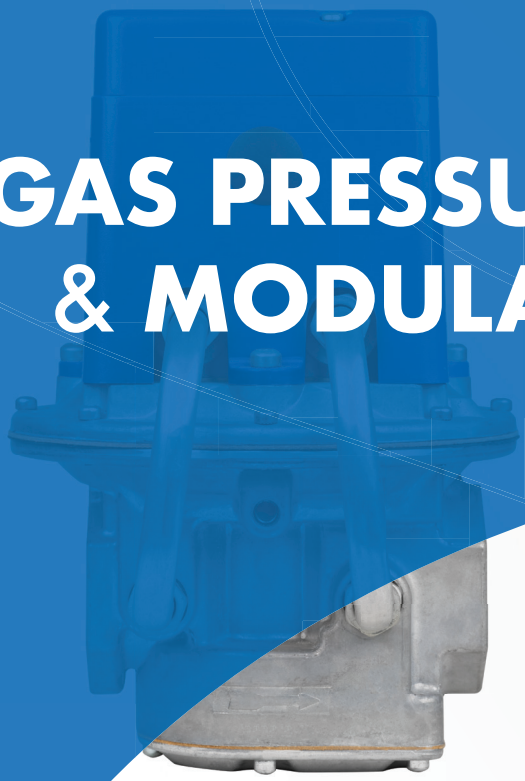
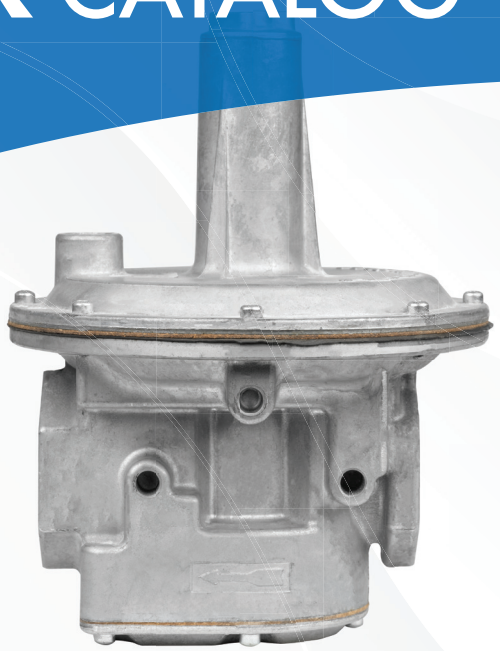
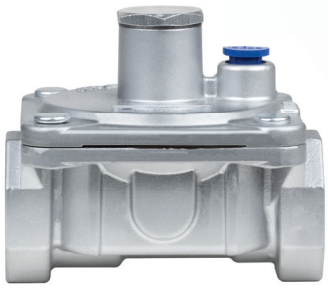
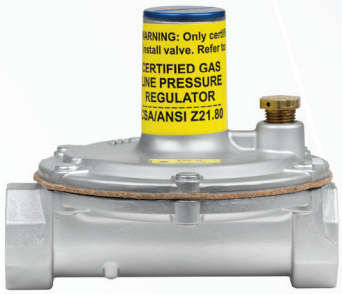
7th Edition

GAS PRESSURE REGULATOR & MODULATOR CATALOG









MAXITROL®

www.maxitrol.com

⚠ WARNING

Service and installation must be performed by a trained/experienced service technician.

All products used with combustible gas **must** be installed and used **strictly** in accordance with the instructions of the Original Equipment Manufacturer (OEM) and with all applicable government codes and regulations, e.g. plumbing, mechanical, and electrical codes and practices. Maxitrol products should be installed and operated in accordance with Maxitrol Safety Warning Instructions.

Maxitrol Company is NOT responsible for any errors or omissions in reliance by anyone of any information set forth in this catalog without additional reference to local requirements and applicable ordinances or codes.

Other worldwide approvals and certifications available upon inquiry.

RZ SERIES

Zero Governor Design

The RZ series are adaptable for air-gas mixing applications. Because of the balanced valve construction, Z models offer superior performance at an economical price compared with other types of atmospheric regulators.

Maxitrol's RZ zero governor model regulators are used for flow control of burners, nozzel mixers, mixing tees and proportional premixers.

R700Z

Specifications

Pipe Sizes.....RZ Models: 3/8" to 1 1/4" threaded connections with NPT or ISO 7-1 threads.

Housing Material.....R400Z, R500Z, R600Z, R700Z: aluminum.

Mounting.....R400Z, R700Z, mount in an upright position only. R500Z, R600Z, suitable for multi-positional mounting. If a vLimiter® or vProtector® is installed, mount in an upright horizontal position only.

NOTE: All Maxitrol gas pressure regulators should be installed and operated in accordance with Maxitrol Safety Warning Instructions (see GPR_MI_EN.ES or GPR_CSA_MI_EN.FR).

Certifications.....R400Z, R500Z, R600Z, R700Z : ANSI Z21.18/CSA 6.3 Gas Appliance Pressure Regulators.

Fuel Gases.....Suitable for natural, manufactured, mixed gases, liquefied petroleum gases, and LP gas-air mixtures.

Rated Inlet Pressure.....CSA Certified: R400Z, R500Z, R600Z: 1/2 psi (3.4 kPa); R700Z: 5 psi (34.5 kPa)
Maxitrol Tested.....R400Z, R500Z, R600Z: 1 psi (6.9 kPa)

Emergency Exposure Limits.....R400Z, R500Z, R600Z, R700Z: 12.5 psi (86 kPa)

Ambient Temperature Ranges.....R400Z, R600Z, R700Z: -40 to 205°F (-40 to 96°C)
R500Z: 32 to 205°F (0 to 96°C)

Sensing Taps..... R700Z has convenient tap locations available for downstream sensing, cross connections, and differential control. Four locations can be tapped and plugged for measuring pressure.

Remote Sensing..... R700Z may be ordered with remote sensing. The internal sensing tube is omitted and external sensing taps are provided. Add suffix letter "R" to model number when ordering.

Minimum Regulation.....R400Z: Suitable for pilot flow applications. Ⓟ (Circle P) (0.15 CFH NG), R500Z, R600Z, R700Z: 10 CFH.

Low-Fire By-Pass.....With the main valve closed, an adjustable by-pass provides a minimum firing rate. Add suffix "L" (left side) , "R" (right side), or "B" (both sides) when ordering.

Model Designations .....(F) Factory-set; fixed non-adjustable regulator. Welch plug replaces seal cap.
(M) B.S.P. - PL parallel thread - conforms to ISO 7-1, where pressure tight joints are made on the threads.

Capacities and Pressure Drop

Capacities expressed in CFH (m^3/h) @ 0.64 sp gr gas

Model	Pipe Size	Pressure Drop - inches w.c. (kPa)											
		0.2 (0.05)	**0.4 (0.10)**	**0.6 (0.15)**	**0.8 (0.20)**	**1.0 (0.25)**	**1.5 (0.37)**	**2.0 (0.50)**	**2.5 (0.62)**	**3.0 (0.75)**	**3.5 (0.87)**	**4.0 (1.0)**	**By-Pass (L & R Suffix Only)**
R400Z	3/8″ x 3/8″	77 (2.16)	110 (3.08)	134 (3.75)	155 (4.34)	174 (4.87)	212 (5.94)	245 (6.86)	274 (7.67)	--	--	--	5-90 (0.14-2.5)
	1/2″ x 1/2″	86 (2.41)	121 (3.39)	148 (4.14)	172 (4.82)	192 (5.38)	235 (6.58)	271 (7.59)	303 (8.48)	--	--	--	
R500Z	1/2″ x 1/2″	163 (4.56)	231 (6.47)	283 (7.92)	327 (9.16)	366 (10.3)	447 (12.5)	516 (14.6)	577 (16.2)	635 (17.8)	685 (19.2)	730 (20.4)	10-125 (0.28-3.5)
	3/4″ x 3/4″	196 (5.49)	277 (7.76)	340 (9.52)	392 (11.0)	438 (12.3)	537 (15.0)	620 (17.4)	693 (19.4)	760 (21.3)	820 (22.7)	876 (24.5)	
R600Z	3/4″ x 3/4″	298 (8.34)	421 (11.8)	516 (14.5)	595 (16.7)	666 (18.7)	816 (22.9)	942 (26.4)	1054 (29.5)	1150 (32.2)	1245 (34.9)	1335 (37.4)	10-330 (0.28-9.3)
	1″ x 1″	330 (9.24)	468 (13.1)	572 (16.0)	661 (18.2)	739 (20.7)	906 (25.4)	1046 (29.3)	1169 (32.7)	1280 (35.8)	1380 (38.6)	1480 (41.4)	
R700Z	1″ x 1″	360 (10.2)	510 (14.4)	620 (17.6)	720 (20.4)	800 (22.7)	980 (27.8)	1130 (32.0)	1270 (36.0)	1390 (39.4)	1500 (42.5)	1600 (45.3)	10-330 (0.28-9.3)
	1 1/4″ x 1 1/4″	670 (19.0)	800 (22.7)	880 (24.9)	950 (26.9)	1000 (28.3)	1230 (34.8)	1410 (39.9)	1580 (44.7)	1730 (49.0)	1870 (53.0)	2000 (56.6)	

NOTE: CSA maximum capacities vary with spring range and pipe size. Please contact Maxitrol directly for CSA maximums. See pages 72-73 for Regulator Sizing Requirements and Examples.

NOTE: Consult Maxitrol for UL certifications.

Model	Pressure Drop - inches w.c. (kPa) unless noted
	By-Pass (L & R Suffix Only)
R400Z	5 - 90 (0.14 - 2.5)
R500Z	10 - 125 (0.28 - 3.5)
R600Z	10 - 330 (0.28 - 9.3)
R700Z	10-330 (0.28-9.3)

By-pass flow maximum calculated at a pressure drop. (Delta P) = 3.5″ w.c. (single by-pass)

RZ SERIES
Zero Governor Design

Spring Selection: inches w.c (kPa)

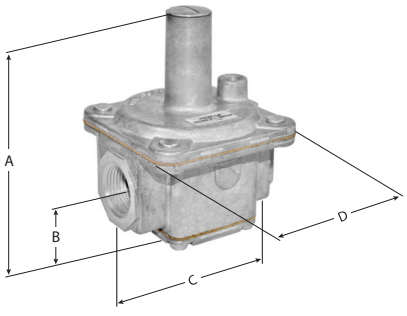
Model	Outlet Pressure Range
R400Z	-1.5 to 1.0 (-0.37 to 0.25)
R500Z	-1.0 to 2.5 (-0.25 to 0.62)
R600Z	-1.0 to 1.5 (-0.25 to 0.37)
R700Z	-1.0 to 1.5 (-0.25 to 0.37)

NOTE: See pages 70-71 for complete Spring Selection Chart.

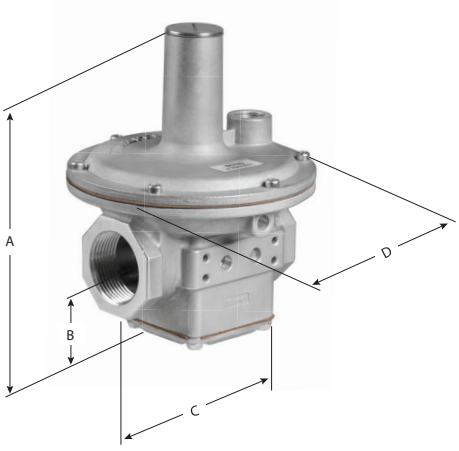
Dimensions

Model	Pipe Size	Vent Connection	Swing Radius	Dimensions			
				A	B	C	D
R400Z	3/8″, 1/2″	1/8″ NPT	2.4″ (60 mm)	3.3″ (83 mm)	0.9″ (24 mm)	2″ (51 mm)	2″ (51 mm)
R500Z	1/2″, 3/4″	1/8″ NPT	3.6″ (90 mm)	4.7″ (119 mm)	1.2″ (30 mm)	3″ (79 mm)	3.1″ (79 mm)
R600Z	3/4″, 1″	1/8″ NPT	4.3″ (109 mm)	5.7″ (144 mm)	1.5″ (37 mm)	4″ (102 mm)	3.9″ (98 mm)
R700Z	1″ , 1 1/4″	3/8″ NPT	5.0″ (128 mm)	6.9″ (176 mm)	1.9″ (48 mm)	4.4″ (113 mm)	5.4″ (139 mm)

NOTE: Dimensions are maximums and to be used only as an aid in designing clearance for the valve. Actual production dimensions may vary somewhat from those shown.



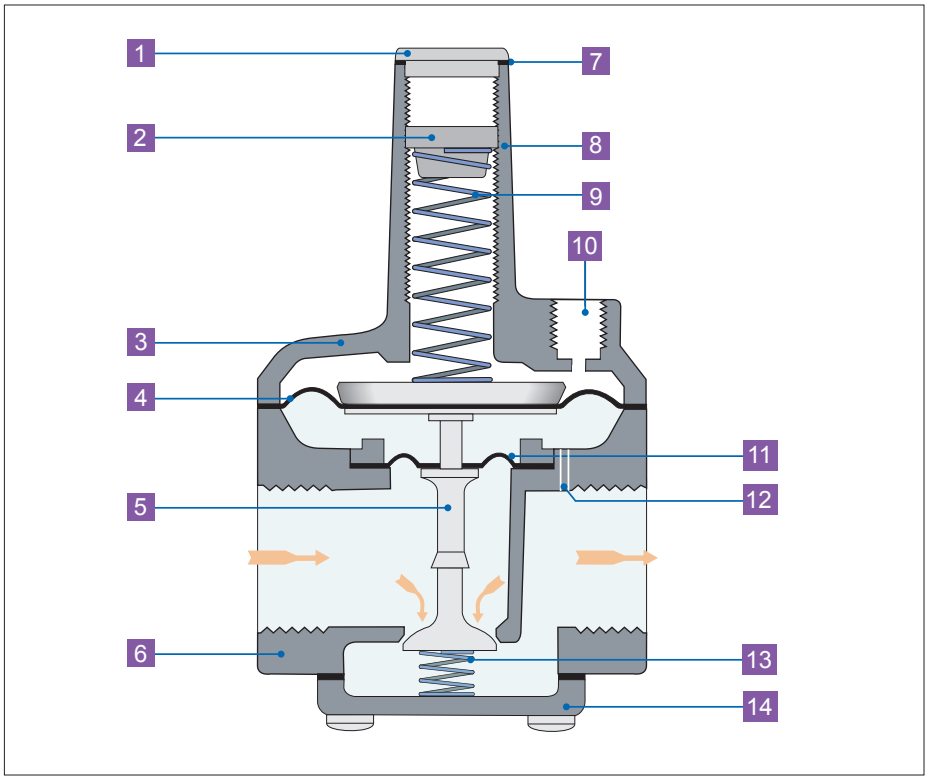
R400Z, R500Z, R600Z



R700Z

Zero Governor Design

R400Z, R500Z, R600Z, R700Z



1	Welch Plug or Seal Cap
2	Adjusting Screw
3	Top Housing
4	Regulating Diaphragm
5	Stem & Valve
6	Bottom Housing
7	Seal Cap Gasket
8	Stack
9	Spring
10	Vent Connection
11	Balancing Diaphragm
12	Sensing Hole
13	Counter Spring
14	Bottom Plate

SIZING A REGULATOR

See **www.maxitrol.com** for our Regulator Sizing Program. Please contact Maxitrol directly for more information on sizing a regulator.

System Requirements

When sizing a regulator the following must be known:

- Gas Type
- Available Inlet Pressure
- Desired Outlet Pressure
- Zero Governor Application (indicated by model number ending in "Z")
- Will the regulator control main burner and pilot load OR main burner only?
- Required minimum and maximum flow rate in cfh or m^3/h or Btu/h
- Pipe Size

In most cases, the manifold pipe size has already been selected on the basis of good engineering practice, and the regulator pipe size should conform to this size.

The capacity of any regulator is not an absolute value but will vary with the application depending on the prevailing differential pressure.

⚠ WARNING

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All products used with combustible gas must be installed and used strictly in accordance with the instructions of the Original Equipment Manufacturer (OEM) and with all applicable government codes and regulations, e.g. plumbing, mechanical, and electrical codes and practices. These instructions do NOT supersede OEM's installation or operating instructions.

All Maxitrol products should be installed and operated in accordance with Maxitrol Safety Warning Instructions.

HOW TO CALCULATE PRESSURE DROP AT VARIOUS FLOW RATES FROM CAPACITY CHART

LP Applications - When using natural gas pressure drop chart to determine LP pressure drop in terms of Btu/h, multiply NAT Btu/h by 1.61; in terms of CFH multiply NAT CFH by 0.645.

Formula: $P2 = P1 \times (Q2/Q1)^2$

P2 = Pressure drop at desired flow rate
P1 = Known pressure drop
Q2 = Desired flow rate
Q1 = Known flow rate

A. Check Capacity Chart, ensuring regulator has ample range of regulation and individual load capacities (for use with pilot) for the application.

B. Know the minimum encountered inlet pressure. MINIMUM INLET PRESSURE MINUS "P2" MUST BE GREATER THAN DESIRED OUTLET PRESSURE. Solve for "P2" using the formula above.
(See examples on page 73.)

Sizing Examples

RUBBER SEAT POPPETS

For main burner and pilot load applications.

Example: To select an RV type regulator:

- Known: Single 150,000 Btu/h main burner; pipe size 1/2″; inlet pressure 7″ w.c.; outlet pressure 4″ w.c.
- Solution: The RV48 (1/2″) has a maximum capacity of 230,000 Bth/h and a maximum individual load of 160,000 Btu/h. The pressure drop at a flow rate of 150,000 Btu/h is 0.4″ w.c., well below the available differential of 3″ w.c. The RV48 (without "L" fixed orifice) is the correct regulator to use for the application.

STRAIGHT-THRU-FLOW (S-T-F)

For main burner only applications not requiring a lockup type regulator. When sizing the S-T-F series, it is recommended that pressure drop not exceed 1/2 of available differential pressure.

Example: To select an RV type regulator:

- Known: Flow rate 2,000,000 Btu/h; pipe size 1 1/4″; inlet pressure 9″ w.c.; outlet pressure 5″ w.c.
- Solution: The RV81(1 1/4″) has a maximum capacity of 2,500,000 Btu/h. The pressure drop at a flow of 2,000,000 Btu/h is 0.66″ w.c. The RV81 (1 1/4″) is the correct regulator to use with this application. The pressure drop of the RV61 (1 1/4″) at a flow rate of 2,000,000 Btu/h is 2.64″ w.c. This is within the available differential but exceeds the recommended 50% maximum.

LEVER ACTING

For main burner and pilot load application requiring positive dead-end lockup (see Definitions page 63).

Example: To select a 325 series regulator:

- Known: Single 145,000 Btu/h burner; pipe size 1/2″; inlet pressure 2 psi; outlet pressure 7″ w.c.
- Solution: The 325-3's pressure drop at a flow rate of 145,000 Btu/h is 7″ w.c., well below the available differential of 1 3/4 psi. However, the Maximum Individual Load for th 325-3 is only 100,000 Btu/h. The 325-5 (1/2″) is the correct regulator to use with this application.

BALANCED VALVE

For main burner and pilot load application requiring a lockup type regulator or zero governor usage (see Definitions page 63).

Example: To select a 210 or R/RS series regulator:

- Known: Desired flow rate 6,000,000 Btu/h; pipe size 1 1/2″; inlet pressure 1 psi; outlet pressure 9″ w.c.
- Solution: The 210E (1 1/2″) has a maximum capacity of 10,000,000 Btu/h. The 210D (1 1/2″) has a capacity of 6,000,000 Btu/h. Therefore, the 210E (1 1/2″) will give you the desired outlet pressure of 9″ w.c. and is the correct regulator to use for the application.

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