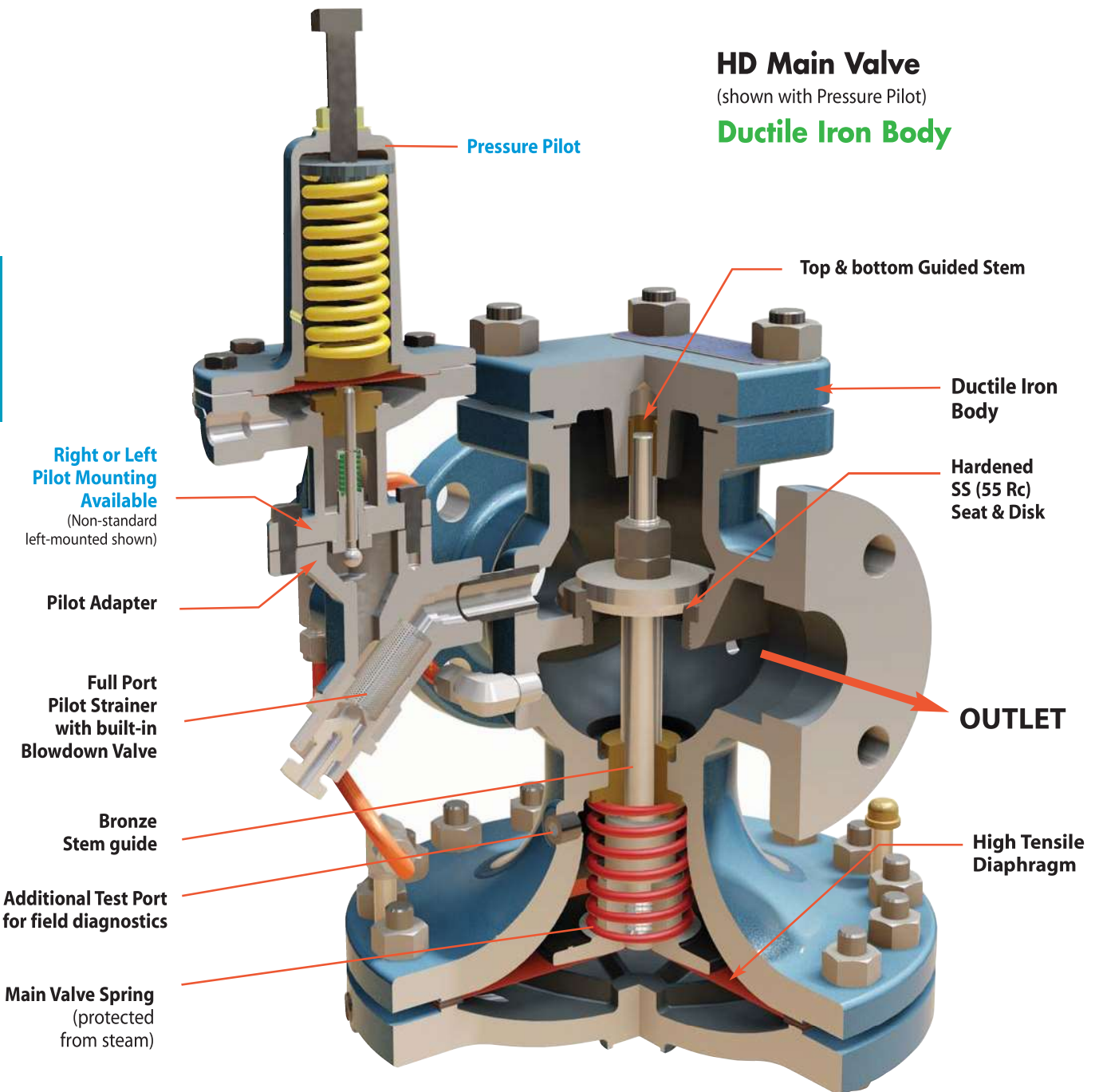


HD Main Valve

(shown with Pressure Pilot)

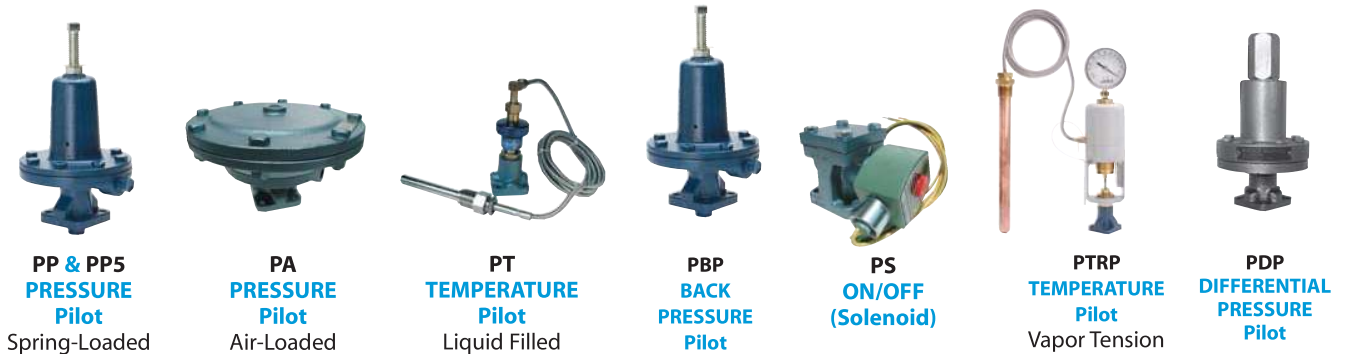
Ductile Iron Body



Features of the HD Regulating Valve

- No external power source is required.
- Pressure & temperature pilots can be used in combination, eliminating the need for a separate pressure and temperature regulator.
- Ductile iron body for higher pressure ranges and increased safety when compared to cast iron.
- Full port strainer and blowdown valve on pilot adapter for ultimate protection against dirt and scale.
- Hardened stainless steel trim (55 Rc) for extended life even in the most demanding applications.
- The innovative design allows the pilot to be mounted on either side of the regulator and is easily field-reversible without having to rebend tubing.
- Tubing and pilot adapter is pre-mounted on main valve. The control pilot requires only four bolts to complete the installation.

Introduction



**PP & PP5
PRESSURE
Pilot**
Spring-Loaded

**PA
PRESSURE
Pilot**
Air-Loaded

**PT
TEMPERATURE
Pilot**
Liquid Filled

**PBP
BACK
PRESSURE
Pilot**

**PS
ON/OFF
(Solenoid)**

**PTRP
TEMPERATURE
Pilot**
Vapor Tension

**PDP
DIFFERENTIAL
PRESSURE
Pilot**

Pilot-Operated
REGULATORS

Typical Configurations

The **HD Series Pilot-Operated Regulating Valve** was designed for extremely accurate control of temperature and pressure in steam service applications. The HD-Series is made of Ductile Iron for extended pressure and temperature ratings when compared to cast iron. Several different control pilots can be mounted to the valve to control pressure, temperature, or a combination of both. When two or more pilots are used together (both a pressure and a temperature pilot) an additional pilot adapter for the second pilot is required (must indicate when ordering). The most common pilots are the PP-Pilot for pressure reducing, and the PT-Pilot for temperature control. The **Standard Main Valve** is used for an inlet steam pressure range of 15-300 PSI. The **Low-pressure Main Valve** contains a different main valve spring and is available for an inlet pressure range of 5-20 PSI. The Main Valve and Pilot are purchased separately.

Pressure Control

When controlling pressure, there are several options you can use for a pilot. The **PP-Pilot** and the **PP5-Pilot** are both **spring-adjusted** pressure pilots. The **PP-Pilot** is used on general-purpose pressure reducing applications and the **PP5-Pilot** is used when higher accuracy is required. The **PA-Pilot** is air controlled and allows for easier and remote adjustment of steam pressure.

Temperature Control

Several choices of pilot valves can be used for temperature control when steam is used on heating applications. The **PT** style pilot (most common) is referred to as a "solid liquid fill" and contains a temperature probe connected by a length of capillary tubing to a bellows in the pilot valve. When the temperature bulb is heated the liquid inside the probe expands the bellows and closes off the pilot valve. **PTRP** pilot operates in a similar fashion except this style is referred to as a vapor tension unit.

The **PTL** temperature controller uses a bi-metal element to sense temperature and deliver an appropriate air signal to a **PA** air pilot that controls the operation of the HD main valve.

Temperature-Pressure Control

The **PP & PT-Pilot** combination is used when it is desirable to control both the **pressure** and **temperature** of a system with only one regulating valve. The unique features of this modular valve allow this to be accomplished quite easily. When the **PP & PT-Pilot** combination is used, the downstream pressure is limited to a maximum setting by the pressure pilot, while the temperature pilot maintains the correct temperature.

On-Off Operation

Electrical **On-off control** of the regulator is possible by using the **PS-Solenoid Pilot**. The **PS-Pilot** allows the regulator to be shut off or turned on **electrically**. Normally the regulator is equipped with either a **PP-Pressure Pilot** or **PT-Temperature Pilot** in addition to the **PS-Solenoid Pilot**.

Back Pressure

When controlling the back pressure in a steam system, the **BP-Pilot** is used in conjunction with the **HD-Series Regulator**. This controls the pressure on the upstream side of the regulator.

Differential Pressure

The **PDP-Pilot** is used when trying to balance two different media sources that are being blended.

Stainless Diaphragm Option

The HD regulator is supplied standard with a high tensile strength Phosphor Bronze diaphragm which has been determined thru experience and testing to be the absolute best diaphragm material choice for steam applications. Stainless Steel diaphragms are offered as an option because certain industry specifications have been written requiring stainless steel. Note: Stainless steel is prone to work hardening and will not last as long as phosphor bronze; only use if required by the specification to do so.

Stainless Tubing Option

Copper tubing is supplied as standard. Copper tubing offers excellent corrosion resistance and is easy to bend and manipulate and normally outlasts the life span of the valve. Stainless Steel tubing is offered as an option.

Reduced port trim Option:

Regulators should be sized to meet the application not to fit the pipe size. Over sizing a regulator may cause overshoot which leads to erratic pressure or temperature control often referred to as "hunting." A valve with reduced port trim has a reduced seat and disc size for a given pipe size, (refer to capacity charts).

Low pressure (differential and inlet) Option:

Regulators require a minimum Inlet pressure as well as a minimum pressure drop across the valve to operate properly. The HD Standard Main valve requires a minimum inlet pressure of 15 PSIG and minimum differential pressure of 10 PSI. The Low Pressure Main valve requires 5 PSIG minimum inlet pressure and 3 PSI minimum differential pressure. Low pressure main valve uses a EPDM diaphragm.

Regulators

Pilot-Operated Regulating Valves

HD Series

HD Main Valve • Ductile Iron

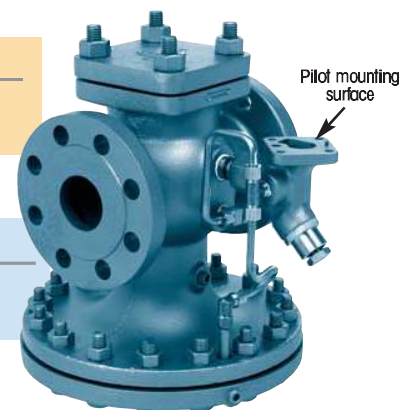
Main Valve	HD-Series
Sizes	1/2" - 6"
Connections	NPT: 1/2" - 2" FLG: 1" - 6"
Body Material	Ductile Iron
PMO Max. Operating Pressure	300 PSIG
Design Pressure/ Temperature Ratings	NPT 450 PSIG @ 650° F 150# FLG 150 PSIG @ 566° F TMA/PMA 300# FLG 450 PSIG @ 650° F

STANDARD Main Valve Spring:

Inlet Pressure: **15-300 PSIG**
Example Model Code: **HD-12-N**

LOW-PRESSURE Main Valve Spring:

Inlet Pressure: **5-20 PSIG**
Example Model Code: **HD-12-N-LP**



Model Code Configuration Chart

Models	Code	Size	Code	Connection Type	Options	(Suffix)
HD Full Port	12	1/2"	N	NPT (1/2"-2")	SSD	SS Diaphragm
HDR Reduced Port	13	3/4"	BSP	BSPT (1/2"-2")	SSXT	SS External Tubing
	14	1"	F150	150# FLG (1"-6")	LP	Low Pressure Main Valve Spring with EPDM Diaphragm
	15	1 1/4"	F300	300# FLG (1"-6")		
	16	1 1/2"				
	17	2"				
	18	2 1/2"				
	19	3"				
	20	4"				
	22	6"				

Note: For more than one Option, combine suffixes.
Example: SSD-SSXT

Model Codes below are for HD Main Valve ONLY. Control Pilot must be ordered separately. When two or more pilots are used on the same valve, a pilot adapter must be ordered also. Use Part Number BADAPTER.

Size/Connection	STANDARD Inlet Pressure 15 - 300 PSI	LOW-PRESSURE Inlet Pressure 5 - 20 PSI	Weight lbs
1/2" NPT	HD-12-N	HD-12-N-LP	24
3/4" NPT	HD-13-N	HD-13-N-LP	24
1" NPT	HD-14-N	HD-14-N-LP	30
1" 150# FLG	HD-14-F150	HD-14-F150-LP	31
1" 300# FLG	HD-14-F300	HD-14-F300-LP	34
1 1/4" NPT	HD-15-N	HD-15-N-LP	50
1 1/2" NPT	HD-16-N	HD-16-N-LP	51
1 1/2" 150# FLG	HD-16-F150	HD-16-F150-LP	54
1 1/2" 300# FLG	HD-16-F300	HD-16-F300-LP	60
2" NPT	HD-17-N	HD-17-N-LP	72
2" 150# FLG	HD-17-F150	HD-17-F150-LP	80
2" 300# FLG	HD-17-F300	HD-17-F300-LP	82
2 1/2" 150# FLG	HD-18-F150	HD-18-F150-LP	105
2 1/2" 300# FLG	HD-18-F300	HD-18-F300-LP	109
3" 150# FLG	HD-19-F150	HD-19-F150-LP	150
3" 300# FLG	HD-19-F300	HD-19-F300-LP	158
4" 150# FLG	HD-20-F150	HD-20-F150-LP	230
4" 300# FLG	HD-20-F300	HD-20-F300-LP	250
6" 150# FLG	HD-22-F150	HD-22-F150-LP	450
6" 300# FLG	HD-22-F300	HD-22-F300-LP	472

Ordering Instructions:

NOTE: When two or more pilots are used on the same valve: An additional Pilot Adapter for Second Pilot is required: (Not required for Solenoid Pilot)

Use part number: (**BADAPTER**)

Options & Adders:	Code
Low Pressure Main Valve:	LP
Reduced Port Valves:	HDR
Stainless Steel Diaphragm:	SSD
Stainless Steel External Tubing:	SSXT
Required for secondary Pilot: (Not required for Solenoid Pilot)	BADAPTER

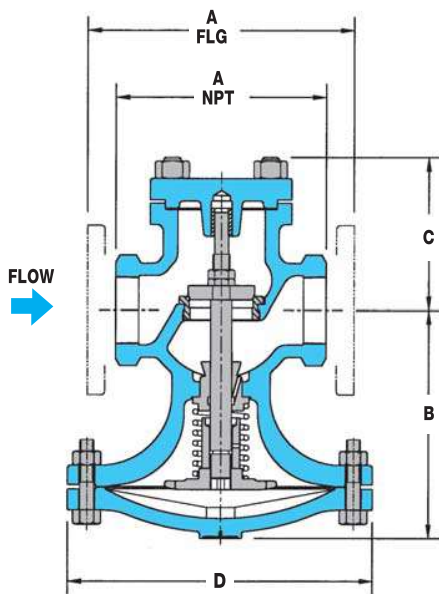
Example Model Codes for Main Valve:

- 1) **HD-15-N**
(HD Series Valve with 1 1/4" Threaded, NPT connections)
- 2) **HDR-16-F150**
(HD Series Valve, Reduced Port with 1 1/2" 150# Flanged connections)
- 3) **HD-20-F300-SSXT**
(HD Series Valve with 4" 300# Flanged connections & SS External tubing)

Regulators Pilot-Operated Regulating Valves

HD Series

HD Main Valve • Ductile Iron



HD-Series DIMENSIONS – inches									
Size	(A) Face-To-Face			B	C	D	Weight (lbs)		
	NPT	150#	300#				NPT	150#	300#
1/2"	4 ³ / ₈			5 ¹ / ₂	3 ³ / ₈	6 ¹ / ₂	18		
3/4"	4 ³ / ₈			5 ¹ / ₂	3 ³ / ₈	6 ¹ / ₂	18		
1"	5 ³ / ₈	5 ¹ / ₂	6	6 ¹ / ₄	3 ¹ / ₂	7	23	40	45
1 ¹ / ₄ "	6 ¹ / ₂			7 ³ / ₈	4 ⁷ / ₈	8 ³ / ₄	43		
1 ¹ / ₂ "	7 ¹ / ₄	6 ⁷ / ₈	7 ³ / ₈	7 ³ / ₈	4 ⁷ / ₈	8 ³ / ₄	43	55	60
2"	7 ¹ / ₂	8 ¹ / ₂	9	8 ¹ / ₄	5 ³ / ₈	10 ⁷ / ₈	65	75	85
2 ¹ / ₂ "		9 ³ / ₈	10	9	5 ³ / ₄	11 ³ / ₄		100	105
3"		10	10 ³ / ₄	8 ⁷ / ₈	6 ³ / ₄	13 ¹ / ₄		130	145
4"		11 ⁷ / ₈	12 ¹ / ₂	10 ⁷ / ₈	7 ¹ / ₂	14 ³ / ₄		215	235
6"		15 ¹ / ₈	16	14 ¹ / ₈	10	19 ³ / ₄		420	470

Option: Stainless diaphragms and external tubing - consult factory

Standard pilot mounting is on the right side of the regulator when looking into the outlet port (as shown). Pilot mounting on HD regulators are field-reversible.

OPERATING PRESSURES

Inlet Pressure Range: (for Main Valve):
15 PSIG (Standard Main Valve)
5 PSIG (Low-Pressure Main Valve)

Minimum Differential Pressure (for Main Valve):*
10 PSI (Standard Main Valve)
3 PSI (Low-Pressure Main Valve)

* Not required for Temperature Pilot applications

MATERIALS

Body	Ductile Iron
Cover	Ductile Iron
Gasket	Grafoil/Garlock
Cover Screws	Steel
Pilot Adapter	Ductile Iron/Cast Steel
Screen	Stainless Steel
Tubing	Copper
Valve Seat	Hardened SST (55Rc)
Valve Disc	Hardened SST (55Rc)
Diaphragm	Phosphor Bronze (standard) EPDM (Low Pressure Main Valve)

Ordering Instructions: HD Series Regulator with a Pilot

Model Code for Main Valve:	HD-19-F150	HD Series Valve with 3" 150# Flanges
Model Code for Pilot:	PP-B	Pressure Pilot, 20-100 PSIG (Blue spring color)

HD Valve with Pressure Pilot



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

Model Code for Pilot: **PP-B**
(Pressure Pilot with 20-100 PSIG Range)

HD Valve with Temperature Pilot



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

Model Code for Pilot: **PTU-14-8**
(Temperature Pilot (100-160° F) with 8 Ft. Capillary)

HD Valve with Pressure & Temperature Pilots



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

Model Code for Pilot: **PP-B**
(Pressure Pilot with 20-100 PSIG Range)

Model Code for Pilot: **PTU-14-8**
(Temperature Pilot (100-160° F) with 8 Ft. Capillary)

Model Code for Secondary Pilot Adapter*: **BADAPTER**

* If 2 Pilots are used on the same valve, a Secondary Pilot Adapter is required.

Regulators

Pilots for HD Regulating Valves

PP & PP5 Pilots

HD Series

Pressure Regulating with PP & PP5 Spring-loaded Pilot

Pressure Pilot	(Standard: 1.0 psig accuracy) (High-accuracy: 0.5 psig accuracy)	PP PP5
Pilot Body Material		Cast Steel
Max Inlet Pressure		300 PSIG
Reduced Outlet Pressure Range		3-200 PSIG
Inlet Pressure Range		15-300 PSIG
(with HD Standard main valve)		
(with HD Low-Pressure (LP) main valve)		5-20 PSIG
Minimum Differential Pressure		10 PSI
(with HD Standard main valve)		
(with HD Low-Pressure (LP) main valve)		3 PSI



Pilot-Operated REGULATORS

Typical Applications

The **PP & PP5 Pressure Pilots** are used with the HD Regulator to control steam pressure in steam mains or for process equipment. Pilot-operated regulators maintain constant downstream pressure even when the inlet pressure to the valve fluctuates or steam usage varies. The PP-Pressure Pilot is adequate for controlling pressure in most industrial applications. For increased accuracy use the PP5 Pilot.

PP-Pressure Pilot (Standard) 1.0 PSIG accuracy

PP5-Pressure Pilot (Special Applications) 0.5 PSIG accuracy

Features

- The **PP-Pilot** can maintain downstream pressure to ± 1 PSIG
- **PP5-Pilot** can maintain downstream pressure to ± 0.5 PSIG
- Choices of three overlapping pressure ranges
- Pilot is easily installed on pilot adapter using four bolts, no tubing connections are required
- Full port strainer and blowdown valve on pilot adapter for protection of pilot from dirt and scale
- Solid floating diaphragm is more failure resistant
- Watson McDaniel's pilots can be used with other manufacturers' regulators

Options

- Pressure pilot can be used with temperature pilot to eliminate the need for two separate regulators
- Solenoid pilot can be added for remote on/off control of regulator

Example: PP-B Pilot at 20-100 PSIG

Reduced Pressure Range PSI	Model Code	Spring Color	Weight lbs
PP-Pressure Pilot (for Standard Industrial Applications) 1.0 PSIG accuracy			
3-25	PP-Y	Yellow	10
20-100	PP-B	Blue	10
80-200	PP-R	Red	10
PP5-Pressure Pilot (Special Applications) 0.5 PSIG accuracy			
1-10	PP5-Y*	Yellow	25
10-25	PP5-B*	Blue	25

* A Spacer (model # BAP-SPACE) is required when using PP5 Pressure Pilots on a 3" & 4" HD Main Valve.

HD Main Valve

with
PP-Pressure Pilot



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

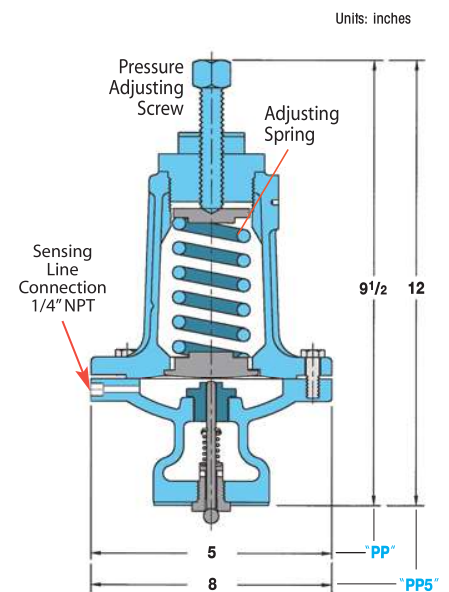
Model Code for Pilot: **PP-B**
(Pressure Pilot with 20-100 PSIG Range)

MATERIALS for PP Pressure Pilot

PP Pilot Body	WCb 216 Cast Steel
PP5 Pilot Body	Cast Iron
Head & Seat Gasket	302 SS
Diaphragm	Phosphor Bronze
Head & Seat Assembly	Hardened SST (55 Rc)

MATERIALS for HD Main Valve

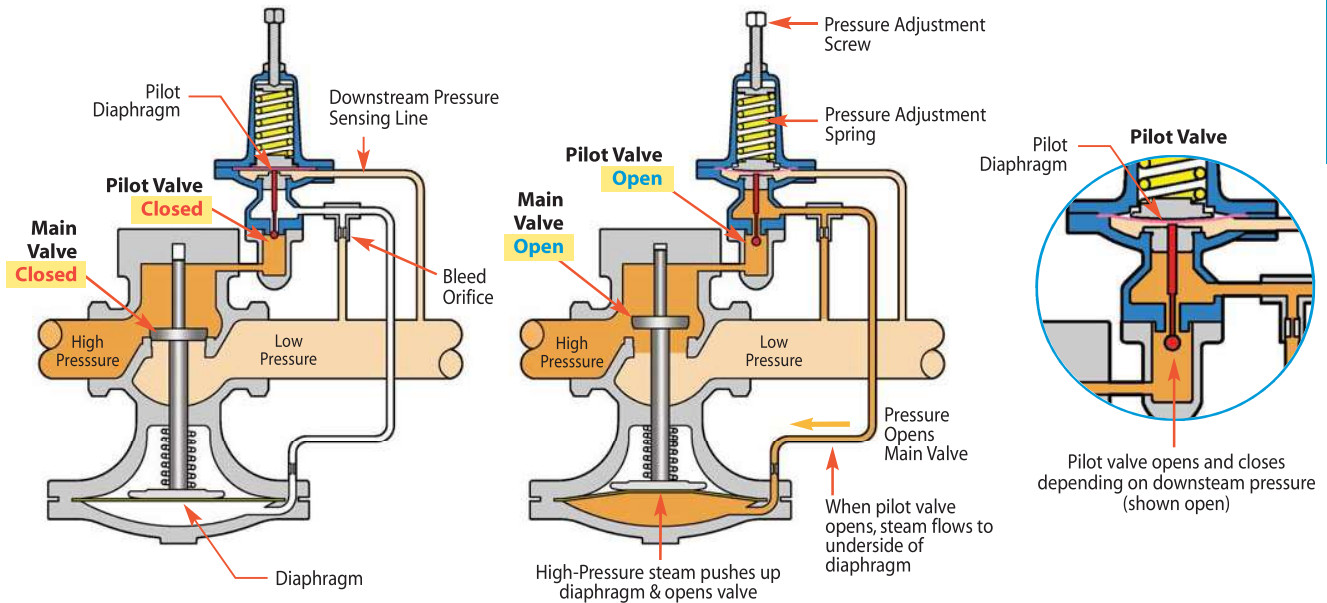
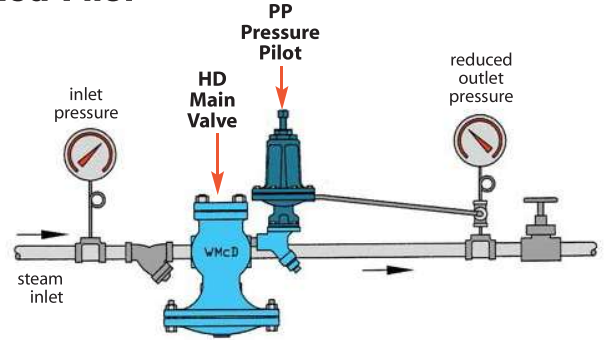
Body	Ductile Iron
Cover	Ductile Iron
Gasket	Grafoil/Garlock
Cover Screws	Steel
Pilot Adapter	Ductile Iron/Cast Steel
Screen	Stainless Steel
Tubing	Copper
Valve Seat	Hardened SST (55 Rc)
Valve Disc	Hardened SST (55 Rc)
Diaphragm	Phosphor Bronze



Pressure Regulating with PP & PP5 Spring-loaded Pilot

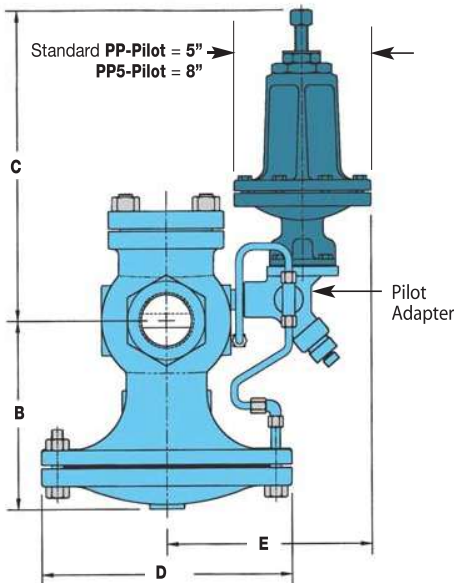
Reducing Pressure

The PP-Pilot and the PP5-Pilot are both spring-adjusted pressure pilots. The PP-Pilot is used on typical general-purpose pressure reducing applications. The PP5-Pilot is used when higher accuracy is required and is capable of maintaining a control pressure window of less than 1 PSI.



How it Works

The Pressure Pilot controls the operation of the HD Regulator. The sensing line connects the pressure pilot to the downstream side of the regulator. Pressure in the sensing line applies an upward force to the pilot diaphragm to compress the adjustment spring. When system pressure equals set point, the diaphragm moves upwards against the force of the adjusting spring, closing pilot valve. When the pilot valve is shut, steam cannot pass thru to the underside of the regulator diaphragm, closing the regulator. When the steam pressure falls below its set point, the pilot valve opens allowing steam to lift the main valve diaphragm which opens the regulating valve.



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

For PP5 Pilot: * For sizes 1/2" to 1 1/2" add 2 1/2" to "C" dimension; For sizes 2" to 6" add 5" to "C" dimension. ** Add 1 1/2" to "E" dimension for all sizes.

HSP Pressure Regulating Valve

Cast Steel



Pilot-Operated
REGULATORS

Cast Steel Pressure Regulating Valve

Model	HSP Series
Sizes	1", 1½", 2", 3", 4"
Connections	150#/300# Flange
Body Material	Cast Steel
PMO Max. Operating Pressure	450 PSIG
TMO Max. Operating Temperature	650°F
PMA Max. Allowable Pressure	550 PSIG @ 650°F
TMA Max. Allowable Temperature	650°F @ 550 PSIG

OPERATING PRESSURES

Inlet Pressure Range:

- 15-450 PSIG** (standard Main Valve)
- 5-20 PSIG** (low-pressure Main Valve)

Minimum Differential Pressure:

- 10 PSIG** (standard Main Valve)
- 3 PSIG** (low-pressure Main Valve)

PRESSURE-ADJUSTING SPRING RANGES

Pressure Ranges	Identifying Colors
10-40 PSIG	yellow
25-100 PSIG	blue
75-300 PSIG	red

Typical Applications

The **HSP Series** Main Valve with **integral Pressure Pilot** reduces steam pressure in steam system piping mains and process applications. This pilot-operated regulator is specifically used in applications where the properties and benefits of Cast Steel are desired and/or specified. Using steel as the material of construction for the main valve body extends the pressure-temperature rating of the regulator. A unique two-bolt pilot adapter design and field-reversible tubing offer even greater versatility to this type of regulator, further reducing maintenance downtime. These valves share the same design and proven reliability of the Watson McDaniel HD-Series Regulators, providing extremely accurate control of downstream system pressure even when inlet pressure to the regulator fluctuates or steam usage varies.

Features

- Cast Steel body for higher pressure and temperature ratings
- New, convenient bolt-on pilot design simplifies installation
- New diaphragm design improves performance and extends life
- Hardened stainless steel trim for extended life
- Optional Stellite trim available
- Full port strainer and blowdown valve on pilot adapter for ultimate protection from dirt and scale
- Maintains downstream pressure to ± 1.0 PSIG
- Choice of three overlapping spring ranges
- Pre-mounted pilot & tubing simplifies installation



Pilot Mounting

Standard pilot mounting is on the right side of the regulator when looking into the outlet port. For opposite-mounting, specify when ordering. Pilot mounting on HSP regulators are field-reversible.

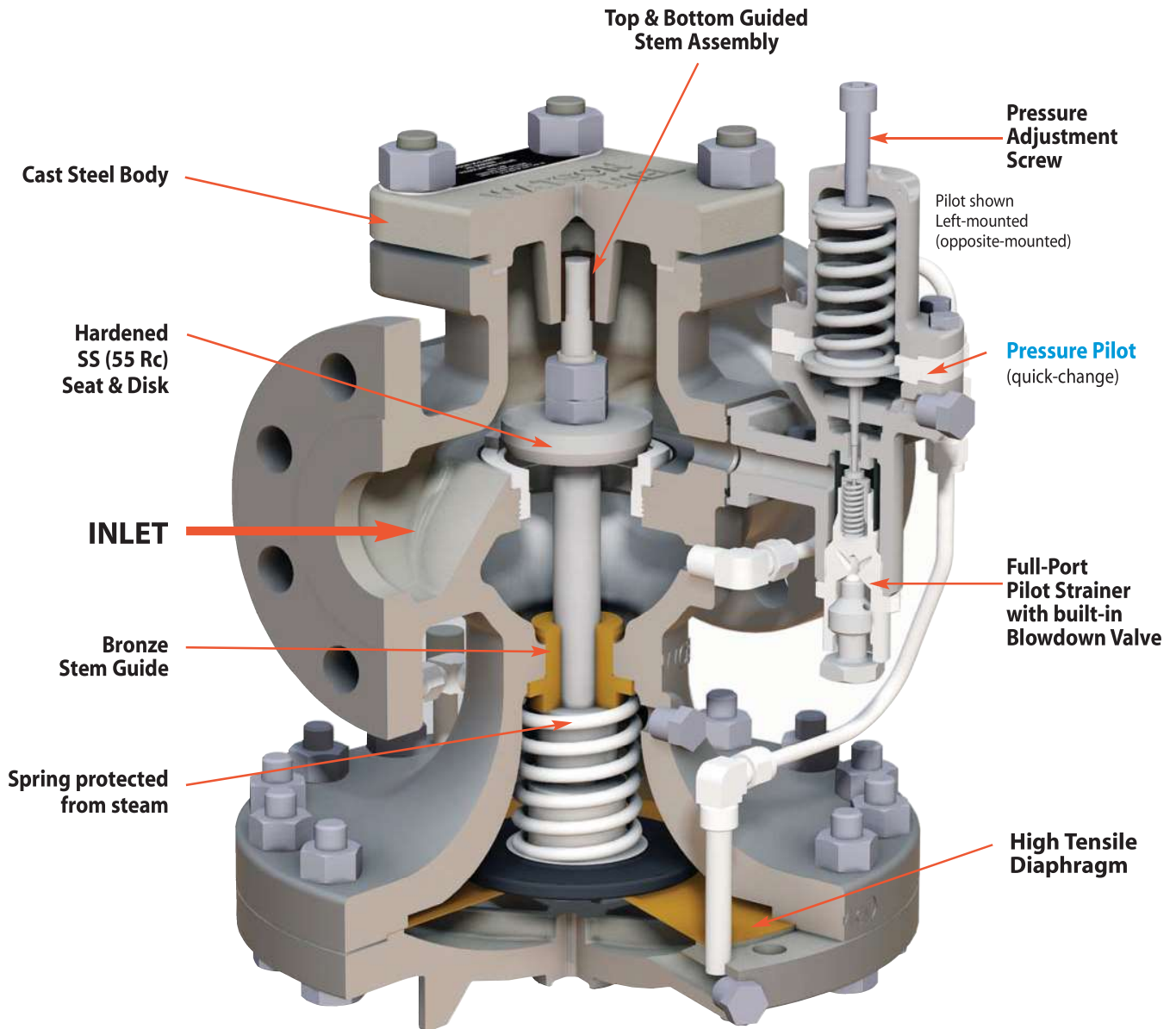
Pressure Pilot

The spring-adjusted Pilot is used for general purpose pressure reducing applications.

MATERIALS for HSP Regulator

Body	ASTM A-216 GR WCB
Cover	ASTM A-216 GR WCB
Diaphragm Cover	ASTM A-216 GR WCB
Pilot	ASTM A-216 GR WCB
Gaskets	Garlock 3400/grafoil SLS
Seat	420F SS (optional Stellite seat, consult factory)
Disc	420F SS
Diaphragm	Bronze
Diaphragm for LP Model	EPDM
Mfg. Bolts	SA-193 GR B7
Spring	302 SS
Stem	416 SS

Cast Steel Pressure Regulating Valve



Pressure Regulator shown with Left-mounted Pilot
(right-mounted is standard)

Cast Steel Pressure Regulating Valve

Model includes HSP Main Valve with Pressure Pilot

Size/Connection	Model Code	Pressure Pilot Range (PSI)	Weight lbs
1"	150# FLG	HSP-14-F150-Y	10-40
		HSP-14-F150-B	25-100
		HSP-14-F150-R	75-300
	300# FLG	HSP-14-F300-Y	10-40
		HSP-14-F300-B	25-100
		HSP-14-F300-R	75-300
1 1/2"	150# FLG	HSP-16-F150-Y	10-40
		HSP-16-F150-B	25-100
		HSP-16-F150-R	75-300
	300# FLG	HSP-16-F300-Y	10-40
		HSP-16-F300-B	25-100
		HSP-16-F300-R	75-300
2"	150# FLG	HSP-17-F150-Y	10-40
		HSP-17-F150-B	25-100
		HSP-17-F150-R	75-300
	300# FLG	HSP-17-F300-Y	10-40
		HSP-17-F300-B	25-100
		HSP-17-F300-R	75-300
3"	150# FLG	HSP-19-F150-Y	10-40
		HSP-19-F150-B	25-100
		HSP-19-F150-R	75-300
	300# FLG	HSP-19-F300-Y	10-40
		HSP-19-F300-B	25-100
		HSP-19-F300-R	75-300
4"	150# FLG	HSP-20-F150-Y	10-40
		HSP-20-F150-B	25-100
		HSP-20-F150-R	75-300
	300# FLG	HSP-20-F300-Y	10-40
		HSP-20-F300-B	25-100
		HSP-20-F300-R	75-300



Pilot Ranges

Code	Color	PSIG
Y	Yellow	10-40
B	Blue	25-100
R	Red	75-300

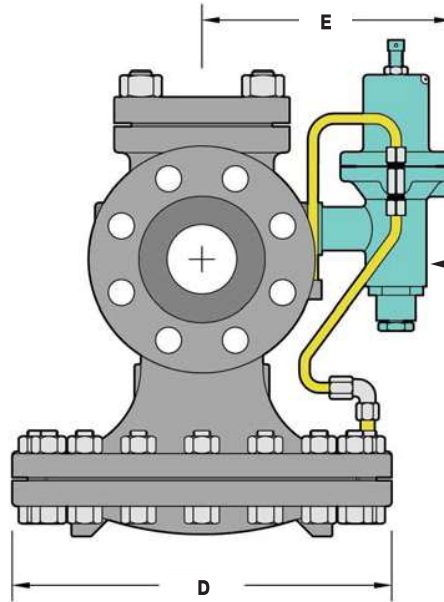
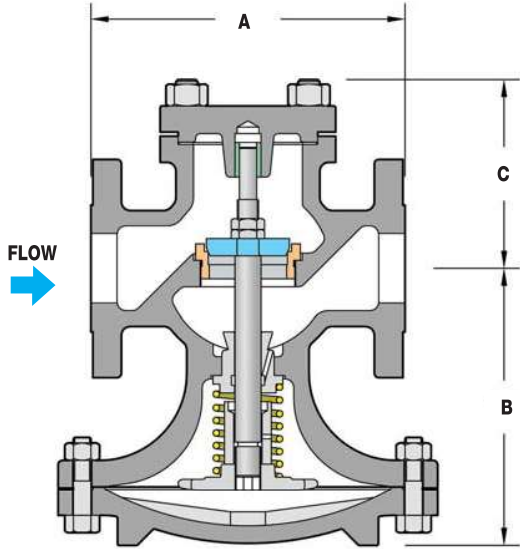
Model Configuration Chart

Models	Code	Size	Code	Connection	Code	Pressure Range (PSIG)	Code	Options (Suffix)	
HSP	Full Port	14	1"	F150	150# Flanged	Y	10-40 (yellow)	SSXT	Stainless Steel External Tubing
HSPR	Reduced Port	16	1 1/2"	F300	300# Flanged	B	25-100 (blue)	ST	Stellite Trim
		17	2"			R	75-300 (red)	LP	Low Pressure Main Valve Spring
		19	3"					SSD	SS Diaphragm
		20	4"						

Example Model Codes:

- 1) **HSP-17-F150-Y** (HSP Full port valve, 2" 150# Flg, 10-40 PSIG, with no options)
- 2) **HSPR-17-F300-B-ST** (HSP Reduced port valve, 2" 300# Flg, 25-100 PSIG, with Stellite Trim)

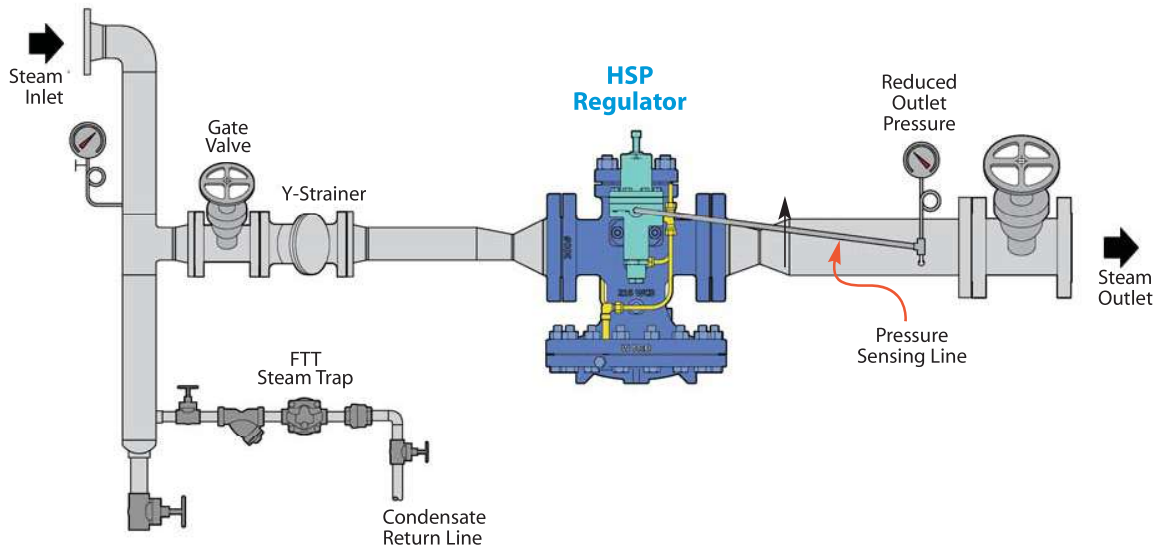
Cast Steel Pressure Regulating Valve



Standard pilot mounting is on the right side of the regulator when looking into the outlet port (as shown). Pilot mounting on HSP regulators are field-reversible.

Pilot-Operated REGULATORS

DIMENSIONS HSP Series – inches								
Size	(A) Face-To-Face		B	C	D	E	Weight (lbs)	
	150#	300#					150#	300#
1"	5 1/2	6	6 1/4	3 1/2	7	6 3/8	40	45
1 1/2"	6 7/8	7 3/8	7 3/8	4 7/8	8 3/4	7 1/16	55	60
2"	8 1/2	9	8 1/4	5 3/8	10 7/8	7 3/16	75	85
3"	10	10 3/4	8 7/8	6 3/4	13 1/4	8 3/16	130	145
4"	11 7/8	12 1/2	10 7/8	7 1/2	14 3/4	9 5/16	215	235



Pressure Reducing Station for Steam Application

Full Port

Pilot-Operated
REGULATORS

CAPACITIES – Steam (lbs/hr)												FULL PORT	
Inlet Pressure (PSIG)	Outlet Pressure (PSIG)	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"		
C _v Factors		3.8	6.7	11	15	21	37	55	71	113	241		
5	0	85	150	250	350	500	800	1200	1600	2600	5500		
	2	80	140	230	310	440	770	1100	1500	2400	5100		
7	0	115	200	325	450	600	1100	1650	2100	3600	7800		
	2	105	180	300	400	575	1000	1500	2000	3100	6700		
	3	90	160	275	375	525	900	1300	1800	2800	6000		
10	0	150	260	425	575	850	1500	2200	2800	4600	9900		
	2	140	240	400	550	800	1400	2100	2700	4300	9100		
	5	100	175	300	400	600	1000	1600	2000	3200	6900		
12	0	160	280	475	600	900	1600	2400	3100	4900	10300		
	4	140	240	400	550	800	1400	2100	2700	4300	9100		
	7	125	200	375	500	700	1200	1900	2400	3800	8200		
15	0-3	190	325	550	750	1000	1800	2700	3500	5600	12000		
	5	175	300	500	700	900	1700	2500	3200	5200	11100		
	8	140	250	400	500	800	1300	2000	2600	4200	8900		
20	0-5	210	375	625	850	1200	2100	3100	4000	6400	13700		
	10	190	325	550	750	1000	1800	2700	3500	5600	12000		
	12	170	300	500	675	950	1600	2500	3200	5100	10800		
25	0-7	250	450	775	1050	1500	2600	3800	5000	7900	16900		
	10	225	425	700	975	1300	2400	3600	4600	7300	15600		
	15	200	350	600	800	1100	2000	3000	3900	6200	13200		
30	0-12	275	500	800	1100	1500	2700	4100	5200	8300	17800		
	15	250	450	750	1000	1400	2500	3800	4900	7800	16600		
	20	225	375	650	850	1200	2100	3200	4100	6500	14000		
40	0-18	350	600	1000	1350	1900	3300	5000	6400	10300	21900		
	25	300	500	850	1150	1600	2800	4200	5400	8700	18500		
	30	250	425	700	1000	1400	2500	3700	4700	7600	16100		
50	0-20	400	700	1200	1650	2300	4100	6000	7800	12400	26500		
	30	350	650	1100	1500	2000	3600	5400	6900	11000	23600		
	40	275	500	800	1100	1500	2700	4100	5200	8300	17800		
60	0-30	475	850	1350	1900	2600	4600	6900	8900	14200	30300		
	35	425	775	1250	1700	2400	4300	6400	8200	13100	27900		
	50	300	525	850	1200	1600	2900	4300	5600	8900	19000		
75	0-35	575	1000	1650	2300	3200	5600	8300	10800	17200	36600		
	50	475	825	1350	1900	2600	4600	6900	8900	14100	30100		
	60	400	700	1150	1600	2200	3900	5800	7400	11800	25200		
90	0-45	675	1200	1950	2700	3700	6600	9800	12700	20200	43100		
	60	575	1000	1700	2300	3200	5700	8500	10900	17400	37100		
	75	425	750	1200	1700	2300	4100	6100	7900	12600	27000		
100	0-50	750	1300	2100	3000	4100	7300	10800	14000	22200	47500		
	60	700	1200	2000	2700	3800	6700	10000	12900	20500	43800		
	80	500	875	1400	1900	2700	4800	7100	9200	14700	31300		
125	0-60	925	1650	2700	3700	5200	9100	14000	17500	28000	59500		
	75	825	1475	2400	3300	4600	8200	12200	15700	25000	53500		
	100	625	1100	1800	2500	3500	6200	9200	11900	19000	40400		
150	0-75	1100	1900	3100	4300	6000	10600	15800	20400	32400	69100		
	100	925	1600	2700	3600	5100	9000	13400	17400	27700	59000		
	125	650	1150	1900	2600	3600	6400	9500	12300	19600	41900		
175	0-85	1275	2250	3700	5000	7100	12500	18600	24000	38200	81400		
	125	1000	1800	2900	4000	5600	9900	14700	18900	30100	64300		
	150	750	1300	2100	2900	4100	7300	10800	14000	22200	47500		
200	0-100	1450	2500	4200	5700	8000	14100	21000	27100	43100	92000		
	125	1300	2300	3700	5100	7100	12600	18700	24100	38400	81900		
	150	1075	1900	3100	4300	6000	10600	15700	20300	32300	68900		
225	0-120	1575	2800	4600	6200	8700	15400	22900	29500	47000	100200		
	150	1450	2500	4200	5700	8000	14100	21000	27200	43300	92300		
	175	1350	2400	3900	5300	7400	13100	19500	25200	40100	85500		
250	0-130	1750	3100	5100	6900	9700	17100	25500	32900	53400	111800		
	150	1650	2900	4700	6500	9100	16000	23800	30800	49000	104600		
	200	1200	2100	3500	4800	6700	11900	17600	22800	36200	77300		
300	0-160	2045	3605	5920	8075	11310	19220	29610	38230	60840	129750		
	175	1945	3425	5625	7670	10740	18925	28130	36320	57800	123270		
	200	1780	3140	5155	7030	9840	17340	25780	33275	52960	112950		
400	0-200			7980		1480	22000		48800	78000			
	250			7550		13800	23800		46200	73950			
	300			6700		12100	21200		41000	65200			
450	0-225			8970		16000	22000		55000	87600			
	300			8500		15000	26900		52100	83200			
	350			7540		13300	23900		46200	73900			

Note: For inlet pressures in green shaded area, use low pressure main valve and low pressure temperature pilot. For 400 & 450 PSIG inlet pressures, use HSP regulator only.

Regulators

Pressure Regulating Valve

O-Series
Direct-Operated

Model	O-Series
Service	Steam, Air, Water & Other Liquids
Sizes	3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2", 2"
Connections	NPT
Body Material	Cast Iron
Seat & Disc	Hardened 420 Stainless Steel
Diaphragm (for Steam)	Phosphor Bronze - Steam
Diaphragm (for Liquid or Air)	Viton - Water, Air & Oil (300°F max)
Max Inlet Pressure	250 PSIG
Min Inlet Pressure	15 PSIG
Max Differential Pressure	125 PSI
Min Differential Pressure	15 PSI

Design Pressure/Temperature Rating – PMA/TMA

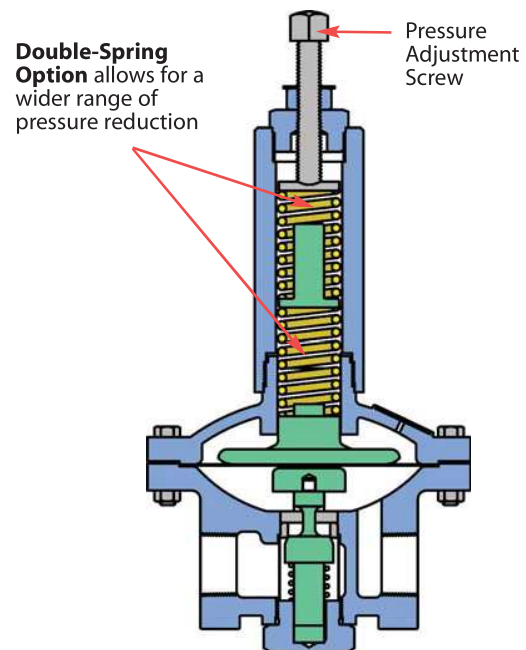
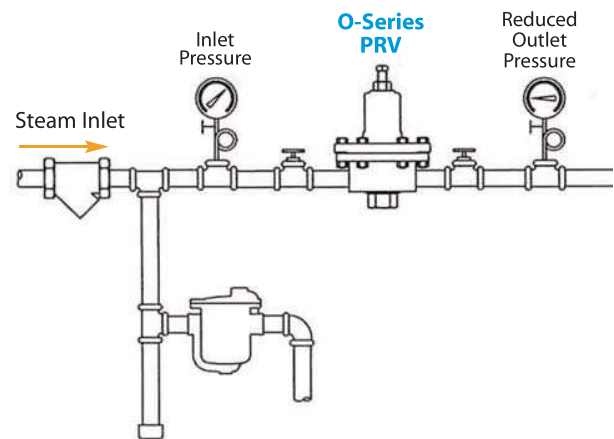
NPT 250 PSIG @ 450°F



PRESSURE
Regulators

Typical Applications

The **O-Series** direct-operated pressure regulators with heavy duty cast iron bodies and internal strainer are suitable for a wide range of applications in the low-to-moderate flow range. Applications include small heaters, humidifiers, various hospital equipment, tire molds, as well as many other general uses. This style of regulator does not require an external sensing line. Set pressure is controlled by turning an adjustment screw with lock nut that increases or decreases spring force above the diaphragm. Several spring ranges are available, depending upon the downstream pressure that needs to be maintained. O-Series contains hardened stainless steel seat and disc for extended service life. Phosphor Bronze Diaphragm specifically designed for Steam service is considered a preferred choice over Stainless Steel diaphragms which are prone to work-hardening and potential cracking. Viton diaphragms are specifically designed for water, air, gases and other liquid service and have a working temperature range up to 300°F.



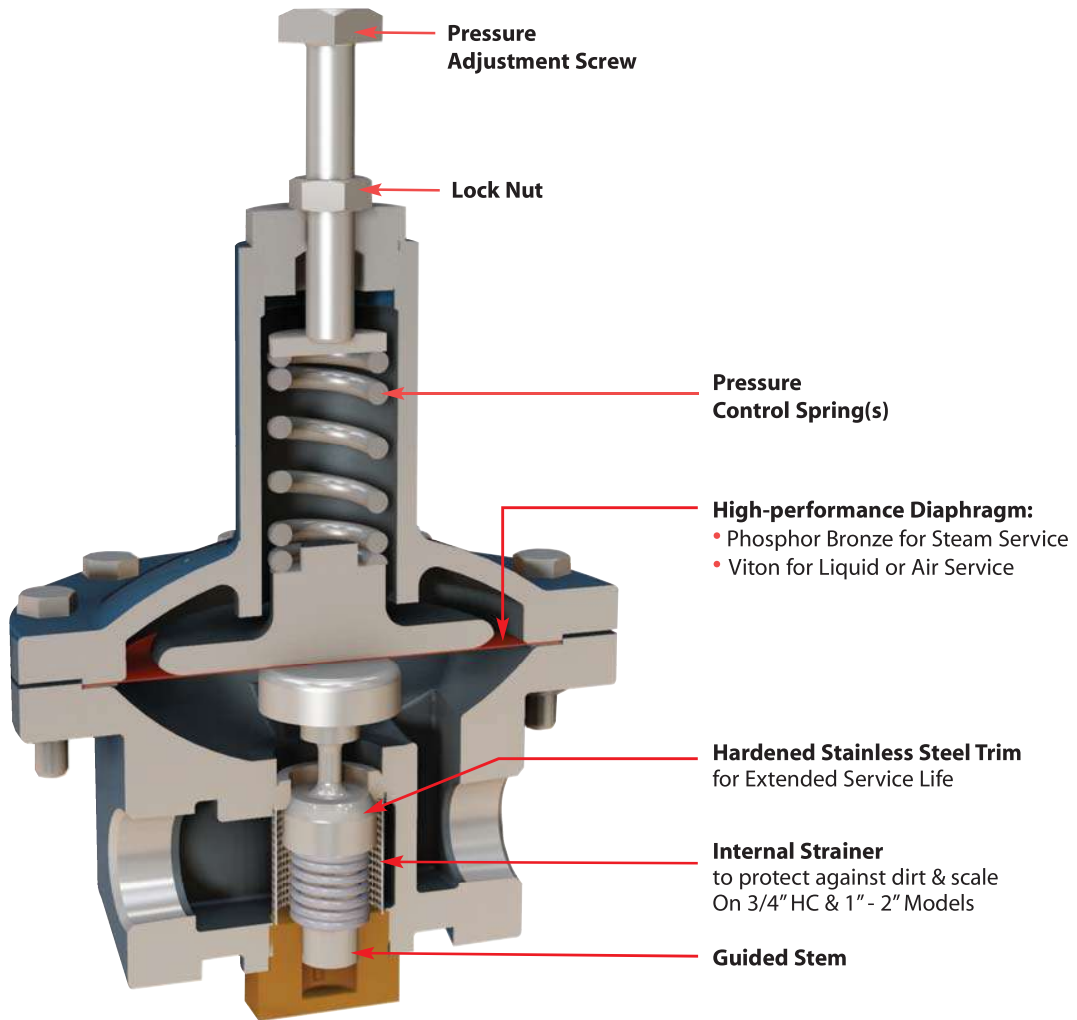
Features & Options

- Hardened stainless steel seat and disc for extended service life (55 Rc)
- Phosphor Bronze diaphragm for Steam Service
- Viton diaphragm for up to 300°F for Water, Oil & Air Service
- Double spring available for extended outlet pressure range
- Integral stainless steel strainer on 3/4" HC, 1", 1 1/4", 1 1/2" & 2"

Regulators

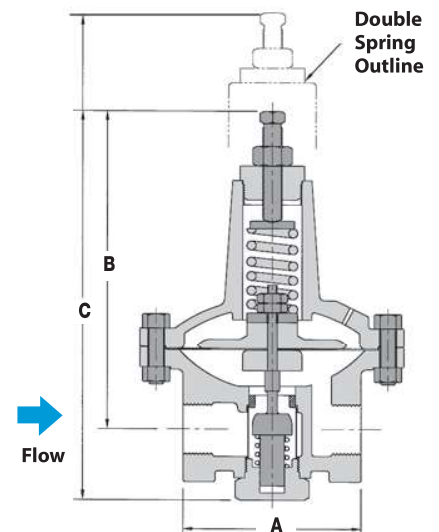
Pressure Regulating Valve

O-Series
Direct-Operated



PRESSURE
Regulators

DIMENSIONS & WEIGHTS – inches					
Size	A	B	C		Weight (lbs)
			Single Spring	Double Spring	
3/8"	4 1/4	6 1/2	8	-	8
1/2"	3 5/8	6 1/2	8	-	8
3/4"	3 5/8	6 1/2	8	-	8
3/4" HC	3 5/8	8	10	12 1/2	15
1"	4 1/2	8 1/2	10 1/2	13	18
1 1/4"	4 1/2	8 1/2	10 1/2	13	18
1 1/2"	6 1/2	8 3/4	12	14 1/2	40
2"	6 1/2	8 3/4	12	14 1/2	40



Regulators

Pressure Regulating Valve

O-Series
Direct-Operated

How to Size/Order

From the Capacity chart, find the inlet pressure and required regulator outlet pressure. Follow across chart to nearest capacity (steam, air, water) that meets or slightly exceeds demand requirements. Follow vertically up to determine appropriate size. When exact application values are not shown, interpolate between values. Select a model with the spring range that accommodates the required outlet set pressure.

Example:

Application: 200 lbs/hr of 100 PSIG Steam reduced to 30 PSIG
Model Code: **O-12-N-14-B** (1/2" O-Series, 10-50 PSIG spring range, NPT with Bronze Diaphragm for Steam)



PRESSURE Regulators

		SINGLE Spring Only			Available with either SINGLE or DOUBLE Pressure Adjustment Spring(s)																	
CAPACITIES		– Steam (lbs/hr); *Air (SCFM); *Water (GPM)																		Inlet/Outlet Pressures (PSIG)		
Inlet Press.	Outlet Press.	3/8", 1/2", 3/4"			3/4" HC **			1"			1 1/4"			1 1/2"			2"					
		Steam	Air	Water	Steam	Air	Water	Steam	Air	Water	Steam	Air	Water	Steam	Air	Water	Steam	Air	Water			
15	2	46	26	6	92	51	11	130	73	16	145	81	18	180	100	22	199	111	25			
	5	38	21	4	75	42	9	106	59	13	119	66	14	147	82	18	163	91	19			
20	5	65	36	8	130	72	15	184	102	22	205	114	25	254	141	30	281	156	34			
	10	61	34	6	123	69	13	174	97	18	194	109	20	241	134	25	266	149	27			
30	15	45	25	4	90	51	9	128	72	13	143	80	14	177	99	18	196	109	19			
	5	83	46	10	167	93	20	236	131	28	264	147	32	327	181	39	362	201	43			
50	10	83	46	10	167	93	18	236	131	25	264	147	28	327	181	35	362	201	39			
	20	71	40	6	142	79	13	201	112	18	225	126	20	278	155	25	308	172	27			
100	5	121	67	13	242	134	27	342	190	38	382	212	42	473	263	53	523	291	58			
	25	121	67	10	242	134	20	342	190	28	382	212	32	473	263	39	523	291	43			
	40	87	49	6	174	97	13	247	138	18	276	154	20	341	191	25	377	211	27			
125	30	214	119	17	428	238	33	607	337	47	678	376	53	839	466	66	928	515	73			
	50	214	119	14	428	238	28	607	337	40	678	376	45	839	466	55	928	515	61			
	70	195	109	11	275	154	18	390	218	25	436	244	28	540	301	35	597	333	39			
150	30	261	145	19	522	290	39	739	410	55	826	458	62	1021	567	76	1130	627	84			
	50	261	145	17	522	290	35	739	410	49	826	458	55	1021	567	68	1130	627	75			
	70	261	145	15	522	290	30	739	410	42	826	458	47	1021	567	58	1130	627	64			
	100	201	112	10	402	225	20	569	318	28	636	355	32	787	440	39	871	486	43			
	120	307	171	22	615	341	44	871	484	62	974	540	69	1204	668	86	1332	740	95			
200	50	307	171	20	615	341	40	871	484	57	974	540	63	1204	668	78	1332	740	87			
	70	307	171	18	615	341	36	871	484	51	974	540	57	1204	668	70	1332	740	78			
	100	298	166	14	596	333	28	844	471	40	943	527	45	1167	652	55	1291	721	61			
	120	239	133	11	478	267	22	677	378	31	756	422	35	935	523	43	1035	578	47			
	150	401	222	26	802	445	52	1135	630	74	1269	705	83	1570	871	102	1737	964	113			
250	50	401	222	24	802	445	49	1135	630	69	1269	705	78	1570	871	96	1737	964	106			
	70	401	222	23	802	445	46	1135	630	65	1269	705	72	1570	871	89	1737	964	99			
	100	401	222	20	802	445	40	1135	630	57	1269	705	63	1570	871	78	1737	964	87			
250	50	494	274	28	988	549	57	1400	777	80	1565	869	90	1935	1074	111	2141	1189	123			
	70	494	274	27	988	549	54	1400	777	76	1565	869	85	1935	1074	105	2141	1189	116			
	125	494	274	22	988	549	45	1400	777	63	1565	869	71	1935	1074	88	2141	1189	97			

* Air and water capacities are based on using elastomeric diaphragms.

** 3/4" HC is high-capacity version of standard 3/4" valve.

Note: For capacities of other gases multiply the air capacities by the following factors: Argon-0.85 CO₂-0.81 Helium-2.69 Nitrogen-1.02