+ CALDON LEFM 2010RCT System

Reactor Coolant Average Temperature Meter

The CALDON® LEFM 2010 RCT provides accurate measurement of Reactor Coolant System (RCS) bulk average temperatures. Two transducer fixtures with transducers (six for the hot leg and four for the cold leg) are mounted externally to the existing piping.

This eliminates any need for troublesome RTD bypass loops or alteration of existing piping and saves the expensive analyses required for changes in plant design. The fixtures precisely locate the transducers on the hot and cold leg pipe surfaces to form acoustic paths. The transit times or acoustic pulses traveling between the transducer pairs are used, with the pipe dimensions and the acoustic properties of water, to calculate the fluid bulk average temperature.

The CALDON LEFM 2010RCT provides a much more accurate and reliable measurement of the bulk average temperature than can be obtained from a single-point RTD. Temperature stratification in hot legs can cause biases up to ±3°F (±1.66°C) in conventional RTD measurement, and increased uncertainty in the differential between the hot and cold leg temperatures. The higher accuracy of the LEFM 2010RCT reduces the RCS differential temperature uncertainty to ±1°F (±0.55°C). Elimination of the RTD biases provides more margin between the calculated RCS flow and minimum flows required by the technical specification. The CALDON LEFM 2010RCT System consists of two electronic units, two fixtures, ten transducers, and ten cables per loop (1 hot leg and 1 cold leg). The electronic units display the loop temperatures and system status. Analog (4-20 mA) and serial (RS-485) outputs are provided for data acquisition and interface to plant equipment. Optional configurations are available for hot or cold leg only measurements.

The CALDON LEFM 2010RCT is a highly reliable system that requires little maintenance and provides preventative diagnostic indicators. The system has continuous on-line testing that verifies that operation is within the specified accuracy envelope. Any detected error will generate a message on the display of the electronic unit, as well as indication via the analog and serial outputs.

+ Accurately measures average bulk temperature in reactor coolant hot and cold legs
+ Reduces RCS ΔT uncertainty to ±1°F (±0.55°C)
+ External system installed completely outside the piping
+ Immune to errors from temperature stratification in hot leg
+ No periodic recalibration required
+ Fewer spurious trips
+ More margin to minimum RCS flow calculation

System Accuracy	
Hot/Cold Leg Temperatures	±1°F (±0.55°C)
Electronics Unit	
Storage Temperature	-65°F to 165°F
	(-53°C to 73.9°C)
Ambient Temperature	0°F to 120°F
	(-17.8°C to 48.9°C)
Storage and operating humidity, %	0% to 95% (non-condensing)
Outputs	0-5V or 0-12V pulse output Up to four (4) 4-20mA analog outputs Two (2) Modbus RS-485 outputs
Pipe Mounted Hardware	
Process Temperature	Hot Leg: 650°F (343°C) Maximum
	Cold Leg: 600°F (315°C) Maximum
Process Pressure	No Limit (External System)
Power Supply	120 VAC (60 Hz) or 240 VAC (50/60 Hz)
Power Surges	Up to 1,200 V for < 50 µs

Services

Sensia provides the following services with every CALDON LEFM RCT System:

+ On-site installation of fixtures and transducers
+ System commissioning
+ Collection of baseline design data
+ Customer training
+ Field testing
+ Uncertainty analysis in accordance with ASME PTC 19.1