

# **GAS PRESSURE REGULATOR & MODULATOR CATALOG**

6th Edition



**MAXITROL®**

## **⚠ 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.**



# RV SERIES

## Straight-Thru-Flow Design

**M**axitrol's original straight-thru-flow (STF) design regulators are non-lockup type regulators for high capacities at low inlet pressures. The difference between STF design and other type regulators is the conical valve. The cone principal permits gas to flow straight through the regulator without changing direction. Frictional flow resistance is reduced, resulting in greater capacity. An improved flow pattern provides accurate, sensitive regulation at extremely low pressure differentials. Typical applications include residential, commercial, and industrial gas-fired appliances and equipment used on low or medium pressure gas supplies.



## Specifications

Pipe Sizes	1/2" to 3" threaded connections with NPT or ISO 7-1 threads. 4" 150lb.
Housing Material	RV52, RV53, RV61, RV81, RV91, RV111: aluminum
Mounting	RV52, RV53, RV61 are suitable for multi-positional mounting. RV81, RV91, RV111, mount in an upright position only. 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	RV52, RV53, RV61, RV81, RV91, RV111: ANSI Z21.18/CSA6.3 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: RV52, RV53, RV61, RV81, RV91, RV111: 1/2 psi (3.4 kPa)
Maxitrol Tested*	RV52, RV53: 1/2 psi (3.4 kPa) RV61, RV81, RV91, RV111: 1 psi (6.9 kPa) *Do not use if inlet pressure is more than 10 times desired outlet pressure.
Emergency Exposure Limits	RV52, RV53: 3 psi (21 kPa) RV61, RV81, RV91, RV111: 5 psi (34 kPa)
Gas Containment Limits	RV52, RV53: 15 psi (103 kPa) RV61, RV81, RV91, RV111: 25 psi (172 kPa)  <b>NOTE:</b> Internal damage may occur when exposed to these pressures.
Ambient Temperature Ranges	RV52, RV53, RV61, RV81, RV91, RV111: -40 to 205°F (-40 to 96°C) RV131: -40 to 125°F (-40 to 52°C)
Minimum Regulation	RV52, RV53: 20 CFH; RV61: 25 CFH; RV81, RV91: 50 CFH; RV111: 250 CFH. Expressed in CFH @ 0.64 sp gr gas.
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.



## Capacities and Pressure Drop

Capacities expressed in CFH (m<sup>3</sup>/h) @ 0.64 sp gr gas

Model	Pipe Size	CSA MAX	Pressure Drop - inches w.c. (kPa)												
			0.1 (0.02)	0.2 (0.04)	0.3 (0.07)	0.4 (0.10)	0.5 (0.12)	0.6 (0.15)	0.7 (0.17)	0.8 (0.20)	0.9 (0.22)	1.0 (0.25)	2.0 (0.5)	3.0 (0.75)	4.0 (1.0)
RV52	1/2" x 1/2" 3/4" x 3/4"	450 (12.7)	151 (4.2)	214 (6.1)	262 (7.4)	302 (8.5)	338 (9.5)	370 (10.5)	400 (11.3)	427 (12.1)	453 (12.8)	478 (13.5)	676 (19.1)	828 (23.4)	956 (27.1)
RV53	3/4" x 3/4" 1" x 1"	690 (19.5)	217 (6.1)	306 (8.6)	375 (10.6)	433 (12.2)	484 (13.7)	530 (15)	573 (16.2)	612 (17.3)	650 (18.4)	684 (19.3)	968 (27.4)	1185 (33.5)	1369 (38.7)
RV61	1" x 1" 1 1/4" x 1 1/4"	900 (24.5)	379 (10.7)	536 (15.1)	675 (19.1)	759 (21.5)	848 (24.0)	929 (26.3)	1004 (28.4)	1073 (30.4)	1138 (32.2)	1200 (34.0)	1742 (49.3)	2134 (60.4)	2464 (69.8)
RV81	1 1/4" x 1 1/4" 1 1/2" x 1 1/2"	2500 (70.8)	780 (22.1)	1102 (31.2)	1350 (38.2)	1559 (44.1)	1743 (49.5)	1909 (54.0)	2062 (58.4)	2204 (62.4)	2339 (66.2)	2465 (69.8)	3485 (98.7)	4269 (120)	4929 (139)
RV91	2" x 2" 2 1/2" x 2 1/2"	3275 (92.7)	1212 (34.3)	1714 (48.5)	2100 (59.4)	2424 (68.6)	2711 (76.7)	2969 (84.1)	3208 (90.8)	3429 (97.1)	3637 (103)	3834 (108)	5422 (153)	6640 (188)	7668 (217)
RV111	2 1/2" x 2 1/2" 3" x 3"	7500 (212)	2742 (78.0)	3878 (110)	4750 (134)	5485 (155)	6132 (175)	6718 (190)	7256 (205)	7757 (219)	8227 (233)	8572 (243)	12134 (343)	14862 (420)	17161 (486)

**NOTE:** See pages 58-59 for Regulator Sizing Requirements and Examples.

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

Model	CSA Certified Springs			Other Springs Available							
	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	---	---	---	---
RV52											
RV53											
RV61									10 to 22 (2.5 to 5.5) Red		
RV81								5 to 15 (1.25 to 3.7) Green	10 to 22 (2.5 to 5.5) Red		
RV91								5 to 15 (1.25 to 3.7) Green	10 to 22 (2.5 to 5.5) Red		
RV111								5 to 15 (1.25 to 3.7) Green	10 to 22 (2.5 to 5.5) Red		

**NOTE:** The area within the heavy line indicates CSA certified springs. See pages 56-57 for complete Spring Selection Chart.

\* The 2 to 5 inches w.c. (0.5 to 1.25 kPa) spring is also CSA certified for the RV61

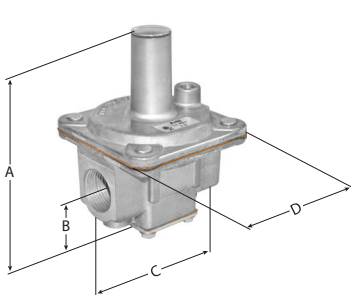
# RV SERIES

## Straight-Thru-Flow Design

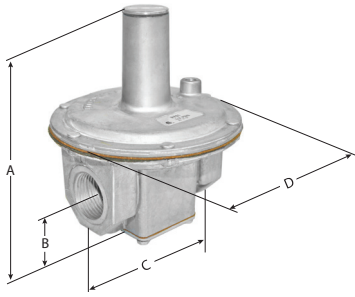
### Dimensions

Model	Pipe Size	Vent Connection	Swing Radius	Dimensions			
				A	B	C	D
RV52	1/2", 3/4"	1/8" NPT	3.6" (91 mm)	4.9" (124 mm)	1.3" (33 mm)	3.2" (81 mm)	3.3" (83 mm)
RV53	3/4", 1"	1/8" NPT	3.9" (99 mm)	5.2" (132 mm)	1.3" (33 mm)	3.8" (95 mm)	3.9" (99 mm)
RV61	1", 1 1/4"	1/8" NPT	4.8" (122 mm)	6.4" (164 mm)	1.6" (41 mm)	4.4" (111 mm)	5.4" (138 mm)
RV81	1 1/4", 1 1/2"	3/8" NPT	6.4" (162 mm)	8.4" (213 mm)	2" (51 mm)	6" (153 mm)	7" (178 mm)
RV91	2"	1/2" NPT	8.5" (216 mm)	10.8" (275 mm)	2.3" (60 mm)	6.5" (165 mm)	9.1" (232 mm)
	2 1/2"	1/4" NPT	8.3" (212 mm)	10.5" (267 mm)	2.4" (62 mm)	7.1" (181 mm)	9.1" (232 mm)
RV111	2 1/2", 3"	3/4" NPT	11.5" (284 mm)	15.1" (373 mm)	3.5" (89 mm)	9" (229 mm)	13.4" (324 mm)

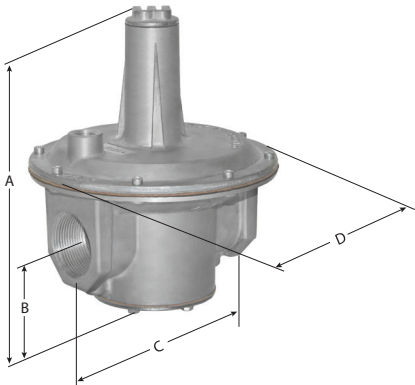
**NOTE:** Dimensions are maximums and to be used only as an aid in designing clearance for the valve.  
Actual production dimensions may vary somewhat from those shown.



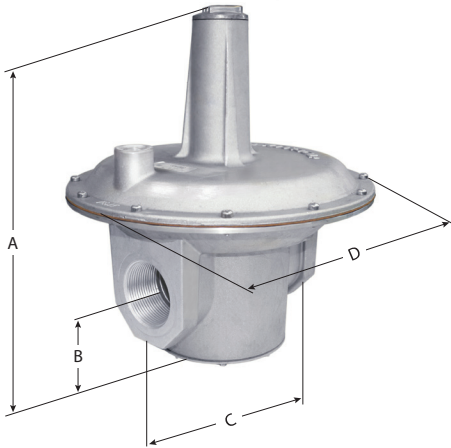
RV52, RV53



RV61

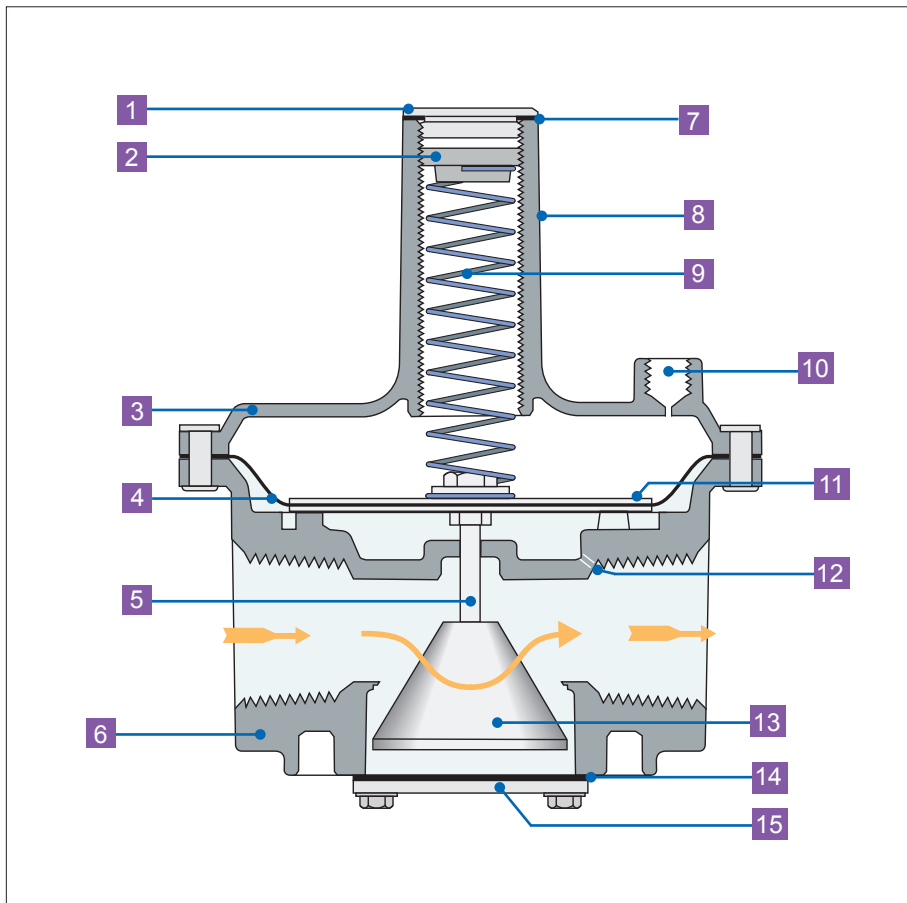


RV81, RV91



RV111

## Straight-Thru-Flow Design



- 1** Welch Plug or Seal Cap
- 2** Vibration Resistant Adjusting Screw
- 3** Top Housing
- 4** Diaphragm
- 5** Stem
- 6** Bottom Housing
- 7** Seal Cap Gasket
- 8** Stack
- 9** Spring
- 10** Vent Connection
- 11** Diaphragm Plates
- 12** Sensing Hole
- 13** Valve
- 14** Bottom Plate Gasket
- 15** 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:  $P2 = P1 \times (Q2/Q1)^2$

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 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.