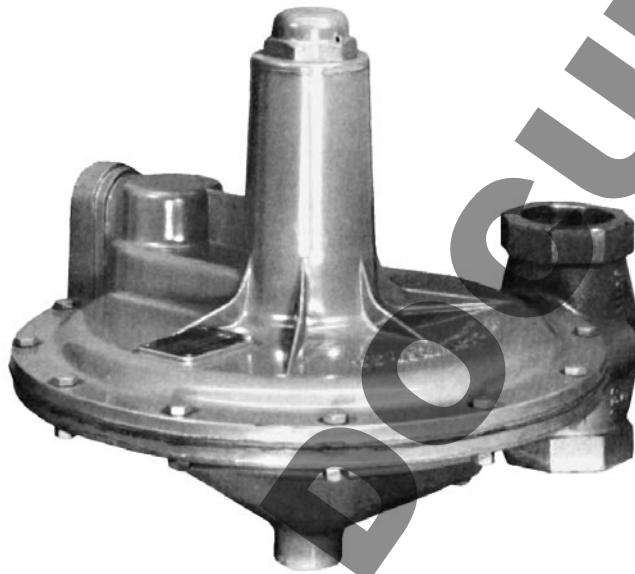


Y610A, Y611A, and Y612A Series Vacuum Service Equipment and Relief Valves



W1094_1

Figure 1. Type Y610A or Y610AP Vacuum Breaker

Introduction

The Y610A, Y611A, and Y612A Series devices (Figures 1 through 4) are used in a wide variety of vacuum and relief service applications. The Y610A Series devices are used as vacuum breakers, the Y611A Series devices are used as either vacuum breakers or relief valves, and the Y612A Series devices are used as vacuum regulators.

Features

- **Precision Control of Low Pressure Setting**—Large diaphragm areas provide more accurate control at low pressure settings.

- **Corrosion Resistance**—Constructions are available in a variety of materials for compatibility with corrosive process gases.

- **Installation Adaptability**—360-degree adjustability of the body/diaphragm case connection and four-position vent mounting permit flexibility in vent positioning and installation in awkward positions or limited spaces. Units may be mounted in any orientation without affecting proper operation.

- **Tamper-Resistant Adjustment**—Closing cap and spring case on most types allow installation of sealing wire to discourage or detect unauthorized adjustment of the pressure setting (Figure 2).

- **Rugged Construction**—Diaphragm case and internal parts are designed to withstand vibration and shock.



Bulletin 71.3:Y610A

Specifications

Available Configurations

See Table 1

Body Sizes (Inlet x Outlet) and End Connection Style⁽¹⁾

Type Y610A, Y610AP, Y611A, Y611AP, Y612A, or Y612AP:

1-1/2 x 1-1/2, 2 x 2-inch (DN 40 x 40, 50 x 50) NPT or 2 x 2-inch (DN 50 x 50) Class 125A flat-face or 250A raised-face flanged

Pressure Information⁽²⁾

Type Y610A or Y610AP

Vacuum Breaker: See Table 2

Type Y611A or Y611AP

Relief Valve: See Table 3

Type Y612A or Y612AP

Vacuum Regulator: See Table 4

Port Diameters and Flow Coefficients

TYPE NUMBER	SEAT RING PORT DIAMETER, Inches (mm)	C _v WITH FULLY OPEN DISK	C ₁
Y610A, Y610AP, Y611A, Y611AP	1-3/16 (30,2)	720	35
Y612A, Y612AP	5/8 (15,9)	150	
	1 (25,4) 1-3/16 (30,2)	450 720	

Typical Flow Capacities and Performance Curves

Y610A Series Vacuum Breakers: See Table 5 and Capacity Information section

Y611A Series Vacuum Breakers: See Capacity Information section

Y611A Series Relief Valves: See Table 6, Figure 5, and Capacity Information section

Y612A Series Vacuum Regulators: See Table 7, Figure 6, and Capacity Information section

Construction Materials

Body: Cast Iron (standard) or steel, or stainless steel for 3/4 x 3/4 through 1-1/4 x 1-1/4-inch (DN 20 x 20 through 32 x 32) sizes only

Union Nut (3/4 x 3/4 through 1-1/4 x 1-1/4-inch (DN 20 x 20 through 32 x 32) Body Only:

Malleable iron (standard) or stainless steel

Spring and Diaphragm Cases

3/4 x 3/4 through 1-1/4 x 1-1/4-inch (DN 20 x 20 through 32 x 32) Body: Cast iron (standard), steel, or stainless steel

1-1/2 x 1-1/2 or 2 x 2-inch (DN 40 x 40 or 50 x 50) Body: Aluminum

Control Spring: Steel

Diaphragm Plate: Steel

Diaphragm and if Used, O-Rings and Wiper Ring: Nitrile Disk

3/4 x 3/4 through 1-1/4 x 1-1/4-inch (DN 20 x 20 through 32 x 32) Body: Nitrile (standard), TFE, or Fluoroelastomer

1-1/2 x 1-1/2 through 2 x 2-inch (DN 40 x 40 through 50 x 50) Body: Nitrile (standard), or Fluoroelastomer

Seat Ring, Pusher Post, Stem Parts, Disk Holder, Adjusting Screw, and if Used, Body Cap

3/4 x 3/4 through 1-1/4 x 1-1/4-inch (DN 20 x 20 through 32 x 32) Body: Brass/zinc (standard) or stainless steel

1-1/2 x 1-1/2 through 2 x 2-inch (DN 40 x 40 through 50 x 50) Body: Aluminum

Lever Assembly

3/4 x 3/4 through 1-1/4 x 1-1/4-inch (DN 20 x 20 through 32 x 32) Body: Cadmium plated steel for brass trim or 302 stainless steel for stainless steel trim

1-1/2 x 1-1/2 or 2 x 2-inch (DN 40 x 40 or 50 x 50) Body: Zinc plated steel

Gaskets: Nitrile or composition depending on location

Stabilizer Vent Flappers if Used: Nylon Flapper Spring, Disk Spring, Screen, and if Used, Snap Ring: Stainless steel

Bolting: Plated steel

Other Metal Parts: Steel, brass, stainless steel, zinc, and/or aluminum depending on construction

Material Temperature Capabilities⁽²⁾

-20° to 150°F (-29° to 66°C)

Pressure Setting Adjustment

Adjusting screw

Pressure Registration

See Table 1

Pressure Connections

See Figures 11 and 12

Approximate Weights

Type Y610A, Y610AP, Y611A, Y611AP, Y612A, or Y612AP

With 1-1/2 x 1-1/2-inch (DN 40 x 40) Body: 25 pounds (11 kg)

With 2 x 2-inch (50 x 50) Body: 30 pounds (14 kg)

Additional Options

TFE diaphragm protector, spring case vent assembly for 3/4 x 3/4 through 1-1/4 x 1-1/4-inch (DN 20 x 20 through 32 x 32) Body sizes.

1. The pressure/temperature limits in this bulletin and any applicable standard limitation should not be exceeded.

2. Ratings and end connections for other than ANSI standards can usually be provided, consult the Fisher sales office or sales representative.

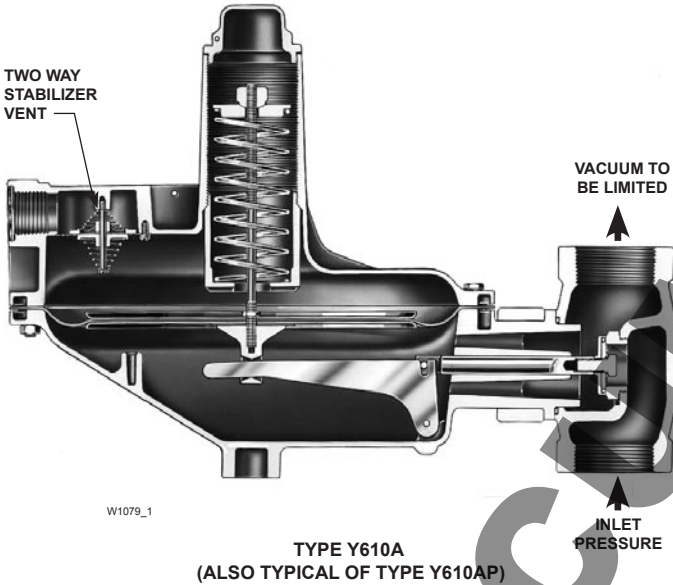


Figure 2. Y610A Series Vacuum Breaker Construction

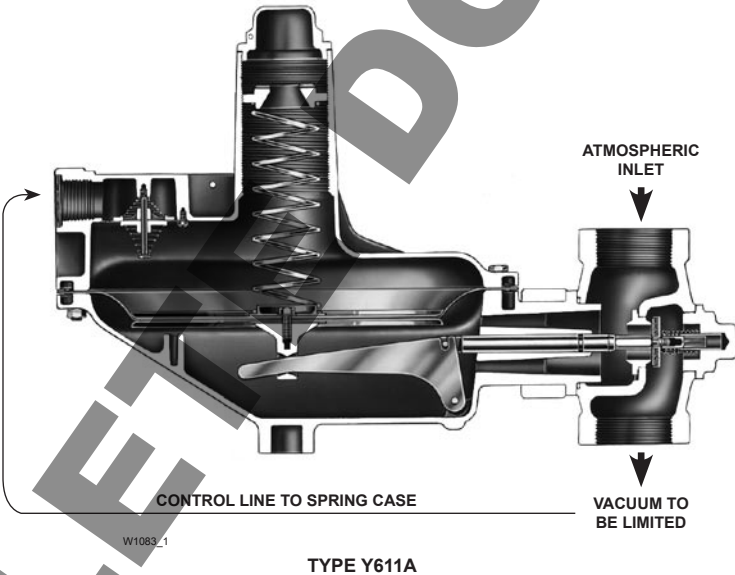
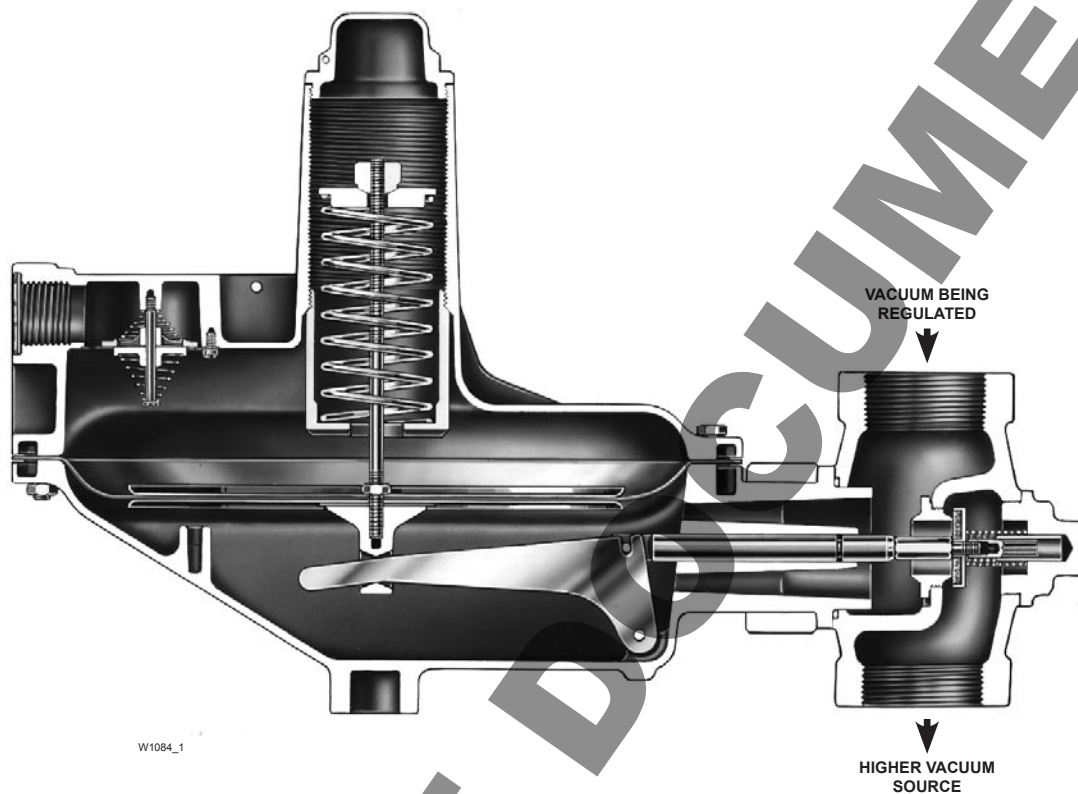


Figure 3. Y611A Series Vacuum Breaker Construction

Y610A and Y611A Series Vacuum Breakers

These vacuum breakers are used in applications where an increase in vacuum must be limited. An increase in vacuum (decrease in absolute pressure) beyond a certain value registers underneath the diaphragm of a Y610A Series vacuum breaker (Figure 2) or above

the diaphragm of a Y611A Series vacuum breaker with control line (Figure 3), opening the disk in either case. This permits atmosphere, or an upstream vacuum that has higher absolute pressure than the downstream vacuum, to enter the system and restore the controlled vacuum to its original pressure setting.



TYPE Y612A (ALSO TYPICAL OF TYPE Y612AP)

Figure 4. Y612A Series Vacuum Regulator Construction

Y611A Series Relief Valves

A Y611A Series relief valve maintains a constant inlet pressure with the outlet flowing to atmosphere or to any system whose pressure is lower than the pressure at the relief valve inlet. An increase in inlet pressure opens the disk, relieving the excess pressure and restoring the inlet pressure to its original setting.

Y612A Series Vacuum Regulators

These vacuum regulators (Figure 4) maintain a constant vacuum at the regulator inlet. A decrease in this vacuum (increases in absolute pressure) beyond this value registers underneath the diaphragm and opens the disk. This permits a downstream vacuum of lower absolute pressure than the upstream vacuum to restore the upstream vacuum to its original pressure setting.

Table 1. Available Configurations

CONSTRUCTION	TYPE NUMBER					
	Y610A	Y610AP	Y611A	Y611AP	Y612A	Y612AP
Vacuum breaker	x	x	----	----	----	----
Vacuum breaker or relief valve	----	----	x	x	----	----
Relief pilot with solid throat	----	----	----	----	----	----
Relief pilot with bleed hole in throat for Type 66RR	----	----	----	----	----	----
Vacuum regulator	----	----	----	----	x	x
3/4 through 1-1/4-inch NPT end connections and spring case with 1/4-inch NPT vent connection	----	----	----	----	----	----
1-1/2 or 2-inch NPT end connections and spring case with 1-inch NPT screened vent	x	x	x	x	x	x
Internal registration	x	----	x	----	----	----
External registration with 1/2-inch NPT downstream control line connection	----	x	----	x	----	x
Light diaphragm plate(s)	x	x	x	x	x	x
Heavy diaphragm plate(s)	----	----	----	----	----	----
O-ring stem seal	----	x	----	x	----	x

Table 2. Types Y610A and Y610AP Vacuum Breaker Pressure Information

TYPE NUMBER	MAXIMUM ALLOWABLE INLET (BODY) PRESSURE		MAXIMUM EMERGENCY OUTLET (CASING) PRESSURE (POSITIVE)		OUTLET PRESSURE RANGE (VACUUM)		MAXIMUM ALLOWABLE VACUUM		CONTROL SPRING COLOR CODE, PART NUMBER	CHANGE IN OUTLET (CONTROLLED) PRESSURE REQUIRED TO FULLY OPEN VACUUM BREAKER	
	Psig	bar	Psig	bar	With Spring Case Above Diaphragm	With Spring Case Below Diaphragm	Psig	bar		Psig	mbar
Y610A, Y610AP	13	0,90	15	1,03	1 to 3-inches w.c. (2,5 to 7 mbar)	0 to 2-inches w.c. (0 to 5 mbar)	5.1	0,35	Brown, 1D892527022	0.043	3,0
					1.5 to 5-inches w.c. (4 to 12 mbar)	0.50 to 4-inches w.c. (1,2 to 10 mbar)	5.2	0,36	Cadmium, 1D7654000A2	0.078	5,4
					3 to 8-inches w.c. (7 to 20 mbar)	2 to 7-inches w.c. (5 to 17 mbar)	5.3	0,37	Purple, 1B0197000A2	0.143	9,9
					8 to 16-inches w.c. (20 to 40 mbar)	7 to 15-inches w.c. (17 to 37 mbar)	5.6	0,39	Gray, 1B766627062	0.181	12
					16 to 32-inches w.c. (40 to 80 mbar)	15 to 31-inches w.c. (37 to 77 mbar)	6.1	0,42	Cadmium, 1B883327022	0.378	26
					0.25 to 3 psig (17 to 207 mbar)	0.25 to 3 psig (17 to 207 mbar)	8.0	0,55	Black, 1A630627022	1.944	134

Bulletin 71.3:Y610A

Table 3. Types Y611A and Y611AP Relief Valve Pressure Information

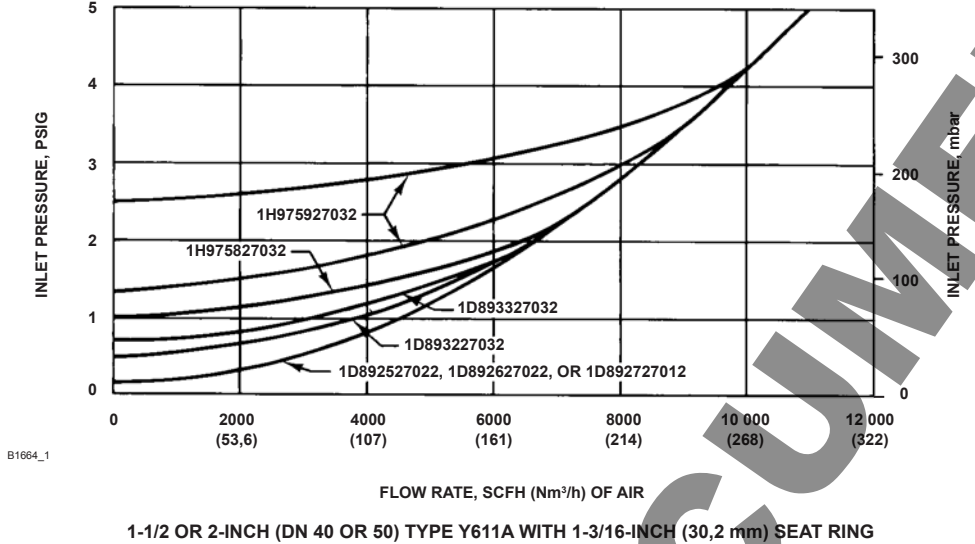
TYPE NUMBER	MAXIMUM ALLOWABLE INLET (CASING) PRESSURE ⁽¹⁾		MAXIMUM OPERATING INLET (RELIEF) PRESSURE TO PREVENT PART DAMAGE ⁽¹⁾		INLET RELIEF SET PRESSURE RANGE		CONTROL SPRING COLOR CODE, PART NUMBER	BUILDUP OVER INLET PRESSURE REQUIRED TO FULLY OPEN RELIEF VALVE	
	Psig	bar	Psig	bar	With Spring Case Above Diaphragm	With Spring Case Below Diaphragm		Psig	mbar
Y611A, Y611AP	15	1,03	5.1	0,35	3 to 4-inches w.c. (7 to 10 mbar)	2 to 3-inches w.c. (5 to 7 mbar)	Brown, 1D892527022	0.089	6,1
			5.2	0,36	3.75 to 6-inches w.c. (9 to 15 mbar)	2.75 to 5-inches w.c. (6,9 to 12 mbar)	Red, 1D892627022	0.100	6,9
			5.3	0,37	5 to 8-inches w.c. (12 to 20 mbar)	4 to 7-inches w.c. (10 to 17 mbar)	Black, 1D892727012	0.124	8,6
			5.5	0,38	7 to 16-inches w.c. (17 to 40 mbar)	6 to 15-inches w.c. (15 to 37 mbar)	Gray, 1D893227032	0.216	15
			6	0,41	10 to 30-inches w.c. (25 to 75 mbar)	9 to 29-inches w.c. (22 to 72 mbar)	Dark Green, 1D893327032	0.351	24
			6.5	0,45	0.75 to 1.5 psig (52 to 103 mbar)	0.75 to 1.5 psig (52 to 103 mbar)	Dark Blue, 1H975827032	0.648	45
			7.5	0,52	1 to 2.5 psig (69 to 172 mbar)	1 to 2.5 psig (69 to 172 mbar)	Orange, 1H975927032	1.026	71

1. Including buildup.

Table 4. Types Y612A and Y612AP Vacuum Regulator Pressure Information

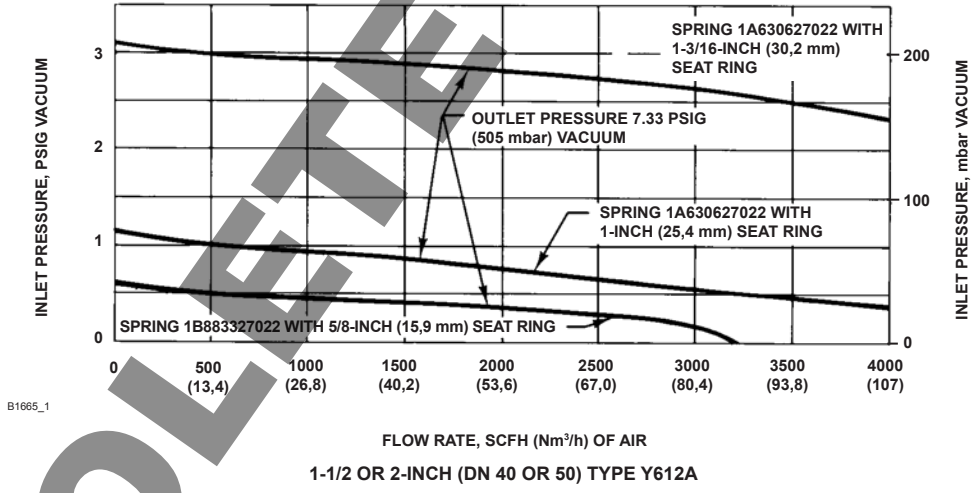
MAXIMUM ALLOWABLE INLET (CASING) PRESSURE		MAXIMUM OPERATING INLET PRESSURE TO PREVENT PART DAMAGE		OUTLET PRESSURE RANGE (VACUUM) ⁽¹⁾		MAXIMUM ALLOWABLE VACUUM		CONTROL SPRING		CHANGE IN OUTLET (CONTROLLED) PRESSURE REQUIRED TO FULLY OPEN VACUUM REGULATOR					
Psig	bar	Psig	bar	With Spring Case Above Diaphragm	With Spring Case Below Diaphragm	Psig	bar	Part Number	Color Code	5/8-Inch (15,9 mm) Port Diameter		1-Inch (25,4 mm) Port Diameter		1-3/16-Inch (30,2 mm) Port Diameter	
										Psig	mbar	Psig	mbar	Psig	mbar
15	1,0	5.1	0,35	1 to 3-inches w.c. (2,5 to 7 mbar)	0 to 2-inches w.c. (0 to 5 mbar)	5.1	0,35	1D892527022	Brown	0.089	6,1	0.053	3,6	0.076	5,2
		5.2	0,36	1.5 to 5-inches w.c. (4 to 12 mbar)	0.5 to 4-inches w.c. (1 to 10 mbar)	5.2	0,36	1D7654000A2	Cadmium	0.124	8,6	0.074	5,1	0.106	7,3
		5.3	0,37	3 to 8-inches w.c. (7 to 20 mbar)	2 to 7-inches w.c. (5 to 17 mbar)	5.3	0,37	0B0197000A2	Purple	0.189	13	0.112	7,7	0.161	11
		5.6	0,39	8 to 16-inches w.c. (20 to 40 mbar)	7 to 15-inches w.c. (17 to 37 mbar)	5.6	0,39	1B766627062	Gray	0.227	16	0.134	9,3	0.193	13
		6.1	0,42	16 to 32-inches w.c. (40 to 80 mbar)	15 to 31-inches w.c. (37 to 77 mbar)	6.1	0,42	1B883327022	Cadmium	0.405	28	0.240	17	0.345	24
		8.0	0,55	0.25 to 3 psig (17 to 207 mbar)	0.25 to 3 psig (17 to 207 mbar)	8.0	0,55	1A630627022	Black	1.944	134	1.152	79	1.656	114

1. With spring case above the diaphragm as shown in Figure 4. With spring case below diaphragm, range 0.6-inch w.c. (1,7 mbar) lower in each end.



NOTE:
SEE CAPACITY INFORMATION SECTION FOR CONVERSION TO EQUIVALENT CAPACITIES OF OTHER GASES AND/OR CUBIC METERS PER HOUR. EACH CURVE REPRESENTS A DIFFERENT CONTROL SPRING AS MARKED AND INITIAL RELIEF SET PRESSURE FOR THAT SPRING AS GIVEN IN TABLE 6. DO NOT BASE YOUR CAPACITY ON A CONTROL SPRING SETTING HIGHER THAN THE MAXIMUM OPERATING INLET (RELIEF) PRESSURE TO PREVENT PART DAMAGE AS GIVEN IN TABLE 3.

Figure 5. Typical Performance Curves for Y611A Series Relief Valves



NOTE:
SEE CAPACITY INFORMATION SECTION FOR CONVERSION TO EQUIVALENT CAPACITIES OF OTHER GASES AND/OR CUBIC METERS PER HOUR. EACH CURVE REPRESENTS A DIFFERENT CONTROL SPRING, SEAT RING PORT DIAMETER, AND OUTLET PRESSURE AS MARKED. THE INITIAL PRESSURE SETTING FOR THE CONTROL SPRING IS GIVEN IN TABLE 7.

Figure 6. Typical Performance Curves for Y612A Series Vacuum Regulators

Capacity Information

Tables 5, 6, and 7 give selected flow capacity information for Y610A, Y611A and Y612A Series devices, respectively. Flows are in SCFH (60°F and 14.7 psia) of air at 60°F. To determine equivalent capacities of 0.6 specific gravity natural gas, propane, butane, or nitrogen, multiply the Table 5, 6, or 7 capacity by the following appropriate conversion factor: 1.29 for 0.6 natural gas, 0.810 for propane, 0.707 for butane, or 1.018 for nitrogen. For gases of other specific gravities, multiply the given capacity by 1.0, and divide by the square root of the appropriate specific gravity. Then, if capacity is desired in normal cubic meters per hour at 0°C and 1,01325 bar, multiply SCFH by 0.0268.

To determine capacities at outlet or relief set pressure not given in Table 5, 6, or 7, use one of the following formulas and convert according to the factors in the preceding paragraph if necessary:

Vacuum Breaker or Vacuum Regulator Application

$$Q = P_{1\text{ abs}} C_g \sin \left(\frac{3415}{C_1} \sqrt{\frac{\Delta P}{P_{1\text{ abs}}}} \right) \text{ deg} \quad (1)$$

where,

- Q = flow capacity in SCFH (60°F and 14.7 psia) of air at 60°F
- $P_{1\text{ abs}}$ = absolute Inlet pressure in psia (P_1 gauge + 14.7)
- C_g = flow coefficient (from Specifications section)
- C_1 = 35 (from Specifications section)
- ΔP = pressure drop across vacuum breaker or regulator

Note that if the actual change in outlet (controlled) pressure (from the service condition) is less than the change in outlet (controlled) pressure required to fully open the vacuum breaker or regulator Table 2 or 5, the C_g in formula (1) must be reduced accordingly. To obtain the correct reduced C_g , multiply the Specifications section C_g by the ratio of the actual change in outlet (controlled) pressure to the change in outlet (controlled) pressure required to fully open the vacuum breaker or regulator.

Relief Valve Application

$$Q = (P_1 + \text{buildup})_{\text{abs}} C_g \times \sin \left(\frac{3415}{C_1} \sqrt{\frac{(P_1 + \text{buildup})_{\text{gauge}}}{(P_1 + \text{buildup})_{\text{abs}}}} \right) \text{ deg} \quad (2)$$

where,

- Q = flow capacity in SCFH
- $(P_1 + \text{buildup})_{\text{abs}}$ = set pressure (gauge) in psi + buildup in psi + 14.7 to determine absolute pressure
- C_g = flow coefficient (from Specifications section)
- C_1 = 35 (from Specifications section)
- $(P_1 + \text{buildup})_{\text{gauge}}$ = set pressure (gauge) in psi + buildup in psi

Note that if the actual buildup is less than the buildup required to fully open the relief valve (Table 3), the C_g in formula (2) must be reduced accordingly. To obtain the correct reduced C_g , multiply the Specifications section C_g by the ratio of the actual buildup to the buildup required to fully open the relief valve.

Table 5. Selected Y610A Series Vacuum Breaker Capacities

CONSTRUCTION, INCHES (DN)	CONTROL SPRING			CAPACITY, SCFH (Nm ³ /h) OF AIR ⁽¹⁾ (INLET PRESSURE IS ATMOSPHERIC)
	Part Number	Outlet Setting, Vacuum	Offset, Vacuum	
1-1/2 or 2 (40 or 50) Type Y610A	1D892527022	2-inches w.c. (5 mbar)	1-inch w.c. (2,5 mbar)	1000 (26,8)
	1D7654000A2	4-inches w.c. (10 mbar)	1-inch w.c. (2,5 mbar)	1400 (37,5)
	0B0197000A2	7-inches w.c. (17 mbar)	1-inch w.c. (2,5 mbar)	1800 (48,2)
	1B766627062	14-inches w.c. (35 mbar)	2-inches w.c. (5 mbar)	1800 (48,2)
	1B883327022	28-inches w.c. (70 mbar)	6-inches w.c. (15 mbar)	1900 (50,9)
	1A630627022	2 psig (138 mbar)	0.4 psig (28 mbar)	2500 (67,0)

1. See Capacity Information section for conversion to equivalent capacities of other gases and/or Nm³/h.

Table 6. Selected Y611A Series Relief Valve Capacities

CONSTRUCTION, INCHES (DN)	CONTROL SPRING PART NUMBER	RELIEF SET PRESSURE	CAPACITY, SCFH (Nm ³ /h) OF AIR ⁽¹⁾ AT FOLLOWING BUILDUP OVER RELIEF SET PRESSURE					
			7-inches w.c. (17 mbar)	14-inches w.c. (35 mbar)	21-inches w.c. (52 mbar)	1 Psig (69 mbar)	1.5 Psig (103 mbar)	2 Psig (5 mbar)
1-1/2 or 2 (40 or 50) Type Y611A	1D892527022	4-inches w.c. (10 mbar)	3000 (80,4)	4000 (107)	4500 (121)	5000 (134)	6000 (161)	7000 (188)
	1D892627022	5-inches w.c. (12 mbar)						
	1D892727012	7-inches w.c. (17 mbar)						
	1D893227032	14-inches w.c. (35 mbar)	2500 (67,0)	4000 (107)	5000 (134)	5500 (147)	6500 (174)	7500 (201)
	1D893327032	21-inches w.c. (52 mbar)	3000 (80,4)	4000 (107)	5000 (134)	6000 (161)	7000 (188)	8000 (214)
	1H975827032	1 psig (69 mbar)	3000 (80,4)	4000 (107)	5500 (147)	6500 (174)	7500 (201)	8000 (214)
	1H975927032	1.25 psig (86 mbar)	2000 (53,6)	4000 (107)	5000 (134)	6000 (161)	7500 (201)	8500 (228)
2.5 psig (172 mbar)		3500 (93,8)	5500 (147)	7000 (188)	8000 (214)	9500 (255)	10 500 (281)	

1. See Capacity Information section for conversion to equivalent capacities of other gases and/or Nm³/h.

- continued -

Table 6. Selected Y611A Series Relief Valve Capacities (continued)

CONSTRUCTION, INCHES (DN)	CONTROL SPRING PART NUMBER	RELIEF SET PRESSURE	CAPACITY, SCFH (Nm ³ /h) OF AIR ⁽¹⁾ AT FOLLOWING BUILDUP OVER RELIEF SET PRESSURE				
			2.5 Psig (172 mbar)	3 Psig (207 mbar)	4 Psig (276 mbar)	5 Psig (345 mbar)	6 Psig (414 mbar)
1-1/2 or 2 (40 or 50) Type Y611A	1D892527022	4-inches w.c. (10 mbar)	8000 (214)	8500 (228)	10 000 (268)	11 000 (295)	
	1D892627022	5-inches w.c. (12 mbar)					
	1D892727012	7-inches w.c. (17 mbar)					
	1D893227032	14-inches w.c. (35 mbar)	8000 (214)	9000 (241)	10 500 (281)	11 300 (303)	
	1D893327032	21-inches w.c. (52 mbar)	8500 (228)	9500 (255)	10 500 (281)	11 600 (311)	
	1H975827032	1 psig (69 mbar)	9000 (241)	10 000 (268)	11 000 (295)	11 800 (316)	
	1H975927032	1.25 psig (86 mbar)	9500 (255)	10 000 (268)	11 000 (295)	12 000 (322)	13 000 (348)
2.5 psig (172 mbar)		10 800 (289)	11 300 (303)	12 300 (330)	13 300 (356)		

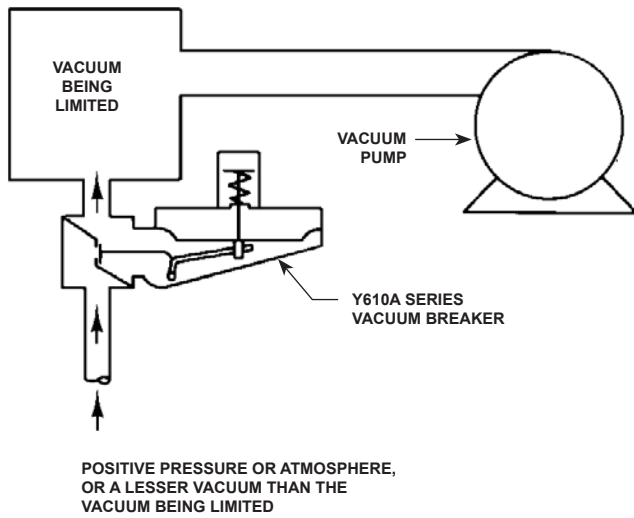
1. See Capacity Information section for conversion to equivalent capacities of other gases and/or Nm³/h.

■ - Shaded areas show where maximum operating inlet (relief) pressure to prevent part damage is exceeded.

Table 7. Selected Y612A Series Vacuum Regulator Capacities

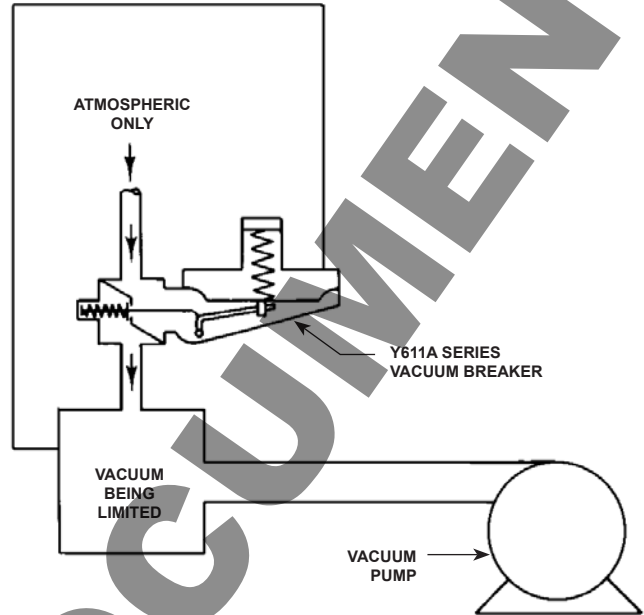
CONSTRUCTION, INCHES (DN)	CONTROL SPRING			CAPACITY, SCFH (Nm ³ /h) OF AIR ⁽¹⁾	AT OUTLET PRESSURE (VACUUM) OF:
	Part Number	Inlet Setting, Vacuum	Offset, Vacuum		
1-1/2 or 2 (40 or 50) Type Y612A	5/8-inch (15,9 mm) Seat Ring 1B883327022	16-inches w.c. (40 mbar)	3-inches w.c. (7 mbar)	1500 (40,2)	7.33 psig (505 mbar)
	1-inch (25,4 mm) Seat Ring 1A630627022	1 psig (69 mbar)	0.2 psig (14 mbar)	2000 (53,6)	
	1-3/16-inch (30,2 mm) Seat Ring 1A630627022	3 psig (207 mbar)	0.6 psig (41 mbar)	3900 (105)	

1. See Capacity Information section for conversion to equivalent capacities of other gases and/or Nm³/h.



A2991

Figure 7. Typical Y610A Series Vacuum Breaker Installation



A2992

Figure 8. Typical Y611A Series Vacuum Breaker Installation

Example Problems Using Formulas

Example Problem 1

This problem involves a Type Y610A vacuum breaker with its outlet connected to vessel in which the vacuum must be limited. This breaker has a 1-3/16-inch (30,2 mm) seat ring and control spring 0B0197000A2 set to start opening and admit atmospheric pressure whenever the vacuum pump downstream from the vessel increases the vessel vacuum to more than 4-inches w.c. (10 mbar). It desired to find the air flow by the time the pump has increased the vessel vacuum to 8-inches w.c. (20 mbar) and the breaker has opened more. To find the air flow through the breaker under these conditions, perform the following steps:

1. Check whether the change in outlet (controlled) pressure of 4-inches w.c. or 0.144 psig (10 mbar) is less than the change in outlet (controlled) pressure required to fully open the vacuum breaker.

Because the change in outlet (controlled) pressure required to fully open a Type Y610A vacuum breaker with a 1-3/16-inch (30,2 mm) seat ring and control spring 0B0197000A2 is 0.143 psig (9,9 mbar) from Table 2, no reduction in the regulating C_g of 720 (Specifications section) need to be made.

2. Solve the problem by using the appropriate values in formula (1) as follows, remembering that the ΔP across the vacuum breaker is 8-inches w.c. or 0.289 psig (20 mbar):

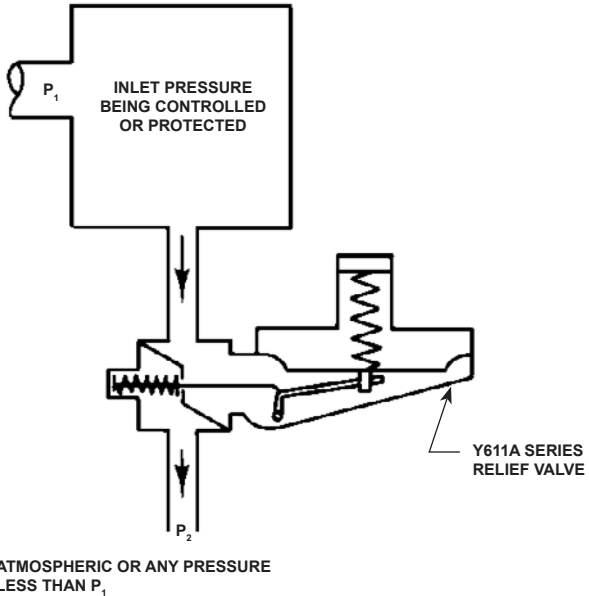
$$Q = 14.7 (720) \sin \left(\frac{3415}{35} \sqrt{\frac{0.289}{14.7}} \right) \text{ deg}$$

$$= 2503 \text{ SCFH (67,1 Nm}^3\text{/h)}$$

Installation

The versatility of the Y610A, Y611A, and Y612A Series devices permits a wide variety of installations as shown in Figures 7 through 10.

The body may be mounted in any position (360-degree rotation possible) relative to the spring and diaphragm cases just by loosening the union nut or cap screws and rotating the diaphragm case. Spring case connection location are shown in Figure 11. Any possible mounting position will provide excellent performance. However, when exposed to the weather, the spring case connection should be protected by an optional vent or should be pointed downward to allow condensate to drain. On indoor installations, this connection should be piped outdoors if used in hazardous gas service.



A2993_2
Figure 9. Typical Y611A Series Relief Valve Installation

Downstream piping will vary with the installation, but to obtain the calculated characteristics, the pipe should be the same size as the outlet and should be straight for the first 18-inches (460 mm).

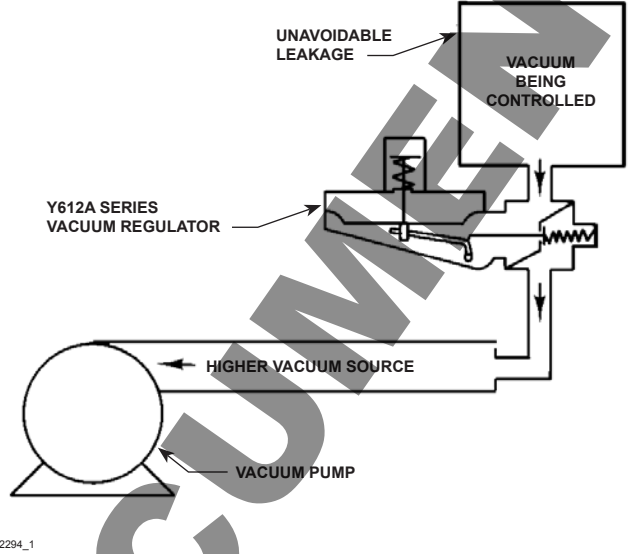
External dimensions and connection sizes are given in Figure 12.

Ordering Information

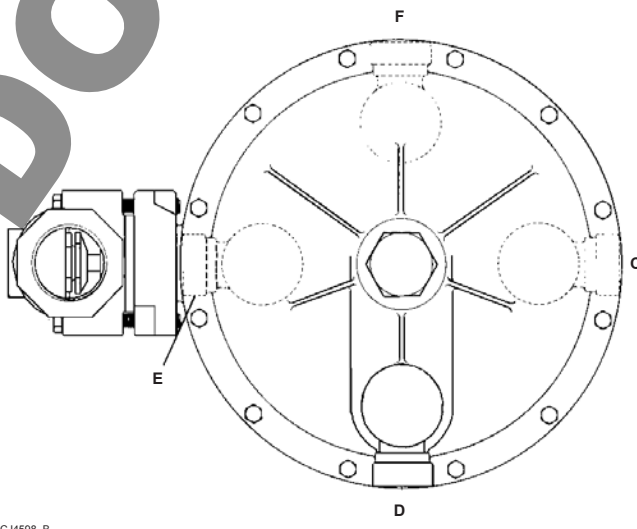
When ordering, specify:

Application

1. Composition and specific gravity of the gas (including chemical analysis if possible).
2. Range of temperatures, flowing inlet pressure (maximum, minimum, nominal), and pressure drops.
3. Desired pressure setting or range.
4. Range of the flow rates (minimum controlled, maximum, normal).
5. Piping size(s).



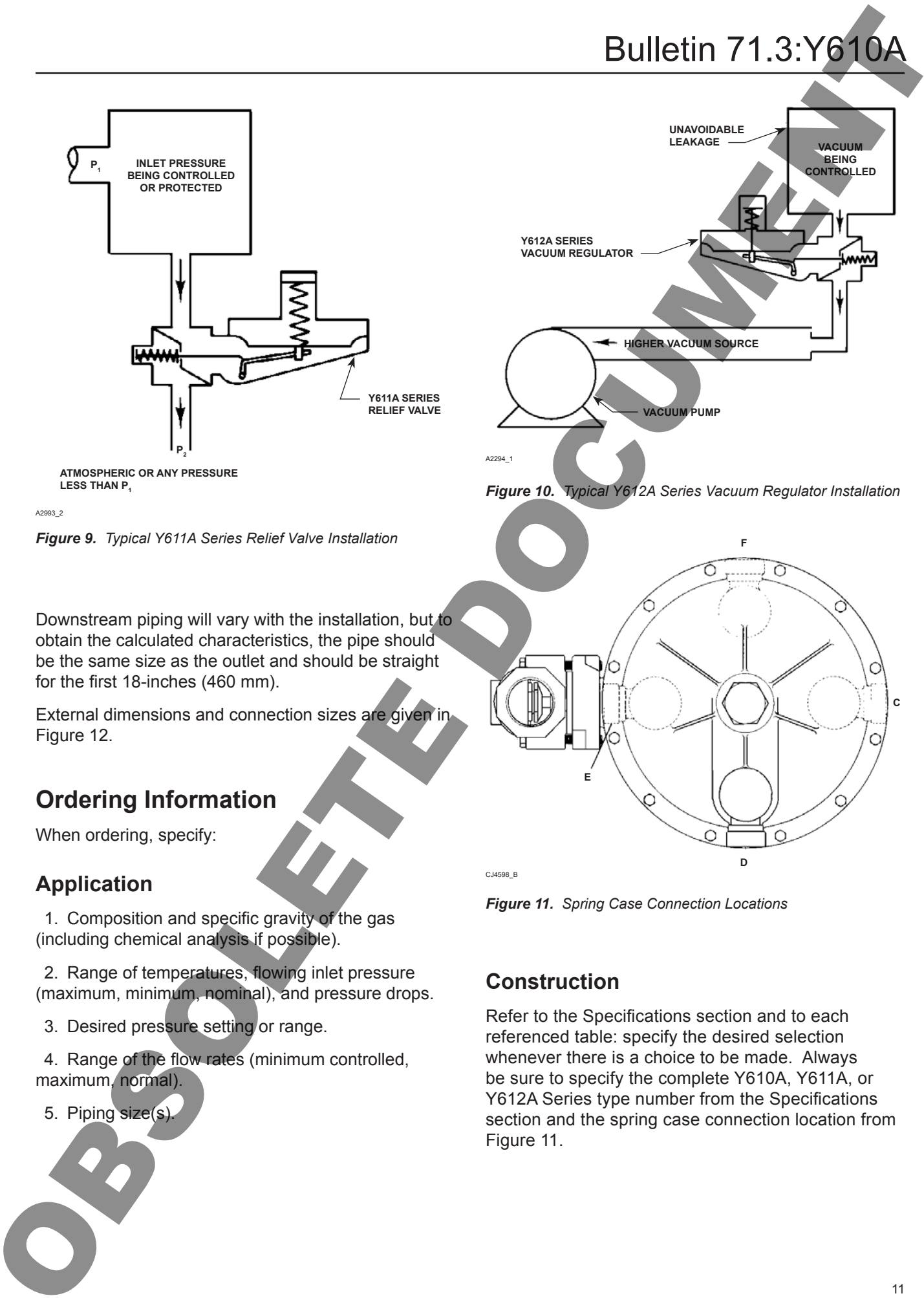
A2294_1
Figure 10. Typical Y612A Series Vacuum Regulator Installation



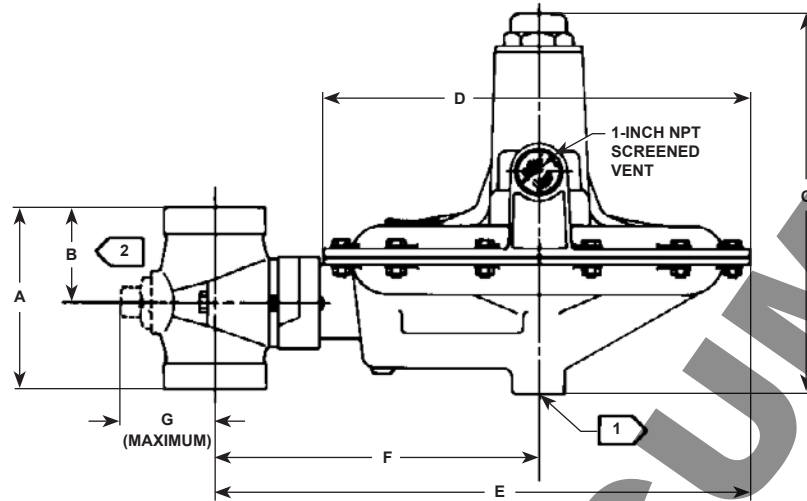
CJ4598_B
Figure 11. Spring Case Connection Locations

Construction

Refer to the Specifications section and to each referenced table: specify the desired selection whenever there is a choice to be made. Always be sure to specify the complete Y610A, Y611A, or Y612A Series type number from the Specifications section and the spring case connection location from Figure 11.



Bulletin 71.3:Y610A



1-1/2 OR 2-INCH (DN 40 OR 50) BODY

NOTE:

1 TAPPED 1/2-INCH NPT IF CONSTRUCTION REQUIRES DIAPHRAGM CASE PIPING

2 $B = \frac{A}{2}$

BODY SIZE, INCHES (DN)	DIMENSIONS, INCHES (mm)									
	A			C		D	E	F	G (MAXIMUM)	
	NPT Connections	Class 125A Flanged Connections	Class 250A Flanged Connections	Y610A and Y612A Series Devices	Y611A Series Devices				Y610A Series Devices	Y611A and Y612A Series Devices
1-1/2 x 1-1/2 (40 x 40) 2 x 2 (50 x 50)	6.12 (156) 6.12 (156)	---- 10.0 (254)	---- 10.5 (267)	12.88 (327) 12.88 (327)	12.88 (327) 12.88 (327)	14.12 (359) 14.12 (359)	18.12 (460) 17.69 (449)	11.06 (281) 10.62 (270)	1.44 (36,5) 2.19 (55,6)	2.33 (59,2) 3.12 (79,2)

Figure 12. Dimensions

Industrial

USA - Headquarters
McKinney, Texas 75070 USA
Tel: 1-800-558-5853
Outside U.S. 1-469-293-4201

Asia-Pacific
Shanghai, China 201206
Tel: 86-21-5899 7887

Europe
Bologna, Italy 40013
Tel: 39 051 4190611

Natural Gas Technologies

USA - Headquarters
McKinney, Texas 75070
Tel: 1-800-558-5853
Outside U.S. 1-469-293-4201

Asia-Pacific
Singapore, Singapore 128461
Tel: +65 6777 8211

Europe
Bologna, Italy 40013
Tel: 39 051 4190611
Gallardon, France 28320
Tel: +33 (0)2 37 33 47 00

Industrial/High Purity

TESCOM
Elk River, Minnesota 55330 USA
Tel: 1-763-241-3238
Selmsdorf, Germany 23923
Tel: +49 (0) 38823 31 0

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