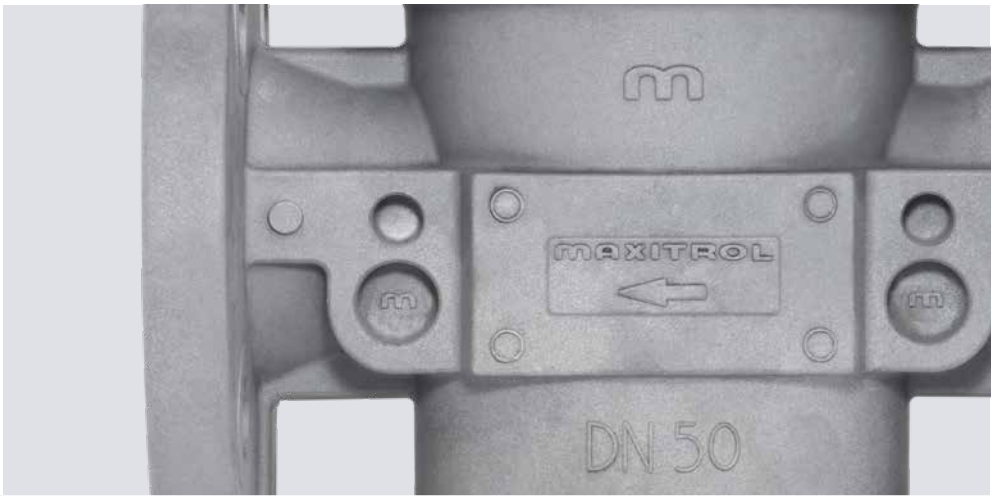


GAS PRESSURE REGULATOR AND FILTER CATALOG

11th Edition

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

Maxitrol 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.

The products in this catalogue comply with EU legislation. The technical specifications refer to the CE certification. Additional international approvals and certifications, e.g., CSA and UL, are available upon request.

CE

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:** Rp ⅜ to Rp 1 threaded connections according to ISO 7-1/EN10226-1
- **Housing Material:** Aluminum
- **Internal Components Material:** Steel, aluminum, brass, elastomer
- **Mounting:** Suitable for multi-positional mounting. Other than upright position will result in a slight difference in outlet pressure. If ball check vent limiting device is installed, mount in an upright position only. Install with gas flowing as indicated by the arrow on bottom casting.
- **Construction and Design/Certifications:** According to the Gas Appliances Regulation (EU) 2016/426 and EN 88-1
- **Fuel Gases:** Suitable for gases of EN 437
- **Maximum Inlet Pressure:** 36 kPa
- **Ambient Temperature Range:** -15 °C to 80 °C
- **Capacities:** See flow chart, page 21
- **Model Designations:** Models having a suffix letter, or a combination of suffix letters, listed below indicates the design modifications described.
  (S) S denotes models with a nitrile rubber bonded to aluminum valve.
  (M) B.S.P. - PL parallel thread "Rp" - conforms to ISO 7-1/EN10226-1, where pressure tight joints are made on the threads.

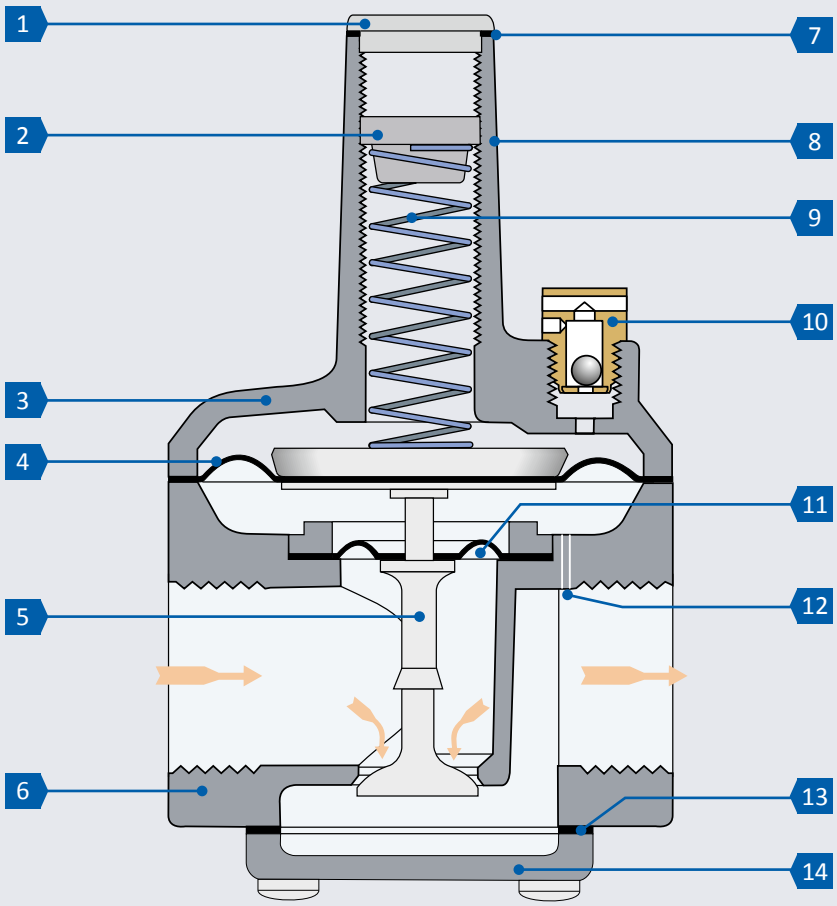
Dimensions

Model	Pipe Sizes	Swing Radius	Dimensions			
			A	B	C	D
R400S(M)...	Rp ⅜, Rp ½	60 mm	83 mm	24 mm	51 mm	51 mm
R500S(M)...	Rp ½, Rp ¾	90 mm	119 mm	30 mm	79 mm	76 mm
R600S(M)...	Rp ¾, Rp 1	110 mm	145 mm	38 mm	99 mm	103 mm

NOTE: NPT thread on request

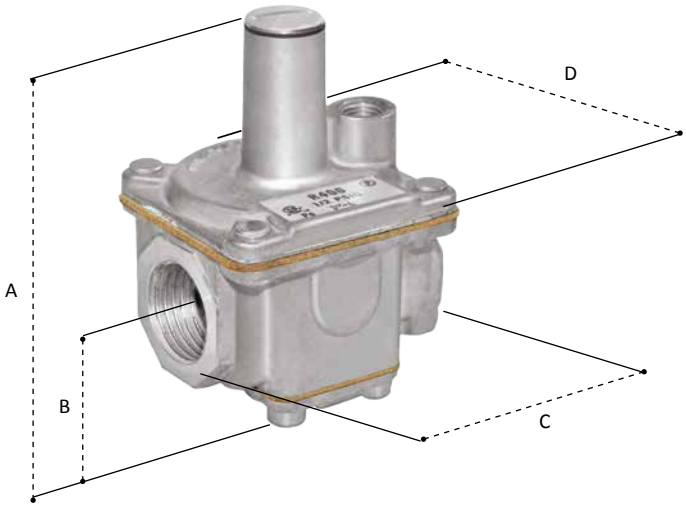
NOTE: *Dimensions are maximums and to be used only as an aid in designing clearance for the regulator. Actual production dimensions may vary somewhat from those shown.*

R/RS Balanced Valve Design



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

1. Welch Plug/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 Limiting Device
11. Balancing Diaphragm
12. Sensing Hole
13. Bottom Plate Gasket
14. Bottom Plate



▲ *R400S(M)...*

▲ *R500S(M)..., R600S(M)...*

210 SERIES

BALANCED VALVE DESIGN

The 210 series is a lockup characteristic regulator. Its balanced valve design makes it possible to maintain steady outlet pressure control with widely varying inlet pressures. The regulator has an integrated dampening mechanism in the breather outlet and the sensing tube to improve regulating stability and reduce hunting tendencies. The 210 series provides precise regulation over a wide range of pressures and flow rates. Applications include gas-fired boilers, steam generators, industrial furnaces, and ovens.

Specifications

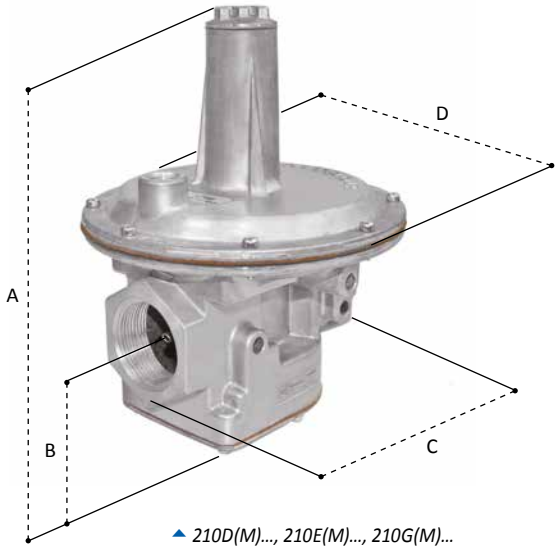
- **Pipe Sizes:**
  - 210D, 210E, 210G: Rp 1 to Rp 3 threaded connections according to ISO 7-1/EN10226-1
  - 210J: DN100 flanged connections according to ISO 7005-2, PN 16
- **Housing Material:**
  - 210D, 210E, 210G, 210J: Aluminum
- **Internal Components Material:** Steel, aluminum, brass, elastomer
- **Mounting:** Mount in an upright position only. Install with gas flowing as indicated by the arrow on the bottom casting. Other than upright position will result in a slight difference in outlet pressure. If ball check vent limiting device is installed, mount in an upright position only. Install with gas flowing as indicated by the arrow on bottom casting.
- **Construction and Design/Certifications:** According to the Gas Appliances Regulation (EU) 2016/426 and EN 88-1
- **Fuel Gases:** Suitable for gases of EN 437
- **Maximum Inlet Pressure:** 85 kPa
- **Ambient Temperature Range:** -15 °C to 80 °C
- **Capacities:** See flow chart, page 22
- **Model Designations:** Models having a suffix letter, or a combination of suffix letters, listed below indicates the design modifications described.
  (M) B.S.P. - PL parallel thread “Rp” - conforms to ISO 7-1/EN10226-1, where pressure tight joints are made on the threads.

Dimensions

Model	Pipe Size	Swing Radius	Dimensions			
			A	B	C	D
210D(M)...	Rp 1, Rp 1 ¼, Rp 1 ½	138 mm	228 mm	60 mm	152 mm	178 mm
210E(M)...	Rp 1 ½, Rp 2	211 mm	286 mm	75 mm	203 mm	232 mm
210G(M)...	Rp 2 ½, Rp 3	302 mm	419 mm	116 mm	300 mm	343 mm
210J(M)...	DN100	467 mm	616 mm	138 mm	349 mm	457 mm

NOTE: NPT thread on request

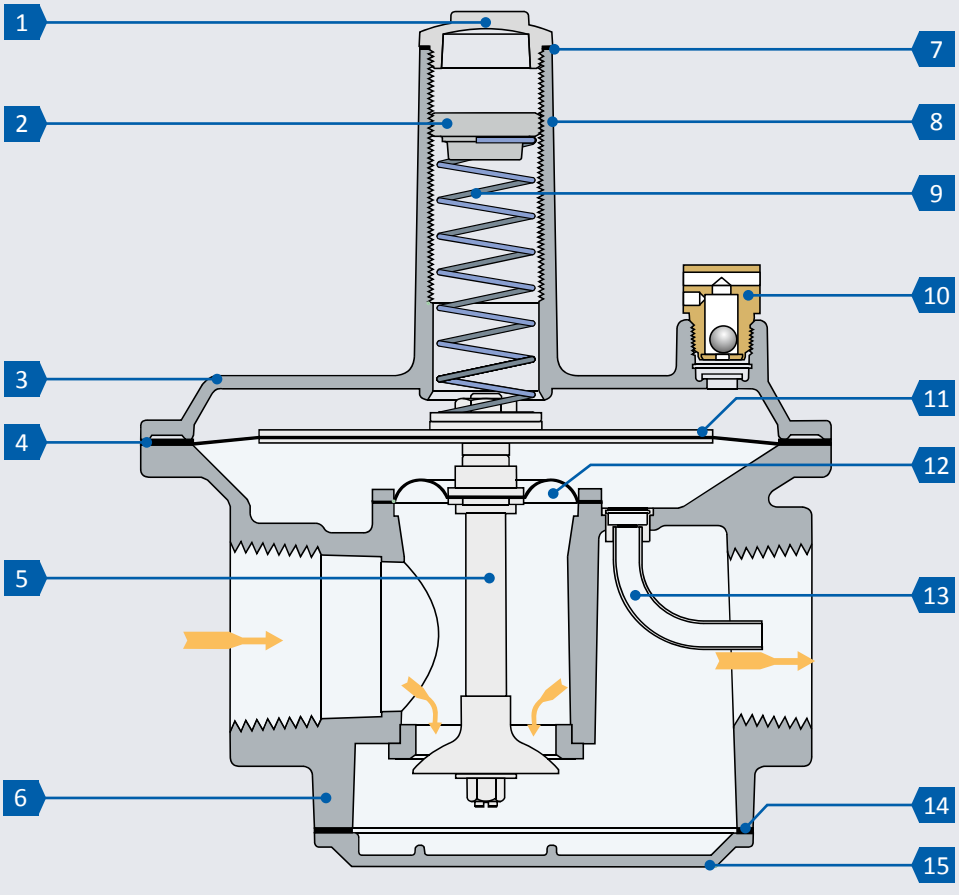
NOTE: *Dimensions are maximums and to be used only as an aid in designing clearance for the regulator. Actual production dimensions may vary somewhat from those shown.*



▲ *210D(M)..., 210E(M)..., 210G(M)...*

▲ *210J(M)...*

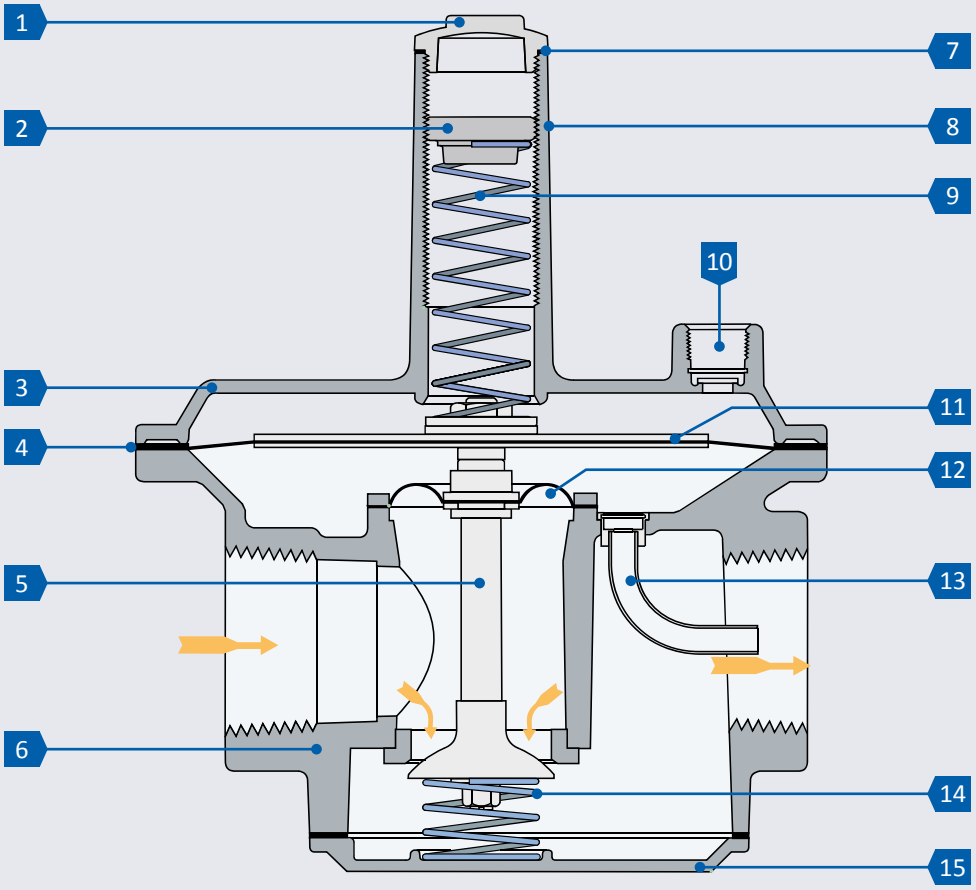
210 Balanced Valve Design



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

1. Welch Plug/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 Limiting Device
11. Diaphragm Plates
12. Balancing Diaphragm
13. Sensing Tube
14. Bottom Plate Gasket
15. Bottom Plate

210DZ, 210EZ, 210GZ, 210JZ



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

1. 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. Diaphragm Plates
12. Balancing Diaphragm
13. Sensing Tube
14. Counter Spring
15. Bottom Plate

SPRING SELECTION

Model	Spring Replacement Number	Spring Code											
		A	B	C	D	E	F	G	H	K	L	M	N
		Outlet Pressure Range (1 kPa = 10 mbar)											
		0.25 – 0.90	0.50 – 1.25	0.50 – 1.50	0.70 – 1.30	0.75 – 2.00	1.00 – 2.00	1.00 – 3.00	1.25 – 3.00	2.50 – 5.50	3.75 – 7.50	5.00 – 10.50	7.00 – 14.00
		Color											
		brown	(plated)	green	(plated)	pink	orange	violet	blue	red	yellow	black	label
RV12...	KIT ...-R1210T	X			X		X	X					
RV20...	KIT ...-R2010	X			X		X	X					
RV47...	KIT ...-R4710	X			X		X	X					
RV48...	KIT ...-R4810	X			X		X		X				
RV52...	KIT ...-R5210	X	X			X		X		X			
RV53...	KIT ...-R5310	X	X			X		X		X	X		
RV61...	KIT ...-R6110	X	X			X			X	X	X		
RV81...	KIT ...-R8110	X	X			X		X		X	X	X	
RV91...	KIT ...-R9110	X	X			X		X		X	X	X	
RV111...	KIT ...-R11110	X	X			X		X		X	X	X	
325-3...	KIT ...-R325C10			X				X		X	X		X
325-5...	KIT ...-R325E10			X				X		X	X		X
325-7...	KIT ...-R8110	X	X			X		X		X	X	X	
R400S...	KIT ...-R400B10	X	X			X		X		X			
R500S...	KIT ...-R5210	X	X			X		X		X			
R600S...	KIT ...-R5310	X	X			X		X		X	X		
210D...	KIT ...-R8110	X	X			X		X		X	X	X	
210E...	KIT ...-R9110	X	X			X		X		X	X	X	
210G...	KIT ...-R11110	X	X			X		X		X	X	X	
210J...	KIT ...-R13110		X			X		X		X	X	X	

NOTE: *No spring replacement required for zero pressure regulator models.*

ACCESSORIES

The following items are not sold separately. They are delivered with the gas pressure regulators.

12A04/12A09 12A39

Vent Limiting Device: vLimiter ®

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.
Optional automatic vent limiting device – ball check permits unobstructed inhalation for fast regulator diaphragm response on opening cycle, but limits gas escapement to be within EN 88 requirements should a diaphragm rupture:

- **12A04:** Use on RV52, RV53, RV61, R400S, R500S, and R600S regulators
- **12A09:** Use on 325-3 regulators
- **12A39:** Use on RV81, RV91, RV111, 325-5, 325-7 and 210 series regulators

NOTE: *When using the vent limiting device, the regulator must be mounted in a horizontal upright position.*

NOTE: *If no vent limiting device is used, regulator vent must be piped in accordance with government and local codes and regulations.*

Pressure Tap

Pressure tap installed as an optional part of the control. The hose fitting is provided with a captive screw plug. This eliminates the need for an additional fitting with a measuring connection.

- PF10: For RVLM (Poppets) and filters (others upon request).

PF10

Dust Cap

Use on vent opening to prevent blockage of breather hole from dust or other foreign particles. Standard on all “L” models with ⅛ threaded vent.

- **13A09:** For Rp ⅛ vent. Press-in plastic cap

13A09

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, R400S(Z), RV500S(Z), R600S(Z), 325-3, and 325-5
- **101311:** For RV81, RV91, RV111, 210D, 210E, 210G, 325-7

SIZING A REGULATOR

System Requirements

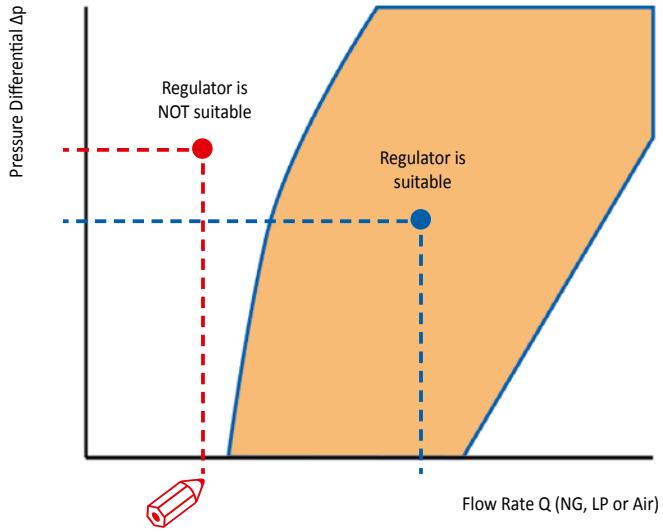
When sizing a regulator the following must be known:

- Fuel Gases
- Available Inlet Pressure
- Desired Outlet Pressure
- Zero Pressure Regulator 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 m^3/h or kW
- 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.

HOW TO DETERMINE THE SUITABLE REGULATOR FROM THE FLOW CHART

Draw a horizontal line with the known differential pressure (inlet pressure minus outlet pressure). Next draw a vertical line with the required flow rate (take care to use the axis with the correct fuel gas). The regulator where both lines cross each other within the range of regulation is the suitable regulator.



NOTE: *Please contact Maxitrol directly for more information on sizing a regulator.*

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

LEGEND FOR FLOW CHARTS

Δp = Pressure Differential in kPa
Q = Flow Rate in m^3/h
dv = Volumetric Rate of Flow
f = Friction Factor
ρ = Density

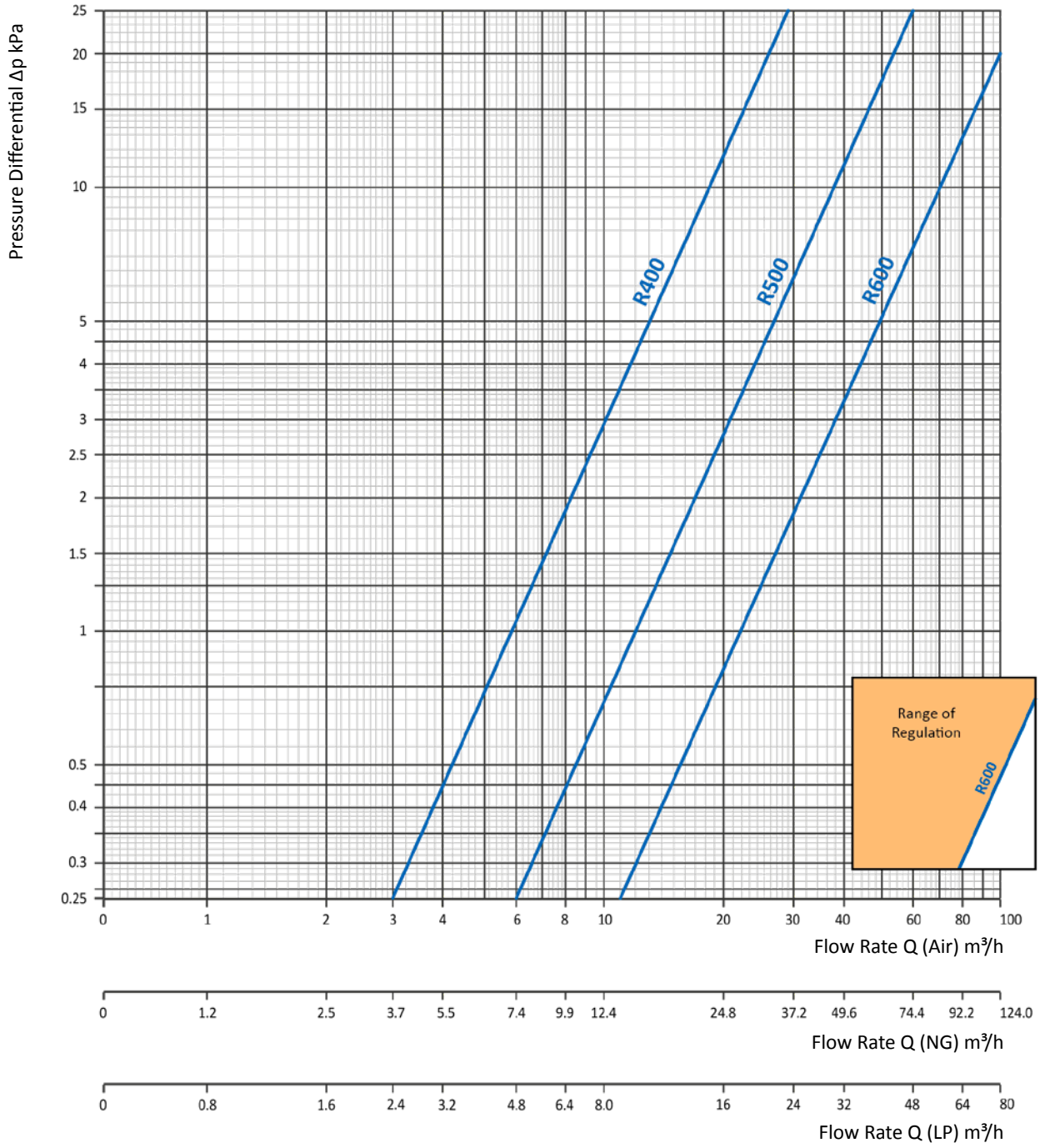
Pressure Units:	1 kPa = 10 mbar = 10 hPa
Air:	dv = 1.00 f = 1.00
Natural Gas (NG):	dv = 0.64 f = 1.24
Liquid petroleum gas (LPG):	dv = 1.56 f = 0.80

$$dv = \frac{\rho_{gas}}{\rho_{air}}$$

$$f = \sqrt{\frac{\rho_{air}}{\rho_{gas}}}$$

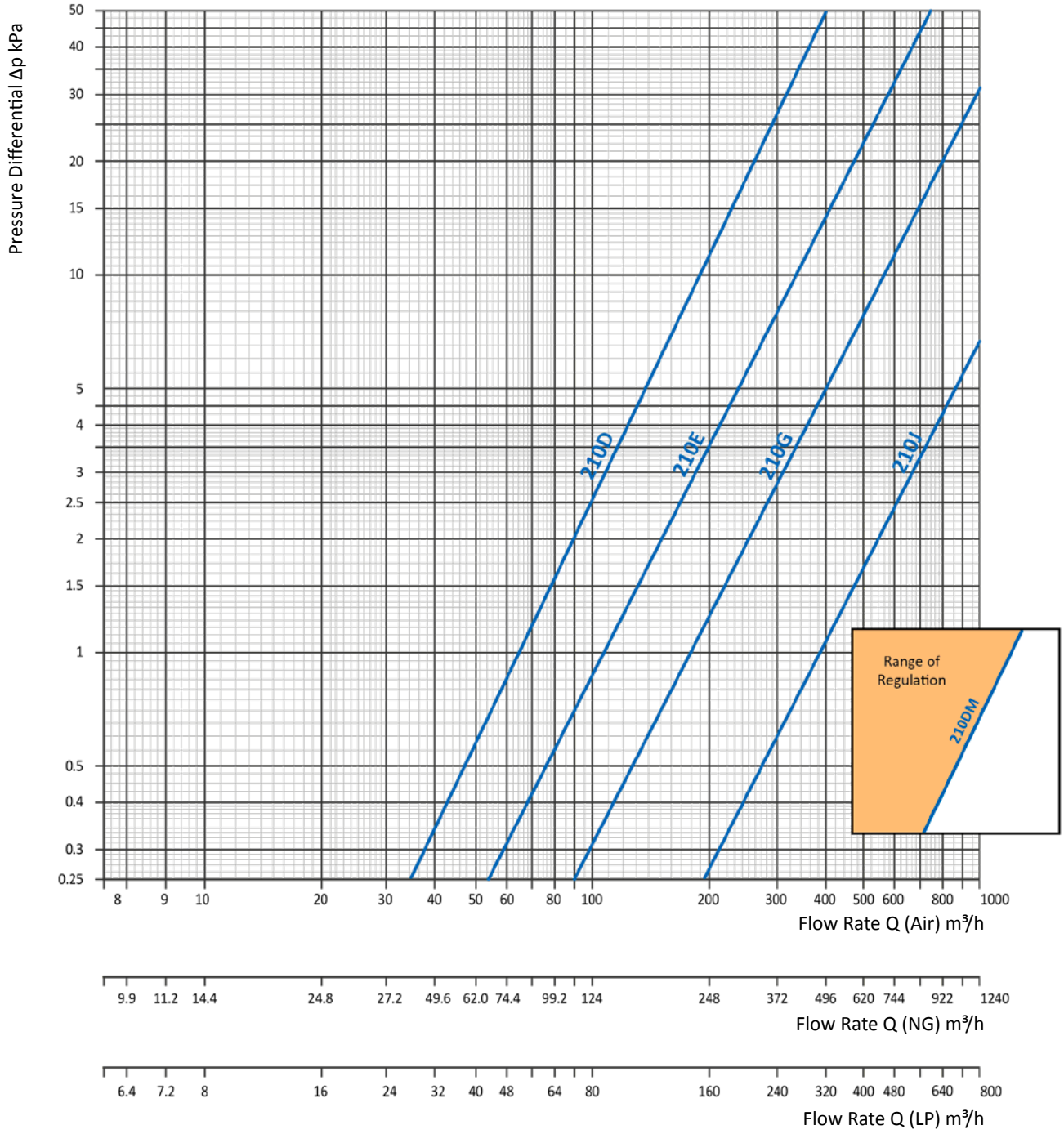
$$\dot{V}_{gas} = f \cdot \dot{V}_{air}$$

RS Series Appliance Regulators – Balanced Valve and Zero Governor Design



NOTE: *The given flow rates are approximate values. Actual flow rates may vary somewhat from those shown.*

210 Series Appliance Regulators – Balanced Valve and Zero Governor Design



NOTE: *The given flow rates are approximate values. Actual flow rates may vary somewhat from those shown.*

DEFINITIONS

Capacity
Total load m³/h of all appliances combined.

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

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.

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 Individual Load
Largest single appliance or burner served by the pressure regulator.

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

Minimum Capacity (Main Burner Only)
Minimum capacity of a pressure regulator designed to control the flow to the main burner only.

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

Pressure Differential
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.

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.

Pressure Tap
A hose fitting incorporating a captured sealing means for testing inlet and outlet pressures. This eliminates the need for a special barb fitting.

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

Gas/Air Ratio Regulators / Zero Pressure Regulators
They require an external impulse signal, such as top loading with pressure or generating vacuum in the downstream piping.

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