

framatome

QUALIFIED TEMPERATURE SENSORS

Field instrumentation temperature sensors qualified to different international standards and levels

Both new build projects and operating fleets require reliable qualified temperature sensors for mounting in pipes or as ambient sensors

Challenge

The availability of temperature sensors is more and more endangered by the risk of suppliers stepping out of nuclear business and occasionally by sensor quality issues resulting in qualification problems. The long-term supply of such sensors is then at risk.

Solution

Framatome secures the supply of high-quality qualified field instrumentation temperature sensors through assuming direct product ownership and responsibility. The design considers Framatome's extensive experience both in applying and qualifying such sensors. Framatome has performed the applicable qualification program and manufactures the sensors in close cooperation with well-established partners.

The sensors feature measurement principles of either Pt100, thermocouples or combining both in one single sensor. The sensors and connectors have been optimized for the ambient conditions of the highest applicable levels.

The current qualification complies with KTA and IEC/IEEE (mild and harsh). Qualification according RCC-E K3 ad and B3000-TAS will be available shortly. Additionally, Framatome provides the sensors in an industrial-grade variant.

Framatome's temperature sensors are offered as spare and replacement parts for power plant operators and are available for field instrumentation projects supporting new builds of all reactor types.

Additionally, tailor-made designs can be engineered and qualified.



Selection of different temperature sensors types (pipe-mounted on top, ambient on bottom) with various accessories

Customer benefits

- Optimized applicability of different model types through broad coverage of international qualification levels and standards.
- Longevity by highest product quality and qualification levels supported by long-term design and qualification expertise.
- Long-term availability and support capabilities through Framatome's product ownership.

Your performance
is our everyday **commitment**

Technical information

Available Sensors Types:

- PTX1: Pt100 sensor for pipes
- PTX2: Diverse Pt100 sensor for pipes
- PTX3: Pt100 sensor for ambient temperature measurement
- PTX4: Double Pt100 sensors for pipes
- THX1: Thermocouple ("TC") type "K" sensor for pipes
- THX2: TC type "K" sensor for surface measurements
- COX1: COMBI sensor combining one Pt100 and two TC type "K" for pipes (combining the fast response of TC and the precision of Pt100)
- Specialty designs upon request

Qualification Categories:

- KTA 3505 (harsh)
- IEC/IEEE 60780-323 (harsh)
- RCC-E K3 ad and B3000-TAS (available shortly)
- NQ (industrial norm ISO 9001)

Available Accessories:

- neck pipes, thermowell, protective wall mount for PTX3

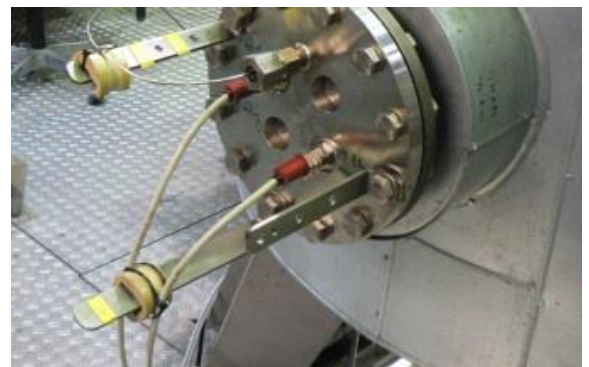
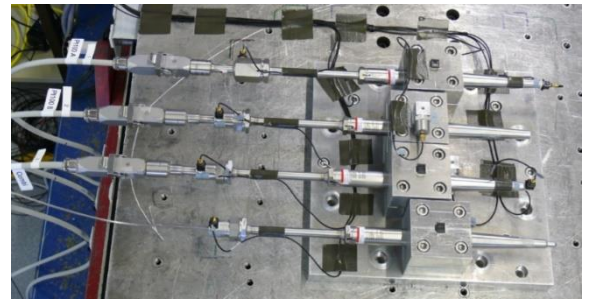
Highlights

Design:

- Application of high accuracy sensor types
- Reduced masses for increased robustness against seismic events and vibration
- Industrial design specifically optimized for nuclear safety applications

100% test for each safety sensor:

- Helium test
- 2-3 times insulation testing (depending on product type)
- Calibration of 3 temperature points
- EN 10204, 3.1 material certificates



Comprehensive qualification activities successfully performed

Main sensor characteristics

- Sensor tip diameter: 6 mm or 8 mm (Pt100); 3.2 mm (COMBI, TC)
- Customizable sensor lengths
- Measurement range: -50°C up to 400°C
- Accuracy class: Cat. A (Pt100) / Class 1 (TC)
- Response time: down to 5s t50 (Pt100); 2s t50 (TC)
- Environment conditions:
 - Ambient temperature up to 75°C
 - Irradiation up to 300kGy (operational + accidental)
 - Vibration / Seismic:
 - Operational vibration up to 500Hz with 1g
 - DBE 7.5g (5 x OBE 3.75g / 1 x SSE 7.5g)
 - APC 7.5g
 - LOCA (1 hour for 160°C saturated steam)
 - Post-LOCA operation proof

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