

# GAS PRESSURE REGULATOR & MODULATOR CATALOG

6th Edition



**MAXITROL®**

[www.maxitrol.com](http://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.**



# R/RS SERIES

## Balanced Valve Design

The R & RS series' double diaphragm balanced valve design makes it possible to maintain steady outlet pressure control with widely varying inlet pressures. The regulator is physically small yet has exceptional capacity characteristics. R & RS series regulators are intended for use with both main burner and pilot load applications. They are ideally suited for use with infrared heaters and pilot lines on large industrial heaters and boilers.



### Specifications

Pipe Sizes	3/8" to 1 1/4" threaded connections with NPT or ISO 7-1 threads.
Housing Material	R400(S), R500(S), R600(S), R700: aluminum.
Mounting	Suitable for multi-positional mounting. If a <b>vLimiter</b> ® or <b>vProtector</b> ® is installed, mount in an upright horizontal position only. The <b>vLimiter</b> ® 12A06 is multi-positional.  <b>NOTE:</b> 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	R400(S), R500(S), R600(S), R700: 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: R400(S), R500(S), R600(S): 1/2 psi (3.4 kPa), R700: 5 psi (34.5 kPa)
Maxitrol Tested:	R400, R500, R600: 1 psi (6.9 kPa); R400S, R500S, R600S: 5 psi (34.5 kPa)
Emergency Exposure Limits	R400, R500, R600: 2 psi (13.8 kPa) R400S, R500S, R600S, R700: 12.5 psi (86.2 kPa)
Ambient Temperature Ranges	R400(S), R500(S), R600(S), R700: -40 to 205°F (-40 to 96°C)
Zero Governor Models	Please refer to pages 32-37 for RZ model information.
Minimum Regulation	R400(S), R500(S), R600(S): Suitable for pilot flow applications. <b>Ⓟ</b> (Circle P) (0.15 CFH NG), None (1.5 CFH NG). R700: 10 CFH
Model Designations	(F) Factory-set; fixed non-adjustable regulator. (M) B.S.P. - PL parallel thread - conforms to ISO 7-1, where pressure tight joints are made on the threads. (S) S denotes models with a nitrile rubber bonded to aluminum valve.

**NOTE:** These R/RS regulators are not suitable for dead-end lockup service. They are capable of controlling pressure at very low flows such as standing pilots, but should not be used as a line pressure regulator for appliances equipped with electronic ignition unless the automatic control valve can open against line pressure.



## Capacities and Pressure Drop

Capacities expressed in CFH (m³/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)
R400(S)	3/8" x 3/8"	77 (2.3)	110 (3.1)	134 (3.8)	155 (4.3)	174 (4.9)	212 (5.9)	245 (6.9)	274 (7.7)	---	---	---
	1/2" x 1/2"	86 (2.4)	121 (3.4)	148 (4.1)	172 (4.82)	192 (5.4)	235 (6.6)	271 (7.6)	303 (8.5)	---	---	---
R500(S)	1/2" x 1/2"	163 (4.6)	231 (6.5)	283 (7.9)	327 (9.2)	366 (10.3)	447 (12.5)	516 (14.6)	577 (16.2)	635 (17.9)	685 (19.2)	730 (20.44)
	3/4" x 3/4"	196 (5.5)	277 (7.8)	340 (9.5)	392 (11.0)	438 (12.3)	537 (15.0)	620 (17.4)	693 (19.4)	760 (21.3)	820 (23.0)	876 (24.53)
R600(S)	3/4" x 3/4"	298 (8.3)	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 (34.86)	1335 (37.38)
	1" x 1"	330 (9.2)	468 (13.1)	572 (16.2)	661 (18.2)	739 (20.7)	906 (25.4)	1046 (29.3)	1169 (32.7)	1280 (35.8)	1380 (38.64)	1480 (41.44)
R700	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)
	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 58-59 for Regulator Sizing Requirements and Examples.

## Spring Selection Chart: inches w.c. (kPa)

Model	CSA Certified Springs			Other Springs Available					
R400(S)	3 to 6 (0.75 to 1.5) Plated	---	5 to 12 (1.25 to 3) Blue	1 to 3.5 (0.25 to 0.9) Brown	2 to 5 (0.5 to 1.25) Plated	3 to 8 (0.75 to 2) Pink	4 to 12 (1 to 3) Violet	10 to 22 (2.5 to 5.5) Red	---
R500(S)	3 to 6 (0.75 to 1.5) Plated	4 to 8 (1 to 2) Orange	5 to 12 (1.25 to 3) Blue	1 to 3.5 (0.25 to 0.9) Brown	2 to 5 (0.5 to 1.25) Plated	3 to 8 (0.75 to 2) Pink	4 to 12 (1 to 3) Violet	10 to 22 (2.5 to 5.5) Red	---
R600(S)	3 to 6 (0.75 to 1.5) Plated	4 to 8 (1 to 2) Orange	5 to 12 (1.25 to 3) Blue	1 to 3.5 (0.25 to 0.9) Brown	2 to 5 (0.5 to 1.25) Plated	3 to 8 (0.75 to 2) Pink	4 to 12 (1 to 3) Violet	10 to 22 (2.5 to 5.5) Red	15 to 30 (3.7 to 7.5) Yellow
R700	3 to 6 (0.75 to 1.5) Plated	4 to 8 (1 to 2) Orange	5 to 12 (1.25 to 3) Blue	1 to 3.5 (0.25 to 0.9) Brown	2 to 5 (0.5 to 1.25) Plated	3 to 8 (0.75 to 2) Pink	4 to 12 (1 to 3) Violet	10 to 22 (2.5 to 5.5) Red	---

**NOTE:** See pages 56-57 for complete Spring Selection Chart.

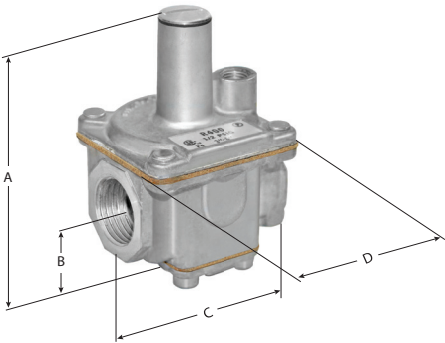
# R/RS SERIES

Balanced Valve Design

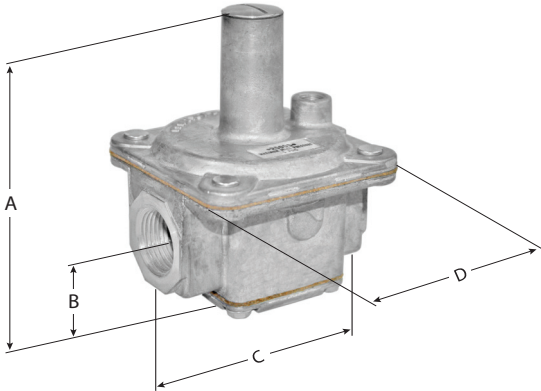
## Dimensions

Model	Pipe Size	Vent Connection	Swing Radius	Dimensions			
				A	B	C	D
R400(S)	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)
R500(S)	1/2", 3/4"	1/8" NPT	3.6" (90 mm)	4.7" (119 mm)	1.2" (30 mm)	3" (76 mm)	3.1" (79 mm)
R600(S)	3/4", 1"	1/8" NPT	4.3" (110 mm)	5.7" (145 mm)	1.5" (38 mm)	4" (103 mm)	3.9" (99 mm)
R700	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)

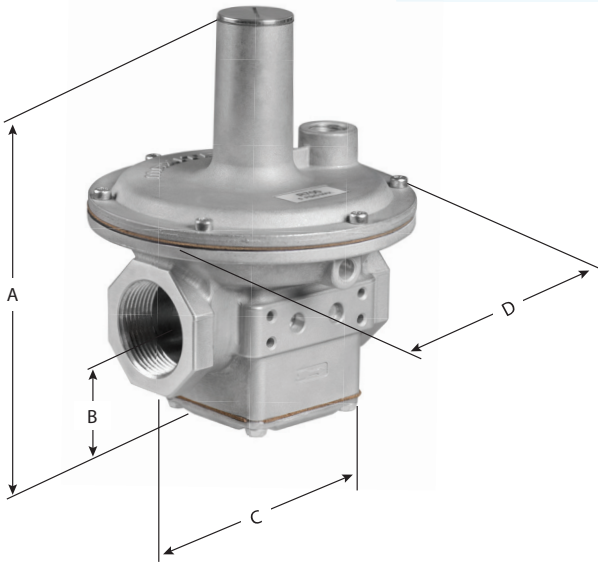
**NOTE:** Dimensions are maximums and to be used only as an aid in designing clearance for the valve.  
Actual production dimensions may vary somewhat from those shown.



R400(S)

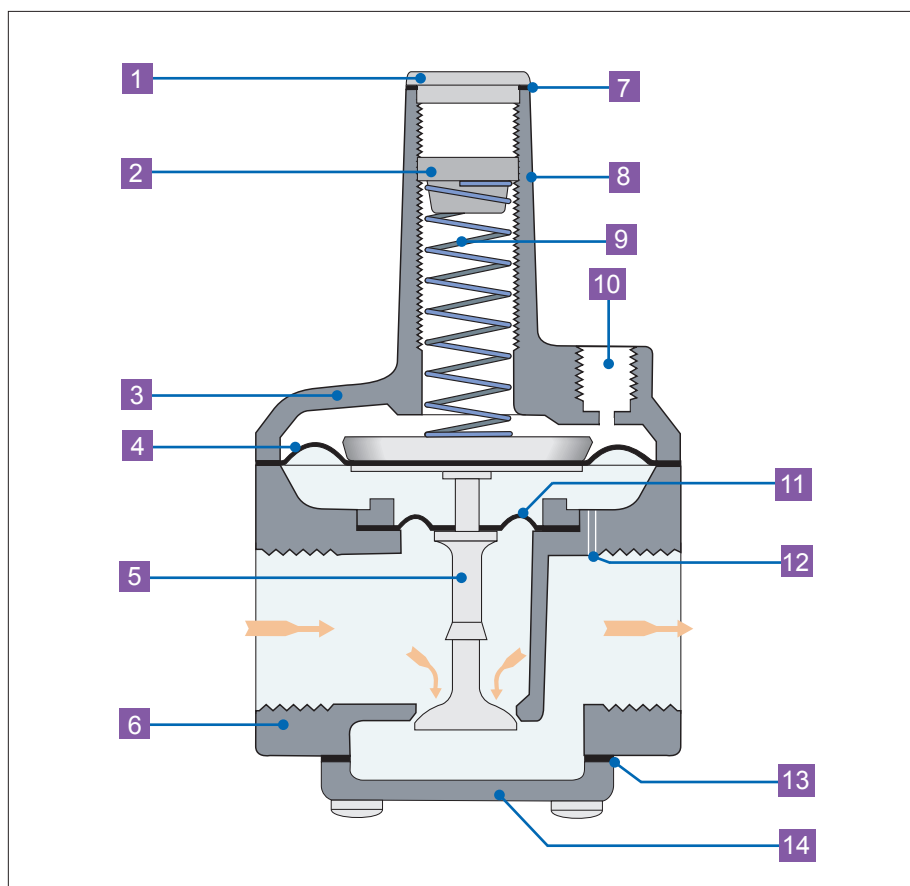


R500(S), R600(S)



R700

## R/RS Balanced Valve Design



- 1** Welch Plug or Seal Cap
- 2** Vibration Resistant 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** Bottom Plate Gasket
- 14** Bottom Plate

**NOTE:** Diagrams are graphical representations only and may differ from actual product.

# SIZING A REGULATOR

See [www.maxitrol.com](http://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<sup>3</sup>/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.**

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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 59.)



## 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.



# MAXITROL®



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### Maxitrol Company

23555 Telegraph Road  
Southfield, MI 48033  
USA

T: (+1) 248 356-1400  
infoNA@maxitrol.com

### Maxitrol GmbH & Co. KG

Valleys Innovation Centre  
Navigation Park  
Abercynon CF45 4SN  
United Kingdom

T: (+44) 1443 742-755  
M: (+44) 7866 492-261  
infoEU@maxitrol.com

### Maxitrol GmbH & Co. KG

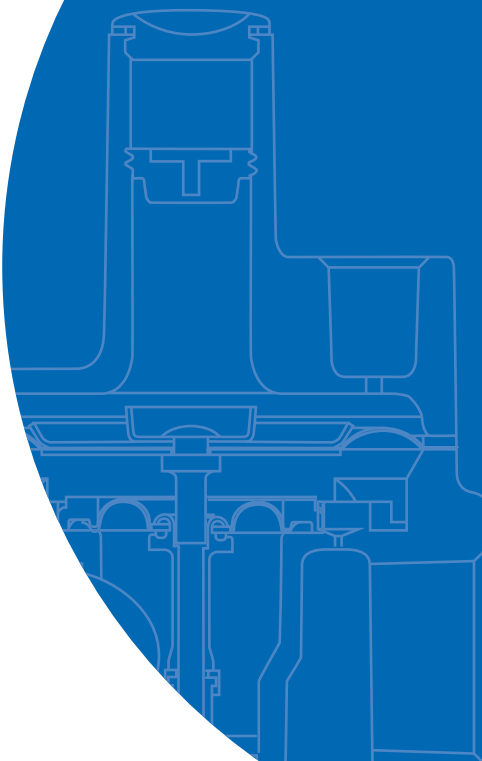
Warnstedter Str. 3  
06502 Thale  
Germany

T: (+49) 3947 400-0  
infoEU@maxitrol.com

### Maxitrol GmbH & Co. KG

Industriestr. 1  
48308 Senden  
Germany

T: (+49) 2597 9632-0  
senden@maxitrol.com



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