

# 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

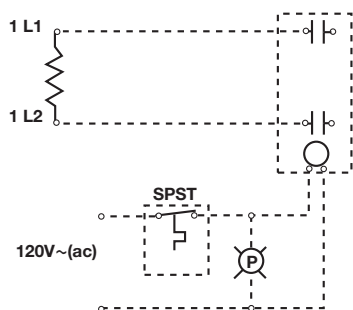
### Technical Information

#### 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.

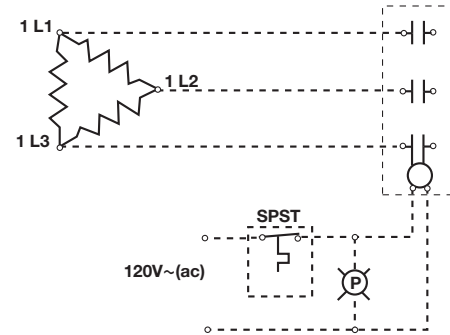
#### Pilot Duty Wiring

##### SPST, 1-phase

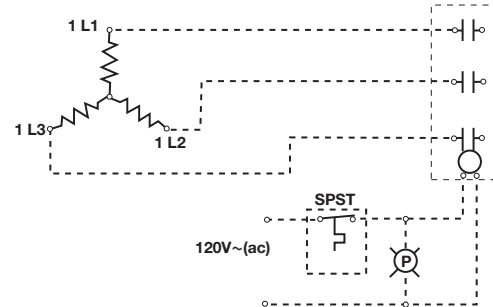


#### Pilot Duty Wiring (Continued)

##### SPST, 3-phase delta

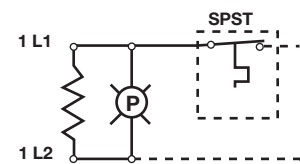


##### SPST, 3-phase wye

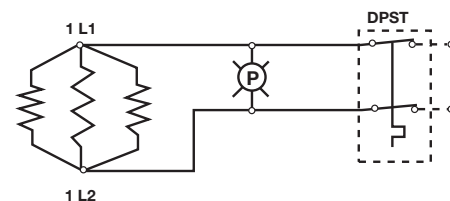


#### Interconnected Wiring

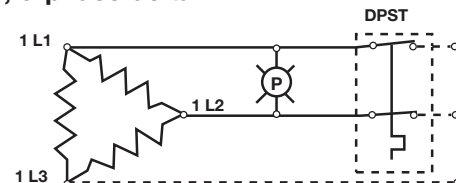
##### SPST, 1-phase



##### DPST, 1-phase



##### DPST, 3-phase delta



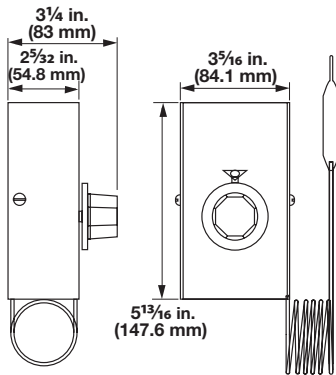
# Thermostats and Accessories

## Bulb and Capillary

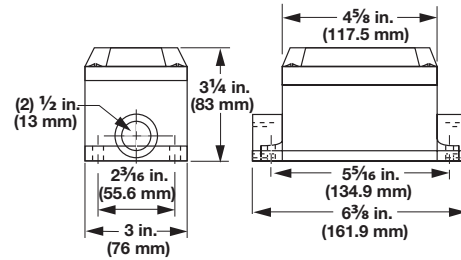
Technical Information (Continued)

### Thermostats with Enclosures

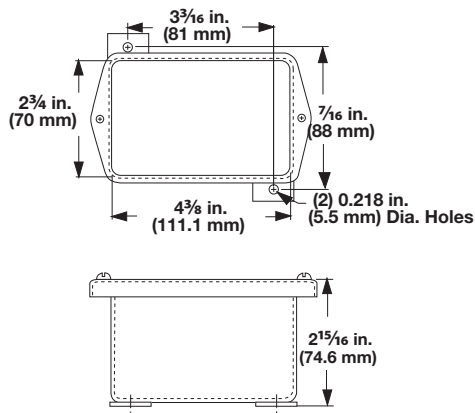
#### General Purpose (NEMA 1) Single- and Double-Pole



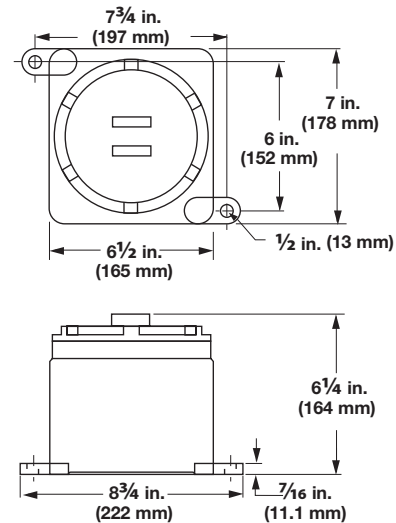
#### Explosion Resistant (NEMA 7) Single-Pole



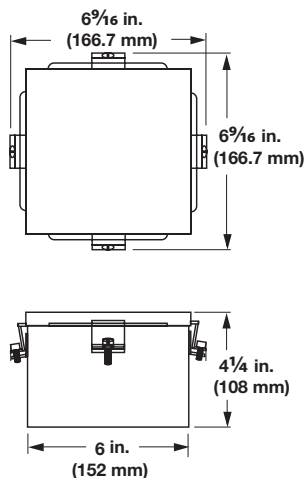
#### Moisture Resistant (NEMA 4) Single-Pole



#### 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<br>°F (°C) | Ampacity @<br>Line Voltage |     |     |           | Bulb<br>Diameter<br>in. (mm) | Bulb<br>Length<br>in. (mm) | Capillary<br>Length<br>in. (mm) | Terminal<br>Type    | Code<br>No. | Est. Net<br>Wt.<br>lbs (kg) |
|-----------------------------------|----------------------------|-------------------|----------|-------------------------|----------------------------|-----|-----|-----------|------------------------------|----------------------------|---------------------------------|---------------------|-------------|-----------------------------|
|                                   |                            | °F                | (°C)     |                         | 120                        | 240 | 277 | 480       |                              |                            |                                 |                     |             |                             |
| On-off<br>Temp<br>Control         | Single-<br>Pole            | 30-110            | (0-40)   | 8 (0)                   | 25                         | 25  | 22  | —         | 0.250 (6)                    | 4 $\frac{3}{4}$ (121)      | 18 (455)                        | #12 AWG             | <b>1</b>    | 1 (0.4)                     |
|                                   |                            | 30-250            | (0-120)  | 15 (8)                  | 25                         | 25  | 22  | —         | 0.250 (6)                    | 3 $\frac{3}{4}$ (85)       | 18 (455)                        |                     | <b>2</b>    | 1 (0.4)                     |
|                                   | Single-<br>Throw<br>(SPST) | 30-250            | (0-120)  | 15 (8)                  | 25                         | 25  | 22  | —         | 0.250 (6)                    | 3 $\frac{3}{4}$ (85)       | 84 (2135)                       | Stranded<br>Leads   | <b>2A</b>   | 1 (0.4)                     |
|                                   |                            | 175-550           | (80-290) | 26 (14)                 | 25                         | 25  | 22  | —         | 0.250 (6)                    | 3 $\frac{3}{4}$ (85)       | 18 (455)                        |                     | <b>3</b> ①  | 1 (0.4)                     |
|                                   |                            | 175-550           | (80-290) | 26 (14)                 | 25                         | 25  | 22  | —         | 0.250 (6)                    | 2 $\frac{3}{4}$ (70)       | 84 (2135)                       |                     | <b>3A</b> 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               | <b>12A</b>  | 1 (0.4)                     |
|                                   | Double-<br>Pole            | 40-110            | (4-40)   | 12 (7)                  | 30                         | 30  | 30  | 10        | 0.250 (6)                    | 6 $\frac{1}{16}$ (167)     | 36 (915)                        | Screw Lug           | <b>4</b>    | 2 (0.9)                     |
|                                   |                            | 60-250            | (15-120) | 12 (7)                  | 30                         | 30  | 30  | 10        | 0.250 (6)                    | 6 $\frac{1}{2}$ (165)      | 48 (1220)                       |                     | <b>5A</b>   | 2 (0.9)                     |
|                                   | 100-550                    | (40-290)          | 22 (12)  | 30                      | 30                         | 30  | 10  | 0.250 (6) | 7 $\frac{1}{16}$ (179)       | 48 (1220)                  | <b>7A</b>                       |                     | 2 (0.9)     |                             |
| On-off<br>with<br>Manual<br>Reset | (DPST)                     | 60-250            | (15-120) | 12 (7)                  | 30                         | 30  | 30  | —         | 0.250 (6)                    | 6 $\frac{1}{2}$ (165)      | 48 (1220)                       | #10-32<br>Screw Lug | <b>8</b>    | 2 (0.9)                     |
|                                   |                            | 100-550           | (40-290) | 22 (12)                 | 30                         | 30  | 30  | —         | 0.188 (8)                    | 12 (305)                   | 48 (1220)                       |                     | <b>9</b>    | 2 (0.9)                     |
|                                   | (SPST)                     | 350 ⑨             | (180)    | —                       | 30                         | 30  | 20  | —         | 0.250 (6)                    | 3 $\frac{1}{2}$ (90)       | 36 (915)                        | #10-32<br>Screw Lug | <b>11</b>   | 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) | <b>PWS12</b>  | 1              | (0.5) |
|                              | 24                   | (610) | <b>PWS24</b>  | 2              | (1.0) |
|                              | 36                   | (915) | <b>PWS36</b>  | 2              | (1.0) |
| Stainless Steel              | 12                   | (305) | <b>PWSS12</b> | 1              | (0.5) |
|                              | 24                   | (610) | <b>PWSS24</b> | 2              | (1.0) |
|                              | 36                   | (915) | <b>PWSS36</b> | 2              | (1.0) |

