

Pneumatic Rotary Motion Actuators

Description

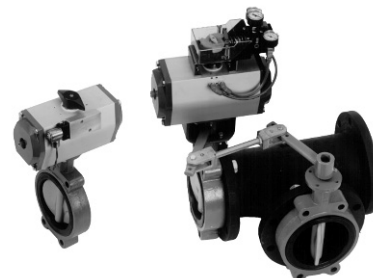
The V-9000 Series Actuators are rotary motion rack and pinion, spring return, and double acting. These actuators are designed for direct mounting on the VF Series Butterfly Valves.

Repair Information

If the V-9000 Pneumatic Rotary Motion Actuator fails to operate within its specifications, replace the unit. For a replacement actuator, contact the nearest Johnson Controls® representative.

Features

- V-909x Series Actuators are double acting (air-to-open/air-to-close)
- V-919x Series Actuators incorporate spring return action
- furnished either with a factory mounted 24 or 120 VAC solenoid air valve for two-position operation, or a V-9000-500 Positioner for modulating control applications



V-9000 Series Pneumatic Actuators Installed on VF Series Butterfly Valves

Selection Charts

V-909x Series Actuator Non-Spring Return Double Acting

Code Number	Supply Pressure, psig (kPa) ¹					VF Series Code Number	Actuator Air Volume, in. ³	Shipping Weight, lb ²
	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. b-in x 113 = mN·m.
2. b x 0.454 = kg.

Using the V-919x Series Spring Return Selection Chart below:

Example 1: A normally open 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 2: 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 3: A three-way valve with 80 psig available air pressure requires 846 lb-in of torque. Use a V-9195-15 with 1,326 lb-in spring end and 1,568 lb-in air end torque.

Selection Chart: V-919x Series Actuator Torque Data (lb-in)¹ Spring Return V-9000 Series Pneumatic Actuators (Part 1 of 2)

Code Number	Suffix	Air Stroke Supply Pressure psig (kPa)										Spring Stroke		Weight (lb) ²	VF Series Code
		40 (280)		60 (420)		80 (560)		100 (700)		120 (840)		NO Start	NC End		
		NC ³ Start	NO ³ 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	-320
	-13	156	76	341	261	526	446	711	631	896	816	275	195	6.3	-330
	-14	--	--	281	176	466	361	651	546	836	731	360	255	6.6	-340
	-16	--	--	--	--	369	185	554	370	739	555	536	352	7.1	-360
V-9194	-12	310	232	570	492	830	752	1089	1011	1349	1271	261	183	8.0	-420
	-13	218	101	478	361	738	621	997	880	1257	1140	392	275	8.4	-430
	-14	--	--	386	231	646	491	905	750	1165	1010	522	367	8.8	-440
	-15	--	--	294	94	554	354	813	613	1073	873	659	459	9.1	-450
	-16	--	--	--	--	462	229	721	488	981	748	784	551	9.5	-460
V-9194	-22	692	469	1249	1026	1805	1582	2362	2139	2919	2696	589	366	18.1	-422
	-23	509	174	1066	731	1622	1287	2179	1844	2736	2401	884	549	18.8	-423
	-24	--	--	883	437	1439	993	1996	1550	2553	2107	1178	732	19.5	-424
	-25	--	--	700	142	1256	698	1813	1255	2370	1812	1473	915	20.3	-425
	-26	--	--	--	--	1073	404	1630	961	2187	1518	1767	1098	21.0	-426
V-9195	-13	--	--	1357	733	2099	1475	2841	2217	3583	2959	1419	795	22.1	-530
	-15	--	--	--	--	1568	529	2310	1271	3052	2013	2365	1326	24.2	-550

V-9000 Series Pneumatic Rotary Motion Actuators (Continued)

Selection Chart: V-919x Series Actuator Torque Data (lb-in)¹ Spring Return V-9000 Series Pneumatic Actuators (Part 2 of 2)

Code Number	Suffix	Air Stroke Supply Pressure psig (kPa)										Spring Stroke		Weight (lb) ²	VF Series Code
		40 (280)		60 (420)		80 (560)		100 (700)		120 (840)		NO Start	NC End		
		NC ³ Start	NO ³ End	NC Start	NO End	NC Start	NO End	NC Start	NO End	NC Start	NO End				
V-9196	-12	1819	1118	3292	2591	4764	4063	6236	5535	7709	7008	1679	978	39.7	-620
	-13	1399	349	2872	1822	4344	3294	5816	4766	7289	6239	2448	1398	42.1	-630
	-14	--	--	2452	1123	3924	2595	5396	4067	6869	5540	3147	1818	44.5	-640
	-15	--	--	2030	353	3502	1825	4974	3297	6447	4770	3917	2240	46.8	-650
	-16	--	--	--	--	3154	1196	4626	2668	6099	4141	4546	2588	49.2	-660
V-9197	-12	3833	2508	6876	5551	9920	8595	12964	11639	16007	14682	3275	1950	75.1	-720
	-13	2859	868	5902	3911	8946	6955	11990	9999	15033	13042	4915	2924	80.2	-730
	-14	--	--	4930	2275	7974	5319	11018	8363	14061	11406	6551	3896	85.2	-740
	-15	--	--	3949	638	6993	3682	10037	6726	13080	9769	8188	4877	90.3	-750
	-16	--	--	--	--	6022	2031	9066	5075	12109	8118	9839	5848	95.3	-760
V-9198	-12	9487	6747	16967	14227	24447	21707	31926	29186	39406	36666	7464	4724	160.2	-820
	-13	7125	3015	14605	10495	22085	17975	29564	25454	37044	32934	11196	7086	168.3	-830
	-14	--	--	12243	6762	19723	14242	27202	21721	34682	29201	14929	9448	176.4	-840
	-15	--	--	9880	3030	17360	10510	24839	17989	32319	25469	18661	11811	184.5	-850
	-16	--	--	--	--	14998	6778	22477	14257	29957	21737	22393	14173	192.6	-860

1. in.lb x 113 = mN.m
2. lb x 0.454 = kg
3. N.C. is the abbreviation for Normally Closed; N.O. is the abbreviation for Normally Open.

Accessories: Solenoid Air Valves

Code Number	Description
V-9000-141 ¹	120 VAC Solenoid Air Valve, Four-Way, for Old-Style ² V-9092 and V-9093 Series Actuators
V-9000-142 ¹	120 VAC Solenoid Air Valve, Four-Way, for Old-Style ² V-9094 through V-9097 Series Actuators
V-9000-146 ¹	120 VAC Solenoid Air Valve, Four-Way, for New-Style ³ V-9092 through V-9094-1 and V-9193 through V-9194-1 Series Actuators
V-9000-147 ¹	120 VAC Solenoid Air Valve, Four-Way, for New-Style ³ V-9094-2 through V-9098 and V-9194-2 through V-9198 Series Actuators
V-9000-246 ¹	24 VAC Solenoid Air Valve, Four-Way, for New-Style ³ V-9092 through V-9094-1 and V-9193 through V-9194-1 Series Actuators
V-9000-247 ¹	24 VAC Solenoid Air Valve, Four-Way, for New-Style ³ V-9094-2 through V-9098 and V-9194-2 through V-9198 Series Actuators
V-9000-131 ¹	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 ¹	120 VAC Solenoid Air Valve, Three-Way, for Old-Style V-9194-2 through V-9198 Series Actuators

For two-position operation of double-acting actuators, a V-9000-140 Series Four-Way Solenoid Air Valve **must be used**. This valve exhausts one chamber of the actuator while the other chamber is pressurized.

For two-position operation of spring return actuators, a V-9000-130 Series Three-Way Solenoid Air Valve **must be used**. This valve provides supply or exhaust air to the inner chamber only of the actuator.

Both styles of solenoid air valves are furnished with a manual override switch and are 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 high pressure positioner is specified).

Technical Specifications, V9000 Solenoid Air Valves

Voltage Requirements	24 or 120 VAC (See Descriptions Above)
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

1. These kits include all mounting hardware.
2. For actuators manufactured before April 1, 1992.
3. For actuators manufactured after April 1, 1992.

V-9000 Series Pneumatic Rotary Motion Actuators (Continued)

Accessories: Speed Controls

Code Number	Description
V-9000-301	Brass Speed Controls (Two) for Old Style ¹ V-9192 and V-9193 Series Actuators
V-9000-302	Brass Speed Controls (Two) for Old Style ¹ V-9194, V-9195, V-9196, and V-9197 Series Actuators
V-9000-311	Brass Speed Controls (Two) for New Style ² V-9192 to V-9194-2 Series Actuators
V-9000-312	Brass Speed Controls (Two) for New Style ² V-9194-2 to V-9198 Series Actuators
V-9000-313	Brass Speed Controls (Two) for Old Style ¹ V-9094 to V-9097 and New Style ² V-9092 to V-9098 Series Actuators
V-9000-314	Brass Speed Controls (Two) for Old Style ¹ V-9092 to V-9093 Series Actuators

The V-9000-300 Series Speed Control Kits are used to regulate the speed at which the two-position actuators stroke. This 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.

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 speed control can be ordered as a factory installed option. (See option C or option E in the ordering data table of VF Series Standard-Pressure, Standard Temperature Butterfly Valves Product Bulletin, LIT-977205.)

1. For actuators manufactured before April 1, 1992.
2. For actuators manufactured after April 1, 1992.

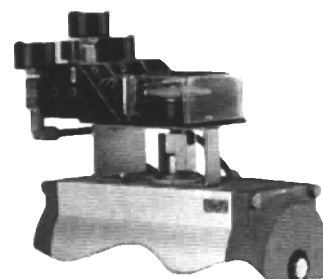
Accessories: Positioner Mounting Kit (Order Separately)

V-9000-500 Series Pneumatic Positioners for All Old and New Style V-9000 Series Actuators (Includes Three Gauges)

Code Number	Description
V-9000-501 ¹	Positioner Mounting Kit for Old-Style V-9x92 and V-9x93 Series Actuators
V-9000-502 ¹	Positioner Mounting Kit for Old-Style V-9x94 and V-9x95 Series Actuators
V-9000-503 ¹	Positioner Mounting Kit for Old-Style V-9x96 and V-9x97 Series Actuators
V-9000-511 ²	Positioner Mounting Kit for New-Style V-9x92 to V-9x94-1 Series Actuators
V-9000-512 ²	Positioner Mounting Kit for New-Style V-9x94-2 and V-9x95 Series Actuators
V-9000-513 ²	Positioner Mounting Kit for New-Style V-9x96 to V-9x98 Series Actuators
Technical Specifications, V-9000-500 Positioners	
Supply Pressure	40 to 140 psig (280 to 980 kPa); Air Supply Must Be Clean, Dry, and Oil Free
Output Flow Capacity	2,000 scim (546 mL/s) at 60 psig (420 kPa)
Air Consumption	1,200 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 From 3 to 15 psig (21 to 105 kPa) 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)
Air Connections	Supply: 1/4 in. IPT Control Input: 1/8 in. IPT Outputs: 1/8 in. IPT
Ambient Temperature Limits	-5 to 160°F (-21 to 71°C)
Dimensions (in.)	6-3/4 H x 3-1/8 W x 6 L (Width and Length as Measured From Valve Shaft Center)
Materials	Body: Aluminum, Anodized Diaphragm: Buna-N-Rubber Spool: Stainless Steel Cover: Polycarbonate

A V-9000-500 High Pressure Positioner **must be used** for modulating control of both the double acting and spring return actuators. This positioner operates on a force-balance principle and allows for precise positioning over the entire range of the actuator stroke. The unit features non-interactive zero and span adjustments, as well as field selectable direct or reverse action. The V-9000-500 is furnished with supply, input, and output gauges and a visual position indicator.

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 high pressure positioner can be ordered as a factory-installed option. (See option B in the ordering data table of VF Series Standard-Pressure, Standard Temperature Butterfly Valves Product Bulletin, LIT-977205.)



V-9000-500 Pneumatic Positioner

1. For actuators manufactured before April 1, 1992.
2. For actuators manufactured after April 1, 1992.

V-9000 Series Pneumatic Rotary Motion Actuators (Continued)

Accessories: Travel Switch and Mounting Kit for Travel Switch

Code Number	Description
Travel Limit Switches	
V-9000-410	For All V-9000 Series Actuators Manufactured After April 1, 1992
V-9000-411	Includes V-9000-410 Travel Limit Switch and Mounting Kit for V-9x96 through V-9x98 Actuators Manufactured After April 1, 1992 ¹
V-9000-400	For All V-9000 Series Actuators Manufactured Before April 1, 1992 (Requires One of the Mounting Kits Listed Below for Initial Installation)
Mounting Kits (For V-9000-400)	
V-9000-401	For V-9x92 and V-9x93 Series Actuators Manufactured Before April 1, 1992
V-9000-402	For V-9x94 and V-9x95 Series Actuators Manufactured Before April 1, 1992
V-9000-403	For V-9x96 and V-9x97 Series Actuators Manufactured Before April 1, 1992
Technical Specifications, V-9000-400 Travel Switches	
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 remote binary valve position indication, a V-9000-400 Travel Switch can be mounted to the actuator. The unit includes two SPDT switches in a die cast aluminum NEMA 4 enclosure.

Note: The travel switch and appropriate mounting kit must be ordered separately. The travel switch cannot be used on V-9000 Series Actuators equipped with a high pressure positioner.

1. Mounting Kits are Not Required for Smaller Sized Actuators (V-9x92 through V-9x95).

Accessories: Pneumatic Rack and Pinion Actuator Adaptor Sleeves¹ for Standard-Pressure, Standard-Temperature Butterfly Valves

Valve Size, in.	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

1. Adaptor sleeves are required to field mount rack and pinion actuators to VFM valves.

Accessories: Mounting Kits¹ for Field Mounting Industrial-Grade V-9000 Series High Pressure Pneumatic Actuators to Two-Way ANSI Class 150 VF Series High-Pressure, High-Temperature Butterfly Valves

Valve Size, in.	Industrial-Grade V-9000 Series High Pressure Pneumatic Actuator						
	V-9x93	V-9x94-1	V-9x94-2	V-9x95	V-9x96	V-9x97	V-9x98
2-1/2	V-9094-410	V-9094-410	V-9095-410	V-9095-410	---	---	---
3	V-9094-410	V-9094-410	V-9095-410	V-9095-410	---	---	---
4	V-9094-410	V-9094-410	V-9095-410	V-9095-410	---	---	---
5	---	---	V-9095-610	V-9095-610	V-9096-610	---	---
6	---	---	V-9095-610	V-9095-610	V-9096-610	---	---
8	---	---	---	V-9095-810	V-9096-810	V-9097-810	---
10	---	---	---	---	---	V-9097-1210	---
12	---	---	---	---	---	V-9097-1210	---
14	---	---	---	---	---	V-9097-1610	V-9098-1610
16	---	---	---	---	---	---	V-9098-1610

1. Mounting Kit Contains a Bracket, Adaptor, and Mounting Hardware.