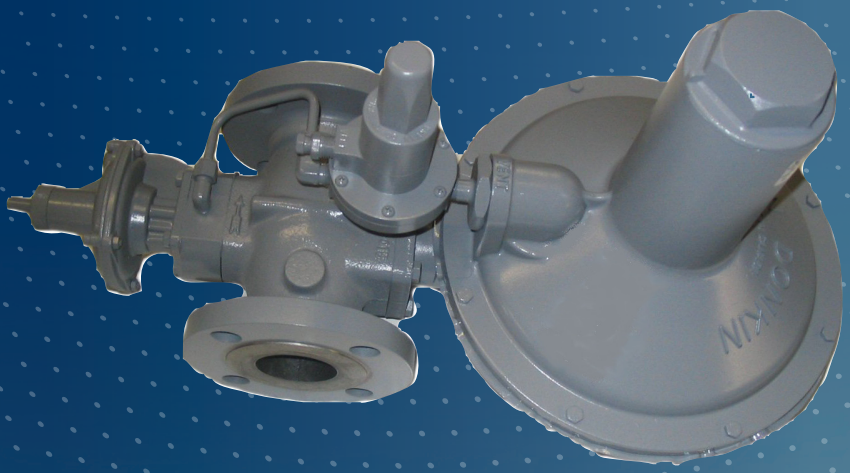
SERVING THE GAS INDUSTRY WORLDWIDE

Technical Bulletin

GAS PRESSURE REGULATOR SERIES 273PL



August 2009

BRYAN DONKIN RMG CANADA LIMITED

Introduction

- The Model 273 Regulator is a pilot operated regulator for superior accuracy and control.
- Use with confidence on natural and manufactured gases of non-aggressive nature, including nitrogen, carbon dioxide, propane, butane, etc.
- Versions available for special applications like indoor applications with no requirement for vent-line
- Fixed factor billing model available (PFM) for applications that require accuracy to +/- 1% absolute pressure

Characteristics

- Wide inlet pressure range 1-275 psi (0.07-19.0 bar) depending on orifice diameter
- Maximum inlet pressure 275 psi (19.0 bar) without incorporated safety slam-shut valve
- Maximum inlet pressure 150 psig (10.3 bar) with incorporated safety slam-shut valve
- Maximum allowable operating pressure 275 psi (19.0 bar) depeding on orifice diameter
- Pilot-operated to accomodate changes in inlet pressure, increase accuracy and widen outlet pressure ranges
- Various interchangeable orifices for ease of maintenance, customability and increased turndown ratio to accomodate a wide range of flow and pressure requirements
- Outlet pressure range from 1.0 psi - 60.0 psi (0.14-6.1 bar) over 3 pilot spring ranges
- 2“ flanged connections (180^{O}) in ANSI150 RF/FF or PN16 RF/FF. Flanged body material available in ductile iron
- Available with internal (I.C.L.) or external (E.C.L.) impluse
- Ease of maintenance due to interchangeable diaphragm casing cartridge
- Various integral safety slam-shut (SSV) models available for pressure/flow shut off protection.
- Custom designed and pre-fabricated regulator meter set assemblies available
- Pilot-loaded version available for higher outlet pressure set points and higher flow capacities

Available Constructions

- 273PL - standard version
- 273PL-309LP UPCO/OPCO - with integral under and over-pressure slam-shut device (over pressure up to 8 psi or 560 mbar)
- 273PL-309LP2 UPCO/OPCO - with integral under and over-pressure slam-shut device (over pressure up to 22 psi or 1.5 bar)
- 273PL-309LP4 UPCO/OPCO - with integral under and over-pressure slam-shut device (over pressure up to 66 psi or 4.5 bar)
- 273SD-309 UPCO/OPCO - safety diaphragm version with integral over and under-pressure slam-shut device and internal vent limiting devices (indoor installations only)
- PFM Version - fixed factor billing or pressure factor metering version for outlet presure accuracy of +/- 1% absolute pressure

PRESSURE RATINGS		
Maximum Inlet Pressure	all orifices	275 psi (19.0 bar)
Maximum Allowable Operating Pressure	20.0mm	275 psi (19.0 bar)
	30.0mm	150 psi (10.3 bar)

Temperature Rating
-40° to 60° Celsius
-40° to 120° Fehrenheit

Weights

- with cast iron screwed body - 22 lb. (10.0 kg)
- with cast iron flanged body - 30 lb. (13.6 kg)
- with ductile iron flanged body - 32 lb. (14.5 kg)
- with cast steel flanged body - 38 lb. (17.3 kg)
- with 309LP UPCO/OPCO - add 2.2 lb. (0.9 kg)
- with 309LP2 UPCO/OPCO - add 2.5 lb. (1.1 kg)
- with 309LP4 UPCO/OPCO - add 8.0 lb. (3.2 kg)
- with 309 T-type UPCO/OPCO - add 4.75 lb. (2.2 kg)

MATERIALS OF CONSTRUCTION	
Screwed Body Casting	Cast Iron
Flanged Body Casting	Cast Iron, Ductile Iron, Cast Steel
Diaphragm Casings	Die Cast Aluminum
Main Diaphragm	Molded Nitrile Rubber with Nylon Reinforcing
Valve Head (Seat)	Polyurethane
Diaphragm Plates	Steel
Orifice	Brass or Stainless Steel (t-type)
Pilot Supply Line (standard)	Copper
Pilot Supply Line (optional)	Stainless Steel
Top Cap	Aluminum
Springs	Steel
Lever	Steel
Pilot Regulator Body and Diaphragm Casing	Aluminum
Pilot Regulator Diaphragm	Molded Nitrile Rubber with Nylon Reinforcing
O-Rings	Nitrile Rubber

Spring Ranges, Relief Valve Ranges, Correction Factors

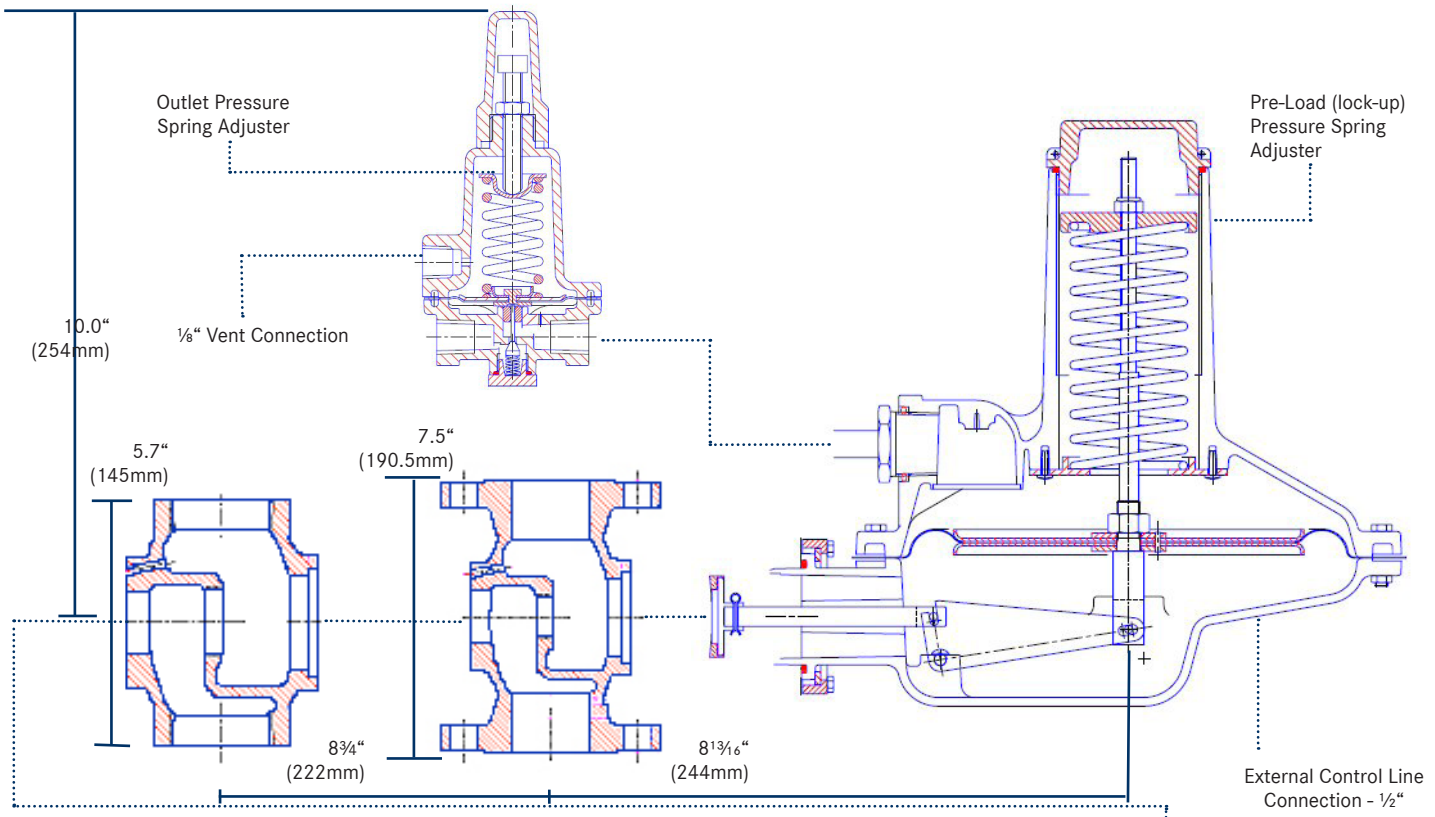
OUTLET PRESSURE RANGES		
Range (imperial)	Range (metric)	Spring Number (Colour)
1.0 - 5.0 psi	0.07 - 0.35 bar	1047 (purple)
3.0 - 30.0 psi	0.21 - 2.1 bar	TX/002 (silver)
30.0 - 60.0 psig	2.1 - 4.1 bar	TX/003 (blue)

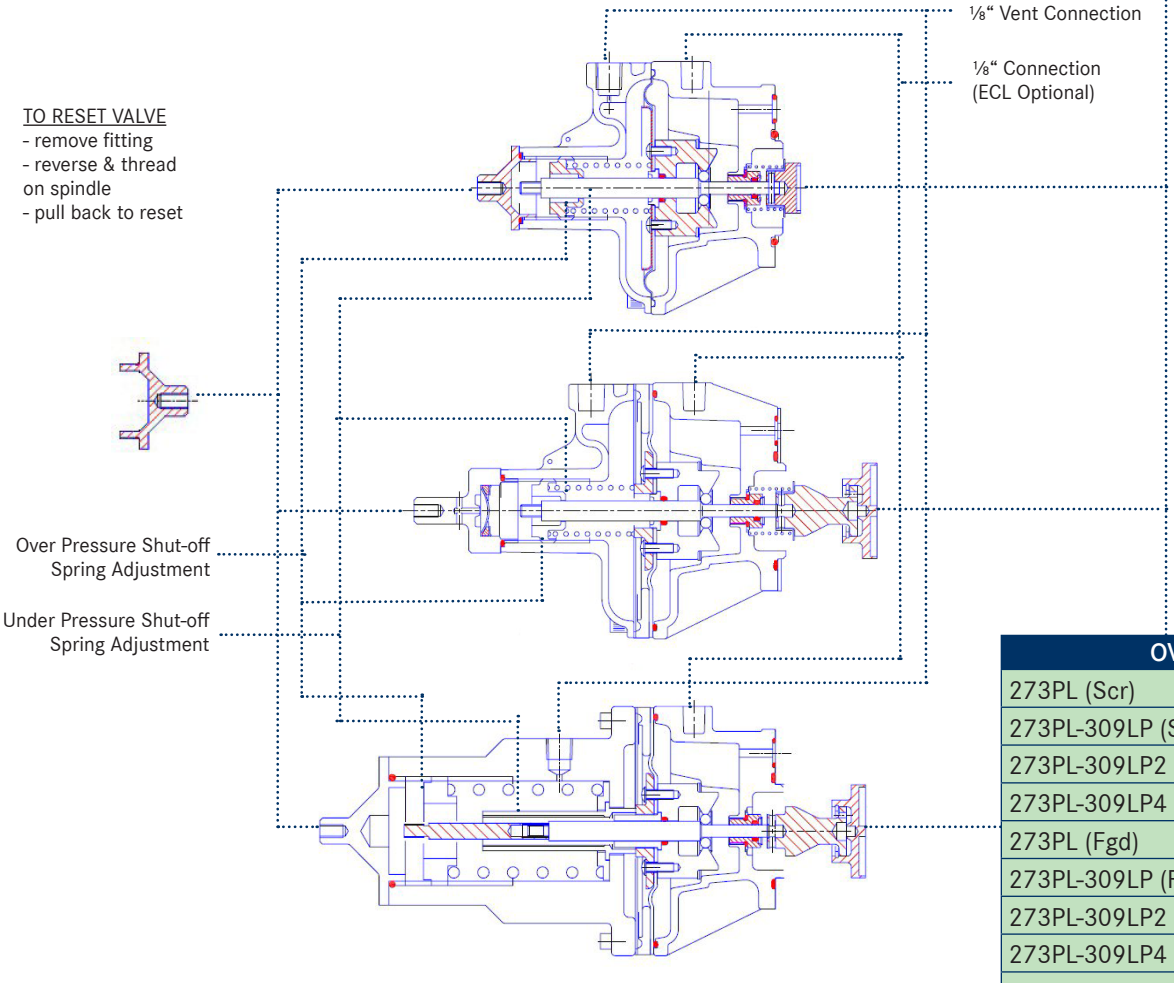
CORRECTION FACTORS FOR OTHER GASES		
Gas Type	Specific Gravity	Correction Factor (CF)
Air	1.00	0.77
Butane	2.01	0.55
Carbon Dioxide (Dry)	1.52	0.63
Carbon Monoxide (Dry)	0.97	0.79
Natural Gas	0.60	1.00
Nitrogen	0.97	0.79
Propane	1.53	0.63
Propane-Air Mix	1.20	0.71

For Other Conversion Factors

$$C_f = \sqrt{\frac{0.6}{\text{SG of Gas}}}$$

Dimensional Data, Sectional View, SSV Reset, ECL Connection, Spring Adjustment

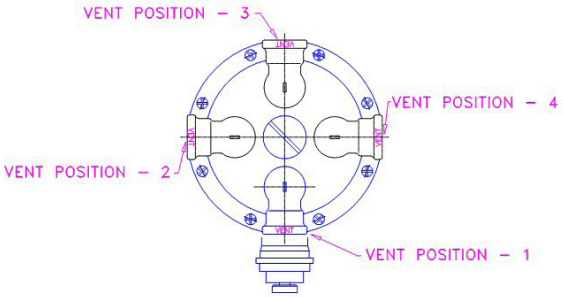


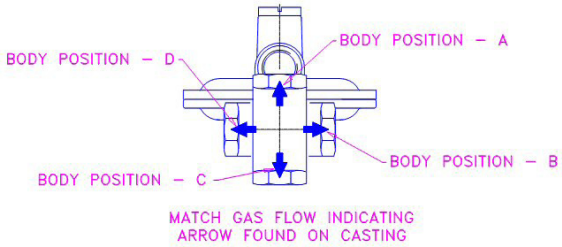


OVERALL LENGTH	
273PL (Scr)	18.0“ (457mm)
273PL-309LP (Scr)	23.5“ (597mm)
273PL-309LP2 (Scr)	24.0“ (610mm)
273PL-309LP4 (Scr)	27.0“ (686mm)
273PL (Fgd)	19.0“ (483mm)
273PL-309LP (Fgd)	24.0“ (610mm)
273PL-309LP2 (Fgd)	25.0“ (635mm)
273PL-309LP4 (Fgd)	28.0“ (711mm)
Scr = Screwed	Fgd = Flanged

Orientation, Approvals, Vent-Less Indoor Regulator

Body/Vent Orientation



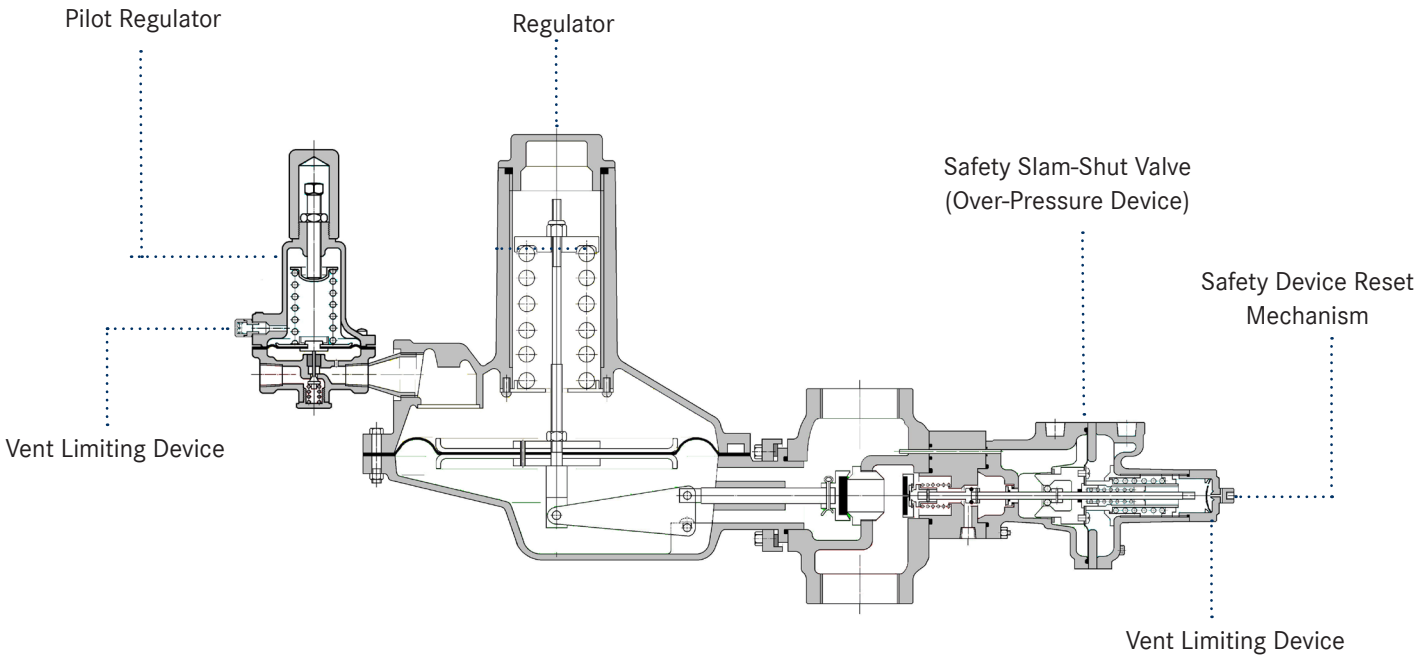


Agency Approvals

- Measurement Canada Approved (P.F.M. applications)

Indoor „Vent-Less“ Regulator

- Regulator assembly incorporates a regulator with integral over-pressure safety slam-shut device (OPCO)
- Regulator does not incorporate an internal relief valve (IRV)
- Both regulator and integral slam-shut device have internal vent-limiting devices to limit the gas expelled from the valve upon diaphragm failure to below 1 ft^3/hr (0.0283 m^3/hr)
- If there is an over-pressure condition above a pre-determined level downstream of the regulator assembly, the slam-shut device (OPCO) will completely shut-off the gas flow.
- The valve must be manually reset after an over-pressure shut-off condition
- The regulator and slam-shut device have vent connections. These are for atmospheric reference and do not require a vent line connection to the outside
- Vent lines will actually restrict the performance of the regulator
- REFER TO TECHNICAL BOOKLET - CERTIFIED LINE PRESSURE REGULATORS FOR MORE INFORMATION



Spring (Spring Range)	Outlet Pressure	Inlet Pressure		Orifice Diameter			
		psi	bar	20.0mm		30.0mm	
Spring 1047 (range 1.0 - 5.0 psi) (range 0.07-0.35 bar)	SET POINT 2.0 psi (140 mbar) DROOP/ BOOST 11“ wc 28 mbar Accuracy Class 20%	10	0.7	8,300	(235.1)	11,500	(325.8)
		15	1.0	11,500	(325.8)	14,700	(416.4)
		30	2.1	20,700	(586.4)	25,700	(728.0)
		45	3.1	27,600	(781.9)	32,200	(912.2)
		60	4.1	27,600	(781.9)	32,200	(912.2)
		90	6.2	27,600	(781.9)	32,200	(912.2)
		150	10.3	n/a	n/a	n/a	n/a
		225	15.5	n/a	n/a	n/a	n/a
		300	20.6	n/a	n/a	n/a	n/a

Spring (Spring Range)	Outlet Pressure	Inlet Pressure		Orifice Diameter			
		psi	bar	20.0mm		30.0mm	
Spring TX/002 (range 3.0 - 30.0 psi) (range 0.21-2.1 bar)	SET POINT 5.0 psi (350 mbar) DROOP/ BOOST 28“ wc 70 mbar Accuracy Class 20%	10	0.7	5,600	(158.6)	11,800	(337.1)
		15	1.0	12,000	(339.9)	15,700	(444.8)
		30	2.1	20,700	(586.4)	25,300	(716.7)
		45	3.1	27,600	(781.9)	38,600	(1093.5)
		60	4.1	34,500	(977.3)	53,700	(1521.2)
		90	6.2	41,400	(1172.8)	68,900	(1951.8)
		150	10.3	23,000	(651.6)	n/a	n/a
		225	15.5	n/a	n/a	n/a	n/a
		300	20.6	n/a	n/a	n/a	n/a

Spring (Spring Range)	Outlet Pressure	Inlet Pressure		Orifice Diameter			
		psi	bar	20.0mm		30.0mm	
Spring TX/002 (range 3.0 - 30.0 psi) (range 0.21-2.1 bar)	SET POINT 15.0 psi (1.0 bar) DROOP/ BOOST 3 psig 210 mbar Accuracy Class 10%	30	2.1	18,900	(535.4)	32,200	(912.2)
		45	3.1	26,200	(742.2)	46,900	(1328.6)
		60	4.1	34,500	(977.3)	64,300	(1821.5)
		90	6.2	46,400	(1314.4)	84,900	(2405.1)
		150	10.3	70,300	(1991.5)	110,200	(3121.8)
		225	15.5	96,400	(2730.9)	n/a	n/a
		300	20.6	96,400	(2730.9)	n/a	n/a

E.C.L. - External Control Line Mandatory

ft^3/hr (m^3/hr)

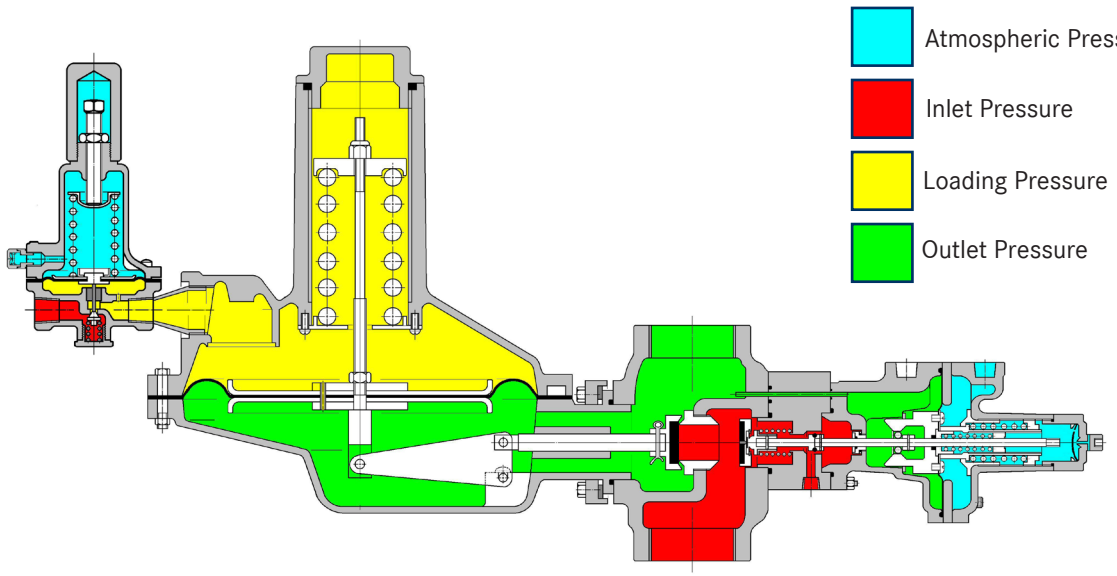
MODEL 273PL REGULATOR

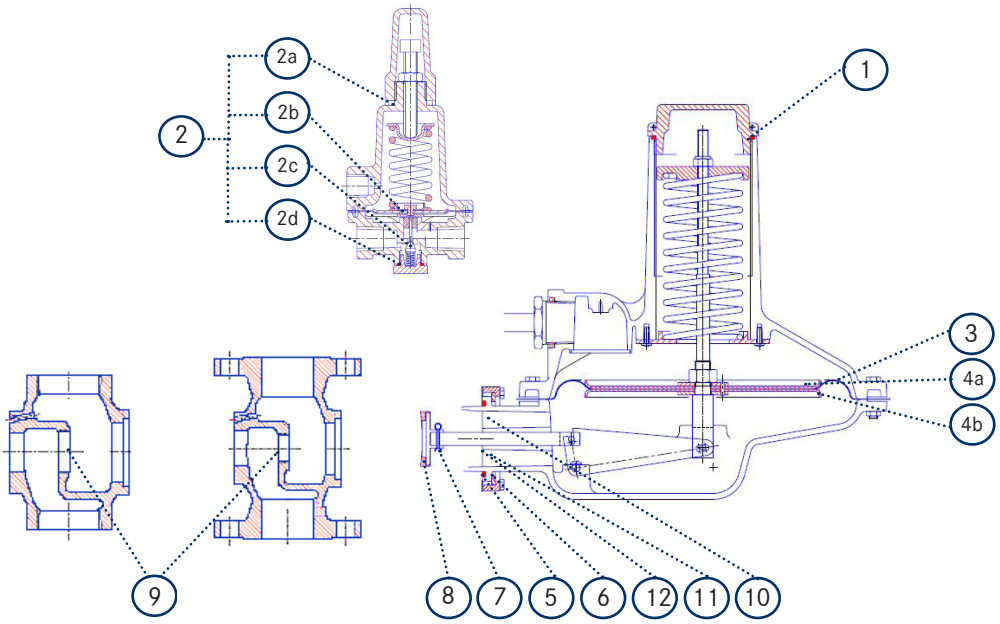
Performance Capacities

Spring (Spring Range)	Outlet Pressure	Inlet Pressure		Orifice Diameter			
		psi	bar	20.0mm		30.0mm	
Spring TX/002 (range 3.0 - 30.0 psi) (range 0.21-2.1 bar)	SET POINT 30.0 psi (2.1 bar) DROOP/ BOOST 6.0 psi 420 mbar Accuracy Class 20%	45	3.1	23,000	(651.6)	39,100	(1107.7)
		60	4.1	32,200	(912.2)	57,400	(1626.1)
		90	5.2	41,400	(1172.8)	81,700	(2314.4)
		150	10.3	68,900	(1951.8)	119,400)	(3382.4)
		225	15.5	96,400	(2730.8)	n/a	n/a
		300	20.7	110,200	(3121.8)	n/a	n/a

Spring (Spring Range)	Outlet Pressure	Inlet Pressure		Orifice Diameter			
		psi	bar	20.0mm		30.0mm	
Spring TX/003 (range 30.0 - 60.0 psi) (range 2.1-4.1 bar)	SET POINT 45.0 psi (3.1 bar) DROOP/ BOOST 9.0 psi 630 mbar Accuracy Class 20%	45	3.1	n/a	n/a	n/a	n/a
		60	4.1	29,900	(847.0)	45,900	(1300.3)
		90	6.2	78,100	(2212.5)	80,400	(2277.6)
		150	6.2	78,100	(2212.5)	114,800	(3252.1)
		225	7.1	110,200	(3121.8)	n/a	n/a
		300	8.0	110,200	(3121.8)	n/a	n/a

Spring (Spring Range)	Outlet Pressure	Inlet Pressure		Orifice Diameter			
		psi	bar	20.0mm		30.0mm	
Spring TX/003 (range 30.0 - 60.0 psi) (range 2.1-4.1 bar)	SET POINT 60.0 psi (4.1 bar) DROOP/ BOOST 12.0 psi 0.8 bar Accuracy Class 20%	45	3.1	n/a	n/a	n/a	n/a
		60	4.1	n/a	n/a	n/a	n/a
		90	6.2	43,600	(1235.1)	73,500	(2082.2)
		150	6.2	75,800	(2147.3)	128,500	(3252.1)
		225	7.1	110,200	(3121.8)	n/a	n/a
		300	8.0	110,200	(3121.8)	n/a	n/a





SPARES KIT FOR MODEL 272PL REGULATOR - CSK 1856 (INCLUDES MODEL 600 PILOT REGULATOR SPARES KIT)		
Bullet	Description	Part Number
1	O-Ring	BS/USA 232
2	Spares Kit for Model 600 Pilot	CSK 1921
2a	O-Ring	BS/USA 113
2b	O-Ring	BS/USA 013
2c	Valve	TN-003
2d	Diaphragm Assembly	TJ-005
3	Diaphragm	MJ/005
4a	Diaphragm Plate	206/XH/028
4b	Diaphragm Plate	206/XH/028

SPARES KIT FOR MODEL 272PL REGULATOR - CSK 1856 (INCLUDES MODEL 600 PILOT REGULATOR SPARES KIT)		
Bullet	Description	Part Number
5	O-Ring	BS/USA 226
6	O-Ring	BS/USA 141
7	Cotter Pin	2mm x 25mm
8	Valve Assembly	MM/001
9a	O-Ring (M30 thread orifice - hex)	BS/USA 120
9b	O-Ring (M39 thread orifice - round)	BS/USA 128
10	O-Ring	BS/USA 128
11	O-Ring	BS/USA 110
12	Retaining Clip	5005-0175

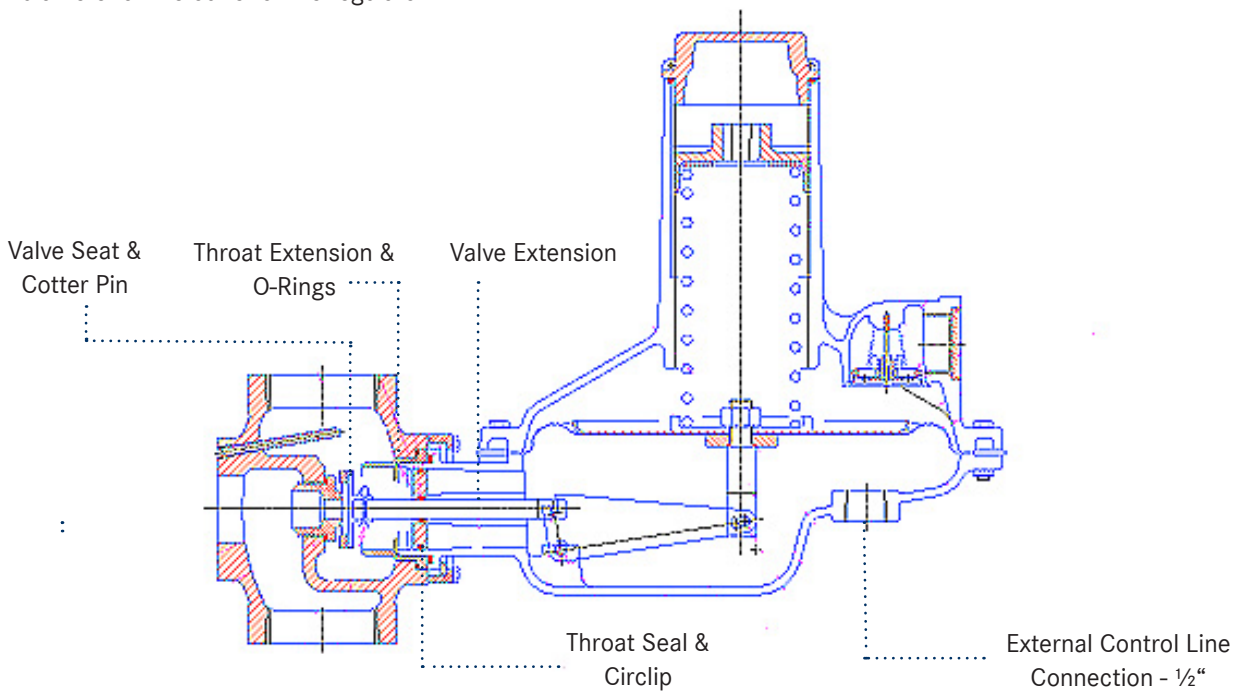
MODEL 273PL REGULATOR

Internal to External Impulse Conversion (E.C.L.)

External Control Line (E.C.L.)

- The standard regulator is supplied as internally impusled or internal control line (I.C.L.) unless specified
- Sensing outlet pressure via an external control line enables the regulator to respond more accurately to the downstream system.
- Additionally, the standard regulator is supplied with both bosses drilled and tapped on the underside of the diaphragm casing. These bosses will be plugged with a removeable brass fitting.

- To modify to E.C.L., remove the 4 bolts that secure the diaphragm casing to the regulator body. Remove the throat extenstion and o-rings. Ensure that the o-rings and the throat extension are kept away from debris
- Remove the valve seat by taking out the cotter pin that secures it to the valve extension.
- Secure the throat seal down the valve extension, ensuring that it bottoms out against the diaphragm casing. Secure with the circlip.
- Replace the valve seat and new cotter pin. Replace throat extension and o-rings.
- Bolt body back to the diaphragm casing with the 4 original bolts.
- Remove one of the brass fittings from the bottom of the diaphragm casing.
- Connect ½“ compression fitting and external control line to this boss.
- The sensing point at the termination of the control line should be a minimum of 5 times the nominal pipe diameter at the outlet of the regulator.



PARTS REQUIRED FOR I.C.L. TO E.C.L. CONVERSION		
Bullet	Description	Part Number
1	Throat Seal Assembly	MN-005
	- Seal Disc	202/LG/004
	- O-ring	BS/USA 128
	- O-ring	BD/USA 110
2	Retaining Clip	5005-0175
3	Cotter Pin for Valve Seat	2mm x 25mm

Part Numbering System

RMG 272 R 1 H N C I X 3 B X K F

INTERNAL RELIEF	
C	constant loaded

OPCO TYPE	
2	309LP OPCO
3	309LP UPCO/OPCO
4	309LP2 OPCO
5	309LP2 UPCO/OPCO
6	309LP4 OPCO
7	309LP4 UPCO/OPCO

CONNECTIONS SIZE	
H	1¼“ x 1¼“
I	1¼“ x1½“
J	1¼“ x 2“
K	1½“ x 1½“
L	1½“ x 2“
M	2“ x 2“

CONNECTION TYPE	
N	NPT
B	BSPT
P	BSPP
1	ANSI150RF
2	ANSI150FF
6	PN16RF
7	PN16FF

MATERIAL	
C	Cast Iron
D	Ductile Iron
S	Cast Steel

IMPULSE	
I	Internal
E	External

OPTIONAL FEATURES	
T	Stainless Steel Pilot Feed Line
I	Test Point on Inlet
O	Test Point on Outlet
E	Casting Engraving
B	Test Point on both Inlet & Outlet
F	Inlet Filter Strainer
Z	Blanking Plate

BODY/VENT ORIENTATION	
B1	E
D1	M

ORIFICE DIAMETER	
20.0mm	G
30.0mm	I

UPCO SPRING	
1138	A
638	B
IA/006	D

OPCO SPRING	
861	A
1171	F
1172	G
1173	H
1174	I
1175	J
1254	C
1030	K
1031	L
1032	M
1033	N

PILOT SPRING	
1047	6
TX/002	2
TX/003	3

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RMG is your worldwide partner for gas control equipment, ranging from exploration to consumer supply. The comprehensive range of RMG products and systems provides you with a total solution for all your gas control and measurement needs

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