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 in. 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 in. through 12 in. standard pressure valve ratings available include 175 psig for 2 in. through 12 in. valves, 150 psig for 14 in. through 20 in. valves, and 50 psig for 4 in. through 20 in. valves.



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

Features and benefits	
• **Low seating / unseating torques**	Reduce actuator torque and size requirements, particularly with lower-pressure rated valves
• **Bubble-tight shutoff**	Ensures positive closure when needed
• **Broad range of pre-assembled actuators**	Offers a wide selection for new and replacement electric and pneumatic actuators
• **Compatible with all types of ANSI 125 / 150 slip-on and weld-neck flanges**	Enables field configuration with readily available standard fittings
• **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 (1 2)	**Butterfly valve**	
C (3)	**Body type**	N = Two-way, Normally Open (N.O.) C = Two-way, Normally Closed (N.C.) M = Two-way, manually operated D = Three-way, style D E = Three-way, style E F = Three-way, style F G = Three-way, style G
– 1 0 0 (4 5 6 7)	**Valve size**	020 = 2 in. 025 = 2 1/2 in. 030 = 3 in. 040 = 4 in. 050 = 5 in. 060 = 6 in. 080 = 8 in. 100 = 10 in. 120 = 12 in. 140 = 14 in. 160 = 16 in. 180 = 18 in. 200 = 20 in.
H (8)	**Closeoff**	H = High pressure closeoff (175 psig 2 through 12 in.; 150 psig 14 in. through 20 in.) J = High pressure closeoff – molded-in seat (175 psig 2 through 12 in.; 150 psig 14 in. through 20 in.) L = Low pressure closeoff (50 psig) M = Low pressure closeoff – molded-in seat (50 psig) N = Low pressure closeoff (50 psig), low torque valve
B (9)	**Stem material**	B = 416 stainless steel (2 in. through 12 in.) C = 304 stainless steel (14 in. through 20 in.)
– 7 0 6 (10 11 12 13)	**Actuator**	See Table 3.
N (14)	**Accessories**	A = Furnished with positioner as standard B = High pressure positioner C = 120 VAC solenoid with speed controls D = Thermostat / heater kit for on / off electric actuators E = 24 VAC solenoid with speed controls G = Gear-operated manual hand wheel M = Ten-position manual handle N = Thermostat / heater kit for proportional electric actuators
4 (15)	**Supply voltage**	Blank = 120 VAC (VA-9070 Electric Actuators) 4 = 24 VAC (VA-9070 Electric Actuators)

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 F (1 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 0 (4 5 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.) J = High pressure closeoff – molded-in seat (175 psig 2 in. through 12 in.; 150 psig 14 in. through 20 in.) L = Low pressure closeoff (50 psig) M = Low pressure closeoff – molded-in seat (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 2 N (10 11 12)	**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
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 VDC to 10 VDC (proportional only), none (all others) C = 0 VDC to 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	A	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 VDC to 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.

Low pressure pneumatic piston type, spring return

001	=	One D-3153
002	=	One D-3244
003	=	One D-3246
005	=	Two D-3246

High pressure pneumatic, non-spring return

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

Electric, proportional, non-spring return

701N	=	VA-9071-03
701N4	=	VA-9071-11
703N	=	VA-9073-03
703N4	=	VA-9073-11
704N	=	VA-9074-03
705N	=	VA-9075-03
705N4	=	VA-9075-15
706N	=	VA-9076-03
707N	=	VA-9077-03
707N4	=	VA-9077-15
708N	=	VA-9078-03
907N	=	VA-907A-03
908N	=	VA-907B-03

Electric, on / off, non-spring return

721D	=	VA-9071-04
721D4	=	VA-9071-12
723D	=	VA-9073-04
723D4	=	VA-9073-12
724D	=	VA-9074-04
725D	=	VA-9075-04
725D4	=	VA-9075-16
726D	=	VA-9076-04
727D	=	VA-9077-04
727D4	=	VA-9077-16
728D	=	VA-9078-04
927D	=	VA-907A-04
928D	=	VA-907B-04

High pressure pneumatic, spring return

720	=	V-9197-12
730	=	V-9197-13
740	=	V-9197-14
750	=	V-9197-15
760	=	V-9197-16
820	=	V-9198-12
830	=	V-9198-13
840	=	V-9198-14
850	=	V-9198-15
860	=	V-9198-16

Manual operator

000	=	Valve less actuator

(See *Optional valve accessories* 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.)

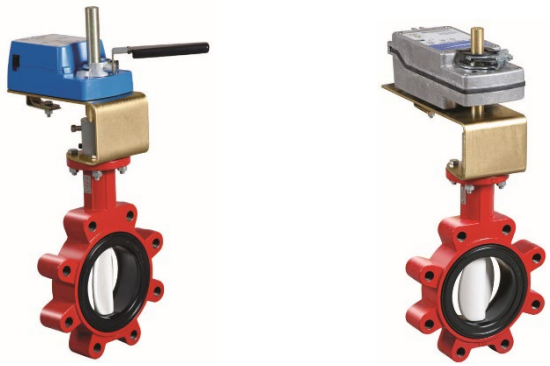


Figure 2: Two-way valve with M9000 Series Electric Actuator (without weather shield)

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-AGC-3 with two end switches			
2	144	61	175	VFN020HB+92NAGC			
2 1/2	282	107	175	VFN025HB+92NAGC			
3	461	154	175	VFN030HB+92NAGC			
4	841	274	50	VFN040LB+92NAGC			
4	841	274	175	VFN040HB292NAGC[2]	VFC040HB294NAGC[2]		
5	1376	428	50	VFN050LB292NAGC[2]	VFC050LB294NAGC[2]		
				On / off			
				M9220-BGA-3 without end switches		**M9220-BGC-3 with two 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 VDC to 10 VDC proportional control			
				M9220-GGA-3 without end switches		**M9220-GGC-3 with two 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 VDC to 10 VDC proportional control**	
				M91xx-AGA-2 without switches	**M91xx-AGC-2 with two switches**	**M91xx-GGA-2 without switches**	**M91xx-GGC-2 with two 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)

				Two-way – non-spring return	
Size, in.	Cv at 90°	Cv at 60°	Closeoff pressure (psig)[1]	Automatic signal detection floating, on / off, proportional[3]	
				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.
3. Automatic signal detection applies to non-tandem assemblies. Tandem assemblies should be operated as proportional only.



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-AGC-3 with two end switches			
4	841	274	50	VFD040LB292NAGC[3]			
Three-way – non-spring return							
				On / off (floating) control		0 VDC 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)

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-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]

1. 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 required style. Example: VF**E**xxxxxx+xxxxxx, VF**F**xxxxxx+xxxxxx, or VF**G**xxxxxx+xxxxxx.
2. 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.
3. Valve assemblies have two actuators mounted in tandem.

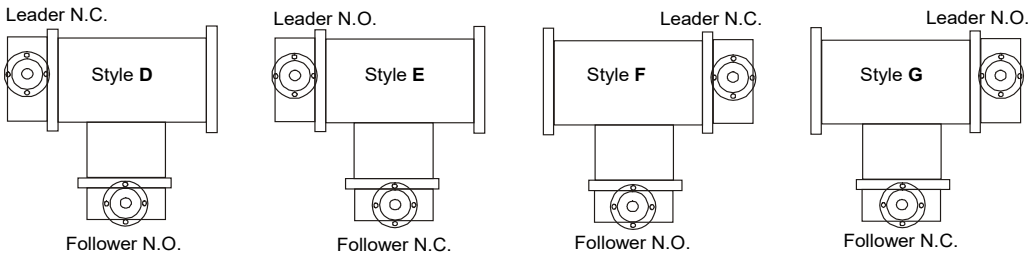


Figure 4: Three-way valve body styles



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-AGC-3 with two end switches			
2	144	61	175	VWN020HB+92NAGC	VWC020HB+94NAGC		
2 1/2	282	107	175	VWN025HB+92NAGC	VWC025HB+94NAGC		
3	461	154	175	VWN030HB+92NAGC	VWC030HB+94NAGC		
4	841	274	50	VWN040LB+92NAGC	VWC040LB+94NAGC		
4	841	274	175	VWN040HB292NAGC[2]	VWC040HB294NAGC[2]		
5	1376	428	50	VWN050LB292NAGC[2]	VWC050LB294NAGC[2]		
				On / off			
				M9220-BGA-3 without end switches		**M9220-BGC-3 with two 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 VDC to 10 VDC proportional control			
				M9220-GGA-3 without end switches		**M9220-GGC-3 with two 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 VDC to 10 VDC proportional control**	
				M91xx-AGA-2 without switches	**M91xx-AGC-2 with two switches**	**M91xx-GGA-2 without switches**	**M91xx-GGC-2 with two 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)

				Two-way – non-spring return	
Size, in.	Cv at 90°	Cv at 60°	Closeoff pressure (psig)[1]	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-AGC-3 with two end switches			
2	144	61	175	VWD020HB+92NAGC			
2 1/2	282	107	175	VWD025HB+92NAGC			
3	461	154	175	VWD030HB292NAGC			
4	841	274	50	VWD040LB292NAGC[3]			
				Three-way – non-spring return			
				On / off (floating) control		0 VDC 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]

1. 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 required style. Example: VF**E**xxxxxx+xxxxxx, VF**F**xxxxxx+xxxxxx, or VF**G**xxxxxx+xxxxxx.
2. All valves are rated for dead-end service. Valves rated for 75 psig closeoff or higher have 75 psig maximum dead-end service rating.
3. Valve assemblies have two actuators mounted in tandem.

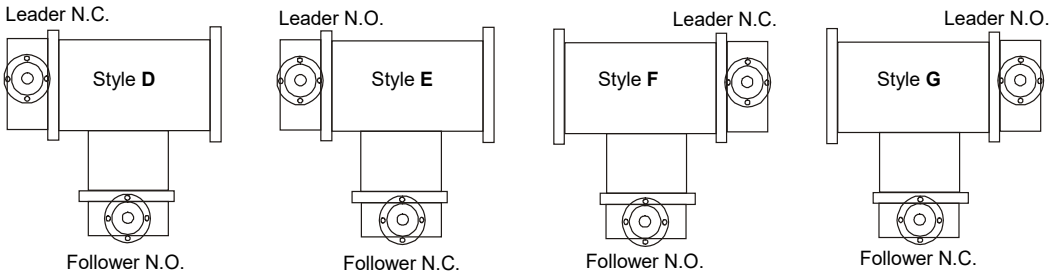


Figure 7: Three-way valve body styles



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						
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						
6	1,025	50	VFC-060NB-003N	VFN-060NB-003N	VFC-060NB-003A	VFN-060NB-003A

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 assemblies[1] – 175 psig closeoff pressure – 75 psig dead-end service				
6	1,025	175	VFD-060HB-005N[2]	VFD-060HB-005A[2]
Three-way assemblies[1] – 50 psig closeoff pressure – not rated for dead-end service				
6	1,025	50	VFD-060NB-003N	VFD-060NB-003A
8	1,862	50	VFD-080NB-005N[2]	VFD-080NB-005A[2]

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 required style. Example: VF**E**-xxxxx-xxxx, VF**F**-xxxxx-xxxx, or VF**G**-xxxxx-xxxx.
2. Valve assemblies have two actuators mounted in tandem.

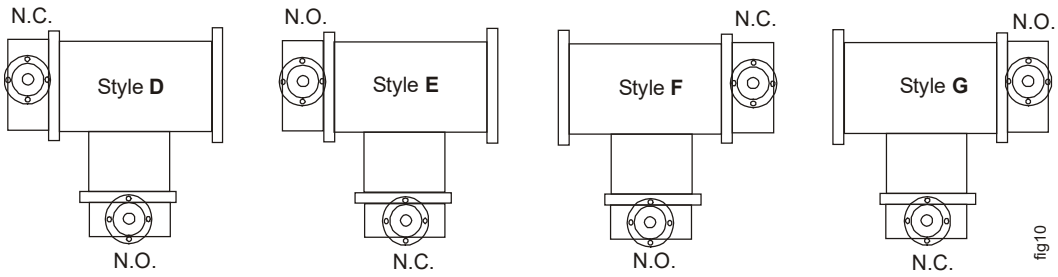


Figure 10: Three-way valve body styles



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 VDC to 10 VDC proportional**	**On / off**	**0 VDC to 10 VDC proportional**
Two-way, non-spring return – 150 psig or 175 psig closeoff pressure; rated for dead-end service up to full closeoff pressure							
2	87	66	175	VFC-020JB-721D	VFC-020JB-701N	VFC-020JB-721D4	VFC-020JB-701N4
2 1/2	185	98	175	VFC-025JB-721D	VFC-025JB-701N	VFC-025JB-721D4	VFC-025JB-701N4
3	360	171	175	VFC-030JB-721D	VFC-030JB-701N	VFC-030JB-721D4	VFC-030JB-701N4
4	740	310	175	VFC-040JB-721D	VFC-040JB-701N	VFC-040JB-721D4	VFC-040JB-701N4
5	1,218	470	175	VFC-050JB-721D	VFC-050JB-701N	VFC-050JB-721D4	VFC-050JB-701N4
6	1,900	757	175	VFC-060JB-723D	VFC-060JB-703N	VFC-060JB-723D4	VFC-060JB-703N4
8	3,765	1,247	175	VFC-080JB-724D	VFC-080JB-704N	VFC-080JB-725D4	VFC-080JB-705N4
10	6,661	2,005	175	VFC-100JB-725D	VFC-100JB-705N	VFC-100JB-725D4	VFC-100JB-705N4
12	10,066	2,868	175	VFC-120JB-726D	VFC-120JB-706N	VFC-120JB-727D4	VFC-120JB-707N4
14	11,598	3,328	150	VFC-140JB-727D	VFC-140JB-707N	VFC-140JB-727D4	VFC-140JB-707N4
16	15,395	4,440	150	VFC-160JB-728D	VFC-160JB-708N	—	—
18	20,120	5,509	150	VFC-180JB-927D	VFC-180JB-907N	—	—
20	25,329	7,056	150	VFC-200JB-928D	VFC-200JB-908N	—	—
Two-way, non-spring return – 50 psig closeoff pressure; not rated for dead-end service							
4	740	310	50	VFC-040MB-721D	VFC-040MB-701N	VFC-040MB-721D4	VFC-040MB-701N4
5	1,218	470	50	VFC-050MB-721D	VFC-050MB-701N	VFC-050MB-721D4	VFC-050MB-701N4
6	1,900	757	50	VFC-060MB-721D	VFC-060MB-701N	VFC-060MB-721D4	VFC-060MB-701N4
8	3,765	1,247	50	VFC-080MB-724D	VFC-080MB-704N	VFC-080MB-725D4	VFC-080MB-705N4
10	6,661	2,005	50	VFC-100MB-724D	VFC-100MB-704N	VFC-100MB-725D4	VFC-100MB-705N4
12	10,066	2,868	50	VFC-120MB-725D	VFC-120MB-705N	VFC-120MB-725D4	VFC-120MB-705N4
14	12,989	3,269	50	VFC-140MB-727D	VFC-140MB-707N	VFC-140MB-727D4	VFC-140MB-707N4
16	17,558	4,292	50	VFC-160MB-727D	VFC-160MB-707N	VFC-160MB-727D4	VFC-160MB-707N4
18	22,487	5,370	50	VFC-180MB-727D	VFC-180MB-707N	—	—
20	27,120	6,798	50	VFC-200MB-728D	VFC-200MB-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 Actuators[1]

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 VDC to 10 VDC proportional**	**On / off**	**0 VDC to 10 VDC proportional**
Three-way, non-spring return – 150 psig or 175 psig closeoff pressure; rated for dead-end service up to full closeoff pressure							
2	87	66	175	VFD-020JB-721D	VFD-020JB-701N	VFD-020JB-721D4	VFD-020JB-701N4
2 1/2	185	98	175	VFD-025JB-721D	VFD-025JB-701N	VFD-025JB-721D4	VFD-025JB-701N4
3	360	171	175	VFD-030JB-721D	VFD-030JB-701N	VFD-030JB-721D4	VFD-030JB-701N4
4	740	310	175	VFD-040JB-721D	VFD-040JB-701N	VFD-040JB-721D4	VFD-040JB-701N4
5	1,218	470	175	VFD-050JB-721D	VFD-050JB-701N	VFD-050JB-721D4	VFD-050JB-701N4
6	1,900	757	175	VFD-060JB-723D	VFD-060JB-703N	VFD-060JB-723D4	VFD-060JB-703N4
8	3,765	1,247	175	VFD-080JB-725D	VFD-080JB-705N	VFD-080JB-725D4	VFD-080JB-705N4
10	6,661	2,005	175	VFD-100JB-726D	VFD-100JB-706N	VFD-100JB-727D4	VFD-100JB-707N4
12	10,066	2,868	175	VFD-120JB-727D	VFD-120JB-707N	—	—
Three-way, non-spring return – 50 psig closeoff pressure; not rated for dead-end service							
4	740	310	50	VFD-040MB-721D	VFD-040MB-701N	VFD-040MB-721D4	VFD-040MB-701N4
5	1,218	470	50	VFD-050MB-721D	VFD-050MB-701N	VFD-050MB-721D4	VFD-050MB-701N4
6	1,900	757	50	VFD-060MB-721D	VFD-060MB-701N	VFD-060MB-721D4	VFD-060MB-701N4
8	3,765	1,247	50	VFD-080MB-724D	VFD-080MB-704N	VFD-080MB-725D4	VFD-080MB-705N4
10	6,661	2,005	50	VFD-100MB-725D	VFD-100MB-705N	VFD-100MB-725D4	VFD-100MB-705N4
12	10,066	2,868	50	VFD-120MB-725D	VFD-120MB-705N	VFD-120MB-725D4	VFD-120MB-705N4

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 required style. Example: VF**E**-xxxxx-xxxx, VF**F**-xxxxx-xxxx, or VF**G**-xxxxx-xxxx (see Figure 10).

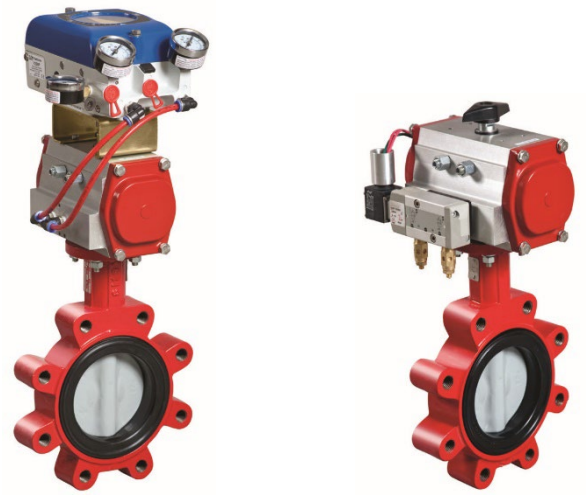


Figure 13: Two-way valve with industrial-grade, spring return, V-919x Series High Pressure Pneumatic Actuator assemblies

Table 12: Two-way valve with industrial-grade, spring return, V-919x Series High Pressure Pneumatic Actuator assemblies

Actuator				On / off[1]		Proportional (with positioner)	
Size, in.	**Cv at 90°**	**Cv at 60°**	**Closeoff pressure, psig**	**Spring closed**	**Spring open**	**Spring closed**	**Spring open**
Two-way, spring return[1] – 150 psig or 175 psig closeoff pressure; 75 psig dead-end service							
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 return[1] – 50 psig closeoff pressure; not rated for dead-end service							
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 required, 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 return[2] – 175 psig closeoff pressure; 75 psig dead-end service					
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 return[2] – 50 psig closeoff pressure; not rated for dead-end service					
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 required, 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 required style. Example: VF**E**-xxxxx-xxxx, VF**F**-xxxxx-xxxx, or VF**G**-xxxxx-xxxx (see Figure 10).

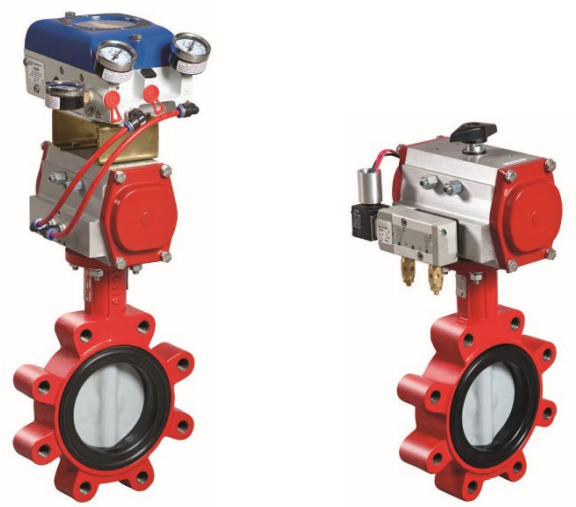


Figure 15: Two-way valve with industrial-grade, non-spring return, V-909x Series High Pressure Pneumatic Actuator

Table 14: Non-spring return, V-909x Series High Pressure Pneumatic Actuators

Actuator				On / off[1]	Proportional (with positioner)
Size, in.	Cv at 90°	Cv at 60°	Closeoff pressure, psig		
Two-way, non-spring return – 150 psig 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 required, 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 return[2] – 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 return[2] – 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 required, 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 required style. Example: VF**E**-xxxxx-xxxx, VF**F**-xxxxx-xxxx, or VF**G**-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 psig 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 in. through 8 in. valves) and a 10% safety factor (10 in. 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). The seats are molded into the valve body (VA-907x Series only), or secured to the valve body by means of a tongue and groove design.

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 in. through 12 in.) and 304 stainless steel (14 in. 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.

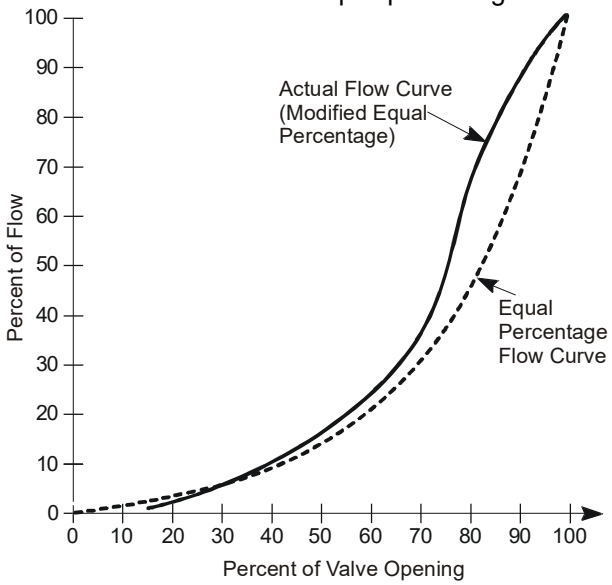


Figure 19: Modified equal percentage valve flow characteristics

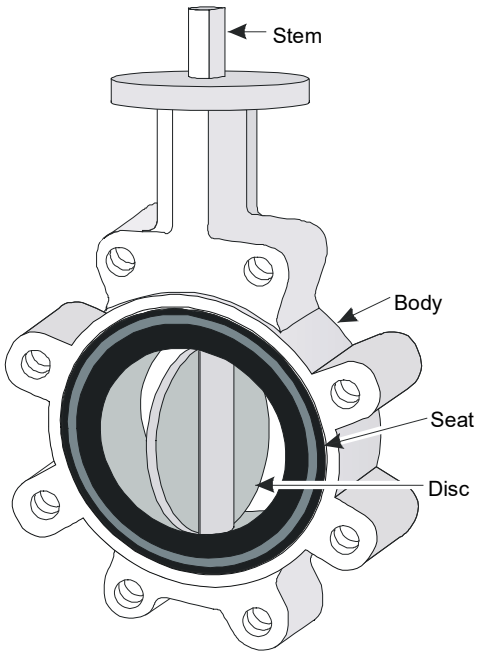


Figure 20: VF Series Standard-Pressure, Standard-Temperature Butterfly Valve

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

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 in. 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 in. 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 in. through 6 in. All models require AC 24 V power.

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 psig to 120 psig (276 kPa to 827 kPa). These actuators are sized and assembled for 90° disc rotation and are furnished with factory-installed 24 VAC 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.

Table 18: Representative maximum shipping weights for VF Series Standard-Pressure, Standard-Temperature Butterfly Valve and actuator assemblies[1]

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.

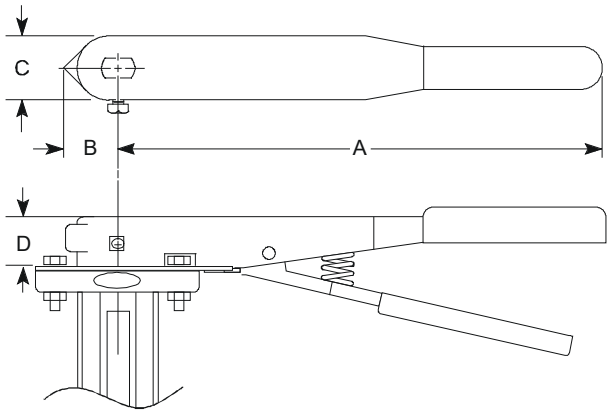


Figure 21: Dimensions for ten-position manual handle

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.

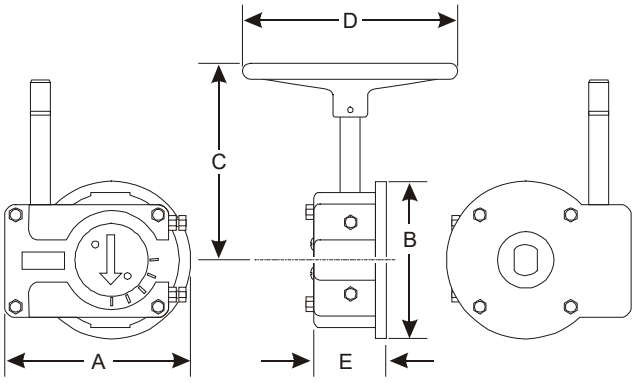


Figure 22: Dimensions for gear-operated manual hand wheel

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).*

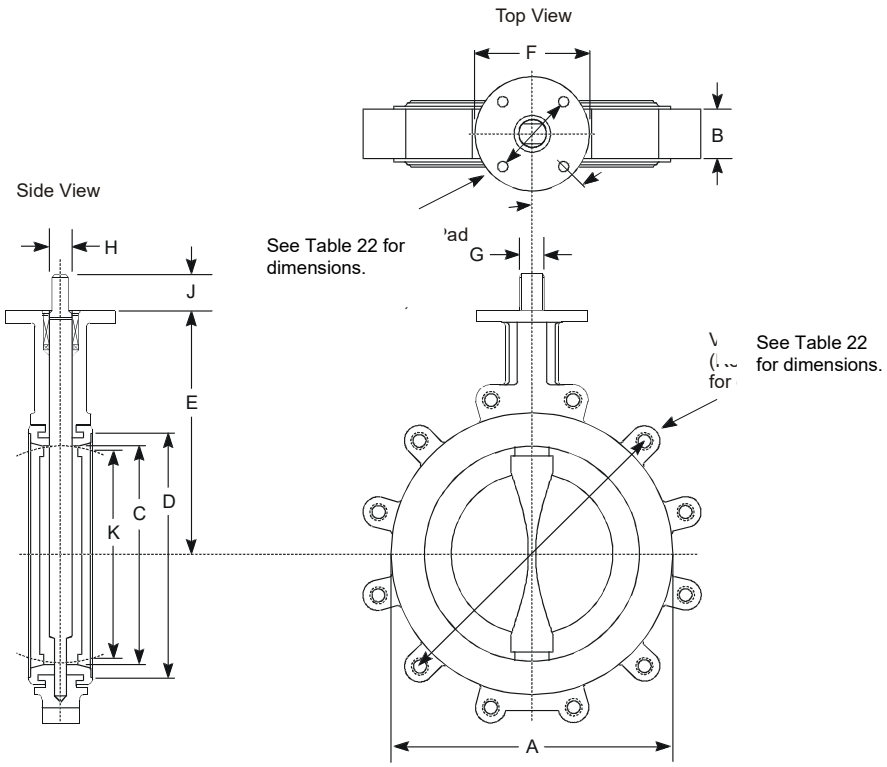


Figure 23: Two-way VF Series Standard-Pressure, Standard-Temperature Butterfly Valve dimensions

Table 21: Two-way valve dimensions, in.[1] (H, L and N closeoff only)

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. 1 in. x 25.4 = 1 mm.
2. 2 in. through 12 in. valves have a Double D stem (round shaft with two machined flats), and 14 in. through 20 in. valves have a round shaft with a keyway and key.
3. Disc chordal dimension at valve face.
4. 1 lb x 0.454 = 1 kg; net weight is for valve only (no actuator).

Table 21b: Two-way valve dimensions for the VA-907x series, 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 11/16	2	2 13/16	5 1/2	3 17/32	9/16	13/32	1 1/4	1 11/32	7
2 1/2	4 3/16	1 13/16	2 1/2	3 5/16	6	3 17/32	9/16	13/32	1 1/4	1 15/16	8
3	4 7/8	1 13/16	3	3 15/16	6 1/4	3 17/32	9/16	13/32	1 1/4	2 9/16	9
4	6 1/16	2 1/16	4 1/16	5 3/32	7	3 17/32	5/8	7/16	1 1/4	3 19/32	16
5	7 1/8	2 3/16	5 1/16	6 5/32	7 1/2	3 17/32	3/4	17/32	1 1/4	4 21/32	21
6	8 1/8	2 3/16	5 3/4	7 3/32	8	3 17/32	3/4	17/32	1 1/4	5 15/32	25
8	10 1/2	2 3/8	7 3/4	9 11/32	9 1/2	5 29/32	7/8	5/8	1 1/4	7 15/32	40
10	12 3/4	2 11/16	9 13/16	11 7/16	10 3/4	5 29/32	1 3/16	7/8	2	9 17/32	62
12	14 7/8	3 1/16	11 3/4	13 7/16	12 1/4	5 29/32	1 3/16	7/8	2	11 15/32	91
14	16 15/16	3 1/16	13 1/4	15 9/32	13 5/8	5 29/32	1 3/8	—	2	13 1/16	122
16	19 1/16	4	15 1/4	17 13/32	14 3/4	5 29/32	1 3/8	—	2	14 27/32	166
18	21 1/8	4 1/2	17 1/4	19 5/32	16	8 9/32	1 31/32	—	2 1/2	16 27/32	233
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	340

1. 1 in. x 25.4 = 1 mm.
2. 2 in. through 12 in. valves have a Double D stem (round shaft with two machined flats), and 14 in. through 20 in. valves have a round shaft with a keyway and key.
3. Disc chordal dimension at valve face.
4. 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 (applies to all standard pressure, standard temperature valves.)

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.

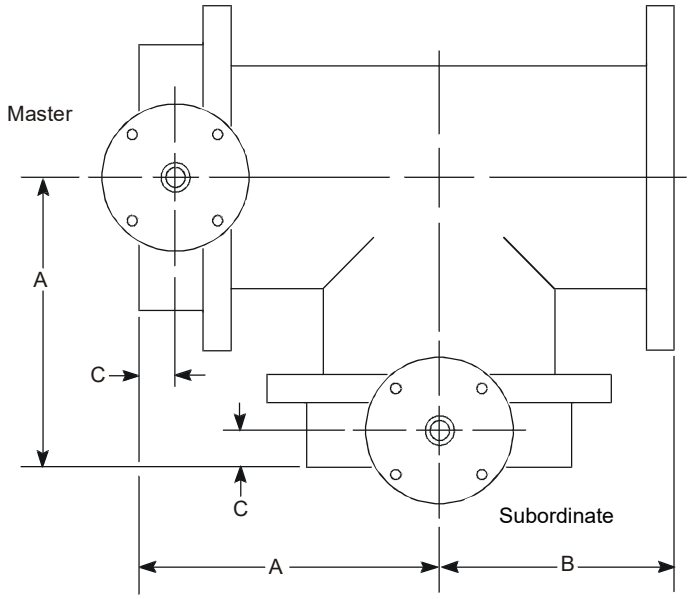


Figure 24: Three-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valve dimensions

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

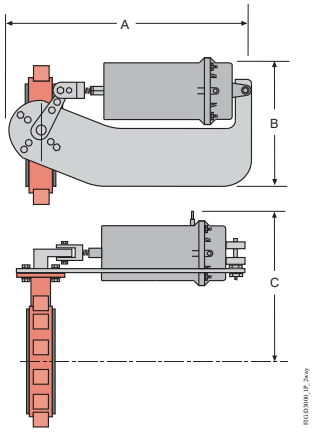


Figure 25: Single pneumatic piston actuator assembled on a two-way butterfly valve

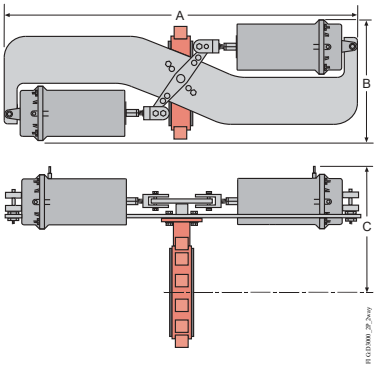


Figure 26: Dual tandem pneumatic piston actuators assembled on a two-way butterfly valve

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.

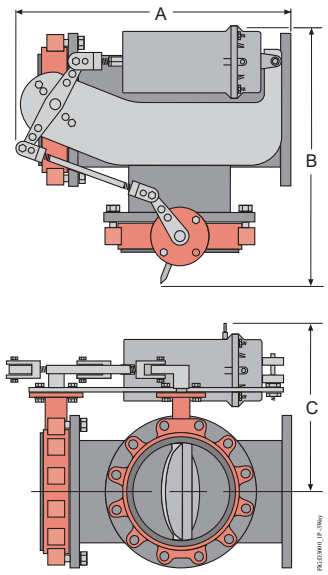


Figure 27: Single pneumatic piston actuator assembled on a three-way butterfly valve

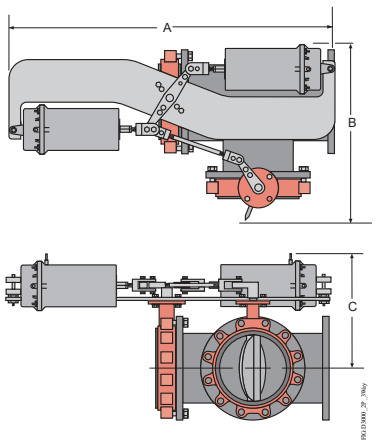


Figure 28: Dual tandem pneumatic piston actuators assembled on a three-way butterfly valve

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.

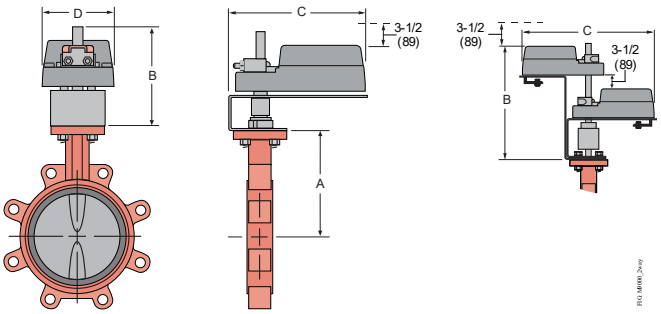


Figure 29: Two-way VF Series M9000 Electrically Actuated Standard-Pressure, Standard-Temperature Butterfly Valve dimensions, in. (mm)

Table 27: 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)	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)
2 1/2	6.00 (152)										
3	6.25 (159)										
4	7.00 (178)										
5	7.50 (191)										
6	8.00 (203)										

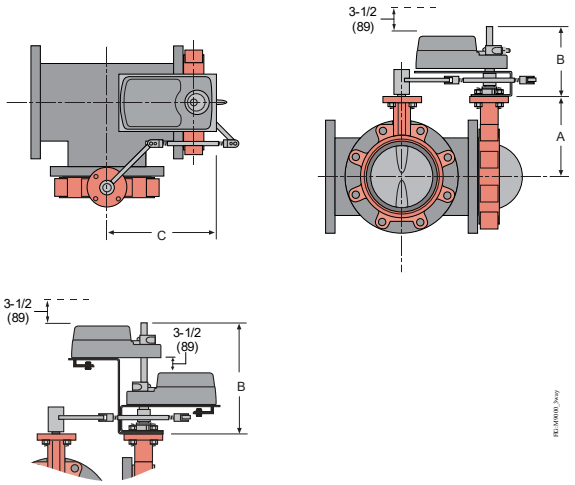


Figure 30: Three-way VF Series M9000 Electrically Actuated Standard-Pressure, Standard-Temperature Butterfly Valve dimensions, in. (mm)

Table 28: 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 (seeTable 32).

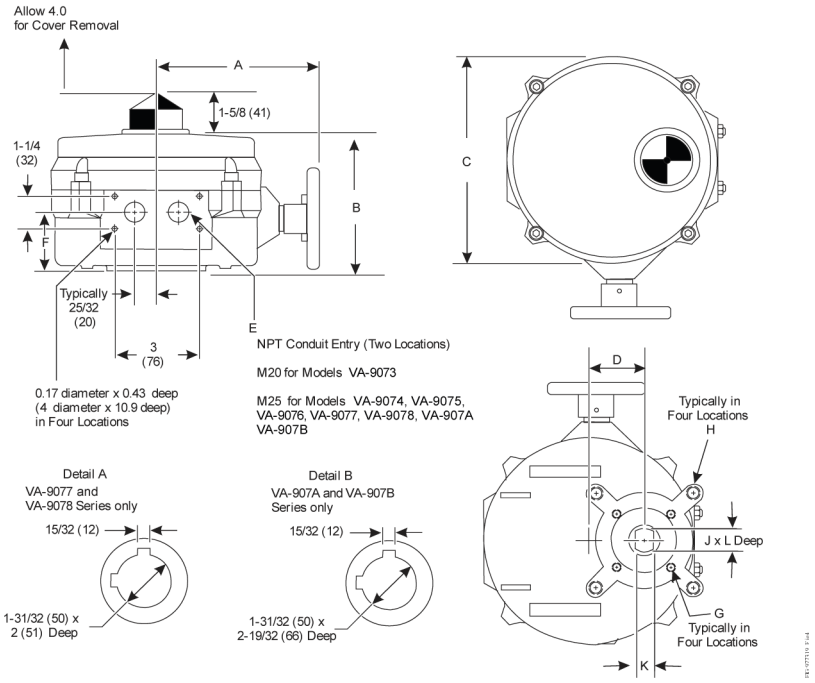


Figure 31: Two-Way VF Series VA-9070 Electrically Actuated Standard-Pressure, Standard-Temperature Butterfly Valve dimensions, in. (mm)

Table 29: VA-9070 Series Electric Rotary Actuator Dimensions, in. (mm)

Dimensions				
	VA-9073	VA-9074 VA-9075 VA-9076	VA-9077 VA-9078	VA-907A VA-907B
A	5 25/32 (147)	7 25/32 (198)	9 1/2 (241)	9 16/32 (241)
B	5 9/16(141)	6 5/8(168)	7 7/32(183)	12 14/32 (316)
C	7 17/32 (191)	10 3/32 (256)	12 1/8 (308)	12 4/32 (308)
D	1 15/16 (49.2)	2 11/16 (68.3)	3 3/16 (80.9)	3 16/32 (89)
E	1/2 (M20 x 1.5)	3/4 (M25 x 1.5)	3/4 (M25 x 1.5)	3/4 (M25 x 1.5)
F	2 5/32 (55)	2 19/32 (66)	3 1/16 (78)	8 10/32 (211)
G (UNC)	5/16 - 18 x 2 3/4, F07	5/16 - 18 x 2 3/4, F07	1/2 - 13 x 4 59/64, F12	1/2 - 13 x 4 59/64, F12
H (UNC)	—	1/2 - 13 x 4 59/64, F12	3/4 - 10 x 6 1/2, F16	3/4 - 10 x 6 1/2, F16
J	3/4 (19)	1 3/16 (30)	See Detail A.	See Detail B.
K	1/2 (13)	7/8 (22)		
L	1 3/4 (44.5)	2 7/32 (56.3)		

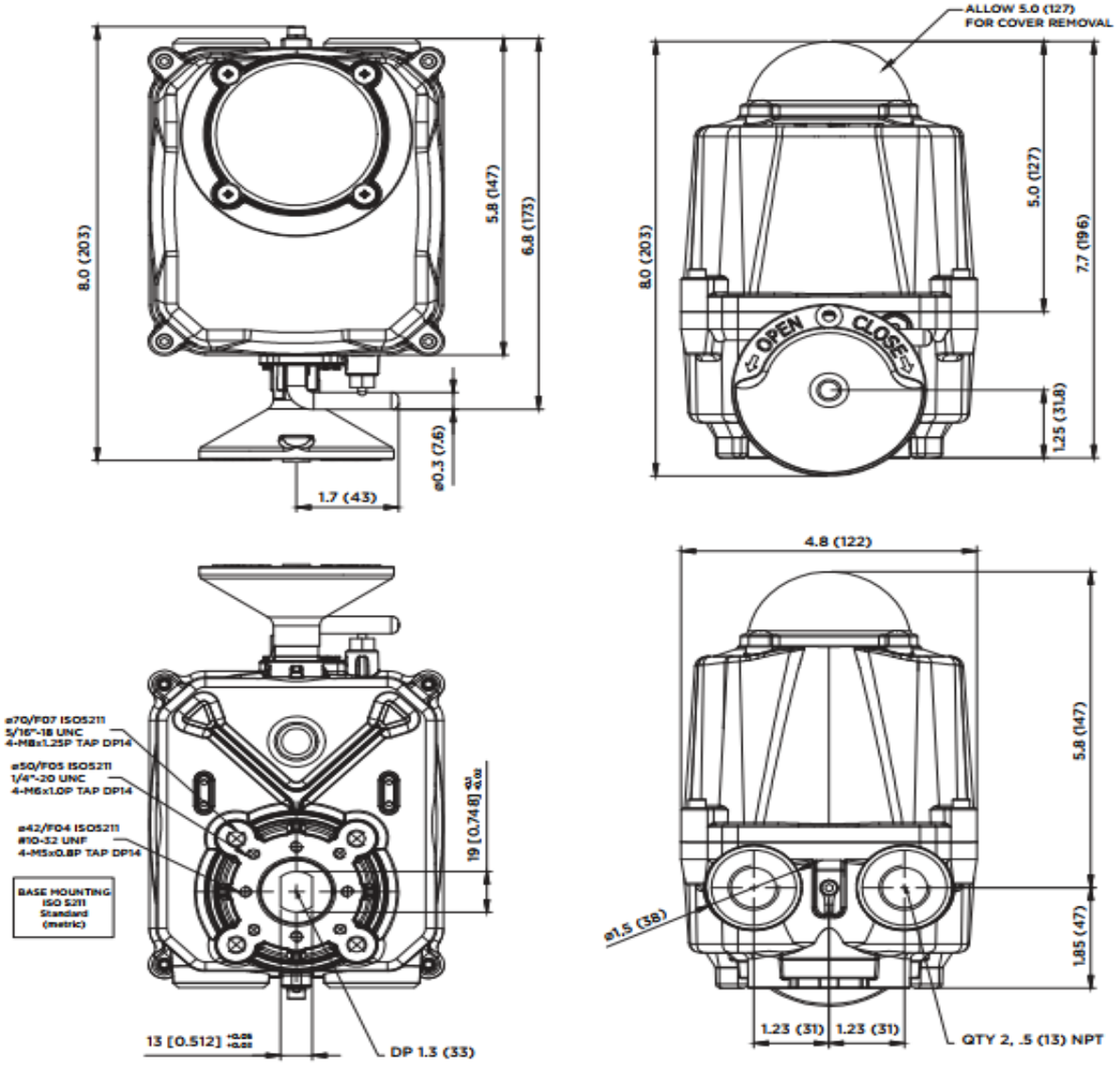


Figure 32 (b): Two-Way VF Series VA-9071 Electrically Actuated Standard-Pressure, Standard-Temperature Butterfly Valve dimensions, in. (mm)

Table 30: 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)	2331/32 (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)	271/4 (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 31: 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	2 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.

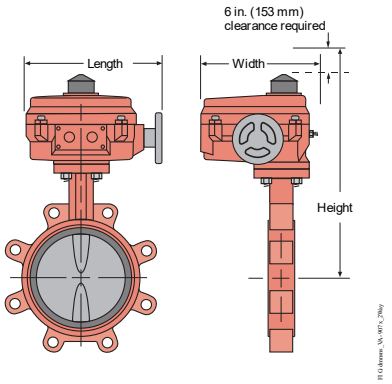


Figure 33: Length, width and height requirements for VA-9070 Series Electric Actuated Two-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valves (See Table 32 and Table 33.)

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-9071	VA-9073	VA-9074	VA-9075	VA-9076	VA-9077	VA-9078	VA-907A	VA907B
2	19 7/32 (488)	—	—	—	—	—	—	—	—
2 1/2	19 11/16 (500)	—	—	—	—	—	—	—	—
3	20 (508)	—	—	—	—	—	—	—	—
4	20 23/32 (526)	—	—	—	—	—	—	—	—
5	21 3/16 (538)	—	—	—	—	—	—	—	—
6	21 11/16 (551)	21 (533)	—	—	—	—	—	—	—
8	—	—	23 1/2 (597)	23 1/2 (597)	—	—	—	—	—
10	—	—	24 11/16 (627)	24 11/16 (627)	—	—	—	—	—
12	—	—	—	26 3/16 (665)	26 3/16 (665)	26 13/16 (681)	—	—	—
14	—	—	—	—	27 19/32 (701)	28 3/16 (716)	—	—	—
16	—	—	—	—	—	29 9/32 (744)	29 9/32 (744)	—	—
18	—	—	—	—	—	30 19/32 (777)	29 9/32 (744)	35 29/32 (912)	—
20	—	—	—	—	—	31 13/16 (808)	29 9/32 (744)	29 9/32 (744)	37 3/32 (942)

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 Valves[1]

Dimension	VA-9070 Series Electric Actuator								
	VA-9071	VA-9073	VA-9074	VA-9075	VA-9076	VA-9077	VA-9078	VA-907A	VA-907B
Width	8 (203)	9 9/16 (243)	12 27/32 (326)	12 27/32 (326)	12 27/32 (326)	15 9/16 (395)	15 9/16 (395)	16 3/32 (411)	16 3/32 (411)
Length	4 13/16 (122)	7 17/32 (191)	10 1/8 (257)	10 1/8 (257)	10 1/8 (257)	12 3/32 (307)	12 3/32 (307)	18 13/16 (478)	18 13/16 (478)

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

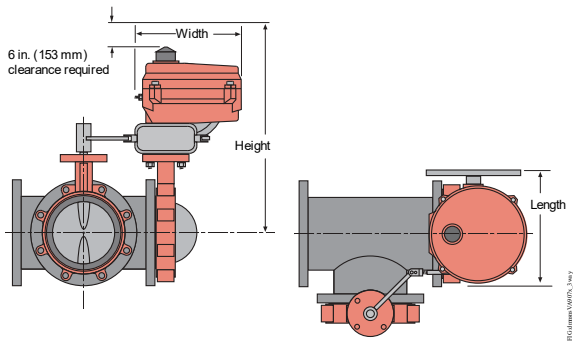


Figure 34: Length, width, and height requirements for VA-9070 Series Electric Actuated Three-Way VF Series Standard-Pressure, Standard-Temperature Butterfly Valves (see Table 34 and Table 35)

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]

Valve size, in.	VA-9070 Series Electric Actuator								
	VA-9071	VA-9073	VA-9074	VA-9075	VA-9076	VA-9077	VA-9078	VA-907A	VA-907B
2	24 3/4 (629)	—	—	—	—	—	—	—	—
2 1/2	25 9/32 (642)	—	—	—	—	—	—	—	—
3	25 1/2 (648)	—	—	—	—	—	—	—	—
4	26 1/4 (667)	—	—	—	—	—	—	—	—
5	26 1/4 (667)	—	—	—	—	—	—	—	—
6	26 1/4 (667)	25 3/16 (640)	—	—	—	—	—	—	—
8	—	—	27 3/4 (705)	27 3/4 (705)	—	—	—	—	—
10	—	—	—	28 31/32 (736)	28 31/32 (736)	29 9/16 (751)	—	—	—
12	—	—	—	30 15/32 (774)	—	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 Valves[1]

Valve Size, in.	VA-9070 Series Electric Actuator								
	VA-9071	VA-9073	VA-9074	VA-9075	VA-9076	VA-9077	VA-9078	VA-907A	VA-907B
Length	8 (203)	9 9/16 (243)	12 27/32 (326)	12 27/32 (326)	12 27/32 (326)	15 9/16 (395)	15 9/16 (395)	16 3/32 (411)	16 3/32 (411)
Width	4 13/16 (122)	7 17/32 (191)	10 1/8 (257)	10 1/8 (257)	10 1/8 (257)	12 3/32 (307)	12 3/32 (307)	18 13/16 (478)	18 13/16 (478)

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	87 (75)	86 (74)	73 (63)	66 (57)	46 (40)	29 (25)	15 (13)	4 (3)	1 (1)
2 1/2	185 (160)	177 (153)	141 (122)	98 (85)	66 (57)	44 (38)	26 (22)	8 (7)	1 (1)
3	360 (311)	338 (292)	256 (221)	171 (148)	112 (97)	71 (61)	43 (37)	22 (19)	2 (2)
4	740 (640)	689 (596)	505 (437)	310 (268)	192 (166)	118 (102)	78 (67)	37 (32)	8 (7)
5	1,218 (1,054)	131 (978)	759 (657)	470 (407)	288 (249)	170 (147)	98 (85)	53 (46)	9 (8)
6	1,900 (1,644)	1,715 (1,483)	1,190 (1,029)	757 (655)	479 (414)	297 (257)	175 (151)	86 (74)	13 (11)
8	3,765 (3,257)	3,376 (2,920)	2,096 (1,813)	1,247 (1,079)	754 (652)	429 (371)	254 (220)	121 (105)	19 (16)
10	6,661 (5,762)	5,814 (5,029)	3,342 (2,891)	2,005 (1,734)	1,215 (1,051)	728 (630)	365 (316)	178 (154)	37 (32)
12	10,066 (8707)	8,455 (7,314)	4,961 (4,291)	2,868 (2,481)	1,696 (1,467)	1,008 (872)	492 (426)	240 (208)	69 (60)
14	11,598 (10032)	9,269 (8,018)	5,571 (4,819)	3,328 (2,879)	1,975 (1,708)	1,141 (987)	609 (527)	287 (248)	110 (95)
16	15,395 (13317)	12,214 (10,565)	7,412 (6,411)	4,440 (3,841)	2,651 (2,293)	1,547 (1,338)	844 (730)	421 (364)	147 (127)
18	20,120 (17404)	18,231 (15,770)	9,382 (8,115)	5,509 (4,766)	3,238 (2,800)	1,807 (1,563)	968 (837)	470 (407)	190 (164)
20	25,329 (21910)	19,637 (16,986)	11803 (10,210)	7,056 (6,103)	4,210 (3,642)	2,455 (2,124)	1,341 (1,160)	675 (584)	230 (199)

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 stroke for electric or pneumatic rack and pinion manual valves.
3. This is the 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 in. 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	26
2	66	64	62	—	—	—	—	—	—	—	—	—	—	—	—	—
2 1/2	—	98	96	91	—	—	—	—	—	—	—	—	—	—	—	—
3	—	—	171	162	153	—	—	—	—	—	—	—	—	—	—	—
4	—	—	—	310	298	284	—	—	—	—	—	—	—	—	—	—
5	—	—	—	—	470	470	457	425	—	—	—	—	—	—	—	—
6	—	—	—	—	—	757	708	663	—	—	—	—	—	—	—	—
8	—	—	—	—	—	—	1,247	1,198	1,140	—	—	—	—	—	—	—
10	—	—	—	—	—	—	—	2,005	1,944	1,860	—	—	—	—	—	—
12	—	—	—	—	—	—	—	—	2,868	2,803	2,700	—	—	—	—	—
14	—	—	—	—	—	—	—	—	—	3,328	3,285	3,209	—	—	—	—
16	—	—	—	—	—	—	—	—	—	—	4,440	4,391	4,301	—	—	—
18	—	—	—	—	—	—	—	—	—	—	—	5,509	5,461	5,368	—	—
20	—	—	—	—	—	—	—	—	—	—	—	—	7,056	7,001	6,889	6,766

Table 38: Effective flow coefficients for 90° opening, Cv for valve sizing (2 in. 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	26
2	87	83	78	—	—	—	—	—	—	—	—	—	—	—	—	—
2 1/2	—	185	173	149	—	—	—	—	—	—	—	—	—	—	—	—
3	—	—	360	292	248	—	—	—	—	—	—	—	—	—	—	—
4	—	—	—	740	611	509	—	—	—	—	—	—	—	—	—	—
5	—	—	—	—	1,218	1,039	773	—	—	—	—	—	—	—	—	—
6	—	—	—	—	—	1,900	1,379	1,111	—	—	—	—	—	—	—	—
8	—	—	—	—	—	—	3,765	2,841	2,250	—	—	—	—	—	—	—
10	—	—	—	—	—	—	—	6,661	5,112	3,985	—	—	—	—	—	—
12	—	—	—	—	—	—	—	—	10,066	8,009	6271	—	—	—	—	—
14	—	—	—	—	—	—	—	—	—	11,598	10,079	8,368	—	—	—	—
16	—	—	—	—	—	—	—	—	—	—	15,395	13,669	11,507	—	—	—
18	—	—	—	—	—	—	—	—	—	—	—	20,120	18,108	15,385	13,431	—
20	—	—	—	—	—	—	—	—	—	—	—	—	25,329	23,088	19,833	17,369

Table 39: Expected seating / unseating torque values[1], lb·in (N·m)

2-Way valves							3-Way valves				
NPS	**Low pressure disc**	**Standard disc**					**Low pressure disc**	**Standard disc**			
	50	**50**	**100**	**150**	**175**		**50**	**50**	**100**	**150**	**175**
2	85	97	105	113	121		111	126	137	147	157
2.5	113	113	121	137	145		147	147	157	178	189
3	145	153	169	185	193		189	199	220	241	251
4	161	185	217	250	282		209	241	282	325	367
5	232	258	290	330	370		302	335	377	429	481
6	346	395	443	487	522		450	514	576	633	679
8	564	644	789	934	1,031		705	805	986	1,168	1,289
10	926	1,168	1,369	1,570	1,691		1,158	1,460	1,711	1,963	2,114
12	1,409	1,546	1,868	2,191	2,376		1,761	1,933	2,335	2,739	2,970
14	2,174	2,859	3,479	4,107	—		2,718	3,574	4,349	5,134	—
16	2,899	3,946	4,897	5,919			3,624	4,933	6,121	7,399	
18	3,624	5,211	6,628	7,913			4,530	6,514	8,285	9,891	
20	4,550	6,531	8,255	9,906			5,688	8,164	10,319	12,383	
24	6,862	10,381	13,723	16,977			8,578	12,976	17,154	21,221	

Table 40: Replacement actuators

Code number	Description
Electric spring and Nnon-spring return actuators	
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 in., 2 1/2 in., or 3 in. 175 psig valves or 4 in. 50 psig valves
D-3153-5130	Pneumatic piston actuator without positioner, for use with 2 in., 2 1/2 in., 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 in. or 6 in. 175 psig valves or 6 in., 8 in., or 10 in. 50 psig valves
D-3246-5110	Pneumatic piston actuator without positioner, for use with 5 in. or 6 in. 175 psig valves or 6 in., 8 in., or 10 in. (requires two actuators) 50 psig valves

Table 41: 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	Manual VF assembly	Actuator code number	Mounting kit[1] code number
2, 2 1/2, 3	N.C.	High	Without positioner	VFM-020HB-000N	D-3153-5130	VF-001-602
				VFM-025HB-000N		
				VFM-030HB-000N		
			With positioner	VFM-020HB-000N	D-3153-5120	
				VFM-025HB-000N		
				VFM-030HB-000N		
	N.O.		Without positioner	VFM-030HB-000N	D-3153-5130	VF-001-603
				VFM-025HB-000N		
				VFM-030HB-000N		
			With positioner	VFM-020HB-000N	D-3153-5120	
				VFM-025HB-000N		
				VFM-030HB-000N		
4	N.C.	Low	Without positioner	VFM-040LB-000N	D-3153-5130	VF-001-604
			With positioner		D-3153-5120	
	N.O.		Without positioner		D-3153-5130	VF-001-605
			With positioner		D-3153-5120	
	N.C.	High	Without positioner	VFM-040HB-000N	D-3244-5110	
			With positioner		D-3244-5100	
	N.O.		Without positioner		D-3244-5110	
			With positioner		D-3244-5100	
5	N.C.	Low	Without positioner	VFM-050LB-000N	D-3244-5110	
			With positioner		D-3244-5100	
	N.O.		Without positioner		D-3244-5110	
			With positioner		D-3244-5100	

Valve Size, in. (Cont.)	Action	Pressure	Type	Required 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	
			With positioner	VFC-050HB-003A		D-3246-5100	
	N.O.		Without positioner	VFC-050HB-003N		D-3246-5110	
			With positioner	VFC-050HB-003A		D-3246-5100	
6	N.C.	High	Without positioner	VFC-060HB-003N	VFM-060HB-000N	D-3246-5110	
		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	
		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	
			With positioner	VFC-080LB-003A		D-3246-5100	
	N.O.		Without positioner	VFN-080LB-003N		D-3246-5110	
			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	
			Without positioner	VFC-100LB-005N		D-3246-5110, Two Required	
	N.O.		With positioner	VFN-100LB-005A		D-3246-5110, D-3246-5100	
			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 42: 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	Master Lever Crankarm Code Number	Subordinate Lever Crankarm Code Number
VFD-020HA-001N or -001A	VF-00X-603	VF-00X-608
VFE-020HA-001N or -001A	VF-00X-604	VF-00X-607
VFF-020HA-001N or -001A	VF-00X-604	VF-00X-607
VFG-020HA-001N or -001A	VF-00X-603	VF-00X-608
VGD-025HA-002N or -002A	VF-00X-603	VF-00X-608
VFE-025HA-002N or -002A	VF-00X-604	VF-00X-607
VFF-025HA-002N or -002A	VF-00X-604	VF-00X-607
VFG-025HA-002N or -002A	VF-00X-603	VF-00X-608
VFD-030HA-002N or -002A	VF-00X-603	VF-00X-608
VFE-030HA-002N or -002A	VF-00X-604	VF-00X-607
VFF-030HA-002N or -002A	VF-00X-604	VF-00X-607
VFG-030HA-002N or -002A	VF-00X-603	VF-00X-608
VFD-040LA-002N or -002A	VF-00X-603	VF-00X-608
VFE-040LA-002N or -002A	VF-00X-604	VF-00X-607
VFF-040LA-002N or -002A	VF-00X-604	VF-00X-607
VFG-040LA-002N or -002A	VF-00X-603	VF-00X-608
VFD-040HA-003N or -003A	VF-00X-603	VF-00X-606
VFE-040HA-003N or -003A	VF-00X-604	VF-00X-605
VFF-040HA-003N or -003A	VF-00X-604	VF-00X-605
VFG-040HA-003N or -003A	VF-00X-603	VF-00X-606
VFD-050LA-003N or -003A	VF-00X-603	VF-00X-606
VFE-050LA-003N or -003A	VF-00X-604	VF-00X-605
VFF-050LA-003N or -003A	VF-00X-604	VF-00X-605
VFG-050LA-003N or -003A	VF-00X-603	VF-00X-606
VFD-050HA-003N or -003A	VF-00X-603	VF-00X-606
VFE-050HA-003N or -003A	VF-00X-604	VF-00X-605
VFF-050HA-003N or -003A	VF-00X-604	VF-00X-605
VFG-050HA-003N or -003A	VF-00X-603	VF-00X-606
VFD-060LA-003N or -003A	VF-00X-603	VF-00X-606
VFE-060LA-003N or -003A	VF-00X-604	VF-00X-605
VFF-060LA-003N or -003A	VF-00X-604	VF-00X-605
VFG-060LA-003N or -003A	VF-00X-603	VF-00X-606
VFD-060HA-005N or -005A	VF-00X-603	VF-00X-606
VFE-060HA-005N or -005A	VF-00X-604	VF-00X-605
VFF-060HA-005N or -005A	VF-00X-604	VF-00X-605
VFG-060HA-005N or -005A	VF-00X-603	VF-00X-606
VFD-080LA-005N or -005A	VF-00X-603	VF-00X-606
VFE-080LA-005N or -005A	VF-00X-604	VF-00X-605
VFF-080LA-005N or -005A	VF-00X-604	VF-00X-605
VFG-080LA-005N or -005A	VF-00X-603	VF-00X-606

Table 43: 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
OneD-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 44: 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	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	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 45: Mounting brackets for field-mounting D-3153, D-3244, and D-3246 Series Pneumatic Actuators

Pneumatic actuator	Actuator sub-code
One D-3153	-001
One D-3244	-002
One D-3246	-003
Two D-3246s	-005

Table 46: Clevis kits for field repair or field-mounting D-3153, D-3244, and D-3246 Series Pneumatic Actuators

Pneumatic actuator	Clevis kit
Three-Way Tandem Actuators	VF-3WAY-100

Table 47: Kits for field-mounting M9000 actuators

Code number	Description
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 48: 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 49: 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 specifications[1]

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 in. through 12 in.	Fully lugged, two-way and three-way
	14 in. 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 in. through 12 in. Type H	175 psig (1,206 kPa) bidirectional, 75 psig (517 kPa) dead-end service
	14 in. though 20 in. Type H	150 psig (1,034 kPa) bidirectional, 75 psig (517 kPa) dead-end service
	2 in. though 12 in. Type J	175 psig (1,206 kPa) bidirectional, 175 psig (1,206 kPa) dead-end service
	14 in. though 20 in. Type J	150 psig (1,034 kPa) bidirectional, 150 psig (1,034 kPa) dead-end service
	4 in. though 20 in. Type L and M	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 in. through 12 in.) 304 stainless steel (14 in. through 20 in.)
Ambient temperature limits	Storage	-20°F to 150°F (-29°C to 66°C), preferably 40°F to 85°F (4°C to 29°C)
	Operating	Spring return actuator: -40°F to 131°F (-40°C to 55°C) Non-spring return actuator: -4°F to 122°F (-20°C 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.

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