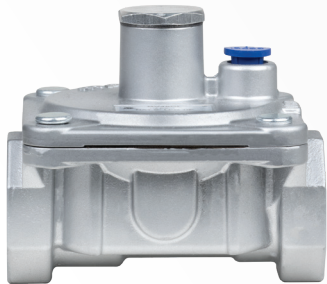
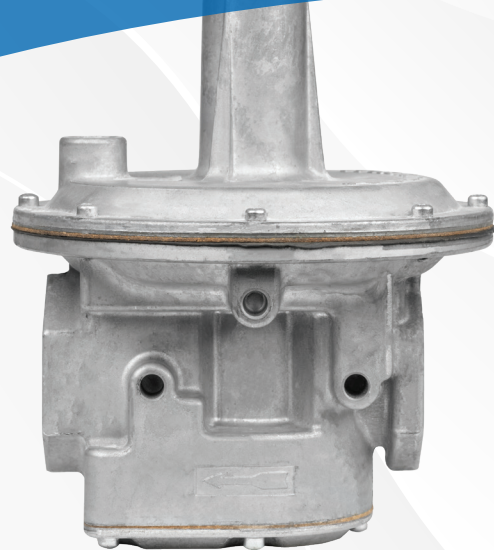
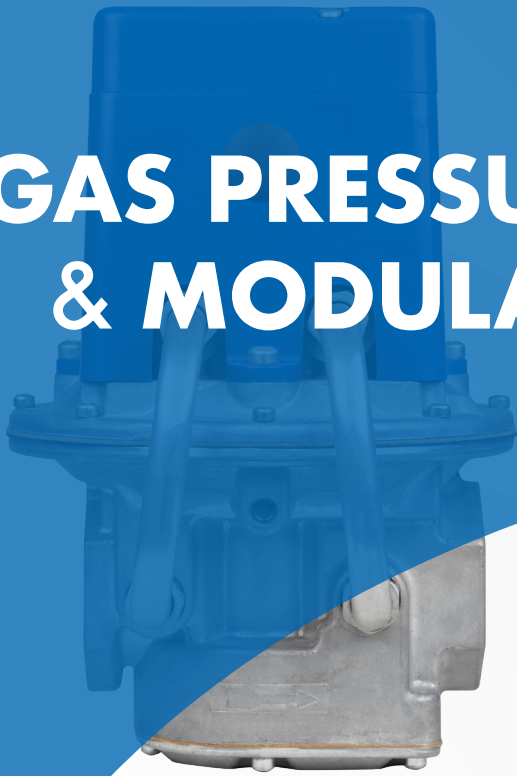


7th Edition

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.

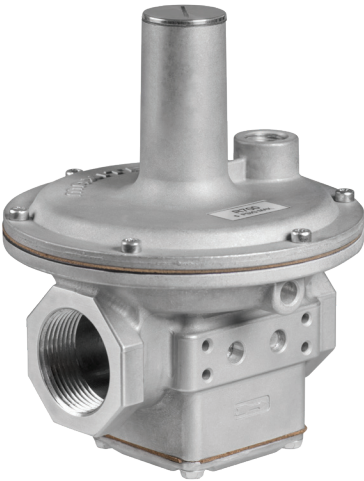


RZ SERIES

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, nozzle 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 v Limit [®] or v Protect [®] 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. (P) (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 (m³/h) @ 0.64 sp gr gas

Model	Pipe Size	Pressure Drop - inches w.c. (kPa)											By-Pass (L & R Suffix Only)
		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)	
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)

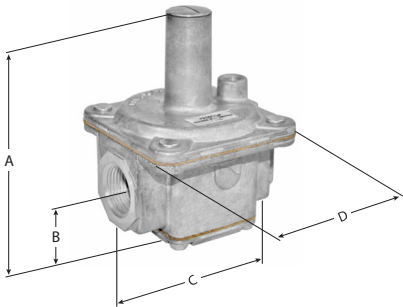
Model	Outlet Pressure Range
R400Z	-1.5 to 1.0 (-0.37 to 0.25)
R500Z	-1.0 to 2.5 (-0.25 to 0.62)
R600Z	-1.0 to 1.5 (-0.25 to 0.37)
R700Z	-1.0 to 1.5 (-0.25 to 0.37)

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

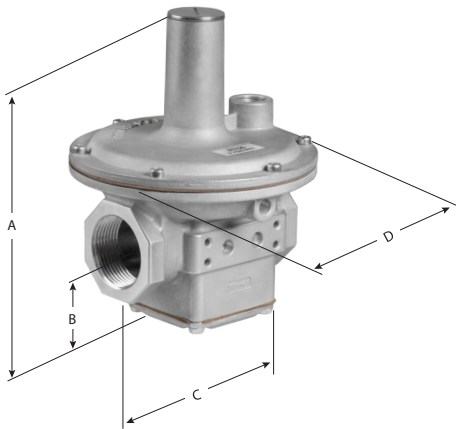
Dimensions

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.



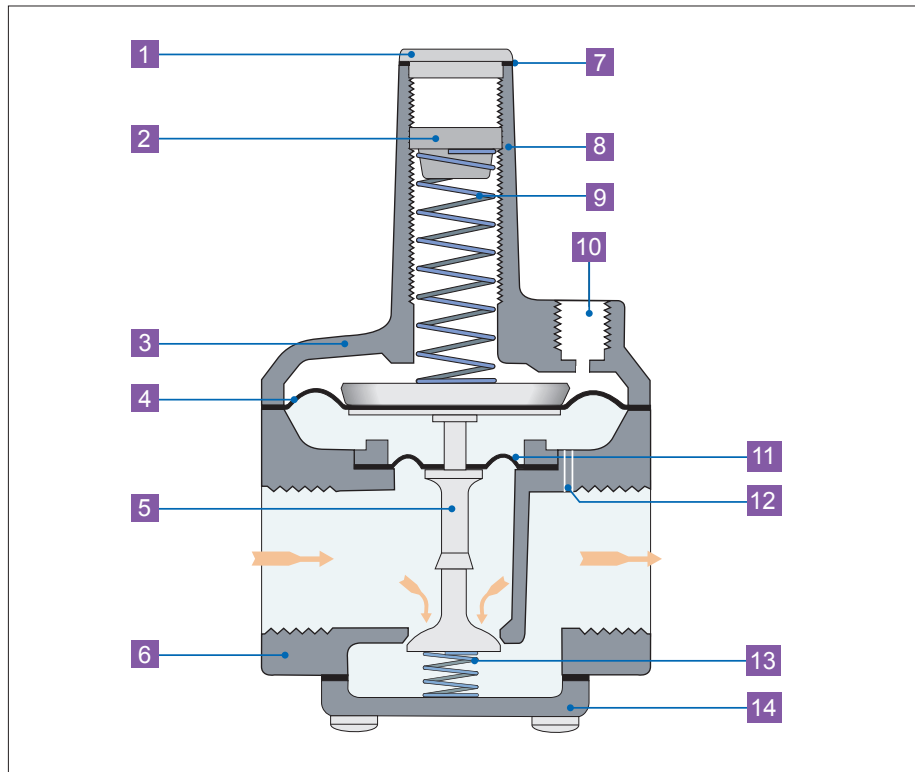
R400Z, R500Z, R600Z



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

SPRING SELECTION CHART

Model	Part Number	Color Code	Outlet Pressure (In. w.c.)	Approx Inner Diameter	Approx Length			
Adjustable Models:								
RV12L	R1210T-13	Brown Plated Orange Red Blue	1.0 to 3.5 2.8 to 5.2 4.0 to 8.0 6.0 to 10 8.0 to 12	3/8"	9/16"			
	R1210T-35*				3/4"			
	R1210T-48				3/4"			
	R1210T-610				7/8"			
	R1210T-812				1"			
RV20L	R2010T-13	Brown Plated Orange Red Blue Plated	1.0 to 3.5 2.8 to 5.2 4.0 to 8.0 6.0 to 10 8.0 to 12 9.0 to 12	7/16"	13/16"			
	R2010T-35*				1 1/16"			
	R2010T-48				15/16"			
	R2010T-610				1"			
	R2010T-812				1 1/8"			
	R2010T-912				1 9/16"			
RV47AD RV47AL	R4710-4 R4710-5 R4710-6 R4710-10	Black Green Red Blue	3.8 to 4.3 4.7 to 5.3 5.6 to 6.4 9.7 to 11.3	9/16"	1 3/4" 1 13/16" 1 13/16" 1 11/16"			
CV47 RV47D RV47L	R4710-13 R4710-35* R4710-48 R4710-412 R4710-610 R4710-812	Brown Plated Orange Violet Red Blue	1.0 to 3.5 2.8 to 5.2 4.0 to 8.0 4.0 to 12 6.0 to 10 8.0 to 12	9/16"	7/8" 1 1/4" 1 5/16" 1 1/16" 1 7/16" 1 1/2"			
	CV48 RV48	R4810-13 R4810-36* R4810-48 R4810-512 R4810-610	Brown Plated Orange Blue Red	1.0 to 3.5 3.0 to 6.0 4.0 to 8.0 5.0 to 12 6.0 to 10	9/16"	15/16" 1 3/16" 1 1/8" 1 3/16" 1 1/2"		
		CV48T RV48T	R4810T-36* R4810T-48 R4810T-512 R4810T-610	S Steel Orange Blue Red	3.0 to 6.0 4.0 to 8.0 5.0 to 12 6.0 to 10	9/16"	1 3/16" 1 1/8" 1 3/16" 1 1/2"	
			R400 R400S	R400B10-13 R400B10-25 R400B10-36* R400B10-38 R400B10-412 R400B10-512 R400B10-1022	Brown Plated Plated Plated Pink Violet Blue Red	1.0 to 3.5 2.0 to 5.0 3.0 to 6.0 3.0 to 8.0 4.0 to 12 5.0 to 12 10 to 22	3/8"	1 1/4" 1 9/16" 2" 1 9/16" 1 1/2" 1 7/8" 1 3/4"
				RV52 R500 R500S	R5210-13 R5210-25 R5210-36* R5210-38 R5210-48 R5210-412 R5210-512	Brown Plated Plated Plated Pink Orange Violet Blue	1.0 to 3.5 2.0 to 5.0 3.0 to 6.0 3.0 to 8.0 4.0 to 8.0 4.0 to 12 5.0 to 12	9/16"
	R500 R500S				R5210-1022	Red	10 to 22	9/16"
RV53 R600 R600S	R5310-13 R5310-25 R5310-36* R5310-38 R5310-48 R5310-412 R5310-512	Brown Plated Plated Plated Pink Orange Violet Blue			1.0 to 3.5 2.0 to 5.0 3.0 to 6.0 3.0 to 8.0 4.0 to 8.0 4.0 to 12 5.0 to 12	5/8"	2 5/8" 2 15/16" 3 3/8" 3 1/16" 3 5/8" 3 1/6" 3 7/16"	

* Standard Spring

Model #	Part Number	Color Code	Outlet Pressure (In. w.c.)	Approx Inner Diameter	Approx Length
Adjustable Models:					
R600 R600S	R5310-1022 R5310-1530	Red Yellow	10 to 22 15 to 30	5/8"	3 1/4" 3 1/2"
RV61 R700	R6110-13 R6110-25 R6110-36* R6110-38 R6110-48 R6110-512 R6110-1022	Brown Plated Plated Pink Orange Blue Red	1.0 to 3.5 2.0 to 5.0 3.0 to 6.0 3.0 to 8.0 4.0 to 8.0 5.0 to 12 10 to 22	3/4"	2 5/8" 3 1/4" 3 1/2" 3 1/8" 3 9/16" 3 9/16" 3 1/2"
RV81 210D	R8110-13 R8110-25 R8110-36* R8110-38 R8110-48 R8110-412 R8110-512 R8110-515 R8110-1022	Brown Plated Plated Pink Orange Violet Blue Green Red	1.0 to 3.5 2.0 to 5.0 3.0 to 6.0 3.0 to 8.0 4.0 to 8.0 4.0 to 12 5.0 to 12 5.0 to 15 10 to 22	7/8"	3 1/8" 3 13/16" 4 5/16" 3 7/8" 4 1/2" 3 3/4" 4 1/16" 3 3/4" 4 5/16"
210D	R8110-1530 R8110-2042	Yellow Black	15 to 30 20 to 42	7/8"	4 1/2" 4 5/16"
RV91 210E	R9110-13 R9110-25 R9110-36* R9110-38 R9110-48 R9110-412 R9110-512 R9110-515 R9110-1022	Brown Plated Plated Pink Orange Violet Blue Green Red	1.0 to 3.5 2.0 to 5.0 3.0 to 6.0 3.0 to 8.0 4.0 to 8.0 4.0 to 12 5.0 to 12 5.0 to 15 10 to 22	1 1/8"	4" 4 15/16" 5 3/4" 5 1/16" 5 15/16" 5 1/16" 5 1/2" 5 1/8" 5 5/8"
210E	R9110-1530 R9110-2042	Yellow Black	15 to 30 20 to 42	1 7/8"	5 7/8" 5 3/4"
RV111 210G	R11110-13 R11110-25 R11110-36* R11110-38 R11110-48 R11110-412 R11110-512 R11110-515 R11110-1022	Brown Plated Plated Pink Orange Violet Blue Green Red	1.0 to 3.5 2.0 to 5.0 3.0 to 6.0 3.0 to 8.0 4.0 to 8.0 4.0 to 12 5.0 to 12 5.0 to 15 10 to 22	1 1/2"	6 1/8" 7 1/6" 8 3/16" 7 3/8" 8 3/8" 7 3/8" 8 1/8" 7 1/16" 8 1/8"
210G	R11110-1530 R11110-2042	Yellow Black	15 to 30 20 to 42	1 1/2"	8 7/16" 8 1/4"
210J	R210J10-25 R210J10-36* R210J10-38 R210J10-412 R210J10-512 R210J10-1022 R210J10-1530 R210J10-2042	Plated Plated Pink Violet Blue Red Yellow Black	2.0 to 5.0 3.0 to 6.0 3.0 to 8.0 4.0 to 12 5.0 to 12 10 to 22 15 to 30 20 to 42	2 1/8"	9 1/6" 11 3/4" 10 1/8" 9 7/8" 11 5/8" 11 1/2" 11 11/16" 11 1/4"
220D, E,G,& J	R325C10-1022 R325C10-1530	Tagged Tagged	1 psi-3 psi 2 psi-5 psi	5/8"	2 1/8" 2 5/16"

SPRING SELECTION CHART

Model	Part Number	Min / Max	Color Code	Outlet Pressure (In. w.c.)	Approx Inner Diameter	Approx Length
Adjustable Models:						
SR400	SR400B10H MR410B10L	Max Min	S Steel Plated	3.0 to 5.0 0.3 to 1.2	$\frac{5}{16}$ " 1 $\frac{1}{16}$ "	1 $\frac{5}{16}$ " $\frac{7}{8}$ "
	SR400B10H-1 MR410B10L	Max Min	White Plated	2.5 to 3.5 0.3 to 1.2		1" $\frac{7}{8}$ "
	SR400B10H MR410B10L-1	Max Min	S Steel Blue	4.0 to 6.0 1.0 to 2.8		1 $\frac{5}{16}$ " 1 $\frac{1}{16}$ "
	SR400B10H-1 MR410B10L-1	Max Min	White Blue	3.0 to 5.0 1.0 to 2.8		1" 1 $\frac{1}{16}$ "
	SR400B10L-4	Min	Black	2.5 to 4.0		1 $\frac{3}{16}$ "
SR400-2**	MR410B102-2	Max	Blue	7.5 to 12.0	$\frac{5}{16}$ "	1 $\frac{1}{2}$ "
SR500	SR500B10H MR510B10L	Max Min	S Steel Plated	3.0 to 5.0 0.3 to 1.2	$\frac{7}{16}$ " 1 $\frac{5}{8}$ "	1 $\frac{9}{16}$ " 1 $\frac{1}{16}$ "
	SR500B10H-1 MR510B10L	Max Min	White Plated	1.5 to 3.5 0.3 to 1.2		1 $\frac{1}{16}$ " 1 $\frac{1}{16}$ "
	SR500B10H MR510B10L-1	Max Min	S Steel Plated	3.5 to 6.0 1.0 to 2.8		1 $\frac{9}{16}$ " 1 $\frac{1}{4}$ "
	SR500B10H-1 MR510B10L-1	Max Min	White Blue	2.0 to 4.5 1.0 to 2.8		1 $\frac{1}{16}$ " 1 $\frac{1}{4}$ "
SR500-2**	SR500B10H\L-2*	Max	Black	7.5 to 12.0	$\frac{7}{16}$ "	2 $\frac{1}{4}$ "
SR600	SR600B10H MR610B10L	Max Min	S Steel Plated	3.0 to 5.0 0.3 to 1.2	$\frac{5}{8}$ " 2 $\frac{1}{8}$ "	2" 1 $\frac{9}{16}$ "
	SR600B10H-1 MR610B10L	Max Min	White Plated	2.5 to 4.0 0.3 to 1.2		1 $\frac{1}{2}$ " 1 $\frac{9}{16}$ "
	SR600B10H MR610B10L-1	Max Min	S Steel Plated	4.0 to 6.0 1.0 to 2.8		2" 1 $\frac{13}{16}$ "
	SR600B10H-1 MR610B10L-1	Max Min	White Blue	3.0 to 5.5 1.0 to 2.8		1 $\frac{1}{2}$ " 1 $\frac{13}{16}$ "

Model #	Part Number	Color Code	Outlet Pressure (In. w.c.)	Approx Inner Diameter	Approx Length
Adjustable Models:					
325-3	R325C10-26 R325C10-59 R325C10-412* R325C10-711 R325C10-1022 R325C10-1530 R325C10-P12	Plated Plated Violet White Red Yellow Tagged	2.0 to 6.0 5.0 to 9.0 # 4.0 to 12 7.0 to 11 10 to 22 15 to 30 1 psi-2 psi	$\frac{5}{8}$ "	1 $\frac{3}{4}$ " 2 $\frac{5}{16}$ " 1 $\frac{3}{4}$ " 2 $\frac{5}{8}$ " 2 $\frac{1}{8}$ " 2 $\frac{5}{16}$ " 2 $\frac{5}{16}$ "
	R325E10-26A R325E10-59A R325E10-412A* R325E10-711A R325E10-1022A R325E10-1530A R325E10-P12A	Plated Plated Violet White Red Yellow Tagged	2.0 to 6.0 5.0 to 9.0 # 4.0 to 12 7.0 to 11 10 to 22 15 to 30 1 psi-2 psi		2 $\frac{7}{8}$ " 4 $\frac{3}{16}$ " 3 $\frac{1}{8}$ " 4" 3 $\frac{9}{16}$ " 3 $\frac{5}{8}$ " 3 $\frac{3}{4}$ "
	R8110-25 R8110-412* R8110-1022 R8110-1530 R8110-2042 R325G10-711	Plated Violet Red Yellow Black White	2.0 to 5.0 4.0 to 12 10 to 22 15 to 30 20 to 42 7.0 to 11		3 $\frac{13}{16}$ " 3 $\frac{3}{4}$ " 4 $\frac{5}{16}$ " 4 $\frac{1}{2}$ " 4 $\frac{5}{16}$ " 4 $\frac{5}{8}$ "
	R9110-25 R9110-412* R9110-1022 R9110-1530 R9110-2042 R325J10-711	Plated Violet Red Yellow Black White	2.0 to 5.0 4.0 to 12 10 to 22 15 to 30 20 to 42 7.0 to 11		4 $\frac{15}{16}$ " 5 $\frac{1}{16}$ " 5 $\frac{5}{8}$ " 5 $\frac{7}{8}$ " 5 $\frac{3}{4}$ " 6 $\frac{1}{2}$ "
	R11110-25 R11110-412* R11110-1022 R11110-1530 R11110-2042 R325K10-711	Plated Violet Red Yellow Black White	2.0 to 5.0 4.0 to 12 10 to 22 15 to 30 20 to 42 7.0 to 11		7 $\frac{1}{6}$ " 7 $\frac{3}{8}$ " 8 $\frac{1}{8}$ " 8 $\frac{7}{16}$ " 8 $\frac{1}{4}$ " 8 $\frac{1}{2}$ "

Model #	Part Number	How Used	Color Code	Approx Inner Diameter	Approx Length
Zero Governor Models:					
R400Z	R400B10-13 R400B10Z	Regulate Counter	Brown Plated	$\frac{3}{8}$ " 1 $\frac{1}{2}$ "	1 $\frac{1}{4}$ " 3 $\frac{3}{4}$ "
R500Z	R5210-13 R500B10Z	Regulate Counter	Brown Plated	$\frac{9}{16}$ " $\frac{7}{16}$ "	2"
R600Z	R5310-13 R600B10Z	Regulate Counter	Brown Plated	$\frac{5}{8}$ "	2 $\frac{5}{8}$ "
R700Z	R6110-25 R700B10Z	Regulate Counter	Plated Plated	$\frac{3}{4}$ " $\frac{7}{8}$ "	3 $\frac{1}{4}$ " 3 $\frac{1}{2}$ "
210DZ	R8110-13 R210D10Z	Regulate Counter	Brown Plated	$\frac{7}{8}$ " 1"	3 $\frac{1}{8}$ " 3 $\frac{3}{8}$ "
210EZ	R9110-13 R210E10Z	Regulate Counter	Brown Plated	1 $\frac{1}{8}$ " 1 $\frac{7}{16}$ "	4" 4 $\frac{3}{4}$ "
210GZ	R11110-13 R210G10Z	Regulate Counter	Brown Plated	1 $\frac{1}{2}$ " 2 $\frac{1}{16}$ "	6 $\frac{1}{8}$ " 6 $\frac{3}{4}$ "
210JZ	R210J10-25 R210J10Z	Regulate Counter	Plated Plated	2 $\frac{1}{8}$ " 2 $\frac{7}{8}$ "	9 $\frac{1}{16}$ " 9 $\frac{1}{4}$ "

* Standard Spring

**L.P. - May be used with any minimum spring.

- or 6.0 to 10.0 for 5 psi

NOTE: Spring free length is given as an aid for the purpose of identification only. Variations of $\pm \frac{1}{2}$ ", although unlikely, can occur. This variation will not affect the spring range.

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 m³/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

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. 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: $P_2 = P_1 \times (Q_2/Q_1)^2$

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 Btu/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 the 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.

ACCESSORIES

Vent Tube Connector

Threaded sleeve - two piece assembly where the nut is tightened inside male connector.

- **11A03:** connects 1/8" female pipe thread to 1/8" O.D. tubing.
- **11A04:** connects 1/8" female pipe thread to 1/4" O.D. tubing.

Threaded sleeve nut - for RV20V.

- **11A08:** 5/16-24 threaded sleeve nut for 1/8" O.D. tubing.

Compression fitting - where nut and sleeve are slipped over tubing and tightened into fitting body.

- **11A05-42:** connects 1/4" female pipe thread to 1/4" O.D. tubing.
- **11A05-61:** connects 1/8" female pipe thread to 3/8" O.D. tubing.
- **11A05-63:** connects 3/8" female pipe thread to 3/8" O.D. tubing.
- **11A05-64:** connects 1/2" female pipe thread to 3/8" O.D. tubing.

Vent Limiting Device: $\checkmark$ Limiter®

Optional automatic vent limiting device - ball check permits unobstructed inhalation for fast regulator diaphragm response on opening cycle, but limits gas escapement to within ANSI standards should a diaphragm rupture.

NOTE: When using the vent limiting device, regulator must be mounted in an upright horizontal position. A Maxitrol vent limiting device should only be installed in the Maxitrol regulator that it is certified with.

- **12A04:** CSA certified for up to 1/2 psi (14" w.c.) inlet pressure. Use on RV48, RV52, RV53, RV61, R400(S), R500(S), R600(S) regulators. Color - brass. 1/8" NPT.
- **12A09:** CSA certified for 2 psi (LP) and 5 psi (natural) inlet pressure with 325-3 and 325-3L regulators; OPD48, OPD600. Color - green. 1/8" NPT.
- **12A34:** CSA certified for up to 1/2 psi (14" w.c.) inlet pressure with RV81. Color - brass. 3/8" NPT.
- **12A39:** CSA certified for 2 psi (LP) and 5 psi (natural) inlet pressure with 325-5 and 325-5L regulators; OPD210D, R700. Color - brass. 3/8" NPT.
- **12A49:** CSA certified for 2 psi (LP) and 5 psi (natural) inlet pressure with 325-7A, 325-7AL, 325-9, and 325-9L regulators; OPD210E. Color - brass. 1/2" NPT.

Satisfies ANSI Standards for both Natural and LP gas.

NOTE: Vent limiters are not recommended for use in models RV91, RV111 and 210 Series.

Vent Limiting Orifice

- **12A06:** Orifice hole is on side of body, under head. Fixed orifice equally limits inhalation and escapement. Use on RV48, RV52, RV53, RV61, R400(S), R500(S), R600(S) regulators. Color- brown. 1/8" NPT.

Satisfies ANSI Standards for both Natural and LP gas.



11A03



11A08



11A05



12A09



12A39



12A49



12A06



Vent Protector: vProtector®

Designed for outdoor applications. Use on vent opening to protect breather hole from rain, snow, dust, insects and other foreign particles.

NOTE: Vent protector MUST be mounted in an upright position.

- **13A30-50:** for 1/8" NPT vent. For outdoor use in 325-3, 325-3L, 325-3BL, RV48, RV52, RV53, RV61, R500(S)(Z), R600(S)(Z).
- **13A31-50:** for 3/8" NPT vent. For outdoor use in 325-5, 325-5L, R700(Z), RV81, and 210D.
- **13A32-50:** for 1/2" NPT vent. For outdoor use in 325-7A, 325-7AL, 325-9, 325-9L, RV91, 210E.
- **13A33-10:** for 3/4" NPT vent. For outdoor use in 325-11, 210G, RV111.

NOTE: NOT a vent limiting device. Consult Maxitrol regarding other configurations.

Vent Dampener

- **KVOP-3:** Used on 325-5, 325-5L.
- **KVOP-4:** Used on 325-7A, 325-7AL, 325-9L

NOTE: Should not be used with vent limiter.

Vent Screen

Brass, 40 mesh screen flame arrestor for insertion in vent outlet. Prevents ignition of gas-air mixture which might be present in upper diaphragm chamber.

- **13A03-1:** for 1/8" NPT vent.
- **13A03-2:** for 1/4" NPT vent.
- **13A03-3:** for 3/8" NPT vent.
- **13A03-4:** for 1/2" NPT vent.
- **13A03-6:** for 3/4" NPT vent.

Pressure Tap Connector

- **PF10:** Pressure tap connector can be installed as part of the control. It is a hose fitting incorporating a captured sealing means for testing inlet and outlet pressures. This eliminates the need for a special barb fitting. Optional per work order.

Dust Cap

Use on vent opening to prevent blockage of breather hole from dust or other foreign particles. Standard on all "L" models with 1/8" threaded vent.

- **13A09:** for 1/8" NPT vent. Press-in plastic cap.

Tamper Proof Seals

Permanent pressure sensitive backed paper. Attempted removal of these seals will destroy the face stock, leaving adhesive residue on surface beneath. Therefore, tampering can be easily detected. Available for all threaded models. Outlet pressure printed on seal.

- **101310:** for RV12, RV20L, RV47, RV48, RV52, RV53, RV61, R400(S)(Z), RV500(S)(Z), R600(S)(Z), R700(S)(Z), 325-3, and 325-5.
- **101311:** for RV81, RV91, RV111, 210D, 210E, 210G, 325-7A, 325-9, and 325-11.



CHOOSING A VENT ACCESSORY

NOTE: If vent limiting device is not used, regulator vent must be piped in accordance with government and local codes and regulations.

RV12L, RV20L	Integral vent limiting orifice with dust cap standard.
RV20VL	Integral vent limiting orifice with dust cap standard or use 11A08 threaded sleeve nut and run vent line as per code.
RV47	Must order: “L” suffix - Integral vent limiting orifice, includes dust cap; or “D” suffix - integral ball-check limiting device, includes dust cap.
RV48	1/8” NPT vent tap. Optional 12A04 or 12A06 vent limiter. Optional 13A09 dust cap. Optional 10A16-2 or 10A16-3 plastic thread protector.
RV48L	Integral vent limiting orifice.
RV52, RV53, RV61	1/8” NPT vent tap. Optional 12A04 or 12A06 vent limiter or 13A30 vent protector.
RV81	3/8” NPT vent tap. Optional 12A34 vent limiter or 13A31 vent protector.
RV91 (2 1/2” pipe size)	1/4” NPT vent tap. Optional 13A30 vent protector. <i>Vent limiter not approved for this model.</i>
RV91 (2” pipe size)	1/2” NPT vent tap. 2” pipe size. Optional 13A32 vent protector. <i>Vent limiter not approved for this model.</i>
RV111	3/4” NPT vent tap. <i>Vent limiter not approved for these models.</i> Optional 13A33 vent protector.
210D	3/8” NPT vent tap. Optional 13A31 vent protector. <i>Vent limiter not approved for this model.</i>
210E	1/2” NPT vent tap. Optional 13A32 vent protector. <i>Vent limiter not approved for this model.</i>
210G, 210J	3/4” NPT vent tap. <i>Vent limiter not approved for these models.</i> Optional 13A33 vent protector.
220D, 220E, 220G, 220J	Pilot regulator is equipped with 12A06 vent limiting orifice, separate vent line is not required.
325-3, 325-3L	1/8” NPT vent tap. Optional 12A09 vent limiting device or 13A30 vent protector.
325-5, 325-5L, R700	3/8” NPT vent tap. Optional 12A39 vent limiting device or 13A31 vent protector.
325-7A, 325-7AL	1/2” NPT vent tap. Optional 12A49 vent limiting device or 13A32 vent protector.
325-9, 325-9L	1/2” NPT vent tap. Optional 12A49 vent limiting device or 13A32 vent protector.
325-11, 325-11L	3/4” NPT vent tap. <i>Contact Maxitrol Customer Service for optional vent protector.</i> Optional 13A33 vent protector.
R400(S), R500(S), R600(S)	1/8’ NPT vent tap. Optional 12A04 vent limiting device.
OPD47	Integral vent limiting orifice, includes dust cap.
OPD48, OPD600	1/8” NPT vent tap. Optional 12A09 vent limiting device or 13A30 vent protector.
OPD210D, OPD700	3/8” NPT vent tap. Optional 12A39 vent limiting device or 13A31 vent protector.
OPD210G	3/4” NPT vent tap. <i>Contact Maxitrol Customer Service for optional vent protector.</i> Optional 13A33 vent protector.
OPD210E	1/2” NPT vent tap. Optional 12A49 vent limiting device or 13A32 vent protector.

NOTICE

Maxitrol vent limiting devices eliminate the need to run vent piping to the outside. Vent limiting devices are designed for use indoors and in spaces where limiting the amount of gas escapement due to diaphragm failure is critical. **Vent limiting devices should not be used outdoors if they are exposed to the environment.** When installed outdoors, the use of a certified Maxitrol Vent Protector is recommended.

Dead End Lockup

Pressure will be maintained within ANSI/CSA limits under no flow conditions. The amount of climb above set point is influenced by inlet pressure, flow rate before no flow condition and piping arrangement. Dead end lockup pressure regulators must be properly sized for desired performance.

Differential Pressure

The difference between inlet pressure to the pressure regulator and outlet pressure from the pressure regulator. To obtain differential pressure, subtract the desired outlet pressure from available inlet pressure.

Line Pressure Regulator

A pressure regulator intended for installation in a building gas distribution system between the building service regulator or LP-gas 2 psi service regulator and gas utilization equipment.

Lockup Type

Under no flow conditions, outlet pressure will rise above adjusted pressure but will not rise to line pressure.

Minimum Capacity (Main Burner Only)

Minimum capacity of a pressure regulator designed to control the flow to the main burner only.

Maximum Capacity (Main Burner Only)

Maximum capacity of a pressure regulator at which the pressure regulator will control main burner pressure within acceptable limits.

Maximum Capacity (Main Burner and Pilot)

Maximum capacity of a pressure regulator at which the pressure regulator will control main burner and pilot line pressure within acceptable limits.

Capacity

Total load Btu/h of all appliances combined.

Maximum Individual Load

Largest single appliance or burner served by the pressure regulator.

Maximum Individual Load Capacity

1. The maximum capacity or flow at which a line pressure regulator will control lockup pressure within acceptable limits.
2. The maximum capacity or flow at which a pressure regulator will control pilot line pressure within acceptable limits.

Non-Lockup Type

Under static conditions when no gas is flowing, outlet pressure will rise to line pressure.

Overpressure Protection Device (OPD)

A device which under abnormal conditions will act to reduce, restrict, or shut off the supply of gas flowing into a system to prevent pressure in that system from exceeding 2 psi.

- *Monitoring Regulator:* An overpressure protection device which functions as a second pressure regulator in series with the primary pressure regulator.
- *Overpressure Relief Device:* An overpressure protection device which functions by discharging gas from the downstream system to a safe location.
- *Overpressure Shut-Off Device:* An overpressure protection device which functions by completely shutting off the flow of gas into the downstream system.

Pressure Drop

The natural loss of pressure that occurs in the pressure regulator (or in any valve or pipe) due to friction. This friction impedes fluid motion, without regard to artificial losses deliberately created by diaphragm action. The equivalent flow rate for a loss in given pressure with the pressure regulator valve in a normally wide open position.

Rated Inlet Pressure

The highest inlet pressure for which the control is intended to be used.

Vent Limiter

A means that limits the flow of gas from the atmospheric chamber to the atmosphere in the event of a diaphragm rupture. This may be either a limiting orifice or a ball check vent limiting device.

- *Limiting Orifice Type:* A vent limiter where the flow through the limiter is the same in both directions

Zero Governors

They require an external impulse signal, such as top loading with pressure or generating vacuum in the downstream piping.

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