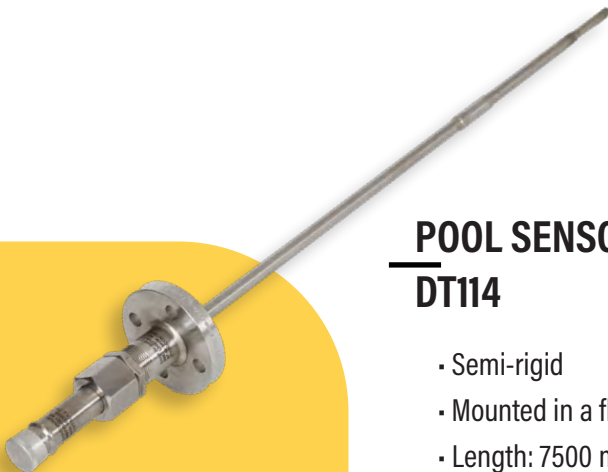
- Semi-rigid
- Mounted on the valves of the pressurizer or on the outer surface of ducts
- K2 qualification according to RCC-E
- One 4-wire Pt100 element
- Temperature range: + 35 / + 300 °C



## **POOL SENSORS**

### **DT114**

- Semi-rigid
- Mounted in a flanged thermowell on the IRWST and BK tanks of EPR reactors
- Length: 7500 mm or 9000 mm
- K1 or K3ad qualification according to RCC-E
- One 4-wire Pt100 element
- Temperature range: 0 / + 160 °C



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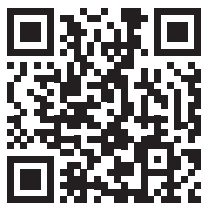
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