

# Thermocouple, RTD, and RTD Transmitter Assemblies With Thermowell

TA-96084B  
Revised 07-04  
Catalog Section 10  
(00-02-0773)



## TC, RTD, and RTDT Series

- 304 Stainless Steel Thermowell Protection
- Compatible with Digital SWICHGAGE®
- Types J or K Ungrounded Thermocouples
- 100 Ohm, 3-Wire RTD Assemblies
- 4-20 mA DC Output RTD Transmitters

### Description

Murphy offers a variety of highly reliable thermocouple and RTD (Resistance Temperature Detector) assemblies and 4-20 mA DC output RTD transmitters.

Their innovative features include a 304 stainless steel thermowell that provides protection to the spring-loaded element.

The cast aluminum connecting head meets NEMA 4 requirements and includes an RTD transmitter or a thermocouple/RTD terminal block mounted on ceramic Steatite and rated NEC Class 2.

The complete assemblies are offered in 2-1/2, 4-1/2, or 7-1/2 in. (63, 114, or 191 mm) thermowell insertion lengths.

#### Thermocouple Assemblies with Thermowell

Available in types J or K, the thermocouple assemblies have ungrounded elements in a 304 stainless steel spring loaded sheath. For product compatibility see back page (replacement parts and thermocouple extension wire are available).

#### RTD Assemblies with Thermowell

Resistance temperature detector (RTD) assemblies are available with a 100 ohm platinum element, 3-wire leads, and spring loaded 316L stainless steel element sheath.

#### RTD Transmitter Assemblies with Thermowell

RTDT assemblies transmit process variable temperatures. Available as part of the temperature sensor assemblies or as a separate units, the RTDT's accept 2 or 3 wire, 100 ohm RTD's. The RTD transmitters are loop powered, they feature linearized 4-20 mA DC outputs and have reversed polarity protection.

### Applications

Murphy's temperature sensing assemblies fit in a variety of industrial processes and applications. Their ruggedness and characteristics make these assemblies a popular and price-competitive choice.

### Specifications

**Thermowell:** 304 stainless steel; 7000 psi (48.2 MPa) [482 bar] max. @ 70°F.

**Connecting Head:** Cast Aluminum; 400°F (204°C) maximum operating temperature.

**Thermocouple:** Ungrounded, Magnesium Oxide (MgO) insulated 96% purity; element sheath of 304 stainless steel.

Type "J" operating temp.: 900°F (482°C) max.

Type "K" operating temp.: 1800°F (982°C) max.

**RTD:** 100 ohm @ 0°C Platinum element; 3-wire; 400 °F maximum; 0.00385 temperature coefficient; 316L stainless steel element sheath.

**RTD Transmitter:** 100 ohms Platinum RTD; 400 °F maximum; Ranges: 0 to 400°F and -60 to 140°F. Linearized 4-20 mA DC output. Loop powered typically 24 VDC, when using the Loop Resistance Graph, 13-40 VDC. For use with 100 ohms Platinum RTD elements, 0.00385 temperature coefficient.

**Thermocouple Accuracy (J/K):** 0.5%.

**RTD Accuracy:** ±0.12%.

**RTD Transmitter Accuracy:** ±0.1%.

**Terminal block:** Ceramic Steatite; thermocouples have: 4 terminals; RTD's: 6 terminals. 28 to 14 AWG wire size, (8-32 SS screws).

**Shipping Weights (listed by insertion length):**

2-1/2 in. (63 mm) model: 2 lb. (0.907 kg).

4-1/2 in. (114 mm) model: 2 lb. 8oz. (1.24 kg).

7-1/2 in. (191 mm) model: 3 lb. 6oz. (1.67 kg).

**Shipping Dimensions (listed by insertion length):**

2-1/2 and 4-1/2 in (63 and 114 mm) models:

12 x 7 x 5-1/2 in. (305 x 178 x 140 mm).

7-1/2 in. (191 mm) models: 16 x 11 x 5-1/2 in. (406 x 280 x 144 mm).

**Optional Thermocouple Extension Wire:**

(Sold separately—see How to Order section)

Individual Conductor Insulation: *Extruded PFA*.

Duplex Conductor Insulation: *Twisted; Extruded PFA Overall*.

Temperature Rating: *Continuous -450 to 500°F (-267 to 260°C).*

Abrasion Resistance: *Good.*

Moisture Resistance: *Excellent.*

Shielding: *Metallic Shield.*

Gauge: *20 AWG (0.5 mm<sup>2</sup>).*

Ohms per Double Foot Type "J": *0.357*

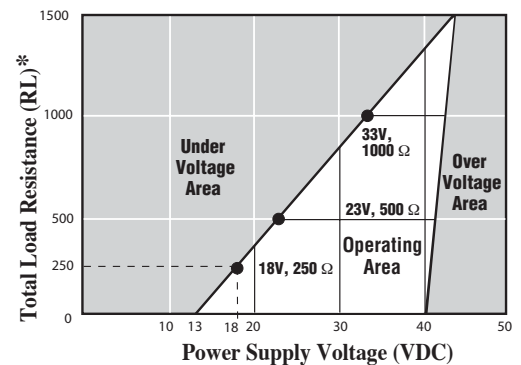
Ohms per Double Foot Type "K": *0.586*

### Warranty

A limited warranty on materials and workmanship is given with this FW Murphy product. A copy of the warranty may be viewed or printed by going to [www.fwmurphy.com/support/warranty.htm](http://www.fwmurphy.com/support/warranty.htm)

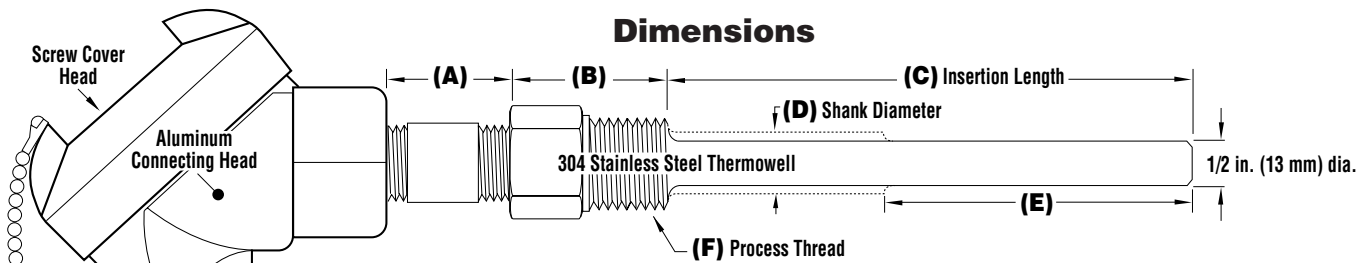
### Loop Resistance Graph

Supply voltage for RTDT must be within 13-40 VDC. The figure below shows the minimum supply voltage (VDC) required for a given load resistance (RL).



\*NOTE: Cable resistance effect included in RL.





Model Number	(A)	(B)	(C)	(D)	(E)	(F)
TCJ-225, TCK-225, RTD-225-400-100, RTDT-225-400-100, RTDT-225-140-100	1 in. (25 mm)	1-3/4 in. (44 mm)	2-1/2 in. (63 mm)	N/A	N/A	1/2 NPT
TCJ-325, TCK-325, RTD-325-400-100, RTDT-325-400-100, RTDT-325-140-100	1 in. (25 mm)	1-3/4 in. (44 mm)	2-1/2 in. (63 mm)	N/A	N/A	3/4 NPT
TCJ-245, TCK-245, RTD-245-400-100, RTDT-245-400-100, RTDT-245-140-100	1 in. (25 mm)	1-3/4 in. (44 mm)	4-1/2 in. (114 mm)	5/8 in. (16 mm)	2-1/2 in. (64 mm)	1/2 NPT
TCJ-345, TCK-345, RTD-345-400-100, RTDT-345-400-100, RTDT-345-140-100	1 in. (25 mm)	1-3/4 in. (44 mm)	4-1/2 in. (114 mm)	5/8 in. (16 mm)	2-1/2 in. (64 mm)	3/4 NPT
TCJ-275, TCK-275, RTD-275-400-100, RTDT-275-400-100, RTDT-275-140-100	1 in. (25 mm)	1-3/4 in. (44 mm)	7-1/2 in. (191 mm)	5/8 in. (16 mm)	2-1/2 in. (64 mm)	1/2 NPT
TCJ-375, TCK-375, RTD-375-400-100, RTDT-375-400-100, RTDT-375-140-100	1 in. (25 mm)	1-3/4 in. (44 mm)	7-1/2 in. (191 mm)	5/8 in. (16 mm)	2-1/2 in. (64 mm)	3/4 NPT

## How to Order

To order just specify the model number needed (see chart below). Order replacement parts and thermocouple extension wire separately.

Model Number	P. Thread	Insertion Length	Sensing Element Type	Transmitter Range
<b>Thermocouple Assemblies (thermowell included)</b>				
TCJ-225	1/2 NPT	2-1/2 in. (63 mm)	J Type Ungrounded Thermocouple	
TCK-225	1/2 NPT	2-1/2 in. (63 mm)	K Type Ungrounded Thermocouple	
TCJ-325	3/4 NPT	2-1/2 in. (63 mm)	J Type Ungrounded Thermocouple	
TCK-325	3/4 NPT	2-1/2 in. (63 mm)	K Type Ungrounded Thermocouple	
TCJ-245	1/2 NPT	4-1/2 in. (114 mm)	J Type Ungrounded Thermocouple	
TCK-245	1/2 NPT	4-1/2 in. (114 mm)	K Type Ungrounded Thermocouple	
TCJ-345	3/4 NPT	4-1/2 in. (114 mm)	J Type Ungrounded Thermocouple	
TCK-345	3/4 NPT	4-1/2 in. (114 mm)	K Type Ungrounded Thermocouple	
TCJ-275	1/2 NPT	7-1/2 in. (191 mm)	J Type Ungrounded Thermocouple	
TCK-275	1/2 NPT	7-1/2 in. (191 mm)	K Type Ungrounded Thermocouple	
TCJ-375	3/4 NPT	7-1/2 in. (191 mm)	J Type Ungrounded Thermocouple	
TCK-375	3/4 NPT	7-1/2 in. (191 mm)	K Type Ungrounded Thermocouple	
<b>RTD Assemblies (thermowell included)</b>				
RTD-225-400-100	1/2 NPT	2-1/2 in. (63 mm)	100 ohm Pt RTD 400°F maximum	
RTD-325-400-100	3/4 NPT	2-1/2 in. (63 mm)	100 ohm Pt RTD 400°F maximum	
RTD-245-400-100	1/2 NPT	4-1/2 in. (114 mm)	100 ohm Pt RTD 400°F maximum	
RTD-345-400-100	3/4 NPT	4-1/2 in. (114 mm)	100 ohm Pt RTD 400°F maximum	
RTD-275-400-100	1/2 NPT	7-1/2 in. (191 mm)	100 ohm Pt RTD 400°F maximum	
RTD-375-400-100	3/4 NPT	7-1/2 in. (191 mm)	100 ohm Pt RTD 400°F maximum	
<b>RTD Transmitter Assemblies (thermowell included)</b>				
RTDT-225-400-100	1/2 NPT	2-1/2 in. (63 mm)	100 ohm Pt 4-20 mA RTD Transmitter	0-400°F (-17.8 to 204°C)
RTDT-225-140-100	1/2 NPT	2-1/2 in. (63 mm)	100 ohm Pt 4-20 mA RTD Transmitter	-60 to 140°F (-51.1 to 60°C)
RTDT-325-400-100	3/4 NPT	2-1/2 in. (63 mm)	100 ohm Pt 4-20 mA RTD Transmitter	0-400°F (-17.8 to 204°C)
RTDT-325-140-100	3/4 NPT	2-1/2 in. (63 mm)	100 ohm Pt 4-20 mA RTD Transmitter	-60 to 140°F (-51.1 to 60°C)
RTDT-245-400-100	1/2 NPT	4-1/2 in. (114 mm)	100 ohm Pt 4-20 mA RTD Transmitter	0-400°F (-17.8 to 204°C)
RTDT-245-140-100	1/2 NPT	4-1/2 in. (114 mm)	100 ohm Pt 4-20 mA RTD Transmitter	-60 to 140°F (-51.1 to 60°C)
RTDT-345-400-100	3/4 NPT	4-1/2 in. (114 mm)	100 ohm Pt 4-20 mA RTD Transmitter	0-400°F (-17.8 to 204°C)
RTDT-345-140-100	3/4 NPT	4-1/2 in. (114 mm)	100 ohm Pt 4-20 mA RTD Transmitter	-60 to 140°F (-51.1 to 60°C)
RTDT-275-400-100	1/2 NPT	7-1/2 in. (191 mm)	100 ohm Pt 4-20 mA RTD Transmitter	0-400°F (-17.8 to 204°C)
RTDT-275-140-100	1/2 NPT	7-1/2 in. (191 mm)	100 ohm Pt 4-20 mA RTD Transmitter	-60 to 140°F (-51.1 to 60°C)
RTDT-375-400-100	3/4 NPT	7-1/2 in. (191 mm)	100 ohm Pt 4-20 mA RTD Transmitter	0-400°F (-17.8 to 204°C)
RTDT-375-140-100	3/4 NPT	7-1/2 in. (191 mm)	100 ohm Pt 4-20 mA RTD Transmitter	-60 to 140°F (-51.1 to 60°C)

## Replacement Parts (order separately)

- TCHA = Cast aluminum head with terminal blocks for thermocouples
- TCJE-25 = Type J element only for 2-1/2 in. wells\*
- TCKE-25 = Type K element only for 2-1/2 in. wells\*
- TCJE-45 = Type J element only for 4-1/2 in. wells\*
- TCKE-45 = Type K element only for 4-1/2 in. wells\*
- TCJE-75 = Type J element only for 7-1/2 in. wells\*
- TCKE-75 = Type K element only for 7-1/2 in. wells\*
- PTW-225 = 1/2 NPT x 2-1/2 in. thermowell
- PTW-325 = 3/4 NPT x 2-1/2 in. thermowell
- PTW-245 = 1/2 NPT x 4-1/2 in. thermowell
- PTW-345 = 3/4 NPT x 4-1/2 in. thermowell
- PTW-275 = 1/2 NPT x 7-1/2 in. thermowell
- PTW-375 = 3/4 NPT x 7-1/2 in. thermowell
- RTDE-25 = 100 Ω Pt RTD element only for 2-1/2 in. wells\*
- RTDE-45 = 100 Ω Pt RTD element only for 4-1/2 in. wells\*
- RTDE-75 = 100 Ω Pt RTD element only for 7-1/2 in. wells\*
- RTDTX-400-100 = 100 Ω Pt RTD Transmitter only (0 to 400°F)\*
- RTDTX-140-100 = 100 Ω Pt RTD Transmitter only (-60 to 140°F)\*

## Thermocouple Extension Wire

- 00-00-3271 = Type J 100 ft roll.
- 00-00-3272 = Type K 100 ft roll.

\* All elements are spring loaded

## Product Compatibility

Model	Power Source	Temperature Sensor
MDTM89	CD Ign. 12/24 VDC, 120 VAC	J/K ungrounded thermocouples
TDX6	CD Ign. 12/24 VDC, 120 VAC	J/K grounded/ungrounded tc.
TD35	8-35 VDC	J/K grounded/ungrounded tc.
MDM45	10-30 VDC @ 3.6 watts max.	4-20 mA RTD transmitter
CS2001	12/24 VDC, 120/220 VAC	J/K ungrounded thermocouples, RTD transmitter / 3-wire RTD



**FW Murphy**  
P.O. Box 470248  
Tulsa, Oklahoma 74147 USA  
+1 918 317 4100  
fax +1 918 317 4266  
e-mail sales@fwmurphy.com  
www.fwmurphy.com

**CONTROL SYSTEMS & SERVICES DIVISION**  
P.O. Box 1819; Rosenberg, Texas 77471; USA  
+1 281 633 4500 fax +1 281 633 4588  
e-mail sales@fwmurphy.com

**MURPHY DE MEXICO, S.A. DE C.V.**  
Blvd. Antonio Rocha Cordero 300, Fracción del Aguaje  
San Luis Potosí, S.L.P.; México 78384  
+52 444 8206264 fax +52 444 8206336  
Villahermosa Office +52 993 3162117  
e-mail ventas@murphymex.com.mx  
www.murphymex.com.mx

**FRANK W. MURPHY, LTD.**  
Church Rd.; Laverstock, Salisbury SP1 1QZ; U.K.  
+44 1722 410055 fax +44 1722 410088  
e-mail sales@fwmurphy.co.uk  
www.fwmurphy.co.uk

**MURPHY SWITCH OF CALIFORNIA**  
41343 12th Street West  
Palmdale, California 93551-1442; USA  
+1 661 272 4700 fax +1 661 947 7570  
e-mail sales@murphyswitch.com  
www.murphyswitch.com

Murphy摩菲仪表授权经销商

信德迈科技(北京)有限公司 CNMEC Technology  
地址: 北京市朝阳区胜古中路2号金基业大厦201室  
电话: 010-8428 2935, 13910962635  
Http: //www.cnmec.com Email: sales@cnmec.biz  
传真: 010-8428 8762



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