

T205VB Series Vacuum Breakers

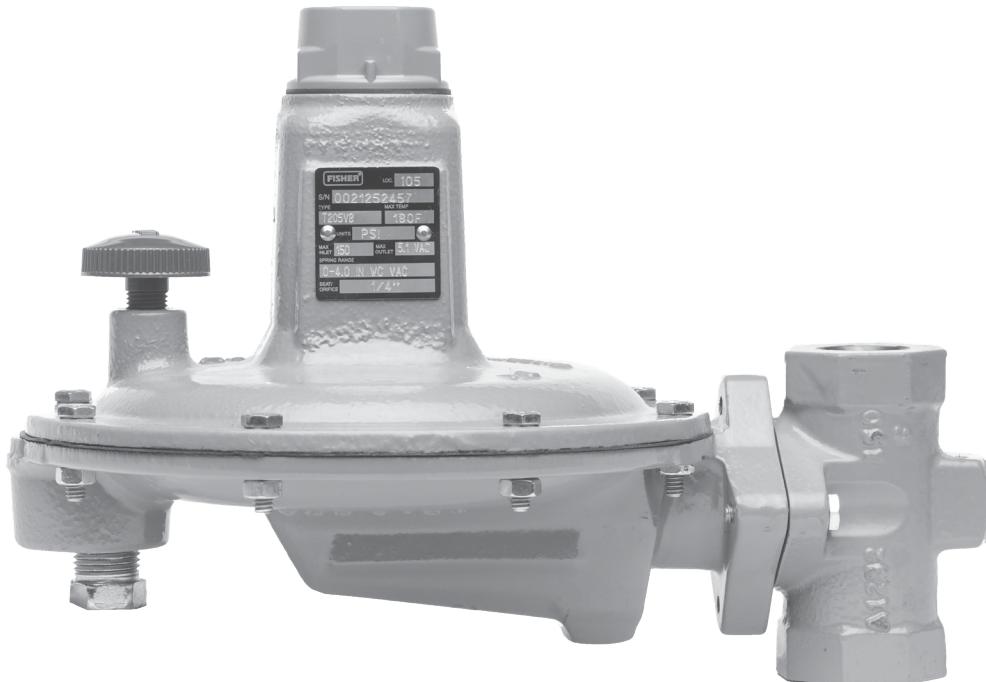


Figure 1. Typical T205VB Series Vacuum Breaker

Introduction

The T205VB Series vacuum breakers (Figure 1) are used for precise control of small capacity, low-pressure service applications where an increase in vacuum must be limited. These direct-operated vacuum breakers are available in NPS 3/4 and 1 / DN 20 and 25 body sizes and have 1/4 or 1/2 in. / 6.4 or 13 mm orifice.

The T205VB Series is available in two configurations: Type T205VB for internal pressure registration requiring no downstream control line and Type T205VBM which has a blocked throat and a control line connection and an O-ring stem seal for external pressure registration.

Features

- **Common Spare Parts**—The Types T205VB and T205VBM have common spare parts with the other T205 Series products.
- **Tamper-Resistant Adjustment**—Closing cap and spring case on many types allow installation of sealing wire to discourage or detect unauthorized adjustment of pressure setting.
- **Easy Conversion**—The Type T205VB (internal pressure registration) converts easily to the Type T205VBM (external pressure registration).
- **Precision Control of Low-Pressure Settings**—Large diaphragm area provides more accurate control at low-pressure settings.
- **Corrosion Resistance**—Constructions are available in a variety of materials for compatibility with corrosive gases.

T205VB Series

Specifications

The Specifications section on this page provides the ratings and other specifications for the T205VB Series. Factory specification such as type, maximum inlet pressure, maximum temperature, maximum outlet pressure, spring range and orifice size are stamped on the nameplate fastened on the regulator at the factory.

Available Configurations

Type T205VB: Direct-operated vacuum breaker with internal registration.

Type T205VBM: Direct-operated vacuum breaker equipped with a blocked throat and control line connection for external pressure registration.

Body Sizes

NPS 3/4 / DN 20

NPS 1 / DN 25

End Connection Styles

BODY SIZE		BODY MATERIAL	END CONNECTION STYLE ⁽¹⁾
NPS	DN		
3/4 or 1	20 or 25	Gray cast iron	NPT
		316/316L Stainless steel, Carbon steel	NPT or CL150 RF

1. All flanges are welded. Weld-on flange dimension is 14 in. / 356 mm face-to-face.

Maximum Operating Inlet Pressure

150 psig / 10.3 bar

Maximum Outlet (Casing) Pressure⁽¹⁾

Cast Iron: 35 psig / 2.41 bar

Steel/Stainless steel: 75 psig / 5.17 bar

Maximum Emergency Outlet (Casing) Pressure to Avoid Internal Parts Damage⁽¹⁾

35 psig / 2.41 bar

Maximum Setpoints for Achieving Wide-Open Flow

See Table 4

Maximum Vacuum Pressure

Full Vacuum

Vacuum Control Pressure Ranges⁽¹⁾

See Table 3

Flow Coefficients

See Table 1

Flow Capacities

See Tables 5 and 6

Construction Materials

See Table 2

Temperature Capabilities⁽¹⁾

Nitrile (NBR)

Cast Iron/Steel Body: -20 to 180°F / -29 to 82°C

Stainless steel Body: -40 to 180°F / -40 to 82°C

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

Pressure Registration

Type T205VB: Internal

Type T205VBM: External

Orifice Size

1/4 in. / 6.4 mm

1/2 in. / 13 mm

Pressure Setting Adjustment

Adjusting Nut

Spring Case Connection

1/4 NPT

Diaphragm Case Connection

1/2 NPT

Approximate Weight

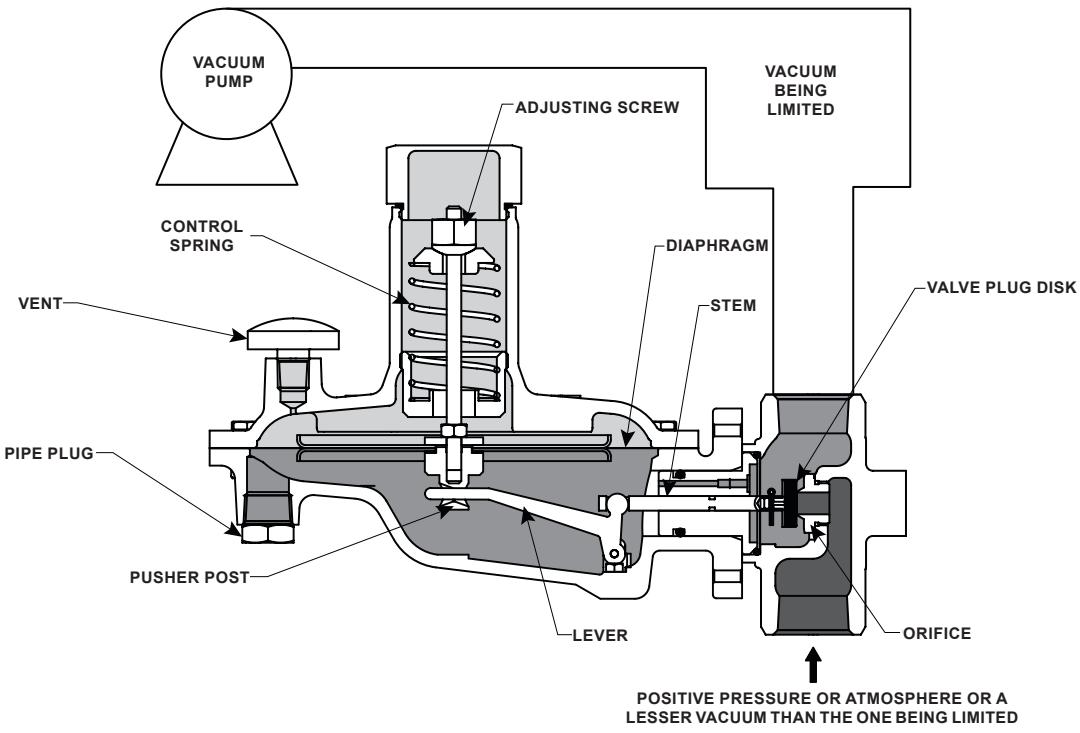
18.7 lbs / 8.5 kg

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

Principle of Operation

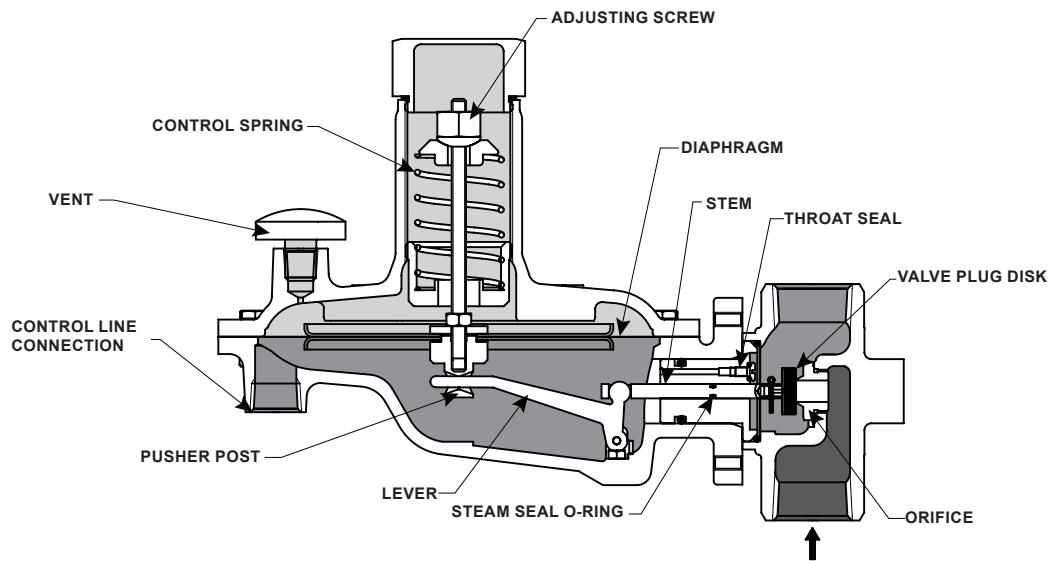
The T205VB Series vacuum breakers are used in applications where an increase in vacuum must be limited. See Figure 2. An increase in vacuum (decrease in absolute pressure) beyond a setpoint is sensed on the under side of the diaphragm, opening the disk assembly. This permits positive pressure, atmosphere 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. On the Type T205VB, the pressure registers internally underneath the diaphragm. The Type T205VBM has a control line connecting the diaphragm casing to the vacuum line and a throat seal allowing for registration only through the control line connection.



TYPE T205VB WITH INTERNAL PRESSURE REGISTRATION

INLET PRESSURE
 OUTLET PRESSURE
 ATMOSPHERIC PRESSURE



TYPE T205VBM WITH EXTERNAL PRESSURE REGISTRATION

INLET PRESSURE
 OUTLET PRESSURE
 ATMOSPHERIC PRESSURE

Figure 2. T205VB Series Operational Schematic

T205VB Series

Table 1. Flow Coefficients

ORIFICE SIZE		REGULATING			WIDE-OPEN		
In.	mm	C_g	C_v	C_1	C_g	C_v	C_1
1/4	6.4	44	1.47	29.7	45	1.52	29.7
1/2	13	173	4.74	36.4	178	4.89	36.4

Table 2. Construction Materials

BODY, LOWER CASING AND SPRING CASE	TRIM	DIAPHRAGM	DISK	O-RING
Gray cast iron, Steel or Stainless steel	Stainless steel	Nitrile (NBR) or Fluorocarbon (FKM)	Nitrile (NBR) or Fluorocarbon (FKM)	Nitrile (NBR) or Fluorocarbon (FKM)

Table 3. Vacuum Control Pressure Ranges

VACUUM CONTROL PRESSURE RANGE ⁽¹⁾⁽²⁾		SPRING PART NUMBER	SPRING COLOR	SPRING WIRE DIAMETER		SPRING FREE LENGTH	
psig	mbar			In.	mm	In.	mm
0 to 4 in. w.c.	0 to 10	ON039427222	Unpainted	0.062	1.6	3.06	78
0 to 1.0	0 to 69	ON086127022	Unpainted	0.125	3.2	2.50	64
0 to 2.1	0 to 145	ON004327022	Yellow	0.162	4.1	2.50	64
0 to 5	0 to 0.34 bar	1D141827012	Blue	0.207	5.3	2.50	64

1. Spring ranges based on atmospheric inlet pressure.
2. To convert to in. Hg, multiply psig value by 2.04.

Table 4. Maximum Setpoints for Achieving Wide-Open Flow

SPRING RANGE, PART NUMBER AND COLOR CODE ⁽¹⁾⁽²⁾	ORIFICE SIZE		MAXIMUM SETPOINTS FOR ACHIEVING WIDE-OPEN FLOW AT SPECIFIC INLET PRESSURES					
			0 psi / 0 bar	25 psi / 1.7 bar	50 psi / 3.4 bar	75 psi / 5.2 bar	100 psi / 6.9 bar	125 psi / 8.6 bar
	In.	mm	psig / bar	psig / bar	psig / bar	psig / bar	psig / bar	psig / bar
0 to 4 in. w.c. / 0 to 10 mbar ON039427222 Unpainted	1/4	6.4	4 in. w.c. / 10 mbar	4 in. w.c. / 10 mbar	3.5 in. w.c. / 8.7 mbar	3 in. w.c. / 7.5 mbar	2.5 in. w.c. / 6.2 mbar	2 in. w.c. / 5 mbar
	1/2	13	4 in. w.c. / 10 mbar	3 in. w.c. / 7.5 mbar				
0 to 1.0 psig / 0 to 69 mbar ON086127022 Unpainted	1/4	6.4	1 / 0.07	1 / 0.07	1 / 0.07	1 / 0.07	0.96 / 0.07	0.92 / 0.06
	1/2	13	1 / 0.07	0.95 / 0.07	0.9 / 0.06	0.85 / 0.06	0.8 / 0.05	0.75 / 0.05
0 to 2.1 psig / 0 to 145 mbar ON004327022 Yellow	1/4	6.4	2.1 / 0.14	2.1 / 0.14	2.1 / 0.4	2.1 / 0.14	2.05 / 0.14	2.0 / 0.14
	1/2	13	2.1 / 0.14	2.1 / 0.14	2.05 / 0.14	1.98 / 0.14	1.92 / 0.13	1.86 / 0.13
0 to 5 psig / 0 to 0.34 bar 1D141827012 Blue	1/4	6.4	5.0 / 0.34	5.0 / 0.34	5.0 / 0.34	5.0 / 0.34	5.0 / 0.34	5.0 / 0.34
	1/2	13	5.0 / 0.34	5.0 / 0.34	5.0 / 0.34	5.0 / 0.34	5.0 / 0.34	5.0 / 0.34

 - Not applicable.
1. Spring ranges based on atmospheric inlet pressure.
2. To convert to in. Hg, multiply psig value by 2.04.

Table 5. Type T205VB Capacities

BODY SIZE		VACUUM CONTROL PRESSURE RANGE		VACUUM CONTROL PRESSURE SETTING		CHANGE IN VACUUM		INLET PRESSURE		CAPACITIES IN SCFH / Nm ³ /h OF AIR			
										Orifice Size, In. / mm			
										1/4 / 6.4		1/2 / 13	
NPS	DN	psig	bar	psig	bar	psig	bar	psig	bar	SCFH	Nm ³ /h	SCFH	Nm ³ /h
3/4	20	0 to 4 in. w.c.	0 to 10 mbar	2 in. w.c.	5 mbar	1 in. w.c.	2.49 mbar	0	0	136	3.7	430	11.5
										472	12.6	867	23.2
										617	16.5	1243	33.3
										698	18.7		
										699	18.7		
										826	22.1		
		0 to 1	0 to 69 mbar	0.5	34 mbar	0.02	1.38	0	0	65	1.7	137	3.7
										402	10.8	950	25.4
										568	15.2	1294	34.7
										778	20.8	1918	51.4
										804	21.5	2180	58.4
										898	24.1	2605	69.8
		0 to 2.1	0 to 145 mbar	1.0	0.07	0.2	13.8 mbar	0	0	62	1.7	173	4.6
										347	9.3	966	25.9
										603	16.2	1754	47.0
										760	20.4	1890	50.6
										871	23.3	2352	63.0
										990	26.5	2697	72.2
		0 to 5	0 to 0.34	2.5	0.17	0.5	34.5	0	0	102	2.7	306	8.2
										395	10.6	1141	30.6
										660	17.7	1698	45.5
										784	21.0	2064	55.3
										991	26.5	2468	66.1
										1205	32.3	2795	74.9

- Not applicable.

- continued -

Installation

A T205VB Series regulator may be installed in any orientation as long as flow through it matches the direction of the arrow on the body. Normal installation is with the spring case vertical above or below the diaphragm case. When exposed to the weather, the vent should be protected by the optional umbrella vent or pointed down to allow condensate to drain. If used in hazardous gas service on indoor installation this connection should be piped outdoors. External dimensions and connections are shown in Figure 3.

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 in. / 457 mm.

T205VB Series

Table 5. Type T205VB Capacities (continued)

BODY SIZE		VACUUM CONTROL PRESSURE RANGE		VACUUM CONTROL PRESSURE SETTING		CHANGE IN VACUUM		INLET PRESSURE		CAPACITIES IN SCFH / Nm ³ /h OF AIR			
										Orifice Size, In. / mm			
										1/4 / 6.4		1/2 / 13	
NPS	DN	psig	bar	psig	bar	psig	bar	psig	bar	SCFH	Nm ³ /h	SCFH	Nm ³ /h
1	25	0 to 4 in. w.c.	0 to 10 mbar	2 in. w.c.	5 mbar	1 in. w.c.	2.49 mbar	0	0	28	0.7	270	7.2
										460	12.3	1065	28.5
										853	22.8	1654	44.3
										739	19.8		
										754	20.2		
										833	22.3		
		0 to 1	0 to 69 mbar	0.5	34 mbar	0.02	1.38	0	0	67	1.8	237	6.3
										492	13.2	1092	29.2
										776	20.8	1374	36.8
										891	23.9	1826	48.9
										1050	28.1	2206	59.1
										1445	38.7	2733	73.2
		0 to 2.1	0 to 145 mbar	1.0	0.07	0.2	13.8 mbar	0	0	81	2.2	210	5.6
										458	12.3	1107	29.6
										741	19.9	1634	43.8
										902	24.2	2050	54.9
										1088	29.2	2468	66.1
										1163	31.2	2870	76.9
		0 to 5	0 to 0.34	2.5	0.17	0.5	34.5	0	0	68	1.8	305	8.2
										446	11.9	1118	30.0
										679	18.2	1619	43.4
										941	25.2	2282	61.1
										1183	31.7	2674	71.6
										1481	39.7	3224	86.4

 - Not applicable.

Conversion Factors

To determine equivalent capacities for natural gas, propane, butane or nitrogen, multiply the calculated capacity by the following appropriate conversion factor: 1.29 for 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. Then, if capacity is desired in normal cubic meters per hour at 0°C and 1.01325 bar, multiply SCFH by 0.0268.

Table 6. Type T205VBM Capacities

BODY SIZE		VACUUM CONTROL PRESSURE RANGE		VACUUM CONTROL PRESSURE SETTING		CHANGE IN VACUUM		INLET PRESSURE		CAPACITIES IN SCFH / Nm ³ /h OF AIR			
										Orifice Size, in. / mm			
										1/4 / 6.4		1/2 / 13	
NPS	DN	psig	bar	psig	bar	psig	bar	psig	bar	SCFH	Nm ³ /h	SCFH	Nm ³ /h
3/4	20	0 to 4 in. w.c.	0 to 10 mbar	2 in. w.c.	5 mbar	1 in. w.c.	2.49 mbar	0	0	11	0.3	40	1.1
										25	1.7	199	5.3
										50	3.4	735	19.7
										75	5.2	1039	27.8
										100	6.9	1373	36.8
										125	8.6	1478	39.6
		0 to 1	0 to 69 mbar	0.5	34 mbar	0.02	1.38	0	0	45	1.2	198	5.3
										25	1.7	446	12.0
										50	3.4	1027	27.5
										75	5.2	1452	38.9
										100	6.9	1775	47.6
										125	8.6	1462	39.2
0 to 2.1	0 to 145 mbar	0 to 2.1	0 to 145 mbar	1.0	0.07	0.2	13.8 mbar	0	0	63	1.7	202	5.4
										25	1.7	437	11.7
										50	3.4	815	21.8
										75	5.2	1044	28.0
										100	6.9	1393	37.3
										125	8.6	1780	47.7
		0 to 5	0 to 0.34	2.5	0.17	0.5	34.5	0	0	108	2.9	314	8.4
										25	1.7	426	11.4
										50	3.4	736	19.7
										75	5.2	1028	27.5
										100	6.9	1331	35.6
										125	8.6	1745	46.8

■ - Not applicable.

- continued -

T205VB Series

Table 6. Type T205VBM Capacities (continued)

BODY SIZE		VACUUM CONTROL PRESSURE RANGE		VACUUM CONTROL PRESSURE SETTING		CHANGE IN VACUUM		INLET PRESSURE		CAPACITIES IN SCFH / Nm ³ /h OF AIR			
										Orifice Size, in. / mm			
										1/4 / 6.4		1/2 / 13	
NPS	DN	psig	bar	psig	bar	psig	bar	psig	bar	SCFH	Nm ³ /h	SCFH	Nm ³ /h
1	25	0 to 4 in. w.c.	0 to 10 mbar	2 in. w.c.	5 mbar	1 in. w.c.	2.49 mbar	0	0	17	0.5	97	2.6
										551	14.8	1287	34.5
										1004	26.9	3475	93.1
										1544	41.4		
										1555	41.7		
										3190	85.5		
		0 to 1	0 to 69 mbar	0.5	34 mbar	0.02	1.38	0	0	77	2.1	594	15.9
										579	15.5	1400	37.5
										911	24.4	1572	42.1
										1371	36.7	3696	99.0
										1941	52.0	4462	119.5
										2144	57.4	7059	189.1
		0 to 2.1	0 to 145 mbar	1.0	0.07	0.2	13.8 mbar	0	0	102	2.7	197	5.3
										448	12.0	1148	30.7
										716	19.2	2388	64.0
										1351	36.2	3180	85.2
										1453	38.9	3971	106.4
										1936	51.9	4313	115.5
		0 to 5	0 to 0.34	2.5	0.17	0.5	34.5	0	0	132	3.5	312	8.3
										472	12.6	1256	33.6
										737	19.7	2094	56.1
										1061	28.4	2896	77.6
										1394	37.4	3757	100.6
										1698	45.5	4683	125.4

- Not applicable.

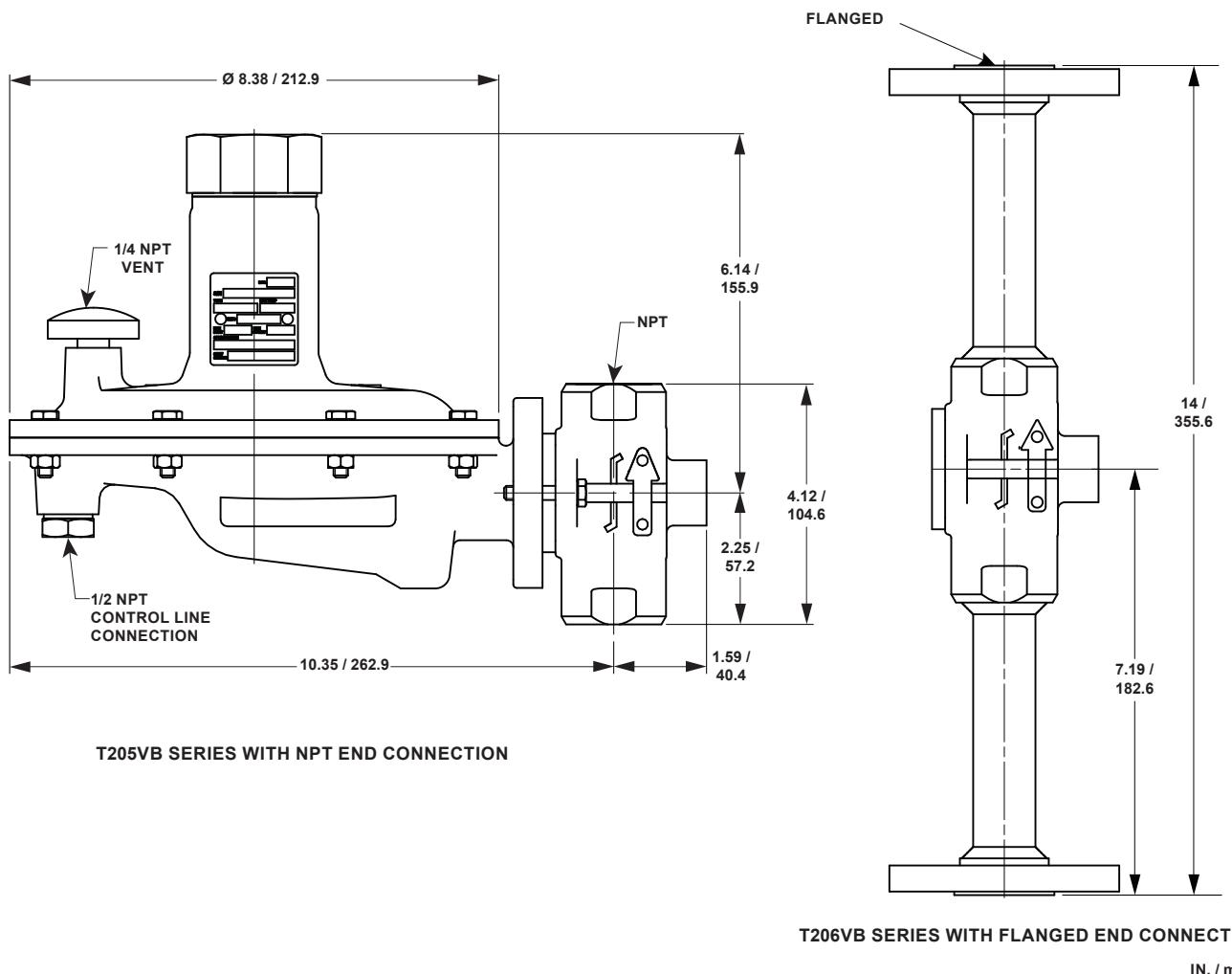


Figure 3. T205VB Series Dimension

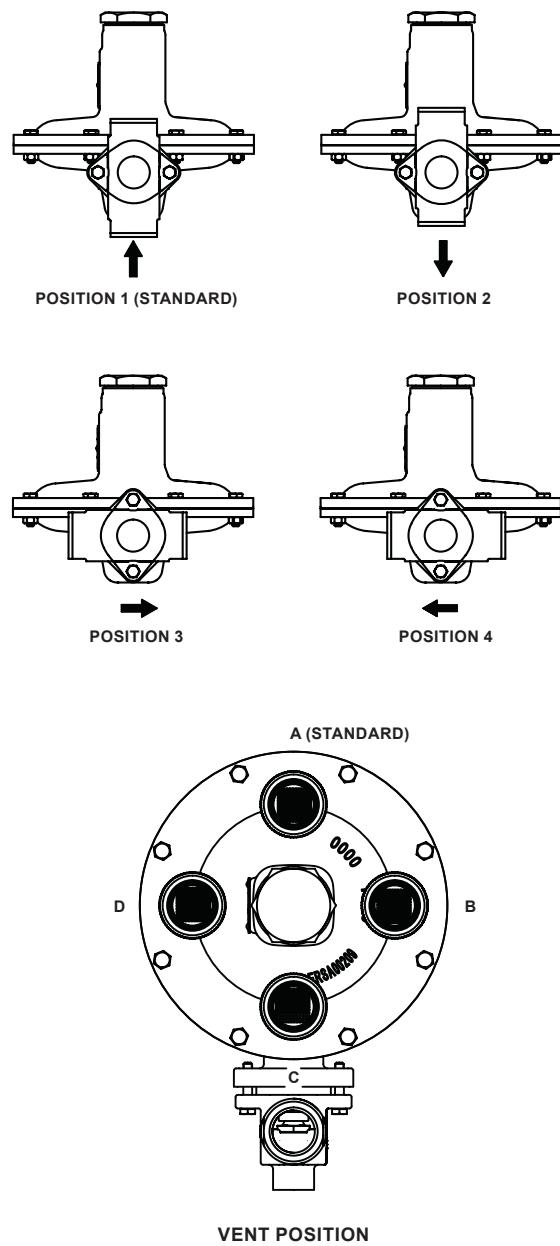


Figure 4. Body and Vent Orientation

Ordering Information

When ordering, complete the ordering guide on this page. Refer to the Specifications section on page 2. Review the description to the right of each

specification and the information in each referenced table or figure. Specify your choice whenever a selection is offered.

Ordering Guide

Type (Select One)

- T205VB, Internal pressure registration
- T205VBM, External pressure registration

Body Size (Select One)

- NPS 3/4 / DN 20***
- NPS 1 / DN 25***

Body Material and End Connection Style (Select One)

Gray Cast Iron

- NPT***

Stainless steel

- NPT (**standard**)***
- CL150 RF**

Carbon Steel

- NPT (**standard**)***
- CL150 RF**

Vacuum (Control) Pressure Range (Select One)

- 0 to 4 in. w.c. / 0 to 10 mbar, Unpainted***
- 0 to 1.0 psig / 0 to 69 mbar, Unpainted***
- 0 to 2.1 psig / 0 to 145 mbar, Yellow***
- 0 to 5 psig / 0 to 0.34 bar, Blue***

Orifice Size (Select One)

- 1/4 in. / 6.4 mm (**standard**)***
- 1/2 in. / 13 mm**

Diaphragm, Disk and O-ring Material

- Nitrile (NBR) (**standard**)
- Fluorocarbon (FKM)

Closing Cap Material (Select One)

- Zinc (**standard**)
- Steel

Body Position (See Figure 4, Select One)

- Position 1 (**standard**)***
- Position 2***
- Position 3***
- Position 4***

Vent Orientation (See Figure 4, Select One)

- Position A (**standard**)***
- Position B***
- Position C***
- Position D***

Spring Case Orientation/Vent Type (Select One)

- Spring Case Up (Type Y602-11) (**standard**)
- Spring Case Down (Type Y602-2)

Replacement Parts Kit (Optional)

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

T205VB Series

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.

Specification Worksheet

Application:

Specific Use _____

Line Size _____

Fluid Type _____

Specific Gravity _____

Temperature _____

Does the Application Require Overpressure Protection?

Yes No

Pressure:

Maximum Inlet Pressure _____

Minimum Inlet Pressure _____

Differential Pressure _____

Set Pressure _____

Maximum Flow _____

Accuracy Requirements:

Less Than or Equal To:

5% 10% 20% Wide-Open

Construction Material Requirements (if known):

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