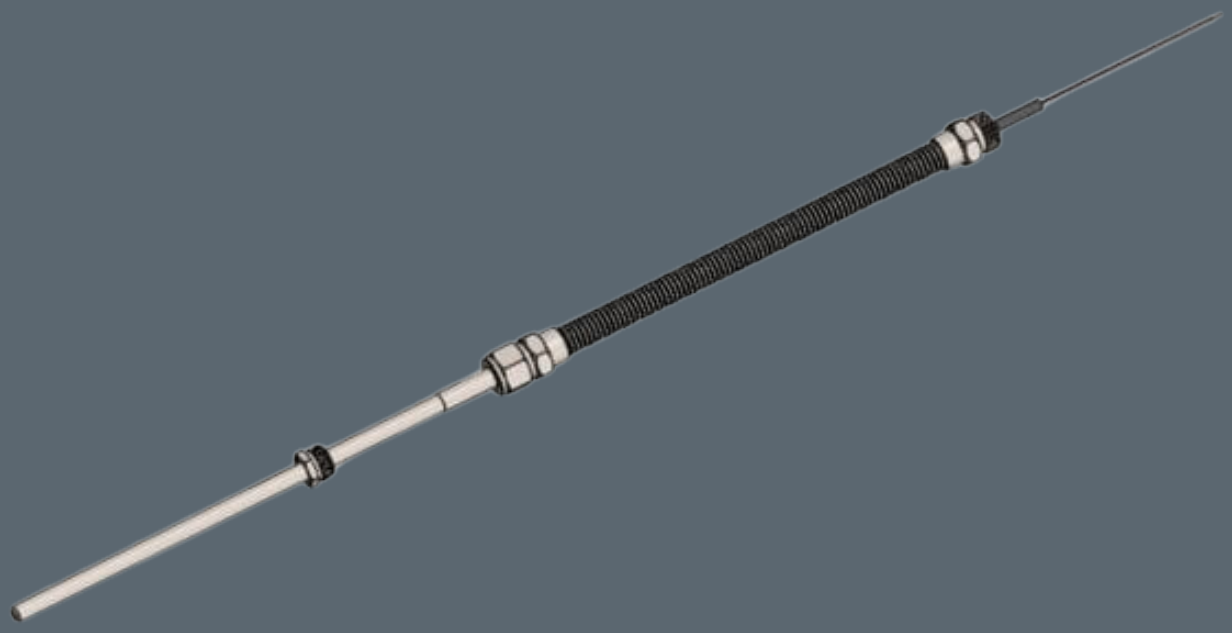
N9001 wide range thermowell mounted RTD assembly



Key features

- AAA

Overview

The model N9001 series RTD is designed for use as a wide range thermowell mounted sensor in the primary coolant loop of PWR (Pressurized Water Reactor) nuclear generating facilities. The RTD is qualified per IEEE 323-1974/1983 and IEEE 344-1975/1987 for use in Class 1E harsh environments, but can also be used for non-safety applications.

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Technical specification

Feature	Description
Maximum operating temperature	0°F to 750°F (-18°C to 400°C)
Element type	Platinum (wire-wound)
Accuracy/interchangeability	IEC 60751 Class B is standard. IEC 60751 Class A is available upon request. Other special accuracies are also available.
Calibration points	Standard calibration points are 32°, 212° and 554°F (0°, 100° and 290°C)
Drift/stability	Sensor drift is less than ±0.2°F (±0.11°C) shift per year up to a maximum of 1.0°F (0.56°C) for the qualified life. These values were determined based on pre and post qualification test data.
Insulation resistance	At room temperature and dry external surfaces, the insulation resistance between any wire and the sensor case will be at least 100 MΩ with 100 VDC applied for a minimum of 30 seconds prior to measurement.
Response time	The response time for the bare sensor is approximately 9 seconds or less for the standard version with 3/8" diameter sheath as verified by a plunge test in accordance with ASTM E644 for a 63.2% of a step change from room temperature air to water flowing transverse to the assembly at 3 ft/s (~1m/s) at 180°F. Response time will vary depending upon final configuration, fit and actual process conditions. Time response with a thermowell will vary depending upon actual thermowell design, but is normally about 30 seconds.
Operating current	Standard operating current is 1 to 4 mA continuous. A continuous current of 20 mA (RMS) or less will not damage the sensor. A short duration or pulsed current of 40 mA maximum will not damage the sensor.

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Technical specification

Feature	Description
Self-heating error	In 154°F (68°C) water flowing transverse to the sensor sheath at 3 ft/s (~1 m/s), with a sheath diameter of 0.25 inches (6.35 mm), the RTD is capable of dissipating 10 mW/°C without causing the indicated temperature to rise more than 0.36°F (0.2°C).
Qualification	RTD assemblies are qualified to Class 1E requirements of IEEE 323-1974/1983 and IEEE 344-1975/1987. Original qualification reports are 548-8854-001 and 06-8680-003.
Quality standards	RTD assemblies are supplied in accordance with Ultra Electronics Energy QA/QC Quality Assurance & Control Manual 100-1 which meets the requirements of 10 CFR 50 Appendix B, 10 CFR Part 21, ISO 9001, ASME NQA-1 and ANSI N45.2.
Sheath material	Stainless steel
External leadwire material	Stranded Constantan with polyolefin
Sheath insulation material	MgO
Internal leadwire material	Solid Constantan
Mounting connections	The RTD can be directly mounted to the thermowell via the swage tube fitting sized for 3/8" connections. Consult the factory if custom mounting connections are required.
Shipping weight	Approximately 4 lbs when the assembly is supplied with 20 feet of flexible armor/tubing. Actual weight will depend upon final configuration supplied.
Identification tags	A S.S. identification tag is attached to the sheath or SS armor/tubing using S.S. wire rope and crimp sleeves. Custom configured tagging is available upon request.
Storage requirements	RTDs to be stored in accordance with ANSI N45.2 Level B or better.

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Technical specification

Model number configurator

N9001	Model N9001 Wide Range RTD Assembly

Code	Element Style
S	Single Platinum Element, 4 Wire Configuration
D	Dual Platinum Element, 6 Wire Configuration
E	Dual Platinum Element, 8 Wire Configuration
X	Other

Code	Resistance at 32°F (0°C)
1	100 Ohms
2	200 Ohms

Code	Temperature Coefficient (Ohms/Ohm/°C)
A	0.003902
B	0.00385055

Code	Flexible Armor/Tubing Length
XXX	Length in Inches

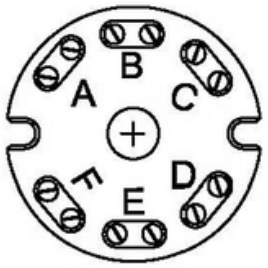
Code	Lead Wire Length
YY	Length in Inches

N9001	S	-	1	B	-	60	-	12

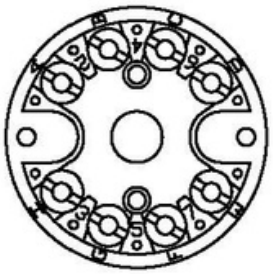
Technical specification

Wiring diagram

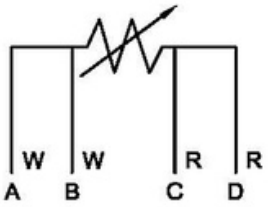
6-WIRE
TERMINAL BLOCK



8-WIRE
TERMINAL BLOCK

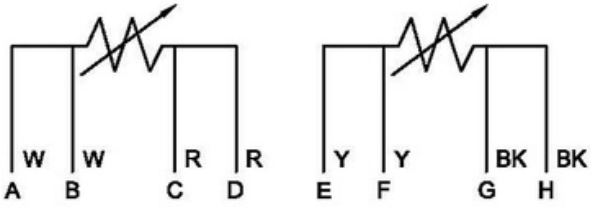


SINGLE 4-WIRE
WIRING DIAGRAM



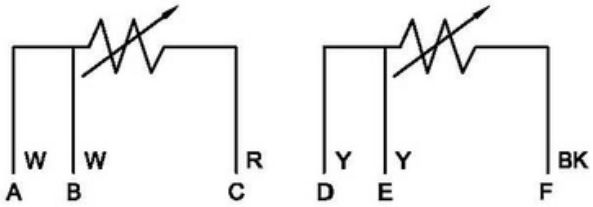
(FOR A 3-WIRE CONNECTION,
DO NOT CONNECT "D")

DUAL 4-WIRE
WIRING DIAGRAM



(FOR A 3-WIRE CONNECTION,
DO NOT CONNECT "D" OR "H")

DUAL 6-WIRE
WIRING DIAGRAM



FAQs and accessories

Can I specify my own required calibration points?

Yes. Calibration at ice point (32°F/0°C) and boiling point (212°F/100°C) are required to determine the appropriate Alpha temperature coefficient. Up to 4 additional calibration points at higher temperatures can be specified. Data from only 3 of the actual calibration points (32°F/0°C, 212°F/100°C and a select third point) will be used to generate a custom temperature versus resistance table using the Callendar-Van Dusen equation.

Can the N9001 RTD be ordered to meet special accuracy needs?

Yes. Please contact Nuclear Sales with the specific requirements so we may determine if we can meet your needs.

Can the N9001 RTD be supplied with a QDC?

Yes. The RTD can be supplied with an integral Quick Disconnect Electrical Connector (QDC). See the QDC model configurator included with the model 611, 615 or N9004 for reference. Consult the Nuclear Sales for specific requirements and instructions on how to order.

Can the N9001 be supplied with ring or spade lugs?

Yes. Please specify the requirement when requesting a quotation from Nuclear Sales.

Can I use the N9001 without the S.S. flexible S.S. armor/tubing?

The cable provided with the N9001 must be installed in sealed conduit to retain qualification for functionality during and after LOCA (Loss of Coolant Accident). If the RTD is not required to function during or after a LOCA event, the flexible armor/tubing can be deleted. If the plant prefers to use it's own sealed conduit to protect the RTD cabling, then the flexible armor/tubing can be removed or deleted from the assembly.

Can the N9001 RTD be mounted without a thermowell?

The N9001 swaged mounting connection could be used to mount the sensor into a process without a thermowell. However, an appropriate analysis would be necessary to ensure the RTD and its mounting connections

Accessories

- Silicone sealant - Item No. 0102-004-0012T
- PST 580 Thread Sealant - Item No. 0109-001-0114T
- Thermowell Cleaning Kit - Item No. 0125-004-0001

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About Ultra Energy

Organizations working with nuclear and industrial technologies must deliver reliable production at the same time as safeguarding people, the environment and infrastructure. We develop and manufacture measurement and control solutions that give our customers complete, long-term control over systems operating in harsh environments, helping them operate safely and increasing the value derived from their investments over their total lifespan.

Part of Ultra Group, a global electronics company, Ultra Energy has worked with nuclear and industrial customers for over 60 years. We support customers across the world from facilities located in the US and UK. Our solutions are embedded in strategic national infrastructure and our people are active partners in customer programs that are focused on delivering advanced future nuclear and industrial capabilities.

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