

J78RS Gas Pressure Regulator

Technical Bulletin



The J78RS is a compact, commercial and industrial low pressure regulator suitable for a wide range of pressure control applications including OEM equipment such as boiler and burner trains for a variety of gases.

General Information

Outlet pressures from 0.8" W.C. up to 18.5" W.C. Operating temperature range is -4°F to +158°F (-20°C to + 70°C) with a maximum allowable inlet pressure of 5 PSIG (350mbar). Flow rates up to 2472 SCFH (70 m³/h)

The J78RS is AGA / CGA approved to the following specifications:

- CGA 6.3 - M95 / ANSI Z21.18 - 1995
- CGA 6.3a - M98 / ANSI Z21.18a - 1998
- CGA 6.3b - M100 / ANSI Z21.18b - 2000

Options

Vent Restrictor

(part number 78069P013) A vent restrictor is available which fits into the regulator vent. In the event of a major malfunction it will limit the amount of gas that can escape to atmosphere. Under normal conditions air can pass freely in and out of the top cover, through the vent restrictor (Fig. 1). This is necessary for the regulator to work.

If there is a sudden surge of pressure, due to equipment failure, the plastic ball inside the unit is blown to the end of the internal hole where it blocks the escaping gas (Fig. 2).

The restrictor is built and tested to comply with ANSI Z21.18 1995.

Advantages

- Positive lock up

Features

- Available in a number of valve body connection sizes – 1/2", 3/4", and 1"
- Comprehensive range of regulator spring ranges for different requirements.

Flow Rates Through Restrictor

Pressure (PSIG)	Flow Rate (ft³/hr 0.6sg Gas)	Flow Rate (ft³/hr Air)
0	0	0
0.5	0.995	1.284
1.0	0.995	1.284
1.5	1.085	1.401
2.0	1.447	1.868
5.0	< 2.0	< 2.5

Each vent restrictor is tested to ensure that the flow in the fault condition is less than 2.5 ft³/hr (0.6 sg Gas) and more than 1 ft³/hr (0.6 sg Gas). This is to make sure that the device does not slow the regulator response time in normal operation.

The preferred installation of the vent restrictor is in the vertical position.

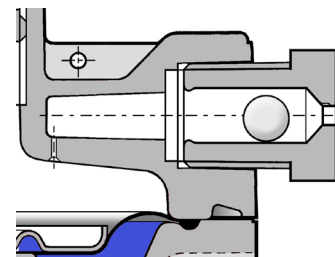


Figure 1

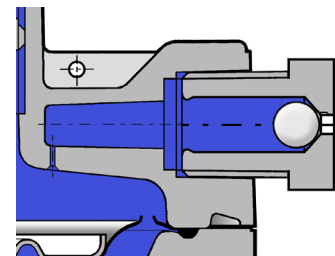
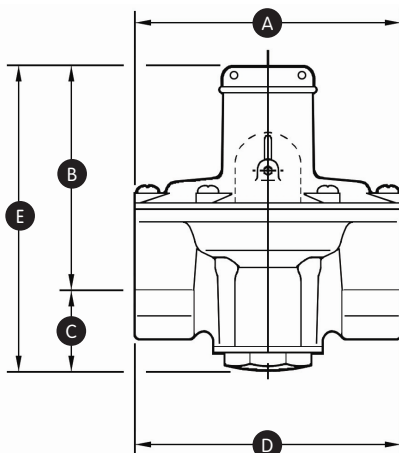


Figure 2

J78RS Gas Pressure Regulators Dimensions



Size	A	B	C	D	E	Weight (oz)
1/2"	3.93" 100mm	3.54" 90mm	1.18" 30mm	3.93" 100mm	4.72" 120mm	19.2
3/4"	3.93" 100mm	3.54" 90mm	1.18" 30mm	3.93" 100mm	4.72" 120mm	17.7
1"	3.93" 100mm	3.54" 90mm	1.57" 40mm	4.13" 105mm	5.12" 130mm	19.6

Material Specifications

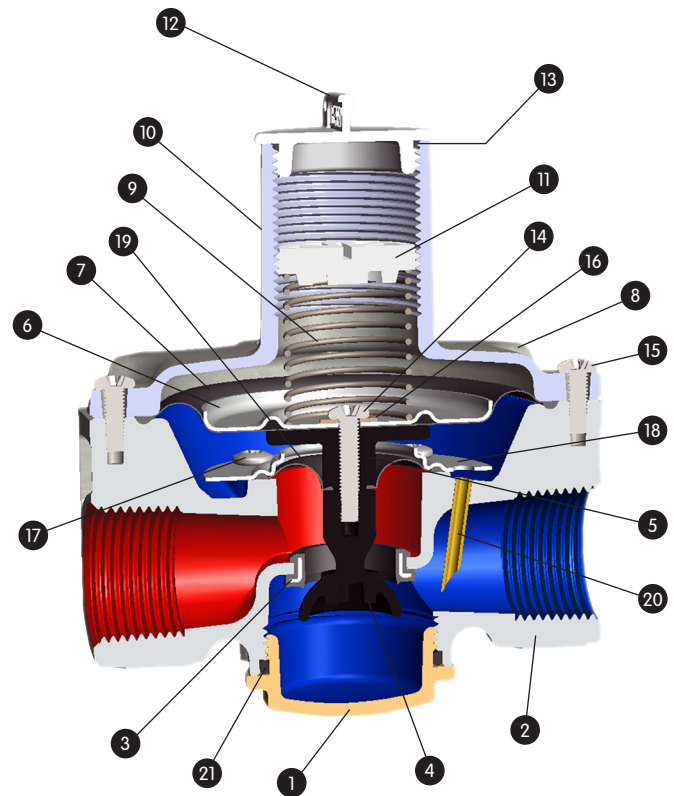
- 1 Bottom Plug - Aluminum Alloy.
- 2 Body - Aluminum Alloy.
- 3 Valve Seat - Nitrile, Buna (1/2" and 3/4" J78RS Only).
- 4 Valve - Acetal Resin (1/2" and 3/4" J78RS Only).
- 5 Diaphragm Spacer - Acetal Resin.
- 6 Top Diaphragm Plate - Mild Steel.
- 7 Main Diaphragm - Nitrile, Buna.
- 8 Top Cover - Aluminum Alloy.
- 9 Loading Spring - Carbon Steel.

Pressure Springs for 1/2" and 3/4" J78RS

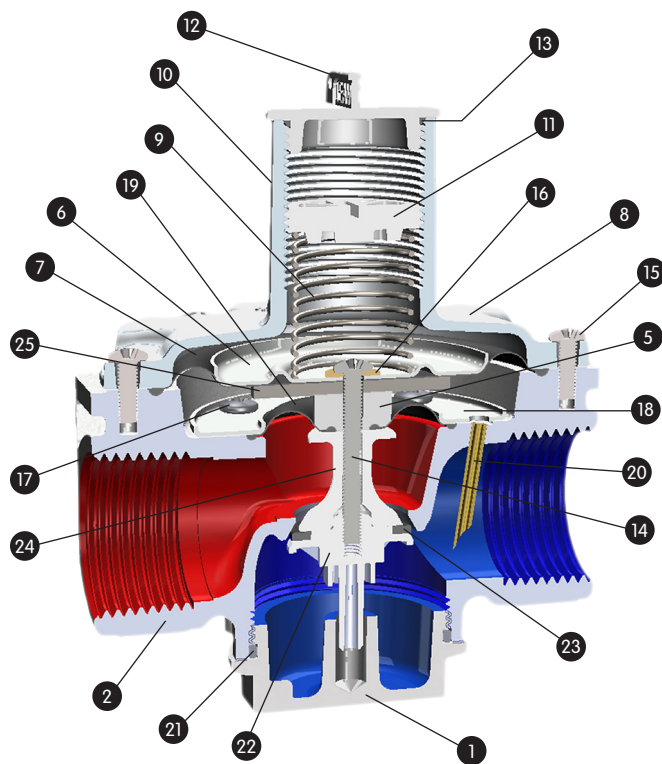
Spring Range W.C.	Color Code	Part Number
0.8 - 5.5	Dark Green/Red	70017P093
0.8 - 6.4	Yellow	70017P094
4 - 8	Black	70017P095
6.4 - 11.2	Orange	70017P096
8.8 - 16	Brown	70017P097

Pressure Springs for 1" J78RS

Spring Range W.C.	Color Code	Part Number
1.6 - 4.5	Dark Green/Red	70017P093
2.4 - 8.4	Yellow	70017P094
5.2 - 10.4	Black	70017P095
7.2 - 14.4	Orange	70017P096
11.2 - 19.3	Brown	70017P097



1/2" and 3/4" J78RS



1" J78RS

- 10 Name Plate - (Not shown).
- 11 Spring Holder, Pressure Adjust - Acetal Resin.
- 12 Top Cap - Zinc Alloy.
- 13 "O" Ring, Top Cap - Nitrile, Buna.
- 14 Valve Spindle.
- 15 Screw, Top Cover (6) - Steel, Plated.
- 16 Sealing Washer.
- 17 Screw, Secondary Diaphragm (4) - Steel, Plated.
- 18 Secondary Diaphragm Clamping Plate - Mild Steel.
- 19 Secondary Diaphragm - Nitrile, Buna.
- 20 Impulse Tube - Brass.
- 21 "O" Ring, Bottom Plug - Nitrile, Buna.
- 22 Valve Disc Holder - Acetal Resin (1" J78RS Only).
- 23 Valve Disc - Nitrile, Buna (1" J78RS Only).
- 24 Valve Spacer - Acetal Resin (1" J78RS Only).
- 25 Lower Diaphragm Plate - Acetal Resin (1" J78RS Only).

J78RS Gas Pressure Regulator Capacity Performance

The capacity tables are developed with the regulator set at a constant inlet pressure, a predetermined flow rate and the required outlet pressure. The flow rate is then increased while keeping the inlet pressure constant. The capacities are recorded when the outlet pressure has fallen by 10% and 20% from the set point.

1/2" Regulator

Set Point 50 SCFH

SCFH (SCMH) 0.64 specific gravity gas at 60°F and 14.7 PSIA (20°C and 1.01 bar)

Outlet Pressure Setting Inches W.C. (mbar) / Droop (%)

Inlet Pressure Inches W.C. (mbar)	4" (9.9)		7" (17.4)		8" (19.9)		11" (27.4)		14" (34.8)	
	10%	20%	10%	20%	10%	20%	10%	20%	10%	20%
6 (15.0)	124 (3.5)	163 (4.6)	—	—	—	—	—	—	—	—
8 (19.9)	168 (4.8)	212 (6.0)	141 (4.0)	181 (5.1)	—	—	—	—	—	—
10 (24.9)	199 (5.6)	247 (7.0)	168 (4.8)	238 (6.7)	155 (4.4)	221 (6.3)	—	—	—	—
Inlet Pressure PSIG (bar)										
0.50 (0.035)	250 (7.1)	327 (9.3)	185 (5.2)	260 (7.4)	190 (5.4)	281 (8.0)	221 (6.3)	265 (7.5)	—	—
0.75 (0.052)	256 (7.3)	309 (8.8)	203 (5.8)	296 (8.4)	216 (6.1)	287 (8.1)	247 (7.0)	397 (11.2)	283 (8.0)	366 (10.4)
1.00 (0.069)	155 (4.4)	207 (5.9)	221 (6.3)	309 (8.8)	230 (6.5)	296 (8.4)	331 (9.4)	464 (13.1)	289 (8.2)	441 (12.5)
1.50 (0.103)	149 (4.2)	199 (5.6)	274 (7.8)	322 (9.1)	274 (7.8)	340 (9.6)	340 (9.6)	408 (11.6)	296 (8.4)	552 (15.6)
2.00 (0.138)	146 (4.1)	195 (5.5)	247 (7.0)	309 (8.8)	252 (7.1)	331 (9.4)	353 (10.0)	395 (11.2)	318 (9.0)	640 (18.1)
3.00 0.207	119 (3.4)	190 (5.4)	225 (6.4)	296 (8.4)	234 (6.6)	322 (9.1)	300 (8.5)	380 (10.8)	309 (8.8)	684 (19.4)
5.00 (0.345)	309 (8.8)	358 (10.1)	260 (7.4)	441 (12.5)	287 (8.1)	495 (14.0)	366 (10.4)	706 (20.0)	353 (10.0)	750 (21.2)

3/4" Regulator

Set Point 50 SCFH

SCFH (SCMH) 0.64 specific gravity gas at 60°F and 14.7 PSIA (20°C and 1.01 bar)

Outlet Pressure Setting (W.C.) / DROOP (%)

Inlet Pressure Inches W.C. (mbar)	4" (9.9)		7" (17.4)		8" (19.9)		11" (27.4)		14" (34.8)	
	10%	20%	10%	20%	10%	20%	10%	20%	10%	20%
6 (15.0)	132 (3.7)	252 (7.1)	—	—	—	—	—	—	—	—
8 (19.9)	150 (4.3)	291 (8.2)	221 (6.3)	296 (8.4)	—	—	—	—	—	—
10 (24.9)	163 (4.6)	344 (9.7)	247 (7.0)	406 (11.5)	243 (6.9)	362 (10.3)	—	—	—	—
Inlet Pressure PSIG (bar)										
0.50 (0.035)	185 (5.2)	238 (6.7)	313 (8.9)	552 (15.6)	340 (9.6)	530 (15.0)	322 (9.1)	455 (12.9)	—	—
0.75 (0.052)	177 (5.0)	234 (6.6)	388 (11.0)	795 (22.5)	415 (11.8)	795 (22.5)	508 (14.4)	750 (21.2)	362 (10.3)	684 (19.4)
1.00 (0.069)	159 (4.5)	221 (6.3)	274 (7.8)	596 (16.9)	406 (11.5)	927 (26.3)	684 (19.4)	993 (28.1)	397 (11.2)	993 (28.1)
1.50 (0.103)	124 (3.5)	349 (9.9)	268 (7.6)	581 (16.5)	278 (7.9)	773 (21.9)	530 (15.0)	1104 (31.3)	402 (11.4)	750 (21.2)
2.00 (0.138)	119 (3.4)	331 (9.4)	243 (6.0)	366 (10.4)	265 (7.5)	508 (14.4)	265 (7.5)	883 (25.0)	441 (12.5)	914 (25.9)
3.00 0.207	172 (4.9)	287 (8.1)	238 (6.7)	397 (11.2)	252 (7.1)	397 (11.2)	331 (9.4)	530 (15.0)	388 (11.0)	989 (28.0)
5.00 (0.345)	234 (6.6)	300 (8.5)	247 (7.0)	441 (12.5)	366 (10.4)	508 (14.4)	419 (11.9)	671 (19.0)	419 (11.9)	883 (25.0)

1" Regulator
Set Point 50 SCFH
 SCFH (SCMH) 0.64 specific gravity gas at 60°F and 14.7 PSIA (20°C and 1.01 bar)

Outlet Pressure Setting Inches W.C. (mbar) / Droop (%)

Inlet Pressure Inches W.C. (mbar)	4" (9.9)		7" (17.4)		8" (19.9)		11" (27.4)		14" (34.8)	
	10%	20%	10%	20%	10%	20%	10%	20%	10%	20%
6 (15.0)	177 (5.0)	287 (8.1)	—	—	—	—	—	—	—	—
8 (19.9)	212 (6.0)	335 (9.5)	256 (7.3)	455 (12.9)	—	—	—	—	—	—
10 (24.9)	238 (6.7)	384 (10.9)	353 (10.0)	574 (16.3)	331 (9.4)	618 (17.5)	—	—	—	—
Inlet Pressure Inches W.C. (mbar)										
0.50 (0.035)	256 (7.3)	459 (13.0)	561 (15.9)	750 (21.2)	530 (15.0)	795 (22.5)	428 (12.1)	883 (25.0)	—	—
0.75 (0.052)	260 (7.4)	662 (18.8)	861 (24.4)	971 (27.5)	750 (21.2)	971 (27.5)	750 (21.2)	1192 (33.8)	750 (21.2)	1236 (35.0)
1.00 (0.069)	795 (22.5)	883 (25.0)	971 (27.5)	1059 (30.0)	883 (25.0)	1148 (32.5)	971 (27.5)	1457 (41.3)	1082 (30.6)	1589 (45.0)
1.50 (0.103)	574 (16.3)	971 (27.5)	1059 (30.0)	1324 (37.5)	927 (26.3)	1324 (37.5)	1059 (30.0)	1898 (53.8)	1766 (50.0)	1898 (53.8)
2.00 (0.138)	927 (26.3)	1192 (33.8)	1104 (31.3)	1148 (32.5)	1059 (30.0)	1280 (36.3)	1766 (50.0)	2163 (61.3)	1986 (56.2)	2163 (61.3)
3.00 (0.207)	1059 (30.0)	1236 (35.0)	1368 (38.7)	1457 (41.3)	1368 (38.7)	1457 (41.3)	1677 (47.5)	2295 (65.0)	2340 (66.3)	2472 (70.0)
5.00 (0.345)	119 (3.4)	181 (5.1)	238 (6.7)	441 (12.5)	199 (5.6)	327 (9.3)	238 (6.7)	450 (12.7)	340 (9.6)	1457 (41.3)

J78RS Gas Pressure Regulators - Technical Data

Other Gas Capacities

To determine the capacity of these regulators for gases other than natural gas, multiply the values within the capacity tables by a Specific Gravity Conversion Factor (F_g). The table below lists this factor for some of the more common gases.

Gas Type	Specific Gravity	Conversion Factor (F _g)
Air	1.00	0.77
Butane	2.01	0.55
Carbon Dioxide	1.52	0.63
Nitrogen	0.97	0.79
Propane	1.53	0.63

To calculate the Conversion Factor for other gases:

$$(F_g) = \sqrt{\frac{\text{Specific gravity of gas on which the capacity table is based}}{\text{Specific gravity of gas being used}}}$$

Example: If using propane and only having tables based on natural gas, the Specific Gravity Conversion Factor is :

$$(F_g) = \sqrt{\frac{\text{Specific gravity of natural gas (0.6)}}{\text{Specific gravity of propane (1.53)}}}$$

$$(F_g) = \sqrt{\frac{0.60}{1.53}}$$

$$(F_g) = 0.626$$

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