

V-9000 Series

Pneumatic Rotary Motion Actuators



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

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.

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

To Order

Specify the code number from the selection charts that follow.

Repair Parts

Unit replacement only.

Specifications

V-9000 Series Pneumatic Rotary Motion Actuators															
Models	V-909x Series Rack and Pinion, Double Acting Actuators V-919x Series Rack and Pinion, Spring Return Actuators														
Supply Pressure	Nominal 60 to 80 psig (420 to 560 kPa); Minimum 40 psig (280 kPa); Maximum 140 psig (980 kPa); Air Supply Must Be Clean, Dry, and Oil Free														
Ambient Temperature Limits	-13 to 200°F (-25 to 93°C)														
Materials	<table border="0"> <tr> <td>Body</td> <td>Extruded Aluminum, Anodized (Red Paint Color)</td> </tr> <tr> <td>End Caps</td> <td>Die Cast Aluminum, Polyester Coated (Red Color)</td> </tr> <tr> <td>Pistons</td> <td>Die Cast Aluminum</td> </tr> <tr> <td>Output Shaft</td> <td>Carbon Steel, Zinc Plated</td> </tr> <tr> <td>Piston Guides</td> <td>Acetal</td> </tr> <tr> <td>Springs</td> <td>Spring Steel, Zinc Plated</td> </tr> <tr> <td>O-Ring Seals</td> <td>Buna-N-Rubber</td> </tr> </table>	Body	Extruded Aluminum, Anodized (Red Paint Color)	End Caps	Die Cast Aluminum, Polyester Coated (Red Color)	Pistons	Die Cast Aluminum	Output Shaft	Carbon Steel, Zinc Plated	Piston Guides	Acetal	Springs	Spring Steel, Zinc Plated	O-Ring Seals	Buna-N-Rubber
Body	Extruded Aluminum, Anodized (Red Paint Color)														
End Caps	Die Cast Aluminum, Polyester Coated (Red Color)														
Pistons	Die Cast Aluminum														
Output Shaft	Carbon Steel, Zinc Plated														
Piston Guides	Acetal														
Springs	Spring Steel, Zinc Plated														
O-Ring Seals	Buna-N-Rubber														

Dimensions

	Dimensions (in.)						
	V-9x92	V-9x93	V-9x94-1	V-9x94-2	V-9x96	V-9x97	V-9x98
Height	4-15/16	5-7/32	5-9/16	6-15/16	9-3/8	11-5/8	13-15/32
Length	6	7-29/32	8-15/16	12-1/8	15-15/32	18-15/16	26-23/32
Width	2-25/32	3-19/32	3-31/32	4-3/4	6-25/32	8-27/32	10-3/4

Using the V-919x Series Spring Return Selection Chart on the following page:

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-909x Series Actuator Data (lb-in), Non-Spring Return Double Acting

Code Number	Supply Pressure, psig (kPa)					VF Series Code Number	Actuator Air Volume, in. ³	Shipping Weight, lb
	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-9095-1	1,410	2,152	2,894	3,636	4,378	-050	74.2	19.0
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

Note: lb-in x 113 = mN-m.

Note: lb x 0.454 = kg.

V-9000 Series Pneumatic Rotary Motion Actuators (Continued)

Selection Chart: V-919x Series Actuator Torque Data (lb-in)^(a) Spring Return V-9000 Series Pneumatic Actuators

Actuator Base Code Number	Suffix	Air Stroke Supply Pressure, psig (kPa)										Spring Stroke		Weight (lb) ^(b)	VF Series Code
		40 (280)		60 (420)		80 (560)		100 (700)		120 (840)		N.O. Start	N.C. End		
		N.C. Start	N.O. End	N.C. Start	N.O. End	N.C. Start	N.O. End	N.C. Start	N.O. End	N.C. Start	N.O. End				
V-9193	-12	210	167	395	352	580	537	765	722	950	907	184	141	7.1	-320
	-13	156	76	341	261	526	446	711	631	896	816	275	195		-330
	-14	—	—	281	176	466	361	651	546	836	731	360	255		-340
	-16	—	—	—	—	369	185	554	370	739	555	536	352		-360
V-9194	-12	310	232	570	492	830	752	1,089	1,011	1,349	1,271	261	183	9.5	-420
	-13	218	101	478	361	738	621	997	880	1,257	1,140	392	275		-430
	-14	—	—	386	231	646	491	905	750	1,165	1,010	522	367		-440
	-15	—	—	294	94	554	354	813	613	1,073	873	659	459		-450
	-16 ^(c)	—	—	—	—	462	229	721	488	981	748	784	551	-460	
	-22	692	469	1,249	1,026	1,805	1,582	2,362	2,139	2,919	2,696	589	366	19.5	-422
	-23	509	174	1,066	731	1,622	1,287	2,179	1,844	2,736	2,401	884	549		-432
-24	—	—	883	437	1,439	993	1,996	1,550	2,553	2,107	1,178	732	-442		
V-9195	-13	—	—	1,357	733	2,099	1,475	2,841	2,217	3,583	2,959	1,419	795	25.2	-530
	-15	—	—	—	—	1,568	529	2,310	1,271	3,052	2,013	2,365	1,326		-550
V-9196	-12	1,819	1,118	3,292	2,591	4,764	4,063	6,236	5,535	7,709	7,008	1,679	978	49.2	-620
	-13	1,399	349	2,872	1,822	4,344	3,294	5,816	4,766	7,289	6,239	2,448	1,398		-630
	-14	—	—	2,452	1,123	3,924	2,595	5,396	4,067	6,869	5,540	3,147	1,818		-640
	-15 ^(c)	—	—	2,030	353	3,502	1,825	4,974	3,297	6,447	4,770	3,917	2,240		-650
	-16	—	—	—	—	3,154	1,196	4,626	2,668	6,099	4,141	4,546	2,588		-660
V-9197	-12	3,833	2,508	6,876	5,551	9,920	8,595	12,964	11,639	16,007	14,682	3,275	1,950	95.3	-720
	-13	2,859	868	5,902	3,911	8,946	6,955	11,990	9,999	15,033	13,042	4,915	2,924		-730
	-14	—	—	4,930	2,275	7,974	5,319	11,018	8,363	14,061	11,406	6,551	3,896		-740
	-15	—	—	3,949	638	6,993	3,682	10,037	6,726	13,080	9,769	8,188	4,877		-750
	-16	—	—	—	—	6,022	2,031	9,066	5,075	12,109	8,118	9,839	5,848		-760
V-9198	-12	9,487	6,747	16,967	14,227	24,447	21,707	31,926	29,186	39,406	36,666	7,464	4,724	192.6	-820
	-13	7,125	3,015	14,605	10,495	22,085	17,975	29,564	25,454	37,044	32,934	11,196	7,086		-830
	-14	—	—	12,243	6,762	19,723	14,242	27,202	21,721	34,682	29,201	14,929	9,448		-840
	-15	—	—	9,880	3,030	17,360	10,510	24,839	17,989	32,319	25,469	18,661	11,811		-850
	-16	—	—	—	—	14,998	6,778	22,477	14,257	29,957	21,737	22,393	14,173		-860

(a) lb-in x 113 = mN-m.

(b) lb x 0.454 = kg.

(c) The V-9194-16 and V-9196-15 were discontinued as available factory-assembled models with VF Series Butterfly Valves on 4/1/93; however, these actuators can still be ordered separately for field replacement.

Note: The above values do not include a safety factor.

V-9000 Series Pneumatic Rotary Motion Actuators (Continued)

Accessories: Solenoid Air Valves

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).

Specifications

Solenoid Air Valve	
V-9000-141 ^(a)	120 VAC Solenoid Air Valve, Four-Way, for Old-Style ^(b) V-9092 and V-9093 Series Actuators
V-9000-142 ^(a)	120 VAC Solenoid Air Valve, Four-Way, for Old-Style ^(b) V-9094 through V-9097 Series Actuators
V-9000-146 ^(a)	120 VAC Solenoid Air Valve, Four-Way, for New-Style ^(c) V-9092 through V-9094-1 and V-9193 through V-9194-1 Series Actuators
V-9000-147 ^(a)	120 VAC Solenoid Air Valve, Four-Way, for New-Style ^(c) V-9094-2 through V-9098 and V-9194-2 through V-9198 Series Actuators
V-9000-246 ^(a)	24 VAC Solenoid Air Valve, Four-Way, for New-Style ^(c) V-9092 through V-9094-1 and V-9193 through V-9194-1 Series Actuators
V-9000-247 ^(a)	24 VAC Solenoid Air Valve, Four-Way, for New-Style ^(c) V-9094-2 through V-9098 and V-9194-2 through V-9198 Series Actuators
V-9000-131 ^(a)	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 ^(a)	120 VAC Solenoid Air Valve, Three-Way, for Old-Style V-9194-2 through V-9198 Series Actuators
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

(a) These kits include all mounting hardware.

(b) For actuators manufactured before April 1, 1992.

(c) For actuators manufactured after April 1, 1992.

Accessories: Speed Controls

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 (option C in *Actuator Accessories*). Refer to *VF Series Pneumatic Butterfly Valves, 2 Through 20 in., Two-Way and Three-Way, Selection Chart*.

Specifications

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

(a) For actuators manufactured before April 1, 1992.

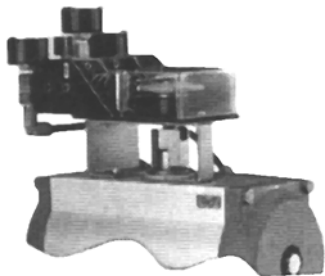
(b) For actuators manufactured after April 1, 1992.

V-9000 Series Pneumatic Rotary Motion Actuators (Continued)

Accessories: Positioner

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 (option B in Actuator Accessories). Refer to VF Series Pneumatic Butterfly Valves, 2 Through 20 in., Two-Way and Three-Way, Selection Chart.



Specifications

Positioner	
Models	V-9000-500 Series Pneumatic Positioners for All Old and New Style V-9000 Series Actuators (Includes Three Gauges)
Mounting Kits (Order Separately)	V-9000-501^(a) Positioner Mounting Kit for Old-Style V-9x92 and V-9x93 Series Actuators
	V-9000-502^(a) Positioner Mounting Kit for Old-Style V-9x94 and V-9x95 Series Actuators
	V-9000-503^(a) Positioner Mounting Kit for Old-Style V-9x96 and V-9x97 Series Actuators
	V-9000-511^(b) Positioner Mounting Kit for New-Style V-9x92 to V-9x94-1 Series Actuators
	V-9000-512^(b) Positioner Mounting Kit for New-Style V-9x94-2 and V-9x95 Series Actuators
V-9000-513^(b) 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, Dry, and Oil Free
Output Flow Capacity	2,000 scfm (546 mL/s) at 60 psig (420 kPa)
Air Consumption	1,200 scfm (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) For actuators manufactured before April 1, 1992.

(b) For actuators manufactured after April 1, 1992.

Accessories: Travel Switch

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.

Specifications

Travel Switches	
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 ^(a)
	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
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

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

V-9000 Series Pneumatic Rotary Motion Actuators (Continued)

Pneumatic Rack and Pinion Actuator Adaptor Sleeves^(a) 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

(a) Adaptor sleeves are required to field mount rack and pinion actuators to VFM valves.

Accessories: Plastic Position Indicators

Actuator Series	Code Number ^(a)
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

(a) For actuators manufactured after April 1, 1992.

Mounting Kits^(a) 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

(a) Mounting Kit Contains a Bracket, Adaptor, and Mounting Hardware.

Mounting Kits^(a) for Field Mounting Industrial-Grade V-9000 Series High Pressure Pneumatic Actuators to Two-Way ANSI Class 300 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-9094-430	V-9094-430	V-9095-430	---	---	---	---
3	V-9094-430	V-9094-430	V-9095-430	---	---	---	---
4	---	---	V-9095-430	V-9095-430	---	---	---
5	---	---	V-9095-530	V-9095-530	V-9096-530	V-9097-530	---
6	---	---	---	V-9095-630	V-9096-630	V-9097-630	---
8	---	---	---	---	V-9096-830	V-9097-830	V-9098-830
10	---	---	---	---	---	V-9097-1230	V-9098-1230
12	---	---	---	---	---	V-9097-1230	V-9098-1230
14	---	---	---	---	---	---	V-9098-1430

(a) Mounting Kit Contains a Bracket, Adaptor, and Mounting Hardware.