



**P-K COMPACT® (01/07/2020)
1004905934 – WMD HD**

P-K COMPACT® Temperature Control Equipment Guide

To be used in conjunction with the latest editions of:
P-K COMPACT® Semi-Instantaneous Water Heater I&OM
P-K COMPACT® Supplemental Equipment Guide

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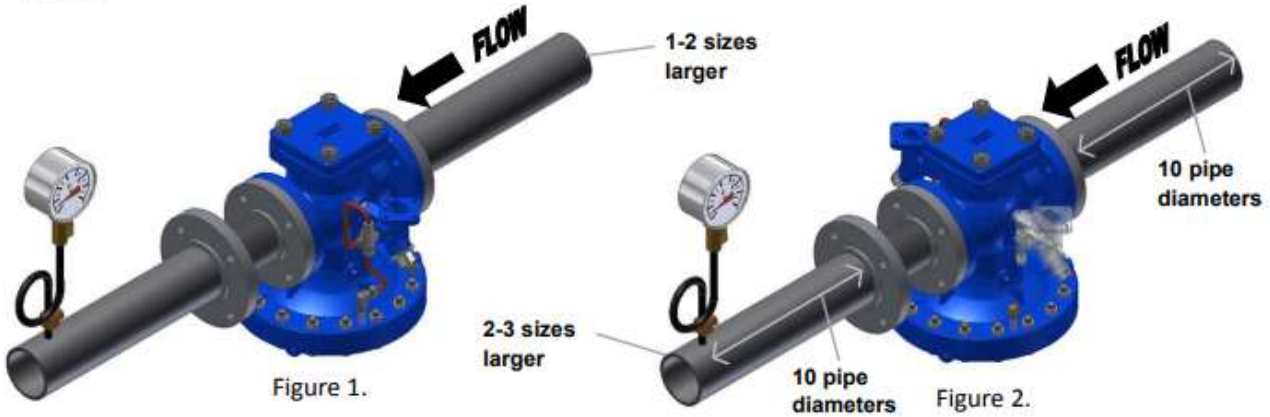
NOTES:



Watson McDaniel HD Series Valve

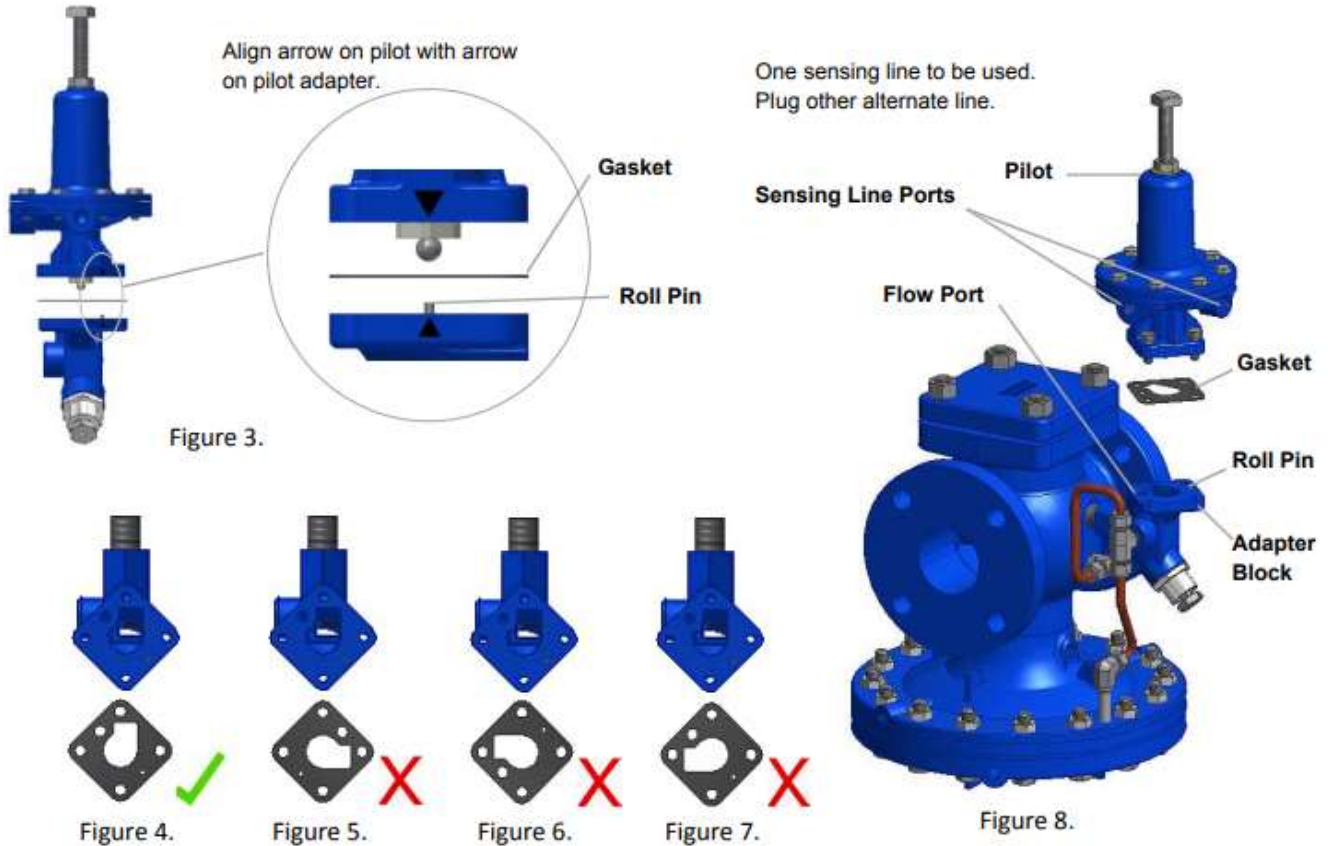
Installing HD Valve Assembly

Install HD valve assembly in horizontal position with flow in direction as indicated by arrow on body. Make sure main valve diaphragm is in the down position. Piping on downstream side of valve is generally larger than valve to eliminate flow restriction. **Caution:** When installing flanged valves make sure flange bolts are tightened evenly as to not overstress and crack flanges.



Install Gasket and Pilot

Remove pilot adapter protector from main valve. Place gasket on pilot adapter block making sure gasket is proper side up and roll pin in pilot adapter block is inserted thru small hole in gasket. Assemble pilot to adapter block making sure roll pin in adapter is inserted in blind hole assembly. Line up arrow on pilot to the side of the adapter block that has the roll pin.





When installing pilot on opposite side of the main valve, make sure the pilot is installed in the proper orientation. The arrows on the pilot adapter and the pilot should be aligned. See figure 3.

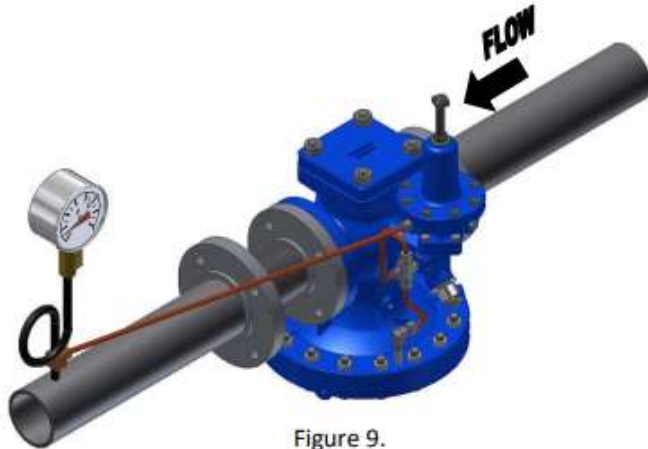


Figure 9.
Downstream facing sensing port used.
Plug secondary sensing port.

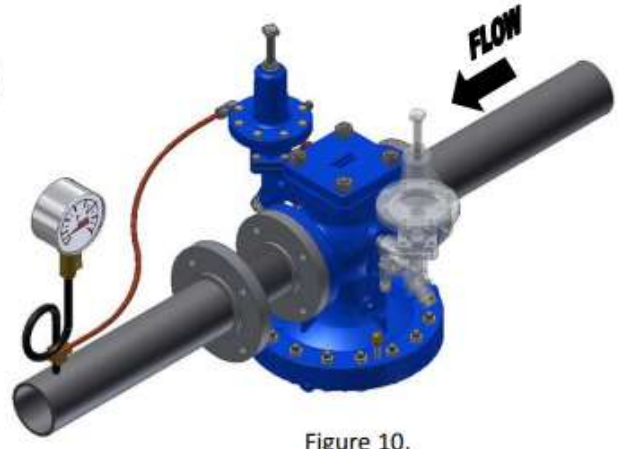


Figure 10.
Secondary sensing port used.
Plug upstream facing sensing port.

Installing Pilot Sense Line

Pressure gauge should be installed downstream of valve at least 10 pipe diameters from start of increased pipe diameter where there will be a minimum amount of turbulence. Pilot sensing line should be connected from the pilot to the downstream pressure gauge and sloped downward away from the valve to keep condensate out of the pilot valve.

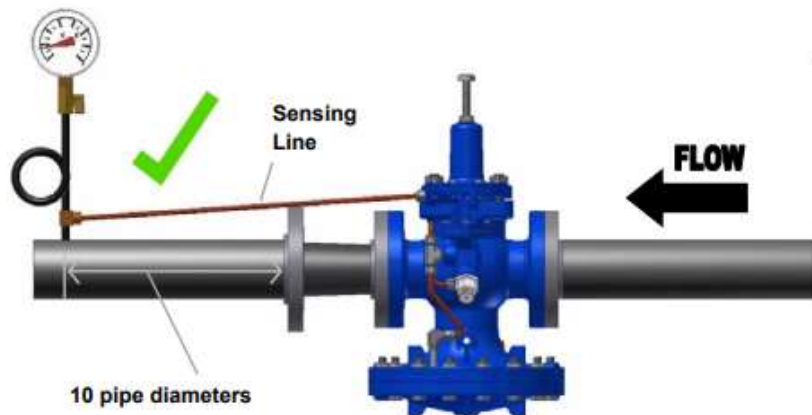


Figure 11.

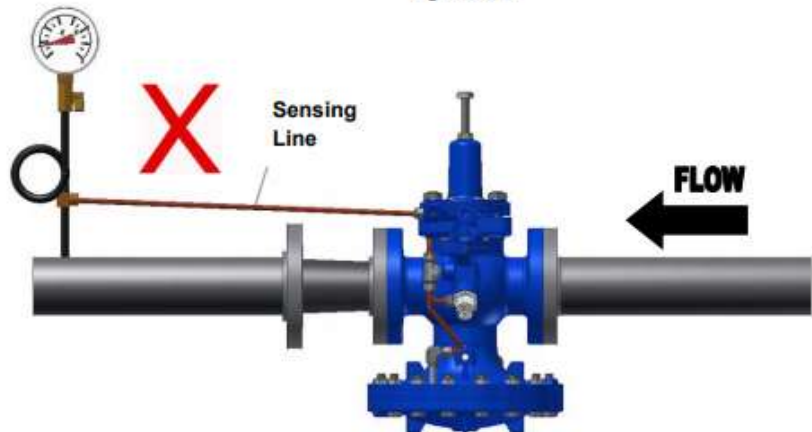


Figure 12.



PTRP Pilot HD Series

Temperature Control with PTRP Temperature Pilot

Pilot-Operated REGULATORS

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 conjunction with a Low Pressure Temperature Pilot for steam pressure under 15 PSIG (Range 5 - 20)
MAIN VALVE: Example Model Code: HD-13-N-LP

Typical Applications

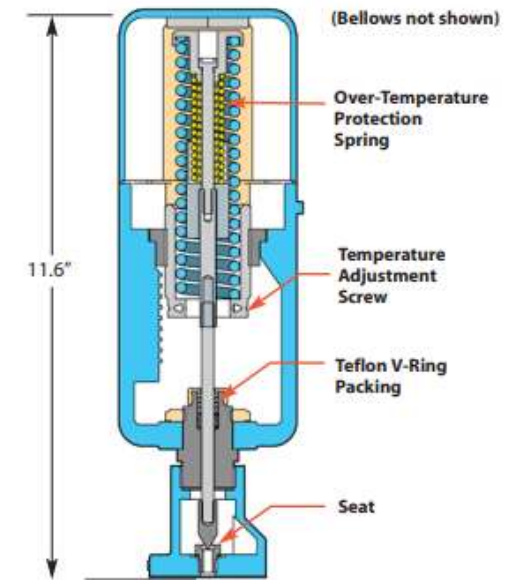
The PTRP-Temperature Pilot is used with the HD Regulator to control temperature in various processes and systems. The PTRP uses a vapor tension system to actuate the bellows in the temperature pilot giving it a faster reaction time and better temperature sensitivity than the standard PT pilot. They can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

Features

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

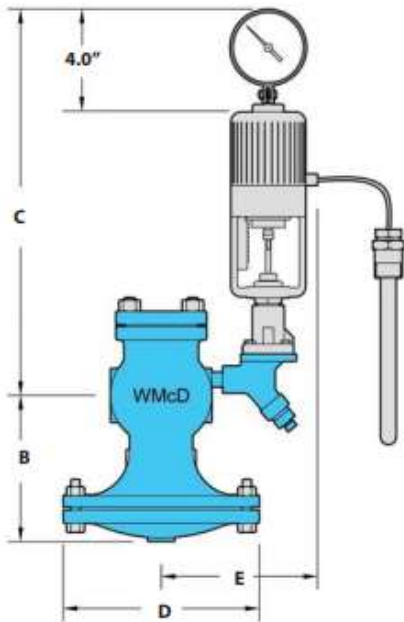
Options

- **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):** Consult factory



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"	4 ³ / ₈			5 ¹ / ₂	14	6 ¹ / ₂	7 ³ / ₄	18	
3/4"	4 ³ / ₈			5 ¹ / ₂	14	6 ¹ / ₂	7 ³ / ₄	18	
1"	5 ³ / ₈	5 ¹ / ₂	6	6 ¹ / ₄	14	7	7 ³ / ₄	23	35
1 ¹ / ₄ "	6 ¹ / ₂			7 ³ / ₈	14	8 ³ / ₄	8 ¹ / ₄	43	
1 ¹ / ₂ "	7 ¹ / ₄	6 ⁷ / ₈	7 ³ / ₈	7 ³ / ₈	14	8 ³ / ₄	8 ¹ / ₄	43	60
2"	7 ¹ / ₂	8 ¹ / ₂	9	8 ¹ / ₄	14	10 ⁷ / ₈	8 ¹ / ₂	65	85
2 ¹ / ₂ "		9 ³ / ₈	10	9	14	11 ³ / ₄	8 ¹ / ₂		105
3"		10	10 ³ / ₄	8 ⁷ / ₈	14	13 ¹ / ₄	9 ¹ / ₂		145
4"		11 ⁷ / ₈	12 ¹ / ₂	10 ⁷ / ₈	14	14 ³ / ₄	10 ¹ / ₂		235
6"		15 ¹ / ₈	16	14 ¹ / ₈	14 ¹ / ₂	19 ³ / ₄	11 ³ / ₄		470

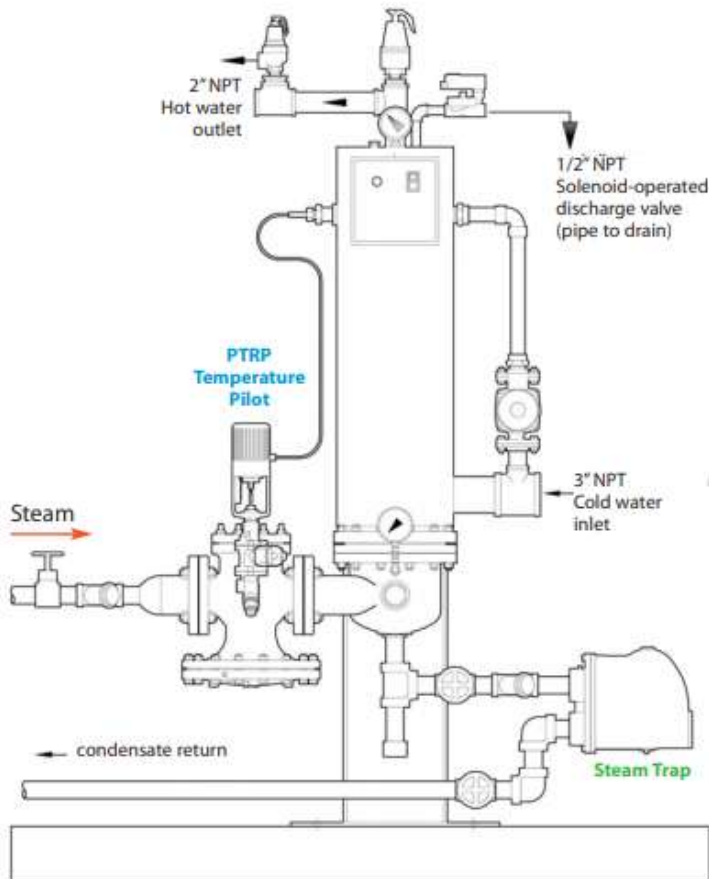
Pilot-Operated REGULATORS

MATERIALS for PTRP Pilot

Pilot Body	Cast Steel
Valve and Seat	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	Grafol/Garlock
Cover Screws	Steel
Pilot Adapter	Ductile Iron/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:

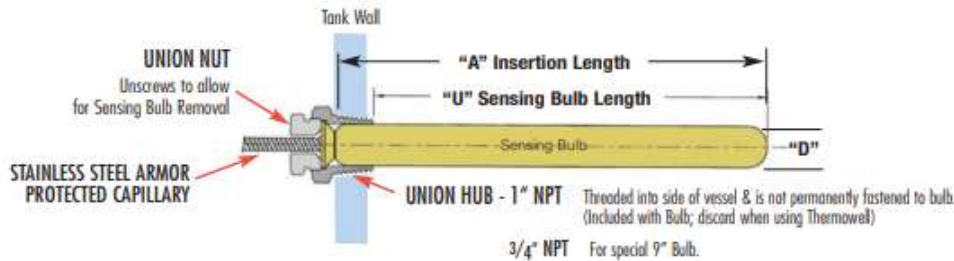
The sensing bulb and capillary is available in either Copper (standard) or Stainless Steel (for corrosive applications). Copper has the best heat transfer properties and should always be chosen unless used in corrosive service. Sensing bulb length is dependent upon the capillary length required; longer 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			"D" Bulb Dia.	
			8, 12, 16	20	24		
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"	

*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.



Thermowell Option (ordered separately)

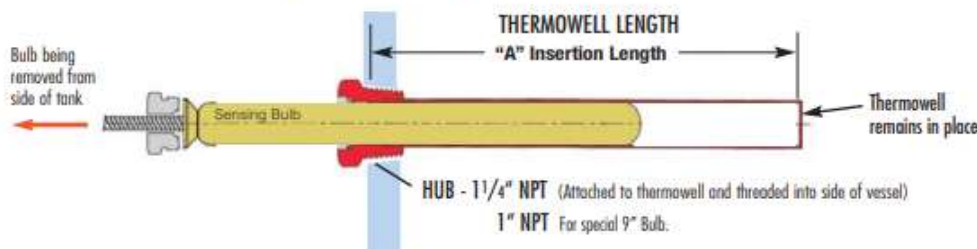
Thermowells isolate and protect the sensing bulb from the process fluid; available in either brass (better heat transfer properties) or Stainless Steel for corrosion resistance. They allow for sensing bulb removal and replacement without having to drain liquid from the system. For corrosive applications, 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.)		Capillary Length in Feet
			BULB	THERMOWELL	
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.





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-94-03-08	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

Pilot-Operated REGULATORS

* 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	S15 (copper bulb) (standard)
PTRP-94	Indicating Dial		S16 (SS bulb)
PTRP-LP-91	Non-Indicating		SB15 (9" copper bulb)
PTRP-LP-94	Indicating Dial		SB16 (9" SS bulb)

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

How to write proper model number:

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

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

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)

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)



NOTES: