



MODEL 241 GAS PRESSURE REGULATOR

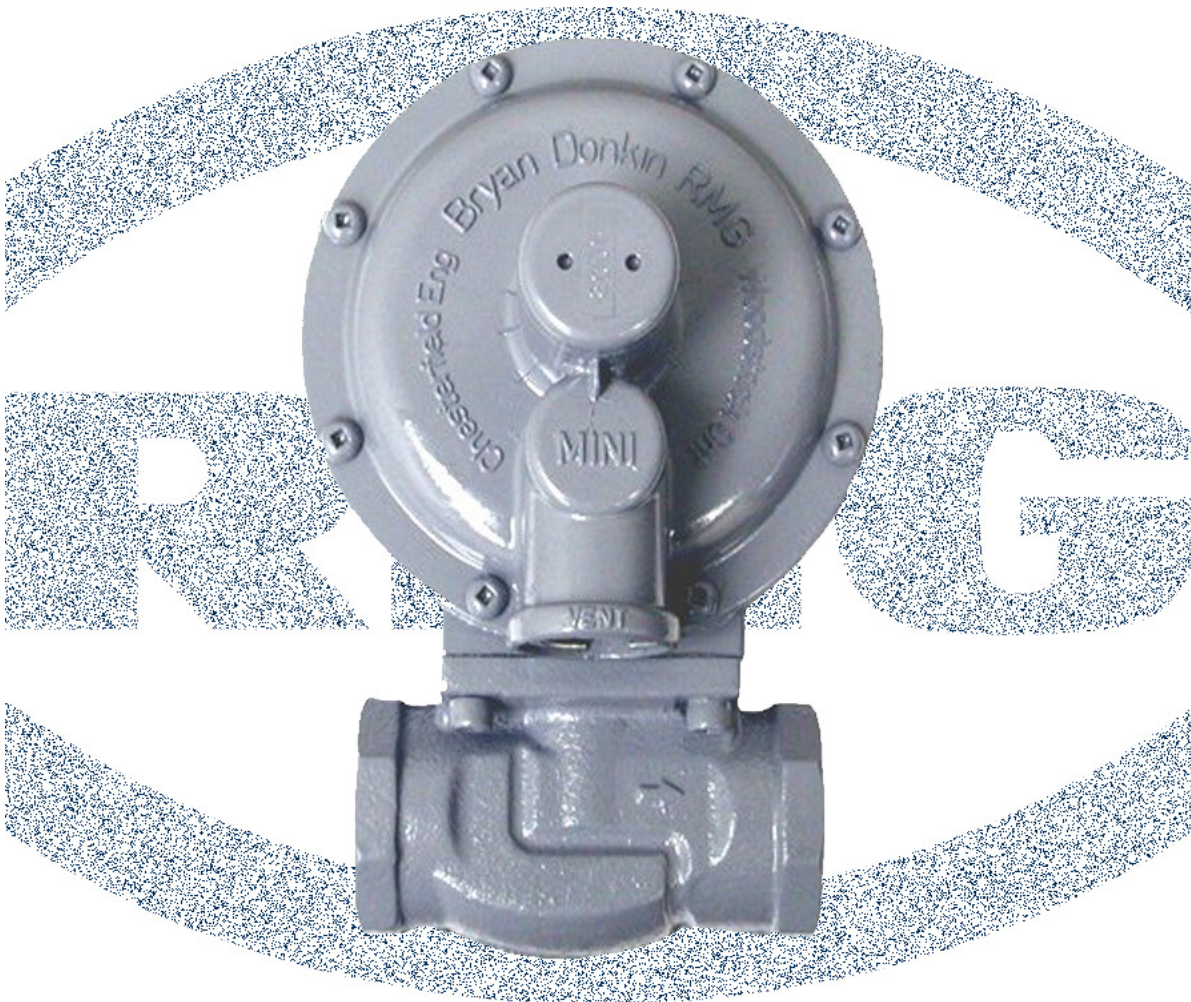
General Description

ΡΥΘΜΙΣΤΗΣ ΠΙΕΣΗΣ ΑΕΡΙΩΝ

Edition
GD241.06



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BRYAN DONKIN RMG CANADA LIMITED
Serving the Gas Industry—WORLDWIDE



MODEL 241 GAS PRESSURE REGULATOR

General Description

Applications

- Primarily utilized for residential, commercial and industrial applications
- For natural gas and all non-corrosive gaseous media
- Various options for specialty applications
- Fixed Factor Billing model available for PFM applications, that ensure outlet pressure accuracy to +/- 1% absolute pressure



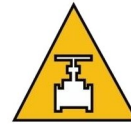
Characteristics

- Specifically designed for safe, accurate, pressure reduction of gaseous media
- Wide inlet pressure range 1–125 psig (0.07-8.5 bar) depending on orifice diameter
- Maximum inlet pressure 150 psig (10 bar)
- Maximum operating pressure 125 psig (8.5 bar)
- Spring-loaded, lever-operated to accommodate changes in inlet pressure
- Various interchangeable orifices for ease of maintenance and increased turndown ratio to accommodate a wide range of flows and pressure conditions (inlet & outlet pressures)
- Outlet pressure settings from 4" w.c. to 5.5 psig (10-385 mbar) over 6 spring ranges
- 3 different inlet/outlet thread diameters (National or British Pipe Standards – NPT, BSPT, BSPP)
- Various relief valve assemblies available (full, limited and zero capacity relief discharge)
- 3/4" threaded vent connection
- Ease of maintenance due to interchangeable diaphragm casing cartridge
- Various safety slam-shut valve (SSV) models available for pressure/flow cut-off protection
- Custom designed and pre-fabricated regulator assemblies available



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◇ Fixed Factor Billing for PFM applications—to maintain outlet pressure accuracy for applications that require downstream pressure to be held within +/- 1% absolute pressure—see Table 4

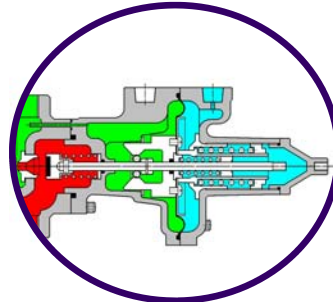
◇ Outlet pressures from 4" w.c. to 5.5 psig over 6 spring ranges. Set point can be adjusted easily with standard screwdriver. Regulator top cap has the capability of including the provision for a wire seal.

◇ 3/4" threaded vent connection protected by screen that is easily removed to attach vent extender or vent-line.

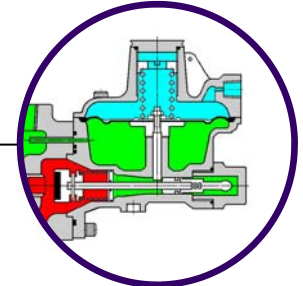
◇ Reinforced diaphragm for increased speed of response and durability.

◇ Available with full capacity, limited capacity, no capacity internal relief valve designs to manage the capability of the regulator to discharge over pressure gas. Safety diaphragms also available.

◇ Cartridge style regulator diaphragm casing design so retrofitting new regulator casings is very easy without removing regulator body from the pipe-work.



◇ Under & Over Pressure Safety Slam-Shut Valve (UPCO/OPCO) options available



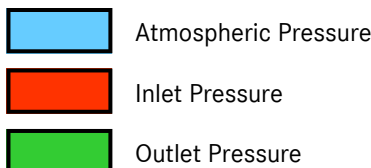
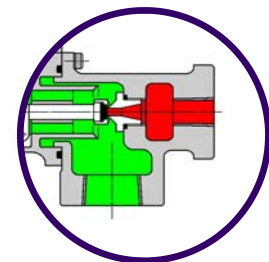
◇ Over Pressure Safety Slam-Shut Valve (OPCO) options available

◇ Integral slam-shut valves available to protect against under (UPCO) and over pressure (OPCO) conditions in the downstream pipe-work. Slam-shut valves also available with low differential pressure cut-off and thermal trip (T-type) protection feature to shut gas off if regulator is engulfed in a fire.

◇ Pressure test points available at inlet & outlet chambers of the body, as an option.

◇ Several available orifice diameters to accommodate a wide range of pressure conditions and flow require-

◇ 3 different pipe thread diameters available on either angle (90°) or inline (180°) body designs. 1/2", 3/4" or 1" NPT, BSPT or BSPP



◇ Available with integrated union fitting with o-ring seal for 100% bubble-tight seal on both inlet or outlet body connections to ease and reduce installation labor. Union available in standard or insulated versions.



MODEL 241 GAS PRESSURE REGULATOR

General Description

Available Constructions

241 R (angle): angle (90°) body design, full internal relief capacity

241 R: standard inline (180°) body design, full internal relief capacity

241 P (angle): angle (90°) body design, no internal relief capacity

241 P: standard inline (180°) body design, no internal relief capacity

241LR-290 OPCO: limited internal relief capacity with integral Over Pressure Cut-Off safety slam-shut valve

241P-290 OPCO: no internal relief capacity with integral Over Pressure Cut-Off safety slam-shut valve

241SD-290 OPCO SD: no internal relief capacity with safety diaphragms and Over Pressure Cut-Off safety slam-shut valve

241LR-309 UPCO/OPCO: limited internal relief capacity with integral Under and Over Pressure Cut-Off safety slam-shut valve

241P-309 UPCO/OPCO: no internal relief capacity with integral Under and Over Pressure Cut-Off safety slam-shut valve

241SD-309 UPCO/OPCO: no internal relief capacity with safety diaphragms and Under and Over Pressure Cut-Off safety slam-shut valve.

PFM version: fixed factor billing or pressure factor metering version for outlet pressure accuracy within $\pm 1\%$ absolute pressure. Outlet pressure range from 2 to 5.5 psig (140 to 385 mbar)

Thermal Protection (T-Type): no internal relief capacity with safety diaphragms and integral safety slam-shut valve (OPCO or UPCO/OPCO) that has shut-off protection if assembly is engulfed in a fire. Assembly has many steel component parts.

F version: complete with inlet mess filter

Body Sizes and Connection Types

Angle (90°) body design

- 1/2" x 1" screwed, 3/4" x 1" screwed, 1" x 1" screwed
- NPT, BSPT or BSPP threaded types
- U-type: with modified inlet union fitting on either inlet and/or outlet connections

Standard Inline (180°) design

- 1/2", 3/4", 1" threaded inlet/outlet
- NPT, BSPT or BSPP screwed types
- U-type: with modified inlet union fitting on either inlet and/or outlet connections



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General Description

Pressure Ratings

Maximum Recommended Inlet Pressure

- 150 psig (10 bar)

Maximum Recommended Operating Pressure

- 125 psig (8.5 bar) with 1/8" or 3.2mm orifice
- 75 psig (5 bar) with 3/16" or 5.0mm orifice
- 60 psig (4 bar) with 1/4" or 6.3mm orifice



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Materials of Construction

Inline Body	Ductile Iron
Angle Body	Cast Iron
Diaphragm Casings	Die Cast Aluminum
Diaphragm	Molded Nitrile Rubber with Nylon Reinforcing
Valve Head (Seat)	Buna-N Rubber
Diaphragm Plates	Steel
Orifice (standard)	Aluminum
Orifice (with incorporated slam-shut valve)	Brass or Stainless Steel (T-type)
Vent Screen	Stainless Steel
Fasteners	Steel
Top Cap (standard)	Molded Plastic
Top Cap (optional)	Aluminum

Weights

- w/ angle body – 3 lb. (1.36 kg)
- w/ inline body - 4 lb. (1.82 kg)
- w/ 290 OPCO - 5.25 lb. (2.3 kg)
- w/ 309 UPCO/OPCO – 6.25 lb. (2.8 kg)
- w/ 309 T-Type UPCO/OPCO – 8.8 lb. (4 kg)

Temperature Rating

- -40° to 60° Celsius
- -40° to 120° Fahrenheit



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Outlet Pressure Range

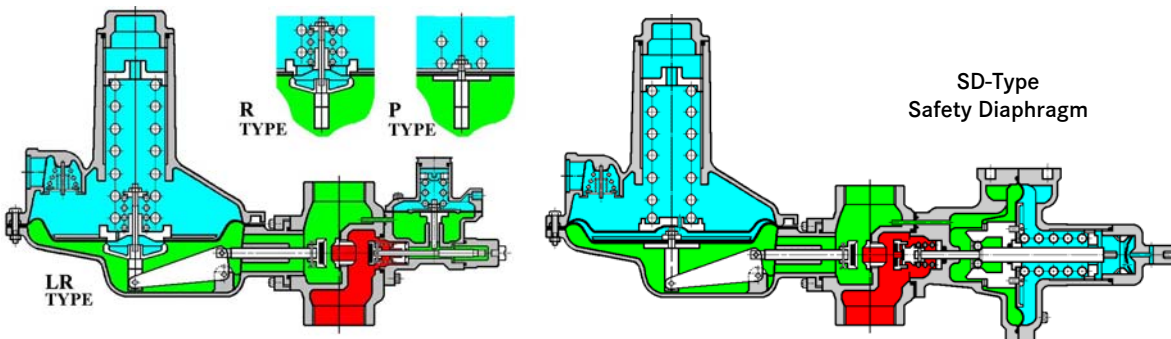
Range (imperial)	Range (metric)	Spring Number/Colour
4" – 5½" w.c.	10 – 14 mbar	121 (red)
5" – 9" w.c.	13 – 23 mbar	1001 (silver)
8" – 12" w.c.	20 – 30 mbar	1235 (dark green)
9" – 18" w.c.	23 – 45 mbar	307 (light green)
17" – 30" w.c.	43 – 75 mbar	1021 (self)
1 – 2 psig	70 – 140 mbar	1047 (purple)
3 – 5.5 psig	210 – 385 mbar	LX/001 (yellow)



Relief Pressure Range

Outlet Pressure Spring	Relief Range (imperial)	Relief Range (metric)
121	6" – 8" w.c.	15 – 20 mbar
1001	8" – 16" w.c.	20 – 40 mbar
1235	11" – 20" w.c.	27 – 50 mbar
307	16" – 28" w.c.	40 – 70 mbar
1021	25" – 42" w.c.	62 – 105 mbar
1047	1½ - 3 psig	105 – 210 mbar
LX/001	4½ - 8 psig	315 - 560 mbar

Relief Valve Options





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	Outlet Pressure	Inlet Pressure		Orifice Size (millimeters/inches)					
		psig	bar	1/8" (3.2mm)		3/16" (5.0mm)		1/4" (6.3mm)	
Spring 121 (range 4" - 5.5" w.c.) (range 10 - 14 mbar)	SET POINT 5" w.c. (12 mbar)	0.5	(0.035)					150	(4.2)
		1	(0.070)	75	(2.1)	150	(4.2)	250	(7.1)
		2	(0.140)	100	(2.8)	250	(7.1)	400	(11.3)
	DROOP/ BOOST 1" w.c. 2.5 mbar	5	(0.350)	175	(5.0)	575	(16.3)	775	(22.0)
		10	(0.700)	250	(7.1)	725	(20.5)	950	(26.9)
		15	(1)	300	(8.5)	850	(24.1)	1100	(31.2)
	Accuracy Class 20%	30	(2)	450	(12.7)	1200	(34.0)	1400	(39.7)
		45	(3)	650	(18.4)	1350	(38.2)	1550	(43.9)
		60	(4)	750	(21.2)	1500	(42.5)	1650	(46.7)
		75	(5)	850	(24.1)	1600	(45.3)		
		100	(7)	1150	(32.6)			ft ³ /hr	
		125	(8.6)	1300	(36.8)			(m ³ /hr)	
Spring 1001 (range 5" - 9" w.c.) (range 12 - 23 mbar)	SET POINT 7" w.c. (18 mbar)	0.5	(0.035)					150	(4.3)
		1	(0.070)	125	(3.5)	150	(4.3)	250	(7.1)
		2	(0.140)	150	(4.3)	250	(7.1)	375	(10.6)
	DROOP/ BOOST 1.4" w.c. 3.6 mbar	5	(0.350)	250	(7.1)	500	(14.2)	800	(22.7)
		10	(0.700)	400	(11.3)	800	(22.7)	1250	(35.4)
		15	(1)	550	(15.6)	1100	(31.2)	1500	(42.5)
	Accuracy Class 20%	30	(2)	900	(25.5)	1700	(48.2)	2350	(66.6)
		45	(3)	1150	(32.6)	2250	(63.7)	2500	(70.8)
		60	(4)	1400	(39.7)	2850	(80.7)	2650	(75.1)
		75	(5)	1500	(42.5)	3000	(85.0)		
		100	(7)	2000	(56.7)			ft ³ /hr	
		125	(8.6)	2400	(68.0)			(m ³ /hr)	
Spring 1235 (range 8" - 12" w.c.) (range 20 - 30 mbar)	SET POINT 10" w.c. (25 mbar)	1	(0.070)	125	(3.5)	200	(5.7)	300	(8.5)
		2	(0.140)	200	(5.7)	300	(8.5)	450	(12.7)
		5	(0.350)	325	(9.2)	500	(14.2)	850	(24.1)
	DROOP/ BOOST 2.0" w.c. 5.0 mbar	10	(0.700)	450	(12.7)	850	(24.1)	1400	(39.7)
		15	(1)	600	(17.0)	1800	(51.0)	1750	(49.6)
		30	(2)	950	(26.9)	1850	(52.4)	2700	(76.5)
	Accuracy Class 20%	45	(3)	1250	(35.4)	2200	(62.3)	3500	(99.2)
		60	(4)	1450	(41.1)	2850	(80.7)	3650	(103.4)
		75	(5)	1650	(46.7)	3000	(85.0)		
		100	(7)	2100	(59.5)			ft ³ /hr	
		125	(8.6)	2300	(65.2)			(m ³ /hr)	

Scfh (ft³/hr) - natural gas, 0.6 sg

Scmh (m³/hr) - natural gas, 0.6 sg



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	Outlet Pressure	Inlet Pressure		Orifice Size (millimeters/inches)					
		psig	bar	1/8" (3.2mm)		3/16" (5.0mm)		1/4" (6.3mm)	
Spring 307 (range 9" - 18" w.c.) (range 23 - 45 mbar)	SET POINT 15" w.c. (38 mbar)	1	(0.070)	125	(3.5)	175	(5.0)	250	(7.1)
		2	(0.140)	200	(5.7)	225	(6.4)	325	(9.2)
		5	(0.350)	275	(7.8)	325	(9.2)	600	(17.0)
	DROOP/ BOOST 3" w.c. 7.5 mbar	10	(0.700)	350	(9.9)	525	(14.9)	950	(26.9)
		15	(1)	475	(13.5)	850	(24.1)	1350	(38.2)
		30	(2)	850	(24.1)	1400	(39.7)	2300	(65.2)
	Accuracy Class 20%	45	(3)	1150	(32.6)	2100	(59.5)	3300	(93.5)
		60	(4)	1400	(39.7)	2750	(77.9)	4000	(113.3)
		75	(5)	1475	(41.8)	3000	(85.0)		
		100	(7)	1700	(48.2)	ft ³ /hr			
	125	(8.6)	2200	(62.3)	(m ³ /hr)				
Spring 1021 (range 17" - 30" w.c.) (range 42 - 75 mbar)	SET POINT 28" w.c. 1 psig (70 mbar)	2	(0.140)	200	(5.7)	250	(7.1)	350	(9.9)
		5	(0.350)	300	(8.5)	500	(14.2)	550	(15.6)
		10	(0.700)	400	(11.3)	850	(24.1)	1100	(31.2)
	DROOP/ BOOST 6" w.c. 15.0 mbar	15	(1)	550	(15.6)	1100	(31.2)	1600	(45.3)
		30	(2)	850	(24.1)	1600	(45.3)	2750	(77.9)
		45	(3)	1200	(34.0)	2200	(62.3)	3400	(96.3)
	Accuracy Class 20%	60	(4)	1400	(39.7)	3000	(85.0)	4100	(116.1)
		75	(5)	1550	(43.9)	3450	(97.7)		
		100	(7)	2000	(56.6)	ft ³ /hr			
		125	(8.6)	2550	(72.2)	(m ³ /hr)			
Spring 1047 (range 1-2.5 psig) (range 70 - 175 mbar)	SET POINT 2 psig (140 mbar)	5	(0.350)	200	(5.7)	300	(8.5)	450	(12.7)
		10	(0.700)	300	(8.5)	475	(13.5)	750	(21.2)
		15	(1)	400	(11.3)	600	(17.0)	950	(26.9)
	DROOP/ BOOST 11" w.c. 28.0 mbar	30	(2)	600	(17.0)	800	(22.7)	1200	(34.0)
		45	(3)	725	(20.5)	1125	(31.9)	2000	(56.7)
		60	(4)	1050	(29.7)	1450	(41.1)	2750	(77.9)
	Accuracy Class 20%	75	(5)	1350	(38.2)	1600	(45.3)		
		100	(7)	1500	(42.5)	ft ³ /hr			
125		(8.6)	1650	(47.7)	(m ³ /hr)				

Scfh (ft³/hr) - natural gas, 0.6 sg

Scmh (m³/hr) - natural gas, 0.6 sg



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General Description



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	Outlet Pressure	Inlet Pressure		Orifice Size (millimeters/inches)						
		psig	bar	1/8" (3.2mm)		3/16" (5.0mm)		1/4" (6.3mm)		
Spring LX/001 (range 3-5.5 psig) (range 210 – 385 mbar)	SET POINT 5.0 psig (350 mbar)	10	(0.700)	400	(11.3)	550	(15.6)	600	(17.0)	
		15	(1)	500	(14.2)	700	(19.8)	850	(24.1)	
		30	(2)	650	(18.4)	1050	(29.7)	1250	(35.4)	
	DROOP/ BOOST 1 psig 70 mbar	45	(3)	800	(22.7)	1400	(39.7)	1500	(42.5)	
		60	(4)	1100	(31.2)	1700	(48.2)	1900	(53.8)	
		75	(5)	1400	(39.7)	1900	(53.8)			
	Accuracy Class 20%	100	(7)	1600	(45.3)					ft ³ /hr
		125	(8.6)	1900	(53.8)					(m ³ /hr)

Pressure Factor Metering ($\pm 1\%$ Absolute Pressure) Measurement Canada Approval – AP-GL-89-0032

	Outlet Pressure	Inlet Pressure		Orifice Size (millimeters/inches)			
		psig	bar	1/8" (3.2mm)		3/16" (5.0mm)	
Spring 1047 (range 1-2.5 psig) (range 70 – 175 mbar)	SET POINT 2.0 psig (140 mbar)	10	(0.700)	130	(3.7)	170	(4.8)
		20	(1.4)	180	(5.1)	270	(7.6)
		30	(2)	335	(9.5)	620	(17.6)
	DROOP/ BOOST 0.16 psig 11 mbar	40	(2.7)	645	(18.3)	865	(24.5)
		50	(3.4)	835	(23.6)	1150	(32.6)
		60	(4.1)	1160	(32.9)	1600	(45.3)
	Accuracy Class $\pm 1\%$ ABS P.F.M.	70	(4.8)	1405	(39.8)	1795 (50.8)	
		80	(5.4)	1510	(42.8)	ft ³ /hr	
	90	(6.1)	1730	(49.0)	(m ³ /hr)		

Inlet Pressure Set Point=40 psig

	Outlet Pressure	Inlet Pressure		Orifice Size (millimeters/inches)			
		psig	bar	1/8" (3.2mm)		3/16" (5.0mm)	
Spring LX/001 (range 3-5.5 psig) (range 210 – 385 mbar)	SET POINT 5.0 psig (350 mbar)	10	(0.700)	65	(1.8)	65	(1.8)
		20	(1.4)	130	(3.7)	155	(4.4)
		30	(2)	230	(6.5)	310	(8.8)
	DROOP/ BOOST 0.2 psig 14 mbar	40	(2.7)	310	(8.8)	350	(9.9)
		50	(3.4)	385	(10.9)	450	(12.7)
		60	(4.1)	410	(11.6)	475	(13.5)
	Accuracy Class $\pm 1\%$ ABS P.F.M.	70	(4.8)	865	(24.5)	1020 (28.9)	
		80	(5.4)	1095	(31.0)	ft ³ /hr	
	90	(6.1)	1250	(35.4)	(m ³ /hr)		

Inlet Pressure Set Point=40 psig

Scfh (ft³/hr) - natural gas, 0.6 sg

Scmh (m³/hr) - natural gas, 0.6 sg



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General Description

Capacity Calculation or Correction Factors for Other Gases

<u>Gas Type</u>	<u>Specific Gravity</u>	<u>Correction Factor (CF)</u>
Air	1.00	0.77
Butane	2.01	0.55
Carbon Dioxide (Dry)	1.52	0.63
Carbon Monoxide (Dry)	0.97	0.79
Natural Gas	0.60	1.00
Nitrogen	0.97	0.79
Propane	1.53	0.63
Propane-Air-Mix	1.20	0.71

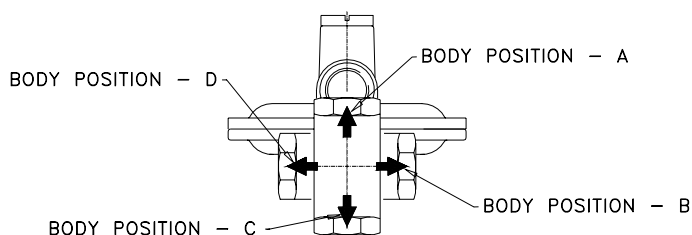
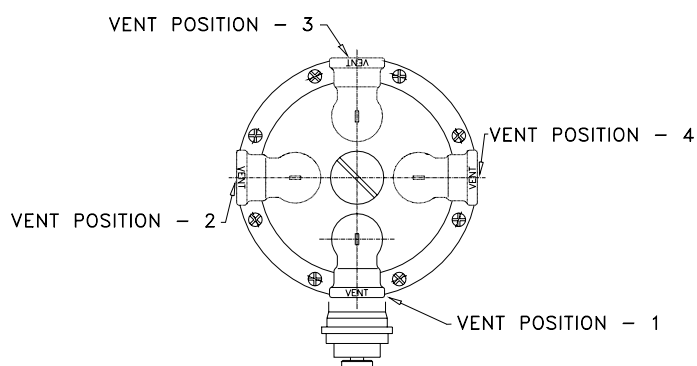


Vent and Body Orientations

Orientation – Body Position Letter followed by Vent Position Number

For Other Correction Factors

$$C_F = \sqrt{\frac{0.6}{\text{Sg of Gas}}}$$



MATCH GAS FLOW INDICATING
ARROW FOUND ON CASTING

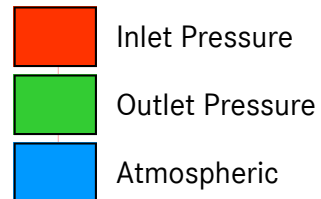
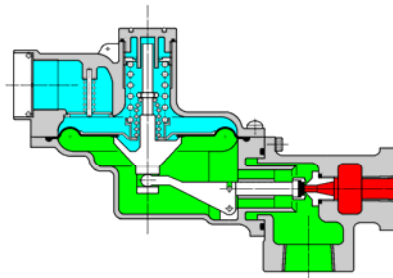


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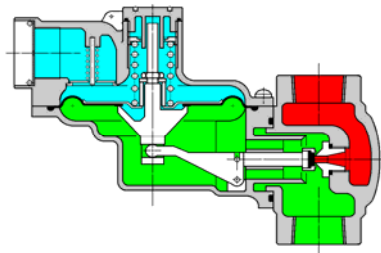
General Description

Sectional Diagrams

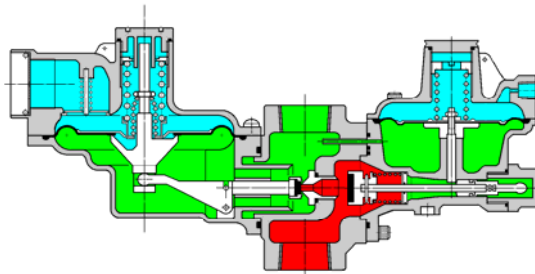
241 (angle body)



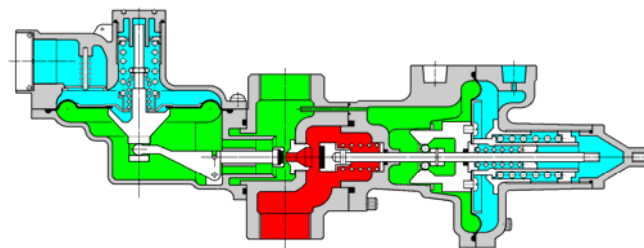
241 (inline body)



241 – 290 OPCO



241 – 309 UPCO/OPCO



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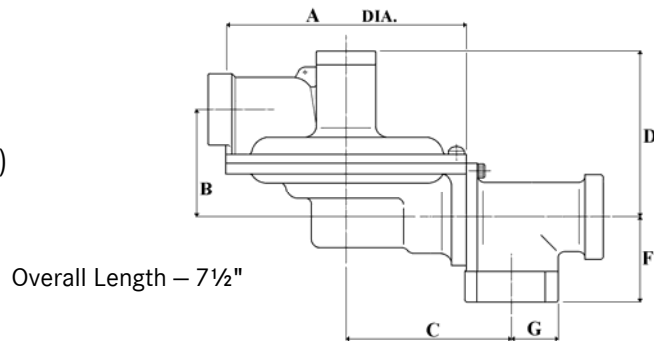


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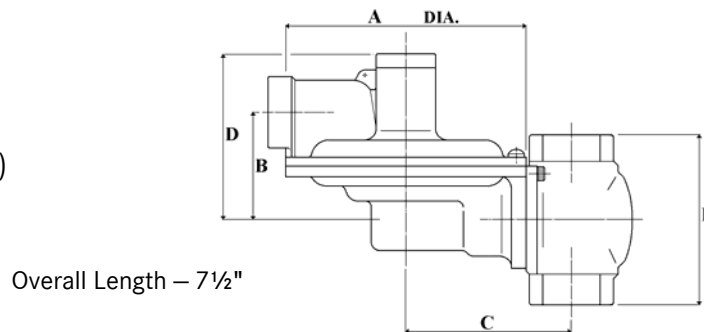
General Description

Dimensional Drawings

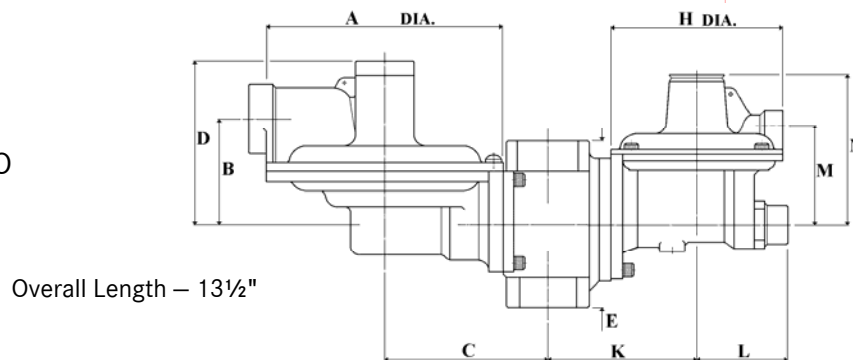
241 (angle body)



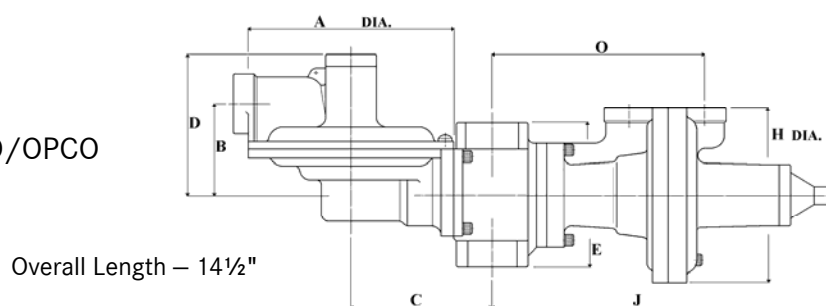
241 (inline body)



241 – 290 OPCO



241 – 309 UPCO/OPCO



A	B	C	D	E	F	G	H	J	K	L	M	N	O
5½"	2½"	3¾"	4½"	4"	2"	1¾"	3¾"	5¾"	4¼"	2½"	2¼"	3¾"	3¾"



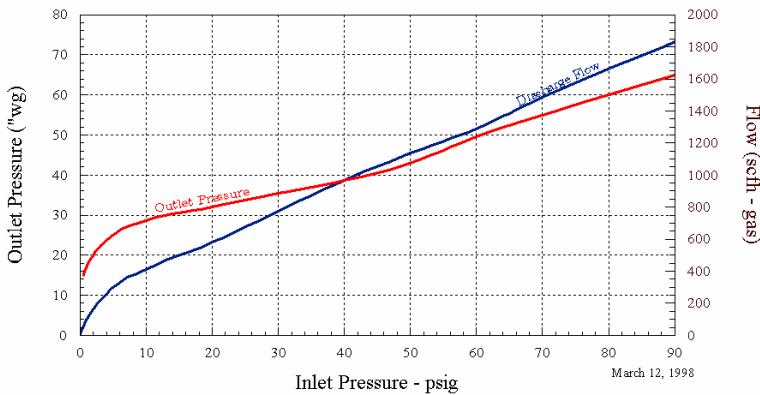
MODEL 241 GAS PRESSURE REGULATOR

General Description

Relief Valve Discharge Capacity vs. Outlet Pressure Control

1/8" Orifice

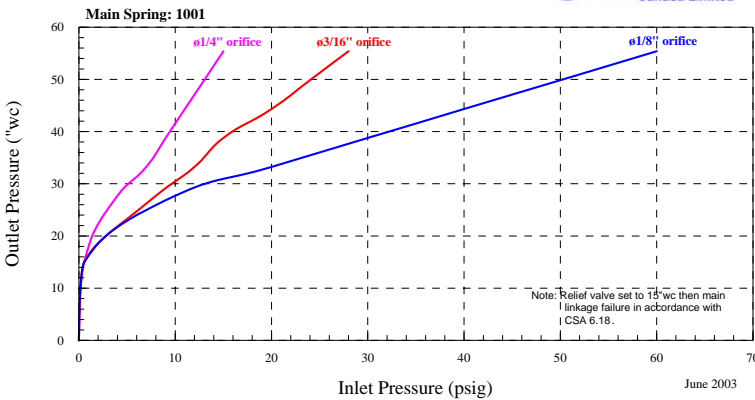
Relief Valve Performance of fig.241 Regulator
- Angle Body c/w 1/8" orifice -



CHRYSSAFIDIS

Relief Valve Performance – Outlet Pressure Increase by Orifice Diameter

Relief Valve Performance of fig.241





MODEL 241 GAS PRESSURE REGULATOR

General Description

Internal Relief Valve and Safety Slam Shut Valve Options

Regulators for Reduced Clearances or Venting Limitations

- Please contact one of our representatives for more detailed information

Regulators for Indoor Installations without Requirement for Vent-Line

- Please contact one of our representatives for more detailed information



Internal Safety Relief Valve (SRV) Description

- The SRV is designed to monitor the pressure in the outlet chamber or downstream of the regulator and to relieve by either venting gas leakages or full flow capacity (depending on the device design) into the atmosphere in the event of an over-pressure condition.
- If the pressure in the measuring chamber exceeds the force of the set point spring of the relief valve, the diaphragm rises and opens the relief valve. The gas then flows from the outlet pressure line to atmosphere or another desired location.
- The relief gas pressure and flow is discharged until the pressure is returned to the predetermined safe level.
- The safety relief pressure of the internal relief valve occurs slightly above the set pressure of the main spring or outlet pressure

Safety Slam Shut Valve (SSV) Description

- The SSV is designed to monitor the outlet pressure and to interrupt the gas flow, if preset limits are exceeded.
- This preset pressure is adjustable in the field.
- If the measured pressure reaches the set point of the SSV, a release mechanism is triggered and the SSV closes the valve on the inlet pressure side of the regulator. This closing function completely blocks the forward movement of gas past the SSV.
- Safety slam shut valves are available in over pressure cut off (OPCO) protection or under and over pressure cut off (UPCO/OPCO) protection.
- After the SSV is tripped, the condition that triggered the closing of the valve must be addressed and then the SSV can be manually reset.
- Thermal trip protection is also available as an option to shut the gas flow off, if the safety slam shut valve is exposed to high temperatures or engulfed in a fire (T-Type).
- Please contact one of our representatives for the technical brochure on all of our safety slam shut valves.



MODEL 241 GAS PRESSURE REGULATOR

General Description

Commissioning and Installation Instructions

Please contact one of our representatives for the installation and commissioning instructions. Additionally, the commissioning and installation instructions are found in each box that the equipment is shipped in and can be downloaded from the website.



Ordering Information

1. Inlet pressure (minimum and maximum)
2. Outlet pressure requirement
3. Flow requirement (minimum and maximum)
4. Type of gas
5. Temperature
6. Pipe connections (inlet and outlet)
7. Internal or external impulse (sensing)
8. Safety options or requirements (SRV and/or SSV)
9. Vent and body orientation
10. Other critical information (system design or description)

Product Portfolio

- Pressure regulators for every application from domestic, commercial, industrial to transmission line, city gate stations and other gas utility applications.
- Safety relief valves
- Safety slam shut valves
- Metering equipment (rotary displacement, turbine, vortex shedding, ultrasonic)
- Volume correctors (temperature and pressure)
- Filters
- Underground pressure regulator and metering modules
- Ball valves
- Station design and assembly (prefabricated stations, skid-mounted assemblies, small regulator/meter-set assemblies)
- Flame arrestors
- Data logging and software
- Check and non-return valves
- Training and after-sales service