

TE-6300P Series Temperature Sensors

Installation Instructions

TE-63xxP-1

Part No. 24-4034-107, Rev. L

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Refer to the [QuickLIT website](http://www.quicklit.com) for the most up-to-date version of this document.

Applications

To meet plenum rating where Underwriters Laboratories Inc.® UL 1995 rating is accepted, replace the existing thermoplastic cover with the TE-6001-13 Metal Cover. To meet International Mechanical Code standards, use all-metal components.

Table 1: TE-6300P Applications

Duct Probe Temperature Sensor	
Model	Description and Probe, in. (mm)
TE-6311P-1	1k ohm Thin-Film Nickel, 8 (203)
TE-6351P-1	1k ohm Thin-Film Platinum, 8 (203)
TE-6341P-1	2.2k ohm Negative Temperature Coefficient (NTC) Thermistor, 8 (203)
TE-6361P-1	10k ohm Johnson Controls® Type II, NTC Thermistor, 8 (203)
Well Insertion Temperature Sensor	
Model	Description and Probe, in. (mm)
TE-6312P-1	Threaded 1k ohm Thin-Film Nickel, 8 (203)
TE-631AP-1	Threadless 1k ohm Thin-Film Nickel, 6 (152)
TE-6352P-1	Threaded 1k ohm Thin-Film Platinum, 8 (203)
TE-635AP-1	Threadless 1k ohm Thin-Film Platinum, 6 (152)
Note: See Figure 9 and Figure 10 for threadless and threaded connections.	
Duct Averaging Temperature Sensor	
Model	Description and Probe, in. (mm)
TE-6315P-1	1k ohm Nickel Wire, 8 (2.4)
TE-6316P-1	1k ohm Nickel Wire, 17 (5.2)
TE-6327P-1	1k ohm Platinum Equivalent Wire, 10 (3.0)
TE-6328P-1	1k ohm Platinum Equivalent Wire, 20 (6.1)
TE-6337P-1	100 ohm Platinum Equivalent Wire, 10 (3.0)
TE-6338P-1	100 ohm Platinum Equivalent Wire, 20 (6.1)

IMPORTANT: The TE-6300P Series Temperature Sensor is intended to provide an input to equipment under normal operating conditions. Where failure or malfunction of the sensor 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 sensor.

Installation

IMPORTANT: Do not install the TE-6300P Series Temperature Sensor probe in ambient temperatures beyond the specified -50 to 220°F (-46 to 104°C) temperature range. Installing the temperature sensor probe in ambient temperatures beyond this range may damage the unit and void the warranty.

Dimensions

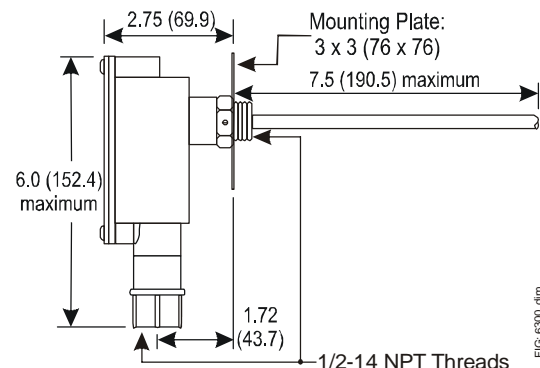


Figure 1: Duct Probe Sensor Dimensions, in. (mm)

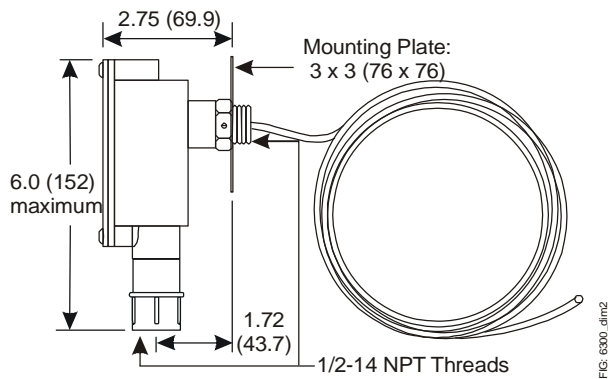


Figure 2: Duct Averaging Sensor Dimensions, in. (mm)

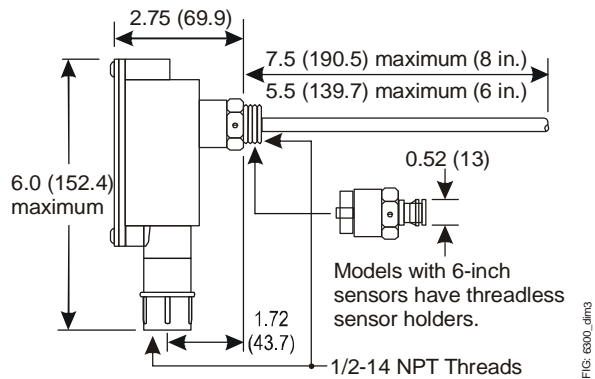


Figure 3: Well Insertion Sensor Dimensions, in. (mm)

Mounting

Location Considerations

Consider the following mounting location guidelines:

- Avoid areas subject to excessive vibration, electrical noise, direct sunlight, or the effects of radiant heat.
- Keep electrical wiring as short as possible to minimize temperature error.
- Install sensors in areas where sufficient mixing of the sensed medium occurs or use an averaging sensor.

Cutting the Sensor Probe (Duct and Well Models Only)

If necessary, cut the sensor probe at the wiring end using the following procedure:

1. Mark the desired length, measuring from the end of the tube without leads. The final sensor probe length must be at least 3 inches (76 mm).

2. Cut the probe using a tubing cutter with a sharp blade, as shown in Figure 4. (Cut slowly, using minimal pressure to decrease burr size and help avoid damaging the leads.)

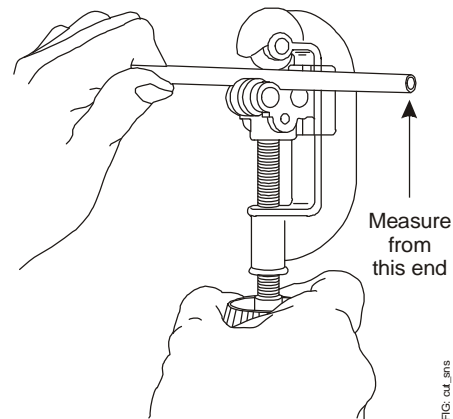


Figure 4: Cutting the Sensor Probe

3. Slide the loose tubing carefully over the leads to remove.
4. Insert the leads into shrink tube (included) or use other material to protect the leads from potential sharp edges where the probe was cut. (Heat the shrink tube using a heat gun.)

Securing or Removing the Sensor Holder

The retainer is a gray plastic tube approximately 1-1/4 in. (32 mm) long x 1/2 in. (13 mm) in diameter. Use the retainer to lock the sensor holder into the conduit box. Using the retainer prevents the snap finger from deflecting, locking the sensor holder into the conduit box. To install the retainer, slide the retainer over the sensor wires and probe, and into the sensor holder. (See Figure 5.)

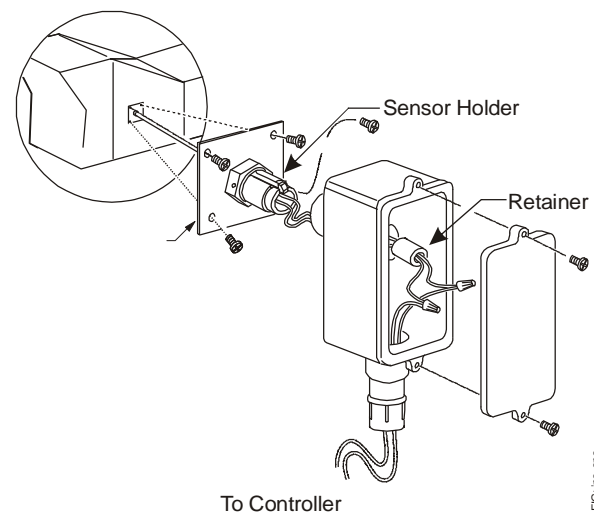


Figure 5: Installing the Duct Sensor

To remove the sensor holder from the conduit box, slide the retainer off of the sensor probe. Push the snap finger toward the center of the sensor holder and pull the holder out of the conduit box.

Note: It may be necessary to loosen the set screw and remove the sensor probe to obtain adequate clearance to slide the sensor holder out of the conduit box.

Mounting the Temperature Sensors

Mounting the Duct Sensor

See Figure 5 and mount the sensor as follows:

1. Drill a 1-3/8 in. (35 mm) diameter hole at the desired mounting location.
2. Use the mounting plate as a template to drill four 1/8 in. (3 mm) holes for the screws.
3. Mount the probe assembly to the duct using the four screws provided.
4. Pull the wires into the conduit box and snap the conduit box onto the sensor holder.
5. Install the retainer into the sensor holder.
6. Wire the sensor to the controller using the wire nuts provided.
7. Reposition the cover and tighten the retention screws.

Mounting the Duct Averaging Sensor

See Figure 6 to mount a single duct averaging sensor. See Figure 7 to mount four duct averaging sensors in series-parallel for larger ducts. Mount the duct averaging sensor as follows:

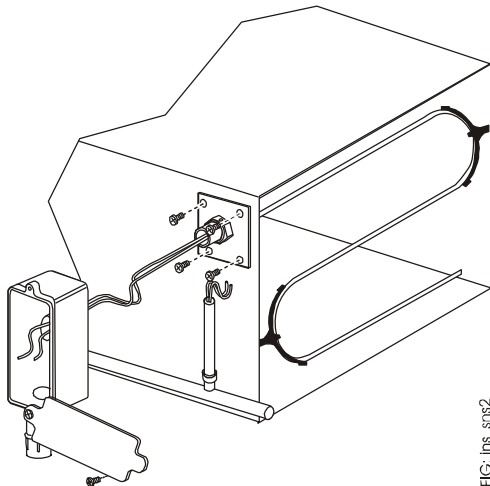


Figure 6: Installing the Duct Averaging Sensor

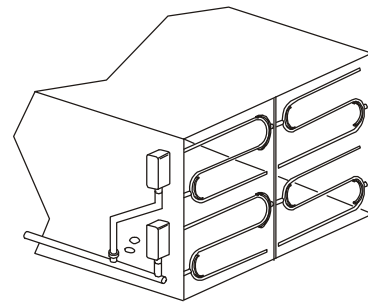


Figure 7: Series-Parallel Mounting Configuration

1. Drill a 1-3/8 in. (35 mm) diameter hole at the desired mounting location.
2. Use the mounting plate as a template to drill four 1/8 in. (3 mm) holes for the screws.
3. Mount the averaging sensor probe inside the duct using a TE-6001-8 or equivalent 3 in. (76 mm) minimum radius temperature element holder.

IMPORTANT: Do not bend the sensor probe tighter than a 3 in. (76 mm) radius, a 6 in. (152 mm) diameter, to avoid permanently damaging the sensor.

Note: Platinum sensor models include two TE-6001-8 Element Holders.

4. Insert the sensor probe into the sensor holder and mounting plate assembly. Firmly tighten the sensor holder set screw.
5. Follow Steps 3 through 7 in Mounting the Duct Sensor.

Mounting the Well Insertion Sensor

The TE-63xxP-1 well models include a sensor holder with built-in thermowell adaptor. No additional well adaptor is required for installation when the sensor is used with TE-6300W thermowells. See Figure 8 and mount the sensor as follows:

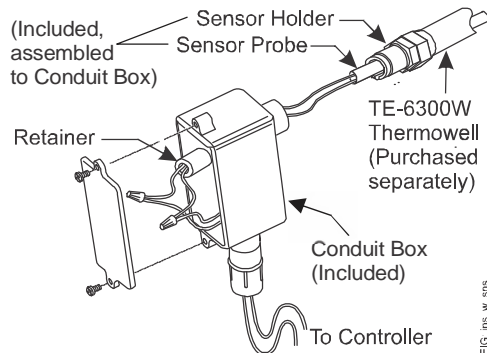


Figure 8: Installing the Well Insertion Sensor

Note: Add thermal grease (F-1000-182, or equivalent) before inserting the probe if the well does not include thermal grease. For proper sensor function, mount the well so that any condensation that forms drains out of the probe.

1. Remove the sensor holder from the conduit box (See *Securing or Removing the Sensor Holder* on page 2).
2. Loosen the sensor holder setscrew and remove the probe.
3. If the thermal well is:
 - **TE-6300W-103** (TE-63xAP-1), see Figure 9 and loosen the two well set screws (the TE-6300W-103 contains thermal grease). Insert the sensor holder, then tighten the well set screws.

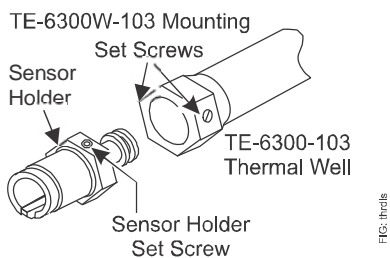


Figure 9: Installing the TE-63xAP-1 Sensor Holder

- **TE-6300W-110** (TE-63x2P-1), see Figure 10 and screw the sensor holder into the thermal well (the TE-6300W-110 does not contain thermal grease).

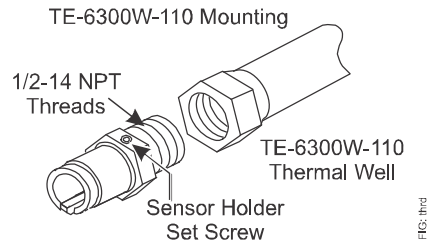


Figure 10: Installing the TE-63x2P-1 Sensor Holder

4. Insert the sensor probe through the sensor holder and into the thermal well until it just touches the bottom of the well.
5. Back the probe out approximately 1/8 in. (3 mm) and tighten the sensor holder set screw.
6. Pull the sensor wires into the conduit box and snap the conduit box onto the sensor holder.
7. Install the retainer over the sensor wire leads and into the sensor holder.
8. Wire the sensor to the controller using the wire nuts provided.
9. Reposition the cover and tighten the retention screws.

Wiring

For 1k ohm nickel temperature sensors, wire resistance can cause approximately 1F° (0.56C°) of error for every 250 ft (76 m) run of 18 AWG wire, or every 100 ft (31 m) run of 22 AWG wire. For 1k ohm platinum temperature sensors, wire resistance can cause approximately 1F° (0.56C°) of error for every 150 ft (46 m) run of 18 AWG wire, or every 50 ft (15 m) run of 22 AWG wire. To minimize error due to field wiring, limit the total resistance of all nickel temperature sensor wiring to 3 ohms, and all 1k ohm platinum temperature sensor wiring to 2 ohms.

To minimize wiring error in applications using **100 ohm platinum equivalent sensors**, use the TQ-6000-1, 4 to 20 mA transmitter. Using a 4 wire (Kelvin) connection can also eliminate wiring error.

The 2.2k and 10k ohm thermistor applications permit wiring to be relatively long before wire resistance adds significantly to total resistance measured at the controller. As a general rule, a 150 ft (46 m) two-wire 18 AWG run contributes 2 ohms of error, or less than 1F° (0.56C°) error over the sensor operating temperature range.

Refer to the appropriate controller documentation for recommended sensor wiring. See Table 2 for an explanation of the lead wiring color convention.

Table 2: Lead Wiring (22 AWG, 6 in.) Color Code

Sensor Type	Lead Color
1k ohm Nickel	White
1k ohm Nickel Averaging ¹	White
100 ohm Platinum Averaging	Red
1k ohm Platinum	White with blue strip
1k ohm Platinum Averaging	Blue
2.2k ohm Thermistor	Red
10k ohm Thermistor	White with green stripe

1. Nickel Averaging sensors use 18 AWG wire

Series-Parallel Wiring

To wire a duct averaging sensor, or another model in series-parallel configuration, see Figure 11.

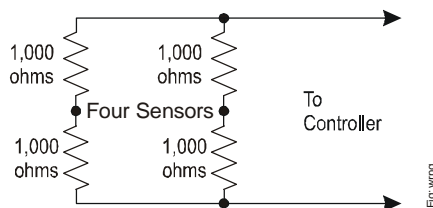


Figure 11: Series-Parallel Wiring Network

Note: Always use sensors of the same value and type throughout the network.



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.

IMPORTANT: Use copper conductors only. Make all wiring connections in accordance with local, national, and regional regulations. Do not exceed the TE-6300P Series Temperature Sensor's electrical ratings.

Repair Information

If the TE-6300P Series Temperature Sensor fails to operate within its specifications, refer to the *TE-6300 Series Temperature Sensor Product Bulletin (LIT-216320)* for a list of repair parts available.

Technical Specifications

TE-6300P Series Temperature Sensors

Sensor Reference Resistance	1k ohm Thin-Film Nickel	1k ohms at 70°F (21°C)
	1k ohm Nickel Averaging	1k ohms at 70°F (21°C)
	1k ohm Thin-Film Platinum	1k ohms at 32°F (0°C)
	100 ohm Platinum Averaging	100 ohms at 32°F (0°C)
	1k ohm Platinum Averaging	1k ohms at 32°F (0°C)
	2.2k ohm Thermistor	2,252 ohms at 77°F (25°C)
	10k ohm Thermistor	10k ohms at 77°F (25°C)
Sensor Accuracy	1k ohm Thin-Film Nickel	± 0.34F° at 70°F (± 0.19C° at 21°C)
	1k ohm Nickel Averaging	± 3.4F° at 70°F (± 1.9C° at 21°C),
	1k ohm Thin-Film Platinum	± 0.35F° at 70°F (± 0.19C° at 21°C), DIN Class A
	100 ohm Platinum Averaging	± 1.0F° at 70°F (± 0.58C° at 21°C)
	1k ohm Platinum Averaging	± 1.0F° at 70°F (± 0.58C° at 21°C)
	2.2k ohm Thermistor	± 0.36F° (± 0.2C°) in the range: 32 to 158°F (0 to 70°C)
	10k ohm Thermistor	± 0.9F° (± 0.5C°) in the range: 32 to 158°F (0 to 70°C)
Sensor Temperature Coefficient	1k ohm Thin-Film Nickel	Approximately 3 ohms/F° (5.4 ohms/C°)
	1k ohm Nickel Averaging	Approximately 3 ohms/F° (5.4 ohms/C°)
	1k ohm Thin-Film Platinum	Approximately 2 ohms/F° (3.9 ohms/C°) 3,850 ppm/K
	100 ohm Platinum Averaging	Approximately 0.2 ohms/F° (.39 ohms/C°)
	1k ohm Platinum Averaging	Approximately 2 ohms/F° (3.9 ohms/C°)
	2.2k ohm Thermistor	Nonlinear, Negative Temperature Coefficient (NTC)
	10k ohm Thermistor	Nonlinear, NTC, Johnson Controls® Type II
Materials	Probe	.25 in. (6.4 mm) Outside Diameter (O.D.) x 6 in. (152 mm) or 8 in. (203 mm) Long, Stainless Steel Tubing
	Nickel Averaging Probe	0.094 in. (2.4 mm) O.D. x 8 ft (2.4 m) or 17 ft (5.2 m) Long, Copper Tubing
	Platinum Averaging Probe	0.19 in. (4.8 mm) O.D. x 10 ft (3.0 m) or 20 ft (6.1 m) Long, Aluminum Tubing
	Conduit Box	Rigid Thermoplastic
	Sensor Holder	Rigid Thermoplastic
	Mounting Plate	Aluminum
Operating Conditions	Probe Assembly	-50 to 220°F (-46 to 104°C)
	Conduit Box	-50 to 122°F (-46 to 50°C)

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.



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