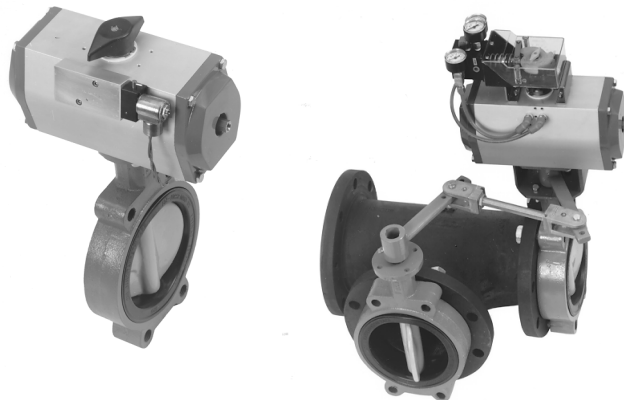


V-9000 Series Rotary Motion Rack and Pinion Pneumatic Actuators for Butterfly Valves

The V-9000 Series Pneumatic Rack and Pinion Actuators are designed for direct mounting on Johnson Controls VF Series Butterfly Valves. The actuators are available in eight sizes with torque output capacities capable of automating VF Series Butterfly Valves up to 20 inches in size.



**Figure 1: V-9000 Series Pneumatic Actuators
Installed on VF Series Butterfly Valves**

Features and Benefits	
<input type="checkbox"/> Compact Modular Design	Provides direct mounting to VF Series Butterfly Valves
<input type="checkbox"/> Low Friction Piston Guides and Rings	Provide maximum efficiency and long life
<input type="checkbox"/> Built-in Shaft Position Indicator and Travel Stops	No add-on visual indicators or travel stops required
<input type="checkbox"/> Full Range of Modular Add-on Control Accessories	Versatility in meeting system design requirements

Applications

The V-909x Series Actuators are double acting (air-to-open/air-to-close) while the V-919x Series Actuators incorporate spring return action. The unique modular design allows the same basic actuator body to be used for both spring return or double acting service requirements.

For two-position operation, either style of actuator is furnished with the appropriate factory-mounted 120 VAC solenoid air valve. For modulating control applications, the solenoid air valve is replaced with a V-9000-500 Positioner.

Clean (filtered), dry air at 40 to 120 psig (280 to 840 kPa) is recommended. Pressures well below and slightly higher than this range may be allowed under certain conditions. Consult a Johnson Controls representative for application recommendations.

The recommended operating temperature range is -13 to 200°F (-25 to 95°C). Below 32°F (0°C), care must be taken to protect the supply air lines from freezing should condensed moisture collect in them.

Features

The V-9000 Series Pneumatic Actuator is a space-saving modular product line that is completely enclosed and self-contained (refer to Figure 2).

The acetal guide ring and bearing pad have a very low coefficient of friction and absorb the side thrusts of the pistons. In addition, the piston cylinder walls in the body are honed to a very fine finish thus reducing the overall coefficient of friction.

The output shaft bearings on the top and bottom of the pinion are made of low-friction acetal. The output shaft and pinion gear are one piece, manufactured from hardened alloy steel, and zinc plated for corrosion protection.

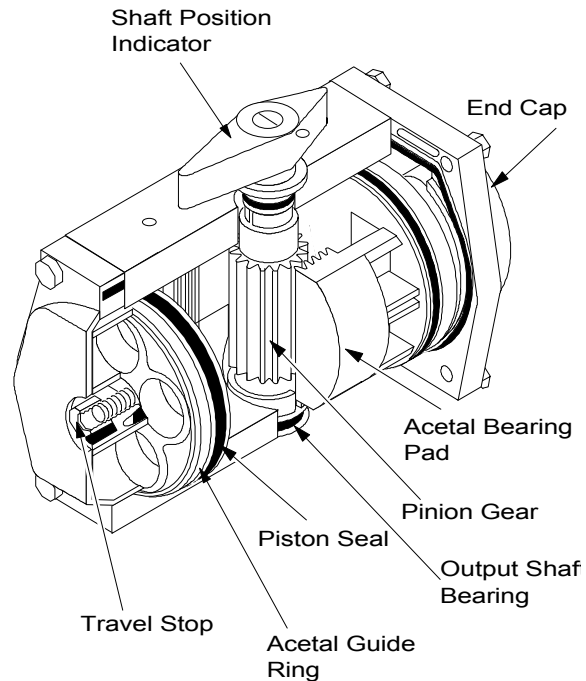


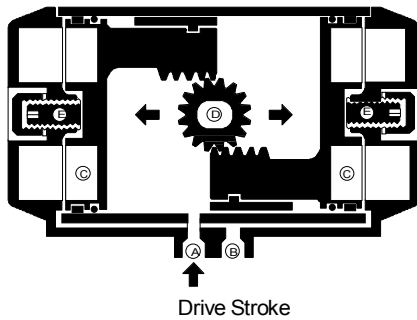
Figure 2: V-9000 Cutaway View

The shaft position indicator clearly shows the open or closed position and can easily be removed when field mounting a positioner or travel switch.

The body is extruded aluminum with an anodized corrosion protective surface. The end caps have a thermoplastic epoxy coat for chemical resistance.

The travel stop adjusting screws limit the travel of the actuator to specific degrees of rotation. The pistons are die cast aluminum.

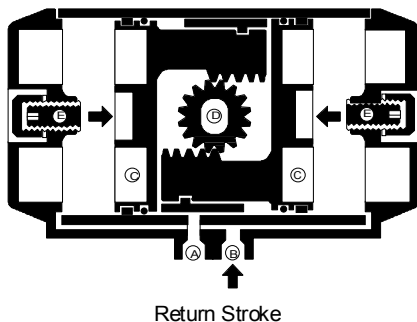
Operation



**Figure 3: Sectional View from Top
V-909x Series Double Acting Actuators**

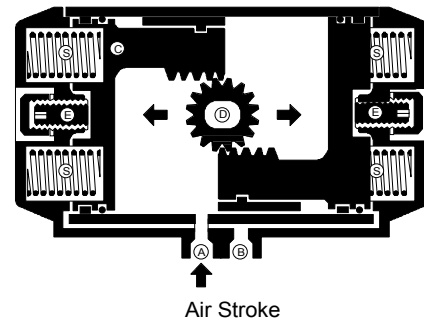
As illustrated in Figure 3, the air pressure is applied to the inner chamber through Port A and exhausted from the outer chamber through the exhaust Port B. The outward generated force cause the pistons (C) to move outward, causing the output shaft (D) to rotate counterclockwise (when viewed from the top).

This movement continues until the pistons come into contact with the mechanical end stroke adjustment screws (E), which are factory set for 90° rotation. The screws can be adjusted to precisely regulate the rotation of the pistons and output shaft to the correct amount of travel.



**Figure 4: Sectional View from Top
V-909x Series Double Acting Actuators**

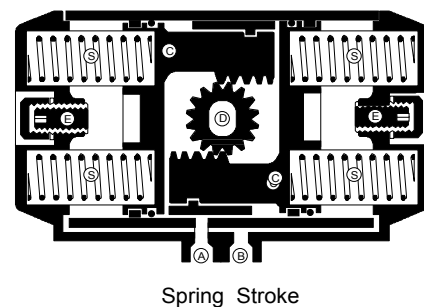
As illustrated in Figure 4, with air pressure applied to the outer chamber from the supply through Port B and exhausted from the inner chamber through Port A, the inward generated force causes the pistons (C) to move inward, causing the output shaft (D) to rotate clockwise (when viewed from the top).



**Figure 5: Sectional View from Top
V-919x Series Spring Return Actuators**

As illustrated in Figure 5, the air pressure is applied to the inner chamber through Port A and exhausted from the outer chamber through the exhaust Port B. The outward generated force causes the pistons (C) to move outward, causing the output shaft (D) to rotate counterclockwise (when viewed from the top) and the return springs (S) to compress.

This movement continues until the pistons come into contact with the mechanical end stroke adjustment screws (E), which are factory set for 90° rotation. The screws can be adjusted to precisely regulate the rotation of the pistons and output shaft to the correct amount of travel.



**Figure 6: Sectional View from Top
V-919x Series Spring Return Actuators**

As illustrated in Figure 6, with air pressure exhausted through Port A, the inward force generated by the return springs (S) causes the pistons (C) to move inward, causing the output shaft (D) to rotate clockwise (when viewed from the top).

Actuator Sizing

The V-9000 Series Rack and Pinion Actuators are sized for all styles of Johnson Controls VF Series Butterfly Valves; refer to the *VF Series Butterfly Valves 2 Through 20 in., Two-Way and Three-Way Product Data (FAN 977)* for sizing recommendations. The actuators are sized for the maximum expected seating/unseating torque requirements of the valve at the minimum available air supply pressure to the actuator. Actuator sizing recommendations on VF Series Butterfly Valves are based on a 25% safety factor on 2 through 12 in. valves and a 10% safety factor on 14 through 20 in. valves.

Refer to Table 1 for torque and ordering data for V-909x Series Actuators. Two examples, using the information in Table 1, are provided below.

Example 1: A valve with 80 psig available air pressure requires 695 lb-in of torque. Use a V-9093-1 with 721 lb-in torque available.

Example 2: A valve with 60 psig available air pressure requires 1,235 lb-in of torque. Use a V-9094-2 with 1,615 lb-in torque available.

Sizing for the V-919x Series Spring Return Actuators is dependent on the return to normal position of the valve.

For normally open, normally closed, and three-way valves refer to Table 2 for sizing information. Three examples using the information provided in Table 2 are provided below.

Example 3: A normally closed valve with 80 psig available air pressure requires 465 lb-in of torque. Use a V-9194-14 with 522 lb-in spring start and 491 lb-in air end torque.

Example 4: A normally closed valve with 60 psig available air pressure requires 705 lb-in of torque. Use a V-9194-24 with 732 lb-in spring end and 883 lb-in air start torque.

Example 5: A three-way valve with 80 psig available air pressure requires 846 lb-in of torque. Use a V-9196-12 with 1,679 lb-in spring start, 978 lb-in spring end, 4764 lb-in and air start and 4,063 lb-in air end torque.

Note: One valve in the three-way assembly is normally open and one valve is normally closed, therefore all four values must exceed the torque requirements for the valve assembly.

Table 1: V-909x Series Actuator Torque Data (lb-in)^① and Ordering Data (Double Acting)

Code Number	Supply Pressure psig (kPa)					VF Series Code Number ^②	Actuator Air Volume (ins ³)	Shipping Weight lb ^③
	40 (280)	60 (420)	80 (560)	100 (700)	120 (840)			
V-9092-1	145	221	297	373	449	-020	9.35	3.0
V-9093-1	351	536	721	906	1,091	-030	20.5	5.5
V-9094-1	493	753	1,013	1,272	1,532	-040	28.9	7.3
V-9094-2	1,058	1,615	2,171	2,728	3,285	-042	62.0	16.6
V-9096-1	2,797	4,270	5,742	7,214	8,687	-060	140.6	35.0
V-9097-1	5,783	8,826	11,870	14,914	17,957	-070	309.5	65.0
V-9098-1	14,211	21,691	29,171	36,650	44,130	-080	734.1	144.0

① lb-in x 113 = N·m

② Refer to the ordering data template in *VF Series Butterfly Valves 2 Through 20 in., Two-Way and Three-Way Product Data (FAN 977)* for full code numbers.

③ lb x 0.454 = kg

Table 2: V-919x Series Actuator Torque Data (in-lb)* and Ordering Data (Spring Return)

Code Number	Suffix	Air Stroke Supply Pressure psig (kPa)										Spring Stroke		Weight (lb)***
		40 (280)		60 (420)		80 (560)		100 (700)		120 (840)		NO Start	NC End	
		NC** Start	NO** End	NC Start	NO End	NC Start	NO End	NC Start	NO End	NC Start	NO End			
V-9193	-12	210	167	395	352	580	537	765	722	950	907	184	141	6.0
	-13	156	76	341	261	526	446	711	631	896	816	275	195	6.3
	-14	--	--	281	176	466	361	651	546	836	731	360	255	6.6
	-15	--	--	220	97	405	282	590	467	775	652	439	316	6.8
	-16	--	--	--	--	369	185	554	370	739	555	536	352	7.1
V-9194	-12	310	232	570	492	830	752	1089	1011	1349	1271	261	183	8.0
	-13	218	101	478	361	738	621	997	880	1257	1140	392	275	8.4
	-14	--	--	386	231	646	491	905	750	1165	1010	522	367	8.8
	-15	--	--	294	94	554	354	813	613	1073	873	659	459	9.1
	-16	--	--	--	--	462	229	721	488	981	748	784	551	9.5
V-9194	-22	692	469	1249	1026	1805	1582	2362	2139	2919	2696	589	366	18.1
	-23	509	174	1066	731	1622	1287	2179	1844	2736	2401	884	549	18.8
	-24	--	--	883	437	1439	993	1996	1550	2553	2107	1178	732	19.5
	-25	--	--	700	142	1256	698	1813	1255	2370	1812	1473	915	20.3
	-26	--	--	--	--	1073	404	1630	961	2187	1518	1767	1098	21.0
V-9195	-13	--	--	1357	733	2099	1475	2841	2217	3583	2959	1419	795	22.1
	-15	--	--	--	--	1568	529	2310	1271	3052	2013	2365	1326	24.2
V-9196	-12	1819	1118	3292	2591	4764	4063	6236	5535	7709	7008	1679	978	39.7
	-13	1399	349	2872	1822	4344	3294	5816	4766	7289	6239	2448	1398	42.1
	-14	--	--	2452	1123	3924	2595	5396	4067	6869	5540	3147	1818	44.5
	-15	--	--	2030	353	3502	1825	4974	3297	6447	4770	3917	2240	46.8
	-16	--	--	--	--	3154	1196	4626	2668	6099	4141	4546	2588	49.2

Continued on next page . . .

* in-lb x 113 = mN·m

** N.C. is the abbreviation for Normally Closed; N.O. is the abbreviation for Normally Open.

*** lb x 0.454 = kg

Code Number (Cont.)	Suffix	Air Stroke Supply Pressure psig (kPa)										Spring Stroke		Weight (lb)***
		40 (280)		60 (420)		80 (560)		100 (700)		120 (840)		NO Start	NC End	
		NC** Start	NO** End	NC Start	NO End	NC Start	NO End	NC Start	NO End	NC Start	NO End			
V-9197	-12	3833	2508	6876	5551	9920	8595	1296 4	11639	16007	1468 2	3275	1950	75.1
	-13	2859	868	5902	3911	8946	6955	1199 0	9999	15033	1304 2	4915	2924	80.2
	-14	--	--	4930	2275	7974	5319	1101 8	8363	14061	1140 6	6551	3896	85.2
	-15		--	3949	638	6993	3682	1003 7	6726	13080	9769	8188	4877	90.3
	-16		--	--	--	6022	2031	9066	5075	12109	8118	9839	5848	95.3
V-9198	-12	9487	6747	1696 7	1422 7	2444 7	2170 7	3192 6	29186	39406	3666 6	7464	4724	160.2
	-13	7125	3015	1460 5	1049 5	2208 5	1797 5	2956 4	25454	37044	3293 4	1119 6	7086	168.3
	-14	--	--	1224 3	6762	1972 3	1424 2	2720 2	21721	34682	2920 1	1492 9	9448	176.4
	-15	--	--	9880	3030	1736 0	1051 0	2483 9	17989	32319	2546 9	1866 1	1181 1	184.5
	-16	--	--	--	--	1499 8	6778	2247 7	14257	29957	2173 7	2239 3	1417 3	192.6

** N.C. is the abbreviation for Normally Closed; N.O. is the abbreviation for Normally Open.

*** lb x 0.454 = kg

Table 3: V-919x Series Ordering Data

Code Number	Suffix	VF Series Code Number*	Total Actuator Air Volume Required for 90° Rotation	Total Number of Springs in Actuator**
V-9193	-12	-320	20.5	4
	-13	-330		6
	-14	-340		8
	-16	-360		12
V-9194	-12	-420	28.9	4
	-13	-430		6
	-14	-440		8
	-15	-450		10
	-16***	-460		12
V-9194	-22	-422	62.0	4
	-23	-432		6
	-24	-442		8
V-9195	-13	-530	74.2	6
	-15	-550		10
V-9196	-12	-620	140.6	4
	-13	-630		6
	-14	-640		8
	-15***	-650		10
	-16	-660		12
V-9197	-12	-720	309.5	4
	-13	-730		6
	-14	-740		8
	-15	-750		10
	-16	-760		12
V-9198	-12	-820	734.1	4
	-13	-830		6
	-14	-840		8
	-15	-850		10
	-16	-860		12

* Refer to the ordering data template in *VF Series Butterfly Valves 2 Through 20 in., Two-Way and Three-Way Product Data (FAN 977)* for full actuator code numbers.

** The numbers listed are the total number of springs in the actuator, the last digit of the code number suffix indicates the number of springs per piston. There are two pistons per actuator.

*** As of April 1, 1993, the V-9194-16 and V-9196-15 Actuators were discontinued as factory-assembled models with the VF Series Butterfly Valves. These can still be ordered separately, however, for field replacement.

Dimensions

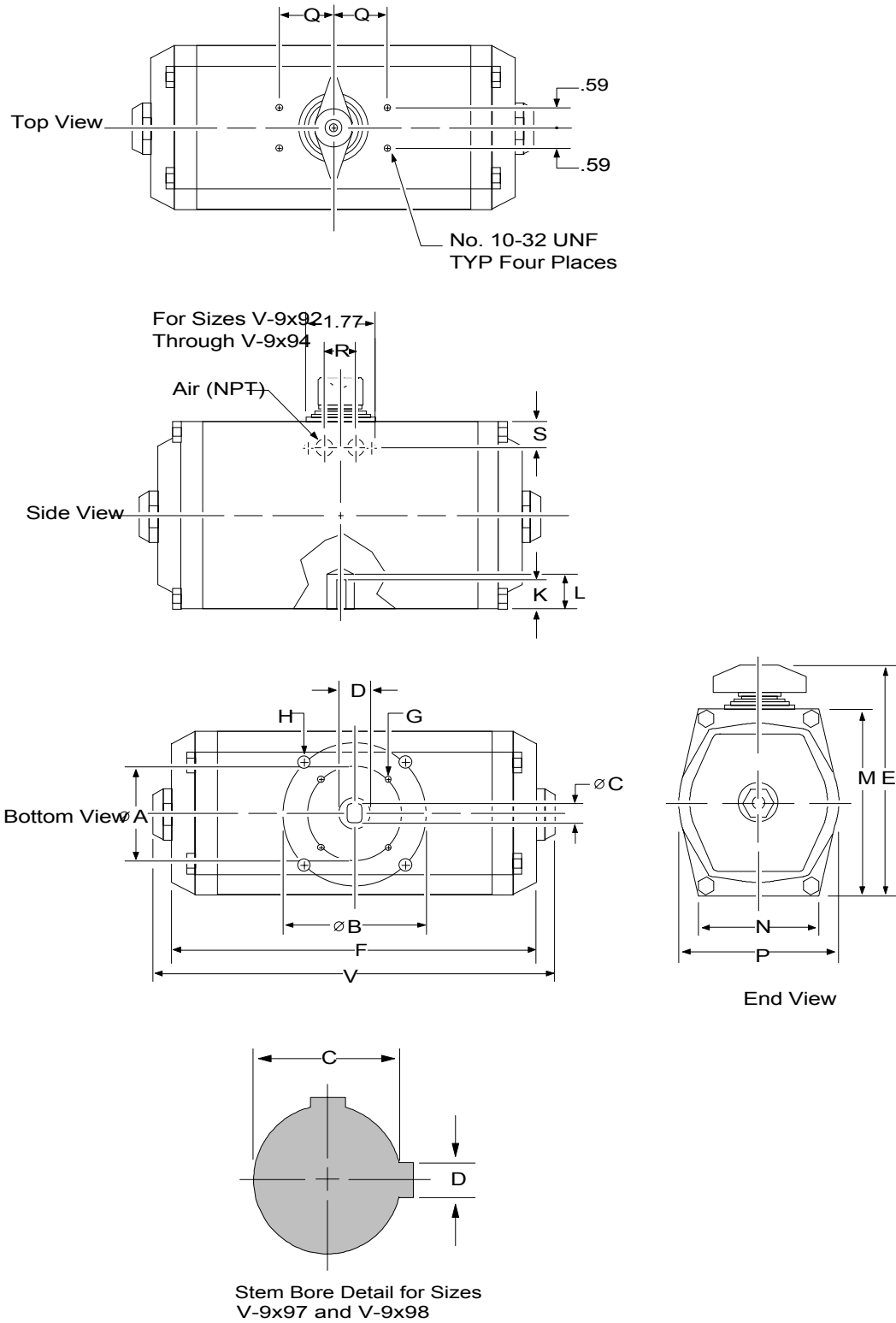


Figure 7: V-9000 Series Pneumatic Actuator Dimensions (in.)

Table 4: V-9000 Series Actuator Dimensions in. (mm)

Dimension	V-9x92	V-9x93	V-9x94-1x	V-9x94-2x	V-9x95	V-9x96	V-9x97	V-9x98
Air (NPT)	1/8	1/8	1/8	1/4	1/4	1/4	1/4	1/4
A	1-31/32 (50)	1-31/32 (50)	1-31/32 (50)	2-25/32 (70)	2-25/32 (70)	--	4-15/16 (125)	6-1/2 (165)
B	2-25/32 (70)	2-25/32 (70)	2-25/32 (70)	4-15/16 (125)	4-15/16 (125)	4-15/16 (125)	6-1/2 (165)	4-23/32 x 7-7/8 (120 x 200)
C	9/16 (14)	3/4 (19)	3/4 (19)	1-3/16 (30)	1-3/16 (30)	1-3/16 (30)	1-31/32 (50)	2-1/2 (64)
D	13/32 (10)	1/2 (13)	1/2 (13)	7/8 (22)	7/8 (22)	7/8 (22)	15/32 (12)	5/8 (16)
E	4-5/16 (109)	5-7/32 (132)	5-9/16 (141)	6-15/16 (176)	7-3/4 (196)	9-3/8 (238)	11-5/8 (295)	13-15/32 (342)
F	5-1/4 (133)	7 (178)	8 (204)	11-7/32 (285)	11-15/32 (291)	14-19/32 (370)	17-13/16 (452)	26-23/32 (678)
G	1/4-20 UNC	1/4-20 UNC	1/4-20 UNC	5/16-18 UNC	--	--	1/2-13 UNC	5/8-11 UNC
H	5/16-18 UNC	5/16-18 UNC	5/16-18 UNC	1/2-13 UNC	1/2-13 UNC	1/2-13 UNC	5/8-11 UNC	5/8-11 UNC
J	13/32 (10)	1/2 (13)	1/2 (13)	1-1/8 (28)	1-1/8 (28)	1-1/8 (28)	1-1/8 (28)	1-1/8 (28)
K	--	--	--	--	--	--	2-25/32 (70)	4-7/16 (113)
L	1-7/16 (36)	1-1/2 (38)	1-1/2 (38)	2-1/4 (57)	2-9/32 (58)	2-9/32 (58)	4-29/32 (124)	4-7/16 (113)
M	3-15/32 (88)	4-9/32 (108)	4-5/8 (117)	5-9/16 (140)	6-11/32 (161)	7-13/16 (198)	10-1/16 (255)	11-29/32 (302)
N	2-3/8 (60)	2-19/32 (65)	2-25/32 (70)	4-5/32 (105)	4-3/32 (103)	4-11/32 (110)	5-11/32 (135)	6-5/16 (160)
P	2-25/32 (70)	3-19/32 (91)	3-15/16 (100)	4-3/4 (120)	5-13/32 (137)	6-25/32 (172)	8-27/32 (224)	10-3/4 (273)
Q	1-19/32 (40)	1-19/32 (40)	1-19/32 (40)	1-19/32 (40)	1-19/32 (40)	2-9/16 (65)	2-9/16 (65)	2-9/16 (65)
R	7/8 (22)	7/8 (22)	7/8 (22)	15/16 (24)	15/16 (24)	15/16 (24)	15/16 (24)	15/16 (24)
S	19/32 (14)	19/32 (15)	9/16 (14)	25/32 (19)	27/32 (21)	27/32 (21)	1-1/16 (26)	1-1/16 (27)
T	9/16 (14)	9/16 (14)	9/16 (14)	9/16 (14)	9/16 (14)	1-5/16 (33)	1-5/16 (33)	1-5/16 (33)
U	3/8 (9)	3/8 (9)	3/8 (9)	9/32 (7)	9/32 (7)	7/8 (22)	7/8 (22)	7/8 (22)
V	6 (152)	7-29/32 (200)	8-29/32 (226)	12-3/32 (307)	12-11/32 (313)	15-15/32 (392)	18-15/16 (481)	28-1/8 (715)

Actuator Accessories

Positioner

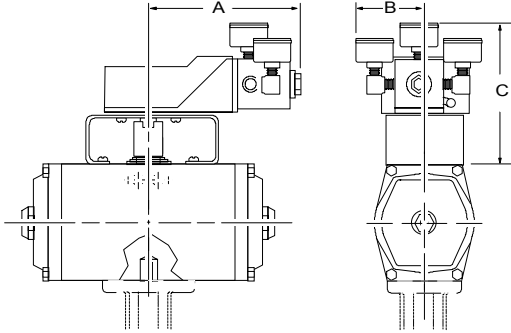


Figure 8: Actuator Positioner Dimensions
(See Table 5.)

Table 5: Positioner Dimensions

Code Number	Dimensions in. (mm)		
	A	B	C
V-9x92	6 (152)	3-1/8 (79)	6-1/2 (165)
V-9x93	6 (152)	3-1/8 (79)	6-1/2 (165)
V-9x94-1x	6 (152)	3-1/8 (79)	6-1/2 (165)
V-9x94-2x	6 (152)	3-1/8 (79)	6-1/2 (165)
V-9x97	6 (152)	3-1/8 (79)	7-1/4 (184)
V-9x98	6 (152)	3-1/8 (79)	7-1/4 (184)

For modulating control of both the double acting and spring return actuators, a V-9000-500 Positioner must be used.

Note: When a V-9000 Series Rack and Pinion Actuator is ordered as a factory-mounted component of a complete VF Series Butterfly Valve assembly, the positioner can be ordered as a factory-installed option.

The positioner is designed for the proportional operation of quarter turn rotary actuators. It is

generally coupled axially to the shaft of the actuator. The transparent cover and a pointer mark the position of the final control element. The positioner operates on a force-balance principle and allows for precise positioning over the entire range of the actuator stroke.

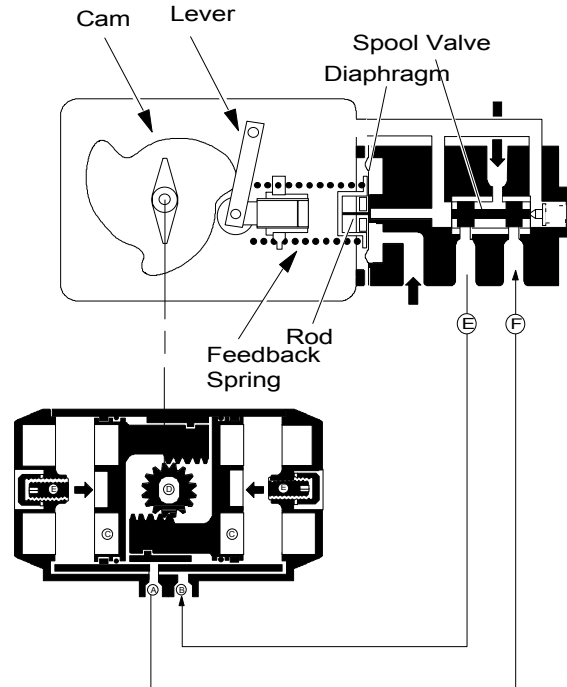


Figure 9: Positioner Operation

The V-9000-500 is furnished with supply, input, and output gauges as well as a position indicator visible through the units clear polycarbonate cover.

The positioner consists of a diaphragm that is exposed to the signal pressure, a feedback spring, and a double acting spool valve connected to the diaphragm through the rod. An increase of signal pressure on the diaphragm causes the displacement of the spool valve and consequently of the pistons in the actuator (refer to Figure 9).

The shaft rotation is transmitted to the feedback spring through the cam and lever, thus balancing the signal pressure on the diaphragm.

The actuator shaft will remain in a stable position only as long as the feedback springs force is equal to the air signal force on the diaphragm. The spool valve is then in a neutral position.

The position of the actuator is determined by the signal pressure and the shape of the cam. For single acting actuators, the operation is identical to the above, except that connection "E" or "F" can be plugged.

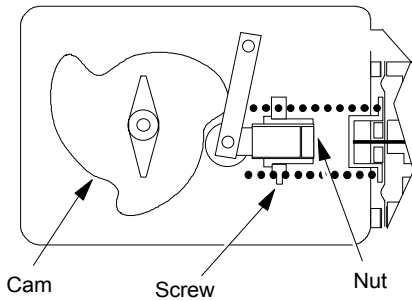


Figure 10: Adjustment Locations

Action reversal is accomplished by turning the cam over and reversing the air connections to the cylinder (see Figure 10).

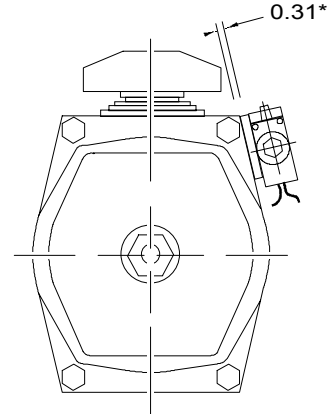
Positioner Calibration Procedures

Solenoid Air Valves

For two-position operation of double acting actuators, a V-9000-140 Series Four-Way Solenoid Air Valve must be used. The four-way solenoid air valve exhausts one chamber of the actuator while the other chamber is pressurized. For two-position operation of spring return actuators, a V-9000-140 Series Four-Way Solenoid Air Valve is also used.

The V-9000-140 is furnished with a manual override switch and is housed in a sturdy NEMA 4 enclosure.

Note: When a V-9000 Series Rack and Pinion Actuator is ordered as a factory-mounted component of a complete VF Series Butterfly Valve assembly, the appropriate solenoid air valve is automatically furnished with the actuator (unless a V-9000-500 Positioner is specified).



*Note: A spacer (included) is required for use on V-9x92-x through V-9x94-x.

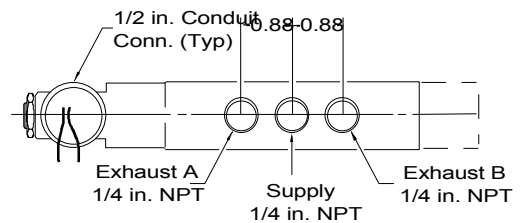


Figure 11: Solenoid Air Valve Dimensions (in.) and Air Connections

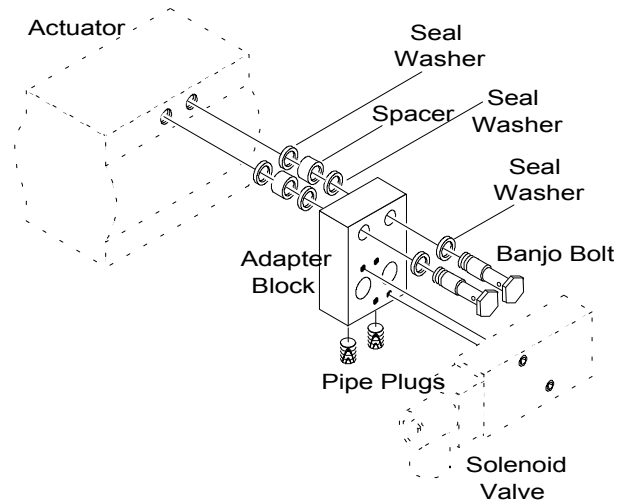


Figure 12: Adapter Block

When replacing a solenoid air valve on the rack and pinion actuators manufactured prior to April 1992, an adapter block is required to mount the replacement solenoid valve to the actuator (refer to Figure 12). The replacement solenoid air valve kit for the old-style actuators includes the solenoid valve and mounting screws.

The existing banjo bolts from the old solenoid valve are used to mount the adapter block to the old-style actuator. The adapter block has two bottom ports that need to be plugged, in order for the solenoid valve to operate correctly once assembled.

1. Using a 3/16 inch hex key, screw the two pipe plugs into the bottom ports.
2. Place a seal washer over each of the banjo bolts before inserting the bolts through the adapter block.
3. Place an additional seal washer on the banjo bolts and slide the washer next to the adapter block. Follow the seal washer with a spacer and then a final washer.
4. The adapter block assembly can now be mounted to the actuator by screwing the banjo bolts into the two air ports on the side of the actuator.
5. The solenoid valve can now be attached to the adapter block with the two mounting screws provided with the solenoid valve.

There are two different size adapter blocks to mount to the V-9000 Series actuators. The V-9092-1 to V-9094-1 actuators have 1/8 in. air connections, while the V-9094-2 to V-9098-1 have 1/4 in. air connections.

Travel Switch

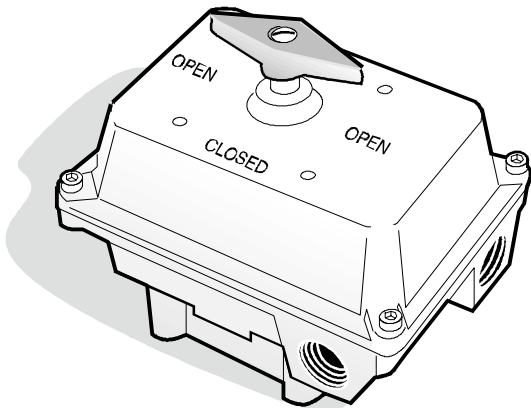


Figure 13: Travel Switch

For remote binary valve position indication, a V-9000-4xx Travel Switch can be mounted to the actuator. The travel switch and appropriate mounting kit must be ordered separately (refer to Table 9)

Note: The travel switch cannot be used on V-9000 Series Actuators equipped with a V-9000-500 Positioner.

The travel switch signals actuator and valve position to local and remote stations. The compact monitor mounts directly to the top of the actuator.

Features include finger-touch control cams, captive cover bolts, local position indicator, and two conduit entries for easy wiring (refer to Figure 14)

Rated for 5 amperes at 125/250 VAC; 5 amperes at 24 VDC, the internal switches are prewired to a terminal block. Standard switches are two Single Pole Double Throw (SPDT) micro switches.

The die cast aluminum housing meets NEMA 4, 4x Standards.

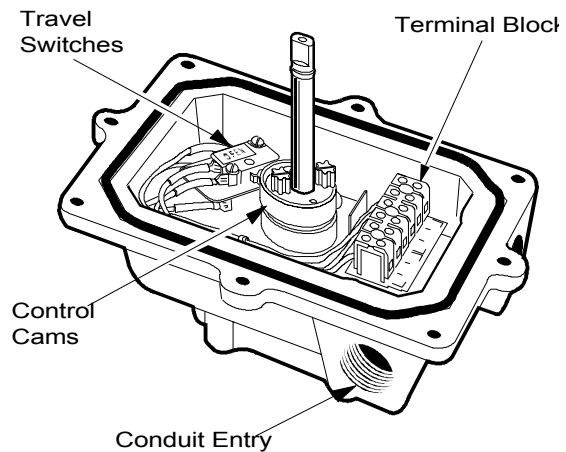


Figure 14: Travel Switch Components

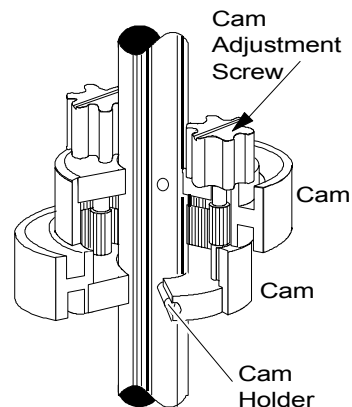


Figure 15: Cams

The uniquely designed cams are easily adjustable from the top by finger touch or a regular screwdriver; no special tools are required (see Figure 15)

The cams will not slip out of adjustment from line vibration. A cam for each switch is mounted directly to the output shaft and each cam is independently micro adjustable. Each cam is color coded--the red adjustment screw matches the red cam and the green screw matches the green cam.

A cam holder remains fixed to the output shaft. The adjustment screws rotate the eccentric shaped cams. Standard factory cam settings are to the open and closed positions for 90° travel.

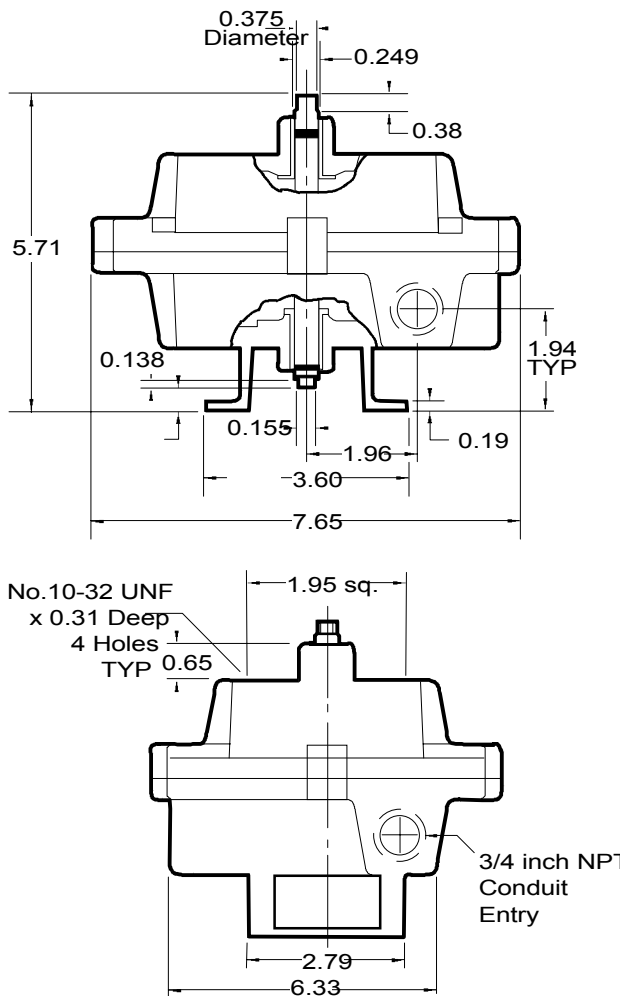


Figure 16: Travel Switch Dimensions (in.)

Speed Controls

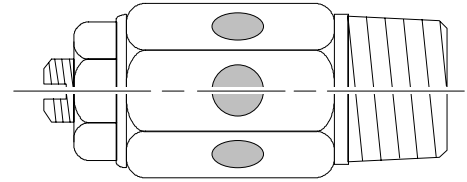


Figure 17: Speed Control

The V-9000-300 Series Speed Control Kits are used to regulate the speed at which the two-position actuators stroke. The speed control option should be used in applications where fast changes in valve disc position may result in objectionable pressure surges and/or water hammer throughout the water distribution system. The speed control kits consist of two adjustable orifices, which are screwed directly into the exhaust ports of the solenoid air valve.

Accessory Specifications

Table 6: Solenoid Valves (Order Separately)

Solenoid Valve Models	
V-9000-141*	120 VAC Solenoid Air Valve, Four-Way, for Old Style** V-9092 and V-9093 Series Actuators
V-9000-142*	120 VAC Solenoid Air Valve, Four-Way, for Old Style** V-9094 and V-9095 Series Actuators
V-9000-143*	120 VAC Solenoid Air Valve, Four-Way, for Old Style** V-9096 Series Actuators
V-9000-144*	120 VAC Solenoid Air Valve, Four-Way, for Old Style** V-9097 Series Actuators
V-9000-146*	120 VAC Solenoid Air Valve, Four-Way, for New Style*** V-9092 to V-9094-1 and V-9193 to V-9194-1 Series Actuators
V-9000-147*	120 VAC Solenoid Air Valve, Four-Way, for New Style*** V-9094-2 to V-9098 and V-9194-2 to V-9198 Series Actuators
V-9000-131*	120 VAC Solenoid Air Valve, Three-Way, for Old Style V-9192, V-9193, and New Style V-9194-1 Series Actuators
V-9000-132*	120 VAC Solenoid Air Valve, Three-Way, for Old Style V-9194-2 to V-9198 Series Actuators
Features	
Voltage Requirements	120 VAC
Power Consumption	AC: 5.6 VA; DC: 7.2 watts
Maximum Pressure	140 psig (980 kPa)
Ambient Temperature Limits	0 to 180°F (-18 to 82°C)
Air Connections	1/4 in. NPT (Internal)
Electrical Connections	18 AWG Leads, 24 in. (61 cm) Long
Enclosure Materials	Die Cast Aluminum Body with NEMA 4 Coil Housing

* These kits include all mounting hardware.

** For actuators manufactured before April 1, 1992

*** For actuators manufactured after April 1, 1992

Table 7: Speed Controls (Order Separately)

Models	
V-9000-301	Brass Speed Controls (Two) for Old Style* V-9192 and V-9193 Series Actuators
V-9000-302	Brass Speed Controls (Two) for Old Style* V-9194, V-9195, V-9196, and V-9197 Series Actuators
V-9000-311	Brass Speed Controls (Two) for New Style** V-9192 to V-9194-2 Series Actuators
V-9000-312	Brass Speed Controls (Two) for New Style** V-9194-2 to V-9198 Series Actuators
V-9000-313	Brass Speed Controls (Two) for Old Style* V-9094 to V-9097 and New Style** V-9092 to V-9098 Series Actuators
V-9000-314	Brass Speed Controls (Two) for Old Style* V-9092 to V-9093 Series Actuators

* For actuators manufactured before April 1, 1992

** For actuators manufactured after April 1, 1992

**Table 8: Plastic Position Indicators
(Order Separately)**

Actuator Series	Code Number*
V-9x92	V-9092-611
V-9x93	V-9093-611
V-9x94-1x	V-9094-6111
V-9x94-2x	V-9094-6112
V-9x95	V-9095-611
V-9x96	V-9096-611
V-9x97	V-9097-611
V-9x98	V-9098-611

* For actuators manufactured after April 1, 1992

Table 9: Positioners (Order Separately)

	Models	V-9000-500 Pneumatic Positioner for All Old and New Style V-9000 Series Actuators (Includes Three Gauges)
Mounting Kits (Order Separately)	V-9000-501*	Positioner Mounting Kit for Old Style V-9x92 and V-9x93 Series Actuators
	V-9000-502*	Positioner Mounting Kit for Old Style V-9x94 and V-9x95 Series Actuators
	V-9000-503*	Positioner Mounting Kit for Old Style V-9x96 and V-9x97 Series Actuators
	V-9000-511**	Positioner Mounting Kit for New Style V-9x92 to V-9x94-1 Series Actuators
	V-9000-512**	Positioner Mounting Kit for New Style V-9x94-2 and V-9x95 Series Actuators
	V-9000-513**	Positioner Mounting Kit for New Style V-9x96 to V-9x98 Series Actuators
	Supply Pressure	40 to 140 psig (280 to 980 kPa) Air supply must be clean (filtered), dry, and oil free.
	Output Flow Capacity	2000 scim (546 mL/s) at 60 psig (420 kPa)
	Air Consumption	1200 scim (328 mL/s) at 60 psig (420 kPa)
	Control Action	Direct or Reverse; Field Selectable
	Operating Range	Factory Set at 3 to 15 psig (21 to 105 kPa) for 90° Rotation; Field Selectable at 3 to 15 psig for 65° Rotation or 3 to 9 psig (21 to 63 kPa) or 9 to 15 psig (63 to 105 kPa) for 65° Rotation
	Starting Point	Factory Set at Approximately 3 psig (21 kPa)
	Ambient Temperature Limits	-5 to 160°F (-21 to 71°C)
Air Connections	Supply	1/4 in. NPT (Internal)
	Control Input	1/8 in. NPT (Internal)
	Outputs	1/8 in. NPT (Internal)
Materials	Body	Aluminum, Anodized
	Diaphragm	Buna-N Rubber
	Spool	Stainless Steel
	Cover	Polycarbonate

* For actuators manufactured before April 1, 1992

** For actuators manufactured after April 1, 1992

Table 10: Travel Switches (Order Separately)

Travel Limit Switch Models		V-9000-400* and V-9000-410** For All V-9000 Series Actuators
Mounting Kits	V-9000-401*	For V-9x92 and V-9x93 Series Actuators
	V-9000-402*	For V-9x94 and V-9x95 Series Actuators
	V-9000-403*	For V-9x96 and V-9x97 Series Actuators
	V-9000-404**	For V-9x96, V-9x97, and V-9x98 Series Actuators***
Features	Switches	Two Single Pole Double Throw (SPDT)
	Electrical Rating	5 amperes at 120/250 VAC; 5 amperes at 24 VDC
	Body Materials	Die Cast Aluminum, NEMA 4, 4x Housing

* For actuators manufactured before April 1, 1992

** For actuators manufactured after April 1, 1992

*** Mounting kits are not required for smaller size actuators (V-9x92 through V-9x95).

Table 11: Pneumatic Rack and Pinion Actuator Adapter Sleeves* (Order Separately)

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

*Adapter sleeves are required to field mount rack and pinion actuators to VFM valves.

Notes

Notes

Specifications

Models	V-909x Series	Rack and Pinion Double Acting Actuators; Refer to Table 1ull code numbers.
	V-919x Series	Rack and Pinion Spring Return Actuators; Refer to Table 2ull code numbers.
Output Torque	V-909x Series	See Table 1
	V-919x Series	See Table 2
Supply Pressure		Nominal 60 to 80 psig (420 to 560 kPa); Minimum 40 psi (280 kPa), Maximum 140 psi (980 kPa). Air supply must be clean (filtered), dry, and oil free.
Ambient Temperature Limits		-13 to 200°F (-25 to 93°C)
Materials	Body	Extruded Aluminum, Anodized
	End Caps	Die Cast Aluminum, Polyester Coated
	Pistons	Die Cast Aluminum
	Output Shaft	Carbon Steel, Zinc Plated
	Piston Guides	Acetal
	Spring Cartridges	Coated Spring Steel, Zinc Plated Hardware
	O-ring Seals	Buna-N Rubber
Accessories (Order Separately)		See Tables 6 through 11.

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, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.



Controls Group
507 E. Michigan Street
P.O. Box 423
Milwaukee, WI 53201

Printed in U.S.A.