

VF Series Standard-Pressure, Standard-Temperature Butterfly Valves

VF Series Standard-Pressure, Standard-Temperature Butterfly Valves are specifically designed for a wide range of HVAC applications, including two-position and modulating control of hot, chilled, or condenser water, and 50/50 glycol solutions. All valves are factory tested for bubble-tight shutoff at 100% of the fully rated pressure. These valves are also bidirectional, allowing positive shutoff with the flow in either direction.

Two-way configurations are available in sizes from 2 through 20 in. Three-way assemblies have two valves that are linked together and mounted on a flanged, cast-iron tee. Three-way configurations are available in sizes from 2 through 12 in. Standard pressure valve ratings available include 175 psig for 2 through 12 in. valves, 150 psig for 14 through 20 in. valves, and 50 psig for 4 through 20 in. valves.



Figure 1: VF Series Standard-Pressure, Standard-Temperature Butterfly Valves

Features and Benefits	
<input type="checkbox"/> Low Seating/Unseating Torques	Reduce actuator torque and size requirements, particularly with lower-pressure rated valves.
<input type="checkbox"/> Bubble-Tight Shutoff	Ensures positive closure when needed.
<input type="checkbox"/> Broad Range of Pre-Assembled Actuators	Offers a wide selection for new and replacement electric and pneumatic actuators.
<input type="checkbox"/> Compatible with All Types of ANSI 125/150 Slip-On and Weld-Neck Flanges	Enables field configuration with readily available standard fittings.
<input type="checkbox"/> High-Integrity Components	Provide quality valve assemblies, combining long cycle life with optimal engineered functional designs.

Table 1: Ordering Data (Except M9000 Electrically Actuated Valve Assemblies)

V	F	Butterfly Valve												
1	2													
	C	Body Type											<p>N = Two-Way, Normally Open (N.O.)</p> <p>C = Two-Way, Normally Closed (N.C.)</p> <p>M = Two-Way, Manually Operated</p> <p>D = Three-Way, Style D</p> <p>E = Three-Way, Style E</p> <p>F = Three-Way, Style F</p> <p>G = Three-Way, Style G</p>	
	3													
	-	1	0	0	Valve Size									<p>020 = 2 in.</p> <p>025 = 2-1/2 in.</p> <p>030 = 3 in.</p> <p>040 = 4 in.</p> <p>050 = 5 in.</p> <p>060 = 6 in.</p> <p>080 = 8 in.</p> <p>100 = 10 in.</p> <p>120 = 12 in.</p> <p>140 = 14 in.</p> <p>160 = 16 in.</p> <p>180 = 18 in.</p> <p>200 = 20 in.</p>
	4	5	6	7										
	H	Closeoff										<p>H = High Pressure Closeoff <i>(175 psig 2 through 12 in.; 150 psig 14 through 20 in.)</i></p> <p>L = Low Pressure Closeoff <i>(50 psig)</i></p> <p>N = Low Pressure Closeoff <i>(50 psig)</i>, Low Torque Valve</p>		
	8													
	B	Stem Material										<p>B = 416 Stainless Steel <i>(2 through 12 in.)</i></p> <p>C = 304 Stainless Steel <i>(14 through 20 in.)</i></p>		
	9													
	-	7	0	6	Actuator								See Table 3.	
	10	11	12	13										
	N	Accessories										<p>A = Furnished with Positioner as Standard</p> <p>B = High Pressure Positioner</p> <p>C = 120 VAC Solenoid with Speed Controls</p> <p>D = Thermostat/Heater Kit for On/Off Electric Actuators</p> <p>E = 24 VAC Solenoid with Speed Controls</p> <p>G = Gear-Operated Manual Hand Wheel</p> <p>M = Ten-Position Manual Handle</p> <p>N = Thermostat/Heater Kit for Proportional Electric Actuators</p>		
	14													
	4	Supply Voltage										<p>Blank = 120 VAC (VA-9070 Electric Actuators)</p> <p>4 = 24 VAC (VA-9070 Electric Actuators)</p>		
	15													

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 = field

V	F	C	-	1	0	0	H	B	-	7	0	6	N	4
Butterfly Valve Assembly														

Example: Two-way normally closed valve, 10 in., high pressure closeoff with 416 stainless steel stem, proportional electric actuator, and thermostat/heater kit.

Table 2: Ordering Data (for M9000 Electrically Actuated Valve Assemblies)

V 1	F 2	Butterfly Valve		VF = Butterfly Valve without Weather Shield VW = Butterfly Valve with Weather Shield
	C 3	Body Type		N = Two-Way, Normally Open (N.O.) C = Two-Way, Normally Closed (N.C.) D = Three-Way, Style D E = Three-Way, Style E F = Three-Way, Style F G = Three-Way, Style G
	0 4	4 5	0 6	Valve Size 020 = 2 in. 025 = 2-1/2 in. 030 = 3 in. 040 = 4 in. 050 = 5 in. 060 = 6 in.
		H 7		Closeoff H = Full Disc (See Table 4 through Table 16 for Closeoff Pressure.) L = Low Pressure Closeoff (50 psig) N = Low Pressure Closeoff (50 psig), Low Torque Valve
		B 8		Stem Material B = 416 Stainless Steel
		+ 9		Number of Actuators + = Single Actuator 2 = Tandem Actuators
		9 10	2 11	Factory Mounted Electric Actuator 916 = M9116 Non-Spring Return 924 = M9124 Non-Spring Return 92N = M9220 Spring Return Open 94N = M9220 Spring Return Closed 920 = M9320 Non-Spring Return 935 = M9335 Non-Spring Return
			N 12	
			G 13	Control A = Floating B = On/Off G = Proportional H = Automatic Signal Detection Floating, On/Off, Proportional
			G 14	Voltage G = 24 VAC
			A 15	Feedback A = 0-10 VDC (Proportional Only), None (All others) C = 0-10 VDC (Proportional Only), 2 Aux. Sw.(All others)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 = field
V F C 0 4 0 H B + 9 4 N G G A
 Butterfly Valve Assembly

Example: Two-way normally closed valve, 4 in., full disc, with 416 stainless steel stem, M9220 Series proportional electric actuator, with 0-10 VDC feedback and no auxiliary switches.

Table 3: Ordering Data – Adding Factory-Mounted Pneumatic or Electric Actuator

See Table 4 through Table 16 for Valid Factory Assemblies.	
<p>Low Pressure Pneumatic Piston Type, Spring Return</p> <p>001 = One D-3153 002 = One D-3244 003 = One D-3246 005 = Two D-3246</p>	<p>High Pressure Pneumatic, Spring Return</p> <p>320 = V-9193-12 330 = V-9193-13 340 = V-9193-14</p> <p>422 = V-9194-22 432 = V-9194-23 440 = V-9194-14 442 = V-9194-24 450 = V-9194-15</p> <p>530 = V-9195-13 550 = V-9195-15</p> <p>620 = V-9196-12 630 = V-9196-13 640 = V-9196-14 660 = V-9196-16</p>
<p>High Pressure Pneumatic, Non-Spring Return</p> <p>020 = V-9092-1 030 = V-9093-1 040 = V-9094-1 042 = V-9094-2 050 = V-9095-1 060 = V-9096-1 070 = V-9097-1 080 = V-9098-1 020 = V-9092-1</p>	<p>720 = V-9197-12 730 = V-9197-13 740 = V-9197-14 750 = V-9197-15 760 = V-9197-16</p> <p>820 = V-9198-12 830 = V-9198-13 840 = V-9198-14 850 = V-9198-15 860 = V-9198-16</p>
<p>Electric, Proportional, Non-Spring Return</p> <p>702 = VA-9072-01 703 = VA-9075-01 704 = VA-9075-01 705 = VA-9075-01 706 = VA-9076-01 707 = VA-9077-01 708 = VA-9078-01 702N4 = VA-9072-11 705N4 = VA-9075-11 707N4 = VA-9077-11</p> <p>907 = VA-907A-01 908 = VA-907B-01</p>	<p>Manual Operator</p> <p>000 = Valve Less Actuator (See <i>Optional Valve Accessories</i> section to add a ten-position manual handle or a gear-operated manual hand wheel in the field; see Table 1 and Table 2 for available factory-mounted options.)</p>
<p>Electric, On/Off, Non-Spring Return</p> <p>722 = VA-9072-02 723 = VA-9075-02 724 = VA-9075-02 725 = VA-9075-02 726 = VA-9076-02</p> <p>727 = VA-9077-02</p> <p>728 = VA-9078-02 722D4 = VA-9072-12 725D4 = VA-9075-12 727D4 = VA-9077-12</p> <p>927 = VA-907A-02 928 = VA-907B-02</p>	

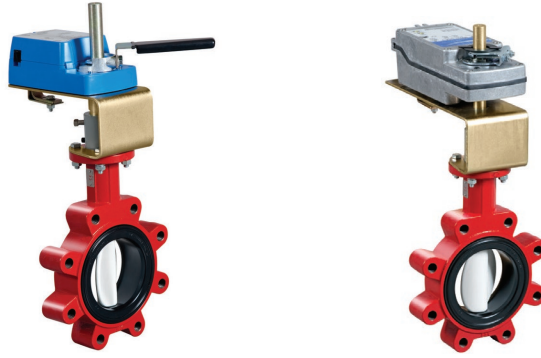


Figure 2: Two-Way Valve with M9000 Series Electric Actuator (without Weather Shield)

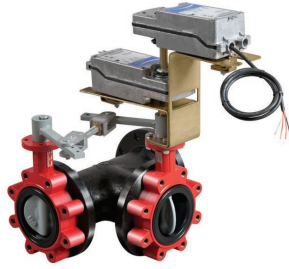
Table 4: Two-Way Valves with M9000 Series Spring Return and Non-Spring Return Electric Actuators (without Weather Shield)

Two-Way – Spring Return							
Size, in.	Cv at 90°	Cv at 60°	Closeoff Pressure (psig) ¹	Spring Open	Spring Closed	Spring Open	Spring Closed
Floating Control							
				M9220-AGA-3 without End Switches		M9220-AGC-3 with 2 End Switches	
2	144	61	175	VFN020HB+92NAGA	VFC020HB+94NAGA	VFN020HB+92NAGC	VFC020HB+94NAGC
2-1/2	282	107	175	VFN025HB+92NAGA	VFC025HB+94NAGA	VFN025HB+92NAGC	VFC025HB+94NAGC
3	461	154	175	VFN030HB+92NAGA	VFC030HB+94NAGA	VFN030HB+92NAGC	VFC030HB+94NAGC
4	841	274	50	VFN040LB+92NAGA	VFC040LB+94NAGA	VFN040LB+92NAGC	VFC040LB+94NAGC
4	841	274	175	VFN040HB292NAGA ²	VFC040HB294NAGA ²	VFN040HB292NAGC ²	VFC040HB294NAGC ²
5	1376	428	50	VFN050LB292NAGA ²	VFC050LB294NAGA ²	VFN050LB292NAGC ²	VFC050LB294NAGC ²
On/Off							
				M9220-BGA-3 without End Switches		M9220-BGC-3 with 2 End Switches	
2	144	61	175	VFN020HB+92NBGA	VFC020HB+94NBGA	VFN020HB+92NBGC	VFC020HB+94NBGC
2-1/2	282	107	175	VFN025HB+92NBGA	VFC025HB+94NBGA	VFN025HB+92NBGC	VFC025HB+94NBGC
3	461	154	175	VFN030HB+92NBGA	VFC030HB+94NBGA	VFN030HB+92NBGC	VFC030HB+94NBGC
4	841	274	50	VFN040LB+92NBGA	VFC040LB+94NBGA	VFN040LB+92NBGC	VFC040LB+94NBGC
4	841	274	175	VFN040HB292NBGA ²	VFC040HB294NBGA ²	VFN040HB292NBGC ²	VFC040HB294NBGC ²
5	1376	428	50	VFN050LB292NBGA ²	VFC050LB294NBGA ²	VFN050LB292NBGC ²	VFC050LB294NBGC ²
0 to 10 VDC Proportional Control							
				M9220-GGA-3 without End Switches		M9220-GGC-3 with 2 End Switches	
2	144	61	175	VFN020HB+92NGGA	VFC020HB+94NGGA	VFN020HB+92NGGC	VFC020HB+94NGGC
2-1/2	282	107	175	VFN025HB+92NGGA	VFC025HB+94NGGA	VFN025HB+92NGGC	VFC025HB+94NGGC
3	461	154	175	VFN030HB+92NGGA	VFC030HB+94NGGA	VFN030HB+92NGGC	VFC030HB+94NGGC
4	841	274	50	VFN040LB+92NGGA	VFC040LB+94NGGA	VFN040LB+92NGGC	VFC040LB+94NGGC
4	841	274	175	VFN040HB292NGGA ²	VFC040HB294NGGA ²	VFN040HB292NGGC ²	VFC040HB294NGGC ²
5	1376	428	50	VFN050LB292NGGA ²	VFC050LB294NGGA ²	VFN050LB292NGGC ²	VFC050LB294NGGC ²
Two-Way – Non-Spring Return							
				On/Off (Floating) Control		0 to 10 VDC Proportional Control	
				M91xx-AGA-2 without switches	M91xx-AGC-2 with 2 Switches	M91xx-GGA-2 without switches	M91xx-GGC-2 with 2 Switches
2	144	61	175	VFN020HB+916AGA	VFN020HB+916AGC	VFN020HB+916GGA	VFN020HB+916GGC
2-1/2	282	107	175	VFN025HB+916AGA	VFN025HB+916AGC	VFN025HB+916GGA	VFN025HB+916GGC
3	461	154	175	VFN030HB+916AGA	VFN030HB+916AGC	VFN030HB+916GGA	VFN030HB+916GGC
4	841	274	175	VFN040HB+924AGA	VFN040HB+924AGC	VFN040HB+924GGA	VFN040HB+924GGC
5	1376	428	50	VFN050LB+924AGA	VFN050LB+924AGC	VFN050LB+924GGA	VFN050LB+924GGC
5	1376	428	175	VFN050HB2924AGA ²	VFN050HB2924AGC ²	VFN050HB2924GGA ²	VFN050HB2924GGC ²
6	1850	567	50	VFN060LB2924AGA ²	VFN060LB2924AGC ²	VFN060LB2924GGA ²	VFN060LB2924GGC ²

Table 4: Two-Way Valves with M9000 Series Spring Return and Non-Spring Return Electric Actuators (without Weather Shield) (continued)

Size, in.	Cv at 90°	Cv at 60°	Closeoff Pressure (psig) ¹	Two-Way – Non-Spring Return	
				Automatic Signal Detection Floating, On/Off, Proportional	
				M93xx-HGC-2 without end switches	M93xx-HGC-2 with two end switches
2	144	84	175	VFN020HB+920HGA	VFN020HB+920HGC
2-1/2	282	163	175	VFN025HB+920HGA	VFN025HB+920HGC
3	461	267	175	VFN030HB+920HGA	VFN030HB+920HGC
4	841	496	175	VFN040HB+935HGA	VFN040HB+935HGC
4	841	496	50	VFN040LB+920HGA	VFN040LB+920HGC
5	1376	775	175	VFN050HB2935HGA ²	VFN050HB2935HGC ²
5	1376	775	50	VFN050LB+935HGA	VFN050LB+935HGC
6	1850	1025	175	VFN060HB2935HGA ²	VFN060HB2935HGC ²
6	1850	1025	50	VFN060NB+935HGA	VFN060NB+935HGC

1. Valves rated for 175 psig closeoff have 75 psig maximum dead-end service rating. Valves rated for 50 psig closeoff are not rated for dead-end service.
2. Valve assemblies have two actuators mounted in tandem.



**Figure 3: Three-Way Valve with M9000 Series Electric Actuator
(without Weather Shield)**

**Table 5: Three-Way Valves with M9000 Series Spring Return and on Spring Return Electric Actuators
(without Weather Shield)**

Three-Way – Spring Return ¹							
Size, in.	Cv at 90°	Cv at 60°	Closeoff Pressure (psig) ²	On/Off Control		Proportional Control	
				M9220-BGA-3 without End Switches	M9220-BGC-3 with Two End Switches	M9220-GGA-3 without End Switches	M9220-GGC-3 with Two End Switches
2	144	61	175	VFD020HB+92NBGA	VFD020HB+92NBGC	VFD020HB+92NGGA	VFD020HB+92NGGC
2-1/2	282	107	175	VFD025HB+92NBGA	VFD025HB+92NBGC	VFD025HB+92NGGA	VFD025HB+92NGGC
3	461	154	175	VFD030HB292NBGA	VFD030HB292NBGC	VFD030HB292NGGA	VFD030HB292NGGC
4	841	274	50	VFD040LB292NBGA ³	VFD040LB292NBGC ³	VFD040LB292NGGA ³	VFD040LB292NGGC ³
				Floating Control			
				M9220-AGA-3 without End Switches	M9220-AGC-3 with Two End Switches		
2	144	61	175	VFD020HB+92NAGA	VFD020HB+92NAGC		
2-1/2	282	107	175	VFD025HB+92NAGA	VFD025HB+92NAGC		
3	461	154	175	VFD030HB292NAGA	VFD030HB292NAGC		
4	841	274	50	VFD040LB292NAGA ³	VFD040LB292NAGC ³		
Three-Way – Non-Spring Return							
				On/Off (Floating) Control		0 to 10 VDC Proportional Control	
				M91xx-AGA-2 without End Switches	M91xx-AGC-2 with Two End Switches	M91xx-GGA-2 without End Switches	M91xx-GGC-2 with Two End Switches
2	144	61	175	VFD020HB+916AGA	VFD020HB+916AGC	VFD020HB+916GGA	VFD020HB+916GGC
2-1/2	282	107	175	VFD025HB+916AGA	VFD025HB+916AGC	VFD025HB+916GGA	VFD025HB+916GGC
3	461	154	175	VFD030HB+924AGA	VFD030HB+924AGC	VFD030HB+924GGA	VFD030HB+924GGC
4	841	274	50	VFD040LB+924AGA	VFD040LB+924AGC	VFD040LB+924GGA	VFD040LB+924GGC
4	841	274	175	VFD040HB2924AGA ³	VFD040HB2924AGC ³	VFD040HB2924GGA ³	VFD040HB2924GGC ³
5	1376	428	50	VFD050LB2924AGA ³	VFD050LB2924AGC ³	VFD050LB2924GGA ³	VFD050LB2924GGC ³
6	1850	567	50	VFD060LB2924AGA ³	VFD060LB2924AGC ³	VFD060LB2924GGA ³	VFD060LB2924GGC ³

Table 5: Three-Way Valves with M9000 Series Spring Return and on Spring Return Electric Actuators (without Weather Shield) (continued)

Size, in.	Cv at 90°	Cv at 60°	Closeoff Pressure (psig) ²	Three-Way – Non-Spring Return	
				Automatic Signal Detection Floating, On/Off Proportional	
				M93xx-HGC-2 without end switches	M93xx-HGC-2 with two end switches
2	144	84	175	VFD020HB+920HGA	VFD020HB+920HGC
2-1/2	282	163	175	VFD025HB+920HGA	VFD025HB+920HGC
3	461	267	175	VFD030HB+935HGA	VFD030HB+935HGC
4	841	496	175	VFD040HB2935HGA ³	VFD040HB2935HGC ³
4	841	496	50	VFD040LB+935HGA	VFD040LB+935HGC
5	1376	775	175	VFD050HB2935HGA ³	VFD050HB2935HGC ³
5	1376	775	50	VFD050LB2935HGA ³	VFD050LB2935HGC ³
6	1850	1025	175	VFD060HB2935HGA ³	VFD060HB2935HGC ³
6	1850	1025	50	VFD060NB2935HGA ³	VFD060NB2935HGC ³

- Code numbers listed above are three-way valves, style **D**. For styles **E**, **F**, or **G**, change the **D** in the third digit of the code number to the desired style. Example: VFExxxxxx+xxxxxx, VFFxxxxxx+xxxxxx, or VFGxxxxxx+xxxxxx.
- Valves rated for 175 psig closeoff have 75 psig maximum dead-end service rating. Valves rated for 50 psig closeoff are not rated for dead-end service.
- Valve assemblies have two actuators mounted in tandem.

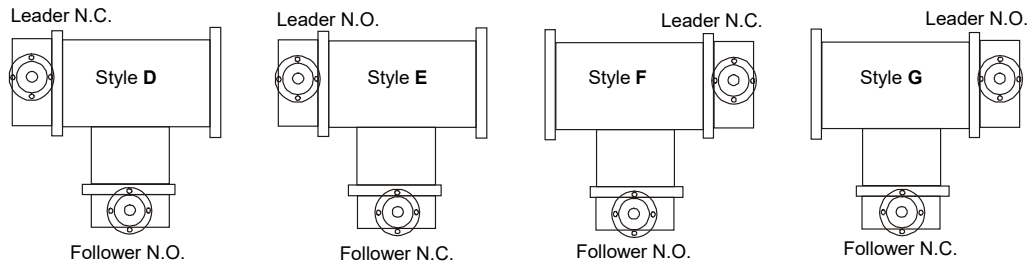


Figure 4: Three-Way Valve Body Styles



**Figure 5: Two-Way Valve with M9000 Series Electric Actuator
(with Weather Shield)**

**Table 6: Two-Way Valves with M9000 Series Spring Return and Non-Spring Return Electric Actuators
(with Weather Shield)**

Two-Way – Spring Return							
Size, in.	Cv at 90°	Cv at 60°	Closeoff Pressure (psig) ¹	Spring Open	Spring Closed	Spring Open	Spring Closed
				Floating Control			
				M9220-AGA-3 without end switches		M9220-AGC-3 with 2 End Switches	
2	144	61	175	VWN020HB+92NAGA	VWC020HB+94NAGA	VWN020HB+92NAGC	VWC020HB+94NAGC
2-1/2	282	107	175	VWN025HB+92NAGA	VWC025HB+94NAGA	VWN025HB+92NAGC	VWC025HB+94NAGC
3	461	154	175	VWN030HB+92NAGA	VWC030HB+94NAGA	VWN030HB+92NAGC	VWC030HB+94NAGC
4	841	274	50	VWN040LB+92NAGA	VWC040LB+94NAGA	VWN040LB+92NAGC	VWC040LB+94NAGC
4	841	274	175	VWN040HB292NAGA ²	VWC040HB294NAGA ²	VWN040HB292NAGC ²	VWC040HB294NAGC ²
5	1376	428	50	VWN050LB292NAGA ²	VWC050LB294NAGA ²	VWN050LB292NAGC ²	VWC050LB294NAGC ²
				On/Off			
				M9220-BGA-3 without end switches		M9220-BGC-3 with 2 End Switches	
2	144	61	175	VWN020HB+92NBGA	VWC020HB+94NBGA	VWN020HB+92NBGC	VWC020HB+94NBGC
2-1/2	282	107	175	VWN025HB+92NBGA	VWC025HB+94NBGA	VWN025HB+92NBGC	VWC025HB+94NBGC
3	461	154	175	VWN030HB+92NBGA	VWC030HB+94NBGA	VWN030HB+92NBGC	VWC030HB+94NBGC
4	841	274	50	VWN040LB+92NBGA	VWC040LB+94NBGA	VWN040LB+92NBGC	VWC040LB+94NBGC
4	841	274	175	VWN040HB292NBGA ²	VWC040HB294NBGA ²	VWN040HB292NBGC ²	VWC040HB294NBGC ²
5	1376	428	50	VWN050LB292NBGA ²	VWC050LB294NBGA ²	VWN050LB292NBGC ²	VWC050LB294NBGC ²
				0 to 10 VDC Proportional Control			
				M9220-GGA-3 without end switches		M9220-GGC-3 with 2 End Switches	
2	144	61	175	VWN020HB+92NGGA	VWC020HB+94NGGA	VWN020HB+92NGGC	VWC020HB+94NGGC
2-1/2	282	107	175	VWN025HB+92NGGA	VWC025HB+94NGGA	VWN025HB+92NGGC	VWC025HB+94NGGC
3	461	154	175	VWN030HB+92NGGA	VWC030HB+94NGGA	VWN030HB+92NGGC	VWC030HB+94NGGC
4	841	274	50	VWN040LB+92NGGA	VWC040LB+94NGGA	VWN040LB+92NGGC	VWC040LB+94NGGC
4	841	274	175	VWN040HB292NGGA ²	VWC040HB294NGGA ²	VWN040HB292NGGC ²	VWC040HB294NGGC ²
5	1376	428	50	VWN050LB292NGGA ²	VWC050LB294NGGA ²	VWN050LB292NGGC ²	VWC050LB294NGGC ²
				Two-Way – Non-Spring Return			
				On/Off (Floating) Control		0 to 10 VDC Proportional Control	
				M91xx-AGA-2 without switches		M91xx-AGC-2 with 2 Switches	
				M91xx-GGA-2 without switches		M91xx-GGC-2 with 2 Switches	
2	144	61	175	VWN020HB+916AGA	VWN020HB+916AGC	VWN020HB+916GGA	VWN020HB+916GGC
2-1/2	282	107	175	VWN025HB+916AGA	VWN025HB+916AGC	VWN025HB+916GGA	VWN025HB+916GGC
3	461	154	175	VWN030HB+916AGA	VWN030HB+916AGC	VWN030HB+916GGA	VWN030HB+916GGC
4	841	274	n175	VWN040HB+924AGA	VWN040HB+924AGC	VWN040HB+924GGA	VWN040HB+924GGC
5	1376	428	50	VWN050LB+924AGA	VWN050LB+924AGC	VWN050LB+924GGA	VWN050LB+924GGC
5	1376	428	175	VWN050HB2924AGA ²	VWN050HB2924AGC ²	VWN050HB2924GGA ²	VWN050HB2924GGC ²
6	1850	567	50	VWN060LB2924AGA ²	VWN060LB2924AGC ²	VWN060LB2924GGA ²	VWN060LB2924GGC ²

Table 6: Two-Way Valves with M9000 Series Spring Return and Non-Spring Return Electric Actuators (with Weather Shield) (continued)

Size, in.	Cv at 90°	Cv at 60°	Closeoff Pressure (psig) ¹	Two-Way – Non-Spring Return	
				Automatic Signal Detection Floating, On/Off Proportional	
				M93xx-HGC-2 without end switches	M93xx-HGC-2 with two end switches
2	144	84	175	VWN020HB+920HGA	VWN020HB+920HGC
2-1/2	282	163	175	VWN025HB+920HGA	VWN025HB+920HGC
3	461	267	175	VWN030HB+920HGA	VWN030HB+920HGC
4	841	496	175	VWN040HB+935HGA	VWN040HB+935HGC
4	841	496	50	VWN040LB+920HGA	VWN040LB+920HGC
5	1376	775	175	VWN050HB2935HGA ²	VWN050HB2935HGC ²
5	1376	775	50	VWN050LB+935HGA	VWN050LB+935HGC
6	1850	1025	175	VWN060HB2935HGA ²	VWN060HB2935HGC ²
6	1850	1025	50	VWN060NB+935HGA	VWN060NB+935HGC

1. Valves rated for 175 psig closeoff have 75 psig maximum dead-end service rating. Valves rated for 50 psig closeoff are not rated for dead-end service.
2. Valve assemblies have two actuators mounted in tandem.



Figure 6: Three-Way Valve with M9000 Series Electric Actuator (with Weather Shield)

Table 7: Three-Way Valves with M9000 Series Spring Return and Non Spring Return Electric Actuators (with Weather Shield)

Three-Way – Spring Return ¹							
Size, in.	Cv at 90°	Cv at 60°	Closeoff Pressure (psig) ²	On/Off Control		Proportional Control	
				M9220-BGA-3 without End Switches	M9220-BGC-3 with Two End Switches	M9220-GGA-3 without End Switches	M9220-GGC-3 with Two End Switches
2	144	61	175	VWD020HB+92NBGA	VWD020HB+92NBGC	VWD020HB+92NGGA	VWD020HB+92NGGC
2-1/2	282	107	175	VWD025HB+92NBGA	VWD025HB+92NBGC	VWD025HB+92NGGA	VWD025HB+92NGGC
3	461	154	175	VWD030HB292NBGA ³	VWD030HB292NBGC	VWD030HB292NGGA	VWD030HB292NGGC
4	841	274	50	VWD040LB292NBGA ³	VWD040LB292NBGC ³	VWD040LB292NGGA ³	VWD040LB292NGGC ³
				Floating Control			
				M9220-AGA-3 without End Switches	M9220-AGC-3 with Two End Switches		
2	144	61	175	VWD020HB+92NAGA	VWD020HB+92NAGC		
2-1/2	282	107	175	VWD025HB+92NAGA	VWD025HB+92NAGC		
3	461	154	175	VWD030HB292NAGA ³	VWD030HB292NAGC		
4	841	274	50	VWD040LB292NAGA ³	VWD040LB292NAGC ³		
Three-Way – Non-Spring Return							
				On/Off (Floating) Control		0 to 10 VDC Proportional Control	
				M91xx-AGA-2 without End Switches	M91xx-AGC-2 with Two End Switches	M91xx-GGA-2 without End Switches	M91xx-GGC-2 with Two End Switches
2	144	61	175	VWD020HB+916AGA	VWD020HB+916AGC	VWD020HB+916GGA	VWD020HB+916GGC
2-1/2	282	107	175	VWD025HB+916AGA	VWD025HB+916AGC	VWD025HB+916GGA	VWD025HB+916GGC
3	461	154	175	VWD030HB+924AGA	VWD030HB+924AGC	VWD030HB+924GGA	VWD030HB+924GGC
4	841	274	50	VWD040LB+924AGA	VWD040LB+924AGC	VWD040LB+924GGA	VWD040LB+924GGC
4	841	274	175	VWD040HB2924AGA ³	VWD040HB2924AGC ³	VWD040HB2924GGA ³	VWD040HB2924GGC ³
5	1376	428	50	VWD050LB2924AGA ³	VWD050LB2924AGC ³	VWD050LB2924GGA ³	VWD050LB2924GGC ³
6	1850	567	50	VWD060LB2924AGA ³	VWD060LB2924AGC ³	VWD060LB2924GGA ³	VWD060LB2924GGC ³

Table 7: Three-Way Valves with M9000 Series Spring Return and Non Spring Return Electric Actuators (with Weather Shield) (continued)

				Three-Way – Non-Spring Return	
Size, in.	Cv at 90°	Cv at 60°	Closeoff Pressure (psig) ²	Automatic Signal Detection Floating, On/Off Proportional	
				M93xx-HGA-2 without end switches	M93xx-HGA-2 with two end switches
2	144	84	175	VWD020HB+920HGA	VWD020HB+920HGC
2-1/2	282	163	175	VWD025HB+920HGA	VWD025HB+920HGC
3	461	267	175	VWD030HB+935HGA	VWD030HB+935HGC
4	841	496	175	VWD040HB2935HGA ³	VWD040HB2935HGC ³
4	841	496	50	VWD040LB+935HGA	VWD040LB+935HGC
5	1376	775	175	VWD050HB2935HGA ³	VWD050HB2935HGC ³
5	1376	775	50	VWD050LB2935HGA ³	VWD050LB2935HGC ³
6	1850	1025	175	VWD060HB2935HGA ³	VWD060HB2935HGC ³
6	1850	1025	50	VWD060NB2935HGA ³	VWD060NB2935HGC ³

- Code numbers listed above are three-way valves, style **D**. For styles **E**, **F**, or **G**, change the **D** in the third digit of the code number to the desired style. Example: VF**E**xxxxxx+xxxxxx, VF**F**xxxxxx+xxxxxx, or VF**G**xxxxxx+xxxxxx.
- All valves are rated for dead-end service. Valves rated for 75 psig closeoff or higher have 75 psig maximum dead-end service rating.
- Valve assemblies have two actuators mounted in tandem.

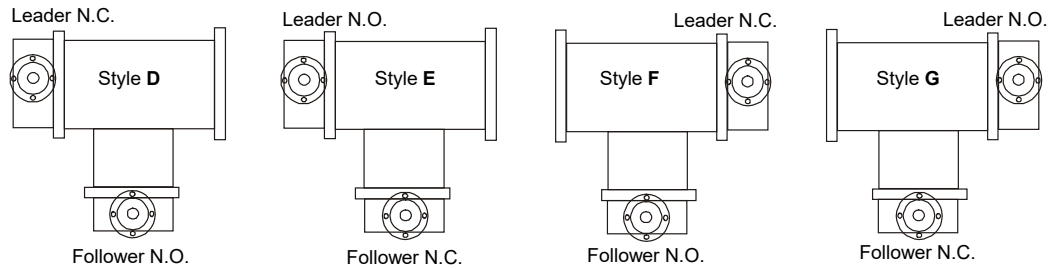


Figure 7: Three-Way Valve Body Styles



**Figure 8: Two-Way
D-3000 Series Pneumatic Actuator**

Table 8: Two-Way Valves with D-3000 Series Spring Return Pneumatic Actuators

Size, in.	Cv at 70°	Closeoff Pressure (psig)	On/Off (Proportional) Control		Proportional Control (with Positioner)	
			Spring Closed	Spring Open	Spring Closed	Spring Open
Two-Way Butterfly Valve Assemblies – 175 psig Closeoff Pressure – Rated for 75 psig Dead-End Service						
2	84	175	VFC-020HB-001N	VFN-020HB-001N	VFC-020HB-001A	VFN-020HB-001A
2-1/2	163	175	VFC-025HB-001N	VFN-025HB-001N	VFC-025HB-001A	VFN-025HB-001A
3	267	175	VFC-030HB-001N	VFN-030HB-001N	VFC-030HB-001A	VFN-030HB-001A
4	496	175	VFC-040HB-002N	VFN-040HB-002N	VFC-040HB-002A	VFN-040HB-002A
5	775	175	VFC-050HB-003N	VFN-050HB-003N	VFC-050HB-003A	VFN-050HB-003A
6	1,025	175	VFC-060HB-003N	VFN-060HB-003N	VFC-060HB-003A	VFN-060HB-003A
8	1,862	175	VFC-080HB-005N ¹	VFN-080HB-005N ¹	VFC-080HB-005A ¹	VFN-080HB-005A ¹
Two-Way Butterfly Valve Assemblies – 50 psig Closeoff Pressure – Not Rated for Dead-End Service						
4	496	50	VFC-040LB-001N	VFN-040LB-001N	VFC-040LB-001A	VFN-040LB-001A
5	775	50	VFC-050LB-002N	VFN-050LB-002N	VFC-050LB-002A	VFN-050LB-002A
6	1,025	50	VFC-060NB-003N	VFN-060NB-003N	VFC-060NB-003A	VFN-060NB-003A
8	1,862	50	VFC-080NB-003N	VFN-080NB-003N	VFC-080NB-003A	VFN-080NB-003A
10	2,948	50	VFC-100LB-005N ¹	VFN-100LB-005N ¹	VFC-100LB-005A ¹	VFN-100LB-005A ¹

1. Valve assemblies have two actuators mounted in tandem.



**Figure 9: Three-Way
D-3000 Series Pneumatic Actuator**

Table 9: Three-Way Valves with D-3000 Series Spring Return Pneumatic Actuators

Size, in.	Cv at 70°	Closeoff Pressure (psig)	Actuator	
			On/Off Control	Proportional Control (with Positioner)
Three-Way Assemblies¹ – 175 psig Closeoff Pressure – 75 psig Dead-End Service				
2	84	175	VFD-020HB-001N	VFD-020HB-001A
2-1/2	163	175	VFD-025HB-002N	VFD-025HB-002A
3	267	175	VFD-030HB-002N	VFD-030HB-002A
4	496	175	VFD-040HB-003N	VFD-040HB-003A
5	775	175	VFD-050HB-003N	VFD-050HB-003A
6	1,025	175	VFD-060HB-005N ²	VFD-060HB-005A ²
Three-Way Assemblies¹ – 50 psig Closeoff Pressure – Not Rated for Dead-End Service				
4	496	50	VFD-040LB-002N	VFD-040LB-002A
5	775	50	VFD-050LB-003N	VFD-050LB-003A
6	1,025	50	VFD-060NB-003N	VFD-060NB-003A
8	1,862	50	VFD-080NB-005N ²	VFD-080NB-005A ²

- Code numbers listed are three-way valves, style **D**. For styles **E**, **F**, or **G**, change the **D** in the third digit of the code number to the desired style. Example: V**F****E**-xxxxx-xxxx, V**F****F**-xxxxx-xxxx, or V**F****G**-xxxxx-xxxx.
- Valve assemblies have two actuators mounted in tandem.

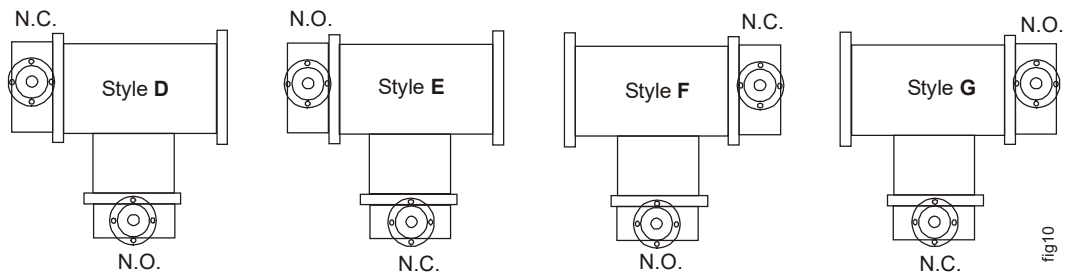


Figure 10: Three-Way Valve Body Styles



Figure 11: Two-Way Valve with Industrial-Grade, Non-Spring Return, VA-907x Series Electric Actuator

Table 10: Two-Way Valves with Industrial-Grade, Non-Spring Return, VA-907x Series Electric Actuators

Actuator				AC 120 V Powered Actuator		AC 24 V Powered Actuator	
Size, in.	Cv at 90°	Cv at 60°	Closeoff Pressure psig	On/Off	0 to 10 VDC Proportional	On/Off	0 to 10 VDC Proportional
Two-Way, Non-Spring Return – 150 or 175 psig Closeoff Pressure; 75 psig Dead-End Service							
2	144	61	175	VFC-020HB-722D	VFC-020HB-702N	VFC-020HB-722D4	VFC-020HB-702N4
2-1/2	282	107	175	VFC-025HB-722D	VFC-025HB-702N	VFC-025HB-722D4	VFC-025HB-702N4
3	461	154	175	VFC-030HB-722D	VFC-030HB-702N	VFC-030HB-722D4	VFC-030HB-702N4
4	841	274	175	VFC-040HB-722D	VFC-040HB-702N	VFC-040HB-722D4	VFC-040HB-702N4
5	1,376	428	175	VFC-050HB-722D	VFC-050HB-702N	VFC-050HB-722D4	VFC-050HB-702N4
6	1,850	567	175	VFC-060HB-722D	VFC-060HB-702N	VFC-060HB-722D4	VFC-060HB-702N4
8	3,316	1,081	175	VFC-080HB-725D	VFC-080HB-705N	VFC-080HB-725D4	VFC-080HB-705N4
10	5,430	1,710	175	VFC-100HB-726D	VFC-100HB-706N	VFC-100HB-727D4	VFC-100HB-707N4
12	8,077	2,563	175	VFC-120HB-727D	VFC-120HB-707N	VFC-120HB-727D4	VFC-120HB-707N4
14	10,538	3,384	150	VFC-140HC-728D	VFC-140HC-708N	—	—
16	13,966	4,483	150	VFC-160HC-927D	VFC-160HC-907N	—	—
18	17,214	5,736	150	VFC-180HC-927D	VFC-180HC-907N	—	—
20	22,339	7,144	150	VFC-200HC-928D	VFC-200HC-908N	—	—
Two-Way, Non-Spring Return – 50 psig Closeoff Pressure; Not Rated for Dead-End Service							
4	841	274	50	VFC-040LB-722D	VFC-040LB-702N	VFC-040LB-722D4	VFC-040LB-702N4
5	1,376	428	50	VFC-050LB-722D	VFC-050LB-702N	VFC-050LB-722D4	VFC-050LB-702N4
6	1,850	567	50	VFC-060NB-722D	VFC-060NB-702N	VFC-060NB-722D4	VFC-060NB-702N4
8	3,316	1,081	50	VFC-080NB-723D	VFC-080NB-703N	VFC-080NB-725D4	VFC-080NB-705N4
10	5,430	1,710	50	VFC-100LB-725D	VFC-100LB-705N	VFC-100LB-725D4	VFC-100LB-705N4
12	8,077	2,563	50	VFC-120LB-726D	VFC-120LB-706N	VFC-120LB-727D4	VFC-120LB-707N4
14	10,538	3,384	50	VFC-140LC-726D	VFC-140LC-706N	VFC-140LC-727D4	VFC-140LC-707N4
16	13,966	4,483	50	VFC-160LC-727D	VFC-160LC-707N	VFC-160LC-727D4	VFC-160LC-707N4
18	17,214	5,736	50	VFC-180LC-727D	VFC-180LC-707N	—	—
20	22,339	7,144	50	VFC-200LC-728D	VFC-200LC-708N	—	—



Figure 12: Three-Way Valve with Industrial-Grade, Non-Spring Return, VA-907x Series Electric Actuator

Table 11: Three-Way Valves with Industrial-Grade, Non-Spring Return, VA-907x Series Electric Actuators¹

Actuator				AC 120 V Powered Actuator		AC 24 V Powered Actuator	
Size, in.	Cv at 90°	Cv at 60°	Closeoff Pressure psig	On/Off	0 to 10 VDC Proportional	On/Off	0 to 10 VDC Proportional
Three-Way, Non-Spring Return – 150 or 175 psig Closeoff Pressure; 75 psig Dead-End Service							
2	144	61	175	VFD-020HB-722D	VFD-020HB-702N	VFD-020HB-722D4	VFD-020HB-702N4
2-1/2	282	107	175	VFD-025HB-722D	VFD-025HB-702N	VFD-025HB-722D4	VFD-025HB-702N4
3	461	154	175	VFD-030HB-722D	VFD-030HB-702N	VFD-030HB-722D4	VFD-030HB-702N4
4	841	274	175	VFD-040HB-722D	VFD-040HB-702N	VFD-040HB-722D4	VFD-040HB-702N4
5	1,376	428	175	VFD-050HB-722D	VFD-050HB-702N	VFD-050HB-722D4	VFD-050HB-702N4
6	1,850	567	175	VFD-060HB-724D	VFD-060HB-704N	VFD-060HB-725D4	VFD-060HB-705N4
8	3,316	1,081	175	VFD-080HB-725D	VFD-080HB-705N	VFD-080HB-725D4	VFD-080HB-705N4
10	5,430	1,710	175	VFD-100HB-727D	VFD-100HB-707N	VFD-100HB-727D4	VFD-100HB-707N4
12	8,077	2,563	175	VFD-120HB-727D	VFD-120HB-707N	—	—
Three-Way, Non-Spring Return – 50 psig Closeoff Pressure; Not Rated for Dead-End Service							
4	841	274	50	VFD-040LB-722D	VFD-040LB-702N	VFD-040LB-722D4	VFD-040LB-702N4
5	1,376	428	50	VFD-050LB-722D	VFD-050LB-702N	VFD-050LB-722D4	VFD-050LB-702N4
6	1,850	567	50	VFD-060NB-722D	VFD-060NB-702N	VFD-060NB-722D4	VFD-060NB-702N4
8	3,316	1,081	50	VFD-080NB-724D	VFD-080NB-704N	VFD-080NB-725D4	VFD-080NB-705N4
10	5,430	1,710	50	VFD-100LB-725D	VFD-100LB-705N	VFD-100LB-725D4	VFD-100LB-705N4
12	8,077	2,563	50	VFD-120LB-726D	VFD-120LB-706N	VFD-120LB-727D4	VFD-120LB-707N4

¹ Code numbers listed are three-way valves, style **D**. For styles **E**, **F**, or **G**, change the **D** in the third digit of the code number to the desired style. Example: VFE-xxxx-xxxx, VFF-xxxx-xxxx, or VFG-xxxx-xxxx (see Figure 10).

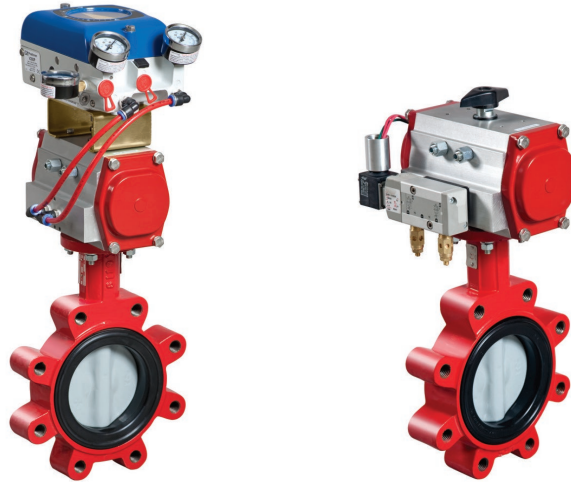


Figure 13: Two-Way Valve with Industrial-Grade, Spring Return, V-919x Series High Pressure Pneumatic Actuator Assemblies

Table 12: Two-Way Valve with Industrial-Grade, Spring Return, V-919x Series High Pressure Pneumatic Actuator Assemblies

Size, in.	Actuator			On/Off ¹		Proportional (with Positioner)	
	Cv at 90°	Cv at 60°	Closeoff Pressure, psig	Spring Closed	Spring Open	Spring Closed	Spring Open
Two-Way, Spring Return¹ – 150 or 175 psig Closeoff Pressure; 75 psig Dead-End Service							
2	144	61	175	VFC-020HB-320C	VFN-020HB-320C	VFC-020HB-320B	VFN-020HB-320B
2-1/2	282	107	175	VFC-025HB-330C	VFN-025HB-320C	VFC-025HB-330B	VFN-025HB-320B
3	461	154	175	VFC-030HB-340C	VFN-030HB-330C	VFC-030HB-340B	VFN-030HB-330B
4	841	274	175	VFC-040HB-450C	VFN-040HB-440C	VFC-040HB-450B	VFN-040HB-440B
5	1,376	428	175	VFC-050HB-432C	VFN-050HB-422C	VFC-050HB-432B	VFN-050HB-422B
6	1,850	567	175	VFC-060HB-442C	VFN-060HB-432C	VFC-060HB-442B	VFN-060HB-432B
8	3,316	1,081	175	VFC-080HB-640C	VFN-080HB-620C	VFC-080HB-640B	VFN-080HB-620B
10	5,430	1,710	175	VFC-100HB-740C	VFN-100HB-720C	VFC-100HB-740B	VFN-100HB-720B
12	8,077	2,563	175	VFC-120HB-750C	VFN-120HB-730C	VFC-120HB-750B	VFN-120HB-730B
14	10,538	3,384	150	VFC-140HC-760C	VFN-140HC-820C	VFC-140HC-760B	VFN-140HC-820B
16	13,966	4,483	150	VFC-160HC-840C	VFN-160HC-830C	VFC-160HC-840B	VFN-160HC-830B
18	17,214	5,736	150	VFC-180HC-850C	VFN-180HC-830C	VFC-180HC-850B	VFN-180HC-830B
20	22,339	7,144	150	VFC-200HC-860C	VFN-200HC-840C	VFC-200HC-860B	VFN-200HC-840B
Two-Way, Spring Return¹ – 50 psig Closeoff Pressure; Not Rated for Dead-End Service							
4	841	274	50	VFC-040LB-340C	VFN-040LB-330C	VFC-040LB-340B	VFN-040LB-330B
5	1,376	428	50	VFC-050LB-440C	VFN-050LB-340C	VFC-050LB-440B	VFN-050LB-340B
6	1,850	567	50	VFC-060NB-432C	VFN-060NB-422C	VFC-060NB-432B	VFN-060NB-422B
8	3,316	1,081	50	VFC-080NB-442C	VFN-080NB-432C	VFC-080NB-442B	VFN-080NB-432B
10	5,430	1,710	50	VFC-100LB-550C	VFN-100LB-530C	VFC-100LB-550B	VFN-100LB-530B
12	8,077	2,563	50	VFC-120LB-660C	VFN-120LB-630C	VFC-120LB-660B	VFN-120LB-630B
14	10,538	3,384	50	VFC-140LC-740C	VFN-140LC-720C	VFC-140LC-740B	VFN-140LC-720B
16	13,966	4,483	50	VFC-160LC-740C	VFN-160LC-730C	VFC-160LC-740B	VFN-160LC-730B
18	17,214	5,736	50	VFC-180LC-750C	VFN-180LC-730C	VFC-180LC-750B	VFN-180LC-730B
20	22,339	7,144	50	VFC-200LC-830C	VFN-200LC-820C	VFC-200LC-830B	VFN-200LC-820B

1. On/Off assemblies come with a 120 VAC solenoid valve and speed controls. If a 24 VAC solenoid valve is desired, change the **C** at the end of the code number to an **E**.



Figure 14: Three-Way Valve with Industrial-Grade, Spring Return, V-919x Series High Pressure Pneumatic Actuator

Table 13: Three-Way Valves with Industrial-Grade, Spring Return, V-919x Series High Pressure Pneumatic Actuators

Actuator				On/Off ¹	Proportional (with Positioner)
Size, in.	Cv at 90°	Cv at 60°	Closeoff Pressure, psig		
Three-Way, Spring Return² – 175 psig Closeoff Pressure; 75 Psig Dead-End Service					
2	144	61	175	VFD-020HB-330C	VFD-020HB-330B
2-1/2	282	107	175	VFD-025HB-340C	VFD-025HB-340B
3	461	154	175	VFD-030HB-340C	VFD-030HB-340B
4	841	274	175	VFD-040HB-432C	VFD-040HB-432B
5	1,376	428	175	VFD-050HB-442C	VFD-050HB-442B
6	1,850	567	175	VFD-060HB-530C	VFD-060HB-530B
8	3,316	1,081	175	VFD-080HB-640C	VFD-080HB-640B
10	5,430	1,710	175	VFD-100HB-740C	VFD-100HB-740B
12	8,077	2,563	175	VFD-120HB-830C	VFD-120HB-830B
Three-Way, Spring Return² – 50 psig Closeoff Pressure; Not Rated for Dead-End Service					
4	841	274	50	VFD-040LB-340C	VFD-040LB-340B
5	1,376	428	50	VFD-050LB-432C	VFD-050LB-432B
6	1,850	567	50	VFD-060NB-442C	VFD-060NB-442B
8	3,316	1,081	50	VFD-080NB-530C	VFD-080NB-530B
10	5,430	1,710	50	VFD-100LB-640C	VFD-100LB-640B
12	8,077	2,563	50	VFD-120LB-740C	VFD-120LB-740B

1. On/Off assemblies come with a 120 VAC solenoid valve and speed controls. If a 24 VAC solenoid valve is desired, change the **C** at the end of the code number to an **E**.
2. Code numbers listed are three-way valves, style **D**. For styles **E**, **F**, or **G**, change the **D** in the third digit of the code number to the desired style. Example: **VFE**-xxxxx-xxxx, **VFF**-xxxxx-xxxx, or **VFG**-xxxxx-xxxx (see Figure 10).

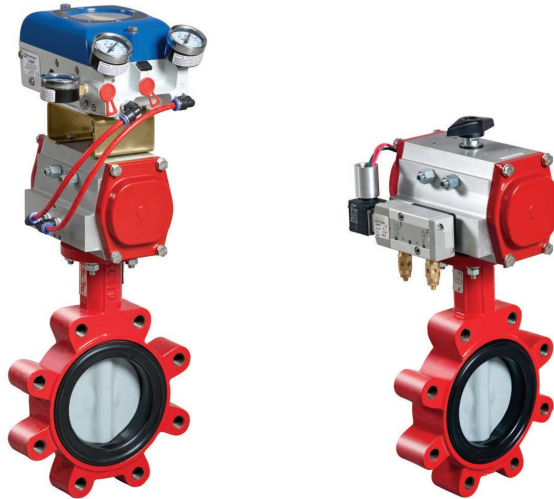


Figure 15: Two-Way Valve with Industrial-Grade, Non-Spring Return, V-909x Series High Pressure Pneumatic Actuator Table 14: Non-Spring Return, V-909x Series High Pressure Pneumatic Actuators

Size, in.	Actuator			On/Off ¹	Proportional (with Positioner)
	Cv at 90°	Cv at 60°	Closeoff Pressure, psig		
Two-Way, Non-Spring Return – 150 or 175 psig Closeoff Pressure; 75 psig Dead-End Service					
2	144	61	175	VFC-020HB-020C	VFC-020HB-020B
2-1/2	282	107	175	VFC-025HB-020C	VFC-025HB-020B
3	461	154	175	VFC-030HB-020C	VFC-030HB-020B
4	841	274	175	VFC-040HB-030C	VFC-040HB-030B
5	1,376	428	175	VFC-050HB-030C	VFC-050HB-030B
6	1,850	567	175	VFC-060HB-030C	VFC-060HB-030B
8	3,316	1,081	175	VFC-080HB-042C	VFC-080HB-042B
10	5,430	1,710	175	VFC-100HB-060C	VFC-100HB-060B
12	8,077	2,563	175	VFC-120HB-060C	VFC-120HB-060B
14	10,538	3,384	150	VFC-140HC-060C	VFC-140HC-060B
16	13,966	4,483	150	VFC-160HC-070C	VFC-160HC-070B
18	17,214	5,736	150	VFC-180HC-070C	VFC-180HC-070B
20	22,339	7,144	150	VFC-200HC-080C	VFC-200HC-080B
Two-Way, Non-Spring Return – 50 psig Closeoff, Not Rated for Dead-End Service					
4	841	274	50	VFC-040LB-030C	VFC-040LB-030B
5	1,376	428	50	VFC-050LB-030C	VFC-050LB-030B
6	1,850	567	50	VFC-060NB-030C	VFC-060NB-030B
8	3,316	1,081	50	VFC-080NB-042C	VFC-080NB-042B
10	5,430	1,710	50	VFC-100LB-042C	VFC-100LB-042B
12	8,077	2,563	50	VFC-120LB-042C	VFC-120LB-042B
14	10,538	3,384	50	VFC-140LC-060C	VFC-140LC-060B
16	13,966	4,483	50	VFC-160LC-060C	VFC-160LC-060B
18	17,214	5,736	50	VFC-180LC-070C	VFC-180LC-080B
20	22,339	7,144	50	VFC-200LC-070C	VFC-200LC-070B

1. On/Off assemblies come with a 120 VAC solenoid valve and speed controls. If a 24 VAC solenoid valve is desired, change the **C** at the end of the code number to an **E**.



Figure 16: Three-Way Valve with Industrial-Grade, Non-Spring Return, V-909x Series High Pressure Pneumatic Actuator

Table 15: Three-Way Valves with Industrial-Grade, Non-Spring Return, V-909x Series High Pressure Pneumatic Actuators

Actuator				On/Off ¹	Proportional (with Positioner)
Size, in.	Cv at 90°	Cv at 60°	Closeoff Pressure, psig		
Three-Way, Non-Spring Return² – 175 psig Closeoff Pressure, 75 psig Dead-End Service					
2	144	61	175	VFD-020HB-020C	VFD-020HB-020B
2-1/2	282	107	175	VFD-025HB-020C	VFD-025HB-020B
3	461	154	175	VFD-030HB-020C	VFD-030HB-020B
4	841	274	175	VFD-040HB-030C	VFD-040HB-030B
5	1,376	428	175	VFD-050HB-030C	VFD-050HB-030B
6	1,850	567	175	VFD-060HB-040C	VFD-060HB-040B
8	3,316	1,081	175	VFD-080HB-042C	VFD-080HB-042B
10	5,430	1,710	175	VFD-100HB-060C	VFD-100HB-060B
12	8,077	2,563	175	VFD-120HB-060C	VFD-120HB-060B
Three-Way, Non-Spring Return² – 50 psig Closeoff Pressure; Not Rated for Dead-End Service					
4	841	274	50	VFD-040LB-030C	VFD-040LB-030B
5	1,376	428	50	VFD-050LB-030C	VFD-050LB-030B
6	1,850	567	50	VFD-060NB-030C	VFD-060NB-030B
8	3,316	1,081	50	VFD-080NB-042C	VFD-080NB-042B
10	5,430	1,710	50	VFD-100LB-042C	VFD-100LB-042B
12	8,077	2,563	50	VFD-120LB-060C	VFD-120LB-060B

1. On/Off assemblies come with a 120 VAC solenoid valve and speed controls. If a 24 VAC solenoid valve is desired, change the **C** at the end of the code number to an **E**.
2. Code numbers listed are three-way valves, style **D**. For styles **E**, **F**, or **G**, change the **D** in the third digit of the code number to the desired style. Example: VFE-xxxxx-xxxx, VFF-xxxxx-xxxx, or VFG-xxxxx-xxxx (see Figure 10).



Figure 17: Two-Way Valve with Ten-Position Manual Handle



Figure 18: Two-Way Valve with Gear-Operated Manual Hand Wheel

Table 16: Two-Way Valves with Manual Operators

Actuator			Ten-Position Manual Handle	Gear-Operated Manual Hand Wheel
Size, in.	Cv at 90°	Closeoff Pressure, psig		
Two-Way, Manually Operated – 150 or 175 psig Closeoff Pressure; 75 psig Dead-End Service				
2	144	175	VFM-020HB-000M	VFM-020HB-000G
2-1/2	282	175	VFM-025HB-000M	VFM-025HB-000G
3	461	175	VFM-030HB-000M	VFM-030HB-000G
4	841	175	VFM-040HB-000M	VFM-040HB-000G
5	1,376	175	VFM-050HB-000M	VFM-050HB-000G
6	1,850	175	VFM-060HB-000M	VFM-060HB-000G
8	3,316	175	---	VFM-080HB-000G
10	5,430	175	---	VFM-100HB-000G
12	8,077	175	---	VFM-120HB-000G
14	10,538	150	---	VFM-140HC-000G
16	13,966	150	---	VFM-160HC-000G
18	17,214	150	---	VFM-180HC-000G
20	22,339	150	---	VFM-200HC-000G

Application Overview

All VF Series Standard-Pressure, Standard-Temperature Valves are available with a factory-assembled and calibrated actuator, sized with a 25% safety factor (2 through 8 in. valves) and a 10% safety factor (10 through 20 in. valves) to provide years of trouble-free operation. The wide variety of actuator choices includes pneumatic rack and pinion style actuators (both spring return and non-spring return) and high-torque rotary electric actuators which are fully compatible with Metasys® controllers.

The valve and actuator can be provided in Normally Open (N.O.) or Normally Closed (N.C.) combinations for pneumatic, two-way operation. Three-way valves are available in four mounting styles to meet all possible piping layouts.

These butterfly valves have an inherent modified equal percentage relationship between disc rotation and flow at a constant pressure drop (as illustrated in Figure 19). Rangeability values are included in Table 17.

The valve body is cast iron and meets the temperature and pressure requirements for American National Standards Institute (ANSI) Class 125 B16.1 Class B pipe flanges. The valve neck is extended to allow for 2 in. of insulation as well as easy access to the actuator. All valve sizes are fully lugged.

The resilient seat of VF Series Standard-Pressure, Standard-Temperature Valves is molded from Ethylene Propylene Diene Monomer (EPDM), and is secured to the valve body by means of a tongue and groove design. The tongue and groove fit permits easy seat replacement after years of service.

The disc is constructed of ductile iron, and is spherically machined, hand polished, and coated with nylon 11 to provide bubble-tight shutoff, minimum torque requirements, and longer seat life. In addition, the nylon 11 coating also resists corrosion and abrasion. The discs for 50 psig closeoff pressure valves are undercut to minimize torque requirements and are coated with white nylon. The discs on all other models are coated with gray nylon.

The stem is available in 416 stainless steel (2 through 12 in.) and 304 stainless steel (14 through 20 in.). The stem-to-disc coupling design features the exclusive **Double D** connection. Without the use of stem retention screws, stem strength is maximized, servicing is simplified, and disc leakage is eliminated.

The flow characteristics of VF Series Standard-Pressure, Standard-Temperature Butterfly Valves are illustrated in Figure 19. Inherent flow characteristics are modified equal percentage.

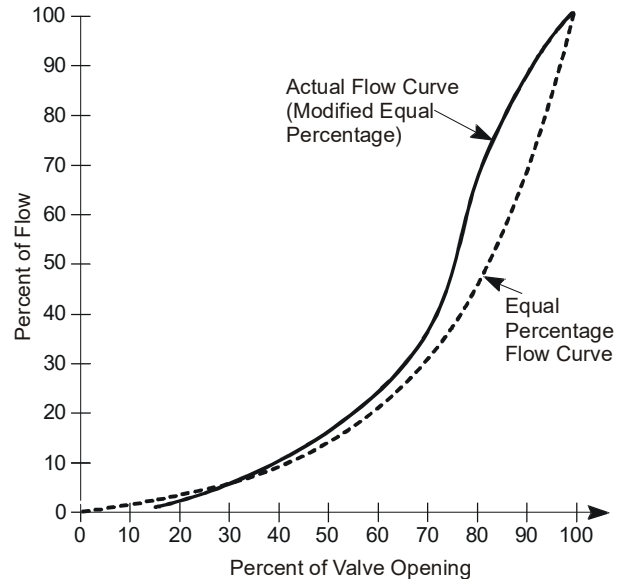


Figure 19: Modified Equal Percentage Valve Flow Characteristics

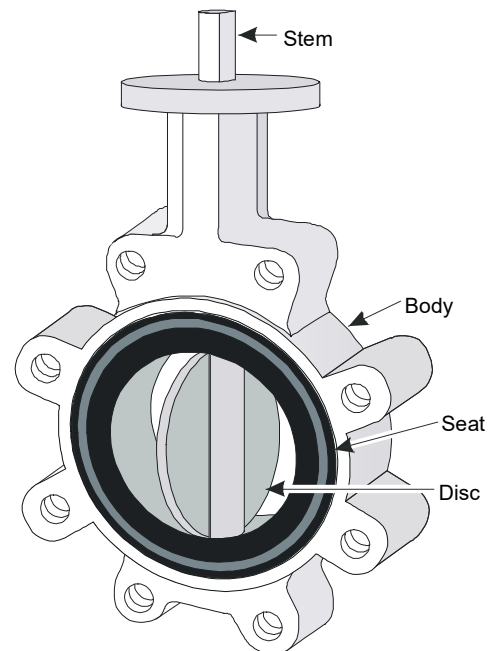


Figure 20: VF Series Standard-Pressure, Standard-Temperature Butterfly Valve

Table 17: Rangeability Values for 60°, 70° and 90° Disc Rotation

Valve Size, in.	Rangeability Values		
	60° Rotation	70° Rotation	90° Rotation
2	13:1	18:1	31:1
2-1/2	12:1	18:1	31:1
3	11:1	19:1	33:1
4	14:1	25:1	42:1
5	18:1	32:1	57:1
6	21:1	39:1	70:1
8	39:1	67:1	119:1
10	32:1	80:1	147:1
12	52:1	92:1	163:1
14	52:1	92:1	163:1
16	53:1	92:1	163:1
18	54:1	92:1	163:1
20	52:1	92:1	163:1

The V-9000 Series Pneumatic Rack and Pinion Style Actuators (both spring return and non-spring return) are ideally suited for applications providing high air supply pressures of 40 to 120 psig (276 to 827 kPa). These actuators are sized and assembled for 90° disc rotation and are furnished with factory-installed 24 or 120 VAC solenoid valves for two-position operation. When these actuators are used for modulating operation, the solenoid valve is replaced with a positioner.

The VA-907x Series Electric Actuators are available in both two-position and modulating styles. These non-spring return, rotary motion actuators are housed in a low profile, compact die-cast aluminum National Electrical Manufacturers' Association (NEMA) 4 enclosure, and are factory calibrated for 90° disc rotation.

For more detailed information on the pneumatic rack and pinion actuators or electric actuators, refer to the appropriate actuator product bulletin.

For more details on additional actuator accessories, refer to the appropriate actuator product bulletin.

Valve Actuators

All VF Series Standard-Pressure, Standard-Temperature Butterfly Valves are available with a wide range of factory-installed pneumatic and electric actuators. Table 4 through Table 16 present the actuator choices available for each valve. These valve and actuator combinations have been sized with torque safety factors to provide adequate actuator torque for years of trouble-free operation.

The D-3000 Series Pneumatic Actuators provide an economical and reliable means of actuation on butterfly valves. Two-way configurations are available in sizes from 2 through 10 in. Three-way assemblies have two valves that are linked together and mounted on a flanged, cast-iron tee. Three-way configurations are available in sizes from 2 through 8 in. These actuators are sized and assembled for 70° disc rotation and require 20 psig (138 kPa) maximum input pressure at the diaphragm to deliver their rated torque.

The economical M9000 Electrically Actuated models are available with or without a rugged, factory-installed weather shield. Two-way and three-way configurations are available in sizes from 2 through 6 in. All models require AC 24 V power.

Table 18: Representative Maximum Shipping Weights for VF Series Standard-Pressure, Standard-Temperature Butterfly Valve and Actuator Assemblies¹

Valve Size, in.	Representative Actuator (Actuator Sub-Code)	Shipping Weight, lb (kg)
Two-Way Valve and Actuator Assemblies		
2	One D-3153 (-001)	53 (24.1)
2-1/2	One D-3153 (-001)	55 (25.0)
3	One D-3153 (-001)	56 (25.4)
4	One D-3244 (-002)	70 (31.8)
5	One D-3246 (-003)	97 (44.0)
6	One D-3246 (-003)	100 (45.4)
8	One D-3246 (-003)	132 (59.9)
10	Two D-3246s (-005)	208 (94.4)
12	One V-9197-15 (-750B)	228 (103.4)
14	One V-9198-12 (-820B)	329 (149.2)
16	One V-9198-14 (-840)	398 (180.7)
18	One V-9198-15 (-850)	468 (212.5)
20	One V-9198-16 (-860)	556 (252.4)
Three-Way Valve and Actuator Assemblies		
2	One D-3153 (-001)	115 (52.2)
2-1/2	One D-3244 (-002)	142 (64.5)
3	One D-3244 (-002)	151 (68.6)
4	One D-3246 (-003)	181 (82.2)
5	One D-3246 (-003)	208 (94.4)
6	Two D-3246s (-005)	278 (126.2)
8	Two D-3246s (-005)	377 (171.2)
10	One V-9197-14 (-740B)	577 (261.7)
12	One V-9198-13 (-830)	808 (366.8)

1. The above shipping weights are approximate, and are based on the heaviest valve, actuator, and accessory combination available for each assembly size.

Optional Valve Accessories

For manually operated actuator and valve assemblies, a ten-position manual handle or gear-operated manual hand wheel is available; see Table 19 and Table 20 for more details.

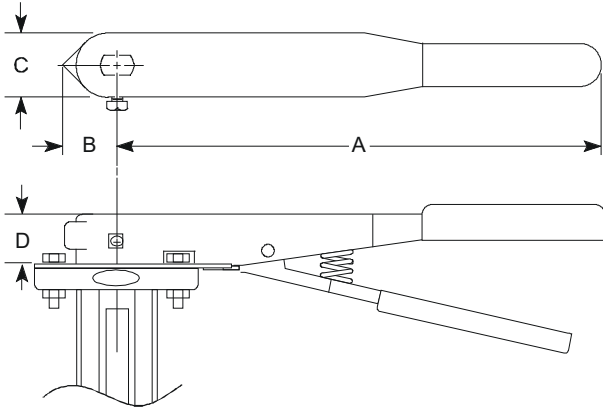


Figure 21: Dimensions for Ten-Position Manual Handle
(See Table 19.)

Table 19: Dimensions for Ten-Position Manual Handle, in. (mm)

Valve Size, in.	Code Number ¹	A	B	C	D
2 through 3	VF-999-101	10-5/8 (270)	1-1/8 (29)	1-3/8 (35)	1 (25)
4	VF-999-102				
5 and 6	VF-999-103				

1. Kit includes a manual handle operator, notch plate, and mounting hardware.

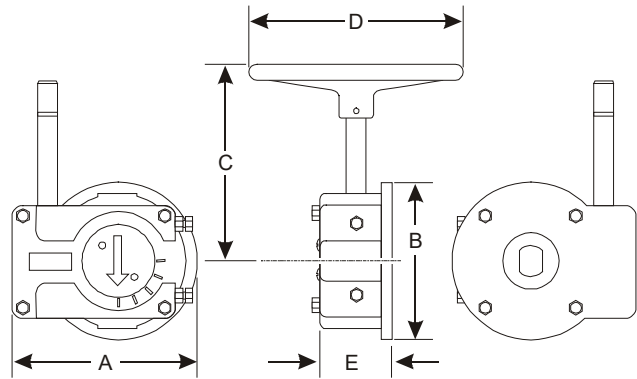


Figure 22: Dimensions for Gear-Operated Manual Hand Wheel
(See Table 20.)

Table 20: Dimensions for Gear-Operated Manual Hand Wheel, in. (mm)

Valve Size, in.	Code Number ¹	A	B	C	D	E
2 through 3	VF-999-301	4.53 (115)	3.50 (89)	5.34 (136)	8.00 (203)	2.56 (65)
4	VF-999-302	4.53 (115)	3.50 (89)	5.34 (136)	8.00 (203)	2.56 (65)
5 and 6	VF-999-303	4.53 (115)	3.50 (89)	5.34 (136)	8.00 (203)	2.56 (65)
8	VF-999-304	6.89 (175)	5.91 (150)	7.50 (191)	8.00 (203)	2.50 (64)
10 and 12	VF-999-305	6.89 (175)	5.91 (150)	7.50 (191)	8.00 (203)	2.50 (64)
14	VF-999-306	6.89 (175)	5.91 (150)	7.50 (191)	8.00 (203)	2.50 (64)
16	VF-999-307	7.53 (191)	5.91 (150)	11.81 (300)	12.00 (305)	3.28 (83)
18 and 20	VF-999-308	10.51 (267)	8.27 (210)	14.81 (376)	12.00 (305)	4.39 (112)

1. Kit includes a manual gear operator, adaptor (if required), and mounting hardware.

Product Guidelines

Please be sure to read the following information carefully before installing a VF Series Standard-Pressure, Standard-Temperature Butterfly Valve Assembly:

- Make sure that the pipeline and flange faces are clean. Pipe scale, metal chips, weld slag, and weld rods can obstruct disc movement and damage the disc and seat.
- The resilient seat of the valve is equipped with molded O-rings on the face of the seat; do not use gaskets.
- The valves should be handled by the extended valve neck only. Heavier valves may require a nylon sling to be used as a hoist around the valve neck and/or cast-iron tee (on three-way assemblies). Never pick up a valve by the actuator, mounting bracket, or interconnecting linkage.
- Most VF Series Standard-Pressure, Standard-Temperature Butterfly Valve Assemblies are shipped with the disc in the near-closed position (approximately 10° open).
- Valves equipped with a V-919x Series Pneumatic Rack and Pinion Spring Return Actuator require a regulated pneumatic air supply to position the disc to 10° open prior to and during installation. If no air supply is available during installation, the actuator must be removed to allow for the manual positioning of the disc to the proper position.
- For more detailed installation information, refer to the *VF Series Butterfly Valves 2 Through 20 in., Two-Way and Three-Way Installation Instructions (LIT-977205X)*.

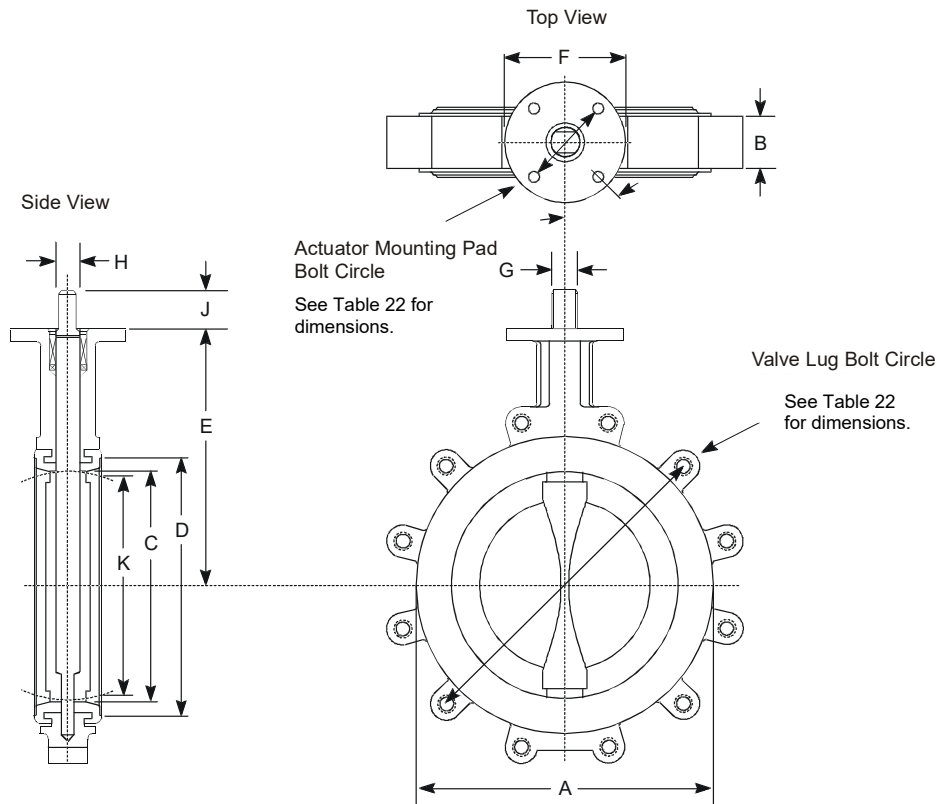


Figure 23: Two-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valve Dimensions (See Table 21 and Table 22.)

Table 21: Two-Way Valve Dimensions, in.¹

Valve Size, in.	A	B	C	D	E	F	G ²	H ²	J	K ³	Valve Net Weight, lb ⁴
2	3-11/16	1-5/8	2	2-27/32	5-1/2	3-17/32	9/16	13/32	1-1/4	1-11/32	7
2-1/2	4-3/16	1-3/4	2-1/2	3-11/32	6	3-17/32	9/16	13/32	1-1/4	1-15/16	8
3	4-7/8	1-3/4	3	4-1/32	6-1/4	3-17/32	9/16	13/32	1-1/4	2-9/16	9
4	6-1/16	2	4	5-5/32	7	3-17/32	5/8	7/16	1-1/4	3-19/32	15
5	7-1/8	2-1/8	5	6-5/32	7-1/2	3-17/32	3/4	17/32	1-1/4	4-21/32	20
6	8-1/8	2-1/8	5-3/4	7	8	3-17/32	3/4	17/32	1-1/4	5-15/32	23
8	10-1/2	2-1/2	7-3/4	9-15/32	9-1/2	5-29/32	7/8	5/8	1-1/4	7-15/32	42
10	12-3/4	2-1/2	9-3/4	11-15/32	10-3/4	5-29/32	1-3/16	7/8	2	9-17/32	66
12	14-7/8	3	11-3/4	13-15/32	12-1/4	5-29/32	1-3/16	7/8	2	11-15/32	88
14	16-15/16	3	13-1/4	15-9/32	13-5/8	5-29/32	1-3/8	---	2	13-1/16	114
16	19-1/16	4	15-1/4	17-5/32	14-3/4	5-29/32	1-3/8	---	2	14-27/32	166
18	21-1/8	4-1/4	17-1/4	19-15/32	16	8-9/32	1-31/32	---	2-1/2	16-27/32	226
20	23-1/4	5	19-1/4	21-19/32	17-1/4	8-9/32	1-31/32	---	2-1/2	18-3/4	305

- 1 in. x 25.4 = 1 mm.
- 2 through 12 in. valves have a **Double D** stem (round shaft with two machined flats), and 14 through 20 in. valves have a round shaft with a keyway and key.
- Disc chordal dimension at valve face.
- 1 lb x 0.454 = 1 kg; net weight is for valve only (no actuator).

Table 22: Two-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valve Actuator Mounting and Valve Lug Bolting Dimensions

Valve Size, in.	Actuator Mounting			Valve Lug Bolting		
	Bolt Circle, in. (mm)	Number of Holes ¹	Hole Diameter, in. (mm)	Bolt Circle, in. (mm)	Number of Holes ²	Threads UNC-2B
2	2-3/4 (70)	4	3/8 (10)	4-3/4 (121)	4	5/8-11
2-1/2				5-1/2 (140)	4	5/8-11
3				6 (152)	4	5/8-11
4				7-1/2 (191)	8	5/8-11
5				8-1/2 (216)	8	3/4-10
6				9-1/2 (241)	8	3/4-10
8	4-29/32 (125)	4	9/16 (14)	11-3/4 (298)	8	3/4-10
10				14-1/4 (362)	12	7/8-9
12				17 (432)	12	7/8-9
14				18-3/4 (476)	12	1-8
16				21-1/4 (540)	16	1-8
18	6-1/2 (165)	4	13/16 (21)	22-3/4 (578)	16	1-1/8-7
20				25 (635)	20	1-1/8-7

1. Actuator mounting holes are drilled only (not tapped).
2. Lug holes are drilled and tapped and evenly spaced around the valve.

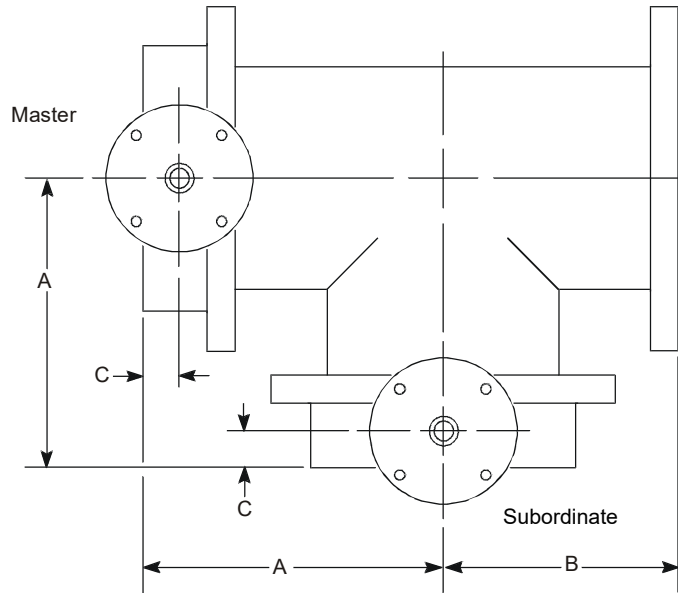


Figure 24: Three-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valve Dimensions (See Table 23.)

Table 23: Three-Way Valve Dimensions, in. (mm) ¹

Valve Size, in.	A	B	C
2	6-1/8 (155)	4-1/2 (114)	13/16 (21)
2-1/2	6-3/4 (171)	5 (127)	7/8 (22)
3	7-1/4 (184)	5-1/2 (140)	7/8 (22)
4	8-1/2 (216)	6-1/2 (165)	1 (25)
5	9-5/8 (244)	7-1/2 (191)	1-1/16 (27)
6	10-1/8 (257)	8 (203)	1-1/16 (27)
8	11-1/2 (292)	9 (229)	1-1/4 (32)
10	13-1/2 (343)	11 (279)	1-1/4 (32)
12	15 (381)	12 (305)	1-1/2 (38)

1. The actuator(s) is always mounted on the master valve.

**Table 24: Flange Screws Required for VF Series
Standard-Pressure, Standard-Temperature Butterfly Valves**

Valve Size, in.	Regular Hex-Head Screws with National Course Threads		
	Diameter, in. (mm)	Length, in. (mm)	Number Required
2	5/8 (16)	1-1/2 (38)	8
2-1/2	5/8 (16)	1-1/2 (38)	8
3	5/8 (16)	1-3/4 (44)	8
4	5/8 (16)	1-3/4 (44)	16
5	3/4 (19)	1-3/4 (44)	16
6	3/4 (19)	2 (51)	16
8	3/4 (19)	2-1/4 (57)	16
10	7/8 (22)	2-1/4 (57)	24
12	7/8 (22)	2-1/2 (64)	24
14	1 (25)	2-3/4 (70)	24
16	1 (25)	3-1/4 (83)	32
18	1-1/8 (29)	3-1/2 (89)	32
20	1-1/8 (29)	3-1/4 (83)	8
		4 (102)	32

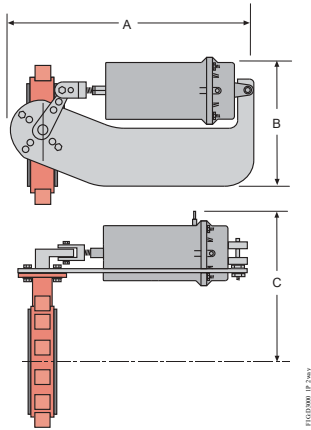


Figure 25: Single Pneumatic Piston Actuator Assembled on a Two-Way Butterfly Valve

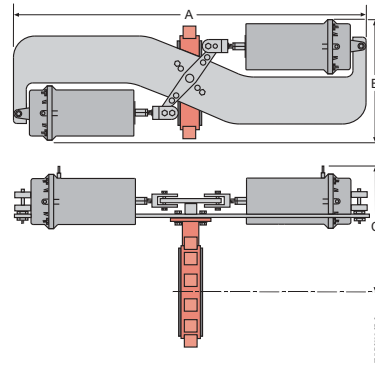


Figure 26: Dual Tandem Pneumatic Piston Actuators Assembled on a Two-Way Butterfly Valve

Table 25: Overall Dimensions of D-3153, D-3244, and D-3246 Series Pneumatic Piston Actuators Assembled on Two-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valves, in. (mm)

Valve Size, in.	Single Pistons (See Figure 25.)									Dual Tandem Pistons (See Figure 26.)		
	One D-3153 = -001			One D-3244 = -002			One D-3246 = -003			Two D-3246s = -005		
	A	B	C ¹	A	B	C ¹	A	B	C ¹	A	B	C ¹
2	16 (406)	8-3/8 (213)	8-1/4 (210)	---	---	---	---	---	---	---	---	---
2-1/2	16 (406)	8-3/8 (213)	9-1/8 (232)	---	---	---	---	---	---	---	---	---
3	16 (406)	8-3/8 (213)	9-3/8 (238)	---	---	---	---	---	---	---	---	---
4	16 (406)	8-3/8 (213)	10-1/8 (257)	20 (508)	11-1/2 (292)	13-3/4 (349)	---	---	---	---	---	---
5	---	---	---	20 (508)	11-1/2 (292)	14-3/8 (365)	25-7/8 (657)	13-1/2 (343)	14-3/8 (365)	---	---	---
6	---	---	---	---	---	---	25-7/8 (657)	13-1/2 (343)	14-7/8 (378)	---	---	---
8	---	---	---	---	---	---	25-7/8 (657)	13-1/2 (343)	16-3/8 (416)	---	---	---
10	---	---	---	---	---	---	---	---	---	45-1/2 (1,156)	16-3/8 (416)	17-5/8 (448)

1. Allow a clearance of 6 in. (153 mm) for removal of the D-3153; 7-1/2 in. (191 mm) for removal of the D-3244 or D-3246.

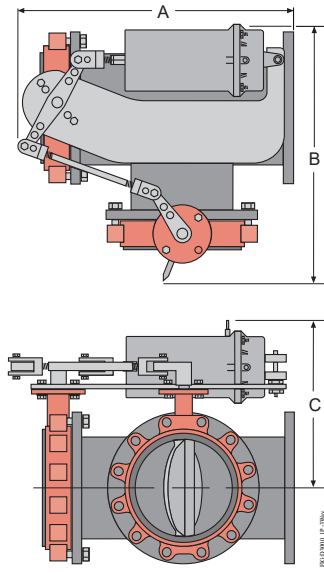


Figure 27: Single Pneumatic Piston Actuator Assembled on a Three-Way Butterfly Valve

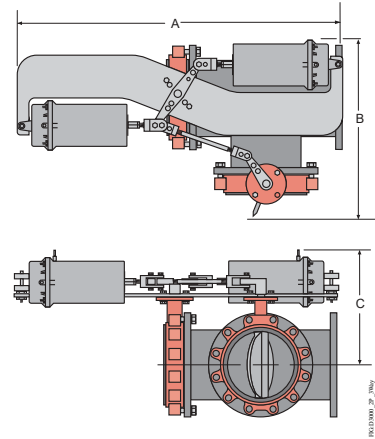


Figure 28: Dual Tandem Pneumatic Piston Actuators Assembled on a Three-Way Butterfly Valve

Table 26: Overall Dimensions of D-3153, D-3244, and D-3246 Series Pneumatic Piston Actuators Assembled on Three-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valves, in. (mm)

Valve Size, in.	Single Pistons (See Figure 27.)									Dual Tandem Pistons (See Figure 28.)		
	One D-3153 = -001			One D-3244 = -002			One D-3246 = -003			Two D-3246s = -005		
	A	B	C ¹	A	B	C ¹	A	B	C ¹	A	B	C ¹
2	17-3/4 (451)	12 (305)	8-5/8 (219)	---	---	---	---	---	---	---	---	---
2-1/2	---	---	---	21-3/4 (553)	14-3/8 (365)	9-1/8 (232)	---	---	---	---	---	---
3	---	---	---	21-3/4 (553)	14-7/8 (378)	9-3/8 (238)	---	---	---	---	---	---
4	---	---	---	21-3/4 (553)	16 (407)	10-1/8 (257)	31-1/8 (791)	17-3/8 (442)	13-3/4 (349)	---	---	---
5	---	---	---	---	---	---	31-1/8 (791)	18-1/2 (470)	14-3/8 (365)	---	---	---
6	---	---	---	---	---	---	31-1/8 (791)	18-1/2 (470)	14-7/8 (378)	45-1/2 (1,156)	18-1/2 (470)	14-7/8 (378)
8	---	---	---	---	---	---	---	---	---	45-1/2 (1,156)	21-3/8 (543)	16-3/8 (416)

1. Allow a clearance of 6 in. (153 mm) for removal of the D-3153; 7-1/2 in. (191 mm) for removal of the D-3244 or D-3246.

Table 27: Height Requirements, in. (mm) for V-9000 Series Pneumatic Actuated Two-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valves (Above Centerline of Pipe; Includes 6 in. Head Clearance)^{1,2}

Valve Size, in.	V-9000 Series Pneumatic Actuator							
	V-9x92	V-9x93	V-9x94-1	V-9x94-2	V-9x95	V-9x96	V-9x97	V-9x98
2	22-5/16 (567)	23-7/32 (590)	23-9/16 (598)	24-15/16 (633)	25-3/4 (654)	---	---	---
2-1/2	22-13/16 (579)	23-23/32 (602)	24-1/16 (611)	25-7/16 (646)	26-1/4 (667)	---	---	---
3	23-1/16 (586)	23-31/32 (609)	24-5/16 (618)	25-11/16 (652)	26-1/2 (673)	---	---	---
4	---	24-23/32 (628)	25-1/16 (637)	26-7/16 (672)	27-1/4 (692)	---	---	---
5	---	25-7/32 (641)	25-9/16 (649)	26-15/16 (684)	27-3/4 (705)	30-1/8 (765)	---	---
6	---	25-23/32 (653)	26-1/16 (662)	27-7/16 (697)	28-1/4 (718)	30-5/8 (778)	32-7/8 (835)	---
8	---	---	---	28-15/16 (735)	29-3/4 (756)	32-1/8 (816)	34-3/8 (873)	---
10	---	---	---	30-3/16 (767)	31 (787)	33-3/8 (848)	35-5/8 (905)	---
12	---	---	---	32-3/16 (818)	32-1/2 (826)	35-1/8 (892)	37-1/8 (943)	---
14	---	---	---	---	---	---	38-1/2 (978)	40-11/32 (1,025)
16	---	---	---	---	---	---	39-5/8 (1,006)	41-15/32 (1,053)
18	---	---	---	---	---	---	40-7/8 (1,038)	42-23/32 (1,085)
20	---	---	---	---	---	---	42-1/8 (1,070)	43-31/32 (1,117)

1. The overall height requirements listed for V-9x92, V-9x93, V-9x94, and V-9x95 actuated VF Series Standard-Pressure, Standard-Temperature Butterfly Valves include 6-1/2 in. (165 mm) for a positioner; overall height requirements for V-9x96, V-9x97, and V-9x98 actuated assemblies include 7-1/2 in. (191 mm) for a positioner.
2. If a positioner is mounted on a travel switch, add 7 in. (178 mm) to the overall height requirement listed above.

Table 28: Height Requirements, in. (mm) for V-9000 Series Pneumatic Actuated Three-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valves (above Centerline of Pipe; Includes 6 in. Head Clearance)^{1,2}

Valve Size, in.	V-9000 Series Pneumatic Actuator						
	V-9x92	V-9x93	V-9x94-1	V-9x94-2	V-9x95	V-9x96	V-9x97
2	26-5/16 (668)	27-7/32 (691)	27-9/16 (700)	28-15/16 (735)	29-3/4 (756)	---	---
2-1/2	26-13/16 (681)	27-23/32 (704)	28-1/16 (713)	29-7/16 (748)	30-1/4 (768)	---	---
3	27-1/16 (687)	27-31/32 (710)	28-5/16 (719)	29-11/16 (754)	30-1/2 (775)	---	---
4	---	28-23/32 (729)	29-1/16 (738)	30-7/16 (773)	31-1/4 (794)	---	---
5	---	29-7/32 (742)	29-9/16 (751)	30-15/16 (786)	31-3/4 (806)	34-1/8 (867)	---
6	---	29-23/32 (755)	30-1/16 (764)	31-7/16 (799)	32-1/4 (819)	34-5/8 (879)	36-7/8 (937)
8	---	---	---	32-15/16 (837)	33-3/4 (857)	36-1/8 (918)	38-3/8 (975)
10	---	---	---	34-3/16 (868)	35 (889)	37-3/8 (949)	39-5/8 (1,006)
12	---	---	---	36-3/16 (919)	36-1/2 (927)	39-1/8 (994)	41-1/8 (1,045)

1. The overall height requirements listed for V-9x92, V-9x93, V-9x94, and V-9x95 actuated VF Series Standard-Pressure, Standard-Temperature Butterfly Valves include 6-1/2 in. (165 mm) for a positioner; overall height requirements for V-9x96 and V-9x97 actuated assemblies include 7-1/2 in. (191 mm) for a positioner.
2. If a positioner is mounted on a travel switch, add 7 in. (178 mm) to the overall height requirement listed above.

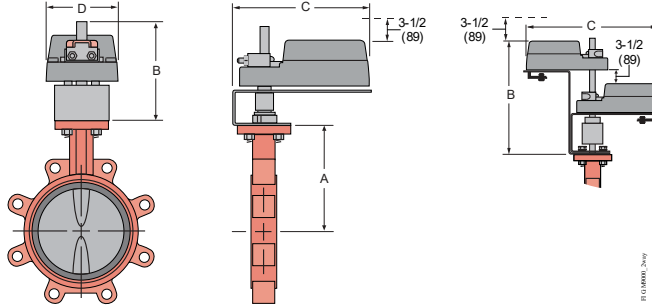
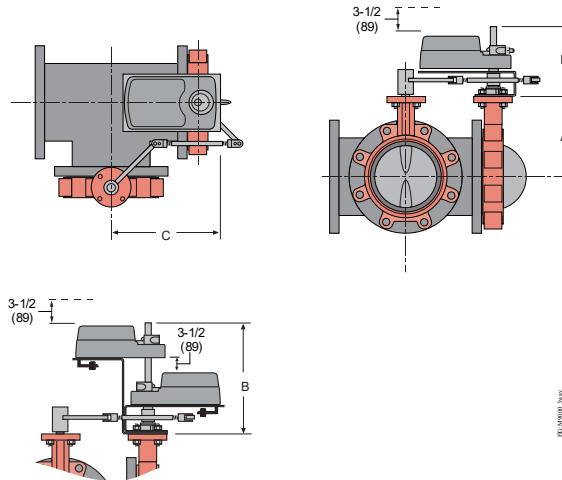


Figure 29: Two-Way VF Series M9000 Electrically Actuated Standard-Pressure, Standard-Temperature Butterfly Valve Dimensions, in. (mm) (See Table 27.)

Table 29: Two-Way VF Series M9000 Electrically Actuated Standard-Pressure, Standard-Temperature Butterfly Valve Dimensions, in. (mm)

Valve Size, in.	A	B		C						D	
		Single Actuator	Dual Actuator	M91xx Single	M91xx Tandem	M9220 Single	M9220 Tandem	M93xx Single	M93xx Tandem	Single Actuator	Dual Actuator
2	5.50 (140)										
2-1/2	6.00 (152)										
3	6.25 (159)	6.00 (152)	11.75 (299)	7.50 (191)	12.50 (318)	10.00 (254)	16.00 (406)	7.50 (191)	12.50 (318)	4.00 (102)	5.00 (127)
4	7.00 (178)										
5	7.50 (191)										
6	8.00 (203)										



**Figure 30: Three-Way VF Series M9000 Electrically Actuated Standard-Pressure, Standard-Temperature Butterfly Valve Dimensions, in. (mm)
(See Table 28.)**

Table 30: Three-Way VF Series M9000 Electrically Actuated Standard-Pressure, Standard-Temperature Butterfly Valve Dimensions, in. (mm)

Valve Size, in.	A	B		C
		Single Actuator	Dual Actuator	
2	5.50 (140)	7.50 (191)	13.25 (337)	12.00 (305)
2-1/2	6.00 (152)			13.00 (330)
3	6.20 (158)			13.50 (343)
4	7.00 (178)			14.50 (368)
5	7.50 (191)			15.5 (394)
6	8.00 (203)			16.25 (413)

Note: The clearance required for actuator removal on these three-way assemblies is the same clearance required for actuator removal on two-way assemblies (see Table 32).

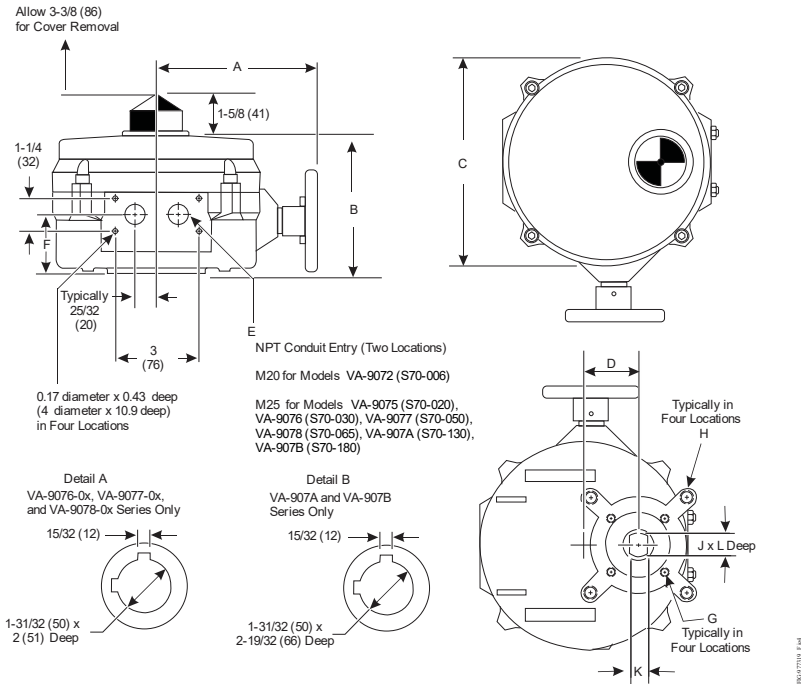


Figure 31: Two-Way VF Series VA-9070 Electrically Actuated Standard-Pressure, Standard-Temperature Butterfly Valve Dimensions, in. (mm) (see Table 29)

Table 31: VA-9070 Series Electric Rotary Actuator Dimensions, in. (mm)

Dimensions				
	VA-9072 (S70-006)	VA-9075 (S70-020)	VA-9076 (S70-030) VA-9077 (S70-050) VA-9078 (S70-065)	VA-907A (S70-130) VA-907B (S70-180)
A	5-19/32 (142)	7-13/16 (198)	9-1/2 (241)	9-1/2 (241)
B	5-3/32 (129)	6-1/2 (165)	7-3/16 (183)	12-1/2 (317)
C	7-1/2 (191)	10-3/32 (256)	12-3/32 (307)	12-3/32 (307)
D	1-15/16 (49)	2-11/16 (68)	3-3/16 (81)	9-3/32 (234)
E	1/2 NPTF	3/4 NPTF	3/4 NPTF	3/4 NPTF
F	2 (51)	2-19/32 (66)	3-3/32 (79)	8-1/3 (211)
G (UNC)	5/16-18x2-3/4, F07	5/16-18 x 2-3/4, F07	1/2-13 x 4-15/16, F12	1/2-13 (F12)
H (UNC)	---	1/2-13 x 4-9/32, F12	3/4-10 x 6-1/2, F16	3/4-10 (F16)
J	3/4 (19)	1-13/16 (30)	See Detail A.	See Detail B.
K	1/2 (13)	7/8 (22)		
L	1-3/4 (44)	2-3/16 (56)		

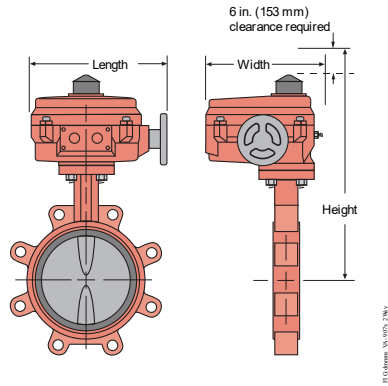


Figure 32: Length, Width and Height Requirements for VA-9070 Series Electric Actuated Two-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valves (See Table 32 and Table 33.)

Table 32: Height Requirements, in. (mm) for VA-9070 Series Electric Actuated Two-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valves (above Centerline of Pipe; Includes 6 in. Head Clearance)^{1,2}

Valve Size, in.	VA-9070 Series Electric Actuator						
	VA-9072	VA-9075	VA-9076	VA-9077	VA-9078	VA-907A	VA-907B
2	18-7/32 (463)	---	---	---	---	---	---
2-1/2	18-23/32 (475)	---	---	---	---	---	---
3	18-31/32 (482)	---	---	---	---	---	---
4	19-23/32 (501)	---	---	---	---	---	---
5	19-29/32 (506)	21-5/8 (549)	---	---	---	---	---
6	20-23/32 (526)	22-1/8 (562)	---	---	---	---	---
8	22-7/32 (564)	23-5/8 (600)	---	---	---	---	---
10	---	24-7/8 (632)	25-9/16 (649)	---	---	---	---
12	---	---	27-1/16 (687)	27-1/16 (687)	---	---	---
14	---	---	---	28-7/16 (722)	28-7/16 (722)	---	---
16	---	---	---	29-9/16 (751)	29-9/16 (751)	33-1/4 (845)	---
18	---	---	---	30-13/16 (783)	30-13/16 (783)	34-1/2 (876)	---
20	---	---	---	---	---	---	35-3/4 (908)

1. The overall height requirements listed above include 1-5/8 in. (41 mm) for a position indicator.
2. Allow appropriate clearance for conduit connections.

Table 33: Length and Width Requirements, in. (mm) for VA-9070 Series Electric Actuated Two-Way and Three-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valves¹

Dimension	VA-9070 Series Electric Actuator						
	VA-9072	VA-9075	VA-9076	VA-9077	VA-9078	VA-907A	VA-907B
Width	5-11/16 (145)	7-3/4 (197)	9-1/4 (235)	9-1/4 (235)	9-1/4 (235)	15-5/16 (389)	15-5/16 (389)
Length	9-15/16 (253)	13-7/16 (342)	13-7/16 (342)	16-5/32 (411)	16-5/32 (411)	16-5/32 (411)	16-5/32 (411)

1. The above dimensions are for the actuator only; see Table 21 and Table 22 for the two-way valve dimensions.

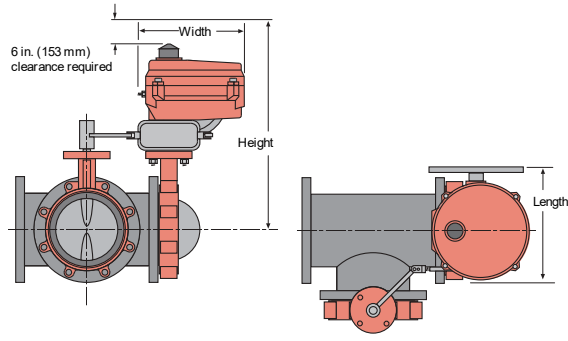


Figure 33: Length, Width, and Height Requirements for VA-9070 Series Electric Actuated Three-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valves (See Table 34 and Table 35.)

Table 34: Height Requirements, in. (mm) for VA-9070 Series Electric Actuated Three-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valves (above Centerline of Pipe; Includes 6 in. Head Clearance)^{1,2}

Valve Size, in.	VA-9070 Series Electric Actuator						
	VA-9072	VA-9075	VA-9076	VA-9077	VA-9078	VA-907A	VA-907B
2	22-7/32 (564)	23-5/8 (600)	---	---	---	---	---
2-1/2	22-23/32 (577)	24-1/8 (613)	---	---	---	---	---
3	22-31/32 (583)	24-3/8 (619)	---	---	---	---	---
4	23-23/32 (602)	25-1/8 (638)	---	---	---	---	---
5	23-29/32 (607)	25-5/8 (651)	---	---	---	---	---
6	24-23/32 (628)	26-1/8 (664)	---	---	---	---	---
8	---	27-5/8 (702)	---	---	---	---	---
10	---	28-7/8 (733)	---	29-9/16 (751)	---	---	---
12	---	---	31-1/16 (789)	31-1/16 (789)	31-1/16 (789)	---	---

1. The overall height requirements listed above include 1-5/8 in. (41 mm) for a position indicator.
2. Allow appropriate clearance for conduit connections.

Table 35: Length and Width Requirements, in. (mm) for VA-9070 Series Electric Actuated Two-Way and Three-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valves¹

Dimension	VA-9070 Series Electric Actuator						
	VA-9072	VA-9075	VA-9076	VA-9077	VA-9078	VA-907A	VA-907B
Width	5-11/16 (145)	7-3/4 (197)	9-1/4 (235)	9-1/4 (235)	9-1/4 (235)	15-5/16 (389)	15-5/16 (389)
Length	9-15/16 (253)	13-7/16 (342)	13-7/16 (342)	16-5/32 (411)	16-5/32 (411)	16-5/32 (411)	16-5/32 (411)

1. The above dimensions are for the actuator only; see Table 23 for the three-way valve dimensions.

Table 36: Valve Flow Coefficients, Cv (Kv)

Valve Size, in.	Disc Position, Degrees Open ¹								
	90° ²	80°	70° ³	60° ⁴	50°	40°	30°	20°	10°
2	144 (123)	114 (98)	84 (72)	61 (52)	43 (37)	27 (23)	16 (14)	7 (6)	1 (0.9)
2-1/2	282 (242)	223 (191)	163 (140)	107 (92)	67 (57)	43 (37)	24 (21)	11 (9)	1.5 (1)
3	461 (395)	364 (312)	267 (229)	154 (132)	96 (82)	61 (52)	35 (30)	15 (13)	2 (2)
4	841 (721)	701 (601)	496 (425)	274 (235)	171 (147)	109 (93)	62 (53)	27 (23)	3 (3)
5	1,376 (1,179)	1,146 (982)	775 (664)	428 (367)	268 (230)	170 (146)	98 (84)	43 (37)	5 (4)
6	1,850 (1,585)	1,542 (1,322)	1,025 (878)	567 (486)	354 (303)	225 (193)	129 (111)	56 (48)	6 (5)
8	3316 (2,842)	2,842 (2,436)	1,862 (1,596)	1,081 (926)	680 (583)	421 (361)	241 (207)	102 (87)	12 (10)
10	5,430 (4,654)	4,525 (3,878)	2,948 (2,526)	1,710 (1,465)	1,076 (922)	667 (572)	382 (327)	162 (139)	19 (16)
12	8,077 (6,922)	6,731 (5,769)	4,393 (3,765)	2,563 (2,197)	1,594 (1,366)	1,005 (861)	555 (476)	235 (201)	27 (23)
14	10,538 (9,031)	8,874 (7,605)	5,939 (5,090)	3,384 (2,900)	2,149 (1,842)	1,320 (1,131)	756 (648)	299 (256)	34 (29)
16	13,966 (11,969)	11,761 (10,079)	7,867 (6,742)	4,483 (3,842)	2,847 (2,440)	1,749 (1,499)	1,001 (858)	397 (340)	45 (39)
18	17,214 (14,752)	14,496 (12,423)	10,065 (8,626)	5,736 (4,916)	3,643 (3,122)	2,237 (1,917)	1,281 (1,098)	507 (435)	58 (50)
20	22,339 (19,145)	18,812 (16,122)	12,535 (10,743)	7,144 (6,122)	4,536 (3,887)	2,786 (2,388)	1,595 (1,367)	632 (542)	72 (62)

1. Recommended disc rotation is between 30° and 70° open; preferred disc rotation for control valve sizing is 50° to 60° open.
2. This is the maximum maximum stroke for electric or pneumatic rack and pinion manual valves.
3. This is the maximum maximum stroke with a D-3000 Actuator.
4. This is the maximum recommended stroke for proportional control.

Table 37: Effective Flow Coefficients for 60° Opening, Cv for Valve Sizing (2 through 20 in. Valves)

Valve Size in.	Pipe Size														
	2	2-1/2	3	4	5	6	8	10	12	14	16	18	20	22	24
2	61	60	58												---
2-1/2		107	105	98											---
3			154	147	140										---
4				274	266	255									---
5					428	418	393								---
6						567	546	524							
8							1,081	1,049	1,009						
10								1,710	1,672	1,617					---
12									2,563	2,516	2,441				---
14										3,384	3,338	3,259			---
16											4,483	4,433	4,340		---
18												5,736	5,682	5,577	---
20													7,144	7,087	6,791

Table 38: Effective Flow Coefficients for 70° Opening, Cv for Valve Sizing (2 through 20 in. Valves)

Valve Size in.	Pipe Size														
	2	2-1/2	3	4	5	6	8	10	12	14	16	18	20	22	24
2	84	80	76												
2-1/2		163	155												
3			267	236											
4				496	451	405									
5					775	722	612								
6						1,025	913	821							
8							1,862	1,711	1,552						
10								2,948	2,765	2,536					
12									4,933	4,169	3,853				
14										5,939	5,702	5,303			
16											7,867	7,605	7,163		
18												10,065	9,782	9,275	
20													12,535	12,234	11,666

Table 39: Effective Flow Coefficients for 90° Opening, Cv for Valve Sizing (2 through 20 in. Valves)

Valve Size in.	Pipe Size														
	2	2-1/2	3	4	5	6	8	10	12	14	16	18	20	22	24
2	144	127	111												
2-1/2		282	245	187											
3			461	340	274										
4				841	664	538									
5					1,376	1,132	808								
6						1,850	1,360	1,101							
8							3,316	2,633	2,142						
10								5,430	4,487	3,667					
12									8,077	6,892	5,690				
14										10,538	9,360	7,942			
16											13,966	12,640	10,872		
18												17,214	15,902	13,962	
20													22,239	20,756	18,296

Table 40: Expected Seating/Unseating Torque Values¹, lb-in (N·m)

Valve Size, in.	Two-Way Valves					Three-Way Valves				
	H Valves ΔP Pressure, psig (kPa)				L Valves ΔP Pressure 50 psig (345 kPa)	H Valves ΔP Pressure, psig (kPa)				L Valves ΔP Pressure 50 psig (345 kPa)
	50 (345)	100 (689)	150 (1,034)	175 (1,206)		50 (345)	100 (689)	150 (1,034)	175 (1,206)	
2	121 (14)	123 (14)	125 (14)	126 (14)	---	145 (16)	148 (17)	150 (17)	151 (17)	---
2-1/2	140 (16)	144 (16)	148 (17)	150 (17)	---	168 (19)	173 (20)	177 (20)	180 (20)	---
3	163 (18)	170 (19)	177 (20)	180 (20)	---	196 (22)	204 (23)	212 (24)	216 (24)	---
4	345 (39)	356 (40)	367 (42)	372 (42)	180 (20)	414 (47)	427 (48)	440 (50)	446 (50)	216 (24)
5	430 (49)	445 (50)	460 (52)	468 (53)	312 (35)	516 (58)	534 (60)	552 (62)	562 (64)	374 (42)
6	526 (59)	541 (61)	556 (63)	564 (64)	456 (52)	631 (71)	649 (73)	667 (75)	677 (77)	547 (62)
8	1,099 (124)	1,149 (130)	1,199 (136)	1,224 (138)	564 (64)	1,319 (149)	1,379 (156)	1,439 (163)	1,469 (166)	677 (77)
10	2,037 (230)	2,291 (259)	2,546 (288)	2,637 (298)	1,128 (127)	2,444 (276)	2,749 (311)	3,055 (345)	3,164 (358)	1,354 (153)
12	3,110 (351)	3,519 (398)	3,928 (444)	4,132 (467)	2,074 (234)	3,732 (421)	4,223 (477)	4,714 (533)	4,958 (560)	2,489 (281)
14	4,500 (508)	5,182 (586)	5,864 (663)	---	3,000 (339)	---	---	---	---	---
16	5,819 (658)	7,000 (791)	8,182 (924)	---	3,880 (438)	---	---	---	---	---
18	7,182 (812)	9,000 (1,017)	10,819 (1,222)	---	4,788 (541)	---	---	---	---	---
20	9,364 (1,058)	11,728 (1,325)	14,091 (1,592)	---	6,243 (705)	---	---	---	---	---

1. Does not include safety factor.

Table 41: Replacement Actuators

Code Number	Description
Electric Spring and Non-Spring Return Actuators	
M9116-AGA-2	Electric Motor Actuator, Non-Spring Return, 140 lb-in, Floating Control, 24 VAC/VDC Input, No End Switches (Cannot be Used in Tandem Configurations)
M9116-AGC-2	Electric Motor Actuator, Non-Spring Return, 140 lb-in, Floating Control, 24 VAC/VDC Input, Two End Switches (Cannot be Used in Tandem Configurations)
M9116-GGA-2	Electric Motor Actuator, Non-Spring Return, 140 lb-in, Proportional Control, 0 (2) to 10 VDC or 0 (4) to 20 mA Input, 0 (2) to 10 VDC Feedback, No End Switches
M9116-GGC-2	Electric Motor Actuator, Non-Spring Return, 140 lb-in, Proportional Control, 0 (2) to 10 VDC or 0 (4) to 20 mA Input, 0 (2) to 10 VDC Feedback, Two End Switches
M9124-AGA-2	Electric Motor Actuator, Non-Spring Return, 210 lb-in, Floating Control, 24 VAC/VDC Input, No End Switches
M9124-AGC-2	Electric Motor Actuator, Non-Spring Return, 210 lb-in, Floating Control, 24 VAC/VDC Input, Two End Switches
M9124-GGA-2	Electric Motor Actuator, Non-Spring Return, 210 lb-in, Proportional Control, 0 (2) to 10 VDC or 0 (4) to 20 mA Input, 0 (2) to 10 VDC Feedback, No End Switches
M9124-GGC-2	Electric Motor Actuator, Non-Spring Return, 210 lb-in, Proportional Control, 0 (2) to 10 VDC or 0 (4) to 20 mA Input, 0 (2) to 10 VDC Feedback, Two End Switches
M9220-AGA-3	Electric Motor Actuator, Spring Return, 177 lb-in, Floating Control, 24 VAC/VDC Input, No End Switches
M9220-AGC-3	Electric Motor Actuator, Spring Return, 177 lb-in, Floating Control, 24 VAC/VDC Input, Two End Switches
M9220-BGA-3	Electric Motor Actuator, Spring Return, 177 lb-in, On/Off Control, 24 VAC/VDC Input, No End Switches
M9220-BGC-3	Electric Motor Actuator, Spring Return, 177 lb-in, On/Off Control, 24 VAC/VDC Input, Two End Switches
M9220-GGA-3	Electric Motor Actuator, Spring Return, 177 lb-in, Proportional Control, 0 (2) to 10 VDC or 0 (4) to 20 mA Input, 0 (2) to 10 VDC Feedback, No End Switches
M9220-GGC-3	Electric Motor Actuator, Spring Return, 177 lb-in, Proportional Control, 0 (2) to 10 VDC or 0 (4) to 20 mA Input, 0 (2) to 10 VDC Feedback, Two End Switches
M9320-HGC-2	Electric Motor Actuator, Non-Spring Return, 180 lb-in, Proportional, On/Off, Floating Control, 0 (2) to 10 VDC or 0 (4) to 20 mA Input, 0 (2) to 10 VDC Feedback, Two End Switches
M9320-HGA-2	Electric Motor Actuator, Non-Spring Return, 180 lb-in, Proportional, On/Off, Floating Control, 0 (2) to 10 VDC or 0 (4) to 20 mA Input, 0 (2) to 10 VDC Feedback, No End Switches
M9335-HGC-2	Electric Motor Actuator, Non-Spring Return, 310 lb-in, Proportional, On/Off, Floating Control, 0 (2) to 10 VDC or 0 (4) to 20 mA Input, 0 (2) to 10 VDC Feedback, Two End Switches
M9335-HGA-2	Electric Motor Actuator, Non-Spring Return, 310 lb-in, Proportional, On/Off, Floating Control, 0 (2) to 10 VDC or 0 (4) to 20 mA Input, 0 (2) to 10 VDC Feedback, No End Switches
Pneumatic Spring Return Actuators	
D-3153-5120	Pneumatic Piston Actuator with Positioner, for Use with 2, 2-1/2, or 3 in. 175 psig Valves or 4 in. 50 psig Valves
D-3153-5130	Pneumatic Piston Actuator without Positioner, for Use with 2, 2-1/2, or 3 in. 175 psig Valves or 4 in. 50 psig Valves
D-3244-5100	Pneumatic Piston Actuator with Positioner, for Use with 4 in. 175 psig Valves or 5 in. 50 psig Valves
D-3244-5110	Pneumatic Piston Actuator without Positioner, for Use with 4 in. 175 psig Valves or 5 in. 50 psig Valves
D-3246-5100	Pneumatic Piston Actuator with Positioner, for Use with 5 or 6 in. 175 psig Valves or 6, 8, or 10 in. 50 psig Valves
D-3246-5110	Pneumatic Piston Actuator without Positioner, for Use with 5 or 6 in. 175 psig Valves or 6, 8, or 10 in. (Requires Two Actuators) 50 psig Valves

Table 42: Descriptions of Mounting Kits for Field Mounting D-3000 Series Pneumatic Piston Actuators on Two-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valves (See Table 44 for more detailed selection information.)

Mounting Kit¹ Code Number	Description
VF-001-602	D-3153-51x0 Actuator Mounting Kit for Normally Closed 2, 2-1/2, or 3 in. 175 or 150 psig Valves
VF-001-603	D-3153-51x0 Actuator Mounting Kit for Normally Open 2, 2-1/2, or 3 in. 175 or 150 psig Valves
VF-001-604	D-3513-51x0 Actuator Mounting Kit for Normally Closed 4 in. 50 psig Valves
VF-001-605	D-3153-51x0 Actuator Mounting Kit for Normally Open 4 in. 50 psig Valves
VF-002-602	D-3244-51x0 Actuator Mounting Kit for Normally Closed 4 in. 175 or 150 psig Valves
VF-002-603	D-3244-51x0 Actuator Mounting Kit for Normally Open 4 in. 175 or 150 psig Valves
VF-002-604	D-3244-51x0 Actuator Mounting Kit for Normally Closed 5 in. 175 or 150 psig Valves
VF-002-605	D-3244-51x0 Actuator Mounting Kit for Normally Open 5 in. 50 psig Valves
VF-003-602	D-3246-51x0 Actuator Mounting Kit for Normally Closed 5 in. 175 or 150 psig Valves
VF-003-603	D-3246-51x0 Actuator Mounting Kit for Normally Open 5 in. 175 or 150 psig Valves
VF-003-604	D-3246-51x0 Actuator Mounting Kit for Normally Closed 6 in. 175, 150, or 50 psig Valves
VF-003-605	D-3246-51x0 Actuator Mounting Kit for Normally Open 6 in. 175, 150, or 50 psig Valves
VF-003-606	D-3246-51x0 Actuator Mounting Kit for Normally Closed 8 in. 50 psig Valves
VF-003-607	D-3246-51x0 Actuator Mounting Kit for Normally Open 8 in. 50 psig Valves
VF-005-602	D-3246-51x0 Actuator Mounting Kit for Normally Closed 10 in. 175 or 150 psig Valves (Includes Parts for Mounting Two Actuators)
VF-005-603	D-3246-51x0 Actuator Mounting Kit for Normally Open 10 in. 50 psig Valves (Includes Parts for Mounting Two Actuators)

1. The mounting kits contain a mounting bracket, crankarm, sleeve adaptor, a clevis kit, and all necessary hardware for completing actuator field mounting.

Table 43: Mounting Kits and Actuators for Field Mounting D-3000 Series Pneumatic Piston Actuators on Two-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valves

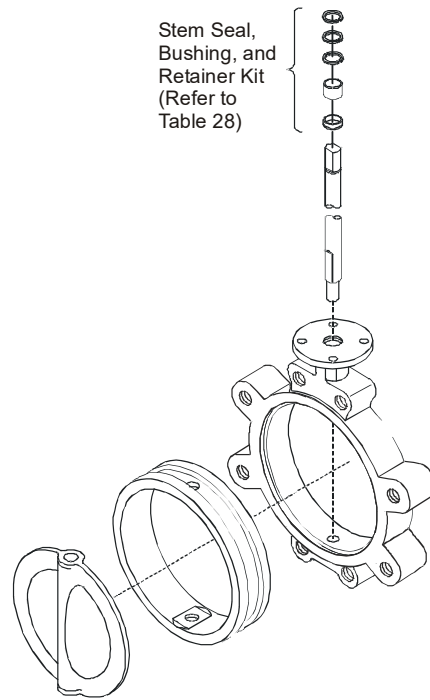
Valve Size, in.	Action	Pressure	Type	Desired VF Assembly	Manual VF Assembly	Actuator Code Number	Mounting Kit ¹ Code Number			
2, 2-1/2, 3	N.C.	High	Without Positioner	VFC-020HB-001N	VFM-020HB-000N	D-3153-5130	VF-001-602			
				VFC-025HB-001N	VFM-025HB-000N					
				VFC-030HB-001N	VFM-030HB-000N					
			With Positioner	VFC-020HB-001A	VFM-020HB-000N	D-3153-5120				
				VFC-025HB-001A	VFM-025HB-000N					
				VFC-030HB-001A	VFM-030HB-000N					
	N.O.		Without Positioner	VFN-020HB-001N	VFM-030HB-000N	D-3153-5130	VF-001-603			
				VFN-025HB-001N	VFM-025HB-000N					
				VFN-030HB-001N	VFM-030HB-000N					
			With Positioner	VFN-020HB-001A	VFM-020HB-000N	D-3153-5120				
				VFN-025HB-001A	VFM-025HB-000N					
				VFN-030HB-001A	VFM-030HB-000N					
4	N.C.	Low	Without Positioner	VFC-040LB-001N	VFM-040LB-000N	D-3153-5130	VF-001-604			
				With Positioner		VFC-040LB-001A		D-3153-5120		
			Without Positioner	VFN-040LB-001N		D-3153-5130		VF-001-605		
				With Positioner		VFN-040LB-001A			D-3153-5120	
	N.O.		High	Without Positioner		VFC-040HB-002N	VFM-040HB-000N		D-3244-5110	VF-002-602
						With Positioner			VFC-040HB-002A	
				Without Positioner		VFC-040HB-002N		D-3244-5110	VF-002-603	
						With Positioner		VFC-040HB-002A		D-3244-5100
	5	N.C.	Low	Without Positioner	VFC-050LB-002N	VFM-050LB-000N		D-3244-5110		VF-002-604
					With Positioner			VFC-050LB-002A		
				Without Positioner	VFC-050LB-002N			D-3244-5110	VF-002-605	
					With Positioner			VFC-050LB-002A		
N.O.		High		Without Positioner	VFC-040HB-002N		VFM-040HB-000N	D-3244-5110		VF-002-602
					With Positioner			VFC-040HB-002A		
				Without Positioner	VFC-050LB-002N			D-3244-5110	VF-002-605	
					With Positioner			VFC-050LB-002A		D-3244-5100
Continued on next page . . .										

Valve Size, in. (Cont.)	Action	Pressure	Type	Desired VF Assembly	Manual VF Assembly	Actuator Code Number	Mounting Kit ¹ Code Number
5	N.C.	High	Without Positioner	VFC-050HB-003N	VFM-050HB-000N	D-3246-5110	VF-003-602
			With Positioner	VFC-050HB-003A		D-3246-5100	
	N.O.		Without Positioner	VFC-050HB-003N		D-3246-5110	VF-003-603
			With Positioner	VFC-050HB-003A		D-3246-5100	
6	N.C.	High	Without Positioner	VFC-060HB-003N	VFM-060HB-000N	D-3246-5110	VF-003-604
		Low		VFC-060LB-003N	VFM-060LB-000N		
		High	With Positioner	VFC-060HB-003A	VFM-060HB-000N	D-3246-5100	
		Low		VFC-060LB-003A	VFM-060LB-000N		
	N.O.	High	Without Positioner	VFN-060HB-003N	VFM-060HB-000N	D-3246-5110	VF-003-605
		Low		VFN-060LB-003N	VFM-060LB-000N		
		High	With Positioner	VFN-060HB-003A	VFM-060HB-000N	D-3246-5100	
		Low		VFN-060LB-003A	VFM-060LB-000N		
8	N.C.	Low	Without Positioner	VFC-080LB-003N	VFM-080LB-000N	D-3246-5110	VF-003-606
			With Positioner	VFC-080LB-003A		D-3246-5100	
	N.O.		Without Positioner	VFN-080LB-003N		D-3246-5110	VF-003-607
			With Positioner	VFN-080LB-003A		D-3246-5100	
10	N.C.	Low	With Positioner	VFC-100LB-005A	VFM-100LB-000N	D-3246-5110, D-3246-5100	VF-005-602
			Without Positioner	VFC-100LB-005N		D-3246-5110, Two Required	
	N.O.		With Positioner	VFN-100LB-005A		D-3246-5110, D-3246-5100	VF-005-603
			With Positioner	VFN-100LB-005N		D-3246-5110, Two Required	

1. Mounting kits include a mounting bracket, crankarm, sleeve adaptor, a clevis kit, and all necessary hardware for completing actuator field mounting.

Table 44: Replacement Brackets and Crankarms for Three-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valve Assemblies with D-3000 Series Pneumatic Piston Actuators

Complete VF Series Code Number	Mounting Bracket Code Number	Master Lever Crankarm Code Number	Subordinate Lever Crankarm Code Number
VFD-020HA-001N or -001A	VF-001-601	VF-00X-603	VF-00X-608
VFE-020HA-001N or -001A	VF-001-601	VF-00X-604	VF-00X-607
VFF-020HA-001N or -001A	VF-001-601	VF-00X-604	VF-00X-607
VFG-020HA-001N or -001A	VF-001-601	VF-00X-603	VF-00X-608
VGD-025HA-002N or -002A	VF-002-601	VF-00X-603	VF-00X-608
VFE-025HA-002N or -002A	VF-002-601	VF-00X-604	VF-00X-607
VFF-025HA-002N or -002A	VF-002-601	VF-00X-604	VF-00X-607
VFG-025HA-002N or -002A	VF-002-601	VF-00X-603	VF-00X-608
VFD-030HA-002N or -002A	VF-002-601	VF-00X-603	VF-00X-608
VFE-030HA-002N or -002A	VF-002-601	VF-00X-604	VF-00X-607
VFF-030HA-002N or -002A	VF-002-601	VF-00X-604	VF-00X-607
VFG-030HA-002N or -002A	VF-002-601	VF-00X-603	VF-00X-608
VFD-040LA-002N or -002A	VF-002-601	VF-00X-603	VF-00X-608
VFE-040LA-002N or -002A	VF-002-601	VF-00X-604	VF-00X-607
VFF-040LA-002N or -002A	VF-002-601	VF-00X-604	VF-00X-607
VFG-040LA-002N or -002A	VF-002-601	VF-00X-603	VF-00X-608
VFD-040HA-003N or -003A	VF-003-601	VF-00X-603	VF-00X-606
VFE-040HA-003N or -003A	VF-003-601	VF-00X-604	VF-00X-605
VFF-040HA-003N or -003A	VF-003-601	VF-00X-604	VF-00X-605
VFG-040HA-003N or -003A	VF-003-601	VF-00X-603	VF-00X-606
VFD-050LA-003N or -003A	VF-003-601	VF-00X-603	VF-00X-606
VFE-050LA-003N or -003A	VF-003-601	VF-00X-604	VF-00X-605
VFF-050LA-003N or -003A	VF-003-601	VF-00X-604	VF-00X-605
VFG-050LA-003N or -003A	VF-003-601	VF-00X-603	VF-00X-606
VFD-050HA-003N or -003A	VF-003-601	VF-00X-603	VF-00X-606
VFE-050HA-003N or -003A	VF-003-601	VF-00X-604	VF-00X-605
VFF-050HA-003N or -003A	VF-003-601	VF-00X-604	VF-00X-605
VFG-050HA-003N or -003A	VF-003-601	VF-00X-603	VF-00X-606
VFD-060LA-003N or -003A	VF-003-601	VF-00X-603	VF-00X-606
VFE-060LA-003N or -003A	VF-003-601	VF-00X-604	VF-00X-605
VFF-060LA-003N or -003A	VF-003-601	VF-00X-604	VF-00X-605
VFG-060LA-003N or -003A	VF-003-601	VF-00X-603	VF-00X-606
VFD-060HA-005N or -005A	VF-005-601	VF-00X-603	VF-00X-606
VFE-060HA-005N or -005A	VF-005-601	VF-00X-604	VF-00X-605
VFF-060HA-005N or -005A	VF-005-601	VF-00X-604	VF-00X-605
VFG-060HA-005N or -005A	VF-005-601	VF-00X-603	VF-00X-606
VFD-080LA-005N or -005A	VF-005-601	VF-00X-603	VF-00X-606
VFE-080LA-005N or -005A	VF-005-601	VF-00X-604	VF-00X-605
VFF-080LA-005N or -005A	VF-005-601	VF-00X-604	VF-00X-605
VFG-080LA-005N or -005A	VF-005-601	VF-00X-603	VF-00X-606



**Figure 34: VF Series Standard-Pressure,
Standard-Temperature Butterfly Valve
Repair Parts**

**Table 45: VF Series Standard-Pressure,
Standard-Temperature Butterfly Valve Repair Parts**

Valve Size, in.	Stem Seal, Bushing, and Retainer Kit
2	VF-025-604
2-1/2	VF-025-604
3	VF-025-604
4	VF-040-604
5	VF-060-604
6	VF-060-604
8	VF-080-604
10	VF-120-604
12	VF-120-604
14	VF-140-604
16	VF-160-604
18	VF-200-604
20	VF-200-604

Table 46: Crankarms for Field Mounting D-3153, D-3244, and D-3246 Series Pneumatic Actuators to Two-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valves

Pneumatic Actuator	Actuator Sub-Code	Valve Configuration	Actuator Crankarm
One D-3153	-001	Normally Closed	VF-00X-601
		Normally Open	VF-00X-602
One D-3244	-002	Normally Closed	VF-00X-601
		Normally Open	VF-00X-602
One D-3246	-003	Normally Closed	VF-00X-601
		Normally Open	VF-00X-602
Two D-3246s	-005	Normally Closed	VF-00X-603
		Normally Open	VF-00X-604

Table 47: Crankarms for Field Mounting D-3153, D-3244, and D-3246 Series Pneumatic Actuators to Three-Way Series Standard-Pressure, Standard-Temperature Butterfly Valves

Pneumatic Actuator	Actuator Sub-Code	Valve Style	Location	Valve Configuration	Primary or Secondary Crankarm
One D-3153	-001	Style D	Primary	Normally Closed	VF-00X-603
			Secondary	Normally Open	VF-00X-608
		Style E	Primary	Normally Open	VF-00X-604
			Secondary	Normally Closed	VF-00X-607
		Style F	Primary	Normally Closed	VF-00X-604
			Secondary	Normally Open	VF-00X-607
Style G	Primary	Normally Open	VF-00X-603		
	Secondary	Normally Closed	VF-00X-608		
One D-3244	-002	Style D	Primary	Normally Closed	VF-00X-603
			Secondary	Normally Open	VF-00X-608
		Style E	Primary	Normally Open	VF-00X-604
			Secondary	Normally Closed	VF-00X-607
		Style F	Primary	Normally Closed	VF-00X-604
			Secondary	Normally Open	VF-00X-607
Style G	Primary	Normally Open	VF-00X-603		
	Secondary	Normally Closed	VF-00X-608		
Continued on next page . . .					

Pneumatic Actuator (Cont.)	Actuator Sub-Code	Valve Style	Location	Valve Configuration	Primary or Secondary Crankarm		
One D-3246	-003	Style D	Primary	Normally Closed	VF-00X-603		
			Secondary	Normally Open	VF-00X-606		
		Style E	Primary	Normally Closed	VF-00X-604		
			Secondary	Normally Open	VF-00X-605		
		Style F	Primary	Normally Closed	VF-00X-604		
			Secondary	Normally Open	VF-00X-605		
		Style G	Primary	Normally Closed	VF-00X-603		
			Secondary	Normally Open	VF-00X-606		
		Two D-3246s	-005	Style D	Primary	Normally Closed	VF-00X-603
					Secondary	Normally Open	VF-00X-606
Style E	Primary			Normally Closed	VF-00X-604		
	Secondary			Normally Open	VF-00X-605		
Style F	Primary			Normally Closed	VF-00X-604		
	Secondary			Normally Open	VF-00X-605		
Style G	Primary			Normally Closed	VF-00X-603		
	Secondary			Normally Open	VF-00X-606		

Table 48: Mounting Brackets for Field Mounting D-3153, D-3244, and D-3246 Series Pneumatic Actuators

Pneumatic Actuator	Actuator Sub-Code	Mounting Bracket
One D-3153	-001	VF-001-601
One D-3244	-002	VF-002-601
One D-3246	-003	VF-003-601
Two D-3246s	-005	VF-005-601

Table 49: Sleeve Adaptors for Field Mounting D-3153, D-3244, and D-3246 Series Pneumatic Actuators

Valve Size, in.	Sleeve Adaptor
4	D-3244-500
5 and 6	D-3246-600
8	D-3246-800
10	None Required

Table 50: Clevis Kits for Field Repair or Field Mounting D-3153, D-3244, and D-3246 Series Pneumatic Actuators

Pneumatic Actuator	Clevis Kit
D-3153	D-3153-701
D-3244	D-3246-701
D-3246	D-3246-701
Three-Way Tandem Actuators	VF-3WAY-100

Table 51: Kits for Field Mounting M9000 actuators

Code Number	Description
M9100-100S	M9100 mounting kit for 2 through 4 in. butterfly valves with single actuator.
M9100-100D	M9100 mounting kit for 4 through 6 in. butterfly valves with tandem actuator.
M9200-100S	M9200 mounting kit for 2 through 4 in. butterfly valves with single actuator.
M9200-100D	M9200 mounting kit for 3 through 5 in. butterfly valves with tandem actuator.
M9300-100S	M9300 mounting kit for 2 through 4 in. butterfly valves with single actuator.
M9300-100D	M9300 mounting kit for 3 through 6 in. butterfly valves with tandem actuator.
M9300-200S	M9300 mounting kit for 8 in. butterfly valves with single actuator.

Table 52: Mounting Adaptors for Field Mounting V-9000 Series Pneumatic Actuators

Valve Size, in.	Pneumatic Rack and Pinion Actuator							
	V-9x92	V-9x93	V-9x94-1	V-9x94-2	V-9x95	V-9x96	V-9x97	V-9x98
2	None Required	V-9094-300 1	V-9094-300 1	V-9095-300 2	V-9095-300 2	---	---	---
2-1/2	None Required	V-9094-300 1	V-9094-300 1	V-9095-300 2	V-9095-300 2	---	---	---
3	None Required	V-9094-300 1	V-9094-300 1	V-9095-300 2	V-9095-300 2	---	---	---
4	---	V-9094-400 1	V-9094-400 1	V-9095-400 2	V-9095-400 2	---	---	---
5	---	None Required	None Required	V-9095-600 2	V-9095-600 2	V-9096-600 3	---	---
6	---	None Required	None Required	V-9095-600 2	V-9095-600 2	V-9096-600 3	---	---
8	---	---	---	V-9095-800 2	V-9095-800 2	V-9096-800 2	V-9097-800 1	---
10	---	---	---	None Required	None Required	None Required	V-9097-120 1	---
12	---	---	---	None Required	None Required	None Required	V-9097-120 1	---
14	---	---	---	---	---	---	V-9097-160 1	V-9098-100 3
16	---	---	---	---	---	---	V-9097-160 1	V-9098-100 3
18	---	---	---	---	---	---	None Required	V-9098-200 1
20	---	---	---	---	---	---	None Required	V-9098-200 1

1. Kit contains one mounting adaptor only (no plate or mounting hardware).
2. Kit contains two mounting adaptors only (no plate or mounting hardware).
3. Kit contains one mounting adaptor with plate and mounting hardware.

Table 53: Mounting and Adaptor Kits for Field Mounting VA-9070 Series Electric Actuators to Two-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valves

Valve Size, in.	Electric Actuator						
	VA-9072	VA-9075	VA-9076	VA-9077	VA-9078	VA-907A	VA-907B
2	VA-9072- 300	---	---	---	---	---	---
2-1/2	VA-9072- 300	---	---	---	---	---	---
3	VA-9072- 300	---	---	---	---	---	---
4	VA-9072- 400	VA-9075-400	---	---	---	---	---
5	VA-9072- 600	VA-9075- 600	---	---	---	---	---
6	VA-9072- 600	VA-9075- 600	---	---	---	---	---
8	---	VA-9075- 800	---	---	---	---	---
10	---	VA-9075- 1200	VA-9078- 1200	VA-9078- 1200	VA-9078- 1200	---	---
12	---	---	VA-9078- 1200	VA-9078- 1200	VA-9078- 1200	---	---
14	---	---	---	VA-9078- 1600	VA-9078- 1600	---	---
16	---	---	---	VA-9078- 1600	VA-9078- 1600	VA-9078- 1600	---
18	---	---	---	VA-9078- 2000	VA-9078- 2000	VA-9078- 1600	---
20	---	---	---	---	---	---	VA-9078- 2000

Technical Specifications¹

Product		VF Series Standard-Pressure, Standard-Temperature Butterfly Valves
Service		Hot, Chilled, or Condenser Water, and 50/50 Glycol Solutions (Not Designed for Use in Steam Applications)
Models and Ordering Data		See Table 1 through Table 16.
Body Styles and Sizes	2 through 12 in.	Fully Lugged, Two-Way and Three-Way
	14 through 20 in.	Fully Lugged, Two-Way Only
Body Pressure Rating		250 psi (1,723 kPa)
Fluid Temperature Limits		-40°F to 250°F (-40°C to 121°C)
Maximum Closeoff Pressure (See Table 1 and Table 2.)	2 through 12 in. Type H	175 psig (1,206 kPa) Bidirectional, 75 psig (517 kPa) Dead-End Service
	14 through 20 in. Type H	150 psig (1,034 kPa) Bidirectional, 75 psig (517 kPa) Dead-End Service
	4 through 20 in. Type L	50 psig (345 kPa) Bidirectional
Maximum Fluid Velocity		30 ft/Second (9 m/Second)
Rangeability		See Table 17.
Leakage		Bubble Tight, Bidirectional Shutoff Rated for Dead-End Service (Uni-Directional); Inlet Must Face Pressure
Flow Characteristics		Modified Equal Percentage; see Figure 19.
Flow Coefficients (Cv)		See Table 38, Table 39, and Table 40.
Torque Requirements		See Table 41.
Materials	Body	Cast Iron, ASTM A126 Class B, Red Epoxy Finish
	Tee (Three-Way Valves Only)	Cast Iron
	Disc	Ductile Iron, Nylon 11 Coated, ASTM A536 Gr 65-45-12
	Seat	Ethylene Propylene Diene Monomer (EPDM)
	Stem	416 Stainless Steel (2 through 12 in.) 304 Stainless Steel (14 through 20 in.)
Ambient Temperature Limits	Storage	-20 to 150°F (-29 to 66°C), Preferably 40 to 85°F (4 to 29°C)
	Operating	Spring Return Actuator: -40 to 131°F (-40 to 55°C) Non-Spring Return Actuator: -4 to 122°F (-20 to 50°C)
Weather Shield Rating		NEMA 4
Accessories (Order Separately)		Ten-Position Manual Handles (See Table 19.) Gear-Operated Manual Hand Wheels (See Table 20.)
Representative Maximum Valve and Actuator Assembly Shipping Weights		See Table 18.

1. For actuator applications, see the *Valve Actuators* section and/or the appropriate actuator product bulletin.

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls shall not be liable for damages resulting from misapplication or misuse of its products.



Building Technologies & Solutions
507 E. Michigan Street, Milwaukee, WI 53202

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