## Temperature Control with PTRP Temperature Pilot

| Model | PTRP |
|---|---|
| Pilot Body Material | Cast Steel |
| Max Inlet Pressure | 300 PSIG |
| Temperature Control Range | 20-440˚ F |
| Steam Inlet Pressure Range (when Standard Temperature Pilot is used with **HD** Standard main valve) | 15-300 PSIG |
| Steam Inlet Pressure Range (when Low-Pressure Temperature Pilot is used with **HD-LP** Low-Pressure main valve) | 5-20 PSIG |

**LOW PRESSURE** PTRP-LP Pilot  (pressures under 15 PSIG)

Use Code **LP**:  Low pressure Temperature Pilot is required for steam pressure under 15 PSI. (Range 5 - 20)

**PILOT:**  Example Model Code: PTRP-LP-06-08-S15

**LOW PRESSURE** HD Main Valve (pressures under 15 PSIG)

Use Code **LP**:  A Low Pressure Main Valve must be used in conjuction with a Low Pressure Temperature Pilot for steam pressure under 15 PSIG

**MAIN VALVE:**  Example Model Code: HD-13-N-LP      (Range 5 - 20)



**Model PTRP-94** contains Temperature Indicating Dial

**Model PTRP-91** is Non-Indicating
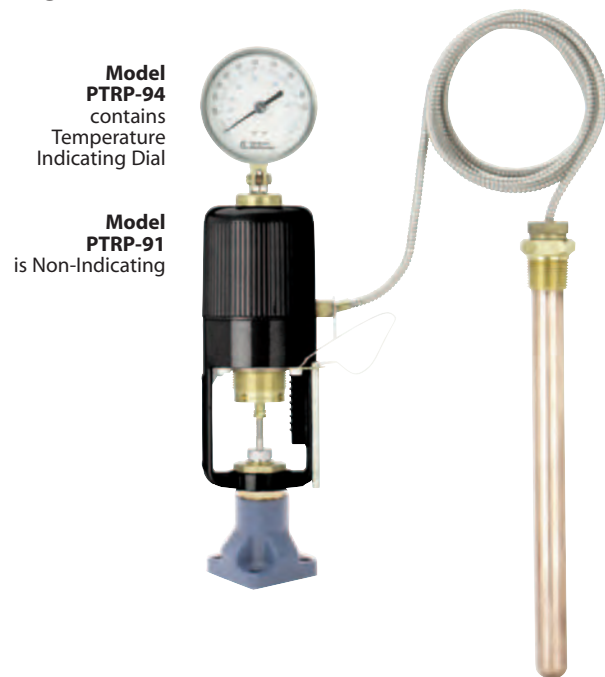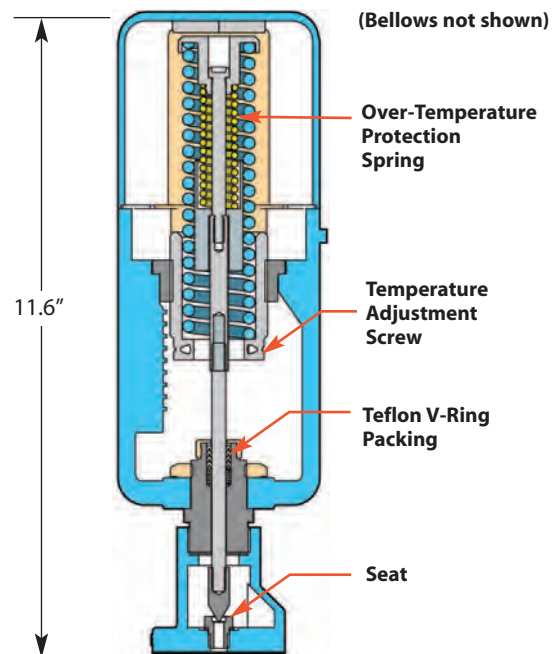
### Typical Applications

The **PTRP-Temperature Pilot** is used with the HD Regulator to control temperature in various processes and systems. The PTRP uses a vapor tension system to actuate the bellows in the temperature pilot giving it a faster reaction time and better temperature sensitivity than the standard PT pilot. They can be used on: oil heaters, ovens, process heaters, vats, dryers, jacketed kettles, and semi-Instantaneous water h-eaters.

### Features

- Stainless steel heat-treated valve and seat for extended service life
- Standard bulb & capillary is copper, which has the best heat transfer properties.
- Standard capillary length is 8 ft. with 316 stainless steel armour-protection

### Options

- **Capillary Lengths:** Available in 8, 12, 16, 20 & 24-ft.
- **Special Materials:** Sensing bulb, thermowells, and capillary are available in special corrosion resistant materials.
    - 316 stainless steel capillary, bulb & bushing
    - 316 stainless steel armor with standard capillary
- **Thermowell (Separable Socket):** Available in stainless steel or copper
- **Temperature Sensing Dial:** Indicates temperature of process being controlled
- **SDWA Compliance (Safe Drinking Water Act);** Suffix Code SDWA



(Bellows not shown)

Over-Temperature Protection Spring

Temperature Adjustment Screw

Teflon V-Ring Packing

Seat

11.6"

### Specifications

| | |
|---|---|
| **Dial Thermometer:** | 4" dial, stainless steel case, swivel and angle adjustment  (Model PTRP-94 only) |
| **Housing:** | Die cast aluminum, epoxy powder coated grey finish |
| **Bellows:** | High pressure brass, corrosion resistant, tin plated finish (not shown) |
| **Over-Temperature Protection:** | Upper range limit +100° F |
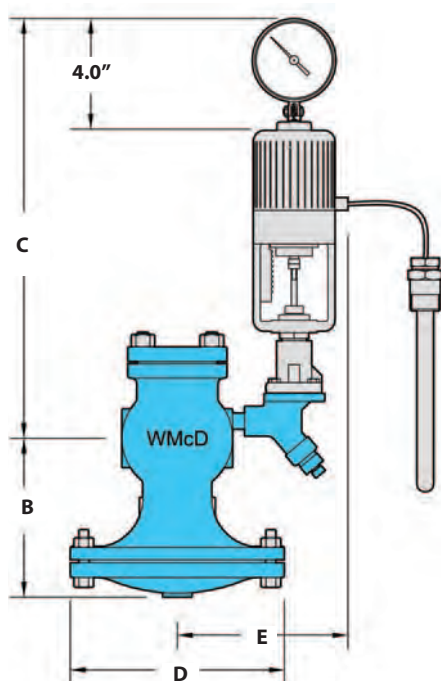
## DIMENSIONS  HD-Series – *inches*

| Size | Face-To-Face | | | B | C | D | E | Weight (lbs) | |
|------|------|------|------|---|---|---|---|------|------|
| | NPT | 150# | 300# | | | | | NPT | FLG |
| 1/2" | 4³/8 | | | 5⁵/8 | 14 | 6³/4 | 7³/4 | 18 | |
| 3/4" | 4³/8 | | | 5⁵/8 | 14 | 6³/4 | 7³/4 | 18 | |
| 1" | 5³/8 | 5¹/2 | 6 | 6¹/4 | 14 | 7¹/8 | 7³/4 | 23 | 35 |
| 1¹/4" | 6¹/2 | | | 7³/8 | 14 | 8⁷/8 | 8¹/4 | 43 | |
| 1¹/2" | 7¹/4 | 6⁷/8 | 7³/8 | 7³/8 | 14 | 8⁷/8 | 8¹/4 | 43 | 60 |
| 2" | 7¹/2 | 8¹/2 | 9 | 8¹/4 | 14 | 10⁷/8 | 8¹/2 | 65 | 85 |
| 2¹/2" | | 9³/8 | 10 | 9 | 14 | 11³/4 | 8¹/2 | | 105 |
| 3" | | 10 | 10³/4 | 8⁷/8 | 14 | 13¹/4 | 9¹/2 | | 145 |
| 4" | | 11⁷/8 | 12¹/2 | 11 | 14 | 14³/4 | 10¹/2 | | 235 |
| 6" | | 15¹/8 | 16 | 14¹/2 | 14¹/2 | 19³/4 | 11³/4 | | 470 |

## MATERIALS for PTRP Pilot

| | |
|---|---|
| Pilot Body | Cast Steel |
| Valve and Seat | Heat-treated Stainless Steel |
| Support Bracket | Aluminum |
| Bulb & Capillary | Copper (optional stainless steel) |
| All Other Parts | Brass |

## MATERIALS for HD Main Valve

| | |
|---|---|
| Body | **Ductile Iron** |
| Cover | **Ductile Iron** |
| Gasket | Grafoil/Garlock |
| Cover Screws | Steel |
| Pilot Adapter | **Cast Steel** |
| Screen | Stainless Steel |
| Tubing | Copper |
| Valve Seat | Hardened SST (55 Rc) |
| Valve Disc | Hardened SST (55 Rc) |
| Diaphragm | Phosphor Bronze |
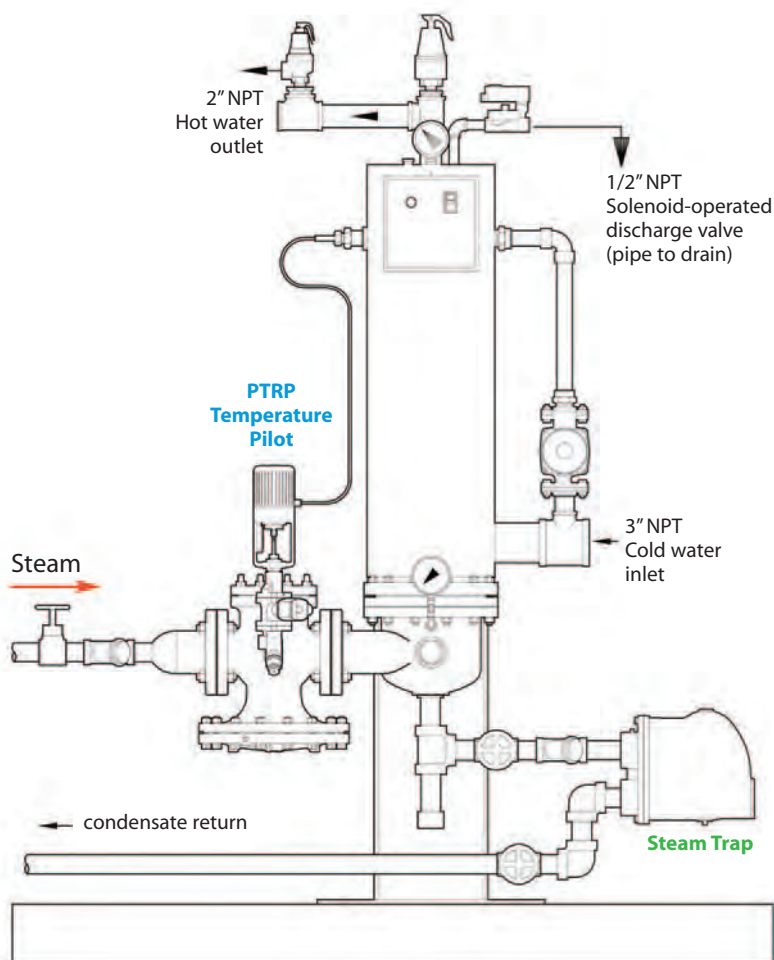


### HD Valve with PTRP-Temperature Pilot Application

A semi-instantaneous steam-to-water heater is a common application where the simple benefits of a self-contained, pilot-operated regulator with temperature sensing pilot may be favored over more complex and expensive control valves.  The thermally sensitive bulb of the PTRP pilot contains a fluid that creates a vapor which increases or decreases in pressure as the sensing bulb – sensing the heated water – temperature increases or decreases. This vapor pressure is transmitted hydraulically to the bellows, which actuates the pilot and HD regulator to control the flow of steam into the heater.  At start-up, the pilot is manually-adjusted to raise the temperature set point and allow steam to flow through the pilot and valve.  As the heated water nears the temperature set point, the vapor pressure in the sensing bulb increases and expands the bellows, closing the pilot and regulator to proportionally limit the steam supply.

## Temperature Control
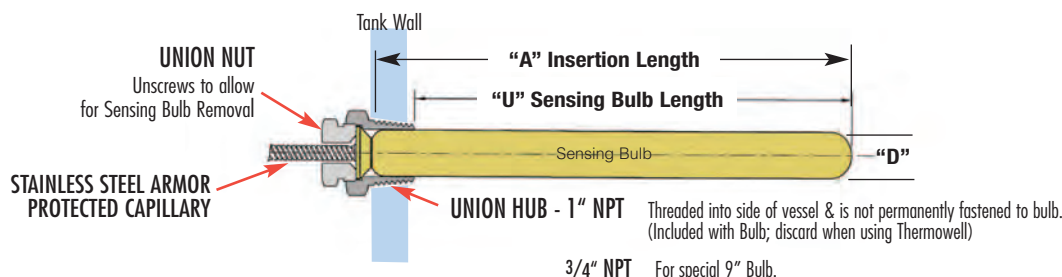
### Sensing Bulb Selection & Installation:

The sensing bulb and capillary is available in either Copper (standard) or Stainless Steel (for corrosive applications). Copper has the best heat transfer properties and should always be chosen unless used in corrosive service. Sensing bulb length is dependent upon the capillary length required; longer capillary lengths require a longer bulb to hold the additional actuating fluid. When installing the sensing bulb, the Union Hub is first threaded into a tank or piping system. The bulb slides thru the Union Hub and held in place by threading in the Union Nut. The angled seating surface of the bulb forms a metal-to-metal seal to the Union Hub, preventing the leakage of process fluid.

**Pilot-Operated REGULATORS**

### Sensing Bulb & Capillary

| ORDER CODE | Sensing Bulb Material | Capillary Tubing Material | | Capillary Length in Feet 8, 12, 16 | 20 | 24 | "D" Bulb Dia. |
|---|---|---|---|---|---|---|---|
| S15 | Copper (Brass Union Hub) | Copper with Stainless Steel Spiral Armor | A | 13" | 16" | 20" | 1" |
| | | | U | 12.25" | 15.25" | 19.25" | |
| S16 | Stainless Steel (Stainless Steel Union Hub) | Stainless Steel with Stainless Steel Spiral Armor | A | 13" | 16" | 20" | 1" |
| | | | U | 12.25" | 15.25" | 19.25" | |
| SB15* (special 9") | Copper (Brass Union Hub) (9" bulb) | Copper with Stainless Steel Spiral Armor | A | 9" | 9" | 9" | 3/4" |
| | | | U | 8.25" | 8.25" | 8.25" | |
| SB16* (special 9") | Stainless Steel (Stainless Steel Union Hub) (9" bulb) | Stainless Steel with Stainless Steel Spiral Armor | A | 9" | 9" | 9" | 3/4" |
| | | | U | 8.25" | 8.25" | 8.25" | |

For SDWA Compliance (Safe Drinking Water Act) of bulb and connection, use Suffix Code SDWA.
Example Model Code: **PTRP-91-06-08-SB15-SDWA**

**\*Note for 9" Bulb:**
Care should be taken when using 9" bulbs, and they should only be used in applications where space considerations exist. They should not be used when the temperature of the actuator housing is higher than the sensing bulb temperature, as this condition may create erratic temperature control. The temperature of the actuator housing is affected by the surrounding ambient temperature as well as the steam temperature flowing through the valve and may reach 140°F.



UNION NUT — Unscrews to allow for Sensing Bulb Removal
STAINLESS STEEL ARMOR PROTECTED CAPILLARY
Tank Wall
"A" Insertion Length
"U" Sensing Bulb Length
Sensing Bulb
"D"
UNION HUB - 1" NPT  Threaded into side of vessel & is not permanently fastened to bulb. (Included with Bulb; discard when using Thermowell)
3/4" NPT  For special 9" Bulb.
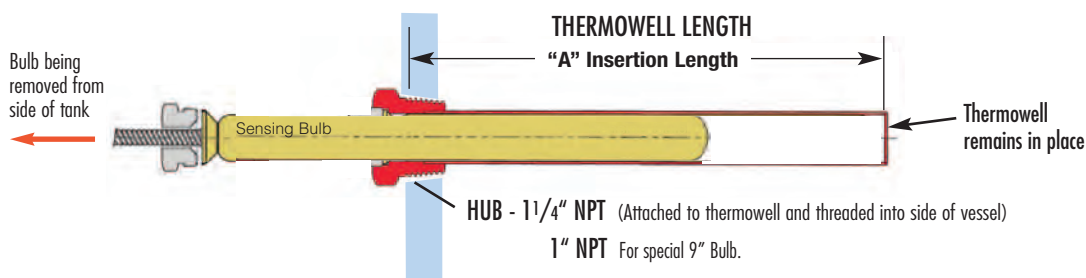
### Thermowell Option (ordered separately)

Thermowells isolate and protect the sensing bulb from the process fluid; available in either brass (better heat transfer properties) or Stainless Steel for corrosion resistance. They allow for sensing bulb removal and replacement without having to drain liquid from the system. For corrosive applications, a Stainless Steel thermowell (with a copper sensing bulb) can be used. For best temperature control use a copper sensing bulb with a brass thermowell. Thermowells are also recommended for applications with excessive system pressures or extremely turbulent flow to protect the sensing bulb from damage.

**Note: to ensure minimum response time, Heat Transfer Paste should be applied to the sensing bulb before installation into the thermowell.**

### THERMOWELLS - Model Numbers & Lengths

| Brass Model No. | Stainless Steel Model No. | Nominal Length | "A" INSERTION LENGTH (in.) BULB | THERMOWELL | Capillary Length in Feet |
|---|---|---|---|---|---|
| 536-S2 | 536-S6 | 13" | 12.25 | 13.00 | 8, 12 or 16 |
| 536-SE2 | 536-SE6 | 16" | 15.25 | 16.00 | 20 |
| 536-WE2 | 536-WE6 | 20" | 19.25 | 20.00 | 24 |
| 535-M2* | 535-M6* | 9" | 8.25 | 9.00 | 8, 12 or 16 |

Notes: 1) Other connections and lengths may be available, consult factory.
2) External pressure rating on Brass is 500 PSI max.
3) External pressure rating on 316 SS is 1000 PSI max.



Bulb being removed from side of tank
Sensing Bulb
THERMOWELL LENGTH
"A" Insertion Length
Thermowell remains in place
HUB - 1 1/4" NPT (Attached to thermowell and threaded into side of vessel)
1" NPT  For special 9" Bulb.

**Pilot-Operated REGULATORS**

## Model Code Chart with Temperature Ranges (8 ft. Capillary Lengths)

| Range Code | Nominal Range (°F) | Recommended* Working Span (°F) | Model Code NON-Indicating | Model Code Indicating | Weight lbs |
|---|---|---|---|---|---|
| 01 | 20 - 70 | 40 to 65 °F | PTRP-91-01-08 | PTRP-94-01-08 | 8 |
| 02 | 40 - 90 | 65 to 85 °F | PTRP-91-02-08 | PTRP-94-02-08 | 8 |
| 03 | 30 - 115 | 85 to 110 °F | PTRP-91-03-08 | PTRP-94-03-08 | 8 |
| 04 | 50 - 140 | 110 to 135 °F | PTRP-91-04-08 | PTRP-94-04-08 | 8 |
| 05 | 75 - 165 | 135 to 160 °F | PTRP-91-05-08 | PTRP-94-05-08 | 8 |
| 06 | 105 - 195 | 160 to 190 °F | PTRP-91-06-08 | PTRP-94-06-08 | 8 |
| 07 | 125- 215 | 190 to 210 °F | PTRP-91-07-08 | PTRP-94-07-08 | 8 |
| 09 | 155- 250 | 210 to 245 °F | PTRP-91-09-08 | PTRP-94-09-08 | 8 |
| 10 | 200 - 280 | 245 to 275 °F | PTRP-91-10-08 | PTRP-94-10-08 | 8 |
| 11 | 225 - 315 | 275 to 310 °F | PTRP-91-11-08 | PTRP-94-11-08 | 8 |
| 12 | 255 - 370 | 305 to 365 °F | PTRP-91-12-08 | PTRP-94-12-08 | 8 |
| 13 | 295 - 420 | 365 to 415 °F | PTRP-91-13-08 | PTRP-94-13-08 | 8 |
| 14 | 310 - 440 | 415 to 435 °F | PTRP-91-14-08 | PTRP-94-14-08 | 8 |

\* The Recommended Working Span typically falls within the upper third of the nominal temperature range.

**CROSS REFERENCE:** PTRP = Spence T-14

### Model Code Configuration Chart

| Models | | Temperature Range | | Capillary Length | | Bulb | |
|---|---|---|---|---|---|---|---|
| PTRP-91 | Non-Indicating | 01 – 14 | Refer to Temperature Range Chart | 08 | 8 Feet (std) | S15 | (copper bulb) (standard) |
| PTRP-94 | Indicating Dial | | | 12 | 12 Feet | | |
| PTRP-LP-91 | Non-Indicating | | | 16 | 16 Feet | S16 | (SS bulb) |
| PTRP-LP-94 | Indicating Dial | | | 20 | 20 Feet | SB15 | (9" copper bulb) |
| | | | | 24 | 24 Feet | SB16 | (9" SS bulb) |

Note: Thermowells are ordered separately.
LP = Low Pressure Models.

**HD Main Valve** with **PTRP-Temperature Pilot**



Model Code for Main Valve: **HD-17-F150** (2" HD Series Valve with 150# Flanged)

Model Code for Pilot: **PTRP-94-06-08-S15**
(Temperature Pilot with Indicating Dial (105-195°F) with 8 Ft. Capillary, Copper Bulb)

### How to write proper model number:

| Explanation of Model Number: | **PTRP-91** | **06** | **08** | **S15** |
|---|---|---|---|---|
| | Model | Temp. Range | Cap. Length | Bulb Type |
| Model Number: | **PTRP-91-06-08-S15** | | | |

Model **PTRP-94** contains Temperature Indicating Dial
Model **PTRP-91** is Non-Indicating

### Example Model Codes:

1) **PTRP-91-06-08-S15** (105°F - 195°F Temp Range, 8 ft. Capillary, 12" Copper Bulb)
2) **PTRP-94-06-08-S15** (105°F - 195°F Temp Range, with Dial Thermometer, 8 ft. Capillary, 12" Copper Bulb)