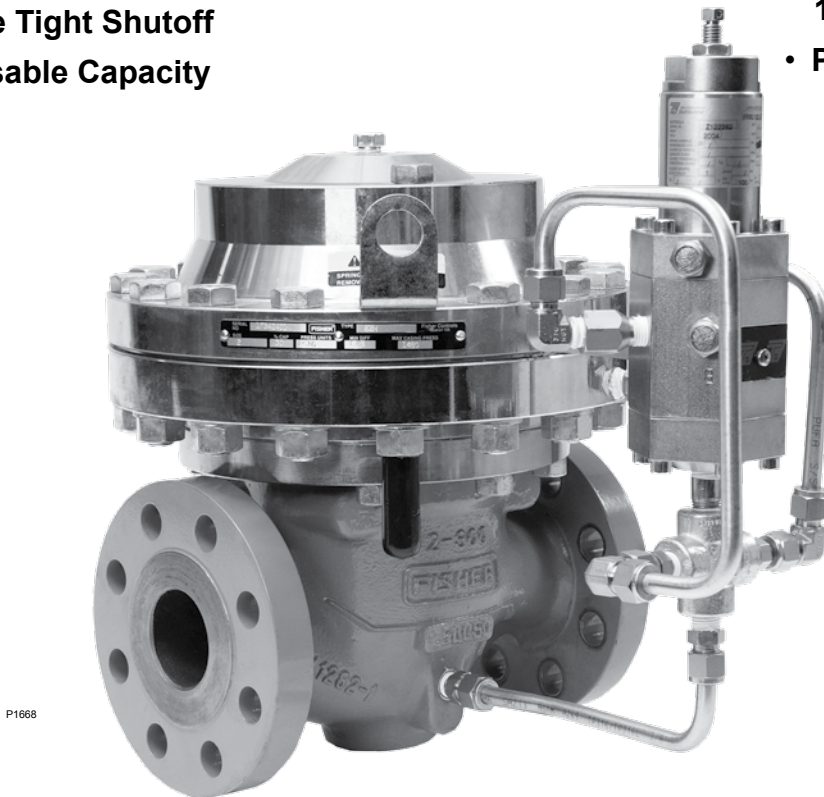


## Type EZH Relief or Backpressure Regulator

- 1500 psig / 103 bar Inlet / Outlet Rating
- Common Body Platform
- Bubble Tight Shutoff
- Full Usable Capacity
- In-Line Maintenance
- NPS 1 through 4 / DN 25 through 100 Body Sizes Available
- Precise Pressure Control



P1668

Figure 1. Type EZH Relief Valve or Backpressure Regulator

### Features

- **Main Diaphragm**—The main diaphragm is Nitrile (NBR) reinforced with fabric and coated with a PVC, which protects and extends the service life of the regulator in applications where the liquids commonly found in natural gas pipelines tend to shorten diaphragm life.
- **Common Body Platform**—The Type EZH use the same standard Fisher® E-Body which is also used in the Types EZR and EZL pressure reducing regulators and Types EZ, ES, ED and ET pressure reducing control valves. This allows easy conversion from one product to another without the need to remove the E-Body from the pipeline.



# Bulletin 71.4:EZH

## Specifications

Ratings and specifications for the Type EZH are listed in the Specifications section below. Specifications for specific relief valve or backpressure regulator constructions are stamped on a nameplate attached to either the main actuator or the pilot spring case.

### Available Configurations

**Type EZH:** Pilot-operated relief or backpressure regulator for low to high outlet pressure

### Body Sizes, End Connection Styles and Pressure Ratings<sup>(1)</sup>

See Table 1

### Maximum Allowable Pressures<sup>(1)</sup>

**Inlet Pressure:** 1500 psig / 103 bar

**Outlet (Casing) Pressure:** 1500 psig / 103 bar

**Emergency Casing Pressure:** 1500 psig / 103 bar

### Minimum Buildup Pressure

**Main Valve:** 1500 psid / 103 bar d

**Pilot** (*Between loading pressure in pilot and loading sense pressure*): 1233 psid / 85.0 bar d

### Minimum Differential Pressures

See Table 3

### Relief Set Pressure Ranges

See Table 2

### Flow and Sizing Coefficients

See Tables 5 and 6

### Flow Capacities

See Table 7

### Pilot and Filter-Regulator Flow Coefficients

**Type PRX Pilot:**  $C_g$ : 10.5;  $C_v$ : 0.36;  $C_f$ : 29

### Pressure Registration

External

### Pilot Connections

1/4 NPT

### Temperature Capabilities<sup>(1)</sup>

**Nitrile (NBR) Version:**

-20 to 180°F / -29 to 82°C

**Fluorocarbon (FKM) Version:**

0 to 180°F / -18 to 82°C<sup>(2)</sup>

**Polyurethane (PU) Version:**

*NPS 1 to 2 / DN 25 to 50 Sizes:*

-22 to 180°F / -30 to 82°C

*NPS 3 to 4 / DN 80 to 100 Sizes:*

-4 to 180°F / -20 to 82°C

### Option

Travel Indicator

### Construction Materials

#### Main Valve

*Main Valve Body:*

*Type EZH:* WCC Steel

*Intermediate Flange and Actuator Casings:*

Steel, ASTM A350 LF2

*Diaphragm Plates:* Steel, ASTM A105

*Diaphragm:* Nitrile (NBR) with PVC coating

*O-rings:* Fluorocarbon (FKM)

*Disk:* Nitrile (NBR), Fluorocarbon (FKM) or Polyurethane (PU)

#### PRX Series Pilots

*Body:* Steel, ASTM 105

*Trim:* Stainless Steel

*Elastomers:* Nitrile (NBR) or Fluorocarbon (FKM)

*Disk:* Polyurethane (PU) or Fluorocarbon (FKM)

### Approximate Weights

See Table 9

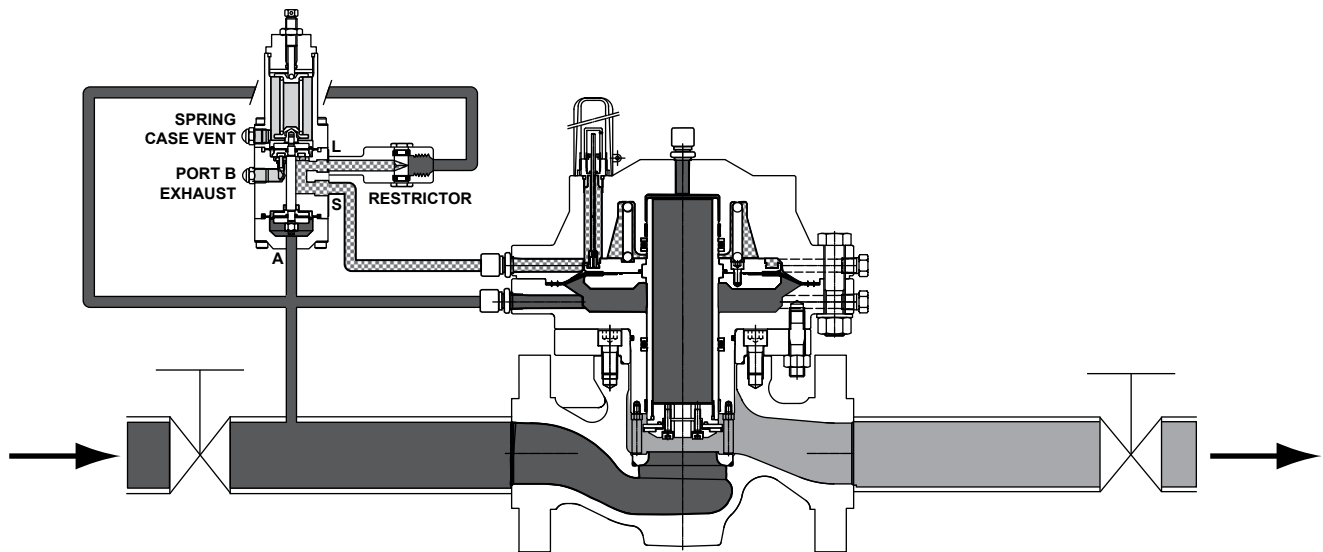
1. The pressure/temperature limits in this Bulletin and any applicable standard or code limitation should not be exceeded.

2. Type PRX Fluorocarbon (FKM) elastomer is limited to 0°F / -18°C.

- **Bubble Tight Shutoff**—The Type EZH have knife-edged, metal plug and a soft seat which provide bubble tight shutoff for use in applications where positive shutoff is required. For example: dead-end systems.
- **In-Line Maintenance**—Top entry design provides easier maintenance. Trim parts can be inspected, cleaned and replaced without removing the body from pipeline.
- **Precise Pressure Control**—The Type EZH use the PRX Series pilot system to provide stable and accurate pressure control.
- **Full Pressure Rating**—The Type EZH have equal inlet and outlet pressure rating of 1500 psig /

103 bar, which allows easier selection and requires no special startup or shutdown procedures.

- **Full Usable Capacity**—Fisher® brand regulators are laboratory tested. 100% of the published flow capacity can be used with confidence.
- **O-ring Design**—Elastomer O-rings are utilized instead of gaskets, reducing maintenance and assembly time.
- **Disk Design**—The EZH and EZHSO Series offer disks for the main body made from Nitrile (NBR), Fluorocarbon (FKM) and Polyurethane (PU). Polyurethane (PU) provides better abrasion resistance properties and a high durometer rating to extend the working life of the disk in difficult applications where disk erosion is an issue.



M1055

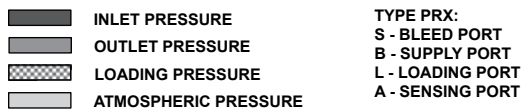


Figure 2. Type EZH with Type PRX-182 Pilot

Table 1. Main Valve Body Sizes, End Connection Styles and Body Ratings

MAIN VALVE BODY SIZE		MAIN VALVE BODY MATERIAL	END CONNECTION STYLE	STRUCTURAL DESIGN RATING	
NPS	DN			psig	bar
1	25	WCC Steel	NPT or SWE	1500	103
			CL150 RF	290	20.0
			CL300 RF	750	51.7
			CL600 RF or BWE	1500	103
2	50		NPT or SWE	1500	103
			CL150 RF	290	20.0
			CL300 RF	750	51.7
			CL600 RF or BWE	1500	103
3	80		CL150 RF	290	20.0
			CL300 RF	750	51.7
			CL600 RF or BWE	1500	103
			CL150 RF	290	20.0
4	100	CL300 RF	750	51.7	
		CL600 RF or BWE	1500	103	

## Introduction

Type EZH is an accurate pilot-operated, pressure-balanced, soft-seated relief valve or backpressure regulator. It is designed for use in high pressure natural gas transmission/city gate stations, large capacity distribution systems and power plant feeds. It provides smooth and reliable operation, tight shutoff and long life.

## Pilot Descriptions

The Type EZH relief valve or backpressure regulator include a Type PRX/182 pilot mounted on the EZH Series main valves for relief valve or backpressure regulator applications. PRX Series pressure reducing pilots have the ability to handle a wide range of setpoints from 29 to 1160 psig / 2.0 to 80.0 bar.

## Principle of Operation

A pressure relief valve is a throttling pressure control device that opens and closes to ensure the downstream pressure does not rise above a predetermined pressure. Fisher® relief valves cannot be used as ASME safety relief valves. A backpressure regulator is a device that controls and responds to changes in the upstream pressure. It functions the same as a relief valve in that it opens on increasing upstream pressure.

As long as the inlet pressure is below the set pressure, the pilot control spring keeps the pilot valve plug closed. Inlet pressure passes through the restrictor and registers as loading pressure on the main valve diaphragm chamber. Force from the main spring, in addition to pilot loading pressure, provide loading pressure to keep the main valve diaphragm and plug assembly tightly shut off. When the inlet pressure rises above the set pressure, the pressure on the pilot diaphragm overcomes the pilot control spring and opens the pilot valve plug. The pilot then exhausts the loading pressure from the main valve diaphragm chamber. The pilot continuously exhausts gas when the inlet pressure is above the set pressure. The inlet pressure unbalance overcomes the main spring force and opens the diaphragm and plug assembly.

As the inlet pressure drops below the set pressure, the pilot control spring closes the pilot valve plug and the exhaust to atmosphere stops. Force from the main spring, along with pilot loading pressure, pushes the diaphragm and plug assembly onto the knife-edged seat, producing tight shutoff.

## Capacity Information

### Note

**EZH Series flow capacities are laboratory verified; therefore, it may be sized for 100% flow using published capacities as shown. It is not necessary to reduce published capacities.**

Table 7 show the natural gas regulating capacities of the Type EZH relief or backpressure regulator at selected inlet pressures and outlet pressure settings. Flows are in thousands of SCFH at 60°F and 14.7 psia (or in thousands of Nm<sup>3</sup>/h at 0°C and 1.01325 bar) of 0.6 specific gravity natural gas.

To determine equivalent capacities for air, propane, butane or nitrogen, multiply the capacity by the following appropriate conversion factor: 0.775 for air, 0.628 for propane, 0.548 for butane or 0.789 for nitrogen. For gases of other specific gravities, multiply the given capacity by 0.775 and divide by the square root of the appropriate specific gravity. Then, if capacity is desired in Nm<sup>3</sup>/h at 0°C and 1.01325 bar, multiply SCFH by 0.0268.

To find approximate regulating capacities at pressure settings not given in Table 7 or to find wide-open flow capacities for relief sizing at any inlet pressure, perform one of the following procedures. Then convert using the factors provided above, if necessary.

## Critical Pressure Drops

For critical pressure drops (absolute outlet pressure equal to or less than one-half of absolute inlet pressure), use the following formula:

$$Q = (P_1)(C_g)(1.29)$$

## Non-Critical Pressure Drops

For pressure drops lower than critical (absolute outlet pressure greater than one-half of absolute inlet pressure).

$$Q = \sqrt{\frac{520}{GT}} C_g P_1 \text{SIN} \left( \frac{3417}{C_1} \sqrt{\frac{\Delta P}{P_1}} \right) \text{DEG}$$

where,

- Q = gas flow rate, SCFH
- P<sub>1</sub> = absolute inlet pressure, psia (P<sub>1</sub> gauge + 14.7)
- C<sub>g</sub> = regulating or wide-open gas sizing coefficient
- G = gas specific gravity of the gas
- T = absolute temperature of gas at inlet, °Rankine
- C<sub>1</sub> = flow coefficient
- ΔP = pressure drop across the regulator, psi

**Table 2. Relief Set Pressure Ranges**

PILOT TYPE	RELIEF SET PRESSURE RANGE		PILOT CONTROL INFORMATION							
			Part Number	Color	Wire Diameter		Free Length		Maximum Emergency Pressure	
	psig	bar			In.	mm	In.	mm	psig	bar
PRX/182	29 to 116	2.0 to 8.0	M0255220X12	Black	0.157	4.00	2.16	55	1480	102
	73 to 290	5.0 to 20.0	M0255200X12	Gold	0.217	5.50	2.01	51		
	217 to 609	15.0 to 42.0	M0255190X12	Red	0.256	6.50	1.97	50		
PRX-AP/182	435 to 1160	30.0 to 80.0	M0273790X12	Clear	0.335	8.50	3.94	100	1480	102

**Table 3. Minimum Differential Pressures**

TYPE	MAIN VALVE BODY SIZE		MINIMUM DIFFERENTIAL			
	NPS	DN	For 90% Capacity		For 100% Capacity	
			psid	bar d	psid	bar d
EZH	1	25	15.2	1.1	15.7	1.1
	2	50	12.0	0.83	13.8	0.95
	3	80	10.6	0.73	12.8	0.88
	4	100	15.8	1.1	16.4	1.1

**Table 4. Relief Set Pressure Build-Up Table**

PILOT TYPE	SET PRESSURE CONTROL RANGE, SPRING PART NUMBER AND COLOR, psig / bar	SET PRESSURE <sup>(1)</sup>		BUILD-UP OVER SET PRESSURE NEEDED TO BEGIN OPENING MAIN VALVE <sup>(2)</sup>		BUILD-UP OVER SET PRESSURE NEEDED TO FULLY OPEN MAIN VALVE <sup>(3)</sup>		PRESSURE DROP BELOW SET PRESSURE NEEDED TO RESEAT PILOT	
		psig	bar	psig	bar	psig	bar	psig	bar
		PRX/182	29 to 116 / 2 to 8 M0255220X12 Black	30	2.1	1.7	0.12	3.4	0.23
60	4.1			2.7	0.19	4.7	0.32	0.9	0.06
80	5.5			2.8	0.19	5.3	0.36	0.9	0.06
100	6.9			3.8	0.26	6.3	0.43	0.9	0.06
73 to 290 / 5 to 20 M0255200X12 Gold	75		5.2	3.7	0.25	7.7	0.53	1.9	0.13
	100		6.9	3.7	0.25	9.2	0.63	1.9	0.13
	150		10.3	4.7	0.32	9.8	0.68	1.9	0.13
	200		13.8	5.0	0.34	10.9	0.75	1.9	0.13
217 to 609 / 14.9 to 41.7 M0255190X12 Red	250		17.2	5.0	0.34	11.5	0.79	1.9	0.13
	225		15.5	5.0	0.34	13.7	0.95	2.5	0.17
	300		20.7	5.1	0.35	14.0	0.97	2.5	0.17
	400		27.6	5.2	0.36	14.5	1.00	2.5	0.17
PRX-AP/182	435 to 1160 / 30 to 80 M0273790X12 Clear	450	31.0	5.4	0.37	14.5	1.00	2.5	0.17
		450	31.0	5.4	0.37	14.9	1.03	2.9	0.20
		500	34.5	5.4	0.37	14.9	1.03	3.2	0.22
		600	41.4	6.2	0.43	14.9	1.03	3.2	0.22
		1050	72.4	6.2	0.43	15.6	1.08	3.2	0.22

1. Set pressure is defined as the pressure at which the pilot starts-to-discharge.  
 2. Crack point pressure of the main valve of the inlet pressure build-up over the set pressure at which the main valve starts audible flow.  
 3. Inlet pressure build-up over the set pressure for the main valve to achieve wide-open flow capacity.

**Table 5. Type EZH Main Valve with Standard Cage Regulating Flow Coefficients**

MAIN VALVE BODY SIZE		TRIM, % OF CAPACITY	LINE SIZE EQUALS BODY SIZE			2:1 LINE SIZE TO BODY SIZE PIPING		
NPS	DN		C <sub>g</sub>	C <sub>v</sub>	C <sub>1</sub>	C <sub>g</sub>	C <sub>v</sub>	C <sub>1</sub>
1	25	100	564	16.3	34.6	544	15.3	35.5
		80	436	12.3	35.4	423	10.9	38.7
		50	284	8.4	33.7	249	6.3	39.7
		30	172	5.3	32.5	157	4.0	39.1
2	50	100	2278	58.5	38.9	2110	62.9	33.5
		80	1719	47.1	36.5	1609	50.5	31.9
		50	1213	31.0	39.1	1177	33.0	35.6
		30	707	16.9	41.7	718	18.8	38.2
3	80	100	4960	133	37.3	4396	143	30.8
		80	3950	109	36.2	3294	97.2	33.9
		50	2550	63.6	40.1	2069	54.7	37.80
		30	1530	36.7	41.7	1339	39.8	33.6
4	100	100	7250	227	31.9	7170	229	31.3
		80	5750	165	34.8	5630	165	34.1
		50	3510	95.9	36.6	3460	95.5	36.2
		30	2130	56.7	37.6	2080	56.2	37.0

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**Table 6. Type EZH Main Valve with Standard Cage IEC Sizing Coefficients**

MAIN VALVE BODY SIZE		TRIM, % OF CAPACITY	LINE SIZE EQUALS BODY SIZE			2:1 LINE SIZE TO BODY SIZE PIPING		
NPS	DN		X <sub>T</sub>	F <sub>D</sub>	F <sub>L</sub>	X <sub>T</sub>	F <sub>D</sub>	F <sub>L</sub>
1	25	100	0.61	0.61	0.89	0.80	0.59	0.89
		80	0.72	0.67		0.95	0.63	
		50	0.69	0.80		0.99	0.69	
		30	0.66	0.81		0.97	0.71	
2	50	100	0.73	0.59		0.69	0.61	
		80	0.84	0.68		0.72	0.70	
		50	0.97	0.69		0.84	0.72	
		30	0.99	0.70		0.92	0.74	
3	80	100	0.88	0.58		0.60	0.60	
		80	0.83	0.71		0.73	0.67	
		50	0.99	0.73		0.90	0.68	
		30	0.99	0.72		0.72	0.75	
4	100	100	0.63	0.63	0.62	0.63		
		80	0.76	0.74	0.74	0.74		
		50	0.85	0.77	0.83	0.77		
		30	0.88	0.78	0.88	0.77		

**Table 7. Capacities for Type EZH with PRX Series Pilot**

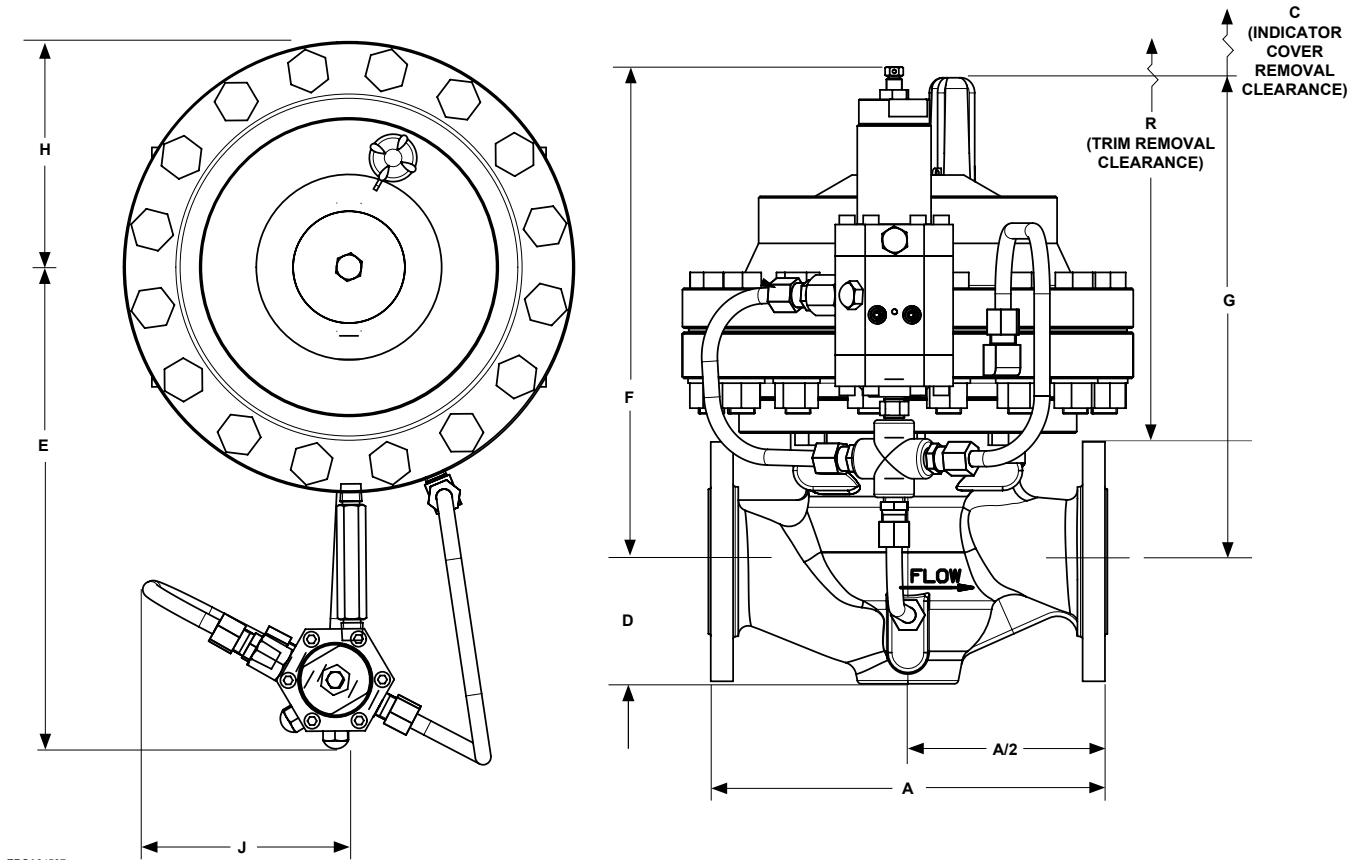
SET PRESSURE RANGE, PILOT SPRING PART NUMBER AND COLOR, psig / bar	SET PRESSURE		CAPACITIES IN THOUSANDS OF SCFH / Nm <sup>3</sup> /h OF 0.6 SPECIFIC GRAVITY NATURAL GAS							
			NPS 1 / DN 25		NPS 2 / DN 50		NPS 3 / DN 80		NPS 4 / DN 100	
	psig	bar	SCFH	Nm <sup>3</sup> /h	SCFH	Nm <sup>3</sup> /h	SCFH	Nm <sup>3</sup> /h	SCFH	Nm <sup>3</sup> /h
29 to 116 / 2 to 8 M0255220X12 Black	30	2.1	36	0.96	139	3.73	307	8.23	458	12.27
	60	4.1	59	1.58	235	6.30	518	13.88	756	20.26
	80	5.5	75	2.01	298	7.99	654	17.53	952	25.51
	100	6.9	91	2.44	363	9.73	795	21.31	1154	30.93
73 to 290 / 5 to 20 M0255200X12 Gold	75	5.2	72	1.93	286	7.66	628	16.83	914	24.50
	100	6.9	91	2.44	366	9.81	801	21.47	1163	31.17
	150	10.3	130	3.48	522	13.99	1141	30.58	1654	44.33
	200	13.8	169	4.53	678	18.17	1482	39.72	2148	57.57
	250	17.2	207	5.55	834	22.35	1822	48.83	2639	70.73
217 to 609 / 14.9 to 41.7 M0255190X12 Red	225	15.5	189	5.07	762	20.42	1664	44.60	2410	64.59
	300	20.7	246	6.59	992	26.59	2165	58.02	3136	84.04
	400	27.6	322	8.63	1298	34.79	2833	75.92	4102	109.93
	450	31.0	360	9.65	1452	38.91	3168	84.90	4588	122.96
435 to 1160 / 30 to 80 M0273790X12 Clear	450	31.0	360	9.65	1452	38.91	3168	84.90	4588	122.96
	500	34.4	398	10.67	1605	43.01	3501	93.83	5071	135.90
	600	41.4	474	12.70	1911	51.21	4167	111.68	6035	161.74
	1050	72.4	815	21.84	3286	88.06	7164	192.00	10,375	278.05

**Table 8. Type EZH Dimensions (See Figure 4)**

BODY SIZE, NPS / DN	DIMENSION, IN. / mm													
	A				C	D (Maximum)	E	F		G	H	J	R	
	NPT or SWE	CL150 RF	CL300 RF	CL600 RF or BWE				Type PRX	Type PRX-AP				Type PRX	Type PRX-AP
1 / 25	8.25 / 210	7.25 / 184	7.75 / 197	8.25 / 210	1.50 / 38.1	2.10 / 53	12.3 / 311	11.30 / 287	13.05 / 331	11.10 / 282	5.10 / 130	8.25 / 210	16.80 / 427	18.55 / 471
2 / 50	11.25 / 286	10.0 / 254	10.50 / 267	11.25 / 286	1.50 / 38.1	3.10 / 79	14 / 356	13.00 / 330	14.75 / 375	11.30 / 287	6.50 / 165	7.75 / 197	18.50 / 470	20.30 / 516
3 / 80	----	11.75 / 298	12.50 / 317	13.25 / 337	2.00 / 50.8	3.81 / 97	16 / 406	13.61 / 346	15.36 / 390	16.75 / 425	8.00 / 203	13.25 / 337	18.60 / 472	20.86 / 530
4 / 100	----	13.9 / 353	14.5 / 368	15.5 / 394	2.00 / 50.8	5.06 / 129	18.3 / 464	14.1 / 358	15.85 / 403	16.8 / 427	10.03 / 255	5.5 / 140	26.1 / 663	26.1 / 663

**Table 9. Approximate Weights**

BODY SIZE, NPS / DN	APPROXIMATE SHIPPING WEIGHT, LBS / kg						
	NPT	SWE	CL150 RF	CL300 RF	CL600 RF	SCH 40	SCH 80
1 / 25	77 / 35	77 / 35	79 / 36	83 / 38	87 / 39	77 / 35	77 / 35
2 / 50	136 / 62	136 / 62	139 / 63	143 / 65	150 / 68	136 / 62	136 / 62
3 / 80	----	390 / 177	394 / 179	397 / 180	410 / 186	390 / 177	390 / 177
4 / 100	----	433 / 197	451 / 205	481 / 219	514 / 234	433 / 197	433 / 197



ERCA04507

Figure 4. Type EZH Dimensions (See Table 8)

## Ordering Information

Use the Specifications section on page 2 and carefully review the description to the right of each specification. Use this information to complete the Ordering Guide

on this page. Specify the desired selection wherever there is a choice to be made. Then send the Ordering Guide to your local Sales Office.

## Ordering Guide

### Body Size (Select One)

- NPS 1 / DN 25\*\*\*
- NPS 2 / DN 50\*\*\*
- NPS 3 / DN 80\*\*\*
- NPS 4 / DN 100\*\*\*

### End Connection Styles (Select One)

#### Type EZH

#### WCC Steel

- NPT (available for NPS 1 and 2 / DN 25 and 50 Body sizes only)\*\*\*
- CL150 RF\*\*\*
- CL300 RF\*\*\*
- CL600 RF\*\*\*
- SWE (Available for NPS 1 and 2 / DN 25 and 50 Body Sizes only)\*\*
- BWE\*\*

- PN 16/40 (For NPS 1 and 2 / DN 25 and 50 Body Sizes only)\*\*
- PN 25/40 (For NPS 3 / DN 80 Body Size only)\*\*

### Main Valve Disk Material (Select One)

- Nitrile (NBR) (standard)\*\*\*
- Fluorocarbon (FKM)\*\*\*

### Pilot Type and Outlet Pressure Range (Select One)

#### Type PRX/182

- 29 to 116 psig / 2.0 to 8.0 bar, Black\*\*\*
- 73 to 290 psig / 5.0 to 20.0 bar, Gold\*\*\*
- 217 to 609 psig / 14.9 to 41.7 bar, Red\*\*\*

#### Type PRX/182-AP

- 435 to 1160 psig / 30 to 80 bar, Clear\*\*\*

- continued -

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## Ordering Guide (continued)

### Pilot Elastomer Material (Select One)

- Nitrile (NBR) / Polyurethane (PU) (standard)\*\*\*
- Fluorocarbon (FKM)\*\*\*

### Travel Indicator (Select One)

- Yes\*\*\*
- No\*\*\*

### Main Valve Spare Parts Kit (Optional)

- Yes, send one disk parts kit to match this order.
- Yes, send one full parts kit to match this order.

### Pilot Spare Parts Kit (Optional)

- Yes, send one spare parts kit to match this order.

Regulators Quick Order Guide	
***	Readily Available for Shipment
**	Allow Additional Time for Shipment
*	Special Order, Constructed from Non-Stocked Parts. Consult your local Sales Office for Availability.
Availability of the product being ordered is determined by the component with the longest shipping time for the requested construction.	

Specification Worksheet	
<b>Application:</b>	
Specific Use	_____
Line Size	_____
Gas Type and Specific Gravity	_____
Gas Temperature	_____
<b>Relief Valve Size:</b>	
Brand of upstream regulator?	_____
Orifice size of the upstream regulator?	_____
Wide-open coefficient of the upstream regulator?	_____
<b>Pressure:</b>	
Maximum Inlet Pressure (P <sub>1max</sub> )	_____
Minimum Inlet Pressure (P <sub>1min</sub> )	_____
Downstream Pressure Setting(s) (P <sub>2</sub> )	_____
Maximum Flow (Q <sub>max</sub> )	_____
<b>Performance Required:</b>	
Accuracy Requirements?	_____
<b>Other Requirements:</b> _____	
_____	

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