

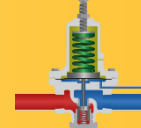
# Industrial Regulators Quick Selection Guide

[Selection Guide](#)  
[Material Selection](#)  
[Conversion Tables](#)  
[Technical Section](#)  
[Additional Resources](#)



## Pressure Reducing Regulators

Devices that open to meet flow demand when downstream pressure drops below setpoint



**Select Application**  
Table 1 (below)

**Choose Product**  
Table 1 (below)

**Check Maximum Flow**  
Guide (2<sup>nd</sup> last column)

**Ensure Compliance**  
Guide (first 6 columns)

**Verify With Bulletin**<sup>1</sup>  
Guide (first / last column)



*If flow demand or attributes not met, select next best product*

**Pressure Control Range**



**Accuracy Requirement**



**Valve Body Size**



**Maximum Inlet Pressure**



**Minimum Differential Pressure**



**Details**



Narrow selection based on desired outlet pressure (setpoint)

Check if specifications mandate setpoint tolerance levels

Ensure body sizes are available at or smaller than pipeline size

Verify maximum inlet pressure does not violate product rating

Confirm differential pressure is sufficient to fully open main valve

**Tips**



Choose lowest setpoint that satisfies flow demand

Pilot-Operated regulators are generally more accurate (less droop)

If pipe swaging is an option, choose the smallest size that meets flow

Ratings can vary based on product size, type, or material

Direct-Ops do not have a minimum differential pressure

<sup>1</sup> The pressure/temperature limits in product Bulletins and any applicable standard or code limitation should not be exceeded.

**TABLE 1. RECOMMENDED PRODUCT SELECTION**

APPLICATION	AIR	STEAM	FUEL GAS	TANK BLANKETING	PROCESS CHEMICALS	SANITARY	LIQUIDS
<b>START HERE</b> Simplest Solutions 1	67C/67D 	MR95H/92C 	119 	T205/T205B 	MR95L/MR95H 	SR5 	MR95L/MR95H 
<b>NEXT OPTION</b> Larger size/flow 2	627/MR95L 	92B 	627/MR95H 	ACE95/ACE95Sr 	MR105 	MR95H/T205 	MR105 
<b>NEXT OPTION</b> Larger size/flow 3	MR95H/1098-EGR 	92S 	LS200/1098-EGR 	1190 	1098-EGR 	ACE95/ACE95Sr 	LR125/92W 

FISHER™

EMERSON

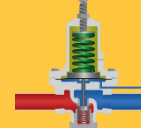
# Industrial Regulators Quick Selection Guide

[Selection Guide](#)  
[Material Selection](#)  
[Conversion Tables](#)  
[Technical Section](#)  
[Additional Resources](#)



## Pressure Reducing Regulators

Devices that open to meet flow demand when downstream pressure drops below setpoint



★ Preferred  
 ■ Alternative



Click Product Type/Series for Bulletin Front Page



Direct-Operated



Pilot-Operated

● Air

● Nitrogen

● Steam

● Water



Click Page No. for Bulletin Capacity Tables

Air  
 Steam  
 Fuel Gas  
 Tank Blanketing  
 Process  
 Sanitary  
 Liquid

PRODUCT <sup>1</sup> TYPE / SERIES	CONTROL PRESSURE RANGE psig / bar	ACCURACY +/- % Setpoint	BODY SIZE NPS	MAX. INLET PRESSURE psig / bar	MIN. DIFF PRESSURE psi / bar	MAX. FLOW CAPACITY See units below See fluid legend above	BULLETIN PAGE NO. <sup>2</sup>
★ <a href="#">67C</a>	0-125 / 0-8.6	10 to 20%	1/4	250 / 17.2	-	4,350 SCFH / 117 Nm <sup>3</sup> /h ●	<a href="#">7</a>
■ <a href="#">67CS</a>	0-150 / 0-10.3	10 to 20%	1/4	400 / 27.6	-	4,350 SCFH / 117 Nm <sup>3</sup> /h ●	<a href="#">7</a>
★ <a href="#">67D/67DS</a>	0-150 / 0-10.3	10 to 20%	1/2	400 / 27.6	-	20,900 SCFH / 560 Nm <sup>3</sup> /h ●	<a href="#">7</a>
■ <a href="#">1301</a>	10-500 / 0.69-34.5	10 to 20%	1/4	6000 / 414	-	4,500 SCFH / 121 Nm <sup>3</sup> /h ● 2.7 GPM / 10 LPM ●	<a href="#">5</a>
★ <a href="#">MR95L</a>	2-30 / 0.14-2.1	10 to 40%	1/4, 1/2, 3/4, 1	300 / 20.7	-	23,000 SCFH / 623 Nm <sup>3</sup> /h ● 790 lb/h / 360 kg/h ● 58 GPM / 219 LPM ●	<a href="#">11</a> <a href="#">16</a> <a href="#">21</a>
★ <a href="#">MR95H</a>	2-400 / 0.14-27.6	10 to 40%	1/4, 1/2, 3/4, 1, 1-1/2, 2	1000 / 68.9	-	510,000 SCFH / 13,600 Nm <sup>3</sup> /h ● 14,000 lb/h / 6,430 kg/h ● 397 GPM / 1,500 LPM ●	<a href="#">12</a> <a href="#">17</a> <a href="#">22</a>
■ <a href="#">SR5</a>	2-135 / 0.14-9.3	10 to 30%	1/2 to 3	210 / 14.5	-	152,970 SCFH / 4,100 Nm <sup>3</sup> /h ● 6,820 lb/h / 3,096 kg/h ● 262 GPM / 992 LPM ●	<a href="#">14</a> <a href="#">21</a> <a href="#">28</a>
■ <a href="#">92C</a>	5-250 / 0.34-17.2	5 to 10%	1/2, 3/4, 1	300 / 20.7	15 / 1	3,600 lb/h / 1,633 kg/h ●	<a href="#">9</a>
★ <a href="#">92B</a>	2-250 / 0.14-17.2	10 to 20%	1, 1-1/2, 2, 3, 4	300 / 20.7	10 / 0.7	42,400 lb/h / 19,234 kg/h ●	<a href="#">11</a>
■ <a href="#">92S/92W</a>	2-250 / 0.14-17.2	5 to 10%	1, 2, 3, 4, 6X4	300 / 20.7	20 / 1.4	45,100 lb/h / 20,457 kg/h ● 960 GPM / 3,634 LPM ●	<a href="#">11</a> <a href="#">5</a>
■ <a href="#">119</a>	3-60 / 0.21-4.1	10 to 20%	3/4, 1, 1-1/4, 2	150 / 10.3	-	79,000 SCFH / 2,117 Nm <sup>3</sup> /h ●	<a href="#">4</a>
■ <a href="#">66</a>	2" w.c.-5 / 5 mbar-0.34	10 to 20%	2, 3, 4	150 / 10.3	-	19,820 SCFH / 532 Nm <sup>3</sup> /h ●	<a href="#">9</a>
■ <a href="#">Y600A</a>	4" w.c.-7 / 10 mbar-0.048	10 to 20%	3/4, 1	150 / 10.3	-	5,162 SCFH / 138 Nm <sup>3</sup> /h ●	<a href="#">6</a>
★ <a href="#">627</a>	5-500 / 0.34-34.5	10 to 40%	3/4, 1, 1-1/4	2000 / 138	-	138,725 SCFH / 3,718 Nm <sup>3</sup> /h ●	<a href="#">16</a>
■ <a href="#">627W</a>	10-500 / 0.67-34.5	10 to 40%	3/4, 1, 2	900 / 62.1	-	82 GPM / 310 LPM ●	<a href="#">6</a>
■ <a href="#">MR105</a>	5-300 / 0.34-20.7	10 to 40%	2, 3, 4	400 / 27.6	-	347,000 SCFH / 9,300 Nm <sup>3</sup> /h ● 1,650 GPM / 6,240 LPM ●	<a href="#">18</a> <a href="#">22</a>
■ <a href="#">LR125</a>	15-400 / 1.0-27.6	5 to 40%	1, 2, 3, 4	600 / 10.3	16 / 1.1	2,501 GPM / 9,467 LPM ●	<a href="#">9</a>
■ <a href="#">LS200</a>	7" w.c.-60 / 17 mbar-4.1	10 to 40%	2, 4X2	285 / 19.7	-	14,487,596 SCFH / 388,331 Nm <sup>3</sup> /h ●	<a href="#">7</a>
★ <a href="#">1098-EGR</a>	4" w.c.-300 / 10 mbar-20.7	2 to 10%	1, 2, 3, 4, 6, 8X6, 12X6	400 / 27.6	1 / 0.07	8,782,000 SCFH / 235,268 Nm <sup>3</sup> /h ● 11,934 GPM / 45,170 LPM ●	<a href="#">17</a> <a href="#">18</a>
■ <a href="#">T205</a>	1" w.c.-7 / 2 mbar-0.48	10 to 20%	3/4 and 1	200 / 13.8	-	23,667 SCFH / 634 Nm <sup>3</sup> /h ●	<a href="#">7</a>
■ <a href="#">T205B</a>	1" w.c.-7 / 2 mbar-0.48	5 to 10%	3/4 and 1	200 / 13.8	-	18,528 SCFH / 497 Nm <sup>3</sup> /h ●	<a href="#">14</a>
■ <a href="#">Y692</a>	1" w.c.-10 / 2 mbar-0.7	10 to 20%	1-1/2 and 2	150 / 10.3	-	19,820 SCFH / 532 Nm <sup>3</sup> /h ●	<a href="#">8</a>
■ <a href="#">Y693</a>	0.5" w.c.-10 / 1 mbar-0.7	10 to 20%	1-1/2 and 2	150 / 10.3	-	26,700 SCFH / 716 Nm <sup>3</sup> /h ●	<a href="#">8</a>
■ <a href="#">ACE95</a>	-5" w.c.-1.5 / -12 mbar-0.1	2 to 5%	3/4, 1, 2X1	200 / 13.8	25 / 1.7	71,900 SCFH / 1,927 Nm <sup>3</sup> /h ●	<a href="#">7</a>
■ <a href="#">ACE95Sr</a>	-5" w.c.-1.5 / -12 mbar-0.1	2 to 5%	2	200 / 13.8	25 / 1.7	499,600 SCFH / 13,389 Nm <sup>3</sup> /h ●	<a href="#">7</a>
■ <a href="#">1190</a>	1/4" w.c.-7 / 0.6 mbar-0.48	1% to 5%	1, 2, 3, 4, 6, 8X6, 12X6	300 / 20.7	2.5 / 0.17	2,811,000 SCFH / 75,335 Nm <sup>3</sup> /h ●	<a href="#">6</a>

<sup>1</sup>See Industrial Regulator Application Guide for complete list of Industrial Regulator offering.  
<sup>2</sup>Bulletin page numbers are subject to change with future revisions/updates.



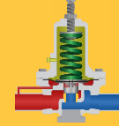
# Industrial Regulators Quick Selection Guide

[Selection Guide](#)  
[Material Selection](#)  
[Conversion Tables](#)  
[Technical Section](#)  
[Additional Resources](#)



## Relief/Backpressure Regulators

Devices that open to meet flow demand when upstream pressure rises above setpoint



**Select Application** *Table 1 (below)* → **Choose Product** *Table 1 (below)* → **Check Maximum Flow** *Guide (2<sup>nd</sup> last column)* → **Ensure Compliance** *Guide (first 6 columns)* → **Verify With Bulletin** <sup>1</sup> *Guide (first / last column)*



*If flow demand or attributes not met, select next best product*



### Details



**Pressure Control Range:** Narrow selection based on desired inlet pressure (setpoint)  
**Accuracy Requirement:** Check if specifications mandate setpoint tolerance levels  
**Valve Body Size:** Ensure body sizes are available at or smaller than pipeline size  
**Maximum Inlet Pressure:** Verify maximum inlet pressure does not violate product rating  
**Minimum Differential Pressure:** Confirm differential pressure is sufficient to fully open main valve

### Tips



**Pressure Control Range:** Choose lowest setpoint that satisfies flow demand  
**Accuracy Requirement:** Pilot-Operated regulators are generally more accurate (less build-up)  
**Valve Body Size:** If pipe swaging is an option, choose the smallest size that meets flow  
**Maximum Inlet Pressure:** Ratings can vary based on product size, type, or material  
**Minimum Differential Pressure:** Direct-Ops do not have a minimum differential pressure

<sup>1</sup> The pressure/temperature limits in product Bulletins and any applicable standard or code limitation should not be exceeded.

TABLE 1. RECOMMENDED PRODUCT SELECTION

APPLICATION	AIR	STEAM	FUEL GAS	TANK BLANKETING	PROCESS CHEMICALS	SANITARY	LIQUIDS
<b>START HERE</b> Simplest Solutions 1	H800/H120 	MR98L 	H120/H200 	T208 	MR98L/MR98H 	SR8 	MR98L/MR98H 
<b>NEXT OPTION</b> Larger size/flow 2	MR98L/MR98H 	MR98H 	MR98L/MR98H 	Y696/66R 	MR108 	T208 	MR108 
<b>NEXT OPTION</b> Larger size/flow 3	MR108 	SR8 	66R/1098-63EGR 	1290 	LR128/63EG-98HM 	MR98L/MR98H 	LR128/63EG-98HM 

Click to learn more about [Direct-Ops vs. Pilot-Ops](#), [Material Selection](#), and [Additional Resources](#)



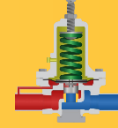
# Industrial Regulators Quick Selection Guide

[Selection Guide](#)  
[Material Selection](#)  
[Conversion Tables](#)  
[Technical Section](#)  
[Additional Resources](#)



## Relief/Backpressure Regulators

Devices that open to meet flow demand when upstream pressure rises above setpoint



- ★ Preferred
  - Alternative
- Air  
Steam  
Fuel Gas  
Tank Blanketing  
Process  
Sanitary  
Liquid



Click Product Type/Series for Bulletin Front Page



Direct-Operated



Pilot-Operated



Air



Nitrogen



Steam



Water

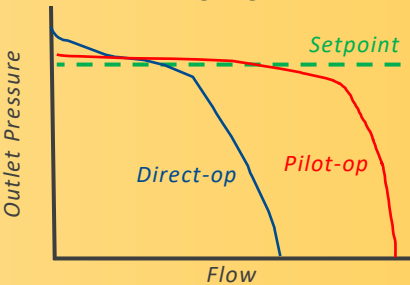


Click Page No. for Bulletin Capacity Tables

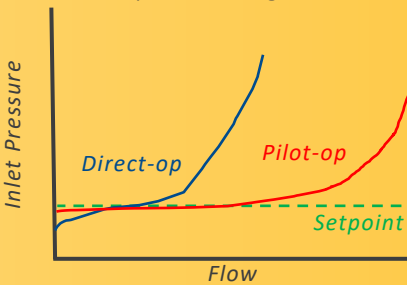
PRODUCT <sup>1</sup> TYPE / SERIES		CONTROL PRESSURE RANGE psig / bar	ACCURACY +/- % Setpoint	BODY SIZE NPS	MAXI. INLET PRESSURE psig / bar	MIN. DIFF PRESSURE psi / bar	MAX. FLOW CAPACITY See units below See fluid legend above	BULLETIN PAGE NO. <sup>2</sup>
★	H800	39-44 / 2.7-3.0	10 to 20%	1/4	250 / 17.2	-	4,000 / 107 ●	3
■	H120	35-350 / 2.4-24.1	30 to 40%	1/4, 1/2, 3/4	400 / 27.6	-	26,784 / 718 ●	1
★	H200	25-300 / 1.7-20.7	30 to 40%	1/4	420 / 29.0	-	151,125 / 4,050 ●	2
★	MR98L	2-30 / 0.14-2.1	10 to 40%	1/4, 1/2, 3/4, 1	300 / 20.7	-	21,000 / 562 ● 850 / 389 ● 51 / 193 ●	22 20 18
■	MR98H	2-400 / 0.14-27.6	10 to 40%	1/4, 1/2, 3/4, 1, 1-1/2, 2	1000 / 68.9	-	206,000 / 5,510 ● 7,300 / 3,300 ● 300 / 1,150 ●	32 30 26
■	SR8	2-135 / 0.14-9.3	10 to 40%	1/2 to 3	210 / 14.5	-	123,800 / 3,318 ● 5,460 / 2,479 ● 280 / 1,060 ●	9 12 15
■	MR108	5-300 / 0.34-20.7	10 to 40%	2, 3, 4	400 / 27.6	-	1,224,000 / 32,800 ● 1,400 / 5,300 ●	11 13
■	LR128	35-375 / 2.4-25.9	5 to 40%	1, 2, 3, 4	450 / 31.0	16 / 1.1	3,368 / 12,748 ●	12
■	63EG-98HM	15-375 / 1.0-25.9	5 to 20%	2, 3, 4, 6, 8X6	450 / 31.0	16 / 1.1	9,850,000 / 263,605 ● 11,266 / 42,642 ●	10 5
■	1098-63EGR	3-65 / 0.21-4.5	2 to 10%	2, 3, 4, 6, 8X6, 12X6	82 / 5.6	2 / 0.14	1,052,713 / 28,212 ●	15
■	T208	2" w.c.-7 / 24mbar-0.48	10 to 20%	3/4 and 1	35 / 2.4	-	2,217 / 59 ●	4
■	Y696	2" w.c.-7 / 5 mbar-0.48	10 to 20%	1-1/2 and 2	15 / 1.0	-	13,100 / 351 ●	6
■	66R	2" w.c.-5 / 5 mbar-0.34	10 to 20%	2, 3, 4	8 / 0.55	-	86,473 / 2,317 ●	5
■	66RR	2" w.c.-7 / 5 mbar-0.48	5 to 10%	2, 3, 4	10 / 0.69	0.5" w.c. / 1.2 mbar	82,713 / 2,217 ●	6
■	1290	1/2" w.c.-7 / 1 mbar-0.48	1% to 5%	1, 2, 3, 4, 6, 8X6, 12X6	12.5 / 0.86	0.25" w.c. / 0.6 mbar	327,400 / 8,774 ●	4

### Direct-Ops vs. Pilot-Ops

Pressure Reducing Regulators



Relief/Backpressure Regulators



Rating	Direct-Operated	Pilot-Operated (Loading-Style)	Pilot-Operated (Unloading-Style)
Accuracy	★	★★★	★★★
Capacity	★	★★★	★★
Response Time	★★★★	★★	★
Minimum Differential	✓ (none required)	★★	★
Cost	★★★★	★	★★
Ease of Maintenance	★★★★	★	★★

<sup>1</sup>See Industrial Regulator Application Guide for complete list of Industrial Regulator offering.

<sup>2</sup>Bulletin page numbers are subject to change with future revisions/updates.



# Industrial Regulators Quick Selection Guide

Selection Guide  
 Material Selection  
 Conversion Tables  
 Technical Section  
 Additional Resources



## Material Selection

★ Base Offering    ◻ Optional Offering    ▲ Non-standard Offering



Click Product Type/Series For Bulletin Materials of Construction

PRODUCT <sup>1</sup> TYPE / SERIES <sup>2</sup>	BODY					INTERNAL TRIM PARTS					DIAPHRAGM							O-RINGS & OTHER ELASTOMERS							
	Aluminum / Brass	Cast Iron / Ductile Iron	Steel	Stainless Steel	Hastelloy® C / Monel® Nickel Aluminum Bronze / Duplex / Super Duplex	Aluminum / Brass	Steel	Stainless Steel	Stellite	Hastelloy® C / Monel®	Stainless Steel	Hastelloy® C / Monel®	Nitrile (NBR)	Neoprene (CR)	Fluorocarbon (FKM)	Fluorinated Ethylene Propylene (FEP)	Ethylene Propylene (EPDM)	Polytetrafluoroethylene (PTFE) Protector/liner	Nitrile (NBR)	Nylon (PA) / Neoprene (CR)	Fluorocarbon (FKM)	Silicone (VMQ) / Low Temp Elastomers	Ethylene Propylene (EPDM)	Polytetrafluoroethylene (PTFE)	Perfluoroelastomer (FFKM)
<a href="#">67C/67D</a>	★			◻		★		◻				★		◻					★		◻	◻			
<a href="#">1301</a>	★			◻	▲	★		◻		★	◻									★	◻	◻	◻	★	
<a href="#">MR95L/MR95H</a> <a href="#">MR98L/MR98H</a>		★	★	★	◻	★	★	◻	◻	★	◻		★	★			◻	◻	★		★	◻	◻	◻	◻
<a href="#">LS200</a>		◻	★				★	★					★						★						
<a href="#">MR105/MR108</a>		◻	★	★	▲		★	★					★		◻		◻		★		◻	◻	◻		
<a href="#">92C</a>		★	◻	◻		★		★		★															
<a href="#">92B</a>		★	★	◻		★	★	★		★															
<a href="#">92S/92W</a>		★	★	◻		★	★	★		★															
<a href="#">SR5/SR8</a>				★				★		★				◻		★	◻				◻		★		◻
<a href="#">627</a>		★	★	◻	▲	★	★		▲				★	★	◻		▲	▲	★	★	◻		▲	▲	▲
<a href="#">627W</a>		★	★	◻	▲		★	▲	▲				★	★	◻		◻	◻	★	★	◻		◻	◻	▲
<a href="#">1098-EGR</a> <a href="#">1098H-EGR</a>		★	★	◻	▲	★	★	▲	▲				★		◻		◻		★		◻	◻	◻	◻	◻
<a href="#">63EG-98HM</a> <a href="#">1098-63EGR</a>		★	★	◻	▲	★	★	▲	▲				★		◻		◻		★		◻	◻	◻	◻	◻
<a href="#">LR125/LR128</a>			★	◻	▲			★					★		◻		▲	◻	★					◻	
<a href="#">T205/T208</a>		★	★	◻	▲			★		▲			★		◻	◻	▲		★		◻	◻	▲	▲	▲
<a href="#">Y600A</a>		★	▲	▲		★	★	★					★				▲		★						
<a href="#">Y692</a>		★	★	◻	▲		★	★		▲			★		◻		◻		★		◻		◻	◻	▲
<a href="#">Y693</a>		★	◻	◻		★	★	★					★		◻				★		◻				
<a href="#">Y696</a>		★	★	◻	▲		★	★		▲			★		◻		◻		★		◻		◻	◻	◻
<a href="#">ACE95</a>				★				★							★				★		◻	◻	◻		◻
<a href="#">1190/1290</a>		★	★	◻		★	★	★					★		◻		◻		★		◻	◻	◻		◻

<sup>1</sup>See Industrial Regulator Application Guide for complete list of Industrial Regulator offering.  
<sup>2</sup>Bulletin page numbers are subject to change with future revisions/updates.





## Conversion Tables

### TEMPERATURE CONVERSION

FROM / TO	FORMULA	FROM / TO	FORMULA
Fahrenheit (°F) / Celsius (°C)	$(°F - 32) \times \frac{5}{9}$	Celsius (°C) / Fahrenheit (°F)	$(°C \times \frac{9}{5}) + 32$
Fahrenheit (°F) / Kelvin (K)	$(°F + 458.67) \times \frac{5}{9}$	Kelvin (K) / Fahrenheit (°F)	$(K \times \frac{9}{5}) - 458.67$
Celsius (°C) / Kelvin (K)	$(°C + 273.15)$	Kelvin (K) / Celsius (°C)	$(K - 273.15)$

### VOLUMETRIC GAS FLOW CONVERSION

FROM	TO			
	Nm <sup>3</sup> /hr	SCFH	SCFM	in <sup>3</sup> /min
Nm <sup>3</sup> /hr	1	35.31	0.59	1017
SCFH	0.03	1	0.02	28.8
SCFM	1.7	60	1	1728
in <sup>3</sup> /min	0.001	0.03	0.0006	1

### VOLUMETRIC LIQUID FLOW CONVERSION

FROM	TO							
	l/sec	l/min	m <sup>3</sup> /min	ft <sup>3</sup> /min	ft <sup>3</sup> /hr	US gal/min	UK gal/min	Barrels (petroleum)/min
l/sec	1	60	3.6	2.12	127.1	15.85	13.2	0.38
l/min	0.02	1	0.06	0.04	2.12	0.26	0.22	0.01
m <sup>3</sup> /min	0.28	16.67	1	0.59	35.31	4.4	3.67	0.1
ft <sup>3</sup> /min	0.47	28.32	1.7	1	60	7.48	6.23	0.18
ft <sup>3</sup> /hr	0.01	0.47	0.03	0.02	1	0.12	0.1	0.003
US gal/min	0.06	3.79	0.23	0.13	8.02	1	0.83	0.02
UK gal/min	0.08	4.55	0.27	0.16	9.63	1.2	1	0.03
Barrels (petroleum)/min	2.65	159	9.54	5.62	336.9	42	34.97	1

### PRESSURE CONVERSION

FROM	TO							
	bar	kPa	Mm Hg (0°C)	Mm H <sub>2</sub> O (4°C)	Kg/cm <sup>2</sup>	in H <sub>2</sub> O (4°C)	psi	in Hg (32°C)
bar	1	100	750.064	10,197.443	1.02	401.474	14.504	29.53
kPa	0.01	1	7.501	101.974	0.01	4.015	0.145	0.295
Mm Hg (0°C)	0.001	0.133	1	13.595	0.001	0.535	0.019	0.039
Mm H <sub>2</sub> O (4°C)	0.0001	0.01	0.074	1	0.0001	0.039	0.001	0.003
Kg/cm <sup>2</sup>	0.981	98.067	735.561	10,000.275	1	393.712	14.223	28.959
in H <sub>2</sub> O (4°C)	0.002	0.249	1.868	25.4	0.003	1	0.036	0.074
psi	0.069	6.895	51.715	703.089	0.07	27.681	1	2.036
in Hg (32°C)	0.034	3.386	25.4	345.324	0.035	13.595	0.491	1



## Pressure Reducing Regulators

### Pressure Reducing Regulators

A pressure reducing regulator maintains a desired outlet pressure while providing the required fluid flow to satisfy a downstream demand. The pressure which the regulator maintains is the outlet pressure setting (setpoint) of the regulator.

### Direct-Operated and Pilot-Operated

Regulators are self-contained, control devices which use energy from the controlled system to operate whereas control valves require external power sources, transmitting instruments and control instruments. The two main types of regulators are *Direct-Operated* and *Pilot-Operated*.

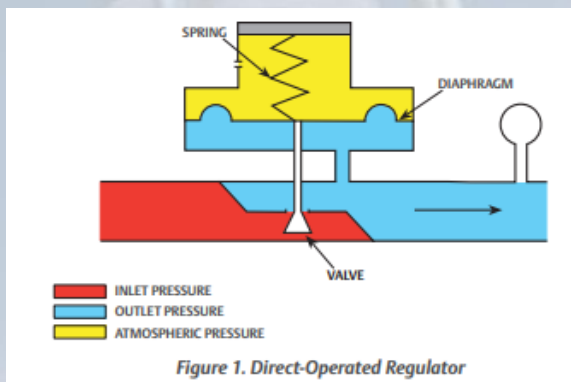


Figure 1. Direct-Operated Regulator

### Direct-Operated Regulators

Direct-Operated regulators are the simplest style of the regulators. At low set pressures, typically below 1 psig / 0.07 bar, they can have very accurate ( $\pm 1\%$ ) control. At high control pressures, up to 500 psig / 34.5 bar, 10% to 20% control is typical.

In operation, a direct-operated, pressure reducing regulator senses the downstream pressure through either internal pressure registration or external control line. This downstream pressure opposes a spring which moves the diaphragm and valve plug to change the size of the flow path through the regulator.

Direct-operated regulators have many commercial and residential uses. Typical applications include industrial, commercial and domestic gas service or instrument air.

### Pilot-Operated Regulators

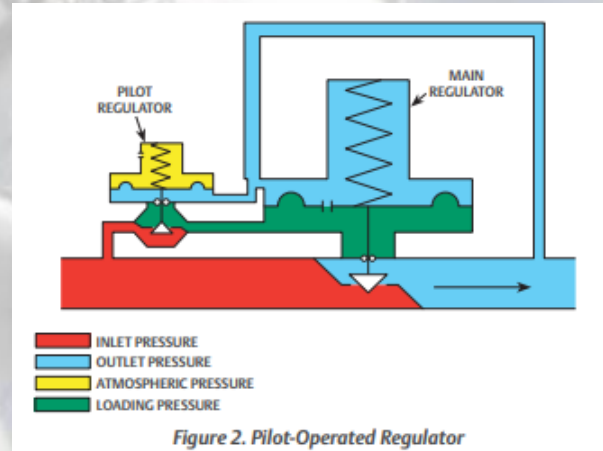


Figure 2. Pilot-Operated Regulator

Pilot-Operated regulators are preferred for high flow rates or where precise pressure control is required. A popular type of pilot-operated system uses two-path control. In two-path control, the main valve diaphragm responds quickly to downstream pressure changes, causing an immediate correction in the main valve plug position. At the same time, the pilot diaphragm diverts some of the reduced inlet pressure to the other side of the main valve diaphragm to control the final positioning of the main valve plug. Two-path control results in fast response and accurate control.

### Direct-Operated Regulators

The majority of applications require a pressure reducing regulator. Assuming the application calls for a pressure reducing regulator. The following parameters must be determined:

- Outlet pressure to be controlled
- Inlet pressure to the regulator
- Capacity required downstream
- Shut-off capability required
- Process fluid
- Process fluid temperature
- Accuracy required
- Pipe size required
- End connection style
- Material requirements
- Control line option
- Overpressure protection



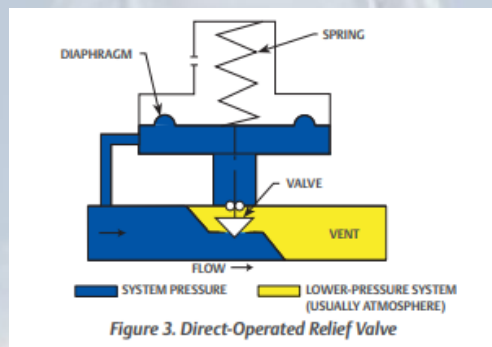
## Relief/Backpressure Regulators

### Relief Valves and Backpressure Regulators

A pressure relief valve is a control device that opens to relieve fluid to atmosphere during an overpressure occurrence. A backpressure regulator is a control device that maintains a constant upstream pressure throughout a given flow range. Relief valves are available in four general types: pop type, direct-operated, pilot-operated and internal relief valves.

#### Direct-Operated Relief Valves

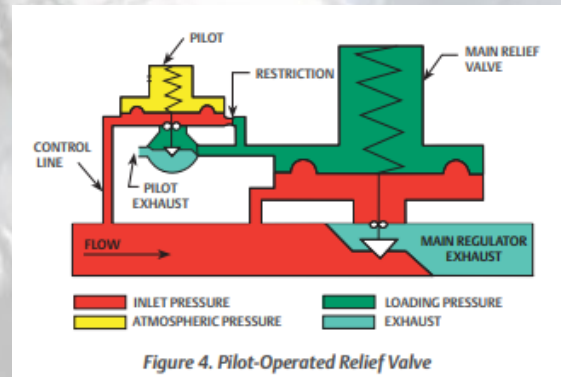
System pressure is referenced under a diaphragm and opposed by a spring. As system pressure increases past the setpoint, the relief valve opens which allows fluid to escape and protects the system. The increase in pressure above the relief setpoint that is required to produce more flow through the relief valve is referred to as pressure buildup.



Direct-Operated relief valves are commonly used in industry to protect industrial furnaces and other equipment.

#### Pilot-Operated Relief Valves

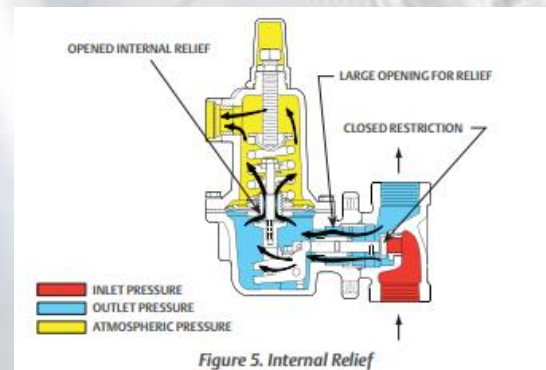
In normal operation, when system pressure is below setpoint of the relief valve, the pilot remains closed. This allows loading pressure to register on top of the main relief valve diaphragm. Loading pressure on top of the diaphragm is opposed by an equal pressure (inlet pressure) on the bottom side of the diaphragm. With little or no pressure differential across the diaphragm, the spring keeps the valve seated. When the system pressure increases past the setpoint, the pilot opens and exhausts the loading pressure from the top of the relief valve main diaphragm which allows the main valve to open.



Pilot-operated relief valves are used in applications requiring high-capacity and low-pressure buildup.

#### Internal Relief

The regulator shown in Figure 5 includes an internal relief valve. The relief valve has a measuring element (the main regulator diaphragm), a loading element (a light spring) and a restricting element (a valve seat and disk).



The relief valve assembly is located in the center of the regulator diaphragm. Internal relief is often used in industrial applications where atmospheric exhaust is acceptable and low buildup is not required.

#### Backpressure Regulator Selection


Backpressure regulators control the inlet pressure rather than the outlet pressure. The selection criteria for the backpressure regulator is the same as for a pressure reducing regulator.



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Section	Page No.
Intro to Regulators	<a href="#">412 to 423</a>
Direct-Operated Regulators	<a href="#">424 to 431</a>
Pilot-Operated Regulators	<a href="#">432 to 436</a>
Regulator Sizing & Selection	<a href="#">437 to 439</a>
Overpressure Protection	<a href="#">440 to 443</a>
Relief Valve/Backpressure	<a href="#">444 to 452</a>
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Pressure-Reducing



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