

Direct-Operated Pressure & Temperature Regulating Valves

Direct-Operated Regulators are used for controlling pressure or temperature in a variety of applications.

Pressure & Temp
REGULATORS

Pressure Regulating Valves

Page No.



O-Series - Cast Iron • 3/8" - 2"

268-271

Steam • Water • Oil • Air • other Liquids & Gases

The O-Series, with Cast Iron body and Hardened Stainless internals, is our most popular and economical solution for reducing pressure in STEAM systems. It is also suitable for Water, Oil, Air as well as other Liquids & Gases. Soft Seat options available for tight shut-off.



OSS-Series - Stainless Steel • 1/2" - 1 1/4"

272-273

Steam • Water • Oil • Air • other Liquids & Gases

The OSS-Series is the Stainless Steel CF8M version of our popular and versatile O-Series and can be configured for Steam, Water, Oil, Air as well as other Liquids & Gases. Hardened Stainless Steel Internals are standard; Soft-Seating options are available for tight shut-off are available.



B-Series • 1/2" - 4"

274-275

Water • Air • Oil • other Liquids & Gases

The B-Series is primarily used for reducing pressure in WATER systems. It is also suitable for Air, Oil, as well as other Liquids and Gases. The B-Series offers higher capacity than the O-Series.



455-Series • 1/2" - 4"

276-277

Steam • Air • Other Gases

The 455 is ideally suited for reducing pressure in STEAM applications and requires only 5 PSIG minimum inlet pressure. Excellent for use in steam systems that contain large amounts of scale that may cause failure in pilot-operated regulators.



403-Series • 1/2" - 4"

278-281

Steam • Air

The 403 are pilot-operated, piston-actuated, pressure regulators primarily used for reducing pressure in STEAM systems. This regulator is available with an optional internal sensing line which simplifies installation.



Direct-Operated Pressure & Temperature Regulating Valves

Relief & Back-Pressure Valves

Page No.



R-Series & 10691-Series - Bronze • 1/2" - 3"

282-284

Relief & Back Pressure Valves: Water, Liquids, Air

The R-Series & 10691 Series are economically-priced Back Pressure Relief Valves for Liquid service. Relief Valves (Back Pressure Valves) are used to maintain a specific back pressure or to protect systems from an over-pressure condition. 10691-Series is similar to the R-Series with the exception of a soft-elastomeric seat for bubble-tight shut-off.



3040-Series - Bronze/Stainless Steel • 1/2" - 2"

285-287

Relief & Back Pressure Valves: Water, Liquids, Air

The 3040 Back Pressure Relief Valve offers a much higher capacity than the R-Series. Used for Liquid service. Relief Valves protect systems from over-pressurized conditions.

Pressure & Temp
REGULATORS

Temperature Regulating Valves



W91 & W94 Series

289-312

Self-Operating Temperature Regulating Valves:

Heating, Cooling, Mixing & Diverting

The W91/W94 Series Temperature Regulating Valves are used for controlling process temperature in industrial and HVAC applications.

Typical applications are: Heating different processes & devices with steam, Cooling equipment with chilled water, or Mixing & Diverting hot & cold liquids using 3-Way Valves.



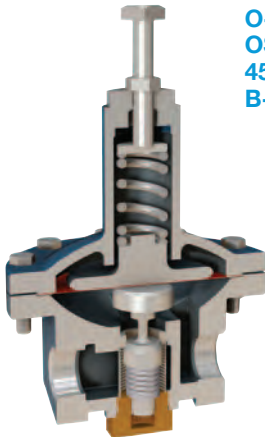
What are Pressure Regulating Valves (PRVs) used for?

Steam, liquids and other gases are typically transported through piping systems at relatively higher pressure than ultimately needed and therefore need to be reduced to a lower pressure at the final point of use. The purpose of the Pressure Regulating Valve (PRV) is to reduce the pressure of steam, liquid or gas to a lower pressure appropriate for its final application. All pressure regulating valves are self-operated, which means they do not require any outside source of power such as air pressure or electric actuators to operate. In contrast, Control valves do require an outside source of power to actuate the valve. All pressure regulating valves are Self-Operated; however, they are categorized as either **Direct-Operated** or **Pilot-Operated**. The Pilot-Operated Regulators are either **Piston-Actuated** or **Diaphragm-Actuated**.

PRESSURE Regulators

Direct-Operated

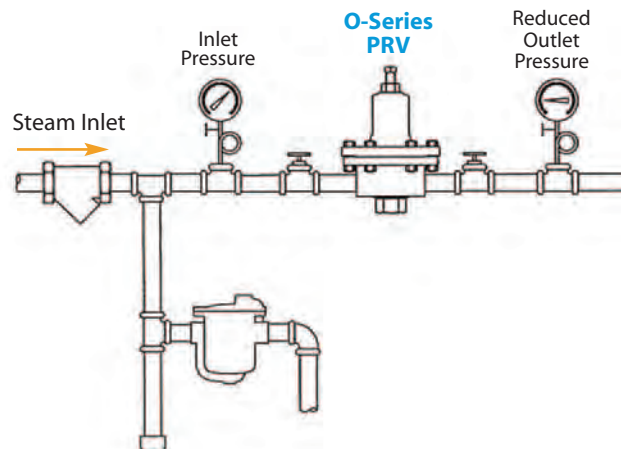
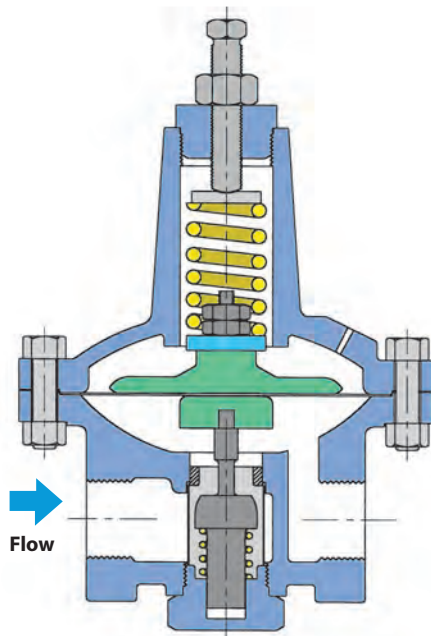
- O-Series** for Steam, Air & Water
- OSS-Series** for Steam, Water, Oil & Air
- 455-Series** for Steam
- B-Series** for Water & Liquids.



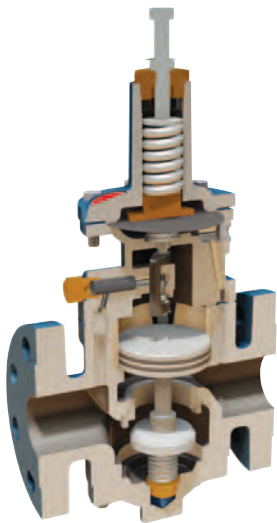
Direct-operated pressure regulating valves are the simplest in design and the most economical to purchase and therefore should be used whenever suitable. The downstream pressure of the steam or liquid being regulated is used to position the diaphragm and valve disc to control the amount of flow through the valve. Downstream pressure adjustment is easily made by turning the adjustment screw to increase or decrease compression on the control spring. The limitation of the direct-operated type regulator is a variation of up to 10% of initial set pressure depending on changes in flow through the valve. As flow requirements through the valve increase, the outlet set pressure will tend to decrease.

For example; Inlet pressure is 100 PSIG and downstream pressure is adjusted to maintain 50 PSIG while 250 lbs/hr of steam flows through the valve. If the steam flow rate happens to increase to 500 lbs/hr, then the outlet pressure would drop to 45 PSIG.

Direct-operated regulators are suitable for many less critical uses in the low-to-moderate flow range including small heaters, humidifiers, hospital equipment, tire molds, typical applications in food processing, as well as many other general uses.



Introduction

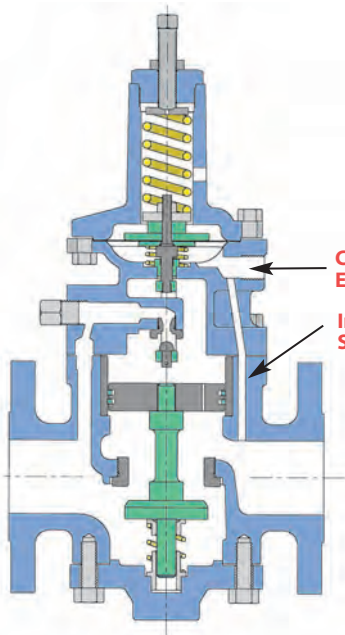


Pilot-Operated Piston-Actuated

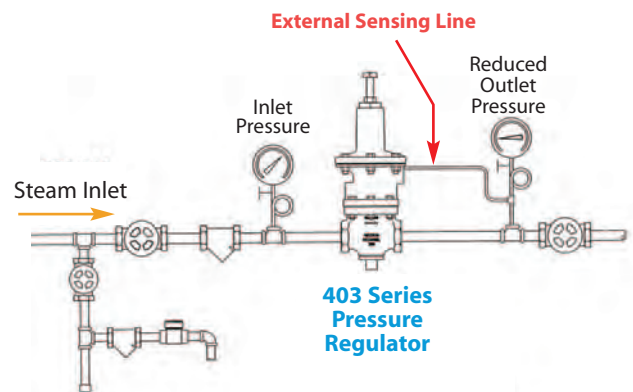
403-Series for Steam, Air & Gas Applications

Pilot-operated piston-actuated pressure regulating valves contain a separate pilot valve which is mounted on top of the main valve. The valve senses the downstream pressure (low pressure side) and precisely modulates a small amount of steam from the upstream side (high pressure side) to the top of the piston chamber, which in turn controls the opening of the main valve. When steam demand increases and downstream pressure starts to drop, the valve is opened further, allowing for additional flow. Pilot-operated piston-actuated regulators have increased accuracy and consistency of set pressure when compared to the Direct-operated type. Set pressure is more stable and will only vary a few percent over the full flow range. Downstream pressure sensing is either done internally (internally sensed) or by using an external pressure sensing line (externally sensed).

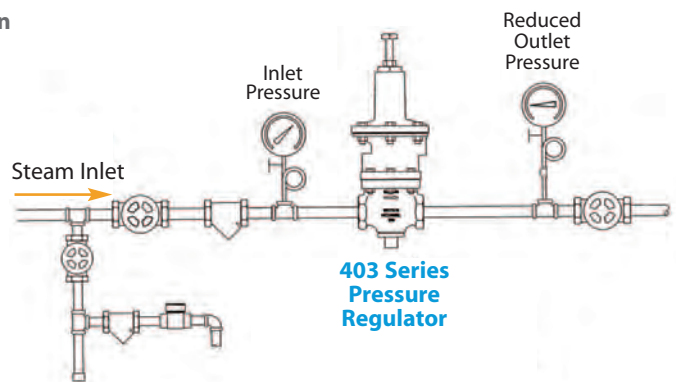
The piston-actuated valves are more compact than diaphragm-actuated valves; however, since the piston has more friction than a freely flexing diaphragm, they are not quite as accurate. These valves can be used for low-to-high flow applications or when larger flow rates or more accurate pressure control is required than can be achieved with direct-operated pressure regulators.



External Sensing (standard)
(requires sensing line)



Internal Sensing Option
(Specially drilled internal sensing path eliminates the need for an external sensing line)



PRESSURE
Regulators



Pilot-Operated Diaphragm-Actuated

Pilot-Operated Diaphragm-Actuated PRVs contain a separate pilot valve mounted externally to the main valve. The pilot valve senses the downstream pressure (low pressure side) through an external sensing line which in turn controls the opening of the main valve. The sensitivity and frictionless motion of the diaphragm, in combination with using a control pilot, make this style of regulators the most accurate. Downstream pressure can often be controlled within 1-2 % of initial set-pressure. Refer to Watson HD-Series Regulators for steam applications.

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

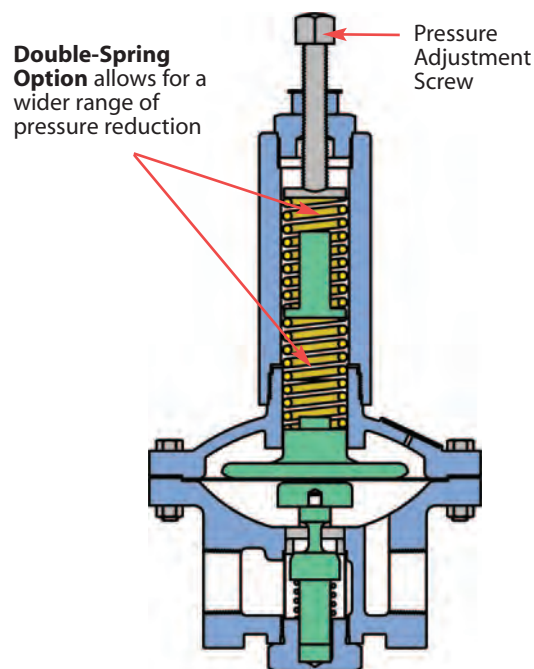
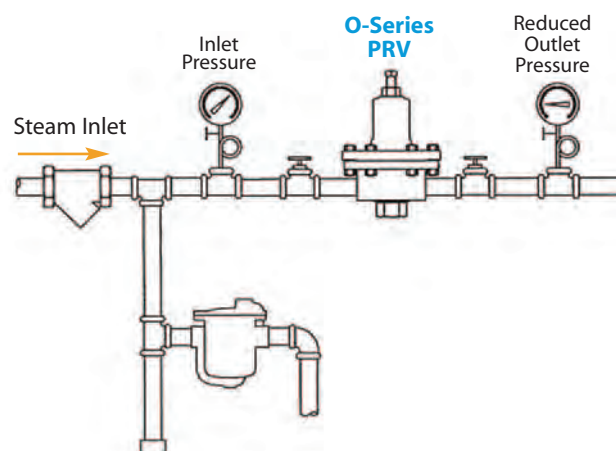
PRESSURE
Regulators

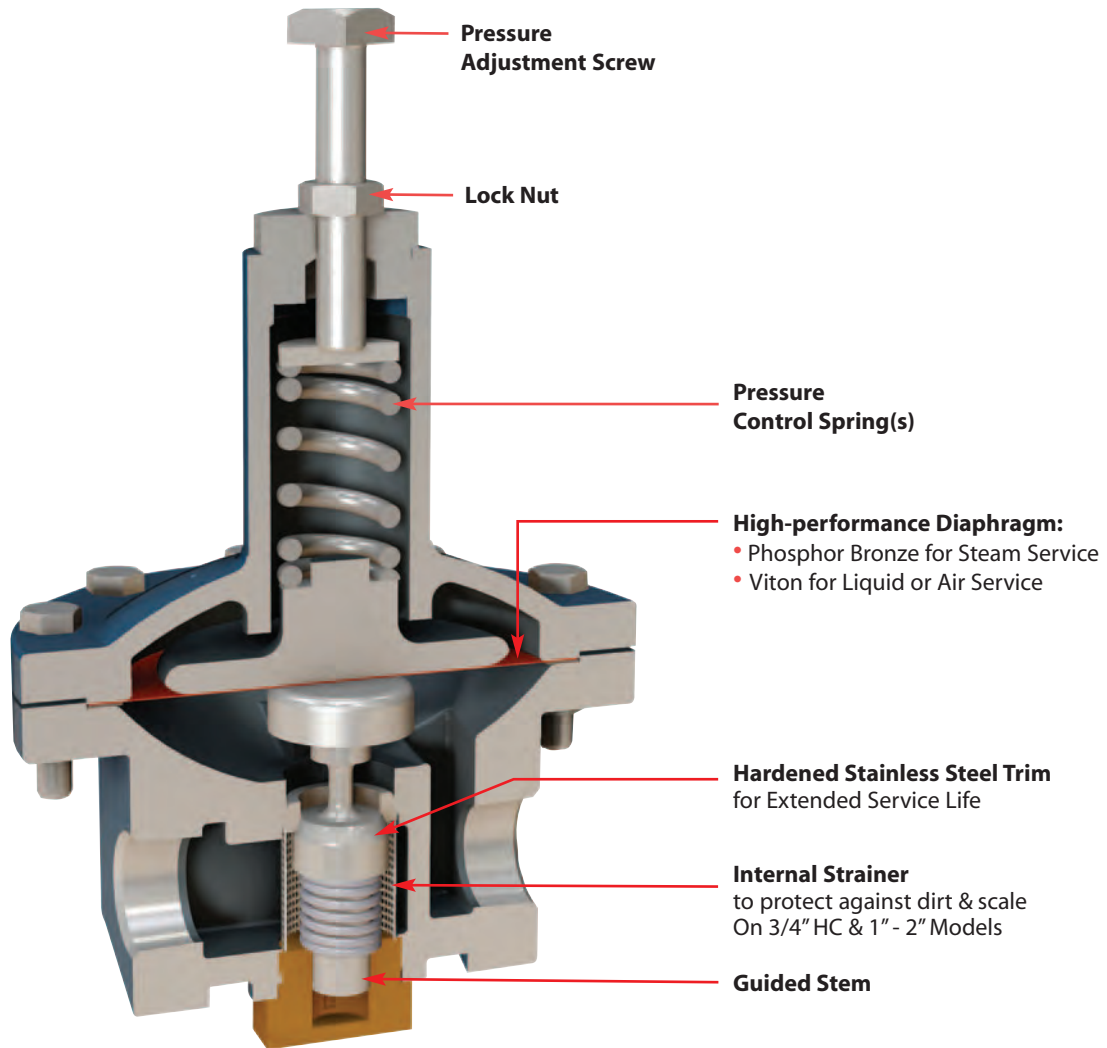
Typical Applications

The **O-Series** direct-operated pressure regulators with heavy duty cast iron bodies 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

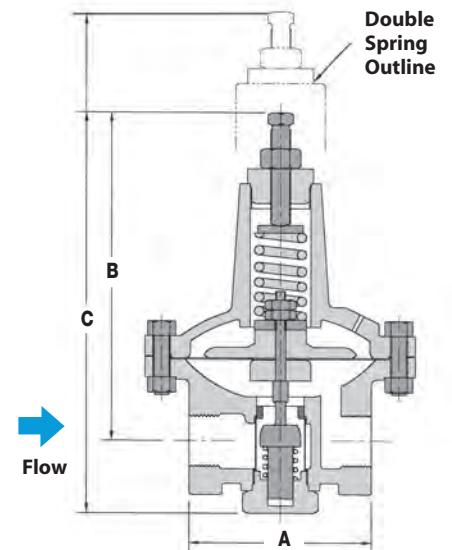
- Hardened stainless steel seat and disc for extended service life (55 Rc)
- Optional Teflon disc for increased shut-off tightness
- Phosphor Bronze diaphragm for Steam Service
- Viton diaphragm for up to 300°F for Water, Oil & Air Service
- Double spring option available for extended outlet pressure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





PRESSURE
Regulators

DIMENSIONS & WEIGHTS – inches					
Size	A	B	C		Weight (lbs)
			Single Spring	Double Spring	
3/8"	3 ⁵ / ₈	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	4	8	10	12 ¹ / ₂	15
1"	4 ¹¹ / ₁₆	8 ¹ / ₂	10 ¹ / ₂	13	18
1 ¹ / ₄ "	4 ¹¹ / ₁₆	8 ¹ / ₂	10 ¹ / ₂	13	18
1 ¹ / ₂ "	6 ³ / ₈	8 ³ / ₄	12	14 ¹ / ₂	40
2"	6 ³ / ₈	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
	15	45	25	4	90	51	9	128	72	13	143	80	14	177	99	18	196	109	19
30	5	83	46	10	167	93	20	236	131	28	264	147	32	327	181	39	362	201	43
	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
50	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
100	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
125	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
150	30	307	171	22	615	341	44	871	484	62	974	540	69	1204	668	86	1332	740	95
	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
200	30	401	222	26	802	445	52	1135	630	74	1269	705	83	1570	871	102	1737	964	113
	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.

Notes: 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
For capacities of other liquids multiply the water capacities by the following: Diesel Fuel (68F) - 1.07 Kerosene (68F) - 1.11 Ethylene Glycol (68F) - 0.56

Regulators

Pressure Regulating Valve

O-Series
Direct-Operated

Pressure Regulating Valves for

Steam: Phosphor Bronze Diaphragm

Water, Oil, Air: Viton Diaphragm

The **O-Series** with Cast Iron body and Hardened Stainless internals, is our most popular and economical solution for reducing pressure in STEAM systems. It is also suitable for Air, Water, Oil as well as other Liquids and Gases. When used on STEAM Applications, the valve must be specified with a Phosphor Bronze Diaphragm (Suffix Code **B**). When used on Air, Water & Oil or other Liquid Applications, the valve must be specified with a Viton Diaphragm (Suffix Code **V**).

Important Application Note:

- Use Phosphor Bronze Diaphragms for Steam.
- Use Viton diaphragms for Water, Air and Oil Applications.

Phosphor Bronze Diaphragms may fracture if used on Liquid Service. Use for Steam Only.

Diaphragm Code:

B - Phosphor Bronze for Steam Service

V - Viton (300 °F Max) for Air & Other Liquids

Teflon Soft-Seat Option Suffix Code: 6T

Example Model Codes:

- 1) **O-13-N-14-B**
(O-Series, 3/4" NPT, 10-50 PSI, Single Spring, **Phosphor Bronze Diaphragm**)
- 2) **O-13-N-14-V**
(O-Series, 3/4" NPT, 10-50 PSI, Single Spring, **Viton Diaphragm**)

Size/ Connection NPT	Reduced Pressure Range (PSI)	STEAM	Water • Oil • Air	Weight lbs
		Model Code	Model Code	
SINGLE SPRING		STEAM	Water • Oil • Air	
3/8"	0-10	O-11-N-13-B	O-11-N-13-V	10
	10-50	O-11-N-14-B	O-11-N-14-V	10
	40-100	O-11-N-09-B	O-11-N-09-V	10
	100-200	O-11-N-10-B	O-11-N-10-V	10
1/2"	0-10	O-12-N-13-B	O-12-N-13-V	10
	10-50	O-12-N-14-B	O-12-N-14-V	10
	40-100	O-12-N-09-B	O-12-N-09-V	10
	100-200	O-12-N-10-B	O-12-N-10-V	10
3/4"	0-10	O-13-N-13-B	O-13-N-13-V	10
	10-50	O-13-N-14-B	O-13-N-14-V	10
	40-100	O-13-N-09-B	O-13-N-09-V	10
	100-200	O-13-N-10-B	O-13-N-10-V	10
SINGLE SPRING		STEAM	Water • Oil • Air	
3/4" HC	0-10	OHC-13-N-0003-B	OHC-13-N-0003-V	15
	10-30	OHC-13-N-0004-B	OHC-13-N-0004-V	15
	30-50	OHC-13-N-0005-B	OHC-13-N-0005-V	15
	40-85	OHC-13-N-0006-B	OHC-13-N-0006-V	15
1"	0-10	O-14-N-0007-B	O-14-N-0007-V	19
	10-30	O-14-N-0008-B	O-14-N-0008-V	19
	30-50	O-14-N-0009-B	O-14-N-0009-V	19
	40-85	O-14-N-0010-B	O-14-N-0010-V	19
1 1/4"	0-10	O-15-N-0007-B	O-15-N-0007-V	18
	10-30	O-15-N-0008-B	O-15-N-0008-V	18
	30-50	O-15-N-0009-B	O-15-N-0009-V	18
	40-85	O-15-N-0010-B	O-15-N-0010-V	18
1 1/2"	0-10	O-16-N-0008-B	O-16-N-0008-V	47
	10-30	O-16-N-0009-B	O-16-N-0009-V	47
	30-50	O-16-N-0010-B	O-16-N-0010-V	47
	40-85	O-16-N-0011-B	O-16-N-0011-V	47
2"	0-10	O-17-N-0008-B	O-17-N-0008-V	48
	10-30	O-17-N-0009-B	O-17-N-0009-V	48
	30-50	O-17-N-0010-B	O-17-N-0010-V	48
	40-85	O-17-N-0011-B	O-17-N-0011-V	48
DOUBLE SPRING		STEAM	Water • Oil • Air	
3/4" HC	0-75	OHC-13-N-0708-B	OHC-13-N-0708-V	19
	30-130	OHC-13-N-0809-B	OHC-13-N-0809-V	19
1"	0-75	O-14-N-0809-B	O-14-N-0809-V	22
	30-130	O-14-N-0910-B	O-14-N-0910-V	22
1 1/4"	0-75	O-15-N-0809-B	O-15-N-0809-V	22
	30-130	O-15-N-0910-B	O-15-N-0910-V	22
1 1/2"	0-75	O-16-N-0809-B	O-16-N-0809-V	48
	30-130	O-16-N-0910-B	O-16-N-0910-V	48
2"	0-75	O-17-N-0809-B	O-17-N-0809-V	48
	30-130	O-17-N-0910-B	O-17-N-0910-V	48

PRESSURE
Regulators

Model	OSS-Series
Service	Steam, Air, Water & Other Liquids
Sizes	1/2", 3/4", 1", 1 1/4" *
Connections	NPT, SW, 150# & 300# FLG
Body Material	Stainless Steel CF8M
Seat & Disc	Hardened 420 Stainless Steel (Disc Options - Teflon)
Diaphragm (for Steam)	Stainless Steel - Steam
Diaphragm (for Liquid or Air)	Viton- Water, Air & oil (300°F max)
Max Inlet Pressure	300 PSIG
Min Inlet Pressure	15 PSIG
Max Differential Pressure	125 PSI
Min Differential Pressure	15 PSI

*1 1/2" End Connections available; consult factory.

Design Pressure/Temperature Rating – PMA/TMA

NPT:	300 PSIG @ 450° F
150# FLG	195 PSIG @ 400° F
300# FLG	300 PSIG @ 450° F

PRESSURE Regulators

Typical Applications

The **OSS-Series** direct-operated pressure regulators with heavy duty stainless steel bodies 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. The Stainless Steel Body & Trim also make this valve a consideration for potable water service.

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. OSS-Series contains hardened stainless steel seat and disc for extended service life (soft seat options available). Stainless Steel Diaphragms are offered for steam service. 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

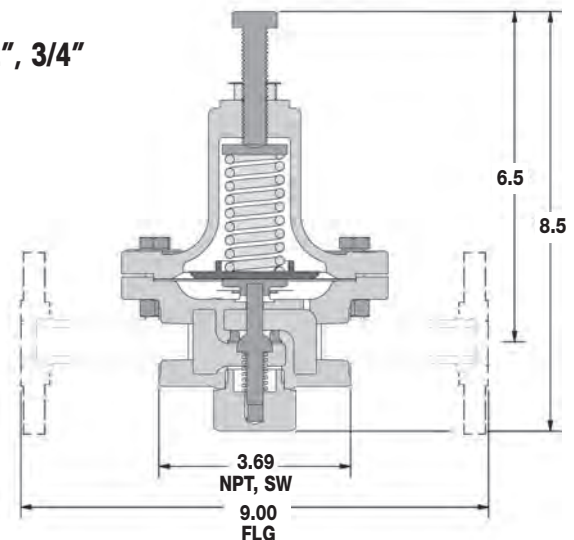
- Hardened stainless steel seat and disc for extended service life (55 Rc)
- Optional Teflon Disc Seats for increased shut-off tightness
- Stainless Steel diaphragm for Steam Service
- Viton diaphragm for up to 300°F for Water, Oil & Air Service
- Integral stainless steel strainer on 1" and 1 1/4" only

MATERIALS

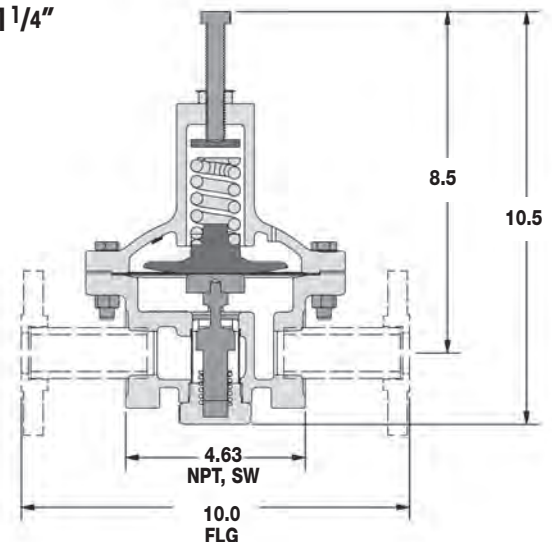
Body	Stainless Steel CF8M
Cover	Stainless Steel CF8M
Gasket	Garlock (only with SST diaphragm)
Cover Screws	Stainless Steel
Cover Nuts	Stainless Steel
Adjusting Screw	Stainless Steel
Screen	Stainless Steel (1" & 1 1/4" only)
Valve Seat	Hardened 420 SST
Valve Disc	Hardened 420 SST (Teflon opt.)
Diaphragm	Stainless Steel, (steam) Viton (water, air, oil service)



1/2", 3/4"



1, 1 1/4"



WEIGHTS – inches	
Size	Weight (lbs)
1/2"	8
3/4"	8
1"	18
1 1/4"	18

Regulators

Pressure Regulating Valve

OSS-Series

Direct-Operated

Pressure Regulating Valves for

Steam: Stainless Steel Diaphragm

Water, Oil, Air: Viton Diaphragm

CAPACITIES – Steam (lbs/hr), Air (SCFM), Water (GPM)							
Inlet Press.	Outlet Press.	1/2", 3/4"			1", 1 1/4"		
		Steam	Air	Water	Steam	Air	Water
15	2	46	26	6	130	73	16
	5	38	21	4	106	59	13
	10	30	16	3	84	45	10
20	5	65	36	8	184	102	22
	10	61	34	6	174	97	18
	15	45	25	4	128	72	13
30	5	83	46	10	236	131	28
	10	83	46	10	236	131	28
	15	71	40	6	201	112	18
50	5	121	67	13	342	190	38
	25	121	67	13	342	190	38
	40	87	49	6	247	138	18
100	30	214	119	17	607	337	47
	50	214	119	14	607	337	40
	70	195	109	11	390	218	25
125	30	261	145	19	739	410	55
	50	261	145	17	739	410	49
	70	261	145	15	739	410	42
150	100	201	112	10	569	318	28
	25	307	171	23	871	484	63
	50	307	171	20	871	484	57
	70	307	171	18	871	484	51
	100	298	166	14	844	471	40
200	120	239	133	11	677	378	31
	75	401	222	22	1135	630	64
	100	401	222	20	1135	630	57
	125	374	205	17	1058	583	49
	150	327	178	14	924	507	40
250	125	494	274	22	1400	777	63
	150	470	259	18	1329	734	56
	200	371	202	14	1049	574	40
300	100**	584	325	28	1721	968	80
	175	542	297	22	1598	885	63
	200	509	278	20	1499	828	56

* Air and water capacities are based on using elastomeric diaphragms. For Water capacities, check pressure drop for cavitation. Consult factory if needed.

** Max. 125 psi pressure drop. Use these capacities when sizing safety valves (SRV).

Note: For capacities of other liquids multiply the water capacities by the following factors:

Argon–0.85 CO2 –0.81 Helium–2.69 Nitrogen–1.02

Notes: For capacities of other liquids multiply the water capacities by the following factors:

Diesel Fuel (68F) - 1.07
Kerosene (68F) - 1.11
Ethylene Glycol (68F) - 0.56

Size/ Connection NPT	Reduced Pressure Range (PSI)	STEAM	Water • Oil • Air	Weight lbs
		Model Code	Model Code	
SINGLE SPRING				
1/2"	0-10	OSS-12-N-13-S	OSS-12-N-13-V	10
	10-50	OSS-12-N-14-S	OSS-12-N-14-V	10
	40-100	OSS-12-N-09-S	OSS-12-N-09-V	10
	100-200	OSS-12-N-10-S	OSS-12-N-10-V	10
3/4"	0-10	OSS-13-N-13-S	OSS-13-N-13-V	10
	10-50	OSS-13-N-14-S	OSS-13-N-14-V	10
	40-100	OSS-13-N-09-S	OSS-13-N-09-V	10
	100-200	OSS-13-N-10-S	OSS-13-N-10-V	10
1"	0-10	OSS-14-N-0007-S	OSS-14-N-0007-V	19
	10-30	OSS-14-N-0008-S	OSS-14-N-0008-V	19
	30-50	OSS-14-N-0009-S	OSS-14-N-0009-V	19
	40-85	OSS-14-N-0010-S	OSS-14-N-0010-V	19
1-1/4"	0-10	OSS-15-N-0007-S	OSS-15-N-0007-V	19
	10-30	OSS-15-N-0008-S	OSS-15-N-0008-V	19
	30-50	OSS-15-N-0009-S	OSS-15-N-0009-V	19
	40-85	OSS-15-N-00010-S	OSS-15-N-00010-V	19

Connection Codes:

(N=NPT, SW=Socket Weld, F150=150# FLG, F300=300# FLG)

Important Application Note:

- Use Stainless Steel Diaphragms for Steam.
- Use Viton diaphragms for Water, Air and Oil Applications.

Stainless Steel Diaphragms may fracture if used on Liquid Service. Use for Steam Only.

Diaphragm Code:

S - Stainless Steel for Steam Service

V - Viton (300 °F Max) for Air & Other Liquids

Teflon Soft-Seat Option Suffix Code: 6T

Example Model Codes:

- 1) **OSS-13-N-14-S-6T**
(OSS Series, 3/4" NPT, 10-50 PSI, Stainless Steel Diaphragm, Teflon Disc)
- 2) **OSS-13-N-14-V**
(OSS Series, 3/4" NPT, 10-50 PSI, Viton Diaphragm, Stainless Disc)

PRESSURE
Regulators

Regulators

Pressure Regulating Valve

B-Series
Direct-Operated

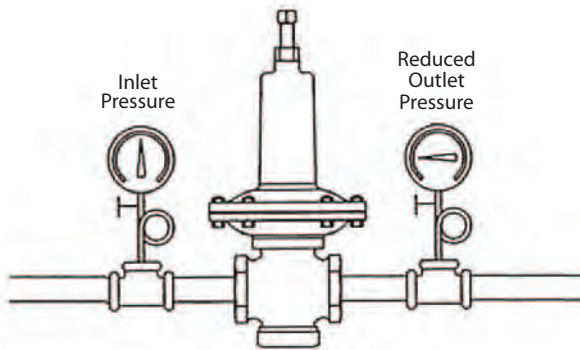
Model	B-Series	
Service	Water, Air, Oil, Other Gases & Liquids	
Sizes	1/2", 3/4", 1", 1 1/4", 1 1/2", 2", 3", 4"	
Connections	NPT, 125# FLG, 250# FLG	
Body Material	1/2" - 2"	Bronze & Stainless Steel
	3" & 4"	Cast Iron
Disc & Diaphragm	Viton - 300°F max	
Max Inlet Pressure	250 PSIG	
Min Inlet Pressure	10 PSIG	
Max Differential Pressure	125 PSI	
Min Differential Pressure	20% of Inlet Pressure	

Design Pressure/Temperature Rating – PMA/TMA

NPT	250 PSIG	@ 400°F
125# FLG	125 PSIG	@ 450°F
250# FLG	250 PSIG	@ 450°F

Typical Applications

The **B-Series** direct-operated pressure regulators with balanced valve trim are used for reducing pressure in air and water systems. These regulators are commonly found in industrial plants, apartment buildings, water supply systems, schools and underground water distribution systems. The soft-seated elastomeric Viton disc has an operating temperature up to 300°F and will produce a Class V shutoff. No external sensing line is required with this style of regulator.



Features & Options

- Diaphragm, disc and cup packing in Viton for 300°F service
- Balanced pressure regulator allows accurate control even when incoming pressure fluctuates
- Valve has a Class V shut-off rating due to the "soft-seated" Viton disc

B Series Spring Selection Table

Reduced Outlet Pressure (PSI) Pressure (PSI)	Spring #	Code = X
1 - 12	#4	4
5 - 35	#3	3
20 - 70	#2	2
40 - 125	#1	1

Note: Reduced Outlet Pressure 1–12 PSI (Code 4) available in 1/2", 3/4", and 1" sizes only.



(1/2" - 1" shown)

Note: Flange selection may reduce pressure/temperature ratings.

Size/Connection	Model Code *	Body Material	Weight lbs
VITON Diaphragm & Disc (300°F Max)			
1/2" NPT	B-12-N-X-V	Bronze/SST	8
3/4" NPT	B-13-N-X-V	Bronze/SST	8
1" NPT	B-14-N-X-V	Bronze/SST	9
1 1/4" NPT	B-15-N-X-V	Bronze/SST	13
1 1/2" NPT	B-16-N-X-V	Bronze/SST	15
2" NPT	B-17-N-X-V	Bronze/SST	25
2" 150# FLG	B-17-F150-X-V	Bronze/SST	37
2" 300# FLG	B-17-F300-X-V	Bronze/SST	41
3" 125# FLG	B-19-F125-X-V	Cast Iron	150
3" 250# FLG	B-19-F250-X-V	Cast Iron	160
4" 125# FLG	B-20-F125-X-V	Cast Iron	200
4" 250# FLG	B-20-F250-X-V	Cast Iron	210

X=Spring Code (reference Spring Selection Table).

Example Model Code:

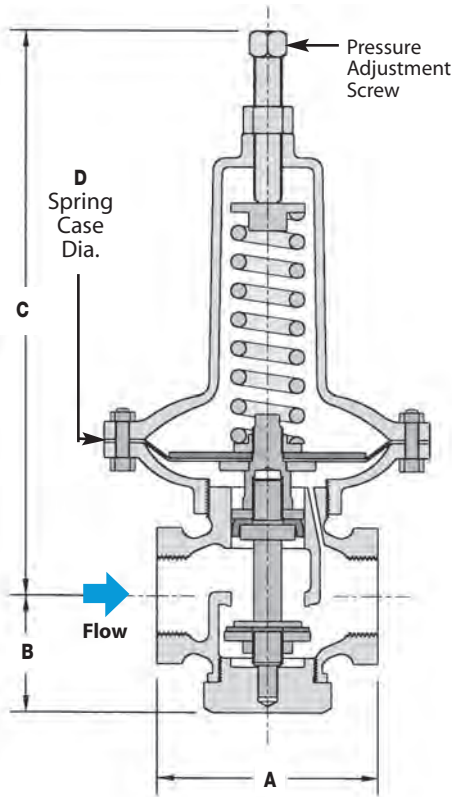
B-13-N-2-V (B-Series, 3/4" NPT, 20-70 PSI Spring Range)

Regulators

Pressure Regulating Valve

B-Series

Direct-Operated



Size	Face-to-Face			B	C	D Spring Case Dia. (in.)
	A					
	NPT Threaded	125# Flanged	250# Flanged			
1/2", 3/4"	3 ³ / ₈			17/8	9	5
1"	3 ⁵ / ₈			2 ¹ / ₄	9 ¹ / ₂	5
1 ¹ / ₄ "	4 ¹ / ₄			2 ³ / ₈	10 ¹ / ₂	6 ³ / ₄
1 ¹ / ₂ "	4 ³ / ₄			2 ¹ / ₂	10 ³ / ₄	6 ³ / ₄
2"	6 ⁵ / ₈	10*	10 ¹ / ₂ "	3 ⁷ / ₈	11 ⁵ / ₈	6 ³ / ₄
3"		10 ¹ / ₄	11	4 ¹ / ₂	21 ¹ / ₂	9 ¹ / ₄
4"		13	13 ⁵ / ₈	5 ³ / ₄	23	9 ¹ / ₄

Note: 2" B-Series flanges are 150# or 300#.

How to Size/Order

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

Example:

Application: 35 GPM of 70 PSIG Water reduced to 20 PSIG
 Model Code: **B-14-N-3-V** (B-Series, 1" NPT, 5-35 PSIG spring range)

PRESSURE
Regulators

CAPACITIES		— Water (GPM); Air (SCFM)															
		Inlet/Outlet Pressures (PSIG)															
Inlet Press.	Outlet Press.	1/2"		3/4"		1"		1 ¹ / ₄ "		1 ¹ / ₂ "		2"		3"		4"	
		Water	Air	Water	Air	Water	Air	Water	Air	Water	Air	Water	Air	Water	Air	Water	Air
10	5	5.5	25	10	45	13	60	22	100	33	150	55	250	132	600	176	800
20	5	9.8	48	18	86	23	114	39	190	59	285	98	475	234	1140	312	1520
	10	8.0	43	14	77	19	102	32	170	48	255	80	425	192	1020	256	1360
	15	5.5	30	10	54	13	72	22	120	33	180	55	300	132	720	176	960
30	5	12.5	68	23	122	30	162	50	270	75	405	125	675	300	1620	400	2160
	10	11.3	63	20	113	27	150	45	250	68	375	113	625	270	1500	360	2000
	20	8.0	48	14	86	19	114	32	190	48	285	80	475	192	1140	256	1520
50	5	16.8	98	30	176	40	234	67	390	101	585	168	975	402	2340	536	3120
	25	12.5	88	23	158	30	210	50	350	75	525	125	875	300	2100	400	2800
	40	8.0	63	14	113	19	150	32	250	48	375	80	625	192	1500	256	2000
70	10	19.3	128	35	230	46	306	77	510	116	765	193	1275	462	3060	616	4080
	30	15.8	125	28	225	38	300	63	500	95	750	158	1250	378	3000	504	4000
	50	11.3	95	20	171	27	228	45	380	68	570	113	950	270	2280	360	3040
100	30	21.0	175	38	315	50	420	84	700	126	1050	210	1750	504	4200	672	5600
	50	17.5	165	32	297	42	396	70	660	105	990	175	1650	420	3960	560	5280
	70	13.8	135	25	243	33	324	55	540	83	810	138	1350	330	3240	440	4320
125	30	24.3	213	44	383	58	510	97	850	146	1275	243	2125	582	5100	776	6800
	50	21.5	213	39	383	52	510	86	850	129	1275	215	2125	516	5100	688	6800
	100	12.5	140	23	252	30	336	50	560	75	840	125	1400	300	3360	400	4480
150	30	27.5	250	50	450	66	600	110	1000	165	1500	275	2500	660	6000	880	8000
	50	25.0	250	45	450	60	600	100	1000	150	1500	250	2500	600	6000	800	8000
	100	17.5	205	32	369	42	492	70	820	105	1230	175	2050	420	4920	560	6560
	125	12.5	153	23	275	30	366	50	610	75	915	125	1525	300	3660	400	4880
200	70	28.5	325	51	585	68	780	114	1300	171	1950	285	3250	684	7800	912	10400
	100	25.0	263	45	473	60	630	100	1050	150	1575	250	2625	600	6300	800	8400
	125	21.5	223	39	401	52	534	86	890	129	1335	215	2225	516	5340	688	7120
250	100	30.8	403	55	725	74	966	123	1610	185	2415	308	4025	738	9660	984	12880
	125	28.0	393	50	707	67	942	101	1570	168	2355	280	3925	672	9420	896	12560

Note: For capacities of other gases multiply the air capacities by the following: Argon-0.85 CO₂-0.81 Helium-2.69 Nitrogen-1.0
 For capacities of other liquids multiply the water capacities by the following: Diesel Fuel (68F) - 1.07 Kerosene (68F) - 1.11 Ethylene Glycol (68F) - 0.56

Regulators

Pressure Regulating Valve

455 Series

Direct-Operated

Model	455 Series
Service	Steam, Water, Air & Other Gases
Sizes	1/2", 3/4", 1", 1 1/4", 1 1/2", 2", 2 1/2", 3", 4"
Connections	NPT, 125# FLG, 250# FLG
Body Material	1/2"– 2" SS Body/Brass Stuffing Box 2 1/2"– 4" Cast Iron
Seat & Disc	Stainless Steel
Diaphragm	Viton
Max Inlet Pressure	250 PSIG
Min Inlet Pressure	5 PSIG
Max Differential Pressure	125 PSI
Min Differential Pressure	20% of Inlet Pressure

Design Pressure/Temperature Rating – PMA/TMA

NPT	250 PSIG	@ 400°F
125# FLG	125 PSIG	@ 450°F
250# FLG	250 PSIG	@ 450°F



PRESSURE Regulators

Typical Applications

The **455 Series** direct-operated pressure regulating valves are used for pressure reduction applications on steam, air and other gases. Balanced seat and disc design allows these valves to be used in applications with low inlet pressure; down to 5 PSIG. Unlike pilot-operated valves, the 455 does not contain any small pilot orifices and are therefore less susceptible to issues caused by dirt and pipe scale. The 455-Series is installed using an external sensing line which is connected several feet downstream of the valve. Placing the pressure sensing line out of range of valve discharge turbulence improves accuracy of downstream pressure.

Features

- Operates with minimum inlet pressure of 5 PSIG
- Stainless steel internals
- Excellent for use in steam systems that contain excessive amounts of pipe scale and other contaminants
- Pressure balanced valve & seat for more precise control of downstream pressure

Options & Notes:

Must Specify Spring Code when Ordering:

Use the 455 Spring Selection Table to specify the proper spring(s) based on valve size and reduced pressure range by Replacing the "X" with Spring Code from chart.

Example Model Codes:

- 1) **455-15-N-65**
(455 Series, 1 1/4" NPT, 1-6 PSIG outlet pressure)
- 2) **455-18-F125-73**
(455 Series, 2 1/2" 125# Flanged, 40-70 PSIG outlet pressure)

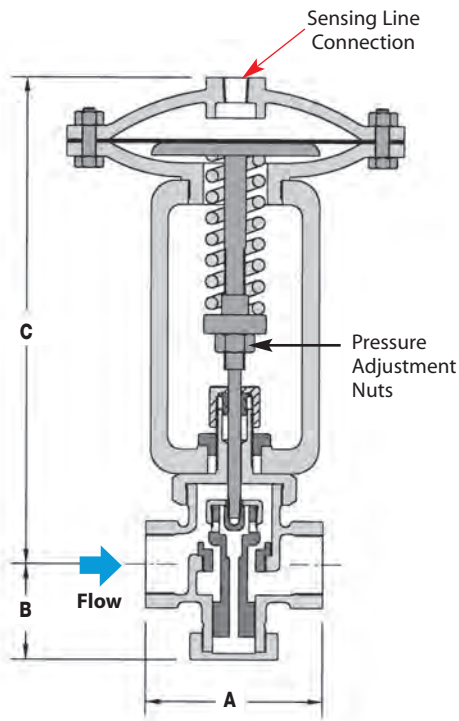
Note:
Flange selection may reduce pressure/temperature ratings.

Size/Connection	Model Code *	Body Material	Weight lbs
STEAM Applications - 455			
1/2" NPT	455-12-N-X	SST	15
3/4" NPT	455-13-N-X	SST	15
1" NPT	455-14-N-X	SST	15
1 1/4" NPT	455-15-N-X	SST	18
1 1/2" NPT	455-16-N-X	SST	18
2" NPT	455-17-N-X	SST	29
	455-17-F150-X	SST	41
2" 150# FLG	455-17-F300-X	SST	45
	455-18-F125-X	Cast Iron	105
2 1/2" 125# FLG	455-18-F250-X	Cast Iron	105
	455-19-F125-X	Cast Iron	125
3" 125# FLG	455-19-F250-X	Cast Iron	125
	455-20-F125-X	Cast Iron	175
4" 125# FLG	455-20-F250-X	Cast Iron	175
	455-20-F250-X	Cast Iron	175

X=Spring Code (reference Spring Selection Table).

455 Spring Selection Table

Size	Reduced Outlet Pressure (PSI)	Spring Case Dia. (in.)	Spring #	Code = X
1/2" – 2"	1 - 6	6	#5	65
	5 - 20	6	#3	63
	15 - 45	6	#2	62
	40 - 70	6	#1	61
3" – 4"	60 - 125	5	#1	51
	1 - 6	13	#4	134
	5 - 20	9	#4	94
	15 - 45	9	#3	93
3" – 4"	40 - 70	7	#3	73
	60 - 125	7	#2	72



Size	Face-to-Face A			B	C	Sensing Line Connection NPT
	NPT Threaded	125# Flanged	250# Flanged			
1/2"	4 1/4			2 3/8	10 1/4	1/4"
3/4"	4 1/4			2 3/8	10 1/4	1/4"
1"	4 1/8			2 3/8	10 1/4	1/4"
1 1/4"	5			3 1/8	10 3/4	1/4"
1 1/2"	5 1/4			3 3/8	11	1/4"
2"	6 5/8	10*	10 1/2*	3 3/8	12 3/16	1/4"
2 1/2"		10 5/8	11 1/4	6 1/4	18 3/4	3/8"
3"		10 7/8	11 5/8	7 1/8	19 1/4	3/8"
4"		12 1/2	13 1/8	8 1/4	20	3/8"

*Note: 2" 455 flanges are 150# or 300#.

How to Size/Order

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

Example:

Application: 1000 lbs/hr of 20 PSIG Steam reduced to 5 PSIG
 Model Code: **455-16-N-65** (455-Series, 1 1/2" NPT, 1-6 PSIG spring range)

PRESSURE Regulators

CAPACITIES – Steam (lbs/hr); Water (GPM)		Inlet/Outlet Pressures (PSIG)																	
Inlet Press.	Outlet Press.	1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
		Steam	Water	Steam	Water	Steam	Water	Steam	Water	Steam	Water	Steam	Water	Steam	Water	Steam	Water	Steam	Water
5	2	53	4.3	95	7.8	191	15.6	276	22.5	403	33.0	572	47.0	890	73.0	1166	95.0	1484	121
	10	95	7.1	171	12.7	342	25.0	494	37.0	722	54.0	1026	76.0	1596	119	2090	156	2660	198
10	5	73	5.6	131	10.1	263	20.0	380	29.0	555	42.0	788	60.0	1226	94.0	1606	123	2044	157
	0-5	157	9.7	283	17.4	565	35.0	816	50.0	1193	75.0	1696	105	2638	163	3454	213	4396	271
20	10	125	7.9	225	14.2	450	28.0	650	41.0	950	60.0	1350	85.0	2100	133	2750	174	3500	221
	0-10	200	11.2	360	20.1	720	40.0	1040	58.0	1520	85.0	2160	121	3360	188	4400	246	5600	313
30	20	145	7.9	261	14.2	522	28.0	754	41.0	1102	60.0	1566	85.0	2436	133	3190	174	4060	221
	25	107	5.6	193	10.1	385	20.0	556	29.0	813	42.0	1156	60.0	1798	94.0	2354	123	2996	157
50	0-20	295	13.7	531	24.6	1062	49.0	1534	71.0	2242	104	3186	148	4956	230	6490	301	8260	383
	30	245	11.2	441	20.1	882	40.0	1274	58.0	1862	85.0	2646	121	4116	188	5390	247	6860	313
75	40	185	7.9	333	14.2	666	28.0	962	41.0	1406	60.0	1998	85.0	3108	133	4070	174	5180	221
	0-30	402	16.8	724	30.2	1447	60.0	2090	87.0	3055	127	4342	181	6754	282	8844	369	11256	470
100	50	327	12.5	589	22.5	1177	45.0	1700	65.0	2485	95.0	3532	135	5494	210	7194	275	9156	350
	60	255	9.7	459	17.4	918	35.0	1326	50.0	1938	74.0	2754	105	4284	163	5610	213	7140	271
125	0-50	522	17.7	940	31.8	1879	64.0	2714	92.0	3967	134	5638	191	8770	297	11484	389	14616	495
	60	455	15.8	819	28.5	1638	57.0	2366	82.0	3458	120	4914	171	7644	266	10010	348	12740	443
150	80	325	11.2	585	20.1	1170	40.0	1690	58.0	2470	85.0	3510	121	5460	188	7150	246	9100	313
	0-60	635	20.2	1143	36.3	2286	73.0	3302	105	4826	153	6858	218	10668	339	13970	443	17780	564
200	70	575	18.5	1035	33.4	2070	67.0	2990	96.0	4370	141	6210	200	9660	311	12650	408	16100	519
	100	420	12.5	756	22.5	1512	45.0	2184	65.0	3192	95.0	4536	135	7056	210	9240	275	11760	350
250	0-70	750	22.4	1350	40.2	2700	80.0	3900	116	5700	170	8100	241	12600	376	16500	492	21000	626
	100	612	17.7	1102	31.8	2203	64.0	3182	92.0	4651	134	6610	191	10282	297	13464	389	17136	495
300	125	435	12.5	783	22.5	1566	45.0	2262	65.0	3306	95	4698	135	7308	210	9570	275	12180	350
	0-100	977	25.0	1759	45.0	3517	90.0	5080	130	7425	190	10552	270	16414	420	21494	550	27356	700
400	125	850	21.7	1530	39.0	3060	78.0	4420	113	6460	165	9180	234	14280	364	18700	476	23800	606
	0-125	1180	28.0	2124	50.3	4248	101	6136	145	8968	212	12744	302	19824	470	25960	615	33040	783

Note: Air in SCFM (Standard Cubic Feet per Minute) = Steam (lbs/hr) x 0.36

Model	403 Series
Service	Steam & Air
Sizes	1/2" - 4"
Connections	NPT, 150# FLG, 300# FLG
Body Material	Ductile Iron
Seat & Disc	Hardened 420 Stainless Steel (55 Rc)
Max Inlet Pressure	450 PSIG
Min Inlet Pressure	20 PSIG
Max Differential Pressure	250 PSI
Min Differential Pressure	15% of Inlet Pressure (10 PSI min)

Design Pressure/Temperature Rating – PMA/TMA

NPT	450 PSIG @ 650°F
150# FLG	150 PSIG @ 566°F
300# FLG	450 PSIG @ 650°F

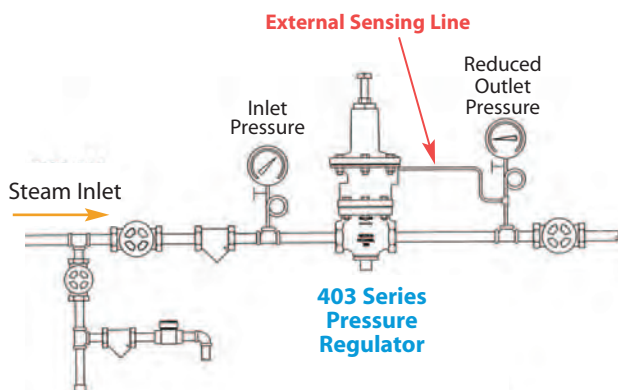


Typical Applications

The **403 Series** pilot-operated (piston-actuated) pressure regulating valves are used for pressure reduction on steam mains and other process equipment. Pilot-operated regulators will maintain a constant and accurate downstream pressure regardless of fluctuations in supply pressure or usage. These regulators can be supplied with an optional internal sensing line which simplifies installation. Piston-actuated regulators are more compact than Diaphragm-actuated regulators. The 403 Series contains all stainless steel internals for high-pressure applications up to 450 PSIG. The Double-Spring option is available for a wider range of reduced pressures.

Pressure Reducing Station with External Sensing Line

External Sensing (standard)
(requires sensing line)

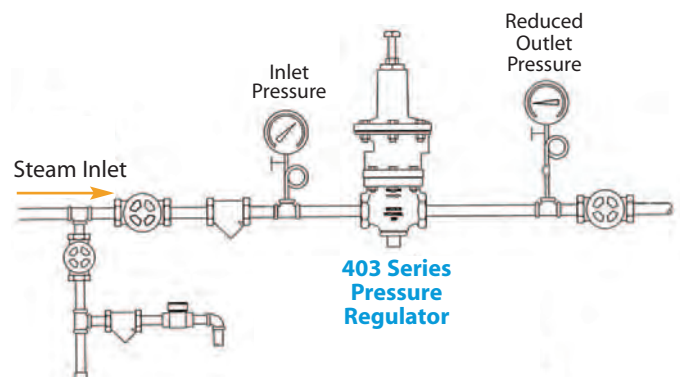


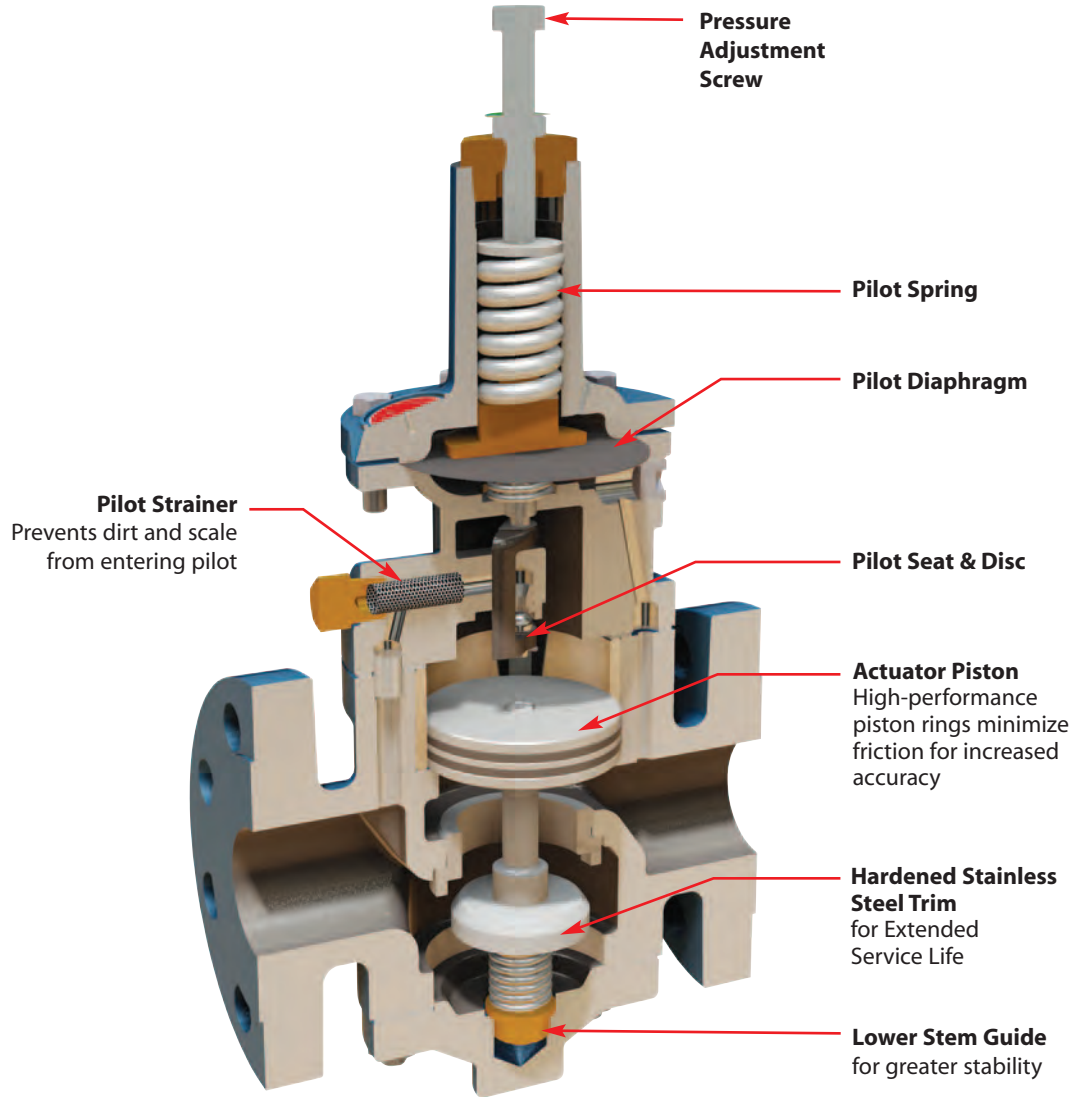
Features & Options

- Pilot-operated regulators minimize outlet pressure fluctuations even when load varies
- Internal Sensing option (If requested, the regulator can be modified to internally sense pressure, eliminating the need for an external sensing line)
- Ductile Iron body to handle increased pressure and temperature
- Hardened stainless steel seat and disc (55 Rc)

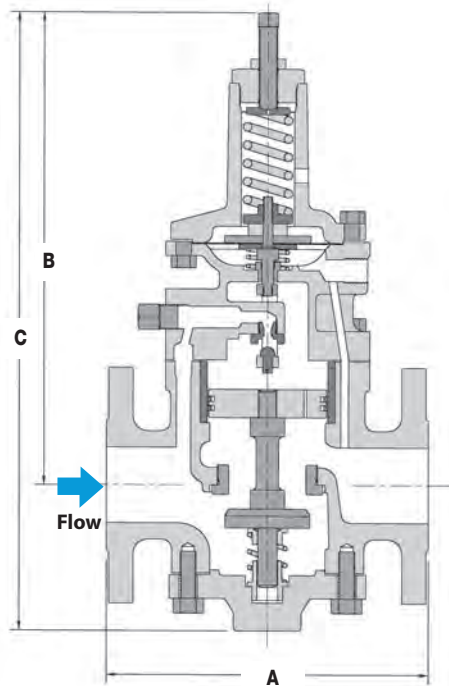
Pressure Reducing Station with Internal Sensing Line

Internal Sensing Option
(Specially drilled internal sensing path eliminates the need for an external sensing line)





PRESSURE
Regulators



DIMENSIONS – inches

Size	Face-to-Face A			Centerline to Top B		Overall Height C	
	NPT Threaded	150# Flanged	300# Flanged	Single Spring	Double Spring	Single Spring	Double Spring
1/2"	4 1/2			12	14 3/8	14 3/8	16 3/4
3/4"	4 1/2			12	14 3/8	14 3/8	16 3/4
1"	4 1/2			12	14 3/8	14 3/8	16 3/4
1 1/4"	8 3/16			12 3/4	15 1/8	16 1/8	18 1/2
1 1/2"	8 3/16			12 3/4	15 1/8	16 1/8	18 1/2
2"	8 3/4	8 1/4	8 3/4	13	15 3/8	17 1/8	19 1/2
2 1/2"		9 1/8	9 3/4	13 3/4	16 1/8	18 1/4	20 5/8
3"		9 3/4	10 1/2	14 3/4	16 1/8	19 3/4	22 1/8
4"		13 1/2	14	16	18 3/8	24	26 3/8

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) that meets or slightly exceeds demand requirements. Follow vertically up to determine appropriate size. When exact application values are not shown, interpolate between values. From the spring range chart, select the spring range that accommodates the required outlet set pressure. Specify Internal or External (remote) Pressure sensing.

Example:

Application: 12,500 lbs/hr of 300 PSIG Steam reduced to 125 PSIG
 Model Code: **403-17-N-0010-R** (2" 403 Series Valve, 100-200 PSIG spring range, with external sensing)

Note: Flange selection may reduce pressure/temperature ratings.

Size/Connection	Model Code *	Weight lbs
REMOTE Pressure Sensing - Requires External Sensing Line		
1/2" NPT	403-12-N-X-R	20
3/4" NPT	403-13-N-X-R	20
1" NPT	403-14-N-X-R	20
1 1/4" NPT	403-15-N-X-R	37
1 1/2" NPT	403-16-N-X-R	38
	403-17-N-X-R	54
2" 150# FLG	403-17-F150-X-R	54
	403-17-F300-X-R	56
2 1/2" 150# FLG	403-18-F150-X-R	66
	403-18-F300-X-R	69
3" 150# FLG	403-19-F150-X-R	88
	403-19-F300-X-R	96
4" 150# FLG	403-20-F150-X-R	174
	403-20-F300-X-R	182
INTERNAL Pressure Sensing - No Sensing Line Required		
1/2" NPT	403-12-N-X-I	20
3/4" NPT	403-13-N-X-I	20
1" NPT	403-14-N-X-I	20
1 1/4" NPT	403-15-N-X-I	37
1 1/2" NPT	403-16-N-X-I	38
	403-17-N-X-I	54
2" 150# FLG	403-17-F150-X-I	54
	403-17-F300-X-I	56
2 1/2" 150# FLG	403-18-F150-X-I	66
	403-18-F300-X-I	69
3" 150# FLG	403-19-F150-X-I	88
	403-19-F300-X-I	96
4" 150# FLG	403-20-F150-X-I	174
	403-20-F300-X-I	182

X = Spring Code (reference Spring Selection Table).



403 Spring Selection Table

Reduced Outlet Pressure PSI	Spring #	Code = X	Color
SINGLE Spring Ranges			
0 to 10	#13	0013	Blue & yellow
10 to 50	#14	0014	Black & yellow
40 to 100	#9	0009	Red & yellow
100 to 200	#10	0010	Green & blue
DOUBLE Spring Ranges			
30 to 125	#14 & #9	1409	Red & yellow Black & yellow
50 to 200	#9 & #10	0910	Red & yellow Green & blue

Note: For 200 - 280 PSI use Bellville washers (Code = **0015**)

Notes:

Must Specify Spring Code when Ordering:

Use the 403 Spring Selection Table to specify the proper spring(s) based on reduced pressure range by replacing the "X" with Spring Code from chart.

Internal Sensing (not available with 0-10 PSI range)

Pressure Sensing Codes:

Code R - Remote Pressure Sensing
 Code I - Internal Pressure Sensing

Example Model Code:

1) **403-15-N-0014-R**
 (403 Series, 1 1/4" NPT, 10-50 PSI, Remote Pressure Sensing)

CAPACITIES – Steam (lbs/hr); Air (SCFM)																	Inlet/Outlet Pressures (PSIG)	
Inlet Press.	Outlet Press.	1/2", 3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"		
		Steam	Air	Steam	Air	Steam	Air	Steam	Air	Steam	Air	Steam	Air	Steam	Air	Steam	Air	
Cv Factors		3.5		8.5		12		17		26		55		77		98		
20	0-10	175	60	425	145	600	204	850	289	1300	442	2750	935	3850	1309	4900	1666	
	30	270	88	655	213	924	300	1309	425	2002	650	4235	1375	5929	1925	7546	2450	
30	20	203	67	493	162	696	228	986	323	1508	494	3190	1045	4466	1463	5684	1862	
	50	385	130	935	315	1320	444	1870	629	2860	962	6050	2035	8470	2849	10780	3626	
50	30	343	116	833	281	1176	396	1666	561	2548	858	5390	1815	7546	2541	9604	3234	
	100	690	231	1675	561	2364	792	3349	1122	5122	1716	10835	3630	15169	5082	19306	6468	
100	60	637	214	1547	519	2184	732	3094	1037	4732	1586	10010	3355	14014	4697	17836	5978	
	80	455	151	1105	366	1560	516	2210	731	3380	1118	7150	2365	10010	3311	12740	4214	
125	0-60	865	287	2100	697	2964	984	4199	1394	6422	2132	13585	4510	19019	6314	24206	8036	
	70	805	270	1955	655	2760	924	3910	1309	5980	2002	12650	4235	17710	5929	22540	7546	
125	100	588	196	1428	476	2016	672	2856	952	4368	1456	9240	3080	12936	4312	16464	5488	
	150	1019	343	2474	833	3492	1176	4947	1666	7566	2548	16005	5390	22407	7546	28518	9604	
150	100	858	287	2083	697	2940	984	4165	1394	6370	2132	13475	4510	18865	6314	24010	8036	
	125	609	214	1479	519	2088	732	2958	1037	4524	1586	9570	3355	13398	4697	17052	5978	
200	0-100	1337	445	3247	1080	4584	1524	6494	2159	9932	3302	21010	6985	29414	9779	37436	12446	
	150	1001	333	2431	808	3432	1140	4862	1615	7436	2470	15730	5225	22022	7315	28028	9310	
200	175	739	245	1794	595	2532	840	3587	1190	5486	1820	11605	3850	16247	5390	20678	6860	
	250	1652	550	4012	1335	5664	1884	8024	2669	12272	4082	25960	8635	36344	12089	46256	15386	
250	175	1358	452	3298	1097	4656	1548	6596	2193	10088	3354	21340	7095	29876	9933	38024	12642	
	200	1138	378	2763	918	3900	1296	5525	1836	8450	2808	17875	5940	25025	8316	31850	10584	
300	0-150	2016	665	4896	1615	6912	2280	9792	3230	14976	4940	31680	10450	44352	14630	56448	18620	
	200	2016	665	4896	1615	6912	2280	9792	3230	14976	4940	31680	10450	44352	14630	56448	18620	
300	250	1250	417	3035	1012	4284	1428	6069	2023	9282	3094	19635	6545	27489	9163	34986	11662	
	400	2657	875	6452	2125	9108	3000	12903	4250	19734	6500	41745	13750	58443	19250	74382	24500	
400	280	2146	711	5211	1726	7356	2436	10421	3451	15938	5278	33715	11165	47201	15631	60074	19894	
	450	2975	984	7225	2389	10200	3372	14450	4777	22100	7306	46750	15455	65450	21637	83300	27538	
450	280	2975	984	7225	2389	10200	3372	14450	4777	22100	7306	46750	15455	65450	21637	83300	27538	

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

REGULATORS

Model	R Series	10691 Series*
Service	Liquids	Liquids
Sizes	1/2" – 3"	1/2", 3/4", 1"
Connections	NPT	NPT
Body	Bronze	Bronze
Seat Material	Bronze	Bronze
Disc Material	Stainless Steel (1/2" – 1 1/2") Bronze (2" – 3")	EPDM* Optional Viton or Teflon
Max Inlet Pressure	300 PSIG	300 PSIG

* **10691-Series** Relief Valves use a soft elastomeric disc for tight shut-off. Available in 1/2", 3/4" & 1" sizes only.

Design Pressure/Temperature Rating – PMA/TMA

NPT 300 PSIG @ 180°F

Description

The **R-Series** & the **10691-Series** Back Pressure & Relief Valves relieve upstream pressure in a variety of processes. **R-Series** has a stainless steel disc and the **10691-Series** has a soft elastomeric disc for tight shut-off. These valves automatically maintain desired maximum pressure in a vessel or system by relieving excess pressure into lower pressure return line or to atmosphere. Ideally suited for use as pump bypass control valve by maintaining constant pump discharge pressures. Used as a continuously operating valve or for protection against intermittent overpressure conditions.

NOT TO BE USED ON STEAM.

Typical Applications

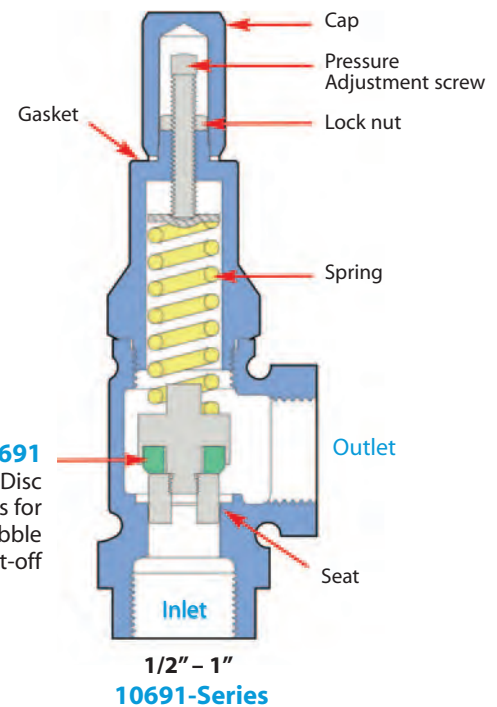
The **R-Series** & **10691 Series** Back Pressure Relief Valves are used in the following applications:

- Water pump bypass for irrigation, sprinkler systems on golf courses, fountains and fire protection systems
- Fuel oil pump bypass on commercial systems or large residential systems

Note: Not to be used as a safety relief valve on steam systems.

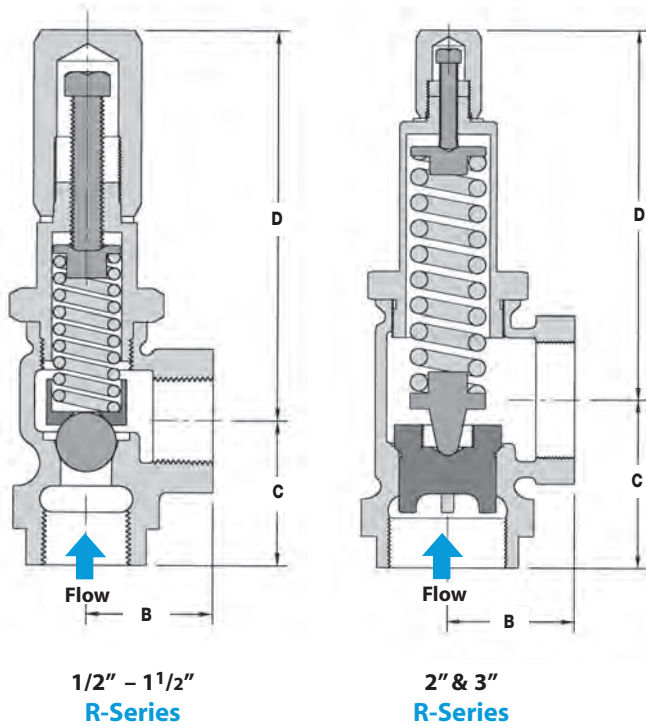
Features & Options

- Four Springs – easily interchanged to cover pressures from 1 to 300 PSIG
- Heavy-duty bronze valve body
- 10691 Series has EPDM Seat for tight shut-off (1/2" - 1")
Viton or Teflon options available



Pressure Adjustments

To adjust set pressure of valve, remove top cap, loosen lock nut and adjust pressure by rotating adjustment screw. Rotating the screw clockwise increases the compression on the spring thereby increasing the set pressure. Rotating the screw counter-clockwise lowers the set pressure. Tighten the lock nut and replace top cap and gasket.



DIMENSIONS & WEIGHTS — inches				
Size	B	C	D	Weight (lbs)
1/2"	1 1/8	1 1/2	3 5/8	1.5
3/4"	1 3/8	1 3/4	5 1/2	2
1"	1 5/8	2 1/4	6	3
1 1/4"	1 7/8	2 1/2	5 9/16	6
1 1/2"	2 3/16	2 3/4	6 5/8	8
2"	2 1/2	3 5/16	7 3/8	10
3"	3 1/2	4 3/4	9 7/8	25

Note: Model 10691 available only in sizes 1/2" thru 1".

Spring Selection Table

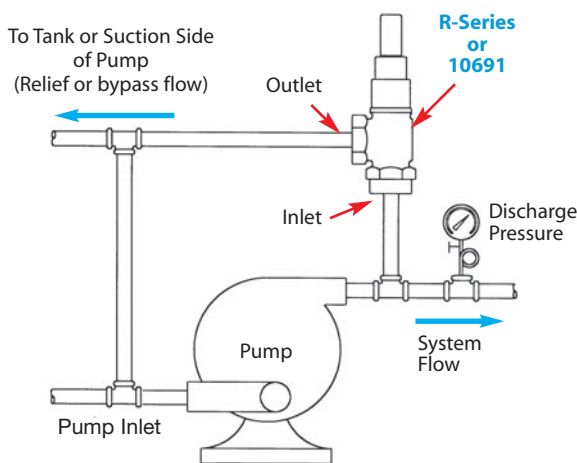
Relief Pressure (PSI)	Spring #	Spring Color
1 - 6	#4*	yellow
5 - 35	#3	silver
25 - 100	#2	blue
75 - 300	#1	red

* 1/2" - 1 1/2" R-Series type only.
Not available on 2" & 3" models.

PRESSURE
Regulators

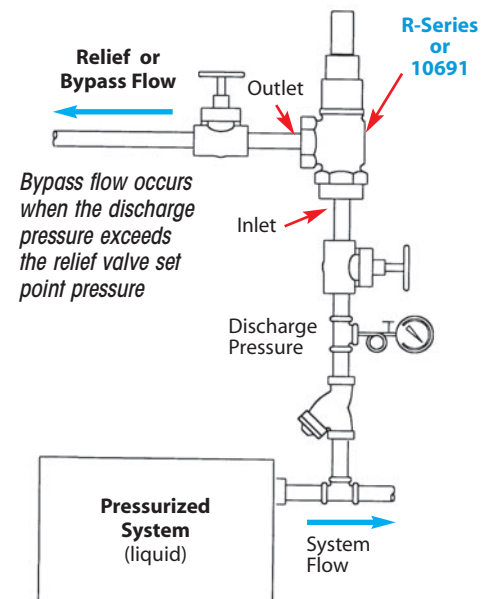
How it Works

The Relief Valve is actuated by the system pressure on the inlet side of the valve. Valve loading is provided by a spring. The adjustment is done by removing the cap and rotating the screw clockwise or counter-clockwise. Spring load balances against the opening force of the upstream (or relief) pressure. Valve will open at the slightest increase in pressure above the spring set point, and will close when the excess pressure has been relieved. The higher the system pressure is above the relief set point pressure, the more flow the valve will pass. It is therefore typical to specify the maximum capacity of a back pressure relief valve at 10% and 20% over set pressure.



A Relief Valve allows water to recirculate through the pump even when the discharge valve on the pump is completely closed. As a rule, a minimum of 20% of the pump capacity must recirculate to prevent overheating of the pumped liquid.

Protection Against Over-pressure Condition



Water, Oil & Other Liquids

Options & Notes:

Factory Setting of Relief Pressure Option:

Specify Set-Pressure when ordering. Add desired factory set pressure to the end of the model code. See Example below:

R-Series Example Model Code with Set-Pressure Option:

R-12-N-2, Set at 50 PSIG

(R Series, 1/2" NPT, 25-100 PSIG Spring Range, with a Factory Set Relief Pressure of 50 PSIG)

10691 Example Model Code with Set-Pressure Option:

10691-14-N-2-E, Set at 75 PSIG

(10691 Series, 1" NPT, 25-100 PSIG Spring Range, EPDM disc, with a Factory Set Relief Pressure of 75 PSIG)

10691-Series

Disc Material: standard in EPDM (Suffix Code E)

Also available in: Teflon (Suffix Code T)
& Viton (Suffix Code V)

Size/ Connection NPT	Model Code R-Series	Model Code 10691 Series EPDM Disc	Relief Pressure Range (PSI)	Weight lbs
1/2"	R-12-N-4	NA	1-6	1.5
	R-12-N-3	10691-12-N-3-E	5-35	1.5
	R-12-N-2	10691-12-N-2-E	25-100	1.5
	R-12-N-1	10691-12-N-1-E	75-300	1.5
3/4"	R-13-N-4	NA	1-6	2.5
	R-13-N-3	10691-13-N-3-E	5-35	2.5
	R-13-N-2	10691-13-N-2-E	25-100	2.5
	R-13-N-1	10691-13-N-1-E	75-300	2.5
1"	R-14-N-4	NA	1-6	3.3
	R-14-N-3	10691-14-N-3-E	5-35	3.3
	R-14-N-2	10691-14-N-2-E	25-100	3.3
	R-14-N-1	10691-14-N-1-E	75-300	3.3
1 1/4"	R-15-N-4		1-6	4.5
	R-15-N-3		5-35	4.5
	R-15-N-2		25-100	4.5
	R-15-N-1		75-300	4.5
1 1/2"	R-16-N-4		1-6	6.3
	R-16-N-3		5-35	6.3
	R-16-N-2		25-100	6.3
	R-16-N-1		75-300	6.3
2"	R-17-N-3		5-35	10.3
	R-17-N-2		25-100	10.3
	R-17-N-1		75-300	10.3
3"	R-19-N-3		5-35	25.0
	R-19-N-2		25-100	25.0
	R-19-N-1		75-300	25.0

The Relief Valve remains closed until the **Set-Pressure** is reached. When the Set-Pressure is met or exceeded, the spring will compress, allowing the valve to open and flow to occur. It is standard practice to publish flow values at 10% and 20% over the **Set-Pressure**.

Example: A 1" valve set at 50 PSIG will pass 3.1 GPM if the system pressure exceeds the set point by 20%.

The **R Series & 10691** Relief Valve water capacities at inlet pressures of 10% and 20% over **Set-Pressure**:

CAPACITIES – Water (GPM)								
At 10% Over Set Pressure								
Spring Range	Set Pressure (PSIG)	1/2" (PSIG)	3/4"	1"	1 1/4"	1 1/2"	2"	3"
1-6	3	1.2	2.2	3.2	4.3	5.4	-	-
5-35	10	0.3	0.4	0.4	0.5	0.5	0.6	0.7
5-35	20	0.6	0.7	0.8	1.0	1.1	1.3	1.6
25-100	50	1.0	1.3	1.6	1.8	2.2	2.6	3.2
25-100	75	1.4	1.9	2.3	2.8	3.4	4.0	5.0
75-300	100	1.9	2.5	3.2	3.8	4.6	5.4	6.9
75-300	200	3.4	4.4	5.8	6.9	8.2	9.7	12.3
At 20% Over Set Pressure								
1-6	3	2.2	3.4	4.6	5.8	7.1	-	-
5-35	10	0.6	0.8	1.1	1.3	1.4	1.8	2.2
5-35	20	1.4	1.9	2.4	3.0	3.4	4.1	4.8
25-100	50	1.8	2.0	3.1	3.8	4.4	5.4	6.4
25-100	75	2.3	3.2	4.0	4.8	5.6	6.9	8.1
75-300	100	3.6	4.2	5.0	6.3	7.0	7.3	8.9
75-300	200	6.5	7.6	9.0	11.2	12.4	13.1	16.0

Regulators

Relief & Back Pressure Valves

3040 Series

Water, Air, Oil & Other Liquids

Model	3040 Series
Service	Water, Oil, other Liquids, Air
Sizes	1/2", 3/4", 1", 1 1/4", 1 1/2", 2"
Connections	NPT, Flanged (2" only)
Body Material	Stainless Steel
Seat Material	Stainless Steel
Disc Material	Viton - 300°F max
Diaphragm	Viton - 300°F max
Max Inlet Pressure	250 PSIG

Design Pressure/Temperature Rating – PMA/TMA

NPT	300 PSIG	@ 200° F
150# FLG	195 PSIG	@ 400° F



3040
(1/2" - 1" shown)

Typical Applications

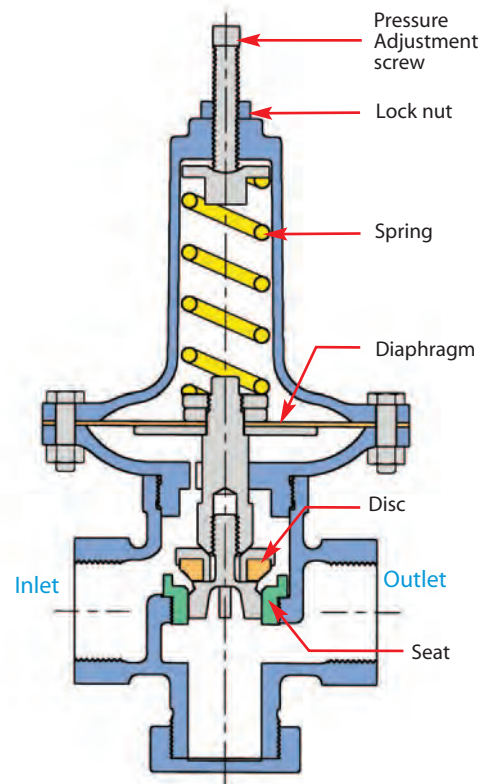
The **3040 Series** Back Pressure Valves relieve upstream pressure in a variety of processes. Automatically maintains desired maximum pressure in a vessel or system by relieving excess pressure into lower pressure return line or to atmosphere. Ideally suited for use as pump bypass control valve by maintaining constant pump discharge pressures. Used as a continuously operating valve or for intermittent protection against over-pressure conditions.

Features & Options

- Fast response
- Viton Trim for 300°F service
- Soft "Seat" for tight shut-off
- Optional Disc options include Teflon and 316SS

Pressure Adjustments

Rotating the adjustment screw clockwise increases the compression on the spring, thereby increasing the set-pressure. Rotating the adjustment screw counter-clockwise lowers the set-pressure. Tighten the locknut after adjustment.



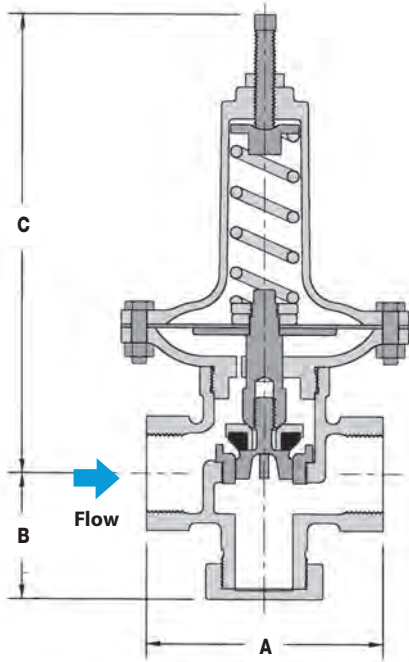
(1 1/4" - 2" shown)

Regulators

Relief & Back Pressure Regulating Valve

3040 Series

Water, Air, Oil & Other Liquids



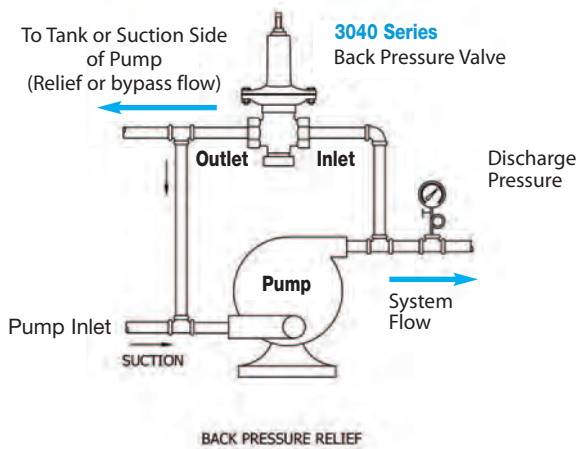
Size	Face-to-Face			B	C
	A NPT Threaded	A 150# Flanged	A 300# Flanged		
1/2"	4 1/8			2 5/16	9
3/4"	4 1/8			2 5/16	9
1"	4 1/8			2 5/16	9
1 1/4"	4 13/16			3 1/4	12 3/4
1 1/2"	5 3/16			3 1/2	13 1/4
2"	6 5/8	10	10 1/2	3 3/8	12

PRESSURE Regulators

How it Works

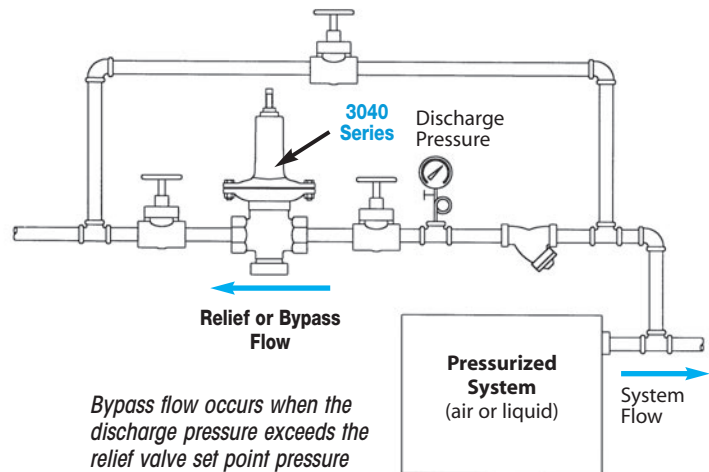
The **3040 Series** Back Pressure Valve senses upstream pressure acting on the underside of the diaphragm through a port in the bottom diaphragm case. An increase in the upstream pressure above the set point will compress the spring and allow the valve to open. The spring will close the valve as the upstream pressure decreases to the set-point.

The higher the system pressurizes above the relief set-point pressure, the more flow the valve will pass. It is therefore typical to specify the maximum capacity of a back pressure relief valve at 10% & 20% over set-pressure.



A Relief Valve allows water to recirculate through the pump even when the discharge valve on the pump is completely closed. As a rule, a minimum of 20% of the pump capacity must recirculate to prevent overheating of the pumped liquid.

Protection Against Over-Pressure Condition



Water, Air, Oil & Other Liquids

3040 Series Spring Selection Table

Relief Pressure (PSI)	Spring #	Code = X
1 - 12	#4	4
5 - 35	#3	3
20 - 70	#2	2
40 - 125	#1	1

Note: Relief Pressure 1-12 PSI (Code 4) available in 1/2", 3/4", and 1" sizes only.

Size/Connection	Model Code *	Body Material	Weight lbs
Viton Diaphragm & Disc (300°F Max)			
1/2" NPT	3040-12-N-X-V	SST	8
3/4" NPT	3040-13-N-X-V	SST	8
1" NPT	3040-14-N-X-V	SST	9
1 1/4" NPT	3040-15-N-X-V	SST	15
1 1/2" NPT	3040-16-N-X-V	SST	16
2" NPT	3040-17-N-X-V	SST	24
2" 150# FLG	3040-17-150-X-V	SST	36
2" 300# FLG	3040-17-300-X-V	SST	40

X=Spring Code. (reference Spring Selection Table)

Disc Option Suffix Codes:

- V - Viton (Standard)
- TD - Teflon
- SSD - 316SS

Example Model Code:

- 1) 3040-15-N-3-V
(3040 Series, 1 1/4" NPT, 5-35 PSIG Relief Pressure, Viton Disc)

Note: The Relief Valve remains closed until the **Set-Pressure** is reached. When the Set-Pressure is met or exceeded, the spring will compress, allowing the valve to open and flow to occur. It is standard practice to publish flow values at 10% and 20% over the **Set-Pressure**.

Example: A 1" valve set at 50 PSIG will pass 35.6 GPM of water or 409 SCFM of air if the system pressure exceeds the set-point by 20%.

PRESSURE Regulators

The 3040 Series Relief Valve water and air capacities at inlet pressures of 10% and 20% over **Set-Pressure**:

CAPACITIES – Water (GPM)							
At 10% Over Set Pressure							
Spring Range (PSIG)	Set Pressure (PSIG)	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
1-12	5	4.0	8.0	10.0	–	–	–
5-35	10	5.7	11.4	14.3	29	43	71
5-35	20	8.1	16.2	20.3	41	61	101
20-70	50	12.7	25.4	31.8	64	95	159
40-125	75	15.6	31.2	39.0	78	117	195
40-125	100	18.0	36.0	45.0	90	135	225
40-125	125	20	40	50	100	150	250
At 20% Over Set Pressure							
1-12	5	4.4	8.8	11.2	–	–	–
5-35	10	6.3	12.5	16.0	32	47	79
5-35	20	8.9	17.8	22.7	45	67	113
20-70	50	14.0	27.0	35.6	71	105	177
40-125	75	17.2	34.3	43.7	87	129	217
40-125	100	19.8	39.6	50.4	101	149	250
40-125	125	22	44	56	112	166	278

CAPACITIES – Air (SCFM)						
At 10% Over Set Pressure						
1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	
31	55	111	–	–	–	
39	70	141	203	297	422	
56	100	201	290	424	603	
106	191	381	551	805	1144	
148	266	532	768	1123	1596	
190	341	682	986	1441	2047	
231	416	833	1203	1758	2499	
At 20% Over Set Pressure						
32	57	113	–	–	–	
41	73	146	211	308	438	
59	106	212	306	447	635	
114	204	409	591	863	1226	
159	287	573	828	1210	1719	
205	369	737	1065	1556	2212	
250	451	901	1302	1903	2704	

