

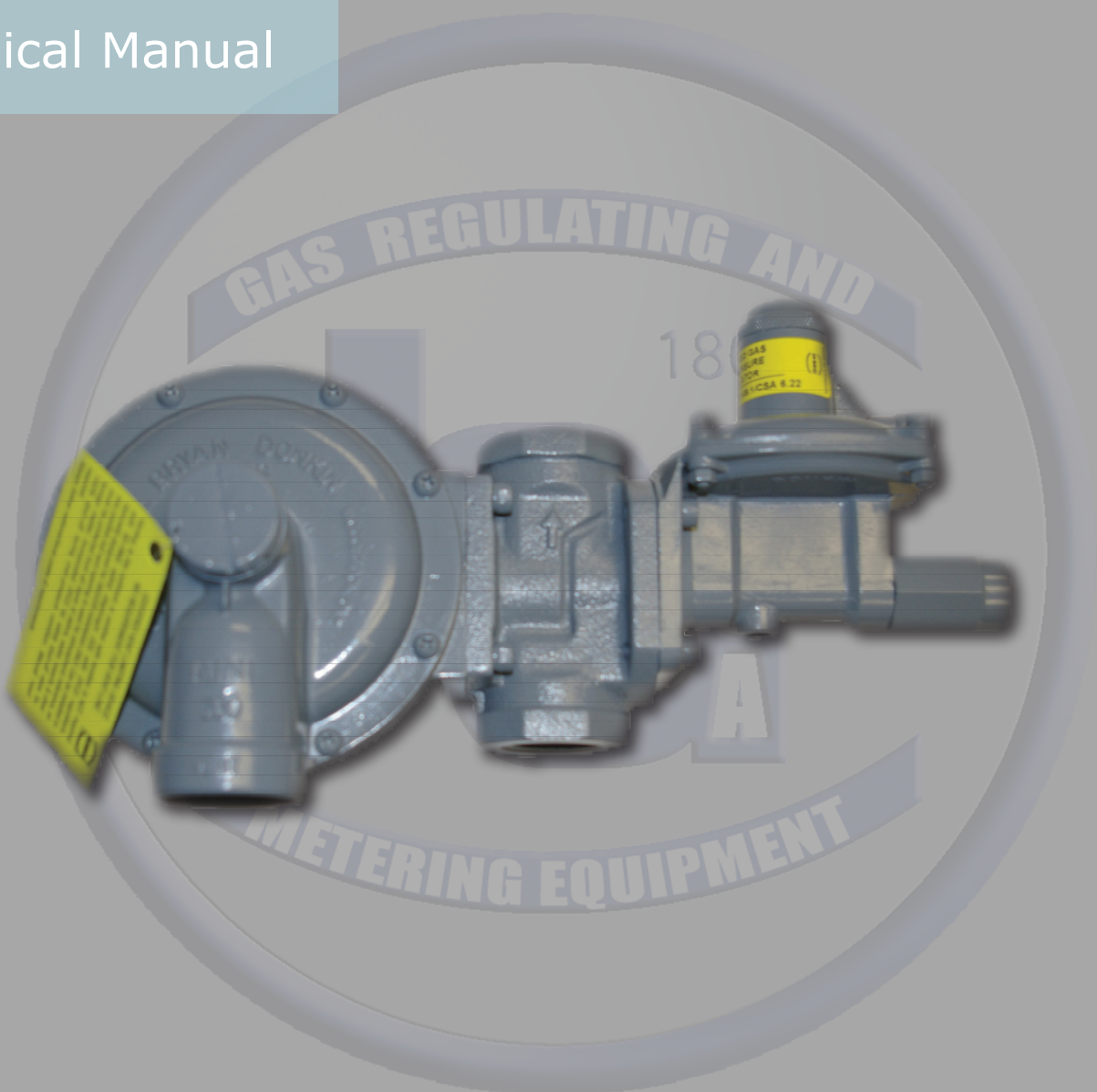


Serving the Gas Industry Worldwide

BD USA MODEL
260

SPRING-LOADED GAS PRESSURE REGULATOR

Technical Manual



Introduction, Characteristics, Constructions, Technical Data

Introduction

- The Model 260 Regulator is a lever operated, spring loaded regulator
- 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
- CSA 6.18 Service Regulator and CSA 6.22 Line Pressure Regulator Approved

Unique Feature

- Upon full regulator failure, outlet pressure is limited to under 1 psi (70 mbar) with 60 psi (4 bar) inlet pressure and full bore relief discharge. Tested and approved to CSA 6.18 specifications

Characteristics

- Wide inlet pressure range 1-125 psi (0.07-8.6 bar) depending on orifice diameter
- Maximum inlet pressure 150 psi (10.3 bar)
- Maximum allowable operating pressure 125 psi (8.6 bar) depending on orifice diameter
- Lever-operated to accommodate changes in inlet pressure, spring-loaded for increased speed of response
- Various interchangeable orifices for ease of maintenance, customability and increased turndown ratio to accommodate a wide range of flow and pressure requirements
- Outlet pressure range from 4" wc - 5.5 psi (10.0-385 mbar) over 6 spring ranges
- 3 different inlet/outlet thread types (NPT, BSPT, BSPP) in 1/2, 3/4, 1" screwed both in-line (180°) or angle (90°) body casting
- Various internal relief valve assemblies available (full, limited and none)
- 1" threaded vent connection
- 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

Available Constructions

- 260 R - full internal relief valve
- 260 P - no internal relief valve
- 260 SD - safety diaphragm version (internal vent-limiting device)
- 260LR-OPCO - limited internal relief valve capacity with integral over-pressure slam-shut device
- 260P-OPCO - no internal relief valve capacity with integral over-pressure slam-shut device
- 260SD-OPCO SD - safety diaphragm version with integral over-pressure slam-shut device and internal vent limiting devices (indoor installations only)
- 260LR-309 UPCO/OPCO - limited internal relief valve capacity with integral under and over-pressure slam-shut device
- 260P-309 UPCO/OPCO - no internal relief valve capacity with integral under and over-pressure slam-shut device
- 260SD-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 pressure accuracy of +/- 1% absolute pressure
- 260 F - complete with inlet mess filter
- 260 EFV - complete with excess flow valve
- 260SD-309 t OPCO - safety diaphragm version with integral over-pressure slam-shut device and integral vent limiting device plus thermal trip protection for shut-off at high temperature limit (indoor installations only)

PRESSURE RATINGS		
Maximum Inlet Pressure	all orifices	150 psi (10.3 bar)
Maximum Allowable Operating Pressure	1/8" (3.5mm)	125 psi (8.6 bar)
	3/16" (5.0mm)	75 psi (5.0 bar)
	1/4" (6.3mm)	60 psi (4.0 bar)
	1/2" (12.5mm)	15 psi (1.0 bar)

Temperature Rating

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

Weights

- with angle body (90°) - 3 lb. (1.36 kg)
- with in-line body (180°) - 4 lb. (1.82 kg)
- with 290 OPCO - 5.25 lb. (2.3 kg)
- with 309 UPCO/OPCO - 6.25 lb. (2.8 kg)
- with 309 T-type UPCO/OPCO - 8.8 lb. (4.0 kg)

MATERIALS OF CONSTRUCTION	
Inline Body Casting	Cast Iron or Ductile Iron
Angle Body Casting	Cast Iron or Ductile Iron
Diaphragm Casings	Die Cast Aluminum
Diaphragm	Molded Nitrile Rubber with Nylon Reinforcing
Valve Head (Seat)	Buna-N Rubber
Diaphragm Plates	Steel
Orifice (regulator without SSV)	Aluminum
Orifice (regulator with SSV)	Brass or Stainless Steel (t-type)
Vent Screen	Stainless Steel
Fasteners	Steel
Top Cap	Molded Plastic or Aluminum
Springs	Steel
Lever	Steel
Relief Valve Assembly	Molded Plastic
Valve Extension	Aluminum
O-Rings	Nitrile Rubber

Spring Ranges, Relief Valve Ranges, Correction Factors

OUTLET PRESSURE RANGES		
Range (imperial)	Range (metric)	Spring Number (Colour)
4" - 5½" wc	10 - 14 mbar	121 (red)
5" - 9" wc	13 - 23 mbar	1001 (silver)
8" - 12" wc	20 - 30 mbar	1235 (orange)
9" - 18" wc	23 - 45 mbar	307 (light green)
17" - 30" wc	43 - 75 mbar	1021 (self)
1.0 - 2.5 psi	70 - 175 mbar	1047 (purple)
3.0 - 5.5 psi	210 - 385 mbar	LX/001 (yellow)

Inlet pressure and orifice diameter have a direct effect on the outlet pressure range since the regulator is unbalanced. These outlet pressure spring ranges are approximate.

Note for regulators with SD-type diaphragm assemblies

- due to precompression of the spring by the diaphragm assemblies, the spring ranges can be increased approximately 10-20%.

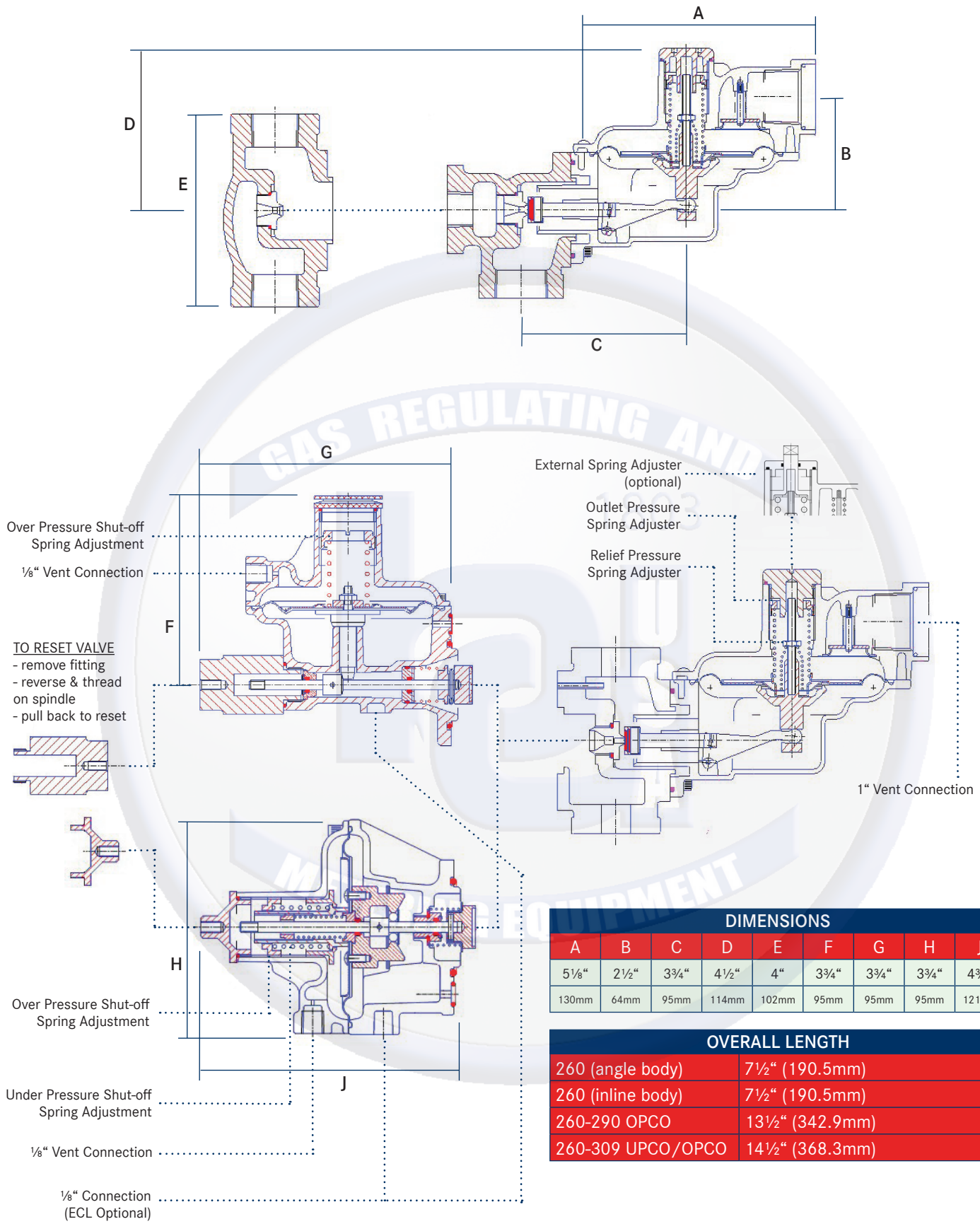
RELIEF PRESSURE RANGES		
Range (imperial)	Range (metric)	Spring Number (Colour)
4" - 5½" wc	10 - 14 mbar	121 (red)
5" - 9" wc	13 - 23 mbar	1001 (silver)
8" - 12" wc	20 - 30 mbar	1235 (orange)
9" - 18" wc	23 - 45 mbar	307 (light green)
17" - 30" wc	43 - 75 mbar	1021 (self)
1.0 - 2.5 psi	70 - 175 mbar	1047 (purple)
3.0 - 5.5 psi	210 - 385 mbar	LX/001 (yellow)

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

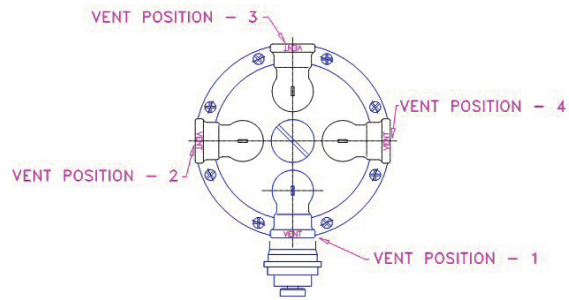


DIMENSIONS									
A	B	C	D	E	F	G	H	J	
5 1/8"	2 1/2"	3 3/4"	4 1/2"	4"	3 3/4"	3 3/4"	3 3/4"	4 3/4"	
130mm	64mm	95mm	114mm	102mm	95mm	95mm	95mm	121mm	

OVERALL LENGTH	
260 (angle body)	7 1/2" (190.5mm)
260 (inline body)	7 1/2" (190.5mm)
260-290 OPCO	13 1/2" (342.9mm)
260-309 UPCO/OPCO	14 1/2" (368.3mm)

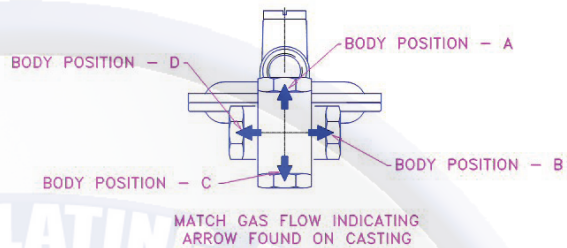
Orientation, Approvals, Vent-Less Indoor Regulator

Body/Vent Orientation



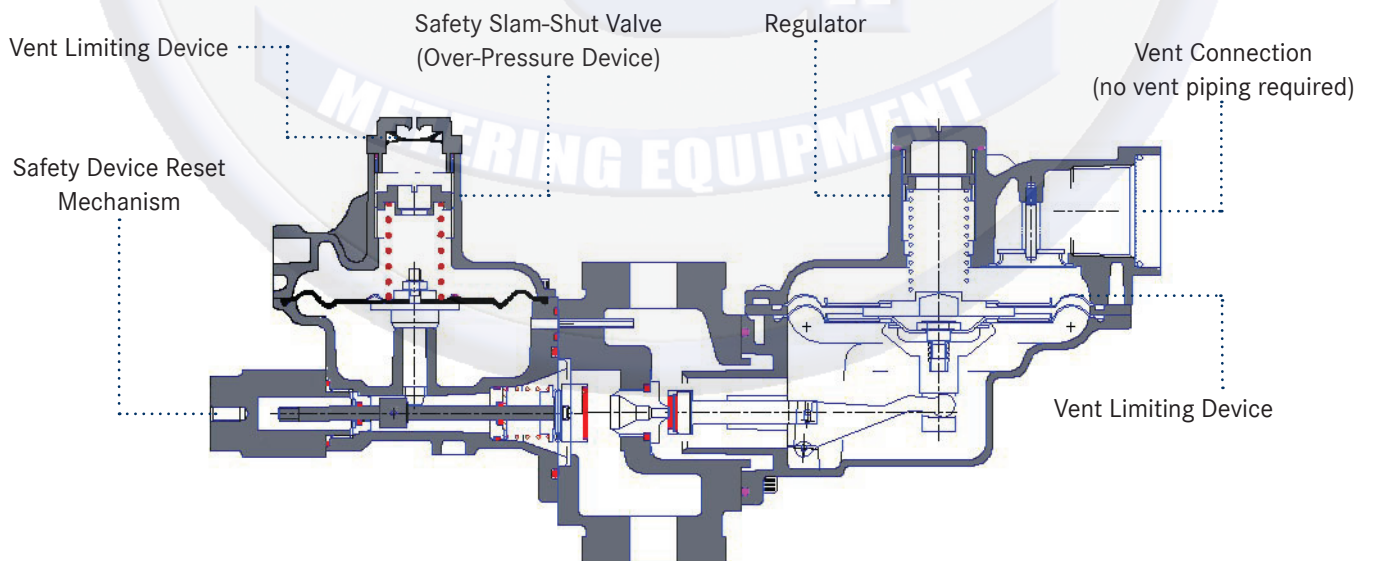
Agency Approvals

- Measurement Canada Approved (P.F.M. applications)
- CSA 6.18 Service Regulator Approved
- CSA 6.22 Line Pressure Regulator Approved
- CE Approved



Indoor "Vent-Less" Regulator - CSA 6.22 Approved

- 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 ft³/hr (0.0283 m³/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	1/8" (3.5mm)		3/16" (5.0mm)		1/4" (6.3mm)		1/2" (12.5mm)	
Spring 121 (range 4"-5.5" wc) (range 10-14 mbar)	SET POINT 5" wc (12 mbar)	0.5	0.035					150	(4.2)	n/a	n/a
		1	0.070	75	(2.1)	150	(4.2)	250	(7.1)	n/a	n/a
		2	0.140	100	(2.8)	250	(7.1)	400	(11.3)	n/a	n/a
	DROOP/ BOOST	5	0.350	175	(5.0)	575	(16.3)	775	(22.0)	n/a	n/a
		10	0.700	250	(7.1)	725	(20.5)	950	(26.9)	n/a	n/a
		15	1.0	300	(8.5)	850	(24.1)	1100	(31.2)	n/a	n/a
	1" wc 2.5 mbar	30	2.0	450	(12.7)	1200	(34.0)	1400	(39.7)	ft ³ /hr (m ³ /hr)	
		45	3.0	650	(18.4)	1350	(38.2)	1550	(32.9)		
		60	4.1	750	(21.2)	1500	(42.5)	1650	(46.7)		
	Accuracy Class 20%	75	5.2	850	(24.1)	1600	(45.3)				
		100	7.1	1150	(32.6)						
		125	8.6	1300	(36.8)						

Spring (Spring Range)	Outlet Pressure	Inlet Pressure		Orifice Diameter							
		psi	bar	1/8" (3.5mm)		3/16" (5.0mm)		1/4" (6.3mm)		1/2" (12.5mm)	
Spring 1001 (range 5"-9" wc) (range 12-23 mbar)	SET POINT 7" wc (18 mbar)	0.5	0.035					100	(2.8)	n/a	n/a
		1	0.070	100	(2.8)	175	(5.0)	200	(5.7)	350	(9.9)
		2	0.140	150	(4.2)	200	(5.7)	350	(9.9)	600	(17.0)
	DROOP/ BOOST	5	0.350	300	(8.5)	375	(10.6)	700	(19.8)	900	(25.6)
		10	0.700	400	(11.3)	800	(22.7)	1200	(34.0)	1250	(35.4)
		15	1.0	550	(15.6)	1200	(34.0)	1900	(53.8)	1500	(42.5)
	1.4" wc 3.6 mbar	30	2.0	850	(24.1)	1600	(45.3)	2800	(79.3)	Spring 121 ft ³ /hr (m ³ /hr)	
		45	3.0	1150	(32.6)	2250	(63.7)	3400	(96.3)		
		60	4.1	1400	(39.7)	2800	(79.3)	3500	(99.2)		
	Accuracy Class 20%	75	5.2	1700	(48.2)	3300	(93.5)				
		100	7.1	1850	(52.4)						
		125	8.6	2000	(56.6)						

Spring (Spring Range)	Outlet Pressure	Inlet Pressure		Orifice Diameter							
		psi	bar	1/8" (3.5mm)		3/16" (5.0mm)		1/4" (6.3mm)		1/2" (12.5mm)	
Spring 1235 (range 8"-12" wc) (range 20-30 mbar)	SET POINT 10" wc (25 mbar)	0.5	0.035								
		1	0.070	125	(3.5)	175	(5.0)	275	(7.8)	400	(11.3)
		2	0.140	175	(5.0)	275	(7.8)	375	(10.6)	900	(25.5)
	DROOP/ BOOST	5	0.350	300	(8.5)	450	(12.5)	850	(24.1)	1250	(35.4)
		10	0.700	400	(11.3)	800	(22.7)	1300	(36.8)	1550	(43.9)
		15	1.0	550	(15.6)	1125	(31.9)	1850	(52.4)	1700	(48.2)
	2.0" wc 5.0 mbar	30	2.0	825	(23.4)	1700	(48.2)	2900	(82.2)	Spring 1001 ft ³ /hr (m ³ /hr)	
		45	3.0	1125	(31.9)	2150	(60.9)	3300	(93.5)		
		60	4.1	1375	(39.0)	2600	(73.6)	3550	(100.6)		
	Accuracy Class 20%	75	5.2	1700	(48.2)	3250	(92.1)				
		100	7.1	1850	(52.4)						
		125	8.6	1950	(55.2)						

Performance Capacities

Spring (Spring Range)	Outlet Pressure	Inlet Pressure		Orifice Diameter							
		psi	bar	1/8" (3.5mm)		3/16" (5.0mm)		1/4" (6.3mm)		1/2" (12.5mm)	
Spring 307 (range 9"-18" wc) (range 23-45 mbar)	SET POINT 15" wc (38 mbar)	0.5	0.035								
		1	0.070	125	(3.5)	150	(4.2)	225	(6.4)	500	(14.2)
		2	0.140	150	(4.2)	200	(5.7)	250	(7.1)	850	(24.1)
	DROOP/ BOOST 3" wc 7.5 mbar	5	0.350	200	(5.7)	250	(7.1)	350	(9.9)	1200	(34.0)
		10	0.700	300	(8.5)	400	(11.3)	550	(15.6)	1500	(42.5)
		15	1.0	400	(11.3)	700	(19.8)	950	(26.9)	1650	(46.7)
	Accuracy Class 20%	30	2.0	700	(19.8)	1400	(39.7)	2500	(70.8)	Spring 1235 ft ³ /hr (m ³ /hr)	
		45	3.0	1125	(31.9)	2100	(59.5)	3150	(89.2)		
		60	4.1	1375	(39.0)	2750	(77.9)	3550	(100.6)		
			75	5.2	1600	(45.3)	3350	(94.9)			
			100	7.1	1750	(49.6)					
			125	8.6	1900	(53.8)					

Spring (Spring Range)	Outlet Pressure	Inlet Pressure		Orifice Diameter							
		psi	bar	1/8" (3.5mm)		3/16" (5.0mm)		1/4" (6.3mm)		1/2" (12.5mm)	
Spring 1021 (range 17"-30" wc) (range 42-75 mbar)	SET POINT 28" wc (70 mbar)	0.5	0.035								
		1	0.070								
		2	0.140	150	(4.2)	300	(8.5)	325	(9.2)	900	(25.5)
	DROOP/ BOOST 6" wc 15 mbar	5	0.350	300	(8.5)	475	(13.5)	500	(14.2)	1250	(35.4)
		10	0.700	400	(11.3)	800	(22.7)	950	(26.9)	1850	(52.4)
		15	1.0	550	(15.6)	1000	(28.3)	1350	(38.2)	2050	(58.1)
	Accuracy Class 20%	30	2.0	800	(22.7)	1450	(41.1)	2000	(56.7)	Spring 307 ft ³ /hr (m ³ /hr)	
		45	3.0	1050	(29.7)	2250	(63.7)	3000	(85.0)		
		60	4.1	1400	(39.7)	2600	(73.6)	3200	(90.6)		
			75	5.2	1650	(46.7)	3250	(92.1)			
			100	7.1	1850	(52.4)					
			125	8.6	2250	(63.7)					

Spring (Spring Range)	Outlet Pressure	Inlet Pressure		Orifice Diameter							
		psi	bar	1/8" (3.5mm)		3/16" (5.0mm)		1/4" (6.3mm)		1/2" (12.5mm)	
Spring 1047 (range 1.0-2.5 psi) (range 70-175 mbar)	SET POINT 2.0 psi (140 mbar)	0.5	0.035								
		1	0.070								
		2	0.140								
	DROOP/ BOOST 11" wc 28 mbar	5	0.350	200	(5.7)	350	(9.9)	450	(12.7)	1050	(29.7)
		10	0.700	300	(8.5)	500	(14.2)	550	(15.6)	1350	(38.2)
		15	1.0	400	(11.3)	600	(17.0)	700	(19.8)	1675	(47.4)
	Accuracy Class 20%	30	2.0	700	(19.8)	1050	(29.7)	1200	(34.0)	Spring 1047 ft ³ /hr (m ³ /hr)	
		45	3.0	1000	(28.3)	1400	(39.7)	1500	(42.5)		
		60	4.1	1200	(34.0)	1600	(45.3)	2200	(62.3)		
			75	5.2	1400	(39.7)	2500	(70.8)			
			100	7.1	1650	(46.7)					
			125	8.6	2100	(59.5)					

Performance Capacities

Spring (Spring Range)	Outlet Pressure	Inlet Pressure		Orifice Diameter							
		psi	bar	1/8" (3.5mm)		3/16" (5.0mm)		1/4" (6.3mm)		1/2" (12.5mm)	
Spring LX/001 (range 3.0-5.5 psi) (range 210-385 mbar)	SET POINT 5.0 psi (350 mbar)	0.5	0.035								
		1	0.070								
		2	0.140								
		5	0.350								
	DROOP/ BOOST	10	0.700	400	(11.3)	550	(15.6)	600	(17.0)	1425	(40.4)
		15	1.0	500	(14.2)	700	(19.8)	850	(24.1)	2075	(58.8)
	1.0 psi 70 mbar	30	2.0	650	(18.4)	1050	(29.7)	1250	(35.4)	Spring 1047 ft ³ /hr (m ³ /hr)	
		45	3.0	800	(22.7)	1400	(39.7)	1500	(42.5)		
	Accuracy Class 20%	60	4.1	1100	(31.2)	1700	(48.2)	1900	(53.8)		
		75	5.2	1400	(39.7)	1900	(53.8)				
		100	7.1	1600	(45.3)						
		125	8.6	1900	(53.8)						

Pressure Factor Metering (+/- 1% Absolute Pressure)
Measurement Canada Approved - AG-0539

Spring (Spring Range)	Outlet Pressure	Inlet Pressure		Orifice Diameter			
		psi	bar	1/8" (3.5mm)		3/16" (5.0mm)	
Spring 1047 (range 1.0-2.5 psi) (range 70-175 mbar)	SET POINT 2.0 psi (140 mbar)	10	0.7	130	(3.7)	170	(4.8)
		20	1.4	180	(5.1)	270	(7.6)
		30	2.0	335	(9.5)	620	(17.6)
		40	2.7	645	(18.3)	865	(24.5)
	Accuracy Class +/-1% ABS PFM	50	3.4	835	(23.6)	1150	(32.6)
		60	4.1	1160	(32.9)	1600	(45.3)
		70	4.8	1405	(39.8)	1795	(50.8)
		80	5.4	1510	(42.8)	ft ³ /hr (m ³ /hr)	
		90	6.1	1730	(49.0)		

Inlet Pressure Set Point
40 psig (2.7 bar)

Spring (Spring Range)	Outlet Pressure	Inlet Pressure		Orifice Diameter			
		psi	bar	1/8" (3.5mm)		3/16" (5.0mm)	
Spring LX/001 (range 3.0-5.5 psi) (range 210-385 mbar)	SET POINT 5.0 psi (350 mbar)	10	0.7	65	(1.8)	65	(1.8)
		20	1.4	130	(3.7)	155	(4.4)
		30	2.0	230	(6.5)	310	(8.8)
		40	2.7	310	(8.8)	350	(9.9)
	Accuracy Class +/-1% ABS PFM	50	3.4	385	(10.9)	450	(12.7)
		60	4.1	410	(11.6)	475	(13.5)
		70	4.8	865	(24.5)	1020	(28.9)
		80	5.4	1095	(31.0)	ft ³ /hr (m ³ /hr)	
		90	6.1	1250	(35.4)		

Inlet Pressure Set Point
40 psig (2.7 bar)

Internal Relief Valve Performance Capacities vs. Outlet Pressure Increase

Inlet Pressure		1/8" (3.5mm) Orifice Diameter			
		Outlet Pressure		IRV Discharge Flow	
psi	bar	wc	mbar	ft ³ /hr	m ³ /hr
0	0.0	15	38	0	0
10	0.7	17	43	400	11.3
20	1.4	17	43	600	17.0
30	2.0	18	45	800	22.7
40	2.7	19	48	1000	28.3
50	3.4	21	52	1200	34.0
60	4.1	22	55	1350	38.2
70	4.8	23	58	1450	41.1
80	5.4	24	60	1650	46.7
90	6.1	26	65	1800	51.0

Inlet Pressure		3/16" (5.0mm) Orifice Diameter			
		Outlet Pressure		IRV Discharge Flow	
psi	bar	wc	mbar	ft ³ /hr	m ³ /hr
0	0.0	15	38	0	0
10	0.7	17	42	900	25.5
20	1.4	22	55	1300	36.8
30	2.0	28	70	1700	48.1
40	2.7	35	88	2000	56.6
50	3.4	41	102	2500	70.1
60	4.1	48	120	3000	85.0
70	4.8	53	132	3500	99.2

Inlet Pressure		1/4" (6.3mm) Orifice Diameter			
		Outlet Pressure		IRV Discharge Flow	
psi	bar	wc	mbar	ft ³ /hr	m ³ /hr
0	0.0	15	38	0	0
10	0.7	30	75	1000	28.3
20	1.4	40	100	1400	39.7
30	2.0	55	138	2000	56.6
40	2.7	70	175	2300	65.2
50	3.4	85	212	2550	72.2
60	4.1	100	250	2750	77.9



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

Modern manufacturing techniques, combined with our expertise and specialist knowledge in the design and build of gas control equipment (including fully automated stations) has earned BRYAN DONKIN a worldwide reputation for supply of safe, accurate and reliable equipment.

WWW.BRYANDONKINUSA.COM

BRYAN DONKIN USA Master Distributors

BURNER CONTROLS AND DESIGN
Territory: KS, MO, Southern IL

436 Anglum Road
Hazelwood, MO 63042
Tel (341) 993-5810
Fax (341) 993-4107
Email rogers@gobdc.com
Web www.gobdc.com

ETTER ENGINEERING COMPANY, INC.
Territory: New England, NY, NJ

210 Century Drive
Bristol, CT 06010
Tel 860-584-8842
Fax 860-584-8612
Email sales@etterengineering.com
Web www.etterengineering.com

BOILERROOM EQUIPMENT SALES
Territory: New York City, Long Island

120 Denton Avenue
New Hyde Park, NY 11040
Tel (516) 877-6300
Fax (516) 877-6303
Email rconstantino@bresales.com
Web www.bresales.com

MARSHALL W. NELSON and ASSOCIATES
Territory: MN, WI, ND, SD, MI (U.P.)

4300 N. Port Washington Road
Milwaukee, WI 53212
Tel (414) 332-6000
Fax (414) 332-2400
Email info@mwnelson.com
Web www.marshallwnelson.com

TRI-STATE METER and REGULATOR
Territory: TN

2865 Rudder Road
Memphis, TN 38118
Tel 800-365-1987
Fax (901) 365-6809
Email sales@tristatemet.com
Web www.tristatemet.com

WEEKS • WILLIAMS • DEVORE, INC.
Territory: NC, SC

222 Beltway Boulevard
Matthews, NC 28106
Tel 800-745-2999
Fax (704) 882-4111
Email kevin.hinson@wwdclt.com
Web www.wwd-inc.com