

Thermostats and Accessories

Thermostats and Accessories	Description	Page
ST10 and ST207	Pre-set thermostats used with flexible heaters are available mounted to the heater or as a separate device used to control process.	575
Bulb and Capillary	Regulates temperature in non-critical applications within a preset range and cycles heaters on and off.	578
Protective Wells	Provides protection for thermostat bulbs and other sensors while directly immersed in process fluids.	583





Thermostats and Accessories

ST10 and ST207

Temperature Sensors

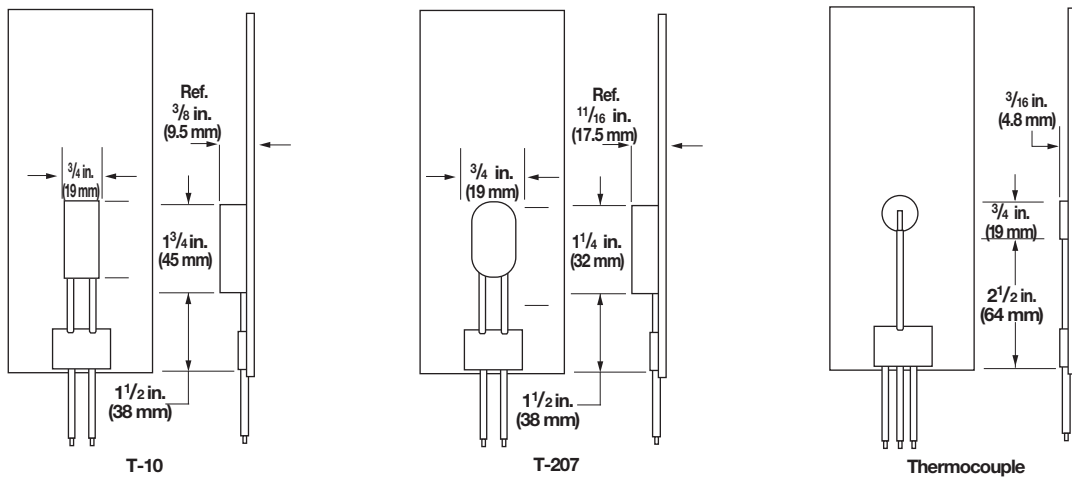
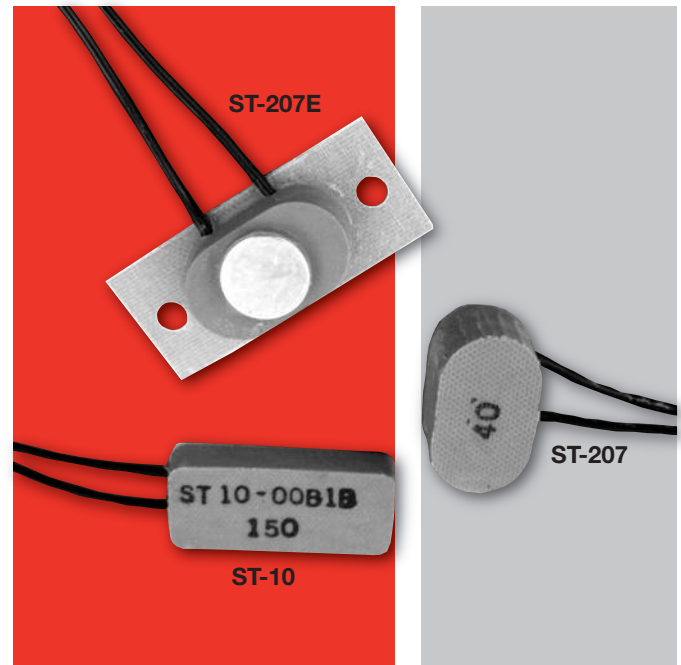
Watlow® offers several styles of sensors for use with flexible heaters. These sensors are available as preset or adjustable thermostats, thermocouples, thermistors, RTDs or thermal fuses. They can be integrally mounted (encapsulated in silicone rubber) to sense the temperature of either the part or the heater sheath. The thermostats can also be ordered separate from the heater, allowing direct control of your process temperature, if desired.

Pre-Set Thermostats

Several styles of non-adjustable, pre-set thermostats are available from Watlow. Thermostats separate from the heater are encapsulated in silicone rubber, and are available with standard 12 in. (305 mm) leads unless otherwise specified.

Thermocouples, thermistors, RTDs and thermal fuses are usually mounted to the heater under a vulcanized protective cap of silicone rubber sheath material. This drawing shows a typical mounting style for a thermocouple.

Note: Precise part temperature control with preset thermostats requires prototyping and field testing.



Pre-Set Thermostats (Non-Adjustable)

Thermostat Model	Maximum Watts	Volts AC	Temperature Settings Available °F (°C)	Agency Approvals		
				UR	cUR	VDE
T-10	600/960	120/240	125-300±10 (50-149±5)	yes	yes	yes
T-207	1500	120/240	40/55±8 (4/13±4.4)	yes	yes	yes
	1500	120/240	60/75±8 (16/24±4.4)	yes	yes	yes
	1500	120/240	95/110±8 (35/43±4.4)	yes	yes	yes
	1500	120/240	145/160±8 (63/71±4.4)	yes	yes	yes

Notes:

- When ordering a pre-set thermostat separate from the heater, simply add the prefix **S** to the model number. (Example: ST-10) See next page.
- Snap action preset temperatures on the T-207 are close/open settings.
- T-10 thermostats are manufactured for specific preset temperatures. Available in 25°F increments.
- Other temperature ranges and voltages are available on special order. Minimum quantities apply, contact your Watlow representative before ordering.

Thermostats and Accessories

ST10 and ST207

Temperature Sensors (Continued)

Adjustable Thermostats

The B-200 thermostat features a maximum rating of 1500 watts at 120/240VAC. The following temperature ranges are available:

- Model B-200-2: 100 to 500°F (40 to 260°C)
- Model B-200-3: 25 to 330°F (-5 to 165°C)

The B-200 thermostat can be integrally mounted to the heater with a bonded protective cap of silicone rubber sheath material.

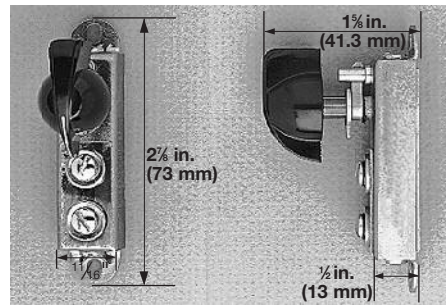
Separate Heater Accessories Available – Pre-Set Thermostats Separate From Heater

These are offered to allow direct control of your process temperature, so you're not limited to controlling only the heater temperature when using catalog heaters. Pre-set thermostats are encapsulated in silicone rubber with standard 12 inch leads.

The same temperature ranges, ratings and sizes are available on these thermostats. When ordering, add "S" prefix to the model number to indicate "separate" item. (Examples: ST-10 and ST-207)

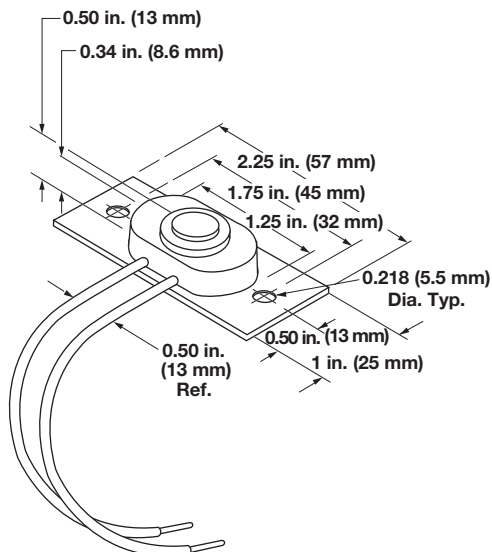
Standard leads are 12 in. (305 mm) 18 gauge UL®1180 black leads.

Adjustable Thermostats Separate From Heater



B-200

The Model B-200 adjustable thermostat can be ordered as a separate item. The same model numbers and temperature ranges indicated under *Adjustable Thermostats* are available. When ordering, simply note that you want the **B-200 separate** from the heater.



Note: For direct control of air temperature as is required in enclosure heating applications, specify thermostat model number ST-207E. This is a modified ST-207 mounted on 1/2 inch thick G-10 circuit board with the thermostat's metal cap exposed to sense air temperature.

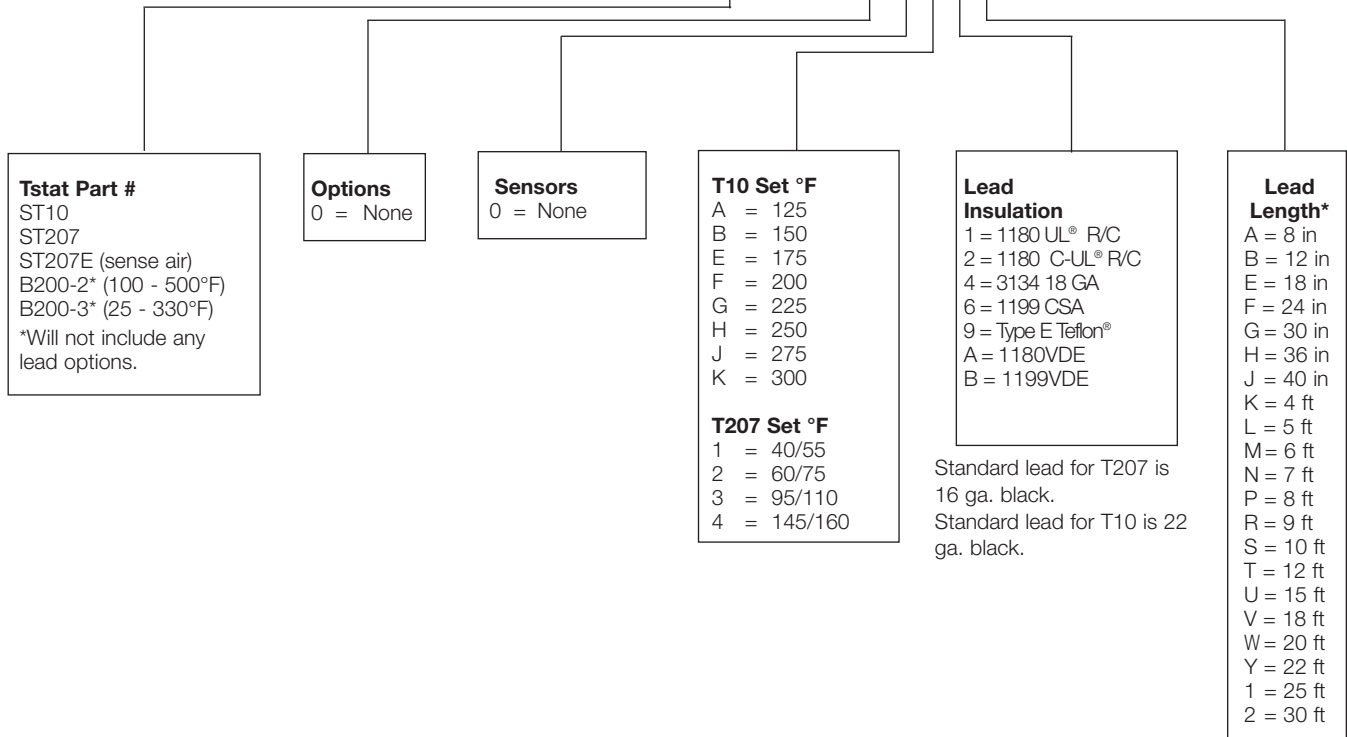
Thermostats and Accessories

ST10 and ST207

Thermostat Ordering Information

To order, complete the code number with the information below:

Tstat Part #- 0 0



* Customer specified length must be noted in inches when ordering.

Thermostats and Accessories

Bulb and Capillary

Thermostats regulate temperature in non-critical applications. They sense temperature, within a preset range and cycle heaters on and off to maintain the set point.

Thermostats may be mounted inside a terminal enclosure or remote mounted (separate from the heater assembly). If using a remote mounted thermostat, be sure to order the sufficient capillary tube length to permit installation.

All Watlow thermostats are normally closed circuit and either single-pole, single-throw (SPST) or double pole, single-throw (DPST). They can be used with or without an enclosure.

Thermostat selection should be based on temperature range, capillary tube length and sensor bulb size (diameter/length).

Remote Mount Thermostat Assemblies

Remote mounted thermostat assemblies can be supplied with the following enclosures:

- General purpose (NEMA 1)
- Moisture resistant (NEMA 4)
- Explosion resistant (NEMA 7)
- Explosion/moisture resistant (NEMA 7/4)
- Dust resistant (NEMA 12)

Pilot Light

An optional pilot light gives visual indication whether the power supplied to the heating element(s) is on or off.

To order, please specify suffix code **PL11**.

Thermostat Conversion Kits

Kits are available to convert a heater's general purpose (NEMA 1) terminal enclosure to accept either a single- or double-pole thermostat. The kit contains all the necessary parts to change out the existing terminal enclosure cover and mount the thermostat inside.

These are **hardware and wiring kits** only.

Single-pole conversion kit covers 1, 1¼, 2 and 2½ inch NPT screw plugs. To order, specify code **K492-000-35-(thermostat type)**.

Double-pole conversion kit covers 2 and 2½ inch NPT screw plugs. To order, specify code **K492-000-34-(thermostat type)**.

Celsius Dial Scale

Thermostats are shipped with Fahrenheit (°F) dial scales. If your application requires a Celsius (°C) scale, order the optional dial face.

To order, specify code **CD**. Scale will match thermostat temperature range.



Warning

Do not use thermostats for high-limit sheath protection. Thermostats fail in a closed circuit mode and will not cut power to the heaters. Limit control should be provided by an isolated, redundant sensor and control system of the appropriate type, design and installation.

Thermostats are precalibrated at the factory. No adjustment, other than selecting the desired operating temperature, is required. All wiring should be performed by qualified personnel and comply with the National Electrical Code and other applicable state and local codes.

To help assure the correct thermostat is selected as well as installed and wired properly, here are a few helpful hints. Schematics are provided for interconnecting thermostats to single- and three-phase heaters.

Thermostats and Accessories

Bulb and Capillary

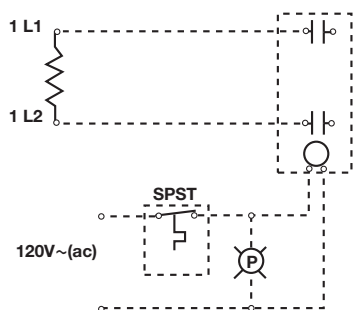
Technical Information

Application Hints

- Locate the thermostat where ambient temperatures do not exceed 150°F (65°C).
- Mount the thermostat in an enclosure that is compatible with the surrounding environment.
- Immerse the entire sensing bulb in the media being heated.
- Make sure the sensing bulb is mounted away from the heating element(s) to negate any undue influence on the sensing bulb's temperature "reading."
- Keep the capillary tube insulated from electrical connections.
- Do not use a thermostat for high-accuracy temperature sensing. Use an appropriate thermocouple, RTD or thermistor and temperature control.
- Do not use thermostats as a primary power switching device. Use a disconnect switch or circuit breaker to cut power when servicing.
- Interconnect the thermostat to the heater only if:
 - The heater has one circuit
 - The heater's ampere draw is lower than the thermostat's rated ampacity at prescribed voltage.
- Interconnect either a single- or double-pole thermostat with a single-phase heater when the supply voltage does not exceed 277VAC for SPST or 480VAC for DPST.
- Only interconnect three-phase delta heaters to DPST thermostats.
- Use a single-pole thermostat for pilot duty where the thermostat is not interconnected with the heater, or heater exceeds the volt/amp rating.

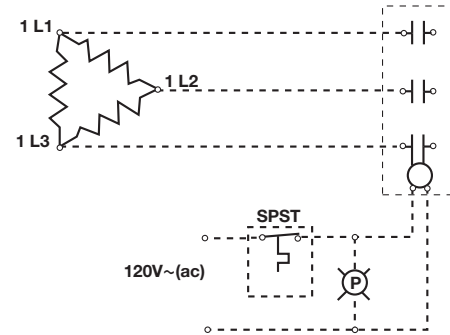
Pilot Duty Wiring

SPST, 1-phase

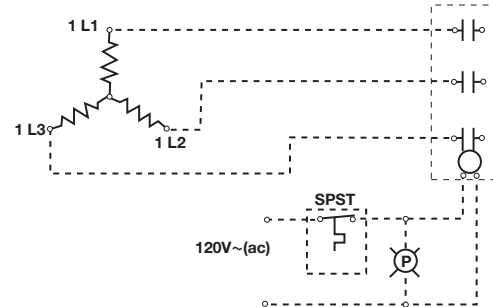


Pilot Duty Wiring (Continued)

SPST, 3-phase delta

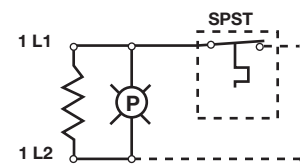


SPST, 3-phase wye

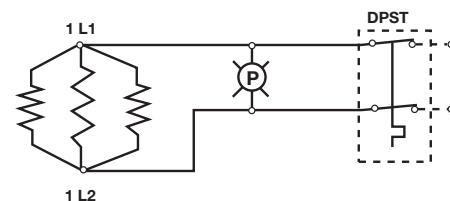


Interconnected Wiring

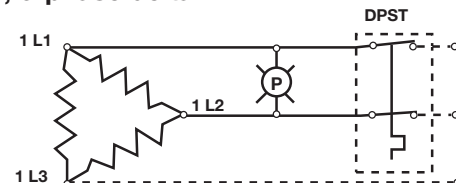
SPST, 1-phase



DPST, 1-phase



DPST, 3-phase delta



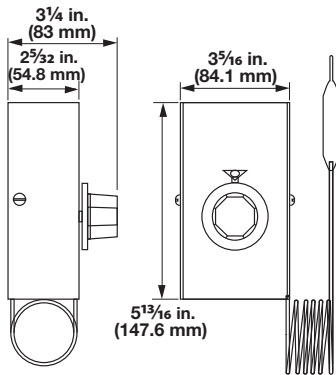
Thermostats and Accessories

Bulb and Capillary

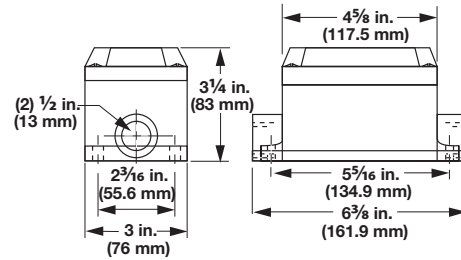
Technical Information (Continued)

Thermostats with Enclosures

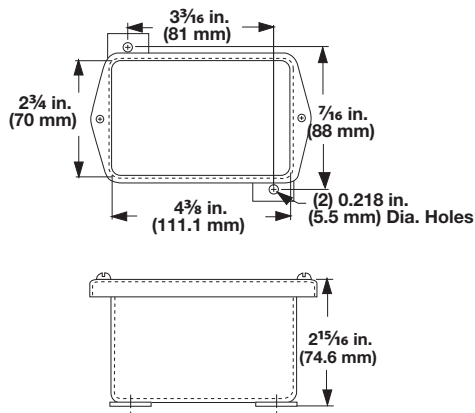
General Purpose (NEMA 1) Single- and Double-Pole



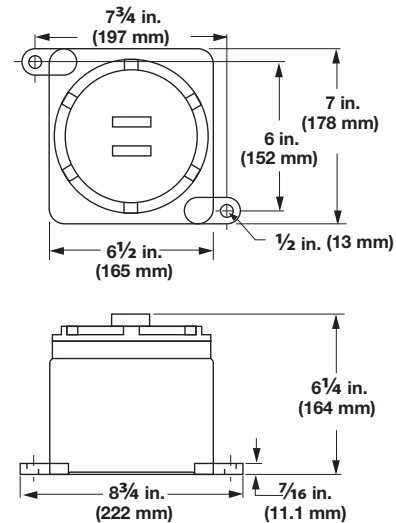
Explosion Resistant (NEMA 7) Single-Pole



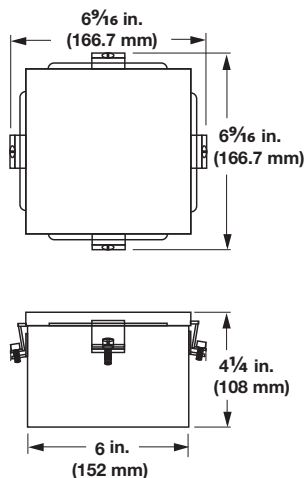
Moisture Resistant (NEMA 4) Single-Pole



Explosion Resistant (NEMA 7) Double-Pole



Moisture Resistant (NEMA 4) Double-Pole



Cross-Reference For Replacement Thermostat	Order With This Number
202-0-21-1 (small knob)	1
202-0-21-2 (small knob)	202-0-21-2MB
202-0-21-4	2
202-0-21-5	2A
202-0-21-3	3
202-0-21-8 (small knob)	202-0-21-8M
202-0-21-6	3A
202-0-4-2	4
202-0-4-17	5A
202-0-4-16	7A
202-0-3-1	8
202-0-3-3	9
202-0-29-2	11
202-0-41-2 (small knob)	12A

If you only have the thermostat code number, use this cross-reference chart.

Thermostats and Accessories



Bulb and Capillary

Technical Information (Continued)

Thermostat

Control Mode	Type	Temperature Range		Differential °F (°C)	Ampacity @ Line Voltage				Bulb Diameter in. (mm)	Bulb Length in. (mm)	Capillary Length in. (mm)	Terminal Type	Code No.	Est. Net Wt. lbs (kg)
		°F	(°C)		120	240	277	480						
On-off Temp Control	Single-Pole	30-110	(0-40)	8 (0)	25	25	22	—	0.250 (6)	4 $\frac{3}{4}$ (121)	18 (455)	#12 AWG	1	1 (0.4)
		30-250	(0-120)	15 (8)	25	25	22	—	0.250 (6)	3 $\frac{3}{4}$ (85)	18 (455)		2	1 (0.4)
	Single-Throw (SPST)	30-250	(0-120)	15 (8)	25	25	22	—	0.250 (6)	3 $\frac{3}{4}$ (85)	84 (2135)	Stranded Leads	2A	1 (0.4)
		175-550	(80-290)	26 (14)	25	25	22	—	0.250 (6)	3 $\frac{3}{4}$ (85)	18 (455)		3 ①	1 (0.4)
		175-550	(80-290)	26 (14)	25	25	22	—	0.250 (6)	2 $\frac{3}{4}$ (70)	84 (2135)		3A ①	1 (0.4)
		60-160	(15-70)	19 (10)	30	30	30	20	0.250 (6)	4 $\frac{3}{4}$ (110)	14 (355)	#8-32	12A	1 (0.4)
	Double-Pole	40-110	(4-40)	12 (7)	30	30	30	10	0.250 (6)	6 $\frac{1}{16}$ (167)	36 (915)	Screw Lug	4	2 (0.9)
		60-250	(15-120)	12 (7)	30	30	30	10	0.250 (6)	6 $\frac{1}{2}$ (165)	48 (1220)		5A	2 (0.9)
	Single-Throw (DPST)	100-550	(40-290)	22 (12)	30	30	30	10	0.250 (6)	7 $\frac{1}{16}$ (179)	48 (1220)		7A	2 (0.9)
On-off with Manual Reset	(DPST)	60-250	(15-120)	12 (7)	30	30	30	—	0.250 (6)	6 $\frac{1}{2}$ (165)	48 (1220)	#10-32 Screw Lug	8	2 (0.9)
		100-550	(40-290)	22 (12)	30	30	30	—	0.188 (8)	12 (305)	48 (1220)		9	2 (0.9)
	(SPST)	350 ⑨	(180)	—	30	30	20	—	0.250 (6)	3 $\frac{1}{2}$ (90)	36 (915)	#10-32 Screw Lug	11	1 (0.4)

RAPID SHIP

• RS - Same day shipment up to 15 pieces

① UL® recognized only

⑨ Fixed temperature setting

Thermostats and Accessories

Bulb and Capillary

Ordering Information

To order, complete the code number to the right with the information below:

Example: 2 W LTB

Thermostat Code Number _____

See chart above

Enclosure (Remote Mount Only) _____

- S = General purpose (NEMA 1)
- W = Moisture resistant (NEMA 4)
- E = Explosion resistant (NEMA 7)
- E/W = Explosion/moisture resistant (NEMA 7/4)
- D = Dust resistant (NEMA 12)

Options _____

- CD = Celsius dial scale
- CB = Chrome bezel
- LTB = Liquid-tight brass fitting (3/8 in. - 18 NPT)
- PL11 = Pilot light, 120V only available on NEMA 4/7 and 7

Thermostats and Accessories

Protective Wells

Protective wells isolate and protect thermostat bulbs and other temperature sensors (thermocouples, RTDs or thermistors). They allow inserting the sensing element sufficiently into the media being heated without being damaged.

Steel or stainless steel protective wells are available in three lengths. They are supplied with 1/2 inch NPT mounting and 3/8 inch-18 NPT internal thread for mating to a liquid-tight bushing (LTB).

To order, specify the appropriate code number from the table below.

Protective Wells

Plug and Thermowell Material	Immersed B Dimension		Code Number	Est. Ship. Wt.	
	in.	(mm)		lb	(kg)
Steel	12	(305)	PWS12	1	(0.5)
	24	(610)	PWS24	2	(1.0)
	36	(915)	PWS36	2	(1.0)
Stainless Steel	12	(305)	PWSS12	1	(0.5)
	24	(610)	PWSS24	2	(1.0)
	36	(915)	PWSS36	2	(1.0)

