

BI-TORQ®

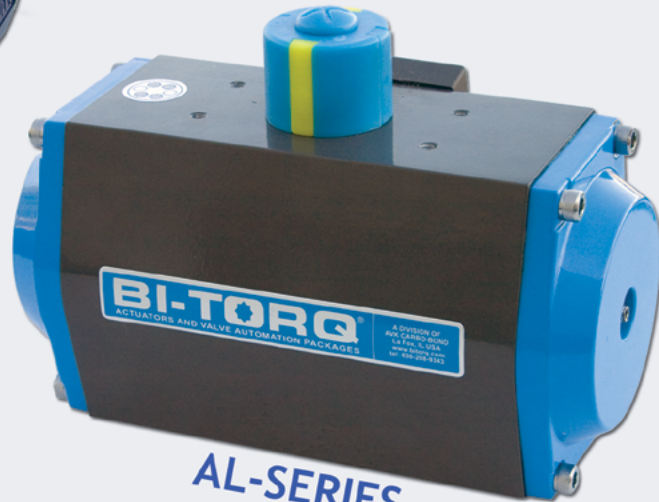
VALVE AUTOMATION



PNEUMATIC ACTUATORS



PN-SERIES

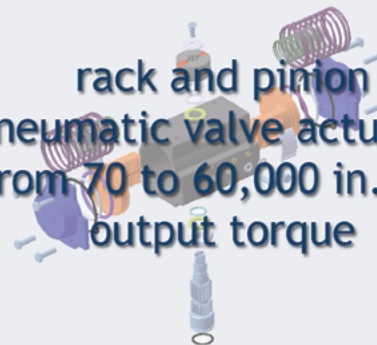


AL-SERIES



SS SERIES

rack and pinion
pneumatic valve actuators
from 70 to 60,000 in. lbs.
output torque



BI-TORQ EXTRUDED ALUMINUM RACK AND PINION PNEUMATIC ACTUATORS



PN-SERIES

PAGES 4-11

ON THE WEB AT WWW.BITORQ.COM/PNEUMATIC.HTML

- COMPACT, RELIABLE DESIGN
- OPEN-CLOSED ADJUSTMENT STOPS
- DOUBLE ACTING AND SPRING RETURN
- HIGH-VISIBILITY INDICATOR

AL-SERIES

PAGES 12-18

ON THE WEB AT WWW.BITORQ.COM/PNEUMATIC.HTML

- HIGH TORQUE OUTPUT
- WIDE SIZING AND SELECTION OPTIONS
- DOUBLE ACTING AND SPRING RETURN
- CARTRIDGE STYLE SPRINGS FOR EASY CHANGEOUTS
- CORROSION-RESISTANT BODY COATING



STANDARD FEATURES

MAXIMUM PRESSURE RATING

120 PSI/8 BAR

STANDARD TEMPERATURE RATING*

-4° F/-20° C to +180° F/+85° C

MAXIMUM TEMPERATURE RATING**

-40° F/-40° C to +350° F/+180° C

*with standard NBR70 seals

**with Viton or HNBR seals (available upon request)

- 100% FACTORY TESTED
- TWIN RACK AND PINION DESIGN FOR CONSISTENT TORQUE OUTPUT
- PRE-LUBRICATED FOR LIFE OF ACTUATOR

MOUNTING OPTIONS

VALVE MOUNTING: True ISO 5211 standard base mounting bolt patterns and a double square female output shaft provide multiple options for direct mounting to valve stems and a greater flexibility of actuator rotation. Double D pinions are also available for additional direct mount options.

ACCESSORY MOUNTING: The top mounting pad is drilled and tapped to international NAMUR and ISO standards, providing for quick and economical accessory mounting in conjunction with the NAMUR pinion shaft. The standard NAMUR slotted and threaded shaft allows for direct mounting of NAMUR limit switches, valve positioners, and position monitors.

SOLENOID MOUNTING: All BI-TORQ® actuators have an international NAMUR solenoid mounting pattern that permits direct mounting of a wide range of solenoid models. The NAMUR mount eliminates the need for pipe nipples or solenoid brackets.

DOUBLE ACTING ACTUATORS

ACTUATOR OVERVIEW

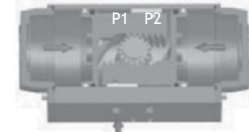
- All listed output torques are expressed in inch pounds of torque (in. lbs.).
- Charts for available air pressure are expressed in pounds per square inch (P.S.I.).
- BI-TORQ® PN-series actuators offer $\pm 5^\circ$ adjustment in the open and closed positions on PN-52 through PN-125 models. For all other models, adjustment is in the open position only. The closed position is 0° fixed. Optional retrofit kits are available to allow for adjustment in both open and closed positions on the PN-160, PN-200 and PN-270 models.

DOUBLE ACTING ACTUATOR SIZING (PLEASE SEE DOUBLE ACTING TORQUE CHART)

1. Establish the valve manufacturer's breakaway or seating/unseating torque, then add 20% as a safety factor (e.g. 115 in. lbs. valve breakaway torque x 20% = 138 in. lbs.).
2. Determine available air pressure to the actuator (e.g. 60 P.S.I.).
3. Refer to the chart, find the 60 P.S.I. column and scan down until a torque value greater than the valve torque is found (e.g. 141 in. lbs.). Then go to the left to determine the BI-TORQ® model number. In this sample case, the selected actuator would be the PN-52DA.

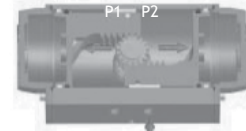
Contact our sales staff for slurry or steam services.

NOTE: The BI-TORQ® double acting actuator has no torque drop through the full 90° stroke.



CLOSED

Air to Port 1 (P1) forces the pistons inwards, causing the pinion to turn clockwise.



OPEN

Air to Port 2 (P2) forces the pistons outwards, causing the pinion to turn counterclockwise.

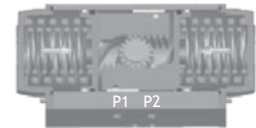
SPRING RETURN ACTUATORS

SPRING RETURN ACTUATOR TERMINOLOGY

1. **AIR STROKE:** When air is supplied to the actuator, the pistons compress the springs. The greater the spring compression, the less torque output the actuator can supply.
2. **SPRING STROKE:** When air is removed from the actuator, the stored energy in the springs forces the pistons inward. At full compression, the spring is at its maximum torque output. This is the SPRING START. When springs are uncompressed, this is the SPRING END.
3. **FAIL POSITION:** Standard BI-TORQ® actuators are preset for fail closed (CW) operation, but can be adjusted easily for fail open (CCW) rotation.

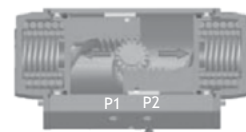
SPRING RETURN ACTUATOR SIZING (PLEASE SEE SPRING RETURN TORQUE CHART)

1. Establish the valve manufacturer's seating torque (closing) and breakaway torque (opening). Add a 20% safety factor (e.g. a valve torque of 80 in. lbs. x 20% = 96 in. lbs.).
 2. Refer to the spring torque column and select the SPRING END TORQUE that equals or exceeds the required valve torque (i.e. the BI-TORQ® model PN-63 with a 80# spring set, which has a spring end of 111 in. lbs. and a spring start of 196 in. lbs.).
 3. Determine the available air line pressure to the actuator (e.g. 80 P.S.I.). Refer to the 80 P.S.I. column and scan down to where it intersects with the PN-63 with an 80# spring. In this case, the end spring torque is 111 in. lbs., which exceeds the required 96 in. lbs. required.
- Contact our sales staff for slurry or steam services.



CLOSED

Loss of air pressure on Port 2 causes springs to drive the pistons inward. The pinion turns clockwise to close while air exhausts from Port 2.



OPEN

Air to Port 2 (P2) forces the pistons outwards, causing the springs to compress. The pinion turns counterclockwise.



BI-TORQ also provides a full line of automated ball valves with double acting and spring return pneumatic actuators pre-sized for normal operating conditions. For more information about our InstruPak series of automated valves, visit www.bitorq.com/instrupak.html or contact our sales staff.



BI-TORQ PN-SERIES PNEUMATIC ACTUATOR FEATURES

ROTATION ADJUSTMENT

BI-52 through BI-125 Models
Standard adjustment is $\pm 5^\circ$ in both the open and closed positions through easily accessible external adjustment screws.

BI-160 through BI-270 Models
Standard adjustment is $\pm 5^\circ$ in the open position. An adapter kit is available for $\pm 5^\circ$ adjustment in the closed position.

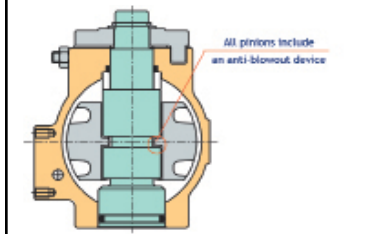
END CAPS

Epoxy coated die cast aluminum end caps provide maximum resistance against potentially corrosive elements.

HEAVY DUTY SPRINGS

True-rated spring sets create absolute confidence in all of the fail safe spring return models. The high tensile steel springs are coated with zinc phosphate for corrosion resistance. Springs can be safely and quickly modified into sets ranging from 40 pounds to 80 pounds (through 120 pounds on 200/270 models). Full length end cap bolts allow for easy and safe disassembly.

ANTI-BLOWOUT SYSTEM



INDICATOR

A disc indicator is standard on the BI-52 through BI-125 models. A high visibility open-closed dome indicator is available on all BI-TORQ actuators.

PINION

The hardened steel pinion is precision ground and then nickel plated in order to reduce friction, provide maximum wear resistance, and protect against corrosion under severe conditions. An optional stainless steel pinion is available for corrosive environments.



CE APPROVED

ACTUATOR BODY

The aluminum extrusion is hard anodized to 45-50 microns to protect against wear and corrosion while reducing piston friction to the absolute minimum.

PISTON GUIDES

Large contact areas and self-lubricating, highly-durable materials provide high thrust stability with minimum friction.

PINION SEALS

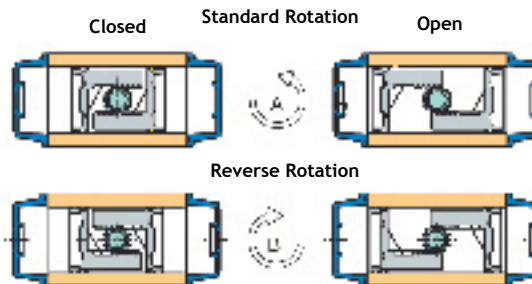
NBR-70 rubber pinion seals provide trouble-free operation at standard temperature ranges. Viton® and HNBR seals are available to high or low temperature extremes.

PISTONS

The precisely-balanced die cast aluminum pistons are fitted with high-quality rings and guides, resulting in high ratios of output torque vs. input air pressure. The twin rack and piston design creates a constant torque output on all models.

ROTATION VARIATIONS

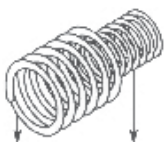
All BI-TORQ® actuators use a counterclockwise rotation to open and a clockwise rotation to close. The piston racks also can be rotated to achieve a fail open (counterclockwise to close) rotation.



OPTIONS FOR CORROSIVE ENVIRONMENTS

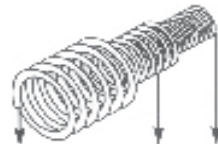
BODY: nickel plated or double epoxy coated bodies available upon request
PINION: stainless steel
END CAPS: nickel plated
ALL 316 STAINLESS STEEL ACTUATORS ALSO AVAILABLE. PLEASE CONTACT OUR SALES STAFF FOR INFORMATION.

SPRING COMBINATION OPTIONS



PN-52SR TO PN-140SR

EXTERNAL SPRING	INTERNAL SPRING	AIR SUPPLY	SET #
1	1	40PSI	01
2	X	50PSI	02
1	2	60PSI	03
2	1	70PSI	04
2	2	80PSI	05



PN-160SR AND PN-200SR

EXTERNAL SPRING	CENTRAL SPRING	INTERNAL SPRING	AIR SUPPLY	SET #
X	2	X	40PSI	01
2	X	X	50PSI	02
1	2	X	60PSI	03
2	X	2	70PSI	04
2	2	X	80PSI	05
2	2	2	100PSI	06

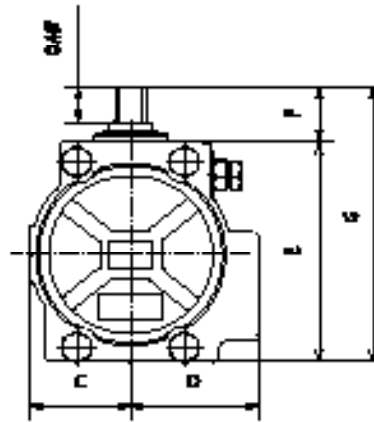
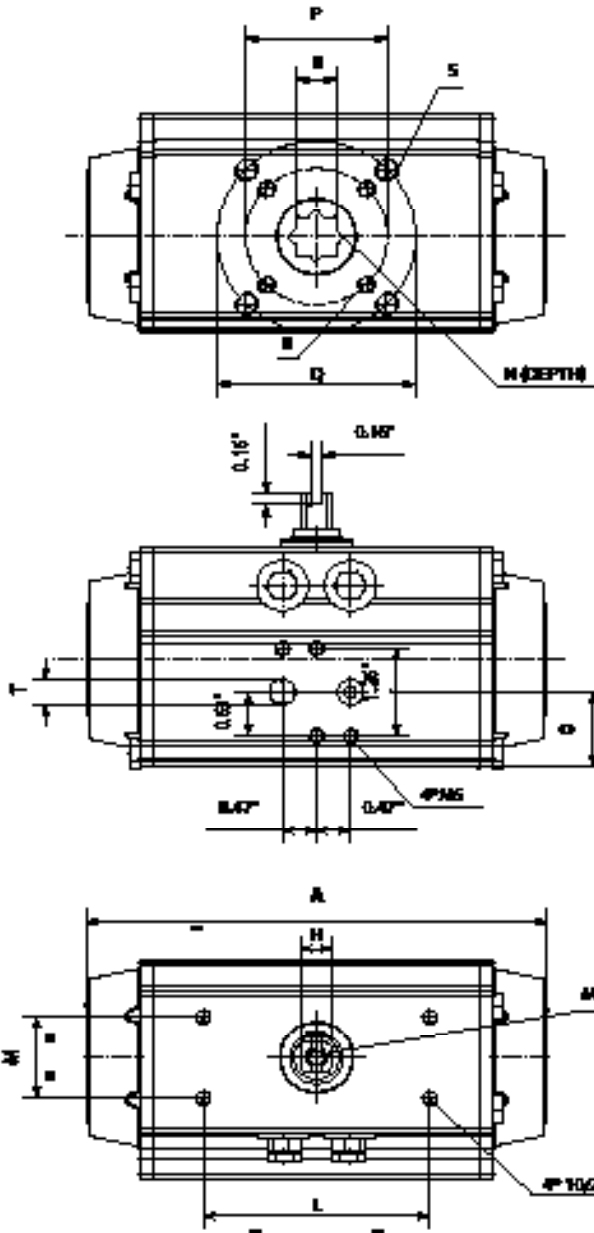


PN-270SR

SPRINGS PER SIDE	AIR SUPPLY	SET #	SPRINGS PER SIDE	AIR SUPPLY	SET #
2/3	40PSI	01	4/5	80PSI	05
3/3	50PSI	02	5/5	100PSI	06
3/4	60PSI	03	5/6	110PSI	07
4/4	70PSI	04	6/6	120PSI	08

BI-TORQ PN-SERIES DIMENSIONAL DATA

FOR ACTUATOR MODELS 52 THROUGH 140



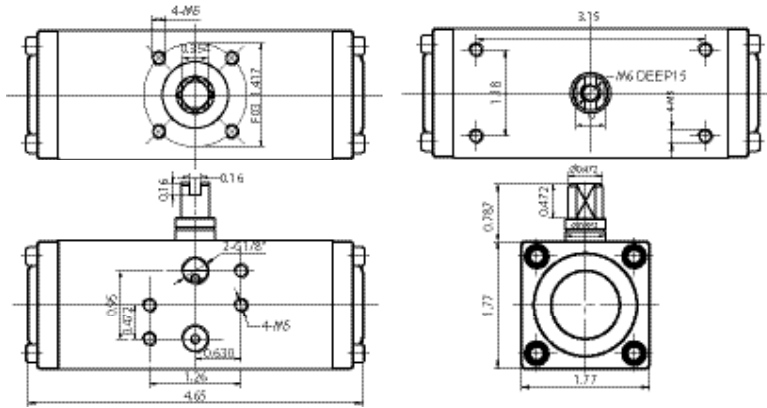
DIMENSIONAL DATA

	ISO 5211	A	B	C	D	E	F	G	H	K	L	M	N	O	P	Q	R (UNC)	S (UNC)	T (NPT)
PN-52	F03/F05	5.49	0.433	1.18	1.61	2.74	0.787	3.52	0.43	0.47	3.15	1.18	0.47	1.04	1.42	1.97	10-24 X 0.29	1/4-20 X 0.35	1/8"
PN-63	F05/F07	6.38	0.551	1.40	1.77	3.17	0.787	3.96	0.43	0.59	3.15	1.18	0.63	1.08	1.97	2.76	1/4-20 X 0.31	5/16-18 X 0.47	1/8"
PN-75	F05/F07	8.15	0.669	1.65	2.07	3.82	0.787	4.61	0.67	0.75	3.15	1.18	0.75	1.38	1.97	2.76	1/4-20 X 0.31	5/16-18 X 0.47	1/8"
PN-85	F05/F07	9.35	0.669	1.87	2.30	4.27	0.787	5.06	0.67	0.87	3.15	1.18	0.75	1.65	1.97	2.76	1/4-20 X 0.31	5/16-18 X 0.47	1/8"
PN-100	F07/F10	10.69	0.669	2.17	2.68	4.78	0.787	5.57	0.67	0.87	3.15	1.18	0.81	1.97	2.76	4.02	5/16-18 x 0.47	3/8-16 x 0.55	1/4"
PN-115	F07/F10	12.91	0.869	2.52	2.87	5.57	1.180	6.75	1.06	1.26	5.12	1.18	0.94	1.97	2.76	4.02	5/16-18 x 0.47	3/8-16 x 0.59	1/4"
PN-125	F07/F10	14.41	0.869	2.68	3.15	6.04	1.180	7.22	1.06	1.26	5.12	1.18	0.94	2.40	2.76	4.02	5/16-18 x 0.47	3/8-16 x 0.59	1/4"
PN-140	F10/F12	16.85	1.060	3.01	3.44	6.93	1.180	8.11	1.06	1.38	5.12	1.18	1.14	2.80	4.02	4.92	3/8-16 x 0.59	1/2-13 x 0.71	1/4"

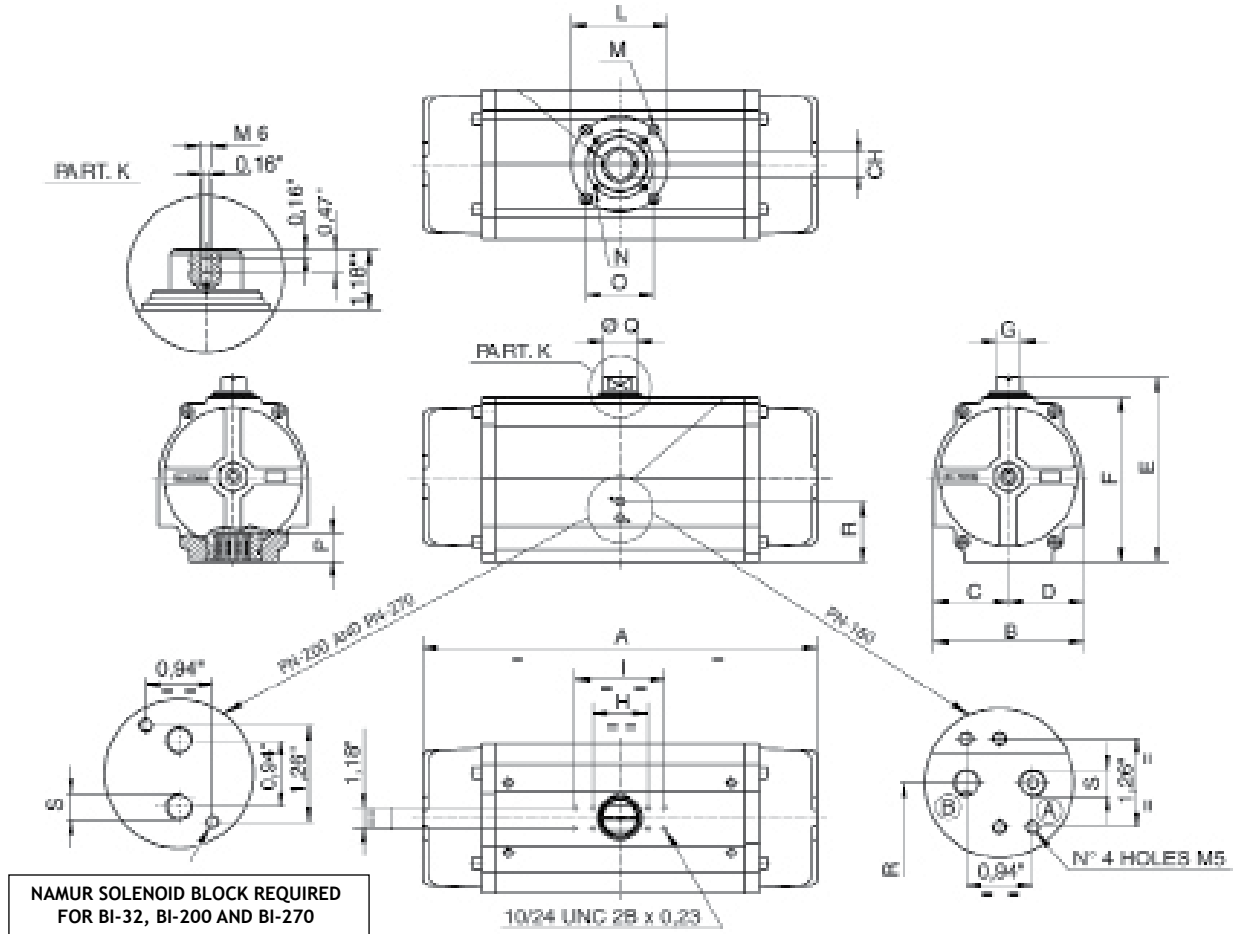
BI-TORQ PN-SERIES DIMENSIONAL DATA

FOR ACTUATOR MODELS 32, 160, 200, AND 270

MODEL PN-32DA



MODELS PN-160 THROUGH PN-270



NAMUR SOLENOID BLOCK REQUIRED FOR BI-32, BI-200 AND BI-270

DIMENSIONAL DATA

	ISO 5211	CH	A	B	C	D	E	F	G	H	I	L	M (UNC)	N (UNC)	O	P	Q	R	S (NPT)	T	U	V	W	Z	Y	X
PN-160	F10-12	1.06	20.55	7.36	3.94	3.94	8.58	7.40	1.18	3.15	5.12	4.92	1/2-13 X 0.71	3/8-16 X 0.59	4.72	1.26	1.38	3.21	1/4"	6.29	1.77	2.20	2.50	1.42	1.06	1.89
PN-200	F14	1.42	22.64	8.58	4.29	4.29	10.59	9.41	1.42	3.15	5.12	5.51	5/8-11 x 0.98	---	---	1.54	1.97	3.46	1/4"	7.48	2.03	2.52	3.11	1.90	1.41	1.52
PN-270	F16	1.81*	26.46	11.42	5.71	5.71	14.21	13.03	1.42	3.15	5.12	6.50	3/4-10 X 1.18	---	---	2.05	1.97	4.76	1/4"	9.05	2.68	3.11	4.37	2.37	1.81	3.23

*SQUARE AT 45° ONLY

BI-TORQ PN-SERIES SPRING RETURN ACTUATOR TORQUE

MODEL	SPRING SET	SPRING TORQUE START-END	40PSI AIR TORQUE START-END	50PSI AIR TORQUE START-END	60PSI AIR TORQUE START-END	70PSI AIR TORQUE START-END	80PSI AIR TORQUE START-END	90PSI AIR TORQUE START-END	100PSI AIR TORQUE START-END	115PSI AIR TORQUE START-END
PN-52SR	01	44-32	48-23	72-47	95-70					
	02	59-42		61-31	85-54	108-77				
	03	66-46			80-47	104-70	127-94	150-117		
	04	82-57			70-31	93-55	116-78	140-101	163-125	
	05	105-72				78-32	101-55	125-78	148-102	183-137
PN-63SR	01	85-44	92-38	134-80	176-122					
	02	109-58		120-56	162-98	204-140				
	03	128-71			149-79	191-121	233-162	275-204		
	04	152-82			136-54	177-96	219-138	261-180	303-222	
	05	196-111				151-53	193-95	235-136	276-178	339-241
PN-75SR	01	172-89	168-63	244-138	319-214					
	02	226-118		215-85	291-160	366-235				
	03	249-133			275-137	351-212	426-288	502-363		
	04	303-162			247-83	322-158	398-234	473-309	549-385	
	05	380-205				279-81	354-157	430-232	505-308	618-421
PN-85SR	01	242-143	238-109	349-219	460-330					
	02	298-176		316-163	427-274	537-384				
	03	361-215			387-211	498-322	609-432	720-543		
	04	417-248			354-155	465-265	576-376	687-487	797-633	
	05	536-321				392-146	503-257	614-368	725-478	891-645
PN-100SR	01	395-218	384-154	556-326	728-499					
	02	521-288		485-199	658-372	830-544				
	03	564-318			628-329	801-502	973-674	1146-847		
	04	691-389			558-203	730-375	903-548	1075-720		
	05	860-486				630-206	802-378	975-551	1147-723	1406-982
PN-115SR	01	658-363	650-270	935-555	1220-840					
	02	835-449		848-378	1133-663	1419-949				
	03	957-538			1044-541	1329-827	1615-1112	1900-1397		
	04	1133-625			958-365	1243-650	1528-934	1813-1220	2098-1505	
	05	1432-800				1067-352	1352-637	1638-922	1923-1207	2350-1635
PN-125SR	01	877-470	850-328	1224-703	1599-1077					
	02	1040-560		1135-539	1509-914	1883-1288				
	03	1313-718			1351-640	1725-1015	2099-1389	2474-1763		
	04	1477-808			1261-477	1636-851	2010-1226	2384-1600	2758-1974	
	05	1913-1055				1388-415	1762-789	2136-1164	2511-1538	3072-2099
PN-140SR	01	1346-726	1240-508	1742-1010	2244-1512					
	02	1523-815		1642-821	2144-1323	2646-1825				
	03	1958-1036			1910-856	2412-1358	2914-1861	3408-2355		
	04	2126-1134			1810-668	2312-1170	2814-1672	3308-2166	3810-2668	
	05	2728-1453				1979-515	2481-1017	2975-1511	3477-2013	4233-2769
PN-160SR	01	1345-885	1921-1390	2644-2140						
	02	1991-1301		2228-1503	2952-2217					
	03	2336-1531		1980-1131	2713-1854	3419-2569				
	04	2841-1770			2447-1350	3162-2074	3886-2779			
	05	3327-2230				2737-1507	3452-2240	4175-2963		
	06	4186-2655					2983-1443	3715-2167	4421-2828	5475-3865
PN-200SR	01	2168-1540	3718-2904	5069-4317						
	02	3150-2186		4414-3308	5770-4681					
	03	3752-2637		3936-2591	5301-4035	6639-5400				
	04	4699-3124			4788-3080	6126-4445	7486-5795			
	05	5327-3726				5453-3613	6822-5008	8182-6385		
	06	6867-4664					5893-3539	7288-4925	8591-6175	10562-8137
PN-270SR	01	6973-4469	8574-6017	11883-9317	15309-12743					
	02	8372-5363	7619-4548	10928-7857	14353-11283					
	03	9761-6257	6672-3088	9972-6388	13398-9814	16824-13240				
	04	11159-7150	5716-1619	9016-7928	12442-8353	15877-11779	19177-15080			
	05	12549-8044		8069-3459	11495-6884	14921-10310	18221-13619	21530-16920		
	06	13947-8938			10539-5415	13965-8850	17274-12150	20574-15459		
	07	15336-9832			9584-3955	13009-7381	16319-10681	19619-13990	23053-17416	
	08	16735-10735			8637-2486	12063-5912	15363-9221	18672-12521	22098-15947	27115-20965

ACTUATOR TORQUE OUTPUT (IN. LBS.)

BI-TORQ PN-SERIES DOUBLE ACTING ACTUATOR TORQUE

AVAILABLE AIR SUPPLY PRESSURE (PSI)

MODEL	40PSI	50PSI	60PSI	70PSI	80PSI	90PSI	100PSI	115PSI
PN-32DA	34	43	55	64	71	82	87	101
PN-52DA	86	110	133	156	179	203	226	261
PN-63DA	154	196	238	280	321	363	405	468
PN-75DA	284	360	435	511	586	661	737	850
PN-85DA	408	518	629	740	851	962	1072	1238
PN-100DA	646	818	991	1163	1336	1508	1681	1939
PN-115DA	1070	1355	1640	1925	2210	2495	2780	3208
PN-125DA	1409	1783	2157	2532	2906	3280	3654	4216
PN-140DA	2009	2511	3013	3515	4018	4513	5015	5772
PN-160DA	2930	3662	4394	5127	5859	6591	7324	8422
PN-200DA	5488	6866	8239	9612	10981	12359	13732	15792
PN-270DA	12734	15919	19097	22284	25469	28654	31832	36661

ACTUATOR TORQUE OUTPUT (IN. LBS.)

FOR TORQUE VALUES OR AIR SUPPLY PRESSURES NOT LISTED, PLEASE CONSULT FACTORY

PN-SERIES TECHNICAL DATA

ACTUATOR WEIGHTS (LBS.)

MODEL	32	52	63	75	85	100	115	125	140	160	200	270
DOUBLE ACTING	1.08	2.25	3.26	5.51	7.39	11.02	17.75	22.09	33.86	43.21	70.99	154.00
SPRING RETURN	---	2.62	3.97	6.94	9.37	14.40	23.92	26.76	45.28	65.04	111.00	192.79

ACTUATOR CYCLE TIME (SECONDS)

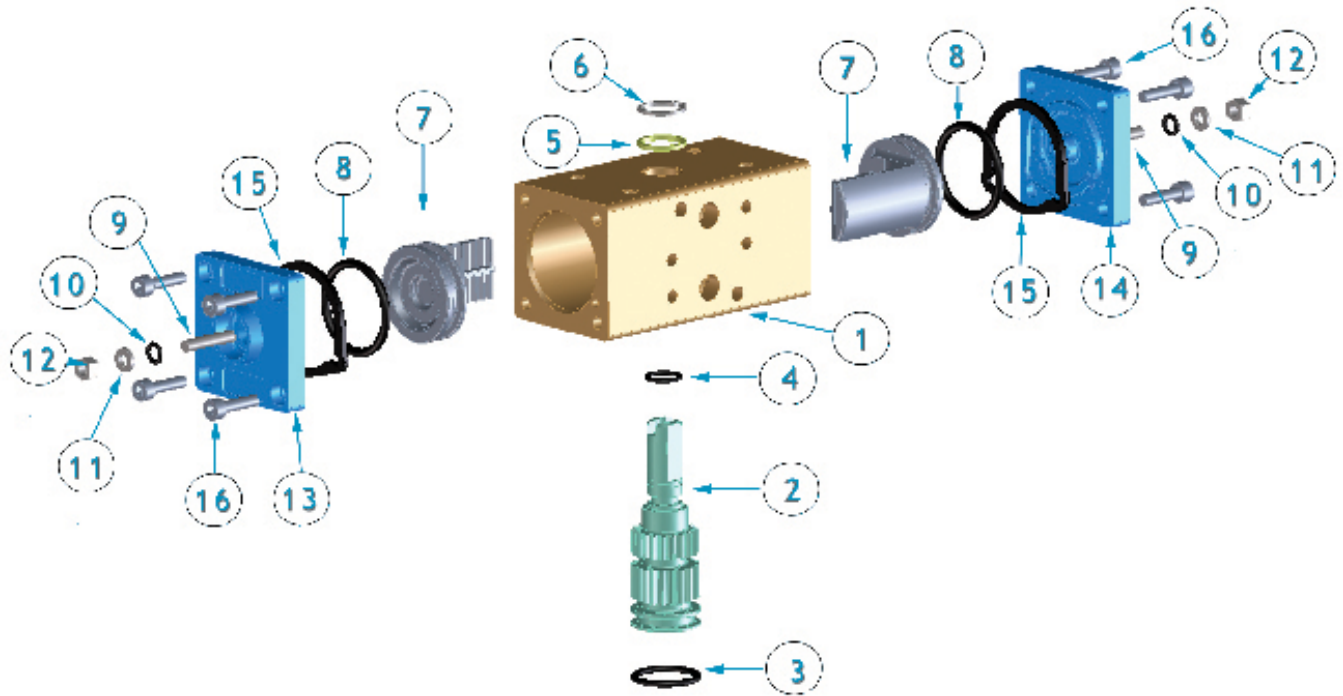
MODEL	32	52	63	75	85	100	115	125	140	160	200	270
CCW (DA)	0.03	0.03	0.06	0.12	0.20	0.30	0.53	0.83	0.98	1.15	1.74	4.50
CW (DA)	0.03	0.04	0.08	0.12	0.19	0.27	0.47	0.66	0.93	1.10	1.70	4.50
CCW (SR)	---	0.09	0.14	0.22	0.31	0.44	0.83	1.08	1.23	1.75	2.38	4.50
CW (SR)	---	0.09	0.14	0.22	0.33	0.46	0.78	0.90	0.97	1.34	2.19	6.20

NOTE: ALL CYCLE TIMES ARE DERIVED INDEPENDENTLY OF VALVES AND ACTUATOR ACCESSORIES THAT MIGHT AFFECT OVERALL TIME PERFORMANCE.
CYCLE TIMES ARE BASED ON 80 PSI AIR SUPPLY.

ACTUATOR AIR CONSUMPTION (CUBIC INCHES)

MODEL	32	52	63	75	85	100	115	125	140	160	200	270
CCW (DA & SR)	2.318	6.590	12.143	16.232	30.206	45.340	61.023	106.852	137.91	220.052	348.080	915.359
CW (DA)	1.708	9.336	17.208	20.504	39.534	66.760	103.740	148.471	192.84	290.596	599.743	1086.226
CW (SR)	---	7.689	14.218	17.147	32.403	54.372	85.433	122.047	146.46	215.109	462.563	945.871

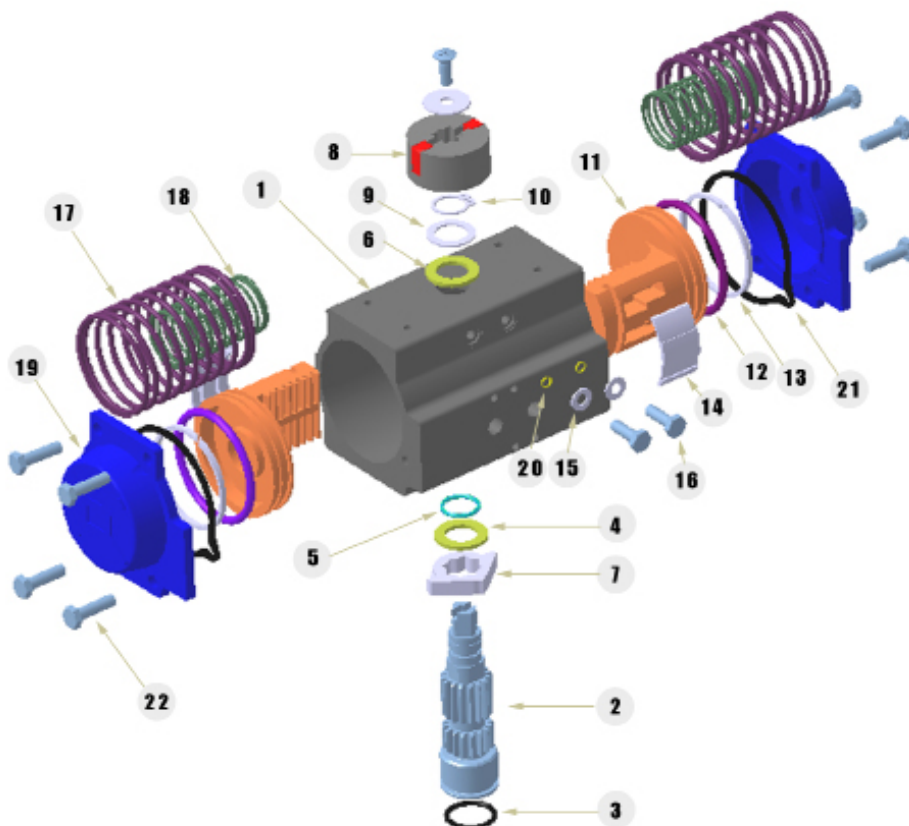
BI-TORQ MODEL PN-32DA



PART NUMBER	DESCRIPTION	MATERIAL	TREATMENT	QTY. (DA)
1	BODY	EXTRUDED ALUMINUM	HARD ANODIZED	1
2	ANTI-BLOWOUT PINION	STEEL	NICKEL PLATED	1
3	LOWER PINION O-RING*	NBR70	---	1
4	TOP PINION O-RING	NBR70	---	1
5	PINION SPACER RING*	PTFE+15% GRAPHITE	---	1
6	PINION SNAP RING	STEEL	NICKEL PLATED	1
7	PISTON	DIE CAST ALUMINUM	---	1
8	PISTON O-RING*	NBR70	---	2
9	STOP BOLT	STAINLESS STEEL	---	2
10	STOP BOLT O-RING*	NBR70	---	2
11	STOP BOLT WASHER	STAINLESS STEEL	---	2
12	STOP BOLT RETAINING NUT	STAINLESS STEEL	---	2
13	LEFT END CAP	DIE CAST ALUMINUM	EPOXY COATED	1
14	RIGHT END CAP	DIE CAST ALUMINUM	EPOXY COATED	1
15	END CAP SEAL	NBR70	---	2
16	END CAP BOLT	STAINLESS STEEL	---	8

*Parts subject to wear

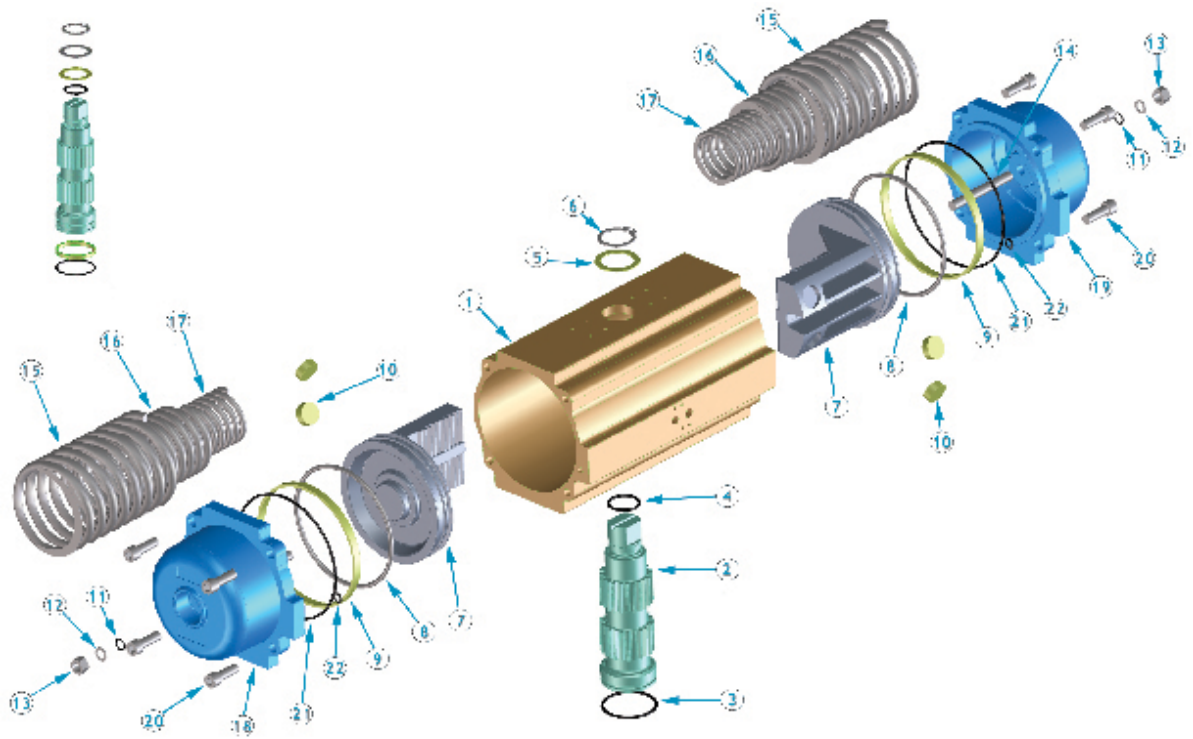
PARTS BREAKDOWN FOR PN-52 THROUGH PN-140



PART NUMBER	DESCRIPTION	MATERIAL	TREATMENT	OPTIONAL MATERIAL	QTY. (DA)	QTY. (SR)
1	BODY	EXTRUDED ALUMINUM	HARD ANODIZED	STAINLESS	1	1
2	ANTI-BLOWOUT PINION	STEEL	NICKEL PLATED	STAINLESS	1	1
3	LOWER PINION O-RING*	NBR70	---	VITON	1	1
4	PINION SPACER RING	PTFE+15% GRAPHITE	---		1	1
5	TOP PINION O-RING	NBR70	---	VITON	1	1
6	CAM SPACER RING*	PTFE+15% GRAPHITE	---		1	1
7	STOP ADJUSTMENT	STAINLESS STEEL	---		1	1
8	POSITION INDICATOR	NYLON	---		1	1
9	PINION WASHER	STAINLESS STEEL	---		1	1
10	PINION SNAP RING	STEEL	NICKEL PLATED		1	1
11	PISTON	DIE CAST ALUMINUM	---		2	2
12	PISTON O-RING*	NBR70	---	VITON	2	2
13	ANTI-FRICTION RING*	PTFE+15% GRAPHITE	---		2	2
14	PISTON THRUST BLOCK	PTFE+15% GRAPHITE	---		2	2
15	STOP BOLT WASHER	STAINLESS STEEL	---		2	2
16	STOP BOLT	STAINLESS STEEL	---		2	2
17	EXTERNAL SPRING	STEEL	ZINC PHOSPHATE COATED		N/A	SEE SPRING CHART
18	INTERNAL SPRING	STEEL	ZINC PHOSPHATE COATED		N/A	SEE SPRING CHART
19	END CAP	DIE CAST ALUMINUM	EPOXY COATED	STAINLESS	1	1
20	STOP WASHER					
21	END CAP SEALS	NBR70	---	VITON	8	8
22	END CAP BOLTS	STAINLESS STEEL	---		8	8

*Parts subject to wear

PARTS BREAKDOWN FOR PN-160 THROUGH PN-270



PART NUMBER	DESCRIPTION	MATERIAL	TREATMENT	QTY. (DA)	QTY. (SR)
1	BODY	EXTRUDED ALUMINUM	HARD ANODIZED	1	1
2	ANTI-BLOWOUT PINION	STEEL	NICKEL PLATED	1	1
3	LOWER PINION O-RING*	NBR70	---	1	1
4	TOP PINION O-RING	NBR70	---	1	1
5	PINION SPACER RING	PTFE+15% GRAPHITE	---	1	1
6	PINION SNAP RING*	STEEL	NICKEL PLATED	1	1
7	PISTON	DIE CAST ALUMINUM	NICKEL PLATED	1	1
8	PISTON O-RING*	NBR70	---	2	2
9	ANTI-FRICTION RING*	PTFE+15% GRAPHITE	---	2	2
10	PISTON THRUST BLOCK	PTFE+15% GRAPHITE	---	2	2
11	STOP BOLT O-RING*	NBR70	---	2	2
12	STOP BOLT WASHER	STAINLESS STEEL	---	2	2
13	STOP BOLT RETAINING NUT	STAINLESS STEEL	---	2	2
14	STOP BOLT	STAINLESS STEEL	---	2	2
15	EXTERNAL SPRING	STEEL	ZINC PHOSPHATE COATED	N/A	SEE SPRING CHART
16	CENTRAL SPRING	STEEL	ZINC PHOSPHATE COATED	N/A	SEE SPRING CHART
17	INTERNAL SPRING	STEEL	ZINC PHOSPHATE COATED	N/A	SEE SPRING CHART
18	LEFT END CAP	DIE CAST ALUMINUM	EPOXY COATED	1	1
19	RIGHT END CAP	DIE CAST ALUMINUM	EPOXY COATED	1	1
20	END CAP BOLTS	STAINLESS STEEL	---	8 (160-200) 12 (270)	8 (160-200) 12 (270)
21	END CAP O-RING	NBR70	---	2	2
22	SUPPLY HOLE O-RING	NBR70	---	2	2
23	CARTRIDGE SPRING	STEEL	ZINC PHOSPHATE COATED	---	12 (270 ONLY)

*Parts subject to wear

BI-TORQ AL-SERIES PNEUMATIC ACTUATOR FEATURES

ROTATION ADJUSTMENT

Standard adjustment is $\pm 5^\circ$ in both the open position through easily accessible external adjustment screws.

ACTUATOR BODY

The aluminum extrusion is hard anodized and polyester powder coated to protect against wear and corrosion while reducing piston friction to the absolute minimum. Other treatments are available as well.

END CAPS

Epoxy coated die cast aluminum end caps provide maximum resistance against potentially corrosive elements. Optional TFE or nickel plated end caps are available.

HEAVY DUTY SPRINGS

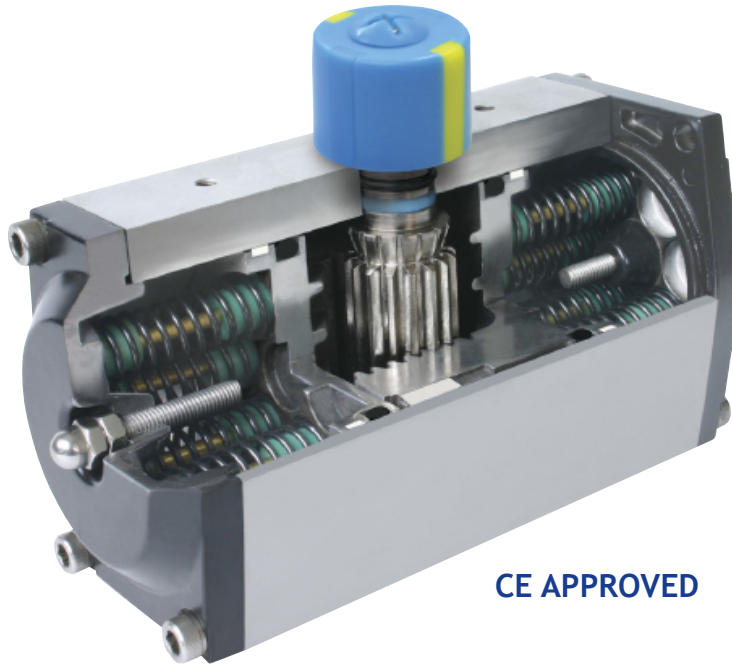
True-rated cartridge spring sets create absolute confidence in all fail safe spring return models. The high tensile steel springs are coated with zinc phosphate for corrosion resistance. Springs can be safely and quickly modified into sets ranging from 40 pounds to 80 pounds. Full length end cap bolts and cartridges allow for easy and safe disassembly.

DESIGN STANDARDS

The BI-TORQ® AL-series pneumatic actuator is manufactured to the latest ISO5211, DIN3337 and NAMUR standards to adhere to industry-wide specifications. The actuator also can be customized to suit a wide variety of applications.

INDICATOR

A position indicator is standard on the BI-52 through BI-125 models. A high visibility open-closed dome indicator is available as an option on all BI-TORQ actuators.



CE APPROVED

PINION

The hardened nickel alloy pinion is precision ground and then nickel plated in order to reduce friction, provide maximum wear resistance, and protect against corrosion under severe conditions. An optional stainless steel pinion is available for corrosive environments.

PINION SEALS

NBR-70 rubber pinion seals provide trouble-free operation at standard temperature ranges. Viton® and HNBR seals are available to high or low temperature extremes.

PISTON GUIDES

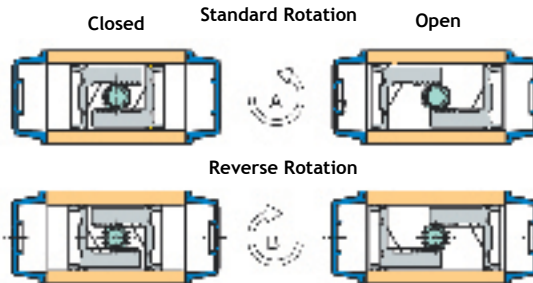
Large contact areas and self-lubricating, highly-durable materials provide high thrust stability with minimum friction.

PISTONS

The precisely-balanced die cast aluminum pistons are fitted with high-quality rings and guides, resulting in high ratios of output torque vs. input air pressure. The twin rack and piston design creates a constant torque output on all models.

ROTATION VARIATIONS

All BI-TORQ® actuators use a counterclockwise rotation to open and a clockwise rotation to close. The piston racks also can be rotated to achieve a fail open (counterclockwise to close) rotation.



OPTIONS FOR CORROSIVE ENVIRONMENTS

BODY: nickel plated or double epoxy coated bodies available upon request
PINION: stainless steel
END CAPS: nickel plated
 ALL STAINLESS STEEL ACTUATORS ALSO AVAILABLE. PLEASE CONTACT OUR SALES STAFF FOR INFORMATION.

SPRING COMBINATION OPTIONS



SPRING SET 02/40 PSI
(4 SPRINGS TOTAL)



SPRING SET 03/50 PSI
(6 SPRINGS TOTAL)



SPRING SET 06/100 PSI
(12 SPRINGS TOTAL)



SPRING SET 04/60 PSI
(8 SPRINGS TOTAL)



SPRING SET 05/80 PSI
(10 SPRINGS TOTAL)

SPRING SETS

All BI-TORQ® AL series (aluminum) pneumatic actuators come standard with a cartridge spring set (5 springs per side) sized for 80 PSI supply pressure unless otherwise specified. Actuators can be configured for different air supplies by removing springs from the end caps.

IMPORTANT: Springs must be arranged in a symmetrical manner (see arrangements to the left) so that side load does not occur between the pistons and the actuator body.

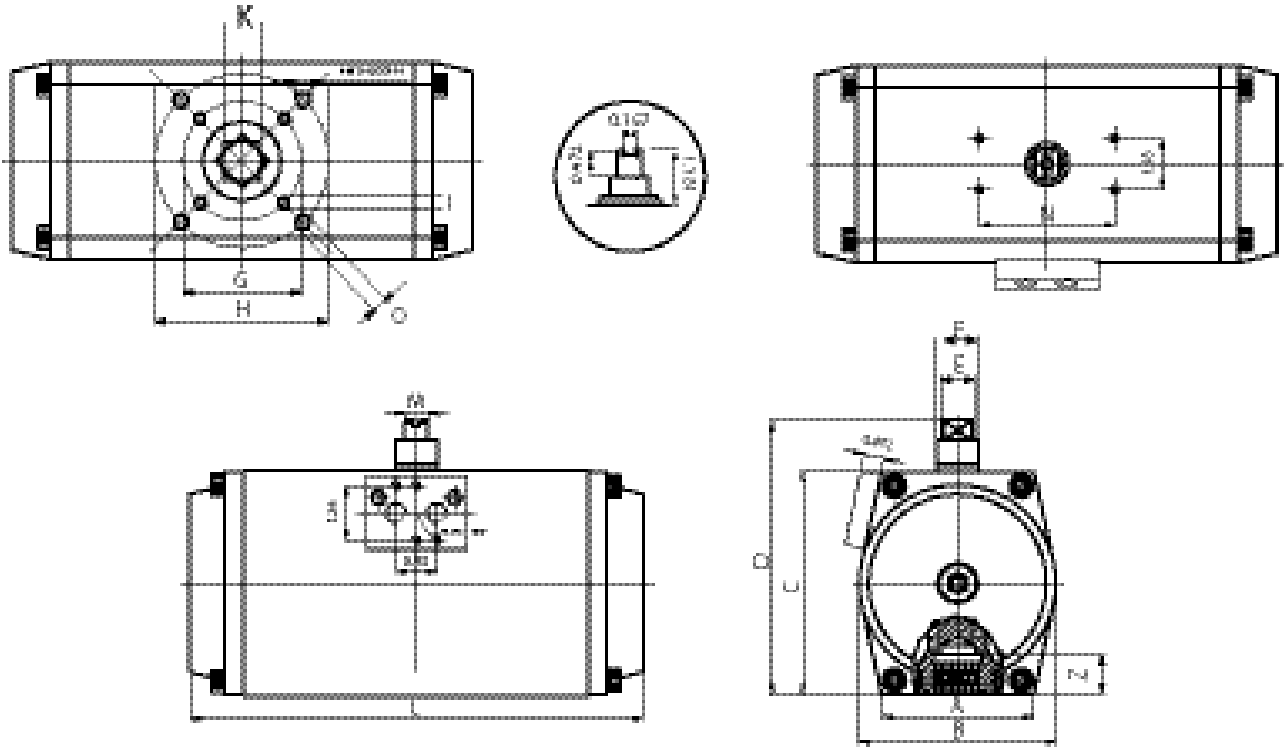
REVERSE OPERATION

All BI-TORQ® actuators are set for a standard CW to close, CCW to open rotation. The action may be reversed by rotating the pistons 180°.

CAUTION: Refer to BI-TORQ® operation and maintenance instructions before disassembly and removal of springs.

BI-TORQ AL-SERIES DIMENSIONAL DATA

FOR ACTUATOR MODELS 45 THROUGH 350

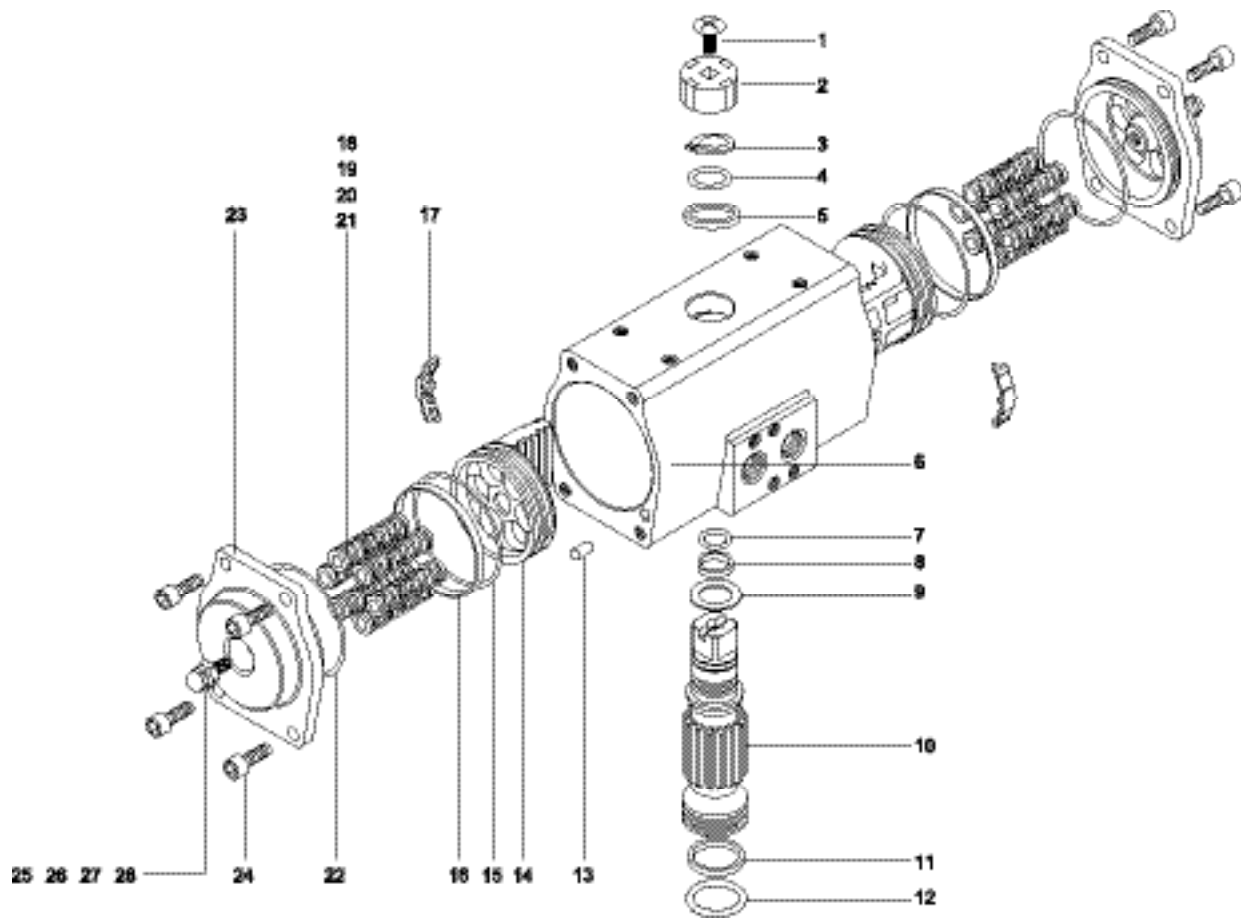


DIMENSIONAL DATA

	ISO 5211	A	B	C	D	E	F	G	H	I	K	L	M	N	O	Z	AIR CONNECTION
AL-45	F03/F05	1.89	2.28	2.56	3.74	0.47	0.55	1.42	1.97	M5 x 8	0.433	5.75	0.39	3.15	M6 x 10	0.55	1/4"
AL-52	F03-F05	1.97	2.32	2.91	4.09	0.47	0.55	1.42	1.97	M5 x 8	0.433	5.75	0.39	3.15	M6 x 10	0.55	1/4"
AL-63	F05/F07	2.36	2.83	3.46	4.65	0.47	0.71	1.97	2.76	M6 x 10	0.551	6.61	0.39	3.15	M8 x 13	0.71	1/4"
AL-75	F05/F07	2.56	3.27	3.94	5.12	0.47	0.71	1.97	2.76	M6 x 10	0.551	7.24	0.39	3.15	M8 x 13	0.71	1/4"
AL-83	F05/F07	2.64	3.54	4.29	5.47	0.55	0.71	1.97	2.76	M6 x 10	0.669	8.03	0.39	3.15	M8 x 13	0.83	1/4"
AL-92	F05-F07	2.99	4.09	4.72	5.91	0.71	0.98	1.97	2.76	M6 x 10	0.669	10.24	0.55	3.15	M8 x 13	0.83	1/4"
AL-105	F07/F10	3.54	4.53	5.24	6.42	0.79	0.98	2.76	4.02	M8 x 13	0.866	10.55	0.55	3.15	M10 x 16	1.02	1/4"
AL-125	F07/F10	4.09	5.51	6.10	7.28	1.10	1.57	2.76	4.02	M8 x 13	0.866	11.73	0.79	5.12	M10 x 16	1.02	1/4"
AL-140	F10/F12	4.21	5.98	6.75	7.93	1.10	1.57	4.02	4.92	M10 x 16	1.063	15.35	0.79	5.12	M12 x 20	1.22	1/4"
AL-160	F10/F12	5.04	6.92	7.76	8.94	1.42	1.57	4.02	4.92	M10 x 16	1.063	18.03	1.10	5.12	M12 x 20	1.22	1/4"
AL-190	F14	5.31	8.11	9.06	10.24	1.77	2.36	---	5.51	---	1.417	20.67	1.26	5.12	M16 x 25	1.57	1/4"
AL-210	F14	5.31	8.90	10.04	11.22	1.77	2.36	---	5.51	---	1.417	20.94	1.26	5.12	M16 x 25	1.57	1/4"
AL-240	F16	6.10	10.08	11.42	12.60	1.77	2.36	---	6.50	---	1.811	23.70	1.26	5.12	M20 x 25	1.97	1/4"
AL-270	F16	7.48	11.57	12.60	13.78	1.77	2.36	---	6.50	---	1.811	28.43	1.26	5.12	M20 x 25	1.97	1/2"
AL-300	F16	7.72	12.76	13.70	14.88	1.77	2.36	---	6.50	---	1.811	29.21	1.26	5.12	M20 x 25	2.36	1/2"
AL-350	F16	8.66	14.96	15.83	17.01	1.77	2.36	---	6.50	---	1.811	33.86	1.26	5.12	M20 x 25	2.36	1/2"

Special mounting patterns and pinion output shafts are available upon request. In addition, AVK Carbo-Bond can manufacture customized mounting hardware, extensions and specialty linkages to adapt the AL-Series pneumatic actuator to a variety of valves and applications.

PARTS BREAKDOWN FOR AL-45 THROUGH AL-350



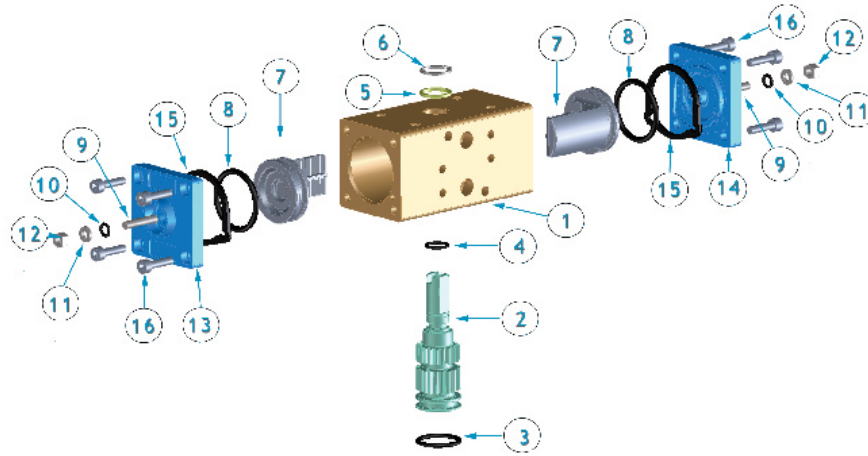
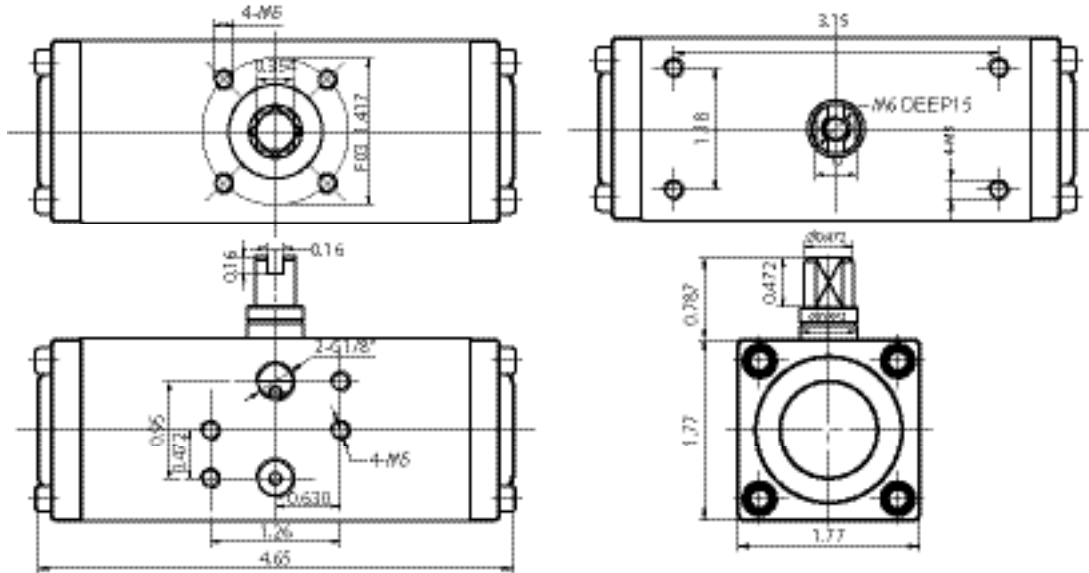
PART NUMBER	DESCRIPTION	MATERIAL	QTY.
1	INDICATOR SCREW	STAINLESS STEEL	1
2	INDICATOR	PLASTIC	1
3	SNAP RING	STAINLESS STEEL	1
4	WASHER	STAINLESS STEEL	1
5	OUTSIDE WASHER	POLYOXYMETHYLENE	1
6	BODY	ALUMINUM ALLOY	1
7	O-RING (top)*	NBR*	1
8	BEARING (top)*	POLYOXYMETHYLENE*	1
9	INSIDE WASHER	POLYOXYMETHYLENE	1
10	PINION	ALLOY STEEL	1
11	BEARING (bottom)*	POLYOXYMETHYLENE*	1
12	O-RING (bottom)*	NBR*	1
13	PLUG	NBR	2
14	PISTON	DIE CAST ALUMINUM	2
15	PISTON O-RING*	NBR*	2

PART NUMBER	DESCRIPTION	MATERIAL	QTY.
16	PISTON BEARING*	POLYOXYMETHYLENE*	2
17	PISTON GUIDE*	NYLON 66*	2
18	CARTRIDGE SPRING	STEEL	12
19	SPRING RETAINER (L)	NYLON 66	6
20	SPRING RETAINER (R)	NYLON 66	6
21	RETAINER CONNECTOR	BRASS	12
22	END CAP O-RING*	NBR*	2
23	END CAP	DIE CAST ALUMINUM	2
24	END CAP STOP SCREW	STAINLESS STEEL	8
25	ADJUSTMENT SCREW	STAINLESS STEEL	2
26	ADJUSTMENT NUT	STAINLESS STEEL	2
27	ADJUSTMENT WASHER	STAINLESS STEEL	2
28	ADJUSTMENT O-RING*	NBR*	2

*Parts subject to wear

Viton seals for high temperature applications (to 350°F) and silicone seals for low temperature applications (to -40°F) are available on all AL-Series pneumatic actuators.

BI-TORQ MODEL AL-32DA



PART NUMBER	DESCRIPTION	MATERIAL	TREATMENT	QUANTITY
1	BODY	EXTRUDED ALUMINUM	HARD ANODIZED	1
2	ANTI-BLOWOUT PINION	STEEL	NICKEL PLATED	1
3	LOWER PINION O-RING*	NBR70	---	1
4	TOP PINION O-RING	NBR70	---	1
5	PINION SPACER RING*	PTFE+15% GRAPHITE	---	1
6	PINION SNAP RING	STEEL	NICKEL PLATED	1
7	PISTON	DIE CAST ALUMINUM	---	1
8	PISTON O-RING*	NBR70	---	2
9	STOP BOLT	STAINLESS STEEL	---	2
10	STOP BOLT O-RING*	NBR70	---	2
11	STOP BOLT WASHER	STAINLESS STEEL	---	2
12	STOP BOLT RETAINING NUT	STAINLESS STEEL	---	2
13	LEFT END CAP	DIE CAST ALUMINUM	EPOXY COATED	1
14	RIGHT END CAP	DIE CAST ALUMINUM	EPOXY COATED	1
15	END CAP SEAL	NBR70	---	2
16	END CAP BOLT	STAINLESS STEEL	---	8

*Parts subject to wear

BI-TORQ AL-SERIES DOUBLE ACTING ACTUATOR TORQUE

AVAILABLE AIR SUPPLY PRESSURE (PSI)

MODEL	40PSI	50PSI	60PSI	70PSI	80PSI	90PSI	100PSI	115PSI
AL-32DA	34	43	55	64	71	82	87	101
AL-45-DA	67	93	107	133	147	164	187	214
AL-52-DA	107	125	143	179	197	215	249	286
AL-63-DA	177	223	256	320	354	385	447	511
AL-75-DA	243	279	356	442	490	534	624	713
AL-83-DA	371	485	558	690	739	832	967	1097
AL-92-DA	548	610	805	991	1106	1221	1407	1602
AL-105-DA	796	850	1165	1434	1598	1746	2038	2327
AL-125-DA	1243	1584	1814	2257	2492	2735	3169	3630
AL-140-DA	2133	2713	3105	3876	4266	4664	5433	6210
AL-160-DA	3248	3452	4732	5912	6501	7125	8275	9462
AL-210-DA	6213	6815	9311	11506	12802	13866	16294	18622
AL-240-DA	8851	9824	13687	16816	18817	20534	23950	27374
AL-270-DA	14285	18184	20782	25667	28575	31173	36377	41573
AL-300-DA	19603	24924	28514	35204	39183	43653	49901	57030
AL-350-DA	29332	37351	42688	53106	58682	64069	74712	85386

ACTUATOR TORQUE OUTPUT (IN. LBS.)

FOR TORQUE VALUES OR AIR SUPPLY PRESSURES NOT LISTED, PLEASE CONSULT FACTORY

AL-SERIES TECHNICAL DATA

ACTUATOR WEIGHTS (LBS.)

MODEL	32	45	52	63	75	83	92	105	125	140	160	190	210	240	270	300	350
DOUBLE ACTING	1.08	2.31	2.43	3.97	4.76	6.28	9.48	13.56	19.40	26.79	44.31	84.00	99.43	138.89	206.79	242.50	411.16
SPRING RETURN	---	2.47	2.71	4.30	5.96	7.10	12.13	16.33	25.40	34.73	50.71	98.77	119.20	171.20	253.53	286.60	516.10

ACTUATOR CYCLE TIME (SECONDS)

MODEL	32	45	52	63	75	83	92	105	125	140	160	200	210	270	300	350
CCW (DA)	0.03	0.03	0.03	0.06	0.12	0.20	0.25	0.30	0.83	0.98	1.15	1.74	2.25	4.50	5.50	7.00
CW (DA)	0.03	0.04	0.04	0.08	0.12	0.19	0.25	0.27	0.66	0.93	1.10	1.70	2.25	4.50	5.50	7.00
CCW (SR)	---	0.09	0.09	0.14	0.22	0.31	0.40	0.44	1.08	1.23	1.75	2.38	2.50	4.50	5.50	7.00
CW (SR)	---	0.09	0.09	0.14	0.22	0.33	0.44	0.46	0.90	0.97	1.34	2.19	4.80	6.20	7.90	9.80

NOTE: ALL CYCLE TIMES ARE DERIVED INDEPENDENTLY OF VALVES AND ACTUATOR ACCESSORIES THAT MIGHT AFFECT OVERALL TIME PERFORMANCE.
CYCLE TIMES ARE BASED ON 80 PSI AIR SUPPLY.

ACTUATOR AIR CONSUMPTION (CUBIC INCHES)

MODEL	32	45	52	63	75	83	105	125	140	160	210	240	270	300	350
CCW (DA & SR)	2.33	5.99	6.59	12.16	16.23	30.21	45.34	106.85	137.91	220.05	348.08	667.94	915.36	1267.89	1898.27
CW (DA)	1.71	8.87	9.38	17.21	20.51	39.53	66.76	148.47	192.84	290.60	599.74	872.63	1086.23	1410.24	2105.72
CW (SR)	---	7.15	7.72	14.22	17.15	32.40	54.37	122.05	146.46	215.11	462.56	798.23	945.87	1287.65	1987.92

BI-TORQ AL-SERIES SPRING RETURN ACTUATOR TORQUE

MODEL	# OF SPRINGS	SPRING TORQUE START-END	40PSI AIR TORQUE START-END	50PSI AIR TORQUE START-END	60PSI AIR TORQUE START-END	70PSI AIR TORQUE START-END	80PSI AIR TORQUE START-END	90PSI AIR TORQUE START-END	100PSI AIR TORQUE START-END	115PSI AIR TORQUE START-END
AL-45SR	5	40-26	54-39	68-53	81-66	106-92				
	6	49-31	49-31	62-45	76-58	100-84				
	7	57-36	44-23	57-36	71-49	97-76	119-97	124-103		
	8	65-41		52-31	66-42	92-68	115-90	120-95	146-121	
	9	73-46			61-33	87-60	109-82	114-87	140-113	168-141
	10	81-51				82-52	104-74	109-79	135-105	163-133
	11	89-57				77-44	99-66	104-71	130-97	157-125
	12	98-62				93-57	98-62	125-89	152-116	
AL-52SR	5	55-37	61-43	87-70	106-89	150-119				
	6	66-45	53-33	79-59	97-80	131-110				
	7	76-52	50-27	72-56	90-66	123-98	144-120			
	8	87-60			82-55	115-88	136-117	151-126	189-162	
	9	98-67			75-44	107-76	129-98	147-116	182-151	218-187
	10	110-75				103-66	121-86	139-104	174-139	210-176
	11	120-82				94-57	114-76	132-94	167-129	203-165
	12	131-89				112-72	125-83	160-118	197-155	
AL-63SR	5	92-60	127-97	163-130	195-163	256-222				
	6	111-73	116-81	151-113	183-145	246-208				
	7	129-85	105-60	139-84	170-126	230-185	266-220	298-254		
	8	148-97		124-79	158-107	221-169	252-202	286-235	350-299	
	9	166-109			145-89	207-150	235-180	274-216	338-280	402-344
	10	185-121				196-133	227-166	262-198	325-262	389-325
	11	203-133				184-112	210-145	250-180	314-244	378-308
	12	221-145				187-133	238-162	301-225	365-289	
AL-75SR	5	128-93	163-122	219-183	264-228	352-317				
	6	154-112	150-113	199-158	244-202	333-291				
	7	179-131	136-87	181-133	226-177	314-265	359-309	404-355		
	8	205-150			207-151	295-240	340-285	385-329	474-419	
	9	231-168			188-126	277-214	322-270	366-303	456-393	544-482
	10	256-187				258-188	303-233	348-278	437-367	526-456
	11	282-205				240-163	284-208	329-252	419-342	507-430
	12	307-224				265-181	311-227	400-317	488-405	
AL-83SR	5	203-140	274-210	343-280	412-348	550-487				
	6	244-168	246-168	315-239	384-308	522-446				
	7	285-195	212-124	288-198	357-267	495-405	564-474	633-543		
	8	326-224			328-227	466-364	536-434	604-503	743-641	
	9	366-252			300-186	438-324	507-393	576-462	714-600	852-738
	10	407-279				411-283	480-352	549-421	687-559	825-697
	11	448-308				382-242	451-310	520-381	658-518	796-657
	12	488-336				420-290	492-340	630-478	768-616	
AL-92SR	5	304-206	397-299	498-399	598-500	799-701				
	6	365-248	355-239	456-339	557-440	758-641				
	7	426-289	314-178	415-278	515-379	716-580	816-680	917-781		
	8	487-289			474-317	675-519	776-619	876-720	1078-921	
	9	548-371			433-257	634-457	734-558	835-659	1036-860	1237-1061
	10	608-413				592-397	693-498	793-598	995-800	1196-1001
	11	669-455				550-336	651-437	751-537	953-739	1154-940
	12	730-496				610-401	711-476	912-678	1113-879	
AL-105SR	5	435-279	593-438	739-583	885-729	1175-1019				
	6	523-336	537-351	682-496	828-642	1119-932				
	7	610-392	481-264	627-409	773-555	1063-845	1208-990	1354-1136		
	8	697-448		578-354	716-468	1007-758	1153-904	1298-1050	1589-1341	
	9	784-504			661-381	951-671	1097-816	1243-962	1534-1253	1825-1544
	10	871-560				895-584	1040-730	1186-875	1477-1167	1768-1458
	11	959-616				839-497	985-642	1130-787	1422-1079	1713-1370
	12	1045-672				921-597	1074-701	1366-992	1657-1283	
AL-125SR	5	694-464	898-667	1124-894	1351-1121	1805-1575				
	6	833-556	805-528	1032-755	1259-982	1713-1436				
	7	971-649	712-390	939-700	1166-844	1620-1298	1847-1525	2073-1751		
	8	1110-741		888-623	1074-705	1527-1114	1754-1386	1980-1611	2435-2067	
	9	1249-834			982-567	1435-1020	1662-1247	1888-1474	2343-1928	2796-2381
	10	1389-927				1343-881	1569-1108	1796-1335	2250-1789	2704-2243
	11	1526-1019				1250-744	1476-970	1703-1197	2157-1651	2611-2104
	12	1665-1112				1328-887	1610-1058	2064-1511	2518-1966	

ACTUATOR TORQUE OUTPUT (IN. LBS.)

BI-TORQ AL-SERIES SPRING RETURN ACTUATOR TORQUE

MODEL	# OF SPRINGS	SPRING TORQUE START-END	40PSI AIR TORQUE START-END	50PSI AIR TORQUE START-END	60PSI AIR TORQUE START-END	70PSI AIR TORQUE START-END	80PSI AIR TORQUE START-END	90PSI AIR TORQUE START-END	100PSI AIR TORQUE START-END	115PSI AIR TORQUE START-END
AL-140SR	5	1141-759	1121-737	1501-1001						
	6	1370-911	979-596	1368-886						
	7	1598-1063	819-362	1209-646	1988-1425					
	8	1826-1215		1048-405	1819-1184	2606-1963	2987-2268	3444-2722	4218-3608	
	9	2055-1367			1668-944	2447-1723	2842-2101	3217-2493	4067-3379	4843-4155
	10	2282-1519			1508-704	2287-1482	2711-1812	3057-2252	3942-3151	4691-3927
	11	2511-1670				2127-1243	2466-1597	2896-2013	3763-2922	4539-3699
	12	2739-1822				1967-1002	2215-1256	2738-1772	3611-2764	4387-3470
AL-160SR	5	1843-1236	2311-1705	2902-2296	3492-2888	4702-3988				
	6	2213-1487	2061-1335	2653-1927	3245-2519	4427-3701				
	7	2584-1735	1813-963	2405-1555	2997-2147	4179-3330	4770-3921	5362-4512		
	8	2948-1974		2288-1312	2758-1784	3940-2967	4532-3558	5123-4149	6306-5333	
	9	3319-2221			2510-1412	3692-2595	4284-3186	4875-3777	6059-4961	7241-6143
	10	3691-2469				3445-2223	4036-2842	4627-3406	5811-4589	6993-5771
	11	4054-2717				3197-1860	3788-2451	4379-3043	5563-4226	6745-5409
	12	4425-2965					3555-2297	4132-2671	5315-3855	6498-5037
AL-190SR	5	2593-1682	4037-3125	4990-4079	5943-5032	7850-6938				
	6	3115-2009	3709-2603	4663-3556	5616-4510	7522-6416				
	7	3629-2257	3373-2090	4207-3043	5280-3996	7186-5903	8139-6855	9092-7808		
	8	4151-2682		3988-2871	4943-3474	6850-5381	7803-6333	8755-7286	10662-9192	
	9	4664-3018			4607-2961	6513-4867	7466-5820	8419-6773	10325-8679	12232-10586
	10	5187-3354				6174-4345	7130-5298	8083-6251	9989-8157	11895-10063
	11	5709-3691					5841-3823	6794-4776	7746-5278	9653-7635
	12	6222-4027					6294-4289	7410-5215	9316-7121	11223-9028
AL-210SR	5	3186-2301	4425-3540	5849-4964	7013-6128	9342-8457				
	6	3824-2770	3982-2982	5380-4326	6544-5491	8873-7820				
	7	4452-3142	3755-2531	4919-3698	6004-4863	8413-7191	9577-8356	10741-9520		
	8	5089-3691		4597-3222	5624-4225	7952-6554	9117-7719	10281-8883	12610-11212	
	9	5726-4151			5163-855	7492-5917	8657-7081	9821-8246	12149-10574	14478-12896
	10	6364-4611				7032-5280	8196-6444	9361-7608	11689-9937	14018-12258
	11	7001-5072				6572-4642	7736-5806	8900-6971	11229-9299	13558-11621
	12	7638-5532					7236-5364	8440-6334	10769-8662	13097-10984
AL-240SR	5	4647-3443	6284-5310	8533-7329	10244-9040	13666-12642				
	6	5576-4133	5930-4425	7842-6400	9554-8111	12976-11533				
	7	6505-4815	5310-3640	7161-5470	8872-7181	12294-10603	14005-12314	15716-14025		
	8	7435-5505		6823-4999	8182-6252	11604-9674	13315-11385	15025-13096	18447-16516	
	9	8364-6196			7491-5323	10913-8745	12624-10455	14335-12167	17757-15558	21178-19003
	10	9293-6886				10223-7815	11931-9524	13644-11237	17066-14659	20488-18074
	11	10222-7567				9541-6886	11252-8596	12963-10308	16385-13729	19807-17144
	12	11152-8258					10789-8310	12267-9374	15694-12800	19116-16215
AL-270SR	5	6594-4691	10899-8996	13509-11595	16096-14193	21293-19390				
	6	7913-5629	9952-7677	12559-10276	15158-12875	20355-18071				
	7	9232-6567	9023-6358	11621-8957	14220-11556	19416-16752	21696-19347	24613-21949		
	8	10550-7506		10660-8210	13282-10237	18478-15433	21077-18032	23675-20631	28872-25827	
	9	11869-8444			12344-8918	17540-14115	20139-16713	22737-19312	27934-24509	33131-29650
	10	13188-9382				16602-12796	19200-15394	21799-17993	26995-23189	32191-28385
	11	14507-10320				15664-11477	18262-14076	20861-16674	26057-21871	31255-27066
	12	15825-11258					17666-12987	19923-15356	25119-20552	30316-25747
AL-300SR	5	9391-6461	14924-11995	18489-15559	22053-19123	29182-26253				
	6	11267-7771	13623-10116	17197-13683	20761-17247	27890-24376				
	7	13144-9046	12340-8242	16351-11806	19469-15371	26598-22500	30160-26064	33727-29629		
	8	15020-10338		15584-9022		25306-20624	28870-24187	32434-27752	39563-34881	
	9	16897-11630				24014-18747	27578-22311	31142-25876	38270-33004	45399-40130
	10	18782-12922				22721-16862	26284-20426	29850-23991	36979-31119	44107-38245
	11	20658-14215				21429-14986	24993-18550	28558-22114	35686-29243	42815-36369
	12	22535-15507					22987-17410	27266-20238	34394-27366	41523-34492
AL-350SR	5	15064-10382	21637-16955	26974-22291	32310-27628	42984-38302				
	6	18082-12462	19557-13937	24894-19273	27420-24610	40904-35283				
	7	20915-14533	17486-10972	22823-16264	28159-21600	38823-32247	44170-37611	49506-42947		
	8	24110-16613		20174-15022	26079-18583	36753-29256	42089-34593	47426-39929	58099-50602	
	9	27040-18693			23999-15573	34673-26246	40008-31583	45346-36920	56019-47593	66692-58266
	10	30138-20764				32601-23228	37938-28565	43275-33902	53948-44574	64621-55248
	11	33147-22844				30522-20219	31433-25556	41195-30893	51868-41565	62541-52239
	12	36165-24924					29998-23642	39115-27874	49788-38547	60461-49220

ACTUATOR TORQUE OUTPUT (IN. LBS.)

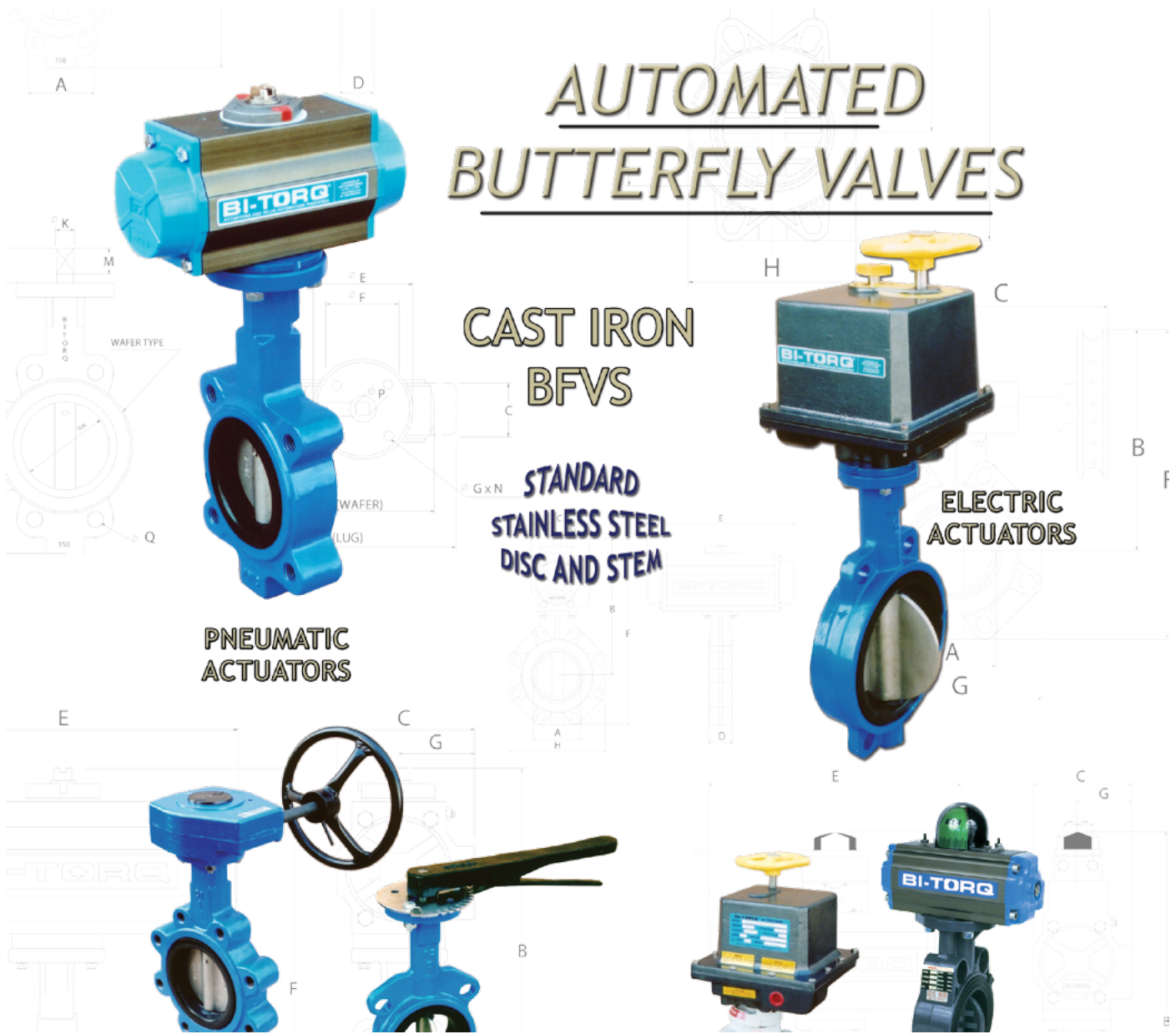
AUTOMATED BUTTERFLY VALVES

CAST IRON
BFVS

STANDARD
STAINLESS STEEL
DISC AND STEM

ELECTRIC
ACTUATORS

PNEUMATIC
ACTUATORS



STANDARD FEATURES

MAXIMUM PRESSURE RATING

120 PSI/8 BAR

STANDARD TEMPERATURE RATING*

-4° F/-20° C to +180° F/+85° C

MAXIMUM TEMPERATURE RATING**

-40° F/-40° C to +350° F/+180° C

*with standard NBR70 seals

**with Viton or HNBR seals (available upon request)

- 100% FACTORY TESTED
- TWIN RACK AND PINION DESIGN FOR CONSISTENT TORQUE OUTPUT
- PRE-LUBRICATED FOR LIFE OF ACTUATOR

MOUNTING OPTIONS

VALVE MOUNTING: True ISO 5211 standard base mounting bolt patterns and a double square female output shaft provide multiple options for direct mounting to valve stems and a greater flexibility of actuator rotation. AVK Carbo-Bond mounting kits also are available for additional direct mount options.

ACCESSORY MOUNTING: The top mounting pad is drilled and tapped to international NAMUR and ISO standards, providing for quick and economical accessory mounting in conjunction with the NAMUR pinion shaft. The standard NAMUR slotted and threaded shaft allows for direct mounting of NAMUR limit switches, valve positioners, and position monitors.

SOLENOID MOUNTING: All BI-TORQ® SS-series actuators have NAMUR solenoid mounting patterns that permit direct mounting of a wide range of solenoid models. The NAMUR mount eliminates the need for pipe nipples or solenoid brackets.

BI-TORQ BI-SS SERIES PNEUMATIC ACTUATOR FEATURES

STAINLESS STEEL BODY

The all-SS housing is ideal for sanitary, pulp and paper, marine and a variety of other applications where corrosion-resistance is crucial.

HEAVY-DUTY PINION

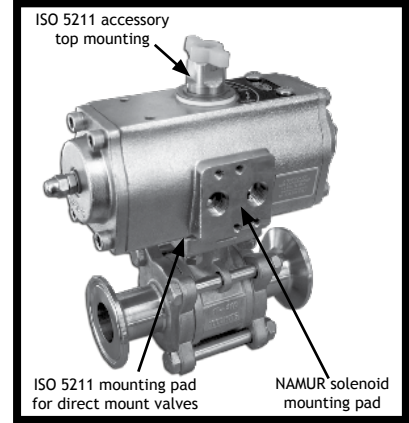
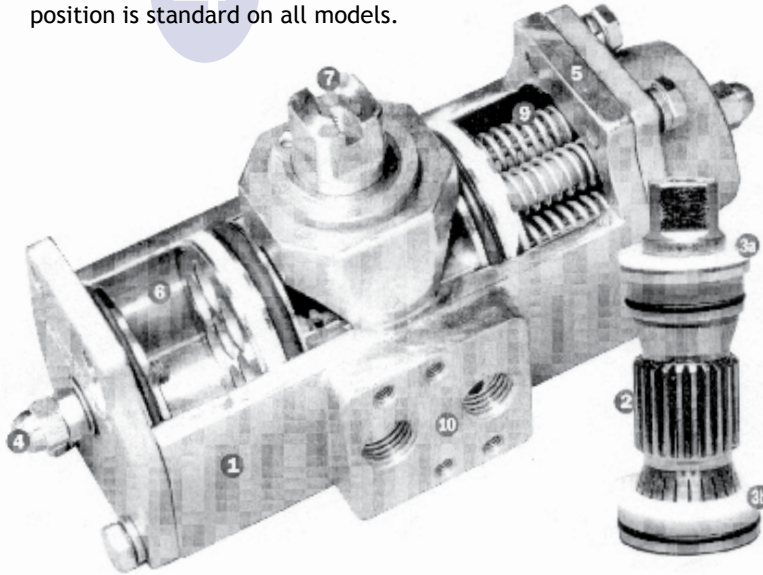
The one-piece stainless steel alloy shaft has precision machined gear teeth for precise operations.

BEARINGS

Replacable top and bottom TFE pinion bearings ensure low friction, stability up to 400° F and corrosion resistance.

TRAVEL STOPS

Travel adjustment of +/- 4° in the open position is standard on all models.



ACCESSORY MOUNTING

NAMUR and ISO mounting allows for the easy factory or field installation of solenoids, switches and positioners.

STAINLESS STEEL PISTONS

Durable, precision cast pistons provide full engagement with the pinion. Quality seals and guides provide high thrust stability with minimal friction.

NAMUR SHAFT

The slotted shaft, along with the NAMUR bolt pattern, allows for direct mounting of NAMUR standard switches and positioners.

ACTUATOR MOUNTING

ISO 5211 standard design provides direct mounting of most ISO pad valves, including BI-TORQ® InstruPak ball and butterfly valves.

SPRING CARTRIDGES

The heavy duty spring cartridges allow for easy conversion of a double acting actuator to a spring return actuator, or to modify the torque output depending on air pressure.

SOLENOID MOUNTING

The BI-SS series actuator is designed for direct mounting of NAMUR solenoid valves without additional piping.

SPRING COMBINATION OPTIONS



SPRING SET 02/40 PSI
(4 SPRINGS TOTAL)



SPRING SET 03/50 PSI
(6 SPRINGS TOTAL)



SPRING SET 06/100 PSI
(12 SPRINGS TOTAL)



SPRING SET 04/60 PSI
(8 SPRINGS TOTAL)



SPRING SET 05/80 PSI
(10 SPRINGS TOTAL)

SPRING SETS

All BI-TORQ® SS series (stainless) pneumatic actuators come standard with a complete cartridge spring set (6 springs per side) sized for 80 PSI supply pressure unless otherwise specified. Actuators can be configured for different air supplies by removing springs from the end caps.

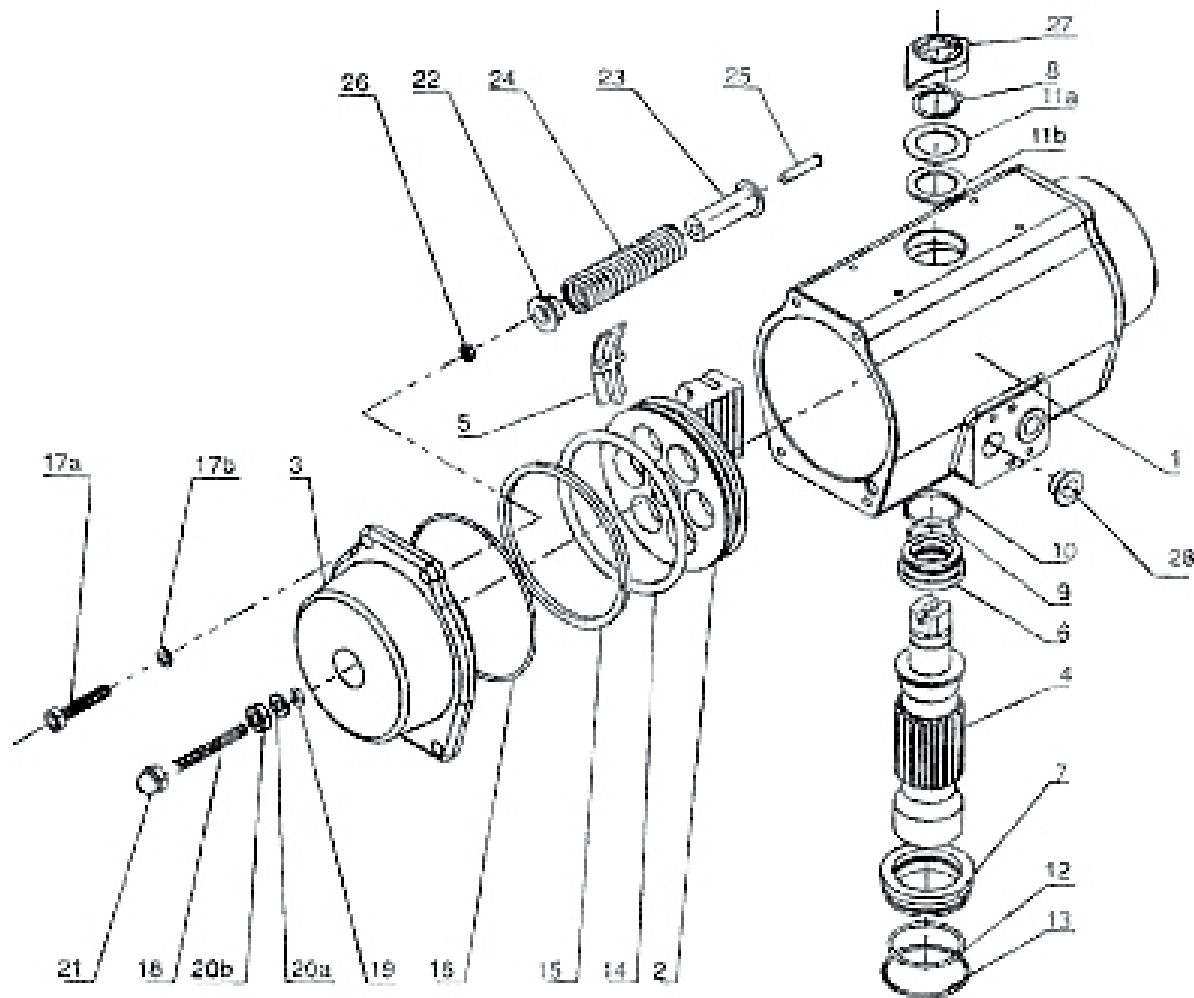
IMPORTANT: Springs must be arranged in a symmetrical manner (see arrangements to the left) so that side load does not occur between the pistons and the actuator body.

REVERSE OPERATION

All BI-TORQ® actuators are set for a standard CW to close, CCW to open rotation. The action may be reversed by rotating the pistons 180°.

CAUTION: Refer to BI-TORQ® operation and maintenance instructions before disassembly and removal of springs.

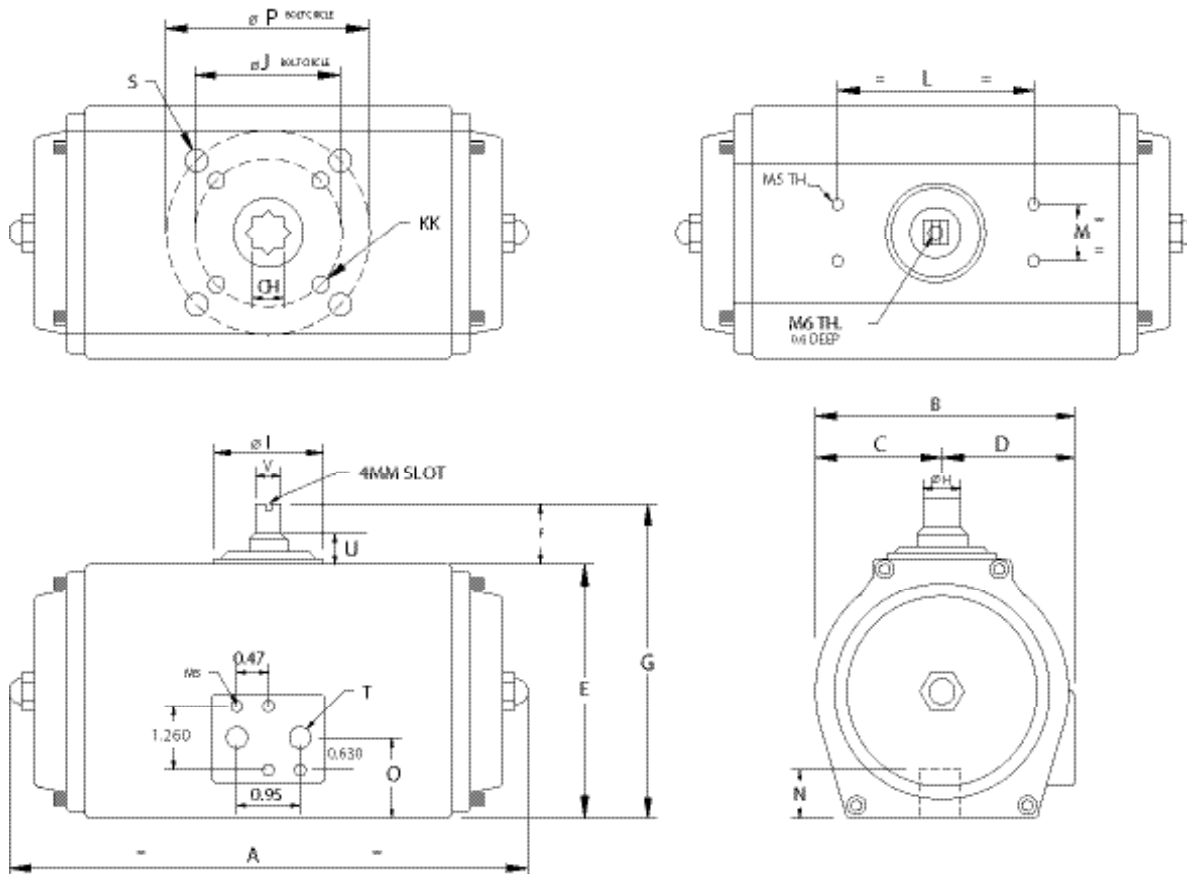
PARTS BREAKDOWN FOR BI-SS ACTUATOR



PART #	NAME	MATERIAL	QTY
1	BODY	SS	1
2	PISTON	SS	2
3	END CAPS	SS	2
4	PINION	SS	1
5	GUIDE BEARING	NYLON 6	1
6	PINION BEARING (TOP)	TFE	1
7	PINION BEARING (BOTTOM)	TFE	1
8	SNAP RING	SS	1
9	O-RING (INNER TOP)	VITON®	1
10	O-RING (OUTER TOP)	VITON®	1
11A	WASHER	SS	1
11B	BEARING	NYLON 6	1
12	O-RING (INNER BOTTOM)	VITON®	1
13	O-RING (OUTER BOTTOM)	VITON®	1
14	O-RING (PISTON)	VITON®	2

PART #	NAME	MATERIAL	QTY
15	PISTON BEARING	NYLON 6	2
16	O-RING (END CAP)	VITON®	2
17A	BOLTS (END CAP)	SS	8
17B	LOCK WASHER	SS	8
18	TRAVEL STOP	SS	2
19	O-RING (TRAVEL STOP)	VITON®	2
20A	WASHER	SS	2
20B	NUT (TRAVEL STOP)	SS	2
21	RETAINING NUT	SS	2
22	SPRING RETAINER	NYLON 6	*
23	SPRING	PLATED CS	*
24	SPRING	PLATED CS	*
25	SPRING SCREW	SS	*
26	SPRING NUT	SS	*
27	POSITION INDICATOR	NYLON	1
28	PORT PLUG	NYLON 6	2

BI-TORQ BI-SS SERIES DIMENSIONAL DATA



GENERAL DIMENSIONS

MODEL	A	B	C	D	E	F	G	CH	J
SS-45	7.56	2.56	1.15	1.15	2.56	0.787	3.34	0.433	1.42
SS-60	7.34	2.92	1.39	1.39	3.18	0.787	3.97	0.551	1.97
SS-85	8.37	3.97	1.91	1.91	4.24	0.787	5.03	0.669	1.97
SS-105	10.53	4.75	2.29	2.29	5.23	0.787	6.02	0.866	2.76
SS-125	12.20	5.39	2.69	2.69	6.09	1.181	7.27	0.866	2.76
SS-140	19.29	6.26	3.11	3.11	6.89	1.181	8.07	1.063	4.02
SS-160	21.10	6.85	3.43	3.42	7.76	1.181	8.94	1.063	4.02

MODEL	L	N	M	P	S	T	V	KK
SS-45	3.15	0.58	1.181	1.97	M6 x 10	1/4" NPT	0.633	M5 x 8
SS-60	3.15	0.59	1.181	N/A	M6 x 10	1/4" NPT	0.633	---
SS-85	3.15	0.66	1.181	2.76	M8 x 13	1/4" NPT	0.635	M6 x 10
SS-105	3.15	0.77	1.181	N/A	M8 x 13	1/4" NPT	0.629	---
SS-125	5.12	0.97	1.181	4.02	M10 x 16	1/4" NPT	0.865	M8 x 13
SS-140	5.12	1.18	1.181	4.92	M12 x 20	1/4" NPT	0.865	M10 x 16
SS-160	5.12	1.18	1.181	4.92	M12 x 20	1/4" NPT	0.865	M10 x 16

ACTUATOR WEIGHTS

MODEL	DA (LBS.)	SR (LBS.)
SS45	5.0	5.5
SS60	8.0	8.5
SS85	14	14.5
SS105	25.5	27.0
SS125	38.5	40.5
SS140	63.5	65.5
SS160	80.0	83.0

NOTE: Inserts and adapters are available for mounting to a variety of ISO and non-ISO mount valves.

BI-TORQ BI-SS ACTUATOR TORQUE CHARTS

SPRING RETURN TORQUE (IN. LBS)

	SPRINGS PER SIDE	SPRING TORQUE		40 PSI		60PSI		80PSI		100PSI	
MODEL	(5 STD)	END	BREAK	END	BREAK	END	BREAK	END	BREAK	END	BREAK
SS45SR	3	35	57	14	36	50	72	86	108	121	143
	4	47	77			30	60	66	96	101	131
	5	60	96					47	83	82	118
	6	71	115							63	107
SS60SR	3	67	136	35	104	120	189	206	275	291	360
	4	90	182			94	166	160	252	245	337
	5	119	207					125	230	200	315
	6	135	273							154	292
SS85SR	3	167	273	106	203	282	388	467	573	652	758
	4	223	364			191	332	376	517	561	702
	5	279	430					284	461	429	646
	6	335	523							378	590
SS105SR	3	346	574	65	278	362	590	675	903	987	1215
	4	461	766			170	475	483	788	795	1110
	5	576	956					293	673	605	985
	6	692	1141							420	869
SS125SR	3	651	941	336	563	881	1171	1288	1778	1895	2385
	4	760	1222			689	953	1105	1560	1514	2167
	5	1080	1602					927	1349	1134	1956
	6	1301	1790							1153	1735
SS140SR	3	808	1359	655	1226	1592	2243	2517	3260	3525	4277
	4	1071	2087			1200	1980	1983	2997	3166	4014
	5	1345	2607					1755	2623	2625	3740
	6	1610	3026							2340	3475
SS160SR	3	1522	2098	895	1580	2420	3131	4022	4682	4657	6233
	4	2035	3133			1720	2618	3122	4169	4822	5720
	5	2550	3690					2467	3654	3588	5205
	6	3054	4893							3333	4701

DOUBLE ACTING TORQUE (IN. LBS)

MODEL	40PSI	60PSI	80PSI	100PSI	120PSI
SS45DA	71	107	143	178	214
SS60DA	171	256	342	427	512
SS85DA	370	555	740	925	1110
SS105DA	624	936	1249	1561	1873
SS125DA	1214	1822	2429	3036	3643
SS140DA	2034	3051	4068	5085	6102
SS160DA	3102	4653	6204	7755	9306



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