

VALVE DESCRIPTION

The Powers #11 Water Mix Regulator is a self-actuating control valve which automatically maintains a mixture of hot and cold water at the desired set point without the use of external power. Adjust the set point and the rugged self-operating #11 Regulator controls the mix of hot or cold water to maintain a constant temperature.

The instrument has a vapor pressure thermal system containing a thermally responsive fluid. This thermal system rapidly senses temperature changes at the bulb and accordingly positions the valve disc or plug, regulating hot and cold water flow to maintain the desired set point. The thermal system features a two-ply brass bellows with six reinforcing ribs on the bellows head and thick capillary tubing walls to insure long operating life.

The Powers #11 WM Regulator features:

- Tight disc shutoff when either of the two inlet ports are closed (up to 2")
- EPT disc is replaceable (on 1/2"-2" valves).
- Lower guide stabilizes valve plug, assisting shutoff and modulation.
- EPT spring loaded V-ring packing provides good sealing and long life.
- A valve stem of highly polished corrosion resistant grade 316L stainless steel to decrease friction and reduce hysteresis.
- An adjusting nut mounted on ball bearings and a removable set point adjusting rod ease set point adjustments
- A set point reference scale aids temperature adjustment.

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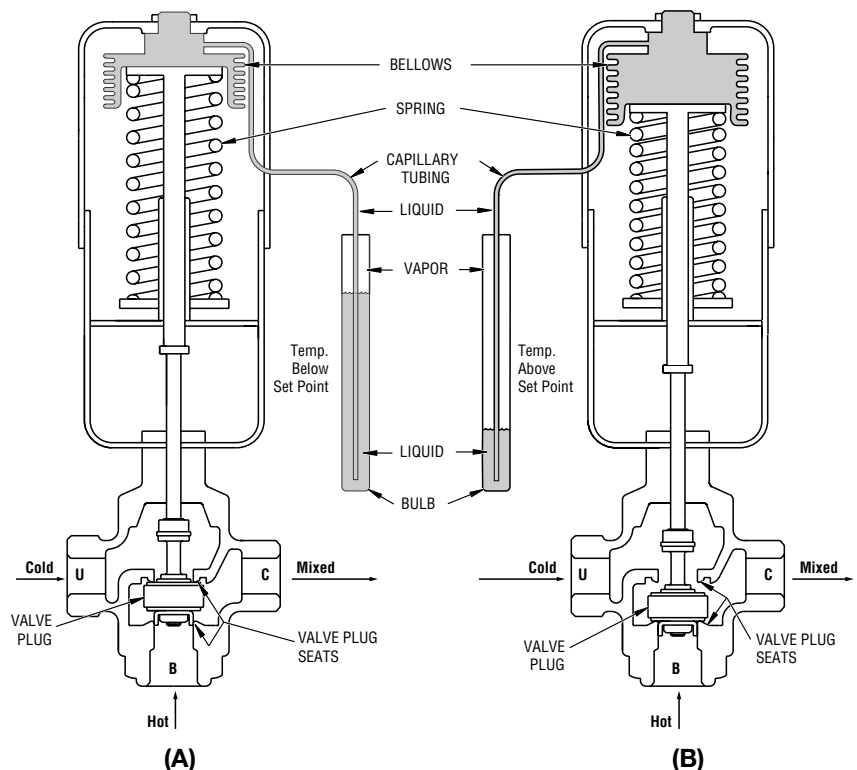
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OPERATION

The #11 Regulator should be installed with the hotter of the two liquids going into the bottom 'B' port and the cooler liquid going into the upper 'U' port.

(A) When the temperature of the mixed liquid drops below the set point, the temperature of the thermally responsive fluid decreases, which decreases the vapor pressure in the bulb/bellows. The force of the resulting vapor pressure is less than the spring force, so the bellows contract and the spring extends, which raises the valve plug up to decrease flow through the upper 'U' port (cold) and increase flow through the bottom 'B' port (hot). This raises the temperature of the flow out of the common 'C' port toward the set point.

(B) As the temperature increases toward or beyond the desired set point, the temperature of the thermally responsive fluid in the bulb increases, which causes the vapor pressure to increase. This expands the bellows, compresses the spring, and moves the valve plug down to increase flow through the upper 'U' port (cold) and decrease flow through the bottom 'B' port (hot). This lowers the temperature of the flow out of the common 'C' port toward the set point.



APPLICATIONS

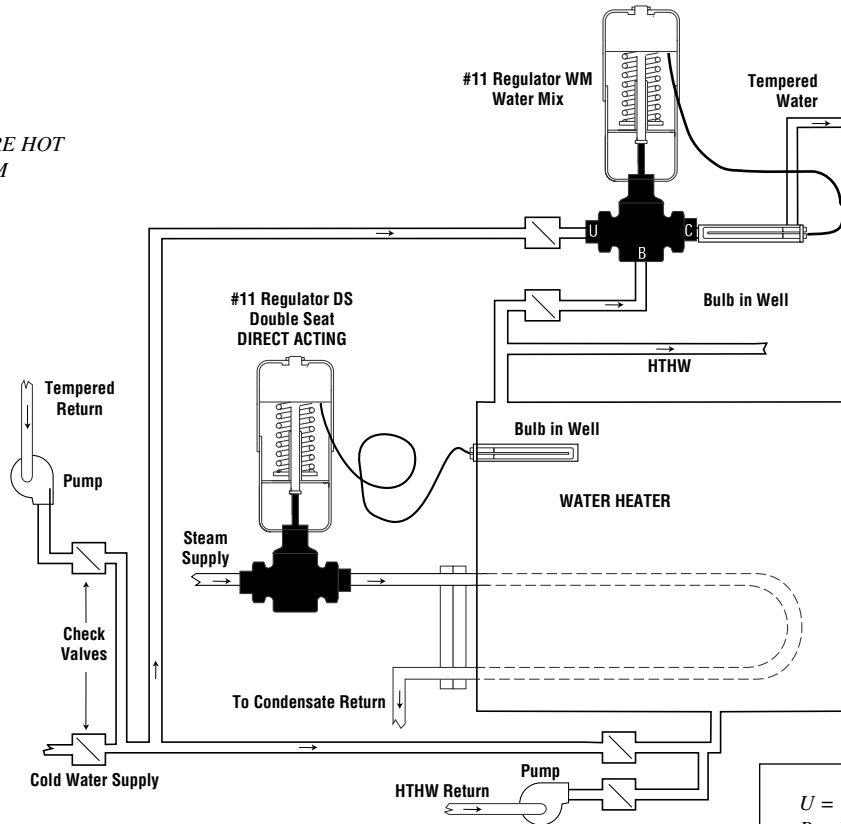
WARNING:

In domestic water system, a safety shutdown device should be installed in conjunction with a #11 regulator. Failure of the #11 thermal system will result in a constant rise in temperature (or constant high temperature) of the fluid which you are trying to control.

Powers #11 Water Mix Regulators are typically used for automatic control of domestic or process water tempering. The self-actuated regulator can easily be installed in any convenient location. Among its applications are: two-temperature hot water systems, jacket water cooling of engines or compressors, and many other industrial processes. Below are two typical applications.

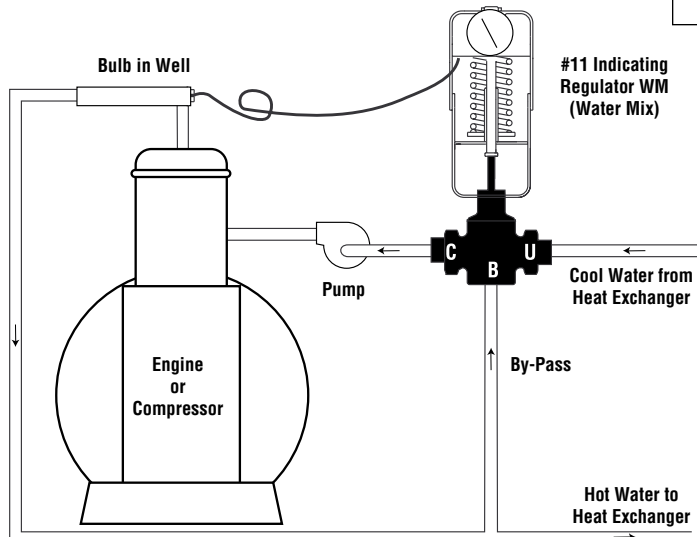
The three-way regulator can also be used for bypass control, in lieu of a diverting valve, but it must be piped as a mixing valve, with two inlets and one outlet.

TWO TEMPERATURE HOT WATER SYSTEM



U = Upper Port/Cold Water Inlet
B = Bottom Port/Hot Water Inlet
C = Combination Port/Mixed Water Outlet

JACKET WATER COOLING APPLICATION



SPECIFICATIONS

| | | Valve Sizes | |
|------------------------|-------------------------------|------------------------------------|-------------------------------|
| | | 1/2", 3/4", 1", 1-1/4", 1-1/2", 2" | 2-1/2", 3", 4" |
| Physical Specs | Valve Plug Travel | See table on page 10 | See table on page 10 |
| | Effective Bellows Area | 7.8 sq. in. (50.3 sq. cm.) | 7.8 sq. in. (50.3 sq. cm.) |
| | Body Material | Bronze | Cast Iron |
| | Body Rating | ANSI Class 125 | ANSI Class 125 |
| | Connections | Screwed Ends | Flanged Ends |
| | Style | Composition Disc | Bronze Trim |
| | Max. Body Temperature | 400°F (204°C) | 350 °F (177°C) |
| Operating Specs | Temperature Range | See bulb spec on page 13 | See bulb spec on page 13 |
| | Controlled Medium | Water | Water |
| | Max. Differential Pressure | See Tables on pp. 3 & 4 | See Tables on pp. 3 & 4 |
| | Max. Allowable Overheat Temp. | 25°F (14°C) above temp. range | 25°F (14°C) above temp. range |
| | Max. Well Safe Pressure | See Tables on page 11 | See Tables on page 11 |
| | Max. Body Pressure | 125 psig | 125 psig |
| | Shipping Weight | See Table on page 10 | See Table on page 10 |
| | Flow Characteristics | Linear | Linear |
| | Shutoff Class Rating | ANSI Class IV | ANSI Class III |
| | Leakage | <0.01% of rated valve capacity | <0.1% of rated valve capacity |

SIZING AND SELECTION

Proper sizing of the Regulator is essential for correct system operation. An undersized Regulator will not allow sufficient flow at maximum load. An oversized Regulator may cycle and will not utilize the full valve stroke for efficient modulation of flow. This results in poor control and shortened valve life (quicker deterioration of valve disc and seat). For these reasons, the correct sizing of the Regulator for actual expected conditions is considered essential for good control.

Note: Select temperature range (see page 14) with the set point in the upper third for best valve performance.

Size the #11 Regulator for actual rather than maximum conditions. DO NOT size according to pipe size; piping systems are designed for different criteria than process controls. Refer to Powers docu-

ment AE-1—"Valve Selection and Sizing"—for further recommendations.

Maximum Operating Pressure Differential (differential for fluid flow): In order for the process medium to flow, a pressure drop must exist across the valve. "Pressure differential" is the difference in valve pressure between the inlet and outlet under flow conditions. The greater the differential, the greater the flow at any given plug position.

Though the regulator should be sized for actual conditions, you need to know the available differential at maximum flow. For optimum control, take as much differential as possible across the valve.

Refer to Maximum Water Capacities tables on page 4.

MAXIMUM WATER CAPACITIES

CAUTION: Do not exceed maximum pressure differentials for given valve sizes. The **maximum differential** is the pressure the valve has against it at shutoff. Too large a differential can cause valve chatter and/or prevent shutoff.

TEMPERING Applications - Maximum MIXED FLOW

Gallons Per Minute

| Valve Size | Cv | Available Sizing Pressure Differential --- PSI | | | | | | | | | | |
|------------|-----|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | 2 | 4 | 6 | 8 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |
| 1/2" | 4.2 | 5.9 | 8.4 | 10 | 12 | 13 | 16 | 19 | 21 | 23 | 27 | 30 |
| 3/4" | 7.2 | 10 | 14 | 18 | 20 | 23 | 28 | 32 | 36 | 39 | 46 | 51 |
| 1" | 12 | 17 | 24 | 29 | 34 | 38 | 46 | 54 | 60 | 66 | 76 | 85 |
| 1-1/4" | 20 | 28 | 40 | 49 | 57 | 63 | 77 | 89 | 100 | 110 | 126 | 141 |
| 1-1/2" | 25 | 35 | 50 | 61 | 71 | 79 | 97 | 112 | 125 | 137 | 158 | 177 |
| 2" | 39 | 55 | 78 | 96 | 110 | 123 | 151 | 174 | 195 | 214 | 247 | 276 |
| 2-1/2" | 77 | 109 | 154 | 189 | 218 | 243 | 298 | 344 | 385 | 422 | -- | -- |
| 3" | 120 | 170 | 240 | 294 | 339 | 379 | 465 | 537 | 600 | 657 | -- | -- |
| 4" | 145 | 205 | 290 | 355 | 410 | 459 | 562 | 648 | 725 | 794 | -- | -- |

Liters per Second

| Valve Size | Cv | Available Sizing Pressure Differential --- kPa | | | | | | | | | | | | |
|------------|-----|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| | | 7 | 15 | 30 | 45 | 60 | 75 | 100 | 125 | 150 | 200 | 250 | 350 | |
| 1/2" | 0.3 | 0.4 | 0.6 | 0.7 | 0.8 | 0.9 | 1 | 1.1 | 1.2 | 1.4 | 1.6 | 1.9 | | |
| 3/4" | 0.5 | 0.7 | 0.9 | 1.2 | 1.3 | 1.5 | 1.7 | 1.9 | 2.1 | 2.4 | 2.7 | 3.2 | | |
| 1" | 0.8 | 1.1 | 1.6 | 1.9 | 2.2 | 2.5 | 2.9 | 3.2 | 3.5 | 4.1 | 4.6 | 5.4 | | |
| 1-1/4" | 1.3 | 1.9 | 2.6 | 3.2 | 3.7 | 4.2 | 4.8 | 5.4 | 5.9 | 6.8 | 7.6 | 9 | | |
| 1-1/2" | 1.6 | 2.3 | 3.3 | 4 | 4.7 | 5.2 | 6 | 6.7 | 7.4 | 8.5 | 9.5 | 11 | | |
| 2" | 2.5 | 3.6 | 5.1 | 6.3 | 7.3 | 8.1 | 9.4 | 10 | 11 | 13 | 15 | 18 | | |
| 2-1/2" | 4.9 | 7.2 | 10 | 12 | 14 | 16 | 18 | 21 | 23 | 26 | -- | -- | | |
| 3" | 7.6 | 11 | 16 | 19 | 22 | 25 | 29 | 32 | 35 | 41 | -- | -- | | |
| 4" | 9.2 | 13 | 19 | 23 | 27 | 30 | 35 | 39 | 43 | 49 | -- | -- | | |

BYPASS Applications - FULL FLOW thru BOTTOM Port (Top Closed)

Gallons Per Minute

| Valve Size | Cv | Available Sizing Pressure Differential --- PSI | | | | | | | | | | |
|------------|-----|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | 2 | 4 | 6 | 8 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |
| 1/2" | 2.2 | 3.1 | 4.4 | 5.4 | 6.2 | 7 | 8.5 | 9.8 | 11 | 12 | 14 | 16 |
| 3/4" | 6 | 8.5 | 12 | 15 | 17 | 19 | 23 | 27 | 30 | 33 | 38 | 42 |
| 1" | 8.9 | 13 | 18 | 22 | 25 | 28 | 34 | 40 | 45 | 49 | 56 | 63 |
| 1-1/4" | 16 | 23 | 32 | 39 | 45 | 51 | 62 | 72 | 80 | 88 | 101 | 113 |
| 1-1/2" | 18 | 25 | 36 | 44 | 51 | 57 | 70 | 80 | 90 | 99 | 114 | 127 |
| 2" | 30 | 42 | 60 | 73 | 85 | 95 | 116 | 134 | 150 | 164 | 190 | 212 |
| 2-1/2" | 77 | 109 | 154 | 189 | 218 | 243 | 298 | 344 | 385 | 422 | -- | -- |
| 3" | 120 | 170 | 240 | 294 | 339 | 379 | 465 | 537 | 600 | 657 | -- | -- |
| 4" | 145 | 205 | 290 | 355 | 410 | 459 | 562 | 648 | 725 | 794 | -- | -- |

Liters per Second

| Valve Size | Cv | Available Sizing Pressure Differential --- kPa | | | | | | | | | | | | |
|------------|-----|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| | | 7 | 15 | 30 | 45 | 60 | 75 | 100 | 125 | 150 | 200 | 250 | 350 | |
| 1/2" | 0.1 | 0.2 | 0.3 | 0.4 | 0.4 | 0.5 | 0.5 | 0.6 | 0.6 | 0.7 | 0.8 | 1 | | |
| 3/4" | 0.4 | 0.6 | 0.8 | 1 | 1.1 | 1.2 | 1.4 | 1.6 | 1.8 | 2 | 2.3 | 2.7 | | |
| 1" | 0.6 | 0.8 | 1.2 | 1.4 | 1.7 | 1.9 | 2.1 | 2.4 | 2.6 | 3 | 3.4 | 4 | | |
| 1-1/4" | 1 | 1.5 | 2.1 | 2.6 | 3 | 3.3 | 3.8 | 4.3 | 4.7 | 5.4 | 6.1 | 7.2 | | |
| 1-1/2" | 1.1 | 1.7 | 2.4 | 2.9 | 3.3 | 3.7 | 4.3 | 4.8 | 5.3 | 6.1 | 6.8 | 8.1 | | |
| 2" | 1.9 | 2.8 | 3.9 | 4.8 | 5.6 | 6.2 | 7.2 | 8.1 | 8.8 | 10 | 11 | 13 | | |
| 2-1/2" | 4.9 | 7.2 | 10 | 12 | 14 | 16 | 18 | 21 | 23 | 26 | -- | -- | | |
| 3" | 7.6 | 11 | 16 | 19 | 22 | 25 | 29 | 32 | 35 | 41 | -- | -- | | |
| 4" | 9.2 | 13 | 19 | 23 | 27 | 30 | 35 | 39 | 43 | 49 | -- | -- | | |

BYPASS Applications - FULL FLOW thru UPPER Port (Bottom Closed)

Gallons Per Minute

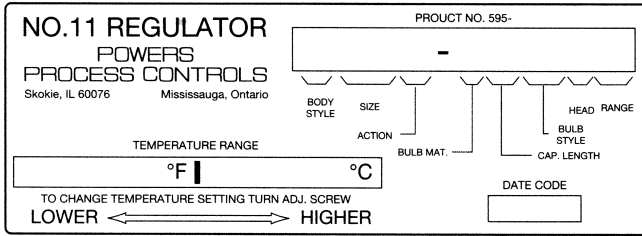
| Valve Size | Cv | Available Sizing Pressure Differential --- PSI | | | | | | | | | | |
|------------|-----|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | 2 | 4 | 6 | 8 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |
| 1/2" | 3.5 | 4.9 | 7 | 8.6 | 9.9 | 11 | 14 | 16 | 18 | 19 | 22 | 25 |
| 3/4" | 6 | 8.5 | 12 | 15 | 17 | 19 | 23 | 27 | 30 | 33 | 38 | 42 |
| 1" | 11 | 16 | 22 | 27 | 31 | 35 | 43 | 49 | 55 | 60 | 70 | 78 |
| 1-1/4" | 17 | 24 | 34 | 42 | 48 | 54 | 66 | 76 | 85 | 93 | 108 | 120 |
| 1-1/2" | 24 | 34 | 48 | 59 | 68 | 76 | 93 | 107 | 120 | 131 | 152 | 170 |
| 2" | 38 | 54 | 76 | 93 | 107 | 120 | 147 | 170 | 190 | 208 | 240 | 269 |
| 2-1/2" | 77 | 109 | 154 | 189 | 218 | 243 | 298 | 344 | 385 | 422 | -- | -- |
| 3" | 120 | 170 | 240 | 294 | 339 | 379 | 465 | 537 | 600 | 657 | -- | -- |
| 4" | 145 | 205 | 290 | 355 | 410 | 459 | 562 | 648 | 725 | 794 | -- | -- |

Liters per Second

| Valve Size | Cv | Available Sizing Pressure Differential --- kPa | | | | | | | | | | | | |
|------------|-----|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| | | 7 | 15 | 30 | 45 | 60 | 75 | 100 | 125 | 150 | 200 | 250 | 350 | |
| 1/2" | 0.2 | 0.3 | 0.5 | 0.6 | 0.7 | 0.7 | 0.8 | 0.9 | 1 | 1.2 | 1.3 | 1.6 | | |
| 3/4" | 0.4 | 0.6 | 0.8 | 1 | 1.1 | 1.2 | 1.4 | 1.6 | 1.8 | 2 | 2.3 | 2.7 | | |
| 1" | 0.7 | 1 | 1.4 | 1.8 | 2 | 2.3 | 2.6 | 3 | 3.2 | 3.7 | 4.2 | 4.9 | | |
| 1-1/4" | 1.1 | 1.6 | 2.2 | 2.7 | 3.2 | 3.5 | 4.1 | 4.6 | 5 | 5.8 | 6.5 | 7.6 | | |
| 1-1/2" | 1.5 | 2.2 | 3.2 | 3.9 | 4.5 | 5 | 5.8 | 6.4 | 7.1 | 8.2 | 9.1 | 11 | | |
| 2" | 2.4 | 3.5 | 5 | 6.1 | 7.1 | 7.9 | 9.1 | 10 | 11 | 13 | 14 | 17 | | |
| 2-1/2" | 4.9 | 7.2 | 10 | 12 | 14 | 16 | 18 | 21 | 23 | 26 | -- | -- | | |
| 3" | 7.6 | 11 | 16 | 19 | 22 | 25 | 29 | 32 | 35 | 41 | -- | -- | | |
| 4" | 9.2 | 13 | 19 | 23 | 27 | 30 | 35 | 39 | 43 | 49 | -- | -- | | |

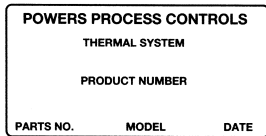
PRODUCT IDENTIFICATION

A red label should be on the front face of the thermal system. *Figure 1.* This label contains information required to properly main-

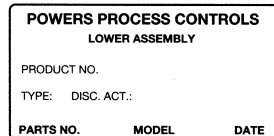


1. PRODUCT LABEL

tain, service and order parts for this product. If there is no label, look for a white label on the inside of the thermal system legs (*Figure 2A*) or the valve body vertical yoke (*Figure 2B*). When replacing the original thermal assembly or valve body, secure the old red label onto the valve or thermal system or ink the number onto the body.



2A. THERMAL SYSTEM LABEL



2B. VALVE BODY LABEL

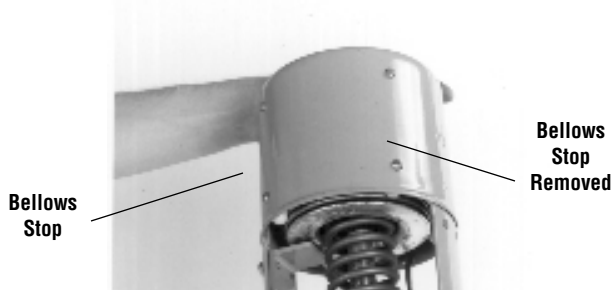
INSTALLATION

TOOLS NEEDED

- Straight slot screwdriver
- 3/8" open end wrench
- 1-3/8" open end wrench
- 1/2" wrench for hi-power regulator housing bolts
- 5/16" open end wrench
- 7/16" open end wrench
- Pliers

BEFORE INSTALLING VALVE

1. *Figure 3.* For 2-1/2" to 4" valves, remove bellows stops before installation and use.



3. BELLOWS STOPS

2. To insure proper system operation, thoroughly flush all piping and valves to rid them of all scale, dirt and debris.

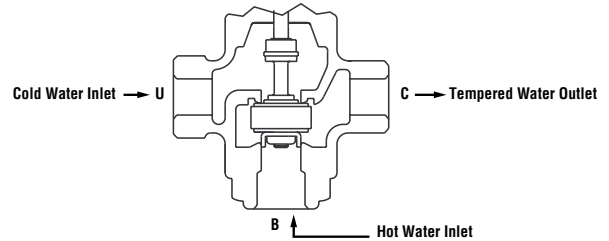
Position Valve

3. Select valve location with sufficient clearance to allow maintenance. Install valve in line. The direction of the arrows on the valve body must match the direction of the water or steam flow.

For best results, we recommend installing the valve in a horizontal line, and in the upright position with bellows head above valve. The valve may also be installed in any position within 90° of upright.

4. *Figure 4.* The direction of the arrows on the valve body must match the direction of the water flow.

Pipe the hot water to the bottom 'B' port, and the cold water to the upper 'U' port. The mixed water will exit the valve through the common 'C' port.

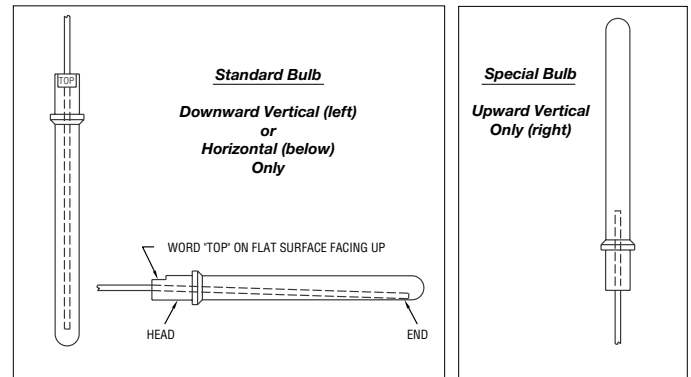


4. INLET PIPING

DO NOT reverse the inlets; the valve will not properly control the temperature of the mixed water if hot and cold supplies are reversed.

INSTALL BULB

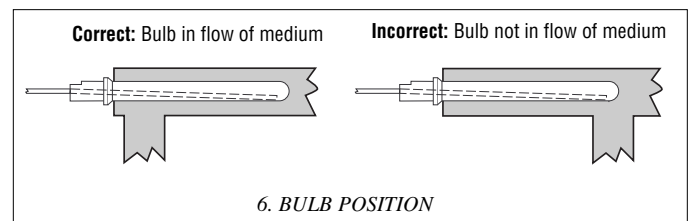
5. *Figure 5a* shows proper bulb orientation. *Figure 5b* shows the special bulb needed for upwards vertical positioning.
6. *Figure 6.* For any position, fully immerse the bulb in the flow of the medium.



5A. BULB ORIENTATION

5B. SPECIAL BULB

These instructions are for D style bulbs - for installation of other styles, refer to tag attached to bulb.



6. BULB POSITION

7. **Without a well:** Remove bushing from the bulb and screw it into the tank. Insert the thermostatic bulb through the bushing and tighten the union nut.
With a well: Do not use bushing. Screw well into tank, insert bulb directly into well, and tighten union nut.

ADJUST CAPILLARY TUBING

8. Coil the extra capillary, and position away from regulator operation where it is subjected to room temperature only.

WARNING: DO NOT kink, cut, sever or file the tubing. DO NOT disconnect tubing from bulb or bellows assembly. This can render the thermal system inoperable and result in severe process overheating.

ADJUST SET POINT

All regulators are factory set to control near mid-range operating temperature.

9. When adjusting the set point, make certain all fluids are flowing through the valve and are at the operating pressure of the system.



7. ADJUSTING SET POINT

10. Figure 7. Make all set point temperature changes by inserting the temperature adjustment rod into one of the holes of the adjusting nut assembly. (Use the temperature adjustment setting scale only for reference)

To Raise the set point: Turn rod left to right (counter-clockwise from top).

To Lower the set point: Turn rod right to left (clockwise from top).

MAINTENANCE

Numbers in brackets [#] refer to part numbers on pp. 12 & 13.

To fully disassemble regulator from valve

1. Figure 3. For 2-1/2" to 4" valves, replace bellows stops before performing any service or maintenance.
2. Before disassembly, the **bulb must be cooled** 30°F (16°C) below the lowest point on the thermal system range, and **flow through the valve must be stopped**.
3. Figure 7. Relieve all pressure on the spring by turning adjusting nut assembly [31] fully right to left (clockwise from top).

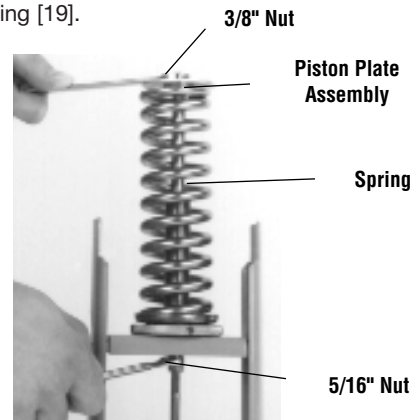
4. Figure 8. Remove housing bolts [6] and nuts [7] and temperature adjustment setting scale [8] and lift off thermal system [1] (housing, bellows, capillary, and bulb).



8. REMOVE HOUSING AND THERMAL SYSTEM

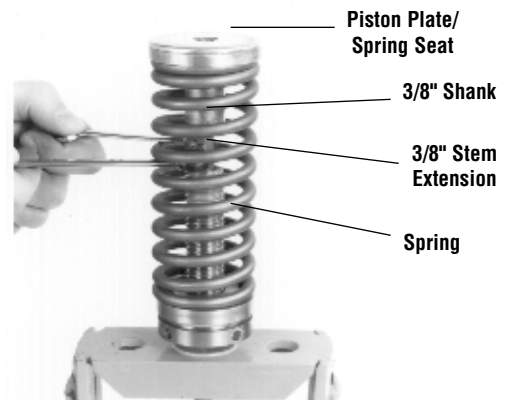
5. Figure 9A. For the 1/2" to 2" valves, use one 3/8" wrench and one 5/16" wrench, carefully loosen and remove piston plate assembly [2,3] from the stem extension [4].

Lift off spring [19].



9A. (1/2" TO 2") REMOVE PISTON PLATE AND SPRING

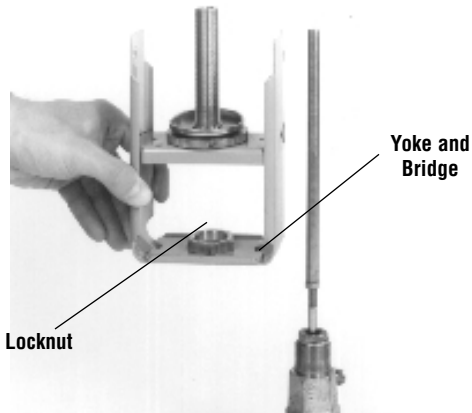
Figure 9B. For the 2-1/2" to 4" valves, use two 3/8" wrenches to carefully loosen piston plate/shank [3] from the stem extension [4]. Make sure the spring is fully decompressed, slowly remove piston plate assembly. Lift off the spring seat and the spring.



9B. (2-1/2" TO 4") REMOVE PISTON PLATE/SHANK AND SPRING

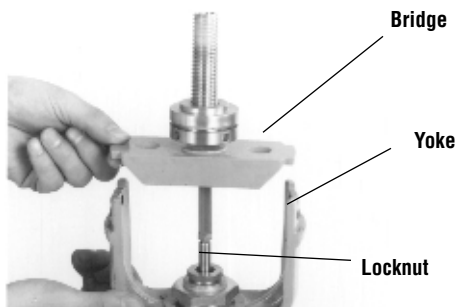
6. Use a 1-3/8" wrench to unscrew lock nut [11].

Figure 10A. For the 1/2" to 2" valves, the bridge and yoke are a one-piece assembly [9]. Lift them off.



10A. (1/2" TO 2") LIFT OFF BRIDGE/YOKE ASSEMBLY

Figure 10B. For the 2-1/2 to 4" valves, the cast iron bridge and yoke can be separated. Lift both off.

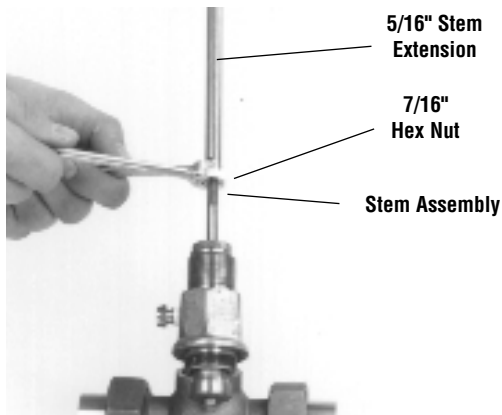


10B. (2-1/2" TO 4") LIFT OFF BRIDGE AND YOKE

To replace valve plug, disks and gaskets

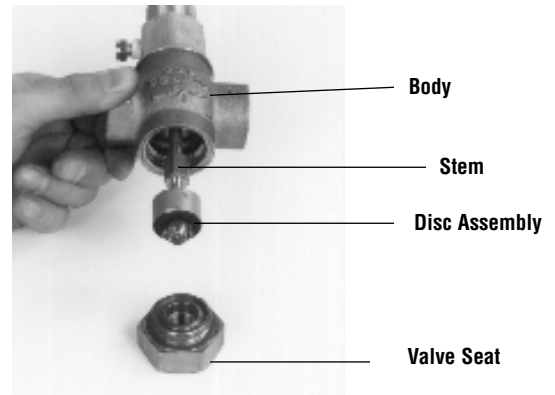
Follow steps 1-5, **To fully disassemble regulator from valve.**

6. *Figure 11.* For all WM valve sizes, use the 3/8" wrench on the stem extension [4] and the 7/16" wrench on the hex nut [12] to loosen and remove them.



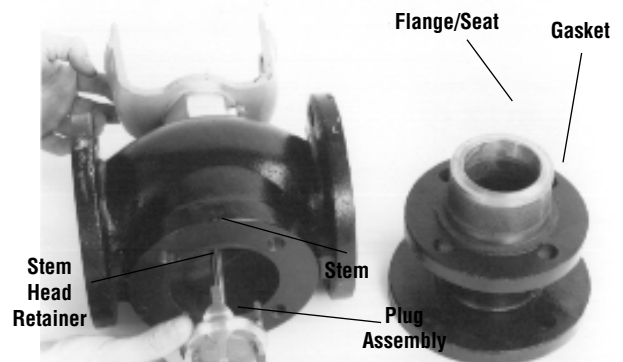
11. REMOVE STEM EXTENSION AND HEX NUT

7. *Figure 12A.* For 1/2" to 2" valves: Unscrew and remove valve seat [25]. Pull down valve plug assembly [23 & 24]. Remove disc lock nut, both disks and other parts [23a-e]. Replace with new discs and reassemble.



12A. (1/2" TO 2") PLUG ASSEMBLY

Figure 12B. For 2-1/2 to 4" valves: Remove four flange cap screws [28]. Remove valve flange and seat assembly [27]. Pull down plug assembly [24], unscrew stem head retainer [22] and replace valve plug. Replace gasket [21] Assemble in reverse order.

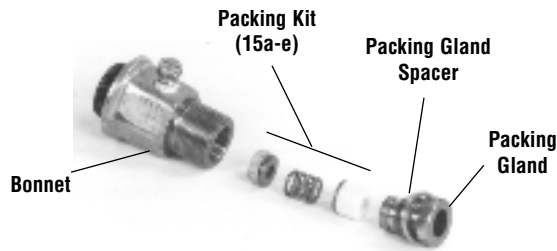


12B. (2-1/2" TO 4") PLUG ASSEMBLY

To replace packing

Follow **To fully disassemble regulator from valve** steps 1-6.

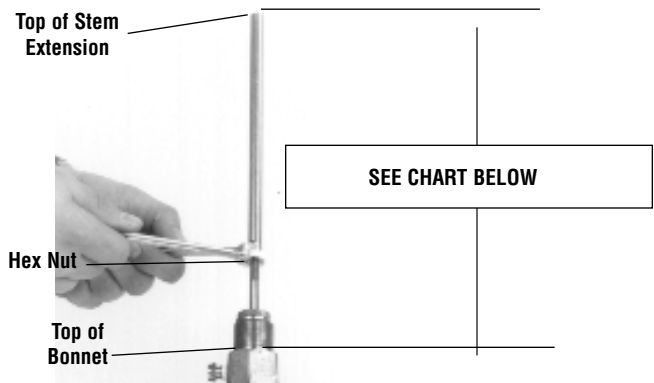
6. *Figure 11.* Use a 5/16" wrench on the flats of the stem extension [4] and a 7/16" wrench on the hex nut [12] to loosen and remove them.
7. Use the 1-3/8" wrench to loosen and remove bonnet [20].
8. Carefully pull out stem assembly [30]. Check the stem. It must have a polished surface that is free of roughness and pitting. Replace any parts if necessary.
9. *Figure 13.* Remove packing gland [14], and all packing components [15a-15e].



13. PACKING COMPONENTS

10. Clean packing chamber, taking care not to scratch seating surfaces. Be sure chamber is free of dirt and grease.
11. **For 1" - 2" valves**, place the upper gasket [21] on body before the bonnet.
12. Replace bonnet [20] and stem [30] into valve body.
NOTE: You must replace the bonnet and stem before attempting to insert the packing. Otherwise, you may tear the packing rings.
13. For standard packing kits, install the parts as shown in *Figure 13.*
Slide part(s) [15e], followed by [15d] and [15c] over the stem. Gently push them into the packing chamber.
NOTE: Some kits do not include all the listed packing parts (see page 12), but the order for part installation is the same.
14. **For EP V-rings**, lubricate the rings first.
Slide each V-ring [15b] over the stem and carefully push it into the packing chamber.
15. Place the packing gland spacer [15a] on top of the bonnet.
16. Thread the packing gland assembly [14] into the bonnet. Tighten the gland assembly against the spacer.

17. **With stem in full UP position** (the valve plug firmly seated), screw stem extension [4] to the dimension shown in *Figure 14* and tighten into place with hex nut [12].



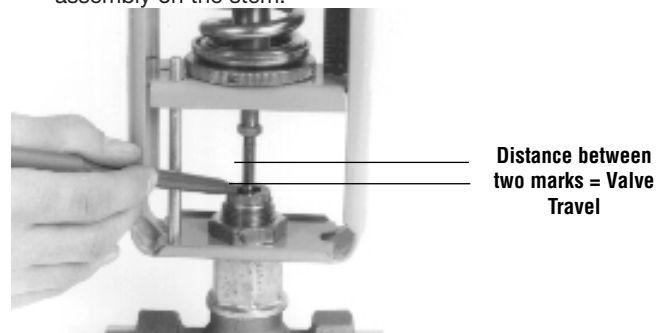
| Stem Setting Dimension (See Above) | |
|--|---|
| Valve Size | |
| 1/2" to 2" | 2-1/2" to 4" |
| 10-1/16" (+1/32, -0) [256mm (+.79, -0)] | 8-3/16" (+1/32, -0) [208mm (+.79, -0)] |

14. STEM EXTENSION REASSEMBLY DIMENSION

18. Make sure the valve stem is in the full up position when replacing the spring seat and piston plate assembly on the large valves.
19. Assemble the remaining parts in reverse order.

TESTING THE THERMAL SYSTEM

1. Stop the flow of fluid through the line.
2. Raise the temperature of the bulb above the set point temperature by placing it in a container of hot water. This will cause the plug to fully seat.
3. *Figure 15.* With the valve plug seated in the bottom port "B," use a felt tip pen to mark the position of the packing gland assembly on the stem.



15. VALVE TRAVEL MEASUREMENT

4. Place the bulb in a pan of cool water. Cool the bulb 30°F (16°C) below set point so the valve is fully open.
5. With the valve plug now seated on the upper port "U," use the pen to mark the new position of the packing gland assembly on the stem.

- The distance between the marks is the valve plug travel. This should correspond with the TRAVEL value in the VALVE DIMENSIONS table on page 10. **No movement or only partial movement indicates the thermal system is defective and should be replaced with a new system.**

PREVENTIVE MAINTENANCE

Once every three months, inspect the Regulator as follows:

- Visually check for leaks from the valve body joints, piping-to-valve connections, packing and stem areas.
- Visually check for excessive corrosion on the regulator, including the bellows, capillary, bulb, thermal system legs, bridge, and yoke. Also check for excessive corrosion on the valve body.
- Perform the instructions in **Testing the Thermal System**. Less than full valve travel may indicate a leak in the bellows, capillary, or bulb, or other problems. This may result in excessive temperature in the process.
- Test the temperature adjusting nut assembly for freedom of movement (see **Adjust Set Point** for instructions).
- Remove bulb from the process fluid and check for excessive corrosion, or erosion that may weaken the bulb and/or cause thermal system failure.

TROUBLESHOOTING

WARNING: Failure of the thermal system will result in a constant rise in temperature (or constant high temperature) of the fluid which you are trying to control.

• Erratic temperature control (valve cycles too hot/too cold)

- Highly fluctuating supply pressures.
- Sticking stem caused by packing gland assembly too tight, locking valve stem. Loosen packing gland assembly and lubricate if desired.
- Sticking stem caused by bent valve stem or valve stem not properly lubricated. Refer to **Maintenance** for replacement.
- Valve sized incorrectly. Verify valve selection.
- Regulator is controlling at incorrect set point. Refer to **Adjust Set Point**.
- Bulb is poorly positioned and/or oriented, and will not control the actual temperature of the heating/cooling medium. Refer to **Install Bulb**.
- Incorrect type of bulb is being used. See Table on page 11.

• Temperature of discharge water too low

- Temperature adjusting nut assembly set too low. Refer to **Adjust Set Point**.
- A radical drop in the hot water supply temperature or pressure. Check supply waters.
- Valve cannot close against cold inlet. Foreign material may be caught between the disc and the valve plug seat. Refer to **Replacing the composition disc** for disassembly. Clean.

• Temperature of discharge water too high

- Temperature adjusting nut assembly set too high. Refer to **Adjusting Set Point**.
- Thermal system failure. Refer to **Testing the Thermal System**.
- Incorrect piping to valve. Refer to **Operation** and/or **Installation**.
- Bulb is poorly positioned and/or oriented, and will not control the actual temperature of the heating/cooling medium. Refer to **Install Bulb**.
- Incorrect type of bulb is being used. See Table on page 11.
- Pressure differential is greater than allowable pressure drop. Refer to **Water Mixing Capacities** tables.
- Disc is worn. Replace disc (refer to **MAINTENANCE**).
- Valve cannot close against hot inlet. Foreign material may be between the disc and the valve plug seat. Refer to **Replacing the composition disc** for disassembly. Clean.
- Packing gland assembly is too tight, locking valve stem. Loosen packing gland assembly and lubricate if desired.
- Bent valve stem; need to replace. Refer to **Maintenance** for disassembly instructions.

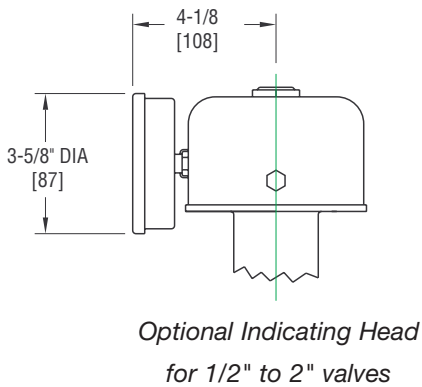
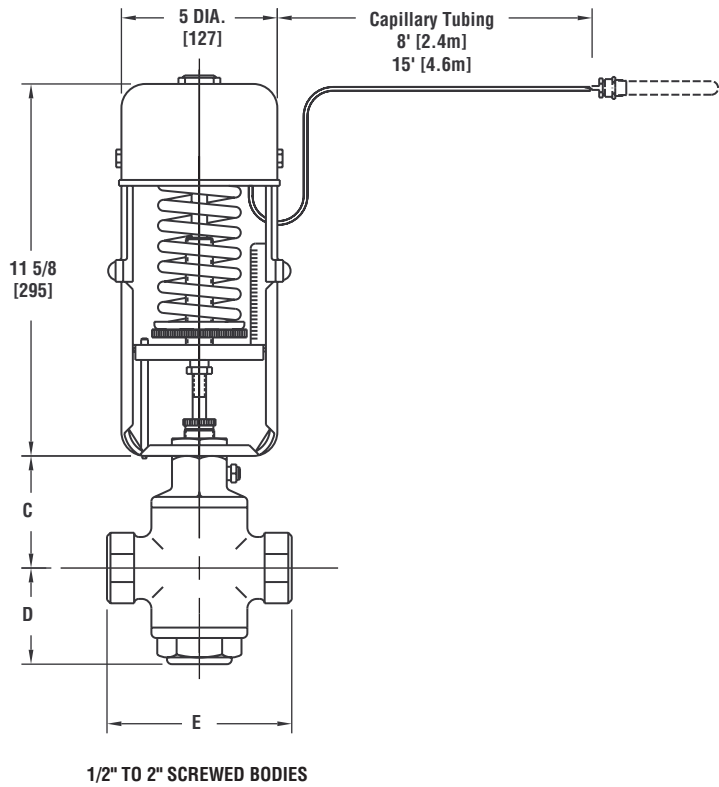
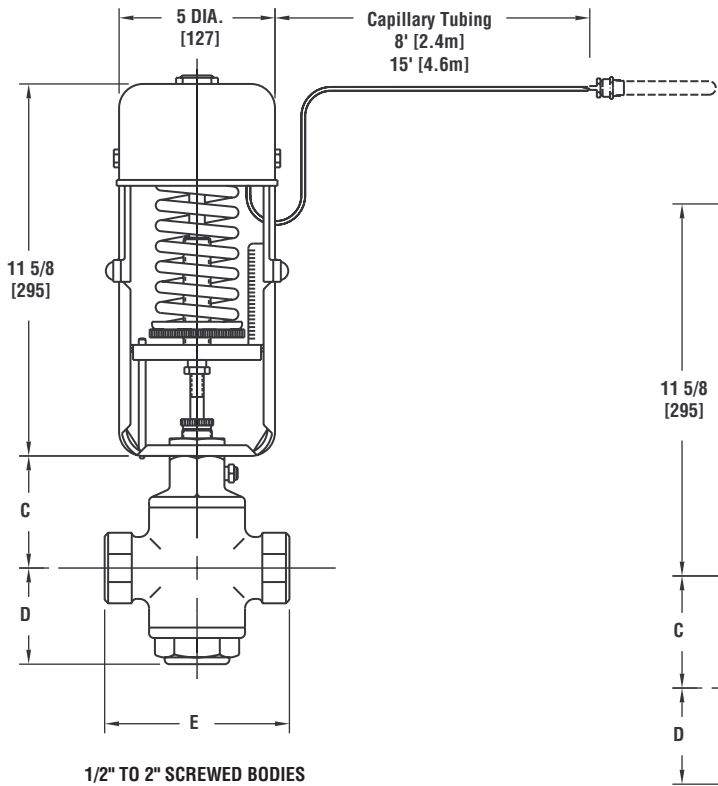
• Chattering of Valve

- Regulator installed with the flow of the control medium in reverse of arrow direction on valve body.
- Pressure differential too high, refer to **Water Mixing Capacities** tables for correct pressure differential range.

• Constant rise in mixed water temperature

- A constant rise in temperature may indicate the thermal system is leaking charge and/or the valve has failed with the port for Hot water fully or partially open.

DIMENSIONS



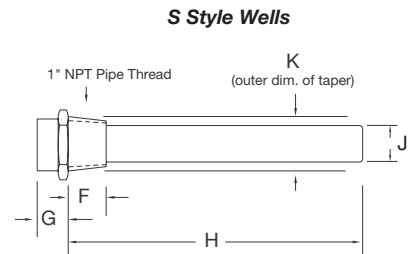
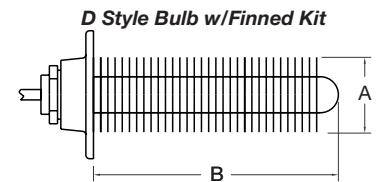
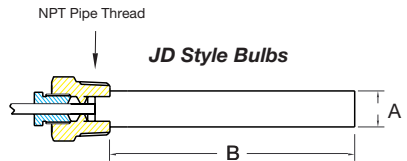
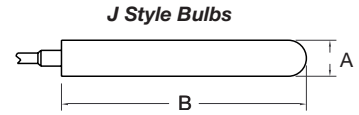
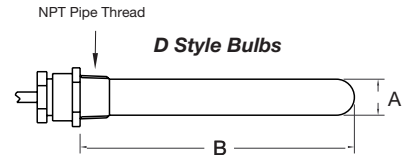
VALVE DIMENSIONS

| Style | Valve Size | C (in) | D (in) | E (in) | Travel (in) | Actual Weight (Lbs.) | |
|-----------------|------------|--------|--------|--------|-------------|----------------------|------------|
| | | | | | | Non Indic. | Indicating |
| Screwed Ends | 1/2" | 2 1/2 | 1 3/4 | 2 7/8 | 1/8 | 19 | 21 |
| | 3/4" | 2 5/8 | 2 1/4 | 3 3/8 | 3/16 | 20 | 22 |
| | 1" | 2 3/4 | 2 1/2 | 3 7/8 | 1/4 | 21 | 23 |
| | 1-1/4" | 3 | 2 3/4 | 4 1/2 | 5/16 | 23 | 25 |
| | 1-1/2" | 3 1/4 | 3 | 5 1/8 | 5/16 | 26 | 28 |
| Flanged Ends | 2" | 3 5/8 | 3 3/8 | 6 1/8 | 5/16 | 31 | 33 |
| | 2-1/2" | 4 1/2 | 7 1/4 | 8 1/2 | 5/8 | 88 | 90 |
| | 3" | 4 7/8 | 7 1/2 | 9 1/2 | 3/4 | 107 | 109 |
| | 4" | 5 5/8 | 9 1/8 | 11 1/2 | 1 | 149 | 151 |

| Style | Valve Size | C (mm) | D (mm) | E (mm) | Travel (mm) | Actual Weight (Kg.) | |
|-----------------|------------|--------|--------|--------|-------------|---------------------|------------|
| | | | | | | Non Indic. | Indicating |
| Screwed Ends | 1/2" | 64 | 44 | 73 | 3 | 8.6 | 9.5 |
| | 3/4" | 67 | 57 | 86 | 5 | 9.1 | 10 |
| | 1" | 70 | 64 | 98 | 6 | 9.5 | 10.4 |
| | 1-1/4" | 76 | 70 | 114 | 8 | 10.4 | 11.3 |
| | 1-1/2" | 83 | 76 | 130 | 8 | 11.8 | 12.7 |
| Flanged Ends | 2" | 92 | 86 | 156 | 8 | 14.1 | 15 |
| | 2-1/2" | 114 | 184 | 216 | 16 | 39.9 | 40.8 |
| | 3" | 124 | 191 | 241 | 19 | 48.5 | 49.4 |
| | 4" | 143 | 232 | 292 | 25 | 67.6 | 68.5 |

BULB DIMENSIONS

| Bulb Style | Size | Material | A (in) | B (in) | Tank Ftg. NPT | Max. Pressure - PSI | |
|---|------------|---------------|--------|----------|------------------|---------------------|-----------|
| | | | | | | Shock | Non-Shock |
| D Fixed Union (& V-Vertical Fixed Union) | 1 x 9 | Copper | 15/16 | 8 | 1" | 175 | 250 |
| | | 347 Stainless | 15/16 | 8 1/16 | 1" | 500 | 725 |
| | 1 x 20 | Copper | 15/16 | 19 7/8 | 1" | 175 | 250 |
| | | 347 Stainless | 15/16 | 19 13/16 | 1" | 500 | 725 |
| | 1-1/4 x 24 | Copper | 1 3/16 | 22 11/16 | 1-1/4" | 150 | 200 |
| 1-3/8 x 30 | Copper | 1 3/8 | 28 5/8 | 1-1/4" | 150 | 200 | |
| J Plain Bulb* | 1 x 9 | 347 Stainless | 15/16 | 8 3/4 | - | - | - |
| | | Teflon Coated | 15/16 | 8 3/4 | - | - | - |
| | 1 x 20 | 347 Stainless | 15/16 | 20 1/2 | - | - | - |
| | | Teflon Coated | 15/16 | 20 1/2 | - | - | - |
| JD Adjustable | 1 x 9 | 347 Stainless | 15/16 | 8 3/4 | 1" | 500 | 725 |
| | 1 x 20 | 347 Stainless | 15/16 | 20 1/2 | 1" | 500 | 725 |
| G Finned Kit* | 1 x 9 | Copper | 2 | 8 13/16 | - | - | - |
| | 1 x 20 | Copper | 2 | 20 15/16 | - | - | - |



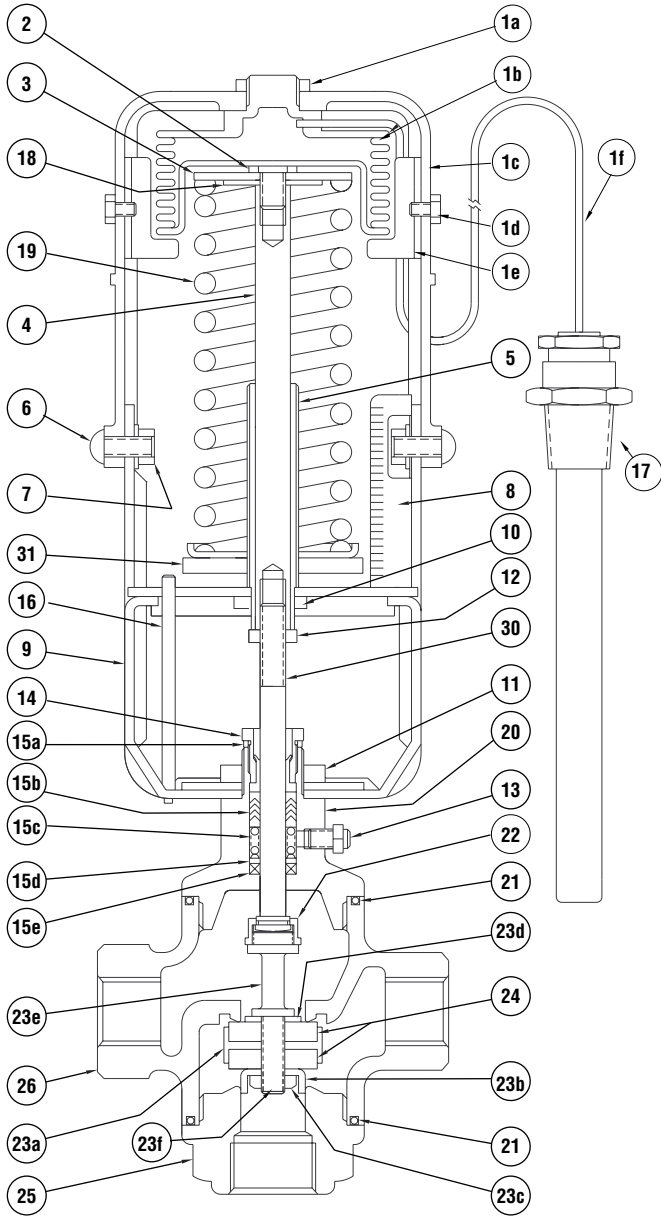
| Bulb Style | Size | Material | A (mm) | B (mm) | Tank Ftg. NPT | Max. Pressure - kPa | |
|---|------------|---------------|--------|--------|------------------|---------------------|-----------|
| | | | | | | Shock | Non-Shock |
| D Fixed Union (& V-Vertical Fixed Union) | 1 x 9 | Copper | 24 | 203 | 1" | 4445 | 6350 |
| | | 347 Stainless | 24 | 205 | 1" | 12700 | 18415 |
| | 1 x 20 | Copper | 24 | 505 | 1" | 4445 | 6350 |
| | | 347 Stainless | 24 | 503 | 1" | 12700 | 18415 |
| | 1-1/4 x 24 | 347 Stainless | 30 | 576 | 1-1/4" | 3810 | 5080 |
| 1-3/8 x 30 | Copper | 35 | 727 | 1-1/4" | 3810 | 5080 | |
| J Plain Bulb* | 1 x 9 | 347 Stainless | 24 | 222 | - | - | - |
| | | Teflon Coated | 24 | 222 | - | - | - |
| | 1 x 20 | 347 Stainless | 24 | 521 | - | - | - |
| | | Teflon Coated | 24 | 521 | - | - | - |
| JD Adjustable | 1 x 9 | 347 Stainless | 24 | 222 | 1" | 12700 | 18415 |
| | 1 x 20 | 347 Stainless | 24 | 521 | 1" | 12700 | 18415 |
| G Finned Kit* | 1 x 9 | Copper | 51 | 224 | - | - | - |
| | 1 x 20 | Copper | 51 | 532 | - | - | - |

WELL DIMENSIONS

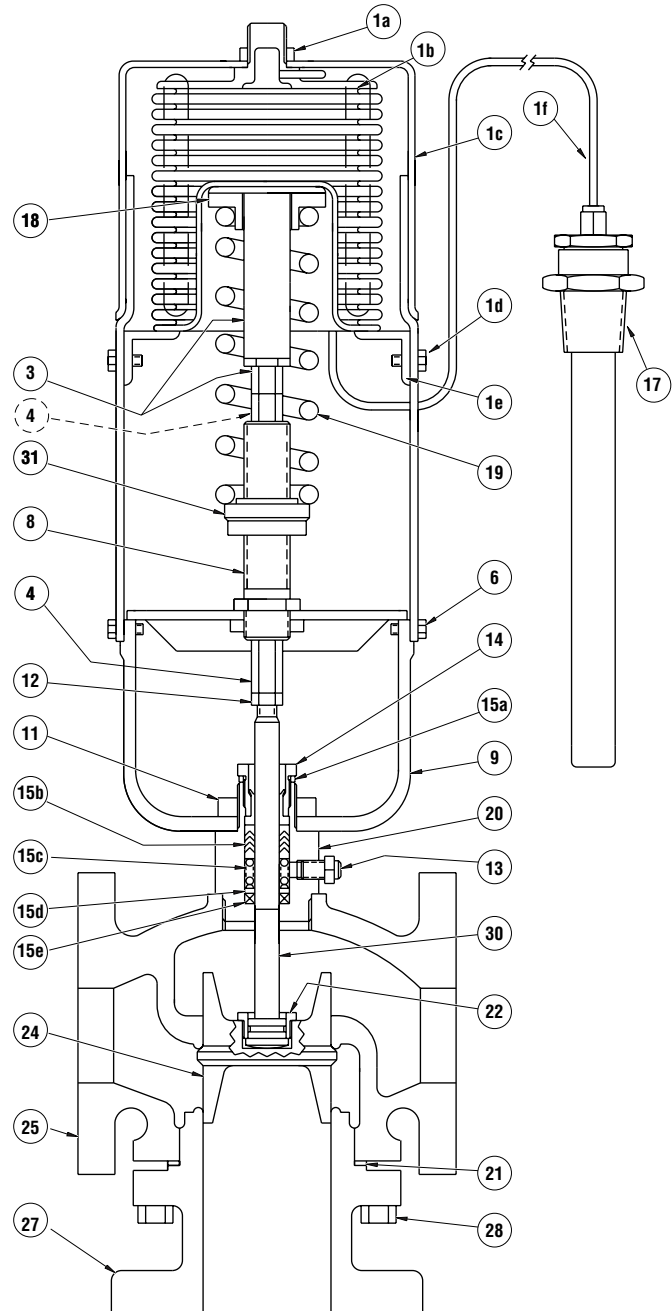
| Bulb Size | Well Kit # | Well Material | F (in) | G (in) | H (in) | J (in) | K (in) | Tank Ftg. NPT | Max. Well Pressure - PSI | |
|------------|------------|----------------------|--------|---------|---------|---------|--------|------------------|--------------------------|-----------|
| | | | | | | | | | Shock | Non-Shock |
| 1 x 9 | 709 193 | Chrome Plated Copper | 15/16 | 13/16 | 9 1/16 | 1 | 1.11 | 1" | 175 | 250 |
| | 808 478 | 316L Stainless Steel | 1 1/16 | 13/16 | 8 11/16 | 1 1/64 | 1.11 | 1" | 450 | 675 |
| | 808 476 | Carbon Steel | 1 | 1 13/16 | 7 11/16 | 1 1/8 | 1.125 | 1" | 1000 | 1500 |
| 1 x 20 | 709 075 | Chrome Plated Copper | 15/16 | 13/16 | 21 1/16 | 1 | 1.11 | 1" | 175 | 250 |
| | 808 475 | 316L Stainless Steel | 1 1/16 | 13/16 | 20 3/8 | 1 1/64 | 1.11 | 1" | 450 | 675 |
| 1-1/4 x 24 | 709 128 | Chrome Plated Copper | 1 3/16 | 1 1/16 | 24 | 1 1/4 | 1.25 | 1-1/4" | 150 | 200 |
| | 808 461 | 347 Stainless Steel | 1 1/8 | 1 1/16 | 23 5/16 | 1 14/53 | 1.39 | 1-1/4" | 360 | 540 |

| Bulb Size | Well Kit # | Well Material | F (mm) | G (mm) | H (mm) | J (mm) | K (mm) | Tank Ftg. NPT | Max. Well Pressure - kPa | |
|------------|------------|----------------------|--------|--------|--------|--------|--------|------------------|--------------------------|-----------|
| | | | | | | | | | Shock | Non-Shock |
| 1 x 9 | 709 193 | Chrome Plated Copper | 24 | 21 | 230 | 25 | 28 | 1" | 1207 | 1724 |
| | 808 478 | 316L Stainless Steel | 27 | 21 | 221 | 26 | 28 | 1" | 3103 | 4654 |
| | 808 476 | Carbon Steel | 25 | 46 | 195 | 29 | 29 | 1" | 6895 | 10342 |
| 1 x 20 | 709 075 | Chrome Plated Copper | 24 | 21 | 535 | 25 | 28 | 1" | 1207 | 1724 |
| | 808 475 | 316L Stainless Steel | 27 | 21 | 518 | 26 | 28 | 1" | 3103 | 4654 |
| 1-1/4 x 24 | 709 128 | Chrome Plated Copper | 30 | 27 | 610 | 32 | 32 | 1-1/4" | 1034 | 1379 |
| | 808 461 | 347 Stainless Steel | 29 | 27 | 592 | 32 | 35 | 1-1/4" | 2482 | 3723 |

PARTS LIST



1/2" - 2" WM Assemblies



2-1/2" - 4" WM Assemblies

| Item | Description | Valve Body Size | | | | | | | | Qty | Material | |
|-------|------------------------------|---|---------|---------|---------|---------------------|---------|---------|---------|-----------------|-----------------|-----------------|
| | | 1/2" | 3/4" | 1" | 1-1/4" | 1-1/2" | 2" | 2-1/2" | 3" | | | 4" |
| 1 | Thermal System | Refer to Order Code | | | | | | | | 1 | - | |
| 1a | Locknut | Not sold as separate part - refer to Thermal System | | | | | | | | 1 | - | |
| 1b | Thermal Motor/Bellows | Not sold as separate part - refer to Thermal System | | | | | | | | 2 | - | |
| 1c | Housing | Not sold as separate part - refer to Thermal System | | | | | | | | 1 | - | |
| 1d | Screw | Not sold as separate part - refer to Thermal System | | | | | | | | 2 | - | |
| 1e | Bellows Stop | Not sold as separate part - refer to Thermal System | | | | | | | | 2 | - | |
| 1f | Bulb/Capillary Assembly | Not sold as separate part - refer to Thermal System | | | | | | | | 1 | - | |
| 2 | Piston Plate Retaining Screw | 590 816 | | | - | | | - | | 1 | SS | |
| 3 | Piston Plate Washer | 590 815 | | | - | | | - | | 1 | Zn plate Steel | |
| 3 | Piston Plate/Shank Assembly | - | | | 700 920 | | | - | | 1 | - | |
| 4 | Stem Extension | 590808B | | | 700128A | | | - | | 1 | Brass | |
| 5 | Spring Adjustment Screw | 590 807 | | | - | | | - | | 1 | Brass | |
| 6 | Screw | 030546J | | | - | | | - | | 2 | Zn plated Steel | |
| 6 | Bolt | - | | | 035123K | | | - | | 2 | Zn plated Steel | |
| 7 | Hex Nut 5/16 x 18 | 041225K | | | - | | | - | | 2 | Cd plated Steel | |
| 8 | Temp. Adj. Setting Scale | 590 813 | | | - | | | - | | 1 | Aluminum | |
| - | Lower Housing Assembly | 590 859 | | | 595 515 | | | - | | 1 | - | |
| 9 | Yoke/Bridge Assembly | 594 515 | | | - | | | - | | 1 | - | |
| 9A | Bridge | - | | | 700 125 | | | - | | 1 | - | |
| 9B | Yoke | - | | | 594517A | | | - | | 1 | - | |
| 10 | Nut, hex | 041167J | | | - | | | - | | 1 | Zn plated Steel | |
| 11 | Nut, hex | 041 125 | | | 041 125 | | | - | | 1 | Brass | |
| 12 | Locknut | 628 008 | | | - | | | - | | 1 | Brass | |
| 12 | Locknut | - | | | 590 405 | | | - | | 1 | Zn plated Steel | |
| 13 | Pipe Plug | 403 007 | | | 403 007 | | | - | | 1 | Brass | |
| 13 | Stem Lubricator Kit | 590184A | | | 590184A | | | - | | 1 | - | |
| 14 | Packing Gland Assembly | 590 763 | | | 591 502 | | | - | | 1 | Brass | |
| 15 | Packing Kit | See Kits on page 14 | | | | See Kits on page 14 | | | | 1 | - | |
| 15a | Packing Spacer | " | | | " | | | " | | 1 | - | |
| 15b | Packing Set | " | | | " | | | " | | 1 | - | |
| 15c | Packing Spring | " | | | " | | | " | | 1 | - | |
| 15d | Packing Washer | " | | | " | | | " | | 1 | - | |
| 15e | Packing Ring | " | | | " | | | " | | 1 | - | |
| 16 | Temp. Adjusting Rod | 590 820 | | | 590 820 | | | - | | 1 | Cd plated Steel | |
| 17 | 1" NPT Tank Fitting | 705 005 | | | 705 005 | | | - | | 1 | Brass | |
| 17 | 1-1/4" NPT Tank Fitting | 705 006 | | | 705 006 | | | - | | 1 | Bronze | |
| 18 | Spring Guide Washer | 590 814 | | | - | | | - | | 1 | Steel | |
| 18 | Spring Seat | - | | | 700 804 | | | - | | 1 | Brass | |
| 19 | Spring | 590 821 | 590 821 | - | - | - | - | - | 1 | Zn plated Steel | | |
| 19 | Spring, inner | - | - | 595 501 | 595 501 | 595 501 | 595 501 | - | 1 | Zn plated Steel | | |
| 19 | Spring, outer | - | - | 595 502 | 595 502 | 595 502 | 595 502 | - | 1 | Zn plated Steel | | |
| 19 | Spring | - | | | | | | 121 061 | 1 | Chr. Si. Steel | | |
| 20 | Bonnet Assembly | 590 131 | 590 134 | 590 137 | 590 140 | 590 143 | 590 146 | 590 402 | 1 | Brass | | |
| 21 | Gasket | - | - | 084 008 | 084 016 | 084 009 | 084 010 | - | 2 | Silicone | | |
| 21 | Gasket | - | | | | | | 632 004 | 632 005 | 633 005 | 1 | Gasket Material |
| 22 | Stem Head Retainer | 601 019 | 708 036 | 654 016 | 654 016 | 603 012 | 603 012 | 590 417 | 1 | 416 Stainless | | |
| 23-24 | Disc Assembly | 656 311 | 590 779 | 590 743 | 590 690 | 590 691 | 590 692 | - | 1 | Brass | | |
| 23a | Disc Holder | " | " | " | " | " | " | - | 1 | Brass | | |
| 23b | Disc Guide | " | " | " | " | " | " | - | 1 | Brass | | |
| 23c | Thrust Collar | " | " | " | " | " | " | - | 1 | Brass | | |
| 23d | Washer | " | " | " | " | " | " | - | 1 | Brass | | |
| 23e | Stem Extension | " | " | " | " | " | " | - | 1 | Brass | | |
| 23f | Disc Sleeve | " | " | " | " | " | " | - | 1 | Brass | | |
| 24 | Disc | " | " | " | " | " | " | - | 2 | Garlock | | |
| 24 | Throttling Disc | - | | | | | | 590 431 | 590 432 | 590 433 | 2 | Bronze |
| 25 | Valve Seat | 590 746 | 590 748 | 594 513 | 590 684 | 594 475 | 594 459 | - | 1 | Bronze | | |
| 26 | Valve Body Assembly | 115 071 | 115 072 | 115 073 | 115 074 | 115 069 | 115 070 | - | 1 | Bronze | | |
| 26 | Valve Body & Seat Assembly | - | | | | | | 590 428 | 590 429 | 590 430 | 1 | Bronze |
| 27 | Valve Flange & Seat Assy. | - | | | | | | 590 434 | 590 435 | 590 436 | 1 | Brass |
| 28 | Cap Screws | - | | | | | | 035175K | 035175K | 035177K | 6 | Brass |
| 30 | Stem Assembly | 594813A | 594813A | 593815A | 593815A | 594816E | 594816E | 591843B | 591843C | 59183D | 1 | - |
| 31 | Temp. Adj. Nut Assembly | 590 829 | | | | | | 703 040 | | | 1 | - |

ACCESSORIES

Packing kits can be ordered to replace parts in the packing assembly (See pages 12 & 13).

| Kit # | Material | Valve Size | Stem Size | Usage | Parts | Lubricant |
|----------------|----------------|-------------|-----------|--|-----------------------------|---|
| 591 927 | Teflon V-ring | 1/2" - 2" | 1/4" | Effective from 200°F-400°F Steam: 50 - 200 psi | 15A, 15B 15C, 15D 15E | None |
| 594 220 | EP V-ring | 1/2" - 2" | 1/4" | Effective from 0°F-300°F Steam: 50 PSI maximum Water: up to maximum PSI valve rating | 15A, 15B 15C, 15D 15E | Silicone required for installation (optional for service) |
| 594 289 | TFE Split Ring | 1/2" - 2" | 1/4" | For replacement only Effective from 40°F-366°F | 15B, 15D | Silicone Part #087 126 |
| 591 928 | Teflon V-ring | 2-1/2" - 4" | 3/8" | Effective from 200°F-400°F Steam: 50 - 200 psi | 15A, 15B 15C, 15D 15E | None |
| 594 221 | EP V-ring | 2-1/2" - 4" | 3/8" | Effective from 0°F-300°F Steam: 50 PSI maximum Water: up to maximum PSI valve rating | 15A, 15B 15C, 15D 15E | Silicone required for installation (optional for service) |
| 594 290 | TFE Split Ring | 2-1/2" - 4" | 3/8" | For replacement only Effective from 40°F-366°F | 15B, 15D | Silicone Part #087 126 |

| Kit # | Bulb Dims. | Width (in) | Length (in) | Description |
|----------------|------------|------------|-------------|-----------------------------|
| 701 549 | 1 x 9 | 2 | 8 13/16 | G Style Finned Kit (Copper) |
| 701 550 | 1 x 20 | 2 | 20 15/16 | G Style Finned Kit (Copper) |

Finned Bulb Kits may be added to style "D" Bulb as noted.

TEMPERATURE RANGES/BULB SIZES

For ordering thermal systems, refer to order code, the Powers #11 Product Specification Brochure, or call Powers.

| Bulb Size | Bulb Temp. Range | | Order Code |
|-----------|-----------------------|-----------|------------|
| | 1/2" to 2" | | |
| | Water Mix | | |
| 1" x 20" | 10-60°F (-12-16°C) | 01 | |
| | 55-115°F (12-46°C) | 02 | |
| | 80-140°F (27-60°C) | 03 | |
| | 100-160°F (37-71°C) | 04 | |
| 1" x 9" | 110-160°F (43-71°C) | 05 | |
| | 135-195°F (57-91°C) | 07 | |
| | 160-220°F (71-104°C) | 08 | |
| | 200-250°F (93-121°C) | 09 | |
| | 230-280°F (110-138°C) | 10 | |
| | 260-320°F (127-160°C) | 11 | |

| Bulb Size | Bulb Temp. Range | | Order Code |
|--------------|------------------------------|-----------|------------|
| | High Power Head 2-1/2" to 4" | | |
| | Water Mix | | |
| 1-3/8" x 30" | 50-80°F | 28 | |
| | 70-100°F | 22 | |
| | 95-125°F | 23 | |
| 1-1/4" x 24" | 120-150°F | 24 | |
| | 140-170°F | 25 | |
| | 150-180°F | 26 | |
| | 180-210°F | 27 | |

ORDER CODE

| | Valve Assembly | | | | Thermal System Assembly | | | |
|--|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 595- | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Valve Type 3-Way Water Mix | WM | | | | | | | |
| Valve Sizes 1/2" 3/4" 1" 1-1/4" 1-1/2" 2" 2-1/2" 3" 4" | 050 075 100 125 150 200 250 300 400 | | | | | | | |
| Applications Mixing | M | | | | | | | |
| Bulb/Capillary Material & Length Copper 8' Copper 15' Copper 30' Stainless Steel 8' Stainless Steel 15' Stainless Steel 30' Teflon over Copper 15' (J Bulb Only) Teflon over SS 15' (J Bulb Only) | C08 C15 C30 S08 S15 S30 T15 O15 | | | | | | | |
| Bulb Size Fixed Union (N/A Teflon) No Pipe Fittings (N/A Copper) Adj. Union (N/A Teflon) Fixed Union (D Type) Vertical | D J A V | | | | | | | |
| Head Assembly High Powered Thermal (required on 2-1/2" to 4") Non-Indicating Indicating | H N I | | | | | | | |
| Range/Bulb Size See chart on page 14 Select Range with Set Point in UPPER THIRD for best performance. | ## | | | | | | | |

For additional information on your application or equipment, please contact a Powers application engineer.

CALIFORNIA PROPOSITION 65 WARNING

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.
(Installer: California law requires that this warning be given to the consumer.)

For more information: www.wattsind.com/prop65

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