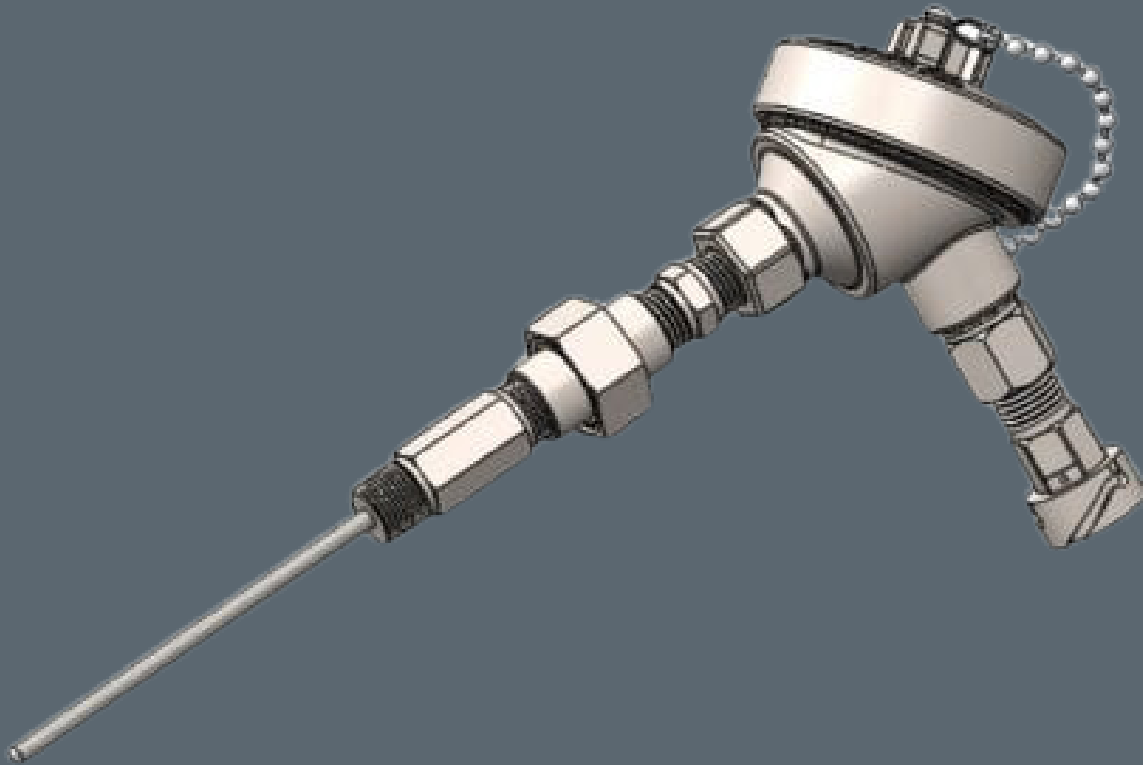


## 615 general purpose spring-loaded RTD assembly



### Key features

- Wide range of nuclear applications
- Installed in thermowell or protection tube
- Spring-loaded for optimal heat transfer
- Configured for a quick disconnect electrical connector (QDC)
- Qualified for use in Class 1E harsh environments

### Overview

The model 615 spring-loaded RTD is designed for a wide range of nuclear applications. The sensor is intended to be installed in a thermowell or protection tube. The spring-loading action ensures proper contact with the tip of the thermowell or protection tube for optimal heat transfer. This sensor model is optimally configured for use with a quick disconnect electrical connector (QDC), but can also be supplied with a terminal block connection. The RTD is qualified per IEEE 323-1974/1983 and IEEE 344-1975/1987 for use in Class 1E harsh environments.

# 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 0.5°F (0.28°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 (without thermowell) is approximately 5 seconds or less for the standard version with 1/4" 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. Actual response time will vary depending upon actual configuration, installation and process conditions. Response time when installed in a thermowell or protection tube will vary depending upon final configuration and fit, but is approximately 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.

# 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 insulated with polyolefin
Sheath internal insulation	MgO
Internal leadwire material	Solid Constantan
Mounting connections	RTDs normally have a 150 lb S.S. union and schedule 80 minimum S.S. extension nipple with 1/2" NPT male threads for interface to the thermowell or protection tube. The terminal head conduit port has 3/4" NPT female threads as standard. The QDC will normally have 1/2" NPT male threads. Custom mounting connections are available upon request.
Terminal block material, if applicable	Ceramic
Shipping weight	Approximately 5 lbs. without QDC and 6 lbs with QDC. Actual weight will depend upon configuration supplied.

# Technical specification

Feature	Description
Identification tags	SS identification tag attached to the terminal head using SS braided cable. Custom configured tagging is available upon request.
Storage requirements	RTDs are to be stored in accordance with ANSI N45.2 Level B requirements or better.
Accessories	
Silicone sealant	Item No. 0102-004-0012T
P1 thread sealant	Item No. 0109-001-0113T
PST 580 thread sealant	Item No. 0109-001-0114T
Viton gasket for terminal head	Item No. 0322-001-0023T
6-Wire terminal block	Item No. 0308-004-0006T
8-Wire terminal block	Item No. 0308-004-0009T
Terminal head - general purpose single port	Item No. 0342-002-0016T
Terminal head - general purpose dual port	Item No. 0342-002-0017T
Thermowell cleaning kit	Item No. 0125-004-0001
QDC O-ring	Item No. 0322-001-0070T

## Technical specifications

### Model number configurator

615	Model 615 Spring-Loaded Thermowell Mounted RTD Assembly	
	<b>Code</b>	<b>Element Style</b>
	S	Single Platinum Element, 4 Wire Configuration
	D	Dual Platinum Element, 6 Wire Configuration
	E	Dual Platinum Element, 8 Wire Configuration
	X	Other - Consult Factory
		<b>Code</b>
		<b>Resistance at 32°F (0°C)</b>
	1	100 Ohms
	2	200 Ohms
	X	Other - Consult Factory
		<b>Code</b>
		<b>Temperature Coefficient (Ohms/Ohm/°C)</b>
	A	0.003902
	B	0.00385055
	X	Other - Consult Factory
		<b>Code</b>
		<b>Temperature Range</b>
	A	500°F [260°C] Maximum
	C	750°F [400°C] Maximum
		<b>Code</b>
		<b>Number of Lead Wires</b>
	4	4-Wire Connection (Note: Can also be used as a 3-wire connection.)
	6	Dual Element, 3-Wire Connection
	8	Dual Element, 4-Wire Connection
		<b>Code</b>
		<b>Sheath Diameter</b>
	C	0.250" [6.4 mm]
	F	0.375" [9.5 mm]
	X	Other - Consult Factory
		<b>Code</b>
		<b>Sheath Length (L)</b>
	XXX.X	Specify Length to Nearest 0.1" [2.5 mm]
		<b>Code</b>
		<b>Lead Length (Inches)</b>
	0	Standard with head (Approximately 3") <i>Note: The number zero (0) and the letter "O" are interchangeable for this code</i>
	ZXX	Other - Use XX to list length to nearest inch

Head/Ext. Code	/	615	S	-	1	B	-	C	-	4	-	C	-	012.0	-	0
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Note: See the Model 615 Terminal Head and Extension Code Configurator to determine the appropriate Head/Ext. Code.

# Technical specifications

## Head/extension code configurator

8	Stainless Steel		
X	Other - Consult Factory		
	<b>Code</b>	<b>Extension Style &amp; Material</b>	
	J	Union/Nipple Extension - 316 Stainless Steel, 2.5" Minimum	
	X	Other - Consult factory	
	<b>Code</b>	<b>Extension Length ("B" Dimension)</b>	
	25	2.5 Inches [63.5 mm]	
	30	3.0 Inches [76.2 mm]	
	35	3.5 Inches [ 88.9 mm]	
	40	4.0 Inches [101.6 mm]	
	45	4.5 Inches [114.3 mm]	
	50	5.0 Inches [127 mm] (Maximum Length Allowed for Qualified Assemblies)	
XX	Other - Consult Factory		
	<b>Code</b>	<b>Head Connection (Instrument x Conduit)</b>	
	A	1/2" Female NPT x 1/2" Female NPT	
	D	1/2" Female NPT x 3/4" Female NPT	
	X	Other - Consult Factory	
8	J	25	D

## Technical specifications

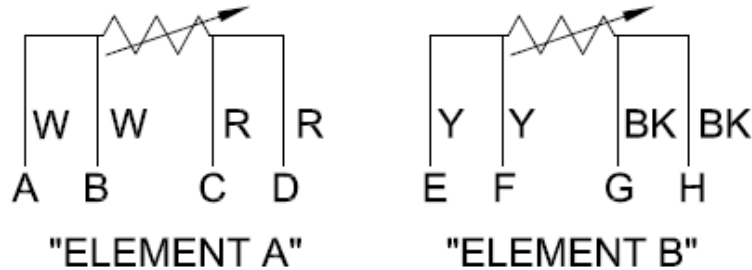
### QDC model number configurator

880701	Generation 1 QDC	
<b>Code Pin/Socket Configuration</b>		
4	4 Pins/Sockets	
8	8 Pins/Sockets	
X	Other - Consult Factory	
<b>Code Conductor Wire Gauge</b>		
16	16 AWG Conductor Size	
18	18 AWG Conductor Size	
20	20 AWG Conductor Size (Standard size for most applications)	
X	Other - Consult Factory	
<b>Code Connector Style</b>		
B	Bayonet	
X	Other - Consult Factory	
<b>Code Insulator Material</b>		
P	PES (Polyethersulfone) or PEI (Polyetherimide)	
X	Other - Consult Factory	
<b>Code O-Ring Material</b>		
E	Nordel EPDM	
X	Other - Consult Factory	
<b>Code Pin Side Potting</b>		
3	EGS Type 3	
W	Ultra Electronics, Energy Potting	
X	Pin Side Not Supplied	
<b>Code Pin Side Lead Wire or Cable</b>		
F	Rockbestos Firewall III, XLPE (Standard)	
W	Ultra Electronics, Energy Supplied XLPE	
X	Pin Side Not Supplied	
<b>Code Socket Side Potting</b>		
3	EGS Type 3	
W	Ultra Electronics, Energy Potting	
X	Socket Side Not Supplied	
<b>Code Socket Side Lead Wire or Cable</b>		
F	Rockbestos Firewall III, XLPE (Standard)	
W	Ultra Electronics, Energy Supplied XLPE	
X	Pin Side Not Supplied	
<b>Code SS Flexible Armor on Pin Side + Length</b>		
000	No Armor	
XXX	Length to the nearest inch	
<b>Code Cable or Wire Length on Pin Side</b>		
000	Pin Side Not Supplied	
XXX	Length to the nearest inch	
<b>Code SS Flexible Armor on Socket Side + Length</b>		
000	No Armor	
XXX	Length to the nearest inch	
<b>Code Cable or Wire Length on Socket Side</b>		
000	Socket Side Not Supplied	
XXX	Length to the nearest inch	
880701 - 8 - 20 - B - P - E - 3 - F - 3 - F - 60 - 72 - 240 - 252		

Note: There is no Gen 3 QDC model number configuration. Contact the factory to obtain the specific Gen 3 model number.

## Technical specifications

### QDC wiring diagram



### WIRING COLOR CODE

W = WHITE

R = RED

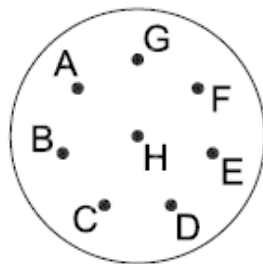
Y = YELLOW

BK = BLACK

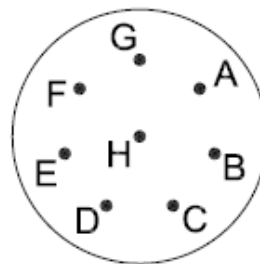
### NOTE:

- ELEMENT "A" - ELEMENT CLOSEST TO THE TIP WILL BE COLOR CODED AS RED & WHITE AND CONNECTED TO QDC PINS A, B, C & D.
- ELEMENT "B" - ELEMENT ABOVE ELEMENT "A" WILL BE COLOR CODED AS BLACK & YELLOW AND CONNECTED TO QDC PINS E, F, G & H.

### CONNECTOR WIRING DIAGRAM



SOCKET BACKSHELL



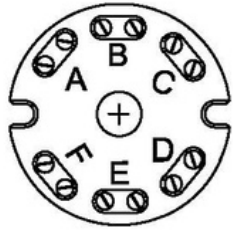
PIN BACKSHELL



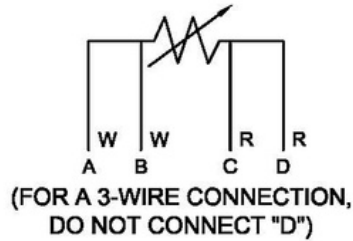
## Technical specifications

### Terminal block wiring diagram

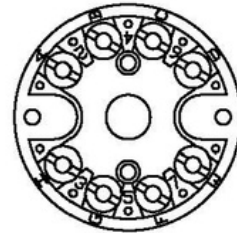
**6-WIRE  
TERMINAL BLOCK**



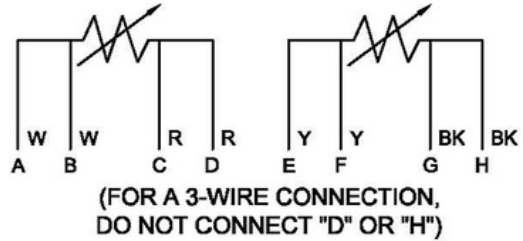
**SINGLE 4-WIRE  
WIRING DIAGRAM**



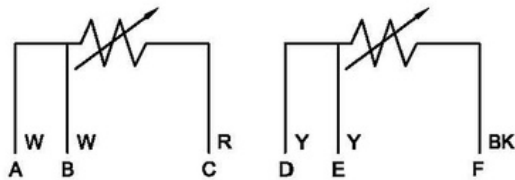
**8-WIRE  
TERMINAL BLOCK**



**DUAL 4-WIRE  
WIRING DIAGRAM**



**DUAL 6-WIRE  
WIRING DIAGRAM**



## FAQs

### **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 615 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 I use my own thermowell with the 615 RTD?**

Yes. The specific thermowell or protection tube design should be supplied during the request for quote stage in order to ensure optimal fit and interface of the RTD to the thermowell or protection tube.

### **Can the 615 RTD be used without a thermowell or protection tube?**

No. The thermowell or protection tube provides an integral part of the environmental seal. See model 611, N9019 or N9355 for direct immersion applications.

## 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.

## United States of America

707 Jeffrey Way  
Round Rock  
Texas 78665-2408  
USA

Tel: +1 512-434-2800

## United Kingdom

Innovation House  
Lancaster Road  
Ferndown Industrial Estate  
Wimborne  
Dorset BH21 7SQ  
UK

Tel: +44 (0) 1202 850 450

## For more information

Web: [ultra.energy](http://ultra.energy)  
Email: [sales@ultra.energy](mailto:sales@ultra.energy)