

TYPE SP AND SP-SR PNEUMATIC RACK AND PINION ACTUATORS

The JAMESBURY SP and SP-SR rack and pinion actuators are designed to offer long lasting trouble free operation as an economical means of automatic control of quarter turn valves.

Type SP double-acting actuators produce output torques ranging from 7 to 250 ft.lbs. (10-340 Nm) for operating 1/4" (DN 6) through 6" (DN 150) ball valves and 3" (DN 80) through 10" (DN 250) butterfly valves.

Type SP-SR spring-return actuators produce torques ranging from 10 to 92 ft.lbs. (14-125 Nm) for operating 1/4" through 4" (DN 6-100) ball valves and 3" through 8" (DN 80-200) butterfly valves.

FEATURES

- Outstanding corrosion resistance in most environments.
- Compact size and light weight.
- Stainless steel rack and pinion with lifetime guarantee.*
- Advanced single rack and pinion system driven by a one-piece shuttling piston provides smooth operation and superior cycle life.
- Adjustable travel stops for both open and closed positions.
- Spring-return units are completely field reversible. NAMUR and NPT solenoid connections.
- Easily fitted with a wide variety of accessories and control devices.

Type SP and SP-SR actuators have a stainless steel rack and pinion system consisting of two drive elements: a shuttling piston with rack, and a one-piece pinion/drive shaft. Together they offer smooth, low backlash operation with a minimum number of parts. The single piston is exceptionally stable and provides reduced stresses compared to other popular designs, thereby avoiding scuffing and galling.

Of major importance are the thermoplastic precision molded housings. The material's low coefficient of friction reduces bearing and seal wear to give superior cycle life. The thermoplastic housing in combination with stainless steel fasteners give the actuators excellent corrosion resistance.



Type SP-SR spring-return units feature springs preloaded in a self-contained cartridge for safer handling and easy maintenance. Fail-open or fail-close operation can be quickly changed in the field by simply inverting the actuator - top and bottom mounting pads are identical. These SP-SR actuators are available in three series, the SR40 for 40 psi minimum supply pressure, the SR60 for 60 psi minimum supply pressure and the SR80 for minimum supplies of 80 psi.

Type SP and Type SP-SR actuators can be furnished with a NAMUR solenoid interface for direct mounting of solenoid valves or standard NPT piping connections.

A wide choice of optional accessories and control devices that include limit switches, position indicators, two-stage flow controllers, programmable cycling controllers and positioners is available to satisfy virtually all automatic valve requirements.

* If at any time during the useable life of the actuator the rack or pinion fails, the actuator will be replaced at Jamesbury's expense. Jamesbury's liability is limited to the value of the actuator.

SPECIFICATIONS

Supply Pressure Range:

Double-acting	Min. 25 psi, max. 125 psi (1.7 - 8.6 bar)
Spring-return	SR40 Min. 40 psi, max. 125 psi (2.8-8.6 bar)
	SR60 Min. 60 psi, max. 125 psi (4.1-8.6 bar)
	SR80 Min. 80 psi, max. 125 psi (5.5-8.6 bar)

Temperature Rating: -40°F to +160°F (-40°C - to +71°C)

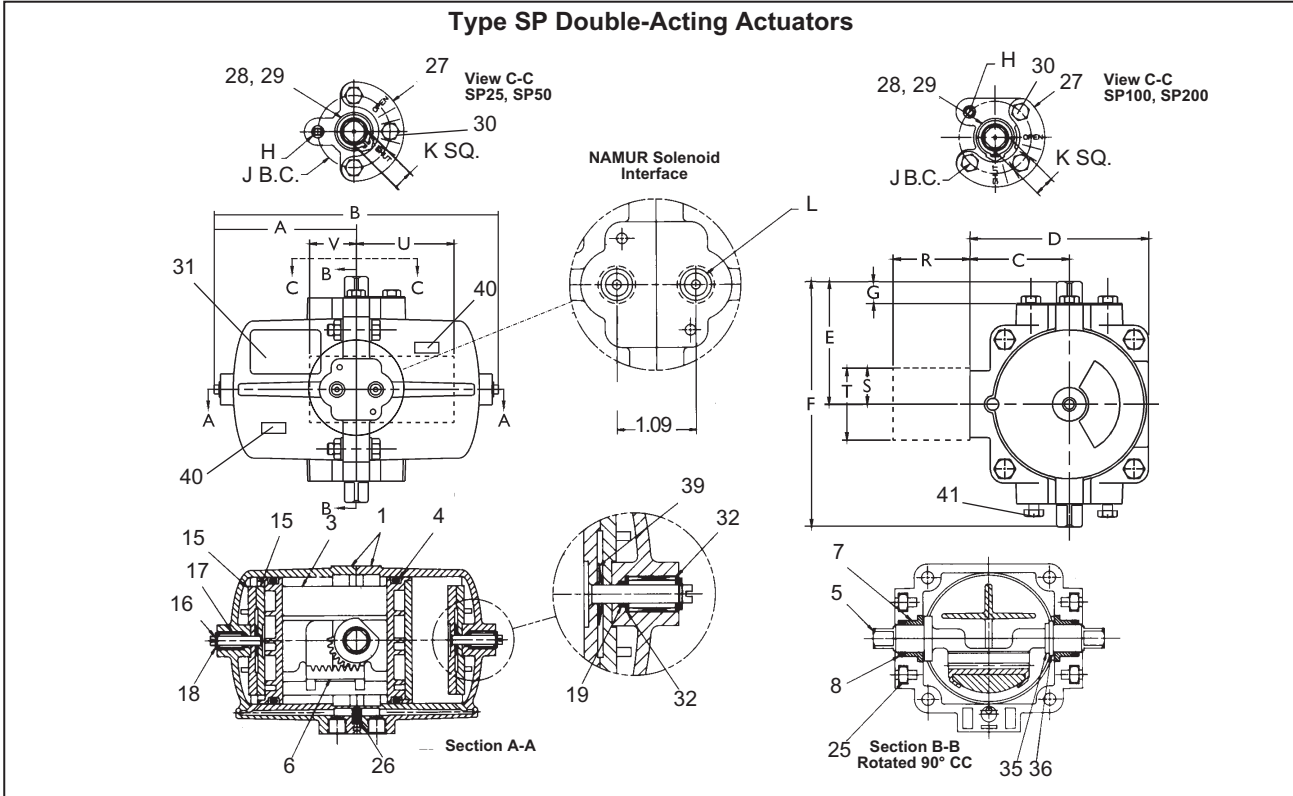
Rotation Adjustment: 85° to 95°

Supply Media: Air.

Supply Media Consumption (in.³):

Actuator	Swept Volume	Dead Volume
SP25, SP6SR60, SP9SR80	5	3
SP50, SP8SR40, SPI3SR60, SPI8SR80	13	4
SP100, SP18SR40, SP26SR60, SP36SR80	23	4
SP200, SP36SR40, SP52SR60, SP72SR80	45	12

DIMENSIONS



Actuator	Approximate Dimensions – inches											Approx. Wt. lbs
	A	B	C	D	E	F	G	H	J	K	L	
SP25	3.50	7.00	2.31	4.06	2.94	5.81	0.63	1/4-20	2.00	0.56	1/8-NPT	2.5
SP50	3.88	7.75	2.63	4.69	3.25	6.44	0.63	1/4-20	2.00	0.56	1/4-NPT	3.6
SP100	4.81	9.63	3.06	5.88	4.56	9.13	1.00	3/8-16	3.00	0.75	1/4-NPT	8.3
SP200	5.44	10.88	3.69	7.06	5.13	10.25	1.00	3/8-16	3.00	0.75	1/4-NPT	14.0

Actuator	Approximate Dimensions – mm											Approx. Wt. kg
	A	B	C	D	E	F	G	H	J	K	L	
SP25	89	178	67	103	75	148	16	1/4-20	51	13	1/8-NPT	1.1
SP50	99	197	67	119	83	164	16	1/4-20	51	13	1/4-NPT	1.6
SP100	122	247	78	149	116	232	25	3/8-16	76	19	1/4-NPT	3.8
SP200	138	276	94	179	130	260	25	3/8-16	76	19	1/4-NPT	6.4

Approximate Solenoid Dimensions – inches					
Solenoid	R	S	T	U	V
NJN-4W-N4	3.10	1.00	2.76	2.59	2.41
NJN-4W-N7	3.88	1.00	2.76	2.59	2.41

Approximate Solenoid Dimensions – mm					
Solenoid	R	S	T	U	V
NEMA IV	79	25	70	66	61
NEMA VII	99	25	70	66	61

Note: All solenoid valves mounted to SP actuators require linkage kit LK-3158.

PARTS AND BILL OF MATERIALS

Type SP Double-Acting Actuators

Part No.	Part Name	Material	Quantity Required			
			SP25	SP50	SP100	SP200
1	Housing DA	Thermoplastic polyphenylene oxide	2	2	2	2
3	Piston ¹	Thermoplastic polyphenylene oxide	1	1	1	1
4	Piston Seal	Carboxylated Nitrile	2	2	2	2
5	Pinion Shaft	Stainless steel	1	1	1	1
6	Rack ¹	Stainless steel	1	1	1	1
7	Shaft Bearing	Nylon	2	2	2	2
8	Shaft O-Ring	Buna-N	2	2	2	2
15	Stop Plate ²	Thermoplastic polycarbonate	4	4	4	4
16	Stop Plate Shaft ²	Stainless steel	2	2	2	2
17	Stop Plate Spring	Stainless steel	2	2	2	2
18	Stop Plate Retaining Ring	Stainless steel	2	2	2	2
19	Stop Plate Shaft O-Ring	Stainless steel/Buna-N	2	2	2	2
22	Body Bolts	Stainless steel	4	4	4	4
23	Flat Washers	Stainless steel	8	8	8	8
24	Hex Nuts	Stainless steel	4	4	4	4
25	Heavy Hex Nuts	Stainless steel	4	4	NA	NA
26	Housing Seal	Buna-N/Polyethylene	1	1	1*	1*
27	Indicator Plate	Stainless steel	1	1	1	1
28	Indicator Pointer	Carbon steel	1	1	1	1
29	Indicator Retaining Ring	Stainless steel	1	1	1	1
30	Indicator Plate Bolts	Nylon	3	3	3	3
31	Nameplate	Mylar [®]	1	1	1	1
32	Flat Washers	Stainless steel	4	4	4	4
35	Retaining Ring	Stainless steel	1	NA	NA	NA
36	Thrust Washer	Stainless steel	1	NA	NA	NA
39	Conical Spring	Stainless steel	2	2	2	2
40	Tag	Mylar [®]	2	2	2	2
41	Hex Head Screw	Carbon Steel	2	2	–	–

Note 1: The rack is permanently attached to the piston.
Disassembly is not recommended.

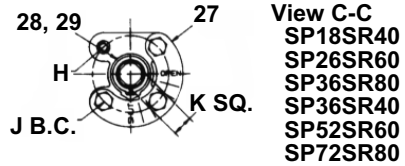
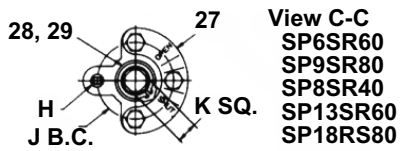
Note 2: The shaft is permanently attached to the stop plate.
Disassembly is not recommended.

* Housing seal is polyethylene
for SP100 and SP200

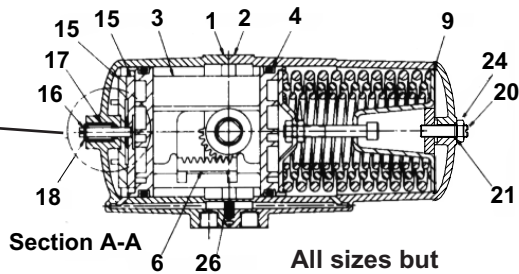
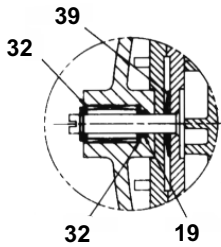
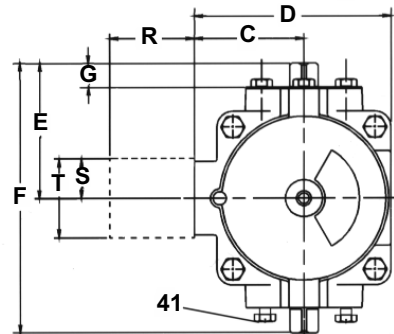
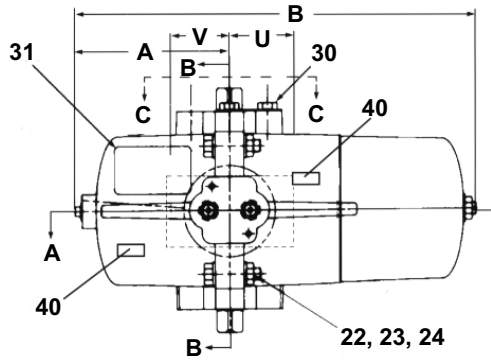
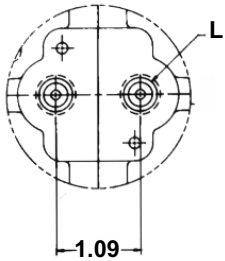
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DIMENSIONS

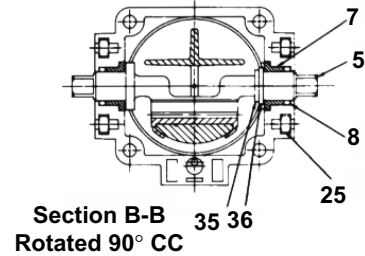
Type SP-SR Spring Return Actuators



NAMUR Solenoid Interface



Section A-A
 All sizes but
 SP6-SR60
 SP9-SR80



Section B-B
 Rotated 90° CC

Actuator	Approximate Dimensions – inches											Approx. Wt. lbs
	A	B	C	D	E	F	G	H	J	K	L	
SP6SR60	3.50	9.31	2.31	4.06	2.94	5.81	0.63	1/420	2.00	0.56	1/8NPT	4.3
SP9SR80	3.50	9.31	2.31	4.06	2.94	5.81	0.63	1/420	2.00	0.56	1/8NPT	4.9
SP8SR40	3.88	10.31	2.63	4.69	3.25	6.44	0.63	1/420	2.00	0.56	1/4NPT	6.2
SP13SR60	3.88	10.31	2.63	4.69	3.25	6.44	0.63	1/420	2.00	0.56	1/4-NPT	6.8
SP18SR80	3.88	10.31	2.63	4.69	3.25	6.44	0.63	1/420	2.00	0.56	1/4NPT	7.6
SP18SR40	4.81	13.69	3.06	5.88	4.56	9.13	1.00	3/816	3.00	0.75	1/4-NPT	13.0
SP26SR60	4.81	13.69	3.06	5.88	4.56	9.13	1.00	3/816	3.00	0.75	1/4NPT	15.0
SP36SR80	4.81	13.69	3.06	5.88	4.56	9.13	1.00	3/816	3.00	0.75	1/4NPT	17.6
SP36SR40	5.44	16.50	3.69	7.06	5.13	10.25	1.00	3/816	3.00	0.75	1/4NPT	26.3
SP52SR60	5.44	16.50	3.69	7.06	5.13	10.25	1.00	3/816	3.00	0.75	1/4NPT	29.0
SP72SR80	5.44	16.50	3.69	7.06	5.13	10.25	1.00	3/816	3.00	0.75	1/4NPT	33.6

Actuator	Approximate Dimensions – mm											Approx. Wt. kg
	A	B	C	D	E	F	G	H	J	K	L	
SP6SR60	89	236	59	103	75	148	16	1/420	51	13	1/8-NPT	2.0
SP9SR80	89	236	59	103	75	148	16	1/420	51	13	1/8-NPT	2.2
SP8SR40	99	262	67	119	83	164	16	1/420	51	13	1/4-NPT	2.8
SP13SR60	99	262	67	119	83	164	16	1/420	51	13	1/4-NPT	3.1
SP18SR80	99	262	67	119	83	164	16	1/420	51	13	1/4-NPT	3.4
SP18SR40	122	348	78	149	116	232	25	3/816	76	19	1/4-NPT	5.9
SP26SR60	122	348	78	149	116	232	25	3/816	76	19	1/4-NPT	6.8
SP36SR80	122	348	78	149	116	232	25	3/816	76	19	1/4-NPT	8.0
SP36SR40	138	419	94	179	130	260	25	3/816	76	19	1/4-NPT	12.0
SP52SR60	138	419	94	179	130	260	25	3/816	76	19	1/4-NPT	13.2
SP72SR80	138	419	94	179	130	260	25	3/8-16	76	190	1/4-NPT	15.2

Approximate Solenoid Dimensions – inches					
Solenoid	R	S	T	U	V
NJN-3W-N4	3.10	.88	1.75	1.95	1.00
NJN-3W-N7	3.10	.88	1.75	1.95	1.00

Approximate Solenoid Dimensions – mm					
Solenoid	R	S	T	U	V
NEMA IV	79	22	44	50	25
NEMA VII	79	22	44	50	25

Note: All solenoid valves mounted to SP actuators require linkage kit LK-3158.

PARTS AND BILL OF MATERIALS

Type SP-SR Spring-Return Actuators

Part No.	Part Name	Material	Quantity			
			SP6SR60 SP9SR80	SP8SR40 SP13SR60 SP18SR80	SP18SR40 SP26SR60 SP36SR80	SP36SR40 SP52SR60 SP72SR80
1	Housing DA	Thermoplastic polyphenylene oxide	1	1	1	1
2	Housing SR	Thermoplastic polyphenylene oxide	1	1	1	1
3	Piston ¹	Thermoplastic polyphenylene oxide	1	1	1	1
4	Piston Seal	Carboxylated Nitrile	2	2	2	2
5	Pinion Shaft	Stainless steel	1	1	1	1
6	Rack ¹	Stainless steel	1	1	1	1
7	Shaft Bearing	Nylon	2	2	2	2
8	Shaft O-Ring	Buna-N	2	2	2	2
9*	Spring Cartridge Assembly	Carbon Steel	See* Note Below			
15	Stop Plate ²	Thermoplastic polycarbonate	2	2	2	2
16	Stop Plate Shaft ²	Stainless steel	1	1	1	1
17	Stop Plate Spring	Stainless steel	1	1	1	1
18	Stop Plate Retaining Ring	Stainless steel	1	1	1	1
19	Stop Plate Shaft O-Ring	Stainless steel/Buna-N	1	1	1	1
20	Set Screw	Stainless steel	1	1	1	1
21	Set Screw Seal	Buna-N	1	1	1	1
22	Body Bolts	Stainless steel	4	4	4	4
23	Flat Washers	Stainless steel	8	8	8	8
24	Hex Nuts	Stainless steel	4	4	4	6
25	Heavy Hex Nuts	Stainless steel	4	4	NA	NA
26	Housing Seal	Buna-N/Polyethylene	1	1	1†	1†
27	Indicator Plate	Stainless steel	1	1	1	1
28	Indicator Pointer	Carbon steel	1	1	1	1
29	Indicator Retaining Ring	Stainless steel	1	1	1	1
30	Indicator Plate Bolts	Nylon	3	3	3	3
31	Nameplate	Mylar®	1	1	1	1
32	Flat Washers	Stainless steel	2	2	2	2
35	Retaining Ring	Stainless steel	1	NA	NA	NA
36	Thrust Washer	Stainless steel	1	NA	NA	NA
39	Conical Spring	Stainless steel	1	1	1	1
40	Tag	Mylar®	2	2	2	2
41	Hex Head Screw	Carbon Steel	2	2	-	-

* This is a permanent assembly that should not be disassembled in the field. If repair is necessary, unit must be returned to the factory.

Note 1: The rack is permanently attached to the piston. Disassembly is not recommended.

Note 2: The shaft is permanently attached to the stop plate. Disassembly is not recommended.

† Housing seal is polyethylene for SP18SR40 through SP72SR80

Actuator Selection

To select the proper actuator for a particular valve and service, first determine the maximum operating torque that will be required for the valve from the applicable valve torque table in the appropriate valve bulletin. Then refer to the appropriate mode of operation of the actuator in the torque output tables and select the actuator that will, at the available air supply pressure, provide a torque output no less than the required operating torque for the valve. In the event confirmation by Jamesbury Inc. is desired of the selection of an actuator for a given valve under specific service conditions, include full details on trim and seat materials, and on fluid characteristics.

Output Torque of Double-Acting Actuators, ft. lbs. (NM)

Actuator	Supply Pressure - psi							
	30	40	50	60	70	80	90	100
SP25	7	10	12	15	17	20	22	25
SP50	15	20	25	30	35	40	45	50
SP100	30	40	50	60	70	80	90	100
SP200	60	80	100	120	140	160	180	200

Actuator	Supply Pressure - bar							
	2.1	2.8	3.5	4.1	4.8	5.5	6.2	6.9
SP25	9	14	16	20	23	27	30	34
SP50	20	27	34	41	47	54	61	68
SP100	41	54	68	81	95	108	122	136
SP200	81	108	136	163	190	217	244	271

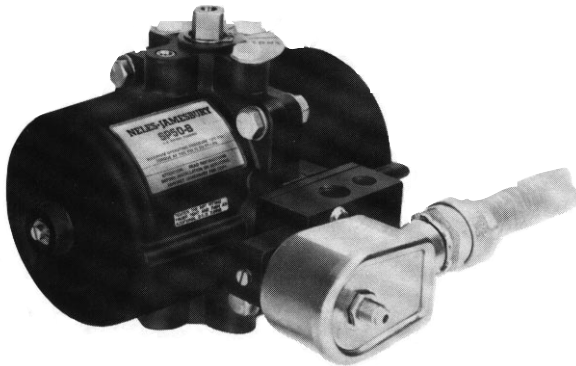
Output Torque of Spring-Return Actuators, ft. lbs.

Actuator Type	Spring Torque ft. lbs.	Air Torque – ft. lbs.					
		Supply Pressure 40 psi	Supply Pressure 50 psi	Supply Pressure 60 psi	Supply Pressure 70 psi	Supply Pressure 80 psi	Supply Pressure 90 psi
SP6SR60	6			8	11		
SP9SR80	9					9	13
SP8SR40	8	10	15				
SP13SR60	13			14	19		
SP18SR40	18	16	28				
SP18SR80	18					18	23
SP26SR60	26			27	32		
SP36SR40	36	32	56				
SP36SR80	36					36	46
SP52SR60	52			56	76		
SP72SR80	72					72	92

Output Torque of Spring-Return Actuators, Nm

Actuator Type	Spring Torque Nm	Air Torque – Nm					
		Supply Pressure 2.8 bar	Supply Pressure 3.5 bar	Supply Pressure 4.1 bar	Supply Pressure 4.8 bar	Supply Pressure 5.5 bar	Supply Pressure 6.2 bar
SP6SR60	80			11	15		
SP9SR80	12					12	18
SP8SR40	11	14	20				
SP13SR60	18			19	26		
SP18SR40	24	22	38				
SP18SR80	24					24	31
SP26SR60	35			37	43		
SP36SR40	49	43	76				
SP36SR80	49					49	62
SP52SR60	70			76	103		
SP72SR80	98					98	125

Solenoids



JAMESBURY direct-mounted solenoid valves are available in both 3-way and 4-way versions, which, when used with interface kit LK3158, mount directly to the actuator in accordance with NAMUR and VDI/VDE 3845 standards. In general, 3-way solenoids are used for spring-return actuators (SP) and 4-way versions for double-acting (SP-SR).

ORDERING JAMESBURY TYPE SP AND SP-SR ACTUATORS

To order an actuator mounted and tested on a valve, the actuator designation should be given after the designation for the valve. For Type SP-SR spring-return actuators, mode of spring operation should be stated.

Examples: 2" Fig. 21-2236TT-0 with Type SP25 actuator, or 1-1/2" Fig. 5150-31-3600TT with Type SP9SR80 actuator, spring-to-close.

Actuator Orientation

While Type SP and SP-SR actuators may be mounted on JAMESBURY valves in any of four directions, standard orientation of these actuators when furnished on valves is with the axis of the actuator parallel to the pipeline unless otherwise specified. Standard spring orientation is fail-closed unless otherwise specified.

Actuator Accessories and Controls

Information on available limit switches is contained in Bulletin A161-2.

Whenever periodic cycling of a valve is required for draining, blowdown, flushing, or sampling of a system, a JAMESBURY Type PPV programmable valve controller permits accomplishing the function automatically. Mounted directly to the valve actuator's solenoid pilot valve or wall mounted and wired to the solenoid valve, the unit provides appropriately timed flow of current for required valve operation. Easily set miniature switches allow setting time intervals for cycling the valve from one minute to sixty-three hours, and setting valve-open times from ten seconds to sixty-three minutes.

	NJN-3W-N4 (NEMA IV) NJN-3W-N7 (NEMA VII)	NJN-4W-N4 (NEMA IV) NJN-4W-N7 (NEMA VII)	NJN-4W-4HF (NEMA IV) NJN-4W-N7HF (NEMA VII)
Configuration	3-way	4-way	4-way
Pipe Size	1/4"	1/4"	1/4"
Cv	0.17	0.55	1.2
Max. Pressure	150 psi		
Voltage	Standard: 120 VAC 60 Hz (110/50) Optional: 240 VAC 60 Hz (220/50); 12 VDC; 24 VDC		
Body Material	Standard: Aluminum Optional: Stainless Steel		
Power consumption	Standard: 10 Watts Optional: 1.5 Watts; 0.6 Watts (DC only)		

Note: Please consult factory for other solenoid valves or additional options including special voltages, double solenoids, special electrical connections, etc.

To order an actuator for installation on a valve already in service, the order should specify the type and size of valve on which the actuator will be mounted in order that correct linkage and mounting kits will be supplied. Contact your Jamesbury Inc. distributor for further information.

Installation, Maintenance and Operation Instructions:

IMO's (Installation, Maintenance and Operating instructions) or AMI's (Assembly, Mounting and Installation Instructions) are shipped with the products. Additional copies of these instructions are available. Call your local Metso Automation Distributor, or visit our web site.

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