

ASD Series

Spring-Diaphragm Actuators



ALLIED ASD
Spring-Diaphragm Rotary Actuators

By utilizing proven spring material, advanced filler reinforced diaphragm technologies, precision engineering of the crankshaft, and the connecting rod design, the ASD Spring-Diaphragm Rotary Actuators are developed specifically for quarter turn valve automation applications to provide safe and reliable operation even with minimal media supply pressure. The design separates the supply power media chamber from the spring sets allowing the actuator to be operated by unfiltered air, gas, water or mineral-based hydraulic fluid. The housing is constructed using a ductile iron and carbon steel casting that is coated with a polyester powder process to ensure exceptional corrosion resistance in most field environments. The independent media chamber is also equipped with a Buna-N diaphragm reinforced with special compound polyamine fabric, allowing the actuators to work in the temperature conditions from as low as -40 and to +390°F.

Warning:
The two EYEBOLTS are provided to assist in valve mounting assemble only. USE EYEBOLTS with lifting straps for safe handling. Refer to IOM 3.1 for Handling Installation Instruction.



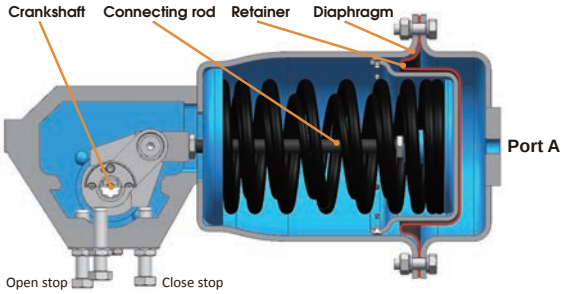


Operating Principle

Spring Stroke

Upon loss of pressure (air) on port A, the stored energy in the compressed springs forces the diaphragm retainer and connection rod to move right and the crankshaft to rotate clock-wise which can be limited by an adjustable close stop.

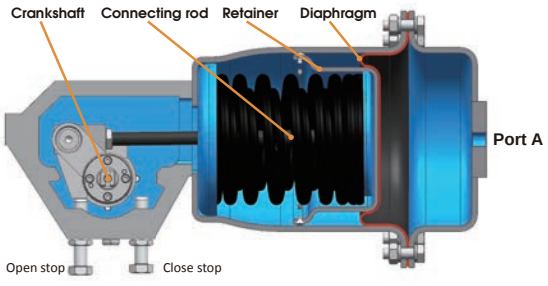
FIELD REVERSIBLE: Fail Closed or Fail Open operation is achieved by inverting the actuator.



Spring Stroke

Air Stroke

By supplying media (air) to port A, pressure forces the diaphragm retainer and connection rod to move left, causing the springs to be compressed. The crankshaft will be rotated counter clock-wise which is limited by an adjustable open stop.



Air Stroke

MAIN FEATURES



- **Universal Mounting Pads – Direct Mount**

  A combination of different mounting pad dimensions allow users to directly replace other existing spring-diaphragm actuators or mount directly to new and existing quarter turn valves.

- **Namur Mount**

  The design of the unit makes it easy to mount for various control accessories, such as limit switches, solenoid valves, positioners, and decluchable manual overrides.

- **Multiple Drive Bushings (Removable & Replaceable)**

  The removable drive bushings allow users to mount ASD actuators to a number of different valve stem configurations wheather in the field on existing valves or on new valve applications.

- **High Cycle Life Design & Low-Friction Bearing**

  The actuators feature a rolling diaphragm design with a one-piece diaphragm retainer and its UMWPH bearing which helps achieve superior longevity of the life cycle and exceptionally smooth actuation due to the low friction generated during operations. Cycle life over 1 million cycles.

- **Reversible in Field Fail Open or Fail Closed Option**

  By simply inverting the actuator and bushings, the ASD actuators can be quickly and easily changed to fail open or fail closed position in the field.

- **Torque Ranges**

  The ASD actuators provide various output torque ranges: from 133 in-lbs to 12,682 in-lbs depending on the actuator size, spring configuration, and available media supply pressures.

- **Supply Pressures**

  The ASD Series Actuators can be operated with numerous designated media supply pressures ranging from 15 psig to 100 psig.

- **Supply Media**

  The ASD Series Actuators can be operated by air, gas, water or mineral-based hydraulic fluid.

- **Travel Stops**

  There are two adjustable travel stops that allow actuators to be adjusted to the fully open or fully closed positions. With extend adjustment bolts, the actuators can be used to adjust a rotary control valve from 60-95 degrees.

- **Mechanical Lockout Option**

  A lockout screw is used to positively lock the unit in the spring failure mode.

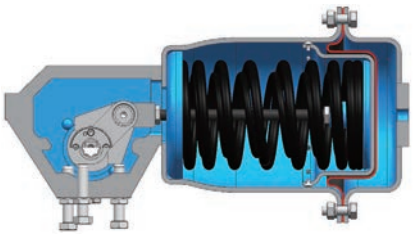
- **Corrosion Resistant**

  Standard surface body and cover are fully applied with a UV Protection polyester powder coating combined with stainless steel external fasteners provides durability and protection in a corrosive environment. PTFE coating is also available as an option.

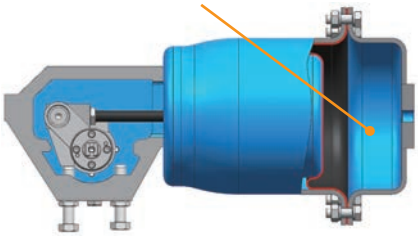
- **Maintenance Free Lubrication**

  All actuators are lubricated at the factory during the time of production. No further lubrication is required during the life cycle.

Mechanical Lock-Spring Failure Mode

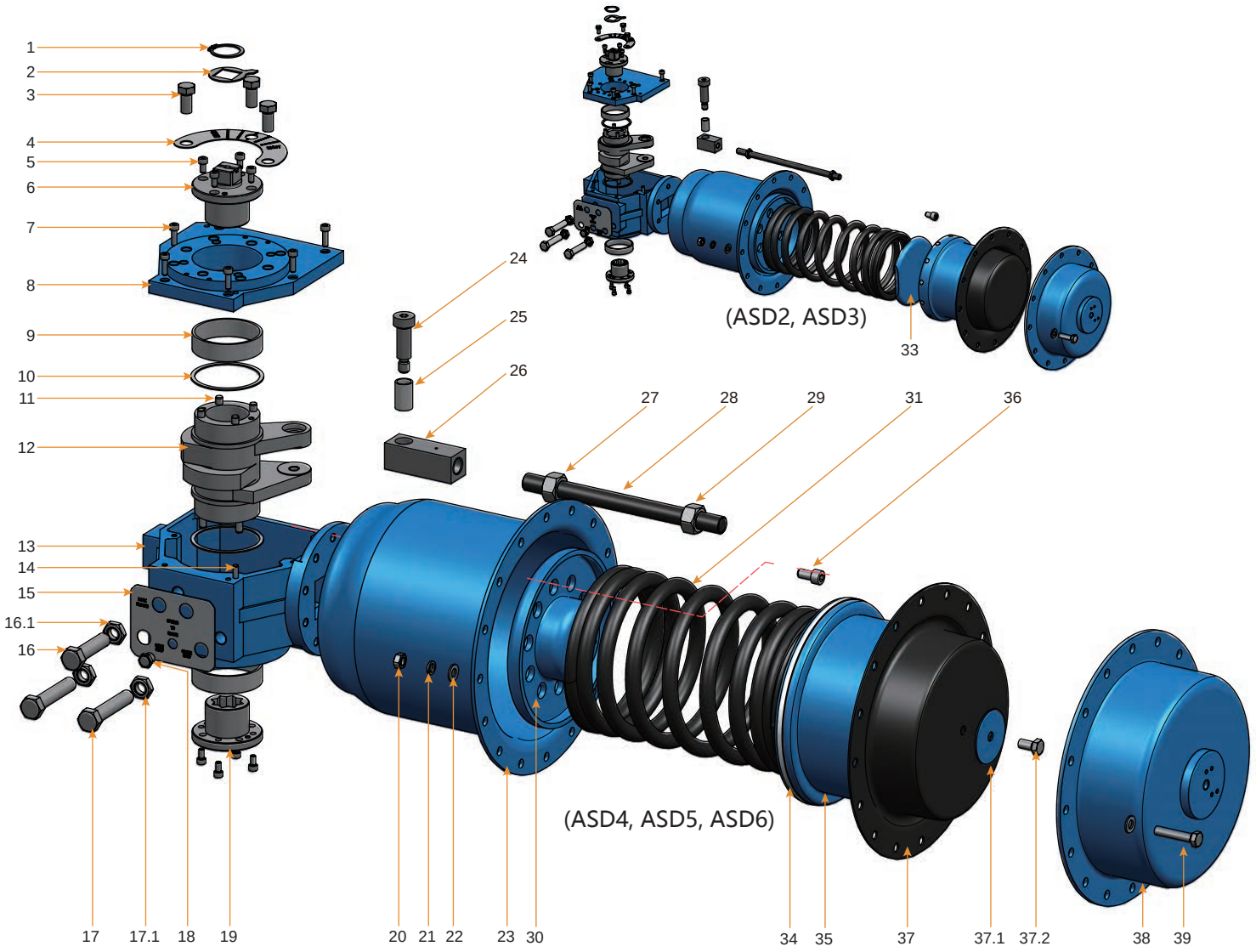


Independent Media Chamber





EXPLODED VIEW



BILL OF MATERIALS & PARTS LIST



NO.	Part Name	Qty.			Material	Surface treatment
		ASD2/3	ASD4/5	ASD6		
1	Snap Ring	1	1	1	Stainless Steel 304	
2	Indicator Pointer	1	1	1	Stainless Steel 304	
3	Hex Head Cap Screw	3	3	3	Stainless Steel 304	
4	Indicator Plate	1	1	1	Stainless Steel 304	
5	Socket Head Bushing Screws	8	8	8	Stainless Steel 304	
6	Namur Stem Namur	1	1	1	Carbon Steel	Nickel Coated Chemically
7	Socket Head Cap Screw	6	6	6	Stainless Steel 304	
8	Cover	1	1	1	Carbon Steel	Polyester Powder Coated
9	Driver Arm Bearing	2	2	2	Stainless Steel w/ Acetal Lining	
10	Thrust Beating	2	2	2	Nylon	
11	Cylindrical Pin	8	8	8	Carbon Steel	
12	Driver Arm	1	1	1	Ductile Iron	Nickel Coated Chemically
13	Driver Housing	1	1	1	Ductile Iron	Polyester Powder Coated
14	Cylindrical Pin	2	2	2	Stainless Steel 304	
15	Nameplate	1	1	1	Stainless Steel 304	
16	Set Screw	1	1	1	Stainless Steel 304	
16.1	Hex Jam Nut	1	1	1	Stainless Steel 304	
17	Stop Screws	2	2	2	Stainless Steel	
17.1	Hex Jam Nut	2	2	2	Stainless Steel 304	
18	Breather	1	1	1	Stainless Steel 316	
19	Drive Bushing	1	1	1	Carbon Steel	Nickel Coated Chemically
20	Lock Nut	12	12	24	Stainless Steel	
21	Spring Washer	12	12	24	Stainless Steel	
22	Gasket	24	24	48	Stainless Steel	
23	Spring Housing	1	1	2	Carbon Steel	Polyester Powder Coated
24	Shoulder Screw	1	1	2	Carbon Steel (12.8)	
25	Clevis Bearing	1	1	2	Stainless Steel w/ Acetal Lining	
26	Clevis	1	1	2	Carbon Steel	
27	Hex Jam Nut	1	1	2	Stainless Steel 304	
28	Acuator Rod	1	1	2	Carbon Steel	
29	Hex Jam Nut	1	1	2	Carbon Steel	
30	Spring Retainer	1	1	2	Carbon Steel	Polyester Powder Coated
31 / 32	Compression Springs	1	1	2	55Mn Spring Steel 55Mn	Polishing Capacitance Coated
33	Spring Retainer Plate	1	–	–	Carbon Steel	Polyester Powder Coated
34	Diaphragm Retainer Bearing Pins	12	–	–	UHMW PE	
34	Diaphragm Retainer Bearing	–	1	2	POM	
35	Diaphragm Retainer	1	1	2	Carbon Steel	Polyester Powder Coated
36	Hex Head Cap Screw	4	4	8	Carbon Steel	
37	Diaphragm	1	1	2	NBR / Nylon66 Fabric Blend (-25°C~70°C)	
	Diaphragm (optional)	1	1	2	LNBR / Nylon66 Fabric Blend (-40°C~70°C)	
	Diaphragm (optional)	1	1	2	EPDM4 / Polyester Fabric Blend (-29℃~170°C)	
	Diaphragm (optional)	1	1	2	Viton / NOMEX Fabric Blend (-15°C~200°C)	
37.1	Retaining Washer	–	1	2	Stainless steel	
37.2	Hex Head Cap Screw	–	1	2	Stainless steel	
38	Diaphragm Cover	1	1	2	Carbon Steel	Polyester Powder Coated
39	Hex Head Cap Screw	12	12	24	Stainless Steel 304	



How To Order By Part Number

ASD | 3 | C | MI | FS | MN | T1

T1 – Environment Temperature
- T1: -25℃ ~ 70℃ (-13°F ~ 158°F)
- T2: -40℃ ~ 70℃ (-40°F ~158°F)
- T3: -29℃ ~170℃ (-20°F~338°F)
- T4: -15℃ ~ 200℃ (5°F ~ 392°F)

MN – Top Drive
- MN-Namur Stem
- FS-Female Star (Double Square)
- FK-Female Keys
- FD-Female Double D
- MQ-Male Square
- MT/JT-Male Star (ISO 5211 Star / JB Star)
- MD-Male Double D

FS – Bottom Drive
- FS-Female Star (Double Square)
- FK-Female Keys
- FD-Female Double D
- MQ-Male Square
- MT/JT-Male Star (ISO 5211 Star / JB Star)
- MD-Male Double D
- MN-Namur Stem

MI – Flange Mount Configuation
- MI-ISO 5211 Mount
- MJ-ISO + JB Mount

C – Spring Configurations
- A - Supply media pressure at 15 – 30 / 1.0 – 2.0 (psi / bar)
- B1- Supply media pressure at 30 – 50 / 2.0 – 3.4 (psi / bar)
- B2- Supply media pressure at 50 – 70 / 3.4 – 4.8 (psi / bar)
- C - Supply media pressure at 60 – 80 / 4.1 – 5.5 (psi / bar)
- D - Supply media pressure at 70 – 90 / 4.8 – 6.2 (psi / bar)

3 – Actuator Size
- 2-Maximum spring return output torque 885 / 100 (in·lbs / N·m)
- 3-Maximum spring return output torque 1752 / 198 (in·lbs / N·m)
- 4-Maximum spring return output torque 3363 / 380 (in·lbs / N·m)
- 5-Maximum spring return output torque 7045 / 796 (in·lbs / N·m)
- 6-Maximum spring return output torque 12682 / 1433 (in·lbs / N·m)

ASD – ALLIED Spring-Diaphragm Rotary Actuator

Working Conditions

Maximum Operating Pressure: 7 bar (100 PSI)
Temperature Rating: -25℃ to 70℃ (-13°F to 158°F)
Optional Temperature Rating: -40℃ to 70℃ (-40°F to 158°F)
Optional Temperature Rating: -29℃ to 170℃ (-20°F to 338°F)
Optional Temperature Rating: -15℃ to 200℃ (5°F to 392°F)
Rotation Adjustment: ＜±5° adjustment at open or closed positions.
Supply Media: Air, water, mineral-based hydraulic fluid.

* Larger solenoid pilot valves may be used to increase operating speeds. Actual times may vary with different applications. Please consult the factory for more specific details based on application requirements.



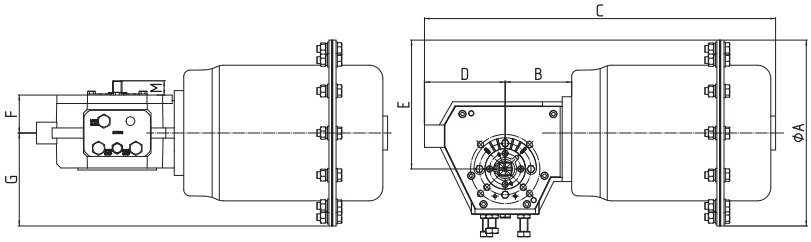
ASD Actuator Output Torques (lbf.in)

Size	Air Stroke at Presure (PSI)									Spring Stroke
	15	20	30	40	50	60	70	80	90	End of Spring(ETC)
	End of Air (ETO)									
ASD2A	55	169	458							133
ASD2B1			73	357	610					425
ASD2B2					314	607	863			575
ASD2C						429	712	977		681
ASD2D							534	817	1099	885
ASD3A	201	469	1053							310
ASD3B1			275	872	1436					885
ASD3B2					718	1250	1780			1151
ASD3C						804	1335	2042		1416
ASD3D							979	1598	2215	1752
ASD4B1			732	2180	3321					1682
ASD4B2					1436	2858	4183			2124
ASD4C						1786	2670	4439		2655
ASD4D							1958	3285	4474	3363
ASD5B1			961	3209	5296					3664
ASD5B2					2738	5047	7334			4717
ASD5C						4930	7414	9890		5496
ASD5D							4602	6898	9374	7045
ASD6B1			1730	5772	9541					6673
ASD6B2					4919	9075	13209			8496
ASD6C						8878	13351	17800		9894
ASD6D							8278	12420	16869	12682

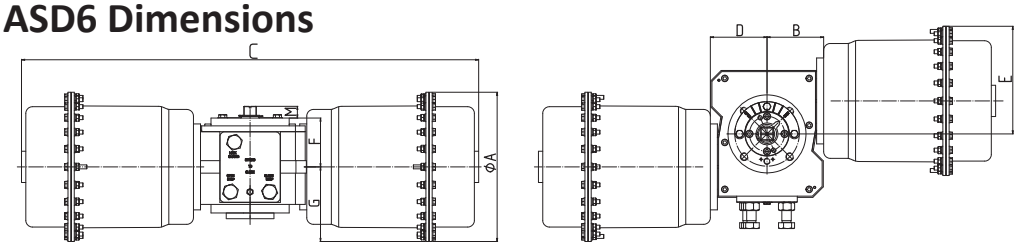


Dimensions

ASD2, ASD3, ADS4, ASD5 Dimensions



ASD6 Dimensions



Actuator Size	Approximate Dimensions (mm)							
	ØA	B	C	D	E	F	G	M
ASD-2	227	75	440	91	148	52	114	20
ASD-3	274	98	520	119	190	56	137	20
ASD-4	320	108	592	140	216	75	160	20
ASD-5	382	130	721	160	276	90	191	20
ASD-6	382	145	1170	145	276	125	191	30

Actuator Size	Approximate Dimensions (in)							
	ØA	B	C	D	E	F	G	M
ASD-2	8.94	2.95	17.32	3.58	5.83	2.05	4.49	0.8
ASD-3	10.79	3.85	20.47	4.69	7.48	2.20	5.39	0.8
ASD-4	12.60	4.25	23.31	5.51	8.50	2.95	6.30	0.8
ASD-5	15.04	5.12	28.39	6.30	10.87	3.54	7.52	0.8
ASD-6	15.04	5.71	46.06	5.71	10.87	4.90	7.52	1.18

Technical Specifications

Actuator Size	Air Volume Requirements		
	Total Volume(L)	Swept Volume(L)	Effective Diaphragm Area(cm^2)
ASD-2	1.57 (96 in^3)	1.08 (66 in^3)	155 (24 in^2)
ASD-3	3.13 (191 in^3)	2.18 (133 in^3)	245 (38 in^2)
ASD-4	6.03 (368 in^3)	4.34 (265 in^3)	387 (60 in^2)
ASD-5	11.72 (715 in^3)	8.70 (531 in^3)	619 (96 in^2)
ASD-6	23.44 (1430 in^3)	17.40 (1062 in^3)	1238 (192 in^2)

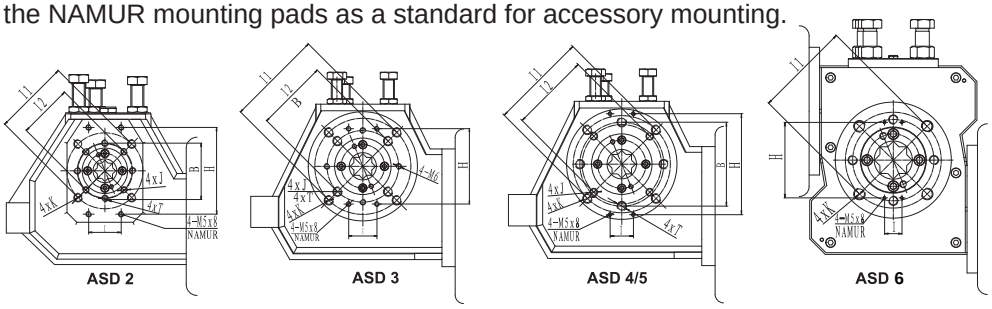
Actuator Size	Operating Speed (s)*		WT (kg/lb)
	Air Stroke	Spring Stroke	
ASD-2C	1.6	1.0	21/46
ASD-3C	3.4	1.6	33/73
ASD-4C	6.0	3.3	61/134
ASD-5C	8.0	6.3	107/236
ASD-6C	8.0	6.3	177/390

* Testing operated under 70 psi air pressure with 50 cfm flow capacity for input and exhausted.



Mounting Dimensions

The ASD Series Actuators mounting dimensions are made to ISO 5211 standards. All ASD actuators come with the NAMUR mounting pads as a standard for accessory mounting.



Unit: in (mm)

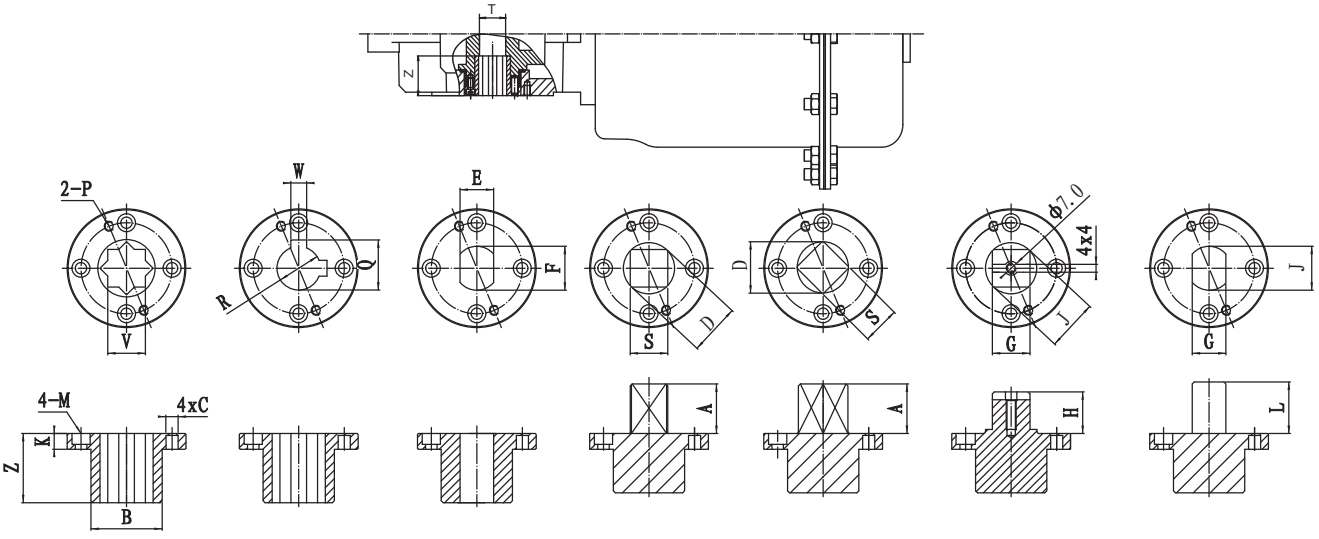
Actuator Size	Flange Mount Configuation	
	ISO 5211 Mount (MI)	ISO + Mount (MJ)
ASD2	F05 + F07	F05+JB51+F07
ASD3	F07 + F10	JB76+F10
ASD4	F10 + F12	F10+JB108+F12
ASD5	F10 + F14	F10+JB108+F14
ASD6	F16	-

Actuator Size	ISO 5211 Mount				JB* Mount		Namur (VDI/VDE 3845)	
	ØI1	K	ØI2	J	ØB	T	H	I
ASD2	2.76 (F07)	M8X13	1.97 (F05)	M6X10	2.00 (51)	1/4-20unc-2B	3.15 (80)	1.18 (30)
ASD3	4.02 (F10)	M10X16	2.76 (F07)	M8X13	3.00 (76)	3/8-16unc-2B	3.15 (80)	1.18 (30)
ASD4	4.92 (F12)	M12X20	4.02 (F10)	M10X16	4.25 (108)	1/2-13unc-2B	5.12 (130)	1.18 (30)
ASD5	5.51 (F14)	M16X25	4.02 (F10)	M10X16	4.25 (108)	1/2-13unc-2B	5.12 (130)	1.18 (30)
ASD6	6.50 (F16)	M20X25	-	-	-	-	5.12 (130)	1.18 (30)

*Industry common mount dimenstions.

Bushing Dimensions *

Drive bushings are available in keyway, double D, female double square, male square, star and namur mount.



Unit: in (mm)

Size	Female drive						Male drive									
	Double Square (FS)	Keys (FK)			Double D (FD)		Square / ISO 5211 Star (MQ / MT)			JB Star (JT**)			Namur / Double D (MN / MD)			
	V	R	Q	W	E	ØF	S	A	Ø D	S	A	Ø D	G	H	L	Ø J
ASD2	0.55 (14)	0.55 (14)	0.64 (16.3)	0.20 (5)	0.55(14)	0.71(18.1)	0.67(17)	0.75(19)	0.87(22)	0.55(14)	0.63(16)	0.69(18)	0.55(14)	0.79(20)	0.98 (25)	0.71(18)
ASD3	0.87(22)	0.87 (22)	0.98 (24.8)	0.24 (6)	0.87(22)	1.11(28.2)	0.87(22)	0.94(24)	1.10(28)	0.75(19)	0.94(24)	0.98(25)	0.87(22)	0.79(20)	1.54 (39)	1.10(28)
ASD4	1.06(27)	1.42 (36)	1.55 (39.3)	0.39 (10)	1.06(27)	1.43(36.2)	1.06(27)	1.14(29)	1.42(36)	0.98(25)	0.55(14)	1.23(31)	1.06(27)	0.79(20)	1.89 (48)	1.42(36)
ASD5	1.42(36)	1.65 (42)	1.78 (45.3)	0.47(12)	1.42(36)	1.90(48.2)	1.42(36)	1.50(38)	1.89(48)	0.98(25)	0.55(14)	1.23(31)	1.42(36)	0.79(20)	2.52(64)	1.89(48)
ASD6	1.81(46)	1.97 (50)	2.12(53.8)	0.55(14)	1.81(46)	2.37(60.2)	1.81(46)	1.89(48)	2.36(60)	-	-	-	1.81(46)	1.18(30)	3.23(82)	2.36(60)

Size	Bush Connections					
	ØB	K	Z	M / P	ØC	ØT
ASD2	0.98(25)	0.24(6)	1.18 (30)	M4x8	0.16 (4)	0.79(20)
ASD3	1.42(36)	0.31(8)	1.38 (35)	M5x10	0.24 (6)	0.98(25)
ASD4	1.97(50)	0.39(10)	1.77 (45)	M6x12	0.31 (8)	1.46(37)
ASD5	2.20(56)	0.47(12)	2.17 (55)	M8x14	0.39 (10)	1.65(42)
ASD6	2.83(72)	0.59(15)	3.23 (82)	M12x16	0.49 (12)	2.56(65)

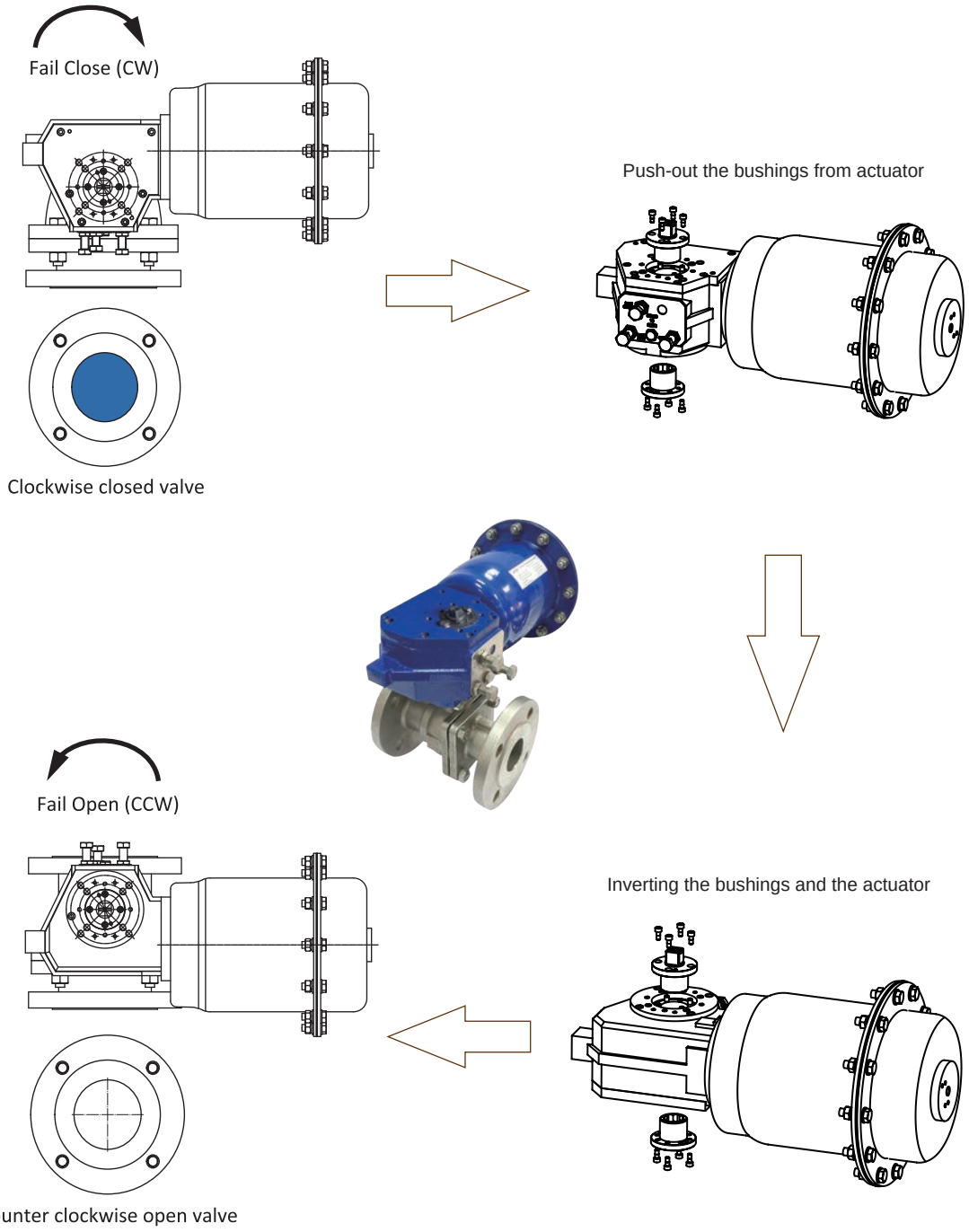
* It is available to customize the drive type.

** These dimensions are exactly the same as the industry common mount dimenstions (JB).



Fail-close to Fail-open

As for ASD series actuators, Fail-close or Fail-open operation can be quickly changed in the field by simply inverting bushings and the actuator.





Manual Override

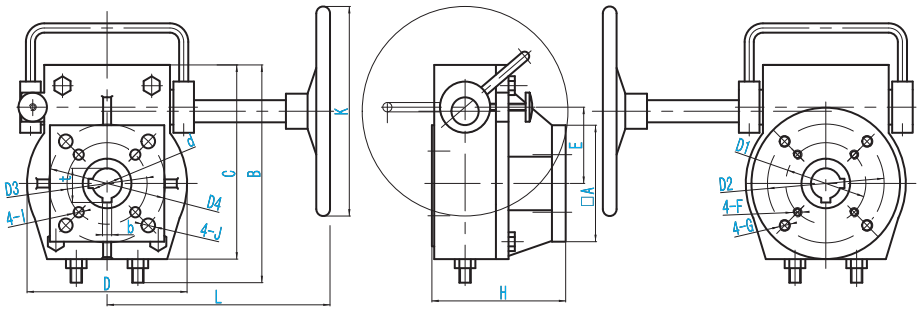
Allied Manual Overrides are available for all models of Allied ASD Series actuators. Our manual overrides can be used with any combination of the drive bushings on page 8.

Allied can also customize our manual overrides to work in various orientations and can mount the package in different applications. Consult factory for more information about Overrides and Mounting options and selection.

Override Guide

NO.	Actuator	Manual Overrider	Gear Ratio	Input Torque(Nm)	Output Torque(Nm)	Weight(Kg)
1	ASD-2	ALXL 26-1	26:1	70 (620 in.lbs)	300 (2655 in.lbs)	4.0 (8.8 lb)
2	ASD-3	ALXL 38-1	38:1	60 (531 in.lbs)	550 (4868 in.lbs)	5.5 (12.1 lb)
3	ASD-4	ALXL 38-2	38:1	60 (531 in.lbs)	550 (4868 in.lbs)	5.5 (12.1 lb)
4	ASD-5	ALXL 54-1	54:1	120 (1062 in.lbs)	1200 (10620 in.lbs)	9.0 (19.8 lb)
5	ASD-6	ALXL 98-1	98:1	300 (2655 in.lbs)	9000 (79650 in.lbs)	135 (297 lb)

ALXL series Manual Override Dimensions



Unit:in

Model	d	b	t	D1	F	D2	G	A	H	E	D3	I	D4	J	K	L	B	C	D
ALXL26-1	0.87	0.24	0.98			2.76	M8	2.76	3.90	1.99			2.76	Φ0.35	Φ7.09	6.10	6.30	5.71	4.13
ALXL38-1	1.02	0.31	1.15	2.76	M8			3.94	4.61	2.58	2.76	Φ0.35			Φ7.87	7.68	7.36	6.57	5.51
ALXL38-2	1.50	0.39	1.63			4.02	M10	4.33					4.02	Φ0.47					
ALXL54-1	1.50	0.39	1.63	4.92	M12			5.12	4.65	3.77	4.92	Φ0.55			Φ11.02	8.07	9.13	8.35	6.89
ALXL98-1	3.15	0.87	3.37	6.50	M20			9.06	7.68	9.02	6.50	Φ0.87			Φ31.50	16.14	21.65	20.87	18.11





ALLIED

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