

TE-6000 Series Temperature Sensing Elements

Installation

IMPORTANT: The TE-600 Series Temperature Sensing Element is intended to provide an input to equipment under normal operating conditions. Where failure or malfunction of the temperature element could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the temperature element.

IMPORTANT: Le TE-600 Series Temperature Sensing Element est destiné à transmettre des données entrantes à un équipement dans des conditions normales de fonctionnement. Lorsqu'une défaillance ou un dysfonctionnement du temperature element risque de provoquer des blessures ou d'endommager l'équipement contrôlé ou un autre équipement, la conception du système de contrôle doit intégrer des dispositifs de protection supplémentaires. Veiller dans ce cas à intégrer de façon permanente d'autres dispositifs, tels que des systèmes de supervision ou d'alarme, ou des dispositifs de sécurité ou de limitation, ayant une fonction d'avertissement ou de protection en cas de défaillance ou de dysfonctionnement du temperature element.

Dimensions

See Figure 1 for dimensions for the different element models.

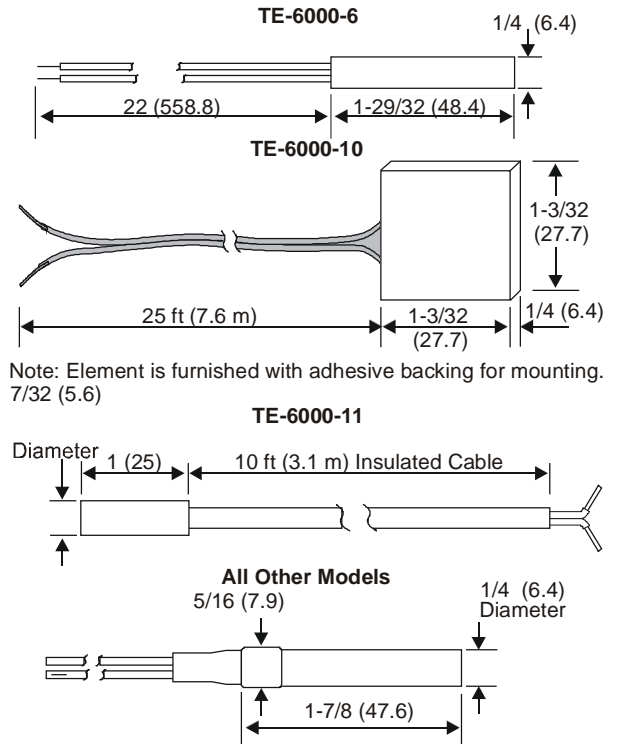


Figure 1: TE-6000 Dimensions, in. (mm), except where Indicated

Accessories

For more information about mounting hardware, refer to the *TE-6001 Hardware Assemblies for TE-6000 Temperature Elements Product/Technical Bulletin (LIT-216300)*.

Wiring



CAUTION: Risk of Property Damage.

Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

MISE EN GARDE: Risque de dégâts matériels.

Ne pas mettre le système sous tension avant d'avoir vérifié tous les raccords de câblage. Des fils formant un court-circuit ou connectés de façon incorrecte risquent d'endommager irrémédiablement l'équipement.

IMPORTANT: Make all wiring connections in accordance with local, national, and regional regulations.

Under normal conditions, shielding is unnecessary when wiring between TE-6000 elements and temperature controllers. If routing the wiring through electrically noisy environments (such as motor control centers, relay panels, or lighting panel boards), using shielded cable may be necessary to minimize the effects of transient voltages and other electromagnetic interference sources.

Connected components may operate incorrectly or fail as a result of induced transient voltages. Do not combine wiring with any relay, motor, frequently interrupted control circuit, or frequently switched lighting load. (See Figure 2 for typical wiring diagrams.)

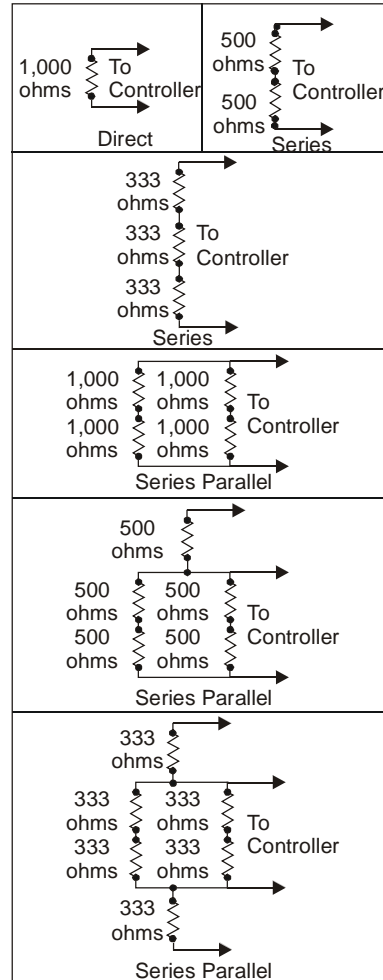


Figure 2: Typical Wiring for Averaging Temperatures at Multiple Locations

When using the temperature elements with controllers, use separate conduit under the following conditions:

- where line voltage switched power is present
- with switched loads of 50 VA or more
- when element wiring and AC power wiring exceed 300 ft (91 m) to avoid AC pickup, which may disrupt proper controller operation

Maintain maximum physical distance between the AC power and element when wiring in a common panel.

TE-6000 elements are not position sensitive; mount them in any position.

Leads on some of the elements have a color-coded band to aid identification (Table 1).

Table 1: Identifying Models with the Color-Coded Band

Model	Band Color
TE-6000-1	Green
TE-6000-2	Black
TE-6000-3	White
TE-6000-5	Blue
TE-6000-100	Red
TE-6000-101	Orange

Note: See the *Technical Specifications* table for product specifications for all of the temperature elements.

Setup and Adjustments

The sensors do **not** require field adjustment; however, if system adjustments are needed, refer to the controller's instructions.

Designated resistance values in Table 2 are for the 1,000-ohm nickel elements (TE-6000-1, -6, -10, -11, -100, -101), and the 1,000 ohm platinum elements (TE-6359-1). Values are as follows:

- the 500 ohm elements (TE-6000-2) are one-half the nickel values
- the 333 ohm elements (TE-6000-3) are one-third the nickel values
- the 50 ohm elements (TE-6000-5) are one-twentieth the nickel values

Table 2: Temperature vs. Resistance

Temperature		Resistance (ohms)	
°F	°C	Nickel	Platinum
-50	-46	674	821
-40	-40	699	843
-30	-34	725	865
-20	-29	751	887
-10	-23	777	909
0	-18	803	930
10	-12	830	952
20	-7	858	994

Temperature		Resistance (ohms)	
°F	°C	Nickel	Platinum
30	-1	885	996
40	4	914	1,017
50	10	942	1,039
60	16	971	1,061
70	21	1,000	1,082
80	27	1,030	1,104
90	32	1,060	1,125
100	38	1,090	1,147
110	43	1,121	1,168
120	49	1,152	1,190
130	54	1,184	1,211
140	60	1,216	1,232
150	66	1,248	1,254
160	71	1,281	1,275
170	77	1,314	1,296
180	82	1,348	1,317
190	88	1,382	1,339
200	93	1,417	1,360
210	99	1,452	1,381
220	104	1,487	1,402
230	110	1,524	1,423
240	116	1,560	1,444
250	121	1,597	1,465

Checkout

Before applying power, make sure installation and wiring connections meet the job specifications.

Troubleshooting

To confirm that the element is functioning correctly:

1. Measure the temperature at the sensor using an accurate thermometer.
2. Determine the element resistance at the ambient temperature by applying the appropriate compensation for models with nominal resistance values less than 1,000 ohms.
3. Measure the resistance of the sensor using an ohmmeter and comparing actual and expected values.
4. Replace the sensor if the measurement indicates:
 - a. open circuit (infinite resistance)
 - b. short circuit (zero resistance)
 - c. out of tolerance indicated for the sensor

Repairs and Replacement

Do not field repair the TE-6000 temperature sensing elements. To order a replacement, refer to the

*TE-6000 Series Temperature Sensing Elements
Product Bulletin (LIT-216288).*

Technical Specifications

Product	TE-6000-1	1,000 ohm nickel element	
	TE-6000-2	500 ohm nickel element	
	TE-6000-3	333 ohm nickel element	
	TE-6000-5	50 ohm nickel element	
	TE-6000-6	1,000 ohm nickel (used in solar heating applications)	
	TE-6000-10	1,000 ohm nickel surface element (encased in aluminum mounting block)	
	TE-6000-11	1,000 ohm nickel bearing element (encased in a brass tube)	
	TE-6000-100	1,000 ohm nickel wide range element	
	TE-6000-101	1,000 ohm nickel narrow range element	
	TE-6359-1	1,000 ohm platinum element	
Sensing Ranges	TE-6000-6:	-40 to 350°F (-40 to 177°C)	
	TE-6000-10:	0 to 125°F (-18 to 52°C)	
	All Other Models:	-50 to 250°F (-46 to 121°C)	
Elements	TE-6359-1:	Platinum	
	All other models:	Nickel	
Resistance Tolerances	TE-6000-1, -2, -3, -6, -10, -11:	±1.0%	
	TE-6000-5:	±2.0%	
	TE-6000-100:	±0.1%, range of -50 to 250°F (-46 to 121°C)	
	TE-6000-101:	±0.1%, range of 55 to 85°F (13 to 29°C)	
	TE-6359-1:	±0.06% (platinum, DIN Class A)	
Temperature Coefficients (All Positive and Approximate)	Nickel:	0.15, 1.0, 1.5 and 3 ohms/F° (0.27, 1.8, 2.7, and 5.4 ohms/C°) for 50, 333.3, 500, and 1,000 ohm elements respectively	
	Platinum:	2.2 ohms/F° (3.9 ohms/C°)	
Reference Resistance	At 32°F (0°C)	TE-6359-1:	1,000 ohms (platinum)
	At 70°F (21°C)	TE-6000-1, 6, 10, 11, 100, 101:	1,000 ohms (nickel)
		TE-6000-2:	500 ohms (nickel)
		TE-6000-3:	333 ohms (nickel)
		TE-6000-5:	50 ohms (nickel)
Temperature Ranges	TE-6000-6:	-40 to 350°F (-40 to 177°C)	
	TE-6000-10:	0 to 125°F (-18 to 52°C)	
	TE-6000-101:	55 to 85°F (13 to 29°C)	
	All other models:	-50 to 250°F (-46 to 121°C)	
Sensor Construction	TE-6000-6:	Black Anodized Aluminum Probe	
	TE-6000-10:	Aluminum Probe	
	TE-6000-11:	Brass Probe	
	All Other Models:	Copper Probe	
Field Connection	Two wire leads, 18 AWG		
Shipping Weight	0.2 lb (0.09 kg)		

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

European Single Point of Contact:

JOHNSON CONTROLS
WESTENDHOF 3
45143 ESSEN
GERMANY

NA/SA Single Point of Contact:

JOHNSON CONTROLS
507 E MICHIGAN ST
MILWAUKEE WI 53202
USA

APAC Single Point of Contact:

JOHNSON CONTROLS
C/O CONTROLS PRODUCT
MANAGEMENT
NO. 22 BLOCK D NEW DISTRICT
WUXI JIANGSU PROVINCE 214142
CHINA



Building Efficiency
507 E. Michigan Street, Milwaukee, WI 53202

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