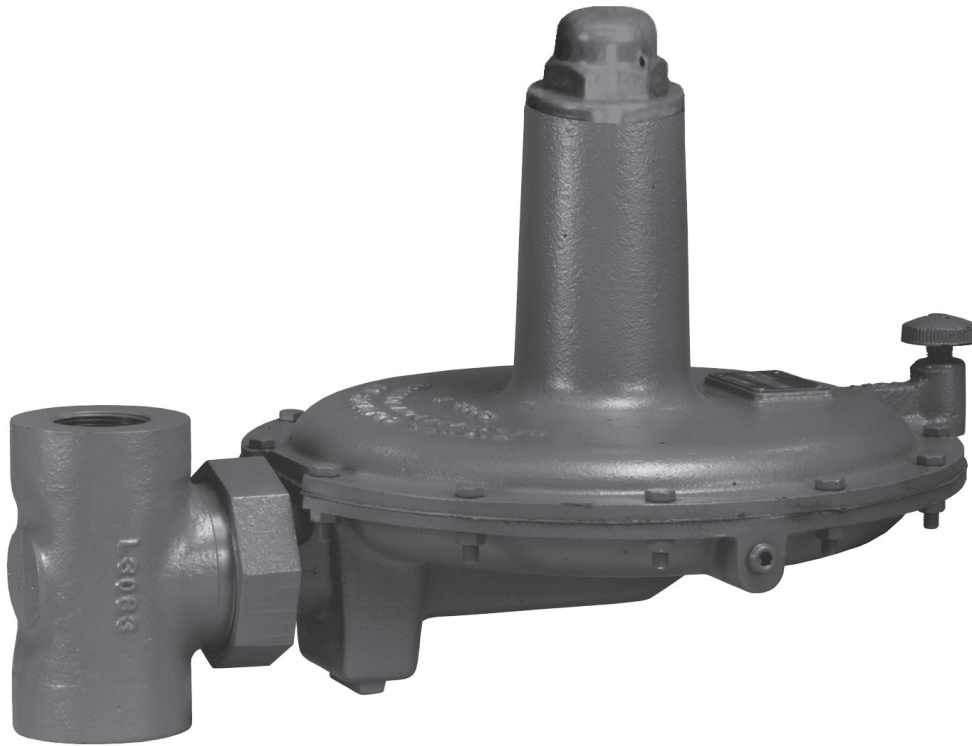


Y692VB Series Vacuum Breaker



W7429

Figure 1. Type Y692VB Vacuum Breaker

Introduction

The Y692VB Series direct-operated vacuum breakers are used for the precise control of small capacity and low-pressure service applications where an increase in vacuum must be limited. The Type Y692VB has internal pressure registration. The Type Y692VBM has a control line connection and an O-ring stem seal to block the throat for external pressure registration.

Features

- **Precision Control of Low-Pressure Settings**—Large diaphragm area provides more accurate control at low-pressure settings.
- **Installation Adaptability**—Four-position vent mounting and 360° adjustability of the union nut connection permit flexibility in vent positioning and installation in awkward positions or limited spaces.
- **Corrosion Resistance**—Constructions are available in a variety of materials for compatibility with corrosive process gases.



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Specifications

Body Sizes and End Connection Styles⁽¹⁾

See Table 1

Maximum Allowable Inlet (Positive) Pressure⁽²⁾ and Orifice Sizes

3/4-inch (19 mm) Orifice:

30 psig (2,1 bar)

1-3/16-inch (30 mm) Orifice:

13 psig (0,89 bar)

Maximum Casing Pressure⁽²⁾

8 psig (0,55 bar) vacuum

Change in Vacuum Control Pressure to Wide-Open⁽²⁾

See Table 2

Vacuum Control Pressure Ranges⁽²⁾

See Table 2

Capacities

See Table 5

Flow Coefficients

See Table 3

Pressure Registration

Type Y692VB: Internal

Type Y692VBM: External

Spring Case Connection

3/4 NPT

Type Y692VB Gauge Tap Connection

1/4 NPT

Type Y692VBM Control Line Connection

1/2 NPT

Construction Materials

Body: Cast iron, WCC steel (NACE), CF8M Stainless steel (NACE), or Hastelloy® C (optional)

Diaphragm Casing: Cast iron, WCC steel (NACE), CF8M Stainless steel, or Hastelloy® C (optional)

Spring Case: Cast iron, WCC steel, Aluminum, or CF8M Stainless steel

Disk Holder: S30200 Stainless steel (**standard**) or S31600 Stainless steel (NACE)

Disk: Nitrile (NBR) or Fluorocarbon (FKM) (**standard**), Neoprene (CR), Polytetrafluoroethylene (PTFE), Fluorocarbon (FKM), Perfluoroelastomer (FFKM), or Ethylenepropylene (EPR) NACE

Diaphragm: Nitrile (NBR), Fluorocarbon (FKM), Ethylenepropylene (EPR), or Silicone (VMQ)

Trim: S30200 stainless steel (**standard**), S31600 Stainless steel (NACE), or Hastelloy® C (optional)

O-rings: Nitrile (NBR), Fluorocarbon (FKM), Perfluoroelastomer (FFKM), or Ethylenepropylene (EPR)

Material Temperature Capabilities⁽²⁾

Nitrile (NBR): -40° to 180°F (-40° to 82°C)

Fluorocarbon (FKM):
40° to 300°F (4° to 149°C)

Ethylenepropylene (EPR):
-20° to 200°F (-29° to 93°C)

Perfluoroelastomer (FFKM):
0° to 300°F (-17° to 149°C)

Silicone (VMQ): -40° to 400°F (-40° to 204°C)

Approximate Weights

Cast Iron: 45 pounds (20 kg)

Steel, Stainless Steel, and Hastelloy® C:
57 pounds (26 kg)

1. End connections for other than U.S. standards can usually be provided; consult the local Sales Office.

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

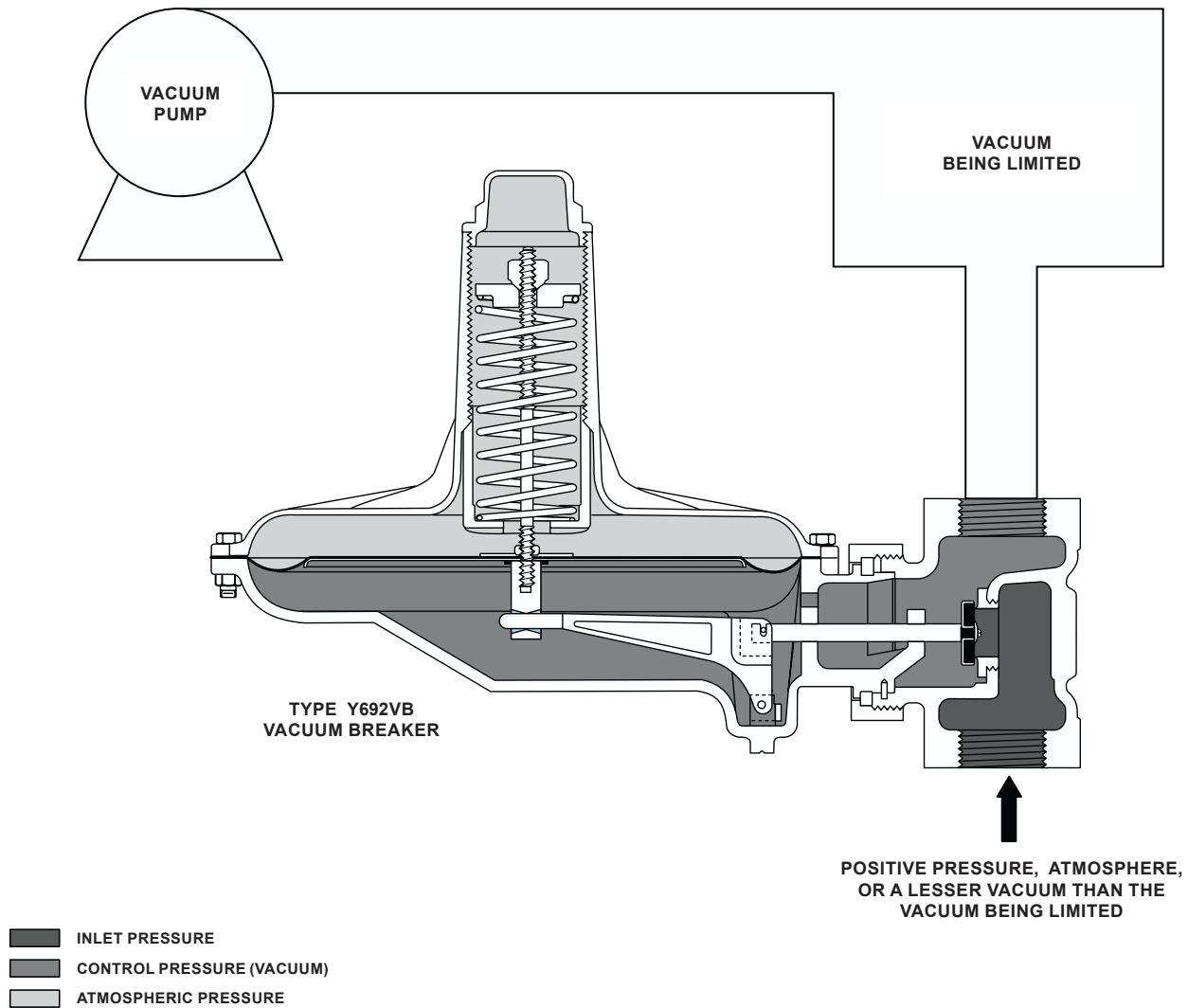


Figure 2. Type Y692VB Operational Schematic

Principle of Operation

An increase in vacuum (decrease in absolute pressure) beyond the setpoint registers on the diaphragm, opening the disk. This permits body inlet pressure to enter the system and restore the controlled vacuum to the setpoint. On the Type Y692VB, the pressure at the regulator body outlet registers directly into the diaphragm casing. The Type Y692VBM has a control line connecting the diaphragm casing to the vacuum being controlled and an O-ring stem seal blocking the throat allowing for registration only through the control line connection (outlet body pressure may or may not be the same as the pressure in the diaphragm casing).

Installation

The versatility of the Y692VB Series vacuum breakers permits a wide variety of installations. The body may be mounted in any position (360° rotation possible) relative to the spring and diaphragm cases by loosening the union nut and rotating the diaphragm casing. The spring case can be rotated to fit the orientation required. Any mounting position provides excellent performance. When exposed to the weather, the spring case port should be protected by an optional umbrella vent or should be pointed downward to allow condensate to drain. On indoor installations, this port should be piped outdoors if used in hazardous gas service.

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Table 1. Body Sizes and End Connection Styles

BODY SIZE, NPS (DN)	CONSTRUCTION MATERIAL AND END CONNECTION STYLE ⁽¹⁾		
	Cast Iron	Steel or Stainless Steel	Hastelloy® C
1-1/2 (40)	NPT	NPT, SWE, CL150 RF, CL300 RF, or PN 16/25/40	NPT or CL150 RF
2 (50)	NPT or CL125 FF		

1. All flanges are welded on to the body and have a face-to-face dimension of 14-inches (356 mm).

Table 2. Vacuum Control Pressure Ranges and Spring Part Numbers

VACUUM CONTROL PRESSURE RANGE ⁽¹⁾	CHANGE IN VACUUM CONTROL PRESSURE TO REACH WIDE-OPEN	SPRING PART NUMBER	SPRING COLOR	SPRING WIRE DIAMETER
1 to 3-inches w.c. (2 to 7 mbar) ⁽²⁾ 1.5 to 5-inches w.c. (4 to 12 mbar) ⁽²⁾ 3 to 8-inches w.c. (7 to 20 mbar) ⁽²⁾	1.2-inches w.c. (3 mbar) 2.2-inches w.c. (5 mbar) 4.0-inches w.c. (10 mbar)	1D892527022 1D7654000A2 0B0197000A2	Brown Unpainted Purple	0.109-inches (2,77 mm) 0.120-inches (3,05 mm) 0.148-inches (3,76 mm)
8 to 16-inches w.c. (20 to 40 mbar) 16 to 32-inches w.c. (40 to 80 mbar) 0.25 to 3 psig (17 to 207 mbar)	5.0-inches w.c. (13 mbar) 10.5-inches w.c. (26 mbar) 2 psig (138 mbar)	1B766270622 1B883327022 1A630627022	Gray Unpainted Black	0.156-inches (3,96 mm) 0.187-inches (4,75 mm) 0.275-inches (6,99 mm)

1. Pressure ranges are based on the spring case pointing up. Pointing the spring case down increases the pressure range 1.7-inches w.c. (4 mbar).
(Example: 1 to 3-inches w.c. (2 to 7 mbar) changes to 2.7 to 4.7-inches w.c. (7 to 12 mbar)).
2. Do not use Fluorocarbon (FKM) with these springs at diaphragm temperatures lower than 40°F (4°C).

Table 3. Flow Coefficients

ORIFICE SIZE, INCHES (mm)	WIDE-OPEN C_g	WIDE-OPEN C_v	C_1	K_m
3/4 (19) 1-3/16 (30)	260 720	7.4 20.6	35 35	0.79

Table 4. IEC Sizing Coefficients

X_T	F_D	F_L
0.76	0.50	0.89

Table 5. Y692VB Series Capacities (based on atmospheric inlet pressure)

VACUUM CONTROL PRESSURE RANGE	VACUUM CONTROL PRESSURE SETTING	CHANGE IN VACUUM	MAXIMUM ALLOWABLE VACUUM PRESSURE	CAPACITIES IN SCFH (Nm ³ /h) OF AIR	
				3/4-inch (19 mm) Orifice	1-3/16-inch (30 mm) Orifice
1 to 3-inches w.c. (2 to 7 mbar) 1.5 to 5-inches w.c. (4 to 12 mbar) 3 to 8-inches w.c. (7 to 20 mbar)	2-inches w.c. (5 mbar) 4-inches w.c. (10 mbar) 7-inches w.c. (17 mbar)	1-inch w.c. (2 mbar) 1-inch w.c. (2 mbar) 1-inch w.c. (2 mbar)	8 psig (0,55 bar)	500 (13,4) 700 (18,8) 900 (24,1)	1000 (26,8) 1400 (37,5) 1800 (48,2)
8 to 16-inches w.c. (20 to 40 mbar) 16 to 32-inches w.c. (40 to 80 mbar) 0.25 to 3 psig (17 to 207 mbar)	14-inches w.c. (35 mbar) 28-inches w.c. (70 mbar) 2 psig (138 mbar)	2-inches w.c. (5 mbar) 6-inches w.c. (15 mbar) 0.4 psig (28 mbar)		900 (24,1) 1000 (26,8) 1300 (34,8)	1800 (48,2) 1900 (50,9) 2500 (67,0)

Note

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).

Capacity Information

To determine flow capacities for the Y692VB Series vacuum breakers, use the following formula:

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

where,

- Q = flow capacity in SCFH (60°F, 14.7 psia) of air
- P_{1abs} = absolute inlet pressure, psia (P₁ psig + 14.7)
- C_g = flow coefficient (from Table 3)
- C₁ = 35 (from Table 3)
- ΔP = pressure drop across the vacuum breaker

If the actual change in control pressure (from the service conditions) is less than the change in control pressure required to reach wide-open (Table 2), the C_g in the formula must be reduced accordingly. To obtain the correct reduced C_g, multiply the C_g (Table 3) by the ratio of the actual change in control pressure to the change in control pressure to reach wide-open.

Conversion Factors

To determine equivalent capacities of 0.6 specific gravity natural gas, propane, butane, or nitrogen, multiply the calculated 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, divide by the square root of the appropriate specific gravity.

Ordering Information

When ordering, specify:

Application

1. Composition and specific gravity of gas (including chemical analysis if possible)
2. Temperature range
3. Inlet pressures (maximum, minimum, nominal)
4. Pressure drops
5. Desired pressure setting or range
6. Flow rates (minimum, maximum, normal)
7. Piping size(s)

Construction

Refer to the Specifications section and to each referenced table; specify the desired selection whenever there is a choice to be made. Be sure to specify spring case port location from Figure 4.

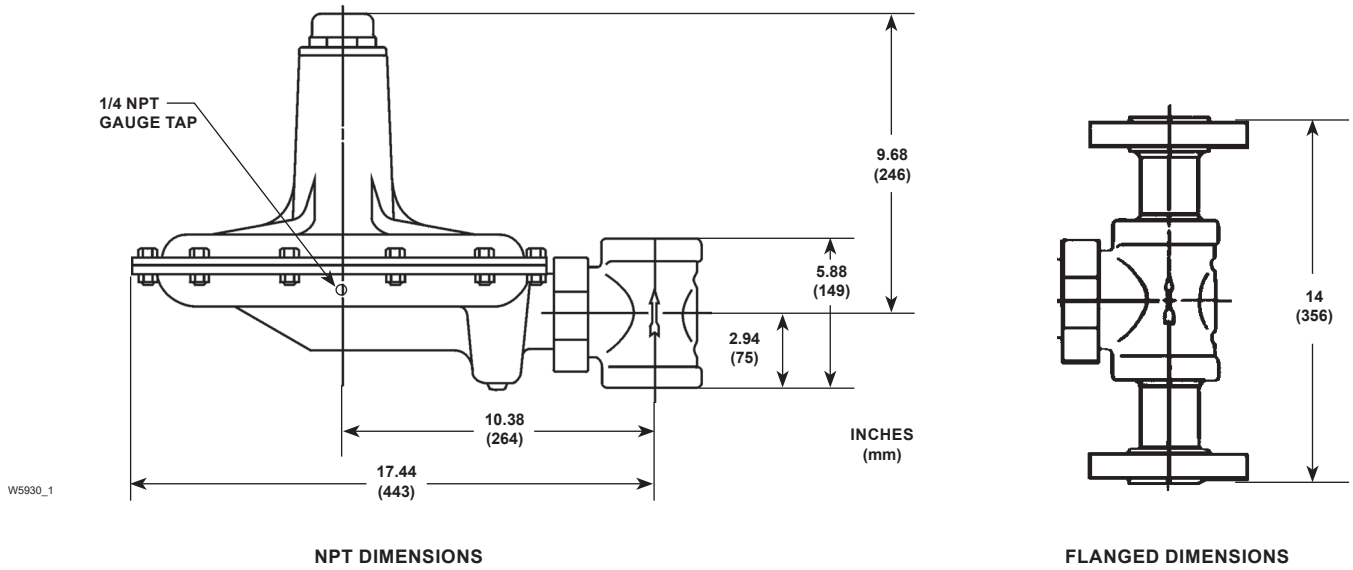


Figure 3. Y692VB Series Dimensions

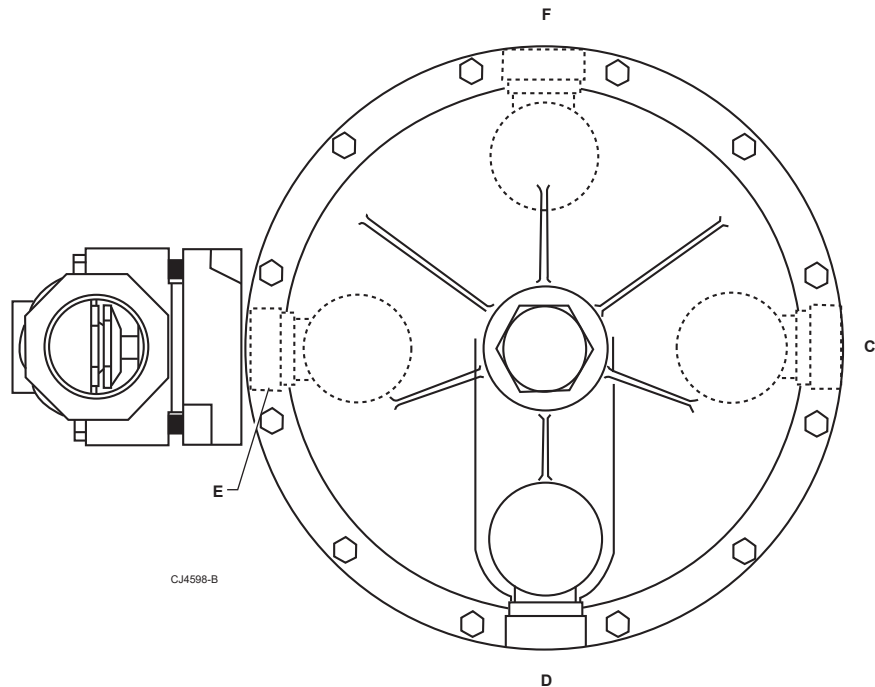


Figure 4. Spring Case Port Location

Ordering Guide

Type (Select One)

- Y692VB (internal registration)***
- Y692VBM (external registration)***

Body Size (Select One)

- NPS 1-1/2 (DN 40)***
- NPS 2 (DN 50)***

Body Material and End Connection Style (Select One)

Cast Iron Body

- NPT***
- CL125 FF***

Hastelloy® C

- NPT*
- CL150 RF***

WCC Steel

- NPT***
- CL150 RF**
- CL300 RF**
- PN 16/25/40*

CF8M Stainless Steel

- NPT***
- CL150 RF**
- CL300 RF**
- PN 16/25/40*

Spring Case Material (Select One)

- Cast Iron***
- WCC Steel***
- CF8M Stainless Steel**

Diaphragm Case Material (Select One)

- Cast Iron***
- WCC Steel***
- CF8M Stainless Steel**
- Hastelloy® C*

Trim Material (Select One)

- 302 Stainless Steel***
- 316 Stainless Steel**
- Hastelloy® C*

Diaphragm Material (Select One)

- Nitrile (NBR) (standard)***
- Fluorocarbon (FKM)**
- Ethylenepropylene (EPDM)*
- Silicone (VMQ)*

Disk Material (Select One)

- Nitrile (NBR) (standard)***
- Fluorocarbon (FKM)**
- Perfluoroelastomer (FFKM)*
- PTFE*
- Ethylenepropylene (EPDM)*
- Neoprene (CR)*

Orifice Size (Select One)

- 3/4-inch (19 mm)***
- 1-3/16-inch (30 mm) (standard)***

Vacuum Control Pressure Range (Select One)

- 1 to 3-inches w.c. (2 to 7 mbar)***
- 1.5 to 5-inches w.c. (4 to 12 mbar)***
- 3 to 8-inches w.c. (7 to 20 mbar)***
- 8 to 16-inches w.c. (20 to 40 mbar)***
- 16 to 32-inches w.c. (40 to 80 mbar)***
- 0.25 to 3 psig (17 to 207 mbar)***

Replacement Parts Kit (Optional)

- Yes, send one replacement parts kit to match this order.

Regulators Quick Order Guide	
***	Readily Available for Shipment
**	Allow Additional Time for Shipment
*	Special Order, Constructed from Non-Stocked Parts. Consult Your local Sales Office for Availability.
Availability of the product being ordered is determined by the component with the longest shipping time for the requested construction.	

Vacuum Specification Worksheet	
Application Specifications:	
Tank Size	_____
Pump In Rate	_____
Pump Out Rate	_____
Blanketing Gas (Type and Specific Gravity)	_____
Pressure Requirements:	
Upstream Pressure	_____
Downstream Pressure	_____
Control Pressure:	
	<input type="checkbox"/> Upstream <input type="checkbox"/> Downstream
Maximum Flow	_____
Special Material Requirements:	
<input type="checkbox"/> Iron <input type="checkbox"/> Steel <input type="checkbox"/> Stainless Steel <input type="checkbox"/> Hastelloy® C	
<input type="checkbox"/> Other _____	
Other Requirements:	

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