PNEU-TURN ROTARY ACTUATORS

PNEU-TURN® ROTARY ACTUATORS

Pneu-Turn® rotary actuators are manufactured using corrosive resistant components including 304 stainless steel gear shaft and cylinder bodies, anodized aluminum housing and end caps. Standard models include a self-lubricating sintered iron copper shaft bearing. Optional shaft ball bearings are also available.

ACTUATOR OPERATION

Rotary action of the Pneu-Turn Rotary Actuator is achieved through the use of a rack and pinion assembly. Just as with a pneumatic or hydraulic cylinder, the speed of rotation may be controlled through the use of flow controls. The action at the end of the rotation can be controlled by the use of adjustable cushions, which are available as an option.

Care should be taken to insure that the inertial force does not exceed the published torque capacity. An external stop may be necessary to avoid exceeding the torque capacity due to inertial loads.

When mounting the Pneu-Turn against the shaft side of the housing, be sure to provide clearance for the pilot diameter to avoid excessive bearing pressure.

For standard models, axial loads must only be applied in the direction indicated on the dimensional drawings. The Dual Shaft or Rear Shaft options can be used to correctly orient tension induced axial loads. With the Ball Bearing option, axial loads can be applied in either direction.

The Angle Adjustment Option will allow 45˚ of adjustability. If cushions are ordered in conjunction with the angle adjustment option, adjustability will be 10˚.

PORT POSITIONING

Ports on the Pneu-Turn may be repositioned to accommodate any air line configuration by loosening the three body retainer screws. Once desired port positions are obtained, tighten screws to specified torque values.

LUBRICATION

The Pneu-Turn Rotary Actuator is pre-lubricated at the factory for extensive, maintenance-free operation. The life of the rotary actuator can be lengthened by providing additional lubrication with an air line mist lubricator or direct introduction of oil to the actuator every 500 hours of operation. Recommended oils for Buna N seals are medium to heavy inhibited hydraulic and general purpose oil. If High Temperature seals, use Dow Corning #710. Other types of pre-lube are available upon request.

The rack and pinion gear and ball bearings are pre-lubricated at the factory for extensive, maintenance-free operation. If additional lubrication should be required, use a high grade bearing grease.

WOODRUFF KEY LOCATION

The standard position of the woodruff key is 12 o'clock at the center of rotation. For Three-Position PneuTurn, the center position is 12 o'clock, ± 2°.

ENGINEERING SPECIFICATIONS

Ratings

Pressure Rating:	150 PSI
Rotation Tolerance*:	9/16" - 3/4" Bore: 0°-15°
	1-1/16" - 2" Bore: 0°-10°
Temperature Range:**	Buna-N (Standard): -20° F to 200° F
	Option V High Temperature Seals: 0° F to 400° F
	High Temperature Seals with Ball Bearing: 0° F to 250° F
Backlash:	Without X option: 1-1/2° of Arc Maximum. Double rack actuators have zero backlash at end of rotational stroke.
	With X option: Single rack models have zero mid rotational and end of rotation backlash. Double rack models have zero mid-rotational backlash.
Breakaway:	<5 PSI

** Bumper option allows compression under pressure which may exceed tolerance. If higher accuracy desired, please specify angle adjustment.*
*** If cylinders are operated at temperatures below 0° for extended time periods, special modifications may be required. Special seal materials are available on request.*

Standard Line

SERIES	9/16"		3/4"		1-1/16"		1-1/2"		2"	
	(006)	(014)	(017)	(033)	(037)	(074)	(098)	(196)	(247)	(494)
Theoretical Torque Capacity (in.-lbs./PSI)	0.068	0.135	0.166	0.331	0.369	0.739	0.982	1.963	2.468	4.935
Bearing Load (Axial) (lbs.)	25	25	25	25	40	40	40	40	80	80
Bearing Load (Radial) (lbs.)	200	200	250	250	300	300	350	350	500	500
Distance Between Bearing Midpoints (in.)	0.77	0.77	0.96	0.96	1.24	1.24	1.70	1.70	1.98	1.98
Maximum Rate of Rotation (@ 100 PSI With No Load)	3000°/ sec.	3000°/ sec.	3500°/ sec.	3500°/ sec.	2000°/ sec.	2000°/ sec.	1500°/ sec.	1500°/ sec.	1000°/ sec.	1000°/ sec.
Weight (Approximate) (oz.)	6	11.5	11	20.5	21	38	48	89	105	152
Body Retainer Cap Screw Recommended Tightening Torque (in.-lbs.)	10	10	12	12	12	12	20	20	20	20

For Ball Bearing Option, the Following Specifications Apply

SERIES	9/16"		3/4"		1-1/16"		1-1/2"		2"	
	(006)	(014)	(017)	(033)	(037)	(074)	(098)	(196)	(247)	(494)
Bearing Load (Axial) (lbs.)	55	55	75	75	100	100	110	110	130	130
Bearing Load (Radial) (lbs.)	205	205	270	270	380	380	425	425	740	740
Distance Between Bearing Midpoints (in.)	.72	.72	.96	.96	1.26	1.26	1.71	1.71	1.82	1.82
Weight (Approximate) (oz.)	6	11.5	10.5	20	20.5	37.5	47	88	103	150

ENGINEERING SPECIFICATIONS

Kinetic Energy Capacity

A load connected to the shaft of a Pneu-Turn will produce kinetic energy as it is rotated. This kinetic energy must be absorbed by the Pneu-Turn or other stopping device. If the Pneu-Turn is to stop the load without external devices, then the application kinetic energy must not exceed the maximums noted in the table below.

Maximum Allowable Kinetic Energy (in-lbs)

SIZE	WITHOUT CUSHIONS	WITH CUSHIONS
9/16" (006 / 014)	0.02	N/A
3/4" (017 / 033)	0.04	0.08
1-1/16" (037 / 074)	0.07	0.88
1-1/2" (098 / 196)	0.41	7.80
2" (247 / 494)	1.60	13.00

The kinetic energy developed by your application can be determined by using the equations noted below:

KE = 0.5 * I * w2
w = 1.20 * (ø / t)

LEGEND:
KE = Kinetic energy (in.-lbs.)
I = Moment of inertia (in.-lb.-sec.2)
w = Rotational speed (radians/sec.)
ø = Angle of rotation (radians)
t = Time of rotation (sec.)
W = Weight of load (lb.)
g = Acceleration of gravity (386 in./sec.2)

Below are examples of attachments, their geometry, and the equation to use to determine the Moment of Inertia.

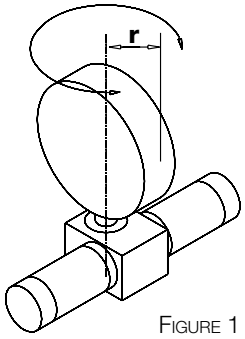


Figure 1

Thin Disc
(Mounted on side through center)

$$I = \frac{W}{g} * \frac{r^2}{4}$$

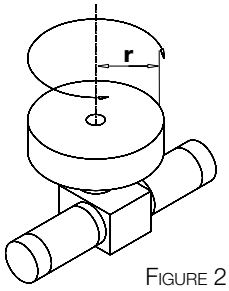


Figure 2

Thin Disc
(Centered)

$$I = \frac{W}{g} * \frac{r^2}{2}$$

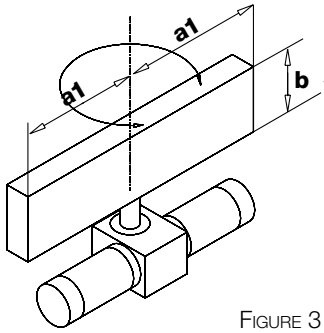


Figure 3

Thin Rectangular Plate
(Centered and mounted on side)

$$I = \frac{W}{g} * \frac{(2(a1))^2}{12}$$

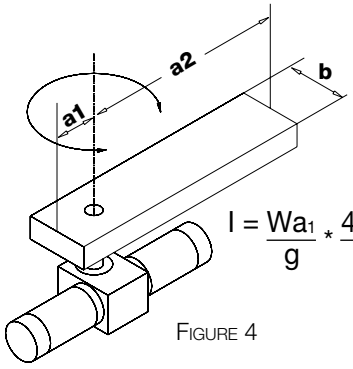


Figure 4

Thin Rectangular Plate
(Off-centered)

$$I = \frac{Wa_1}{g} * \frac{4(a1)^2 + b^2}{12} + \frac{Wa_2}{g} * \frac{4(a2)^2 + b^2}{12}$$

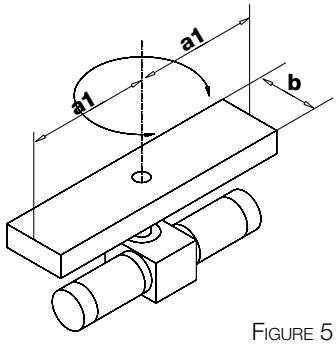


Figure 5

Thin Rectangular Plate
(Centered)

$$I = \frac{W}{g} * \frac{(2(a1))^2 + b}{12}$$

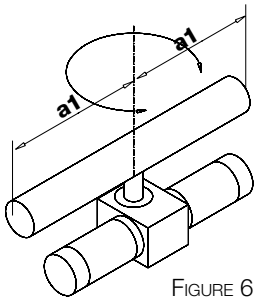


Figure 6

Slender Rod
(Centered)

$$I = \frac{W}{g} * \frac{(2(a1))^2}{12}$$

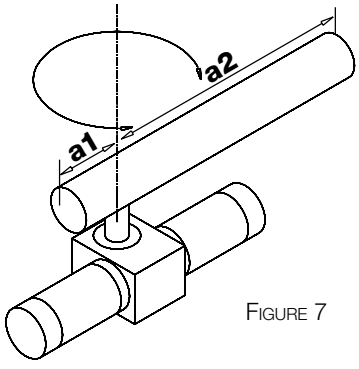


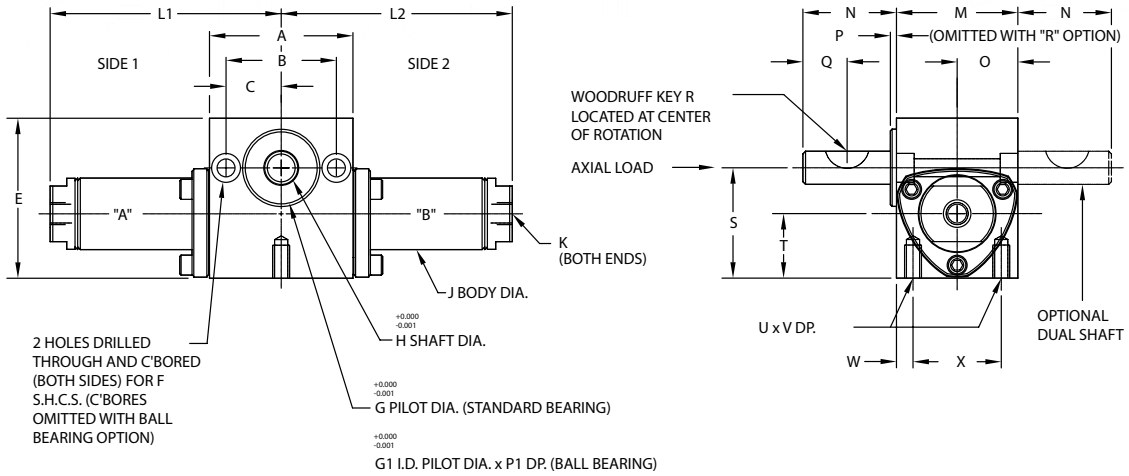
Figure 7

Slender Rod
(Off-centered)

$$I = \frac{Wa_1}{g} * \frac{a1^2}{3} + \frac{Wa_2}{g} * \frac{a2^2}{3}$$

DIMENSIONS

Single Rack Models (in)



L1/L2 dimensions shown in chart on page 4.6.

BORE	A	B	C	E	E (WITH R OPTION)	F (C' BORES OMITTED WITH BALL BEARING OPTION)	G (STD BEARING O.D. PILOT DIA.)
9/16" (006)	1.38	1.00	0.50	1.44	1.44	#8 S.H.C.S.	0.675
3/4" (017)	1.62	1.25	0.62	1.81	1.81	#10 S.H.C.S.	0.875
1-1/16" (037)	1.88	1.44	0.72	2.12	2.19	1/4" S.H.C.S.	0.968
1-1/2" (098)	2.38	1.81	0.90	2.81	2.84	5/16" S.H.C.S.	1.249
2" (247)	3.00	2.38	1.19	3.75	3.75	5/16" S.H.C.S.	1.749

BORE	G1 (BALL BEARING I.D. PILOT)	H	J	K	M	N	O	P	P1
9/16" (006)	0.750	0.250	0.61	#10-32 [1]	1.12	0.69	0.56	0.06	0.06
3/4" (017)	0.875	0.375	0.82	#10-32 [1]	1.37	1.06	0.69	0.06	0.06
1-1/16" (037)	1.125	0.500	1.12	1/8 NPT	1.75	1.31	0.88	0.06	0.09
1-1/2" (098)	1.375	0.625	1.56	1/8 NPT	2.25	1.38	1.12	0.09	0.09
2" (247)	1.875	0.875	2.08	1/4 NPT	2.56	2.00	1.28	0.11	0.10

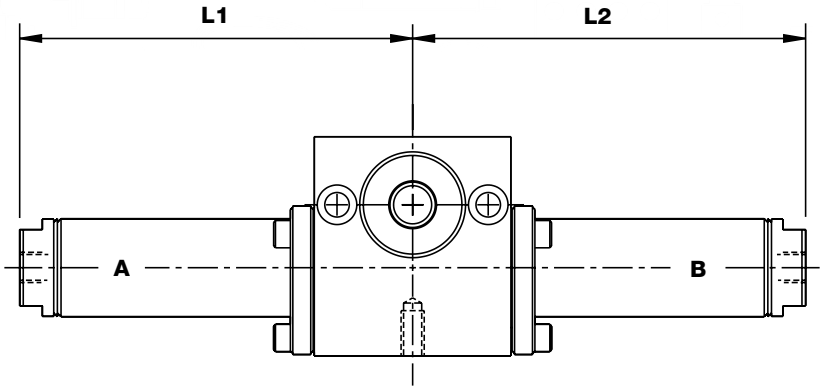
BORE	Q	R2	S	T	U	V	W	X
9/16" (006)	0.31	#202.5	1.03	0.61	#8-32	0.44	0.19	0.75
3/4" (017)	0.50	#204	1.25	0.73	#10-24	0.38	0.19	1.00
1-1/16" (037)	0.62	#305	1.56	0.88	1/4-20	0.50	0.25	1.25
1-1/2" (098)	0.62	#405	2.09	1.16	5/16-18	0.62	0.31	1.62
2" (247)	0.75	#606	2.56	1.28	5/16-18	0.62	0.28	2.00

[1] Option-S ports are 1/8 NPT
[2] Key dimensions on page XX.

DIMENSIONS

Single Rack Options (in)

(Dimensional variations from standard as shown.)



	9/16" (006)		3/4" (017)		1-1/16" (037)		1-1/2" (098)		2" (247)	
	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2
Adder Per Degree of Rotation	0.0048	0.0048	0.0066	0.0066	0.0073	0.0073	0.0097	0.0097	0.0137	0.0137
PLUS ONE LENGTH ADDER BELOW PER SIDE										
Base Unit (No Options)	1.52	1.52	1.63	1.63	2.03	2.03	2.34	2.34	2.84	2.84
Bumper Both Sides (B1)	1.64	1.64	1.77	1.77	2.18	2.18	2.49	2.49	3.04	3.04
Bumper CCW Side (B2)	1.52	1.64	1.63	1.77	2.03	2.18	2.34	2.49	2.84	3.04
Bumper CW Side (B3)	1.64	1.52	1.77	1.63	2.18	2.03	2.49	2.34	3.04	2.84
Cushion Both Sides (C1)	N/A	N/A	2.16	2.16	2.66	2.66	2.98	2.98	3.65	3.65
Cushion CCW Side (C2)	N/A	N/A	1.63	2.16	2.03	2.66	2.34	2.98	2.84	3.65
Cushion CW Side (C3)	N/A	N/A	2.16	1.63	2.66	2.03	2.98	2.34	3.65	2.84
Oil Service Seals (S)	1.93	1.93	2.18	2.18	2.34	2.34	2.77	2.77	3.38	3.38
Oil Service with Angle Adjustment (AS)	N/A	N/A	N/A	N/A	2.97	2.97	3.41	3.41	4.19	4.19

Note: Option A- Angle Adjustment and Option M- Magnetic Position Sensing is found on pages 4.9 and 4.10.

"CCW Side" refers to the extreme rotation of the shaft in the counter-clockwise direction as viewed from the mounting pilot side of the actuator.

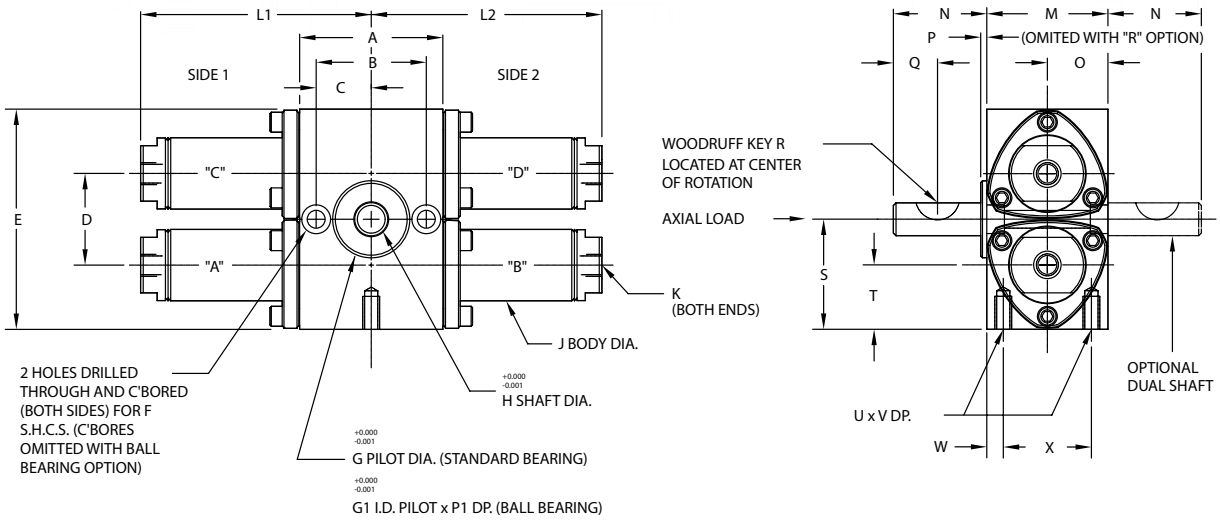
The location of the optional feature chosen will be on tube B for single rack actuators.

"CW Side" refers to the extreme rotation of the shaft in the clockwise direction as viewed from the mounting pilot side of the actuator.

The location of the optional feature chosen will be on tube A for single rack actuators.

DIMENSIONS

Double Rack Models (in)



NOTE: Body retainer on 2" bore has 4 corners. L1/L2 dimensions shown in chart on page XX..

BORE	A	B	C	D	E	F (C' BORES OMITTED WITH BALL BEARING OPTION)	G (STD BEARING O.D. PILOT DIA.)
9/16" (014)	1.38	1.00	0.50	0.83	2.06	#8 S.H.C.S.	0.675
3/4" (033)	1.62	1.25	0.62	1.04	2.50	#10 S.H.C.S.	0.875
1-1/16" (074)	1.88	1.44	0.72	1.36	3.12	1/4" S.H.C.S.	0.968
1-1/2" (196)	2.38	1.81	0.90	1.88	4.19	5/16" S.H.C.S.	1.249
2" (494)	3.00	2.38	1.19	2.56	5.13	5/16" S.H.C.S.	1.749

BORE	G1 (BALL BEARING I.D. PILOT)	H	J	K	M	N	O	P	P1
9/16" (014)	0.750	0.250	0.61	#10-32 [1]	1.12	0.69	0.56	0.06	0.06
3/4" (033)	0.875	0.375	0.82	#10-32 [1]	1.37	1.06	0.69	0.06	0.06
1-1/16" (074)	1.125	0.500	1.12	1/8 NPT	1.75	1.31	0.88	0.06	0.09
1-1/2" (196)	1.375	0.625	1.56	1/8 NPT	2.25	1.38	1.12	0.09	0.09
2" (494)	1.875	0.875	2.08	1/4 NPT	2.56	2.00	1.28	0.11	0.10

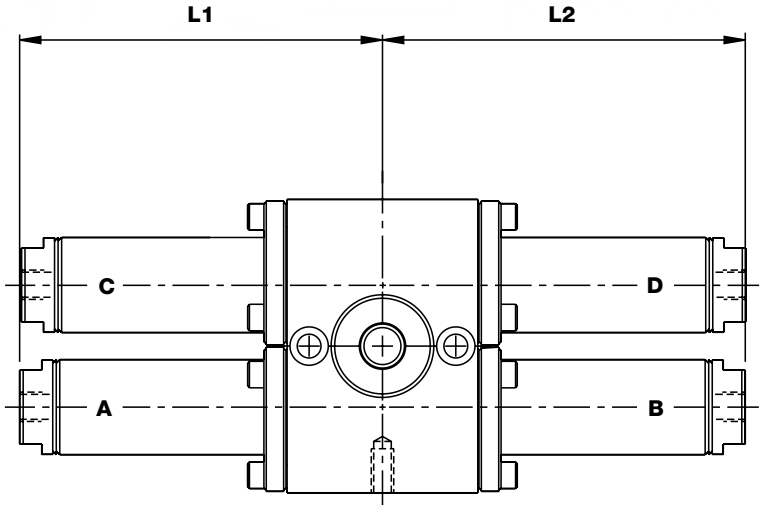
BORE	Q	R2	S	T	U	V	W	X
9/16" (014)	0.31	#202.5	1.03	0.61	#8-32	0.44	0.19	0.75
3/4" (033)	0.50	#204	1.25	0.73	#10-24	0.38	0.19	1.00
1-1/16" (074)	0.62	#305	1.56	0.88	1/4-20	0.50	0.25	1.25
1-1/2" (196)	0.62	#405	2.09	1.16	5/16-18	0.62	0.31	1.62
2" (494)	0.75	#606	2.56	1.28	5/16-18	0.62	0.28	2.00

[1] Option-S ports are 1/8 NPT (bodies "A" and "C" only).
[2] Key dimensions on page XX

DIMENSIONS

Double Rack Options (in)

(Dimensional variations from standard as shown.)



SIDE 1 **SIDE 2**

	9/16" (014)		3/4" (033)		1-1/16" (074)		1-1/2" (196)		2" (494)	
	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2
Adder Per Degree of Rotation	0.0048	0.0048	0.0066	0.0066	0.0073	0.0073	0.0097	0.0097	0.0137	0.0137
PLUS ONE LENGTH ADDER BELOW PER SIDE										
Base Unit (No Options)	1.52	1.57	1.63	1.68	2.03	2.08	2.34	2.39	2.84	2.89
Bumper Both Sides (B1)	1.64	1.57	1.77	1.68	2.18	2.08	2.49	2.39	3.04	2.89
Bumper CCW Side (B2)	1.64	1.57	1.77	1.68	2.18	2.08	2.49	2.39	3.04	2.89
Bumper CW Side (B3)	1.64	1.57	1.77	1.68	2.18	2.08	2.49	2.39	3.04	2.89
Cushion Both Sides (C1)	N/A	N/A	2.16	1.68	2.66	2.08	2.98	2.39	3.65	2.89
Cushion CCW Side (C2)	N/A	N/A	2.16	1.68	2.66	2.08	2.98	2.39	3.65	2.89
Cushion CW Side (C3)	N/A	N/A	2.16	1.68	2.66	2.08	2.98	2.39	3.65	2.89
Oil Service Seals (S)	1.93	1.57	2.18	1.68	2.34	2.08	2.77	2.39	3.38	2.89
Oil Service with Angle Adjustment (AS)	N/A	N/A	N/A	N/A	2.97	2.08	3.41	2.39	4.19	2.89

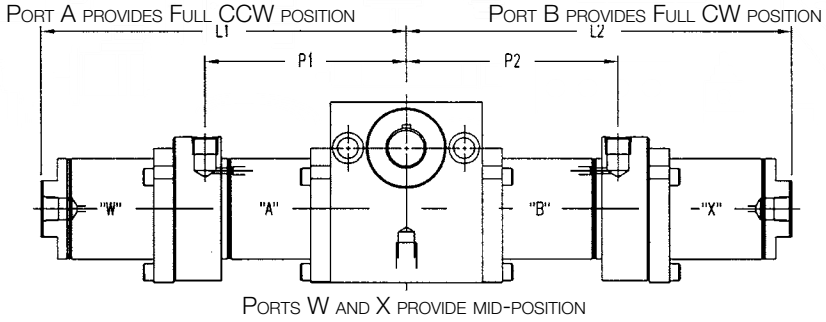
"CCW Side" refers to the extreme rotation of the shaft in the counter-clockwise direction as viewed from the mounting pilot side of the actuator.

The location of the optional feature chosen will be on tube C for single rack actuators.

"CW Side" refers to the extreme rotation of the shaft in the clockwise direction as viewed from the mounting pilot side of the actuator.

The location of the optional feature chosen will be on tube A for double rack actuators.

DIMENSIONS (THREE POSITION MODELS)



Single Rack Model Dimensions

	9/16" (006)				3/4" (017)				1-1/16" (037)			
	P1	P2	L1	L2	P1	P2	L1	L2	P1	P2	L1	LR
Degrees of Full Rotation Adder per degree of rotation	FULL ROT. 0.0048	FULL ROT. 0.0048	FULL ROT. 0.0048	FULL ROT. 0.0048	FULL ROT. 0.0066	FULL ROT. 0.0066	FULL ROT. 0.0066	FULL ROT. 0.0066	FULL ROT. 0.0073	FULL ROT. 0.0073	FULL ROT. 0.0073	FULL ROT. 0.0073
Degree of Stop Rotation Adder per degree of rotation	2nd stop N/A	1st stop N/A	2nd stop 0.0048	1st stop 0.0048	2nd stop N/A	1st stop N/A	2nd stop 0.0066	1st stop 0.0066	2nd stop N/A	1st stop N/A	2nd stop 0.0073	1st stop 0.0073
Base Unit (No Option)	1.41	1.41	2.82	2.82	1.63	1.63	3.05	3.05	2.03	2.03	3.89	3.89
Bumpers Both Sides (B1)	1.53	1.53	3.06	3.06	1.77	1.77	3.33	3.33	2.18	2.18	4.19	4.19
Bumper CCW Side (B2)	1.41	1.53	2.82	3.06	1.63	1.77	3.05	3.33	2.03	2.18	3.89	4.19
Bumper CW Side (B3)	1.53	1.41	3.06	2.82	1.77	1.63	3.33	3.05	2.18	2.03	4.19	3.89
Cushion/Flow Both Sides (C1) (Q1)	N/A	N/A	N/A	N/A	1.63	1.63	3.58	3.58	2.03	2.03	4.51	4.51
Cushion/Flow CCW Side (C2) (Q2)	N/A	N/A	N/A	N/A	1.63	1.63	3.05	3.58	2.03	2.03	3.89	4.51
Cushion/Flow CW Side (C3) (Q3)	N/A	N/A	N/A	N/A	1.63	1.63	3.58	3.05	2.03	2.03	4.51	3.89
Angle Adjustment Both Sides (A1)	1.41	1.41	3.05	3.05	1.63	1.63	3.27	3.27	2.03	2.30	4.28	4.28
Angle Adjustment CCW Side (A2)	1.41	1.41	2.82	3.05	1.63	1.63	3.05	3.27	2.03	2.03	3.89	4.28
Angle Adjustment CW Side (A3)	1.41	1.41	3.05	2.82	1.63	1.63	3.27	3.05	2.03	2.03	4.28	3.89

	1-1/2" (098)				2" (247)			
	P1	P2	L1	L2	P1	P2	L1	L2
Degrees of Full Rotation Adder per degree of rotation	FULL ROT. 0.0097	FULL ROT. 0.0097	FULL ROT. 0.0097	FULL ROT. 0.0097	FULL ROT. 0.0137	FULL ROT. 0.0137	FULL ROT. 0.0137	FULL ROT. 0.0137
Degree of Stop Rotation Adder per degree of rotation	2nd stop N/A	1st stop N/A	2nd stop 0.0048	1st stop 0.0048	2nd stop N/A	1st stop N/A	2nd stop 0.0066	1st stop 0.0066
Base Unit (No Option)	2.28	2.28	4.39	4.39	2.81	2.81	5.13	5.13
Bumpers Both Sides (B1)	2.43	2.43	4.69	4.69	3.01	3.01	5.53	5.53
Bumper CCW Side (B2)	2.28	2.43	4.39	4.69	2.81	3.01	5.13	5.53
Bumper CW Side (B3)	2.43	2.28	4.69	4.39	3.01	2.81	5.53	5.13
Cushion/Flow Both Sides (C1) (Q1)	2.28	2.28	5.03	5.03	2.81	2.81	5.95	5.95
Cushion/Flow CCW Side (C2) (Q2)	2.28	2.28	4.39	5.03	2.81	2.81	5.13	5.95
Cushion/Flow CW Side (C3) (Q3)	2.28	2.28	5.03	4.39	2.81	2.81	5.95	5.13
Angle Adjustment Both Sides (A1)	2.28	2.28	4.80	4.80	2.81	2.81	5.66	5.66
Angle Adjustment CCW Side (A2)	2.28	2.28	4.39	4.80	2.81	2.81	5.13	5.66
Angle Adjustment CW Side (A3)	2.28	2.28	4.80	4.39	2.81	2.81	5.66	5.13

***Select Magnetic Position Sensing adder from MRS table*

MRS LENGTH ADDER (in)					
TOTAL ROT. DEGREES	006/014	017/033	037/074	098/196	247/494
45˚	0.66	0.66	0.75	0.75	0.75
90˚	0.55	0.52	0.59	0.53	0.44
180˚	0.34	0.22	0.26	0.09	0.00
270˚	0.12	0.00	0.00	0.00	0.00
360˚	0.00	0.00	0.00	0.00	0.00

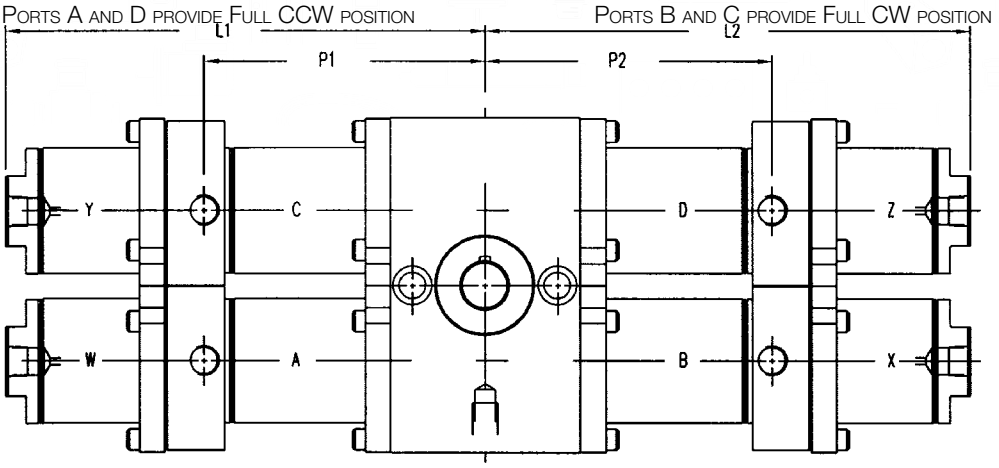
NOTE: Overall length calculator spreadsheet available. Contact the Technical Assistance Center for details.

Single rack overall width calculation:

PT-098180/045-8C1--Using the chart above, calculate L1 and L2 dimensions as follows:

- L1 = total rotation (180) * (.0097) full rotation adder + degrees to 2nd stop (135) * (.0097) 2nd stop rotation adder + cushion adder (5.03")
- L2 = total rotation (180) * (.0097) full rotation adder + degrees to 1st stop (45) * (.0097) 1st stop rotation adder + cushion adder (5.03")
- [L1 = (1.746" + 1.310" + 5.03") = 8.086"] + [L2 = (1.746" + .437 + 5.03") = 7.213"]; Total width = 8.086" + 7.213" = 15.30"

DIMENSIONS (THREE POSITION MODELS)



PORTS W, X, Y, AND Z PROVIDE MID-POSITION

Double Rack Model Dimensions

	9/16" (014)				3/4" (033)				1-1/16" (074)			
	P1	P2	L1	L2	P1	P2	L1	L2	P1	P2	L1	LR
Degrees of Full Rotation Adder per degree of rotation	FULL ROT. 0.0048	FULL ROT. 0.0048	FULL ROT. 0.0048	FULL ROT. 0.0048	FULL ROT. 0.0066	FULL ROT. 0.0066	FULL ROT. 0.0066	FULL ROT. 0.0066	FULL ROT. 0.0073	FULL ROT. 0.0073	FULL ROT. 0.0073	FULL ROT. 0.0073
*Degrees to longest stop Adder per degree of rotation	Stop rot. N/A	Stop rot. N/A	Stop rot. 0.0048	Stop rot. 0.0048	Stop rot. N/A	Stop rot. N/A	Stop rot. 0.0066	Stop rot. 0.0066	Stop rot. N/A	Stop rot. N/A	Stop rot. 0.0073	Stop rot. 0.0073
Base Unit (No Option)	1.41	1.46	2.82	2.87	1.63	1.68	3.05	3.10	2.03	2.08	3.89	3.94
Bumpers Both Sides (B1)	1.53	1.46	3.06	2.87	1.77	1.68	3.33	3.10	2.18	2.08	4.19	3.94
Bumper CCW Side (B2)	1.53	1.46	3.06	2.87	1.77	1.68	3.33	3.10	2.18	2.08	4.19	3.94
Bumper CW Side (B3)	1.53	1.46	3.06	2.87	1.77	1.68	3.33	3.10	2.18	2.08	4.19	3.94
Cushion/Flow Both Sides (C1) (Q1)	N/A	N/A	N/A	N/A	1.63	1.68	3.58	3.10	2.03	2.08	4.51	3.94
Cushion/Flow CCW Side (C2) (Q2)	N/A	N/A	N/A	N/A	1.63	1.68	3.58	3.10	2.03	2.08	4.51	3.94
Cushion/Flow CW Side (C3) (Q3)	N/A	N/A	N/A	N/A	1.63	1.68	3.58	3.10	2.03	2.08	4.51	3.94
Angle Adjustment Both Sides (A1)	1.41	1.46	3.05	2.87	1.63	1.68	3.27	3.10	2.03	2.08	4.28	3.94
Angle Adjustment CCW Side (A2)	1.41	1.46	3.05	2.87	1.63	1.68	3.27	3.10	2.03	2.08	4.28	3.94
Angle Adjustment CW Side (A3)	1.41	1.46	3.05	2.87	1.63	1.68	3.27	3.10	2.03	2.08	4.28	3.94

	1-1/2" (196)				2" (494)			
	P1	P2	L1	L2	P1	P2	L1	L2
Degrees of Full Rotation Adder per degree of rotation	FULL ROT. 0.0097	FULL ROT. 0.0097	FULL ROT. 0.0097	FULL ROT. 0.0097	FULL ROT. 0.0137	FULL ROT. 0.0137	FULL ROT. 0.0137	FULL ROT. 0.0137
Degree of Stop Rotation Adder per degree of rotation	Stop rot. N/A	Stop rot. N/A	Stop rot. 0.0097	Stop rot. 0.0097	Stop rot. N/A	Stop rot. N/A	Stop rot. 0.0137	Stop rot. 0.0137
Base Unit (No Option)	2.28	2.33	4.39	4.44	2.81	2.86	5.13	5.18
Bumpers Both Sides (B1)	2.43	2.33	4.69	4.44	3.01	2.86	5.53	5.18
Bumper CCW Side (B2)	2.43	2.33	4.69	4.44	3.01	2.86	5.53	5.18
Bumper CW Side (B3)	2.43	2.33	4.69	4.44	3.01	2.86	5.53	5.18
Cushion/Flow Both Sides (C1) (Q1)	2.28	2.33	5.03	4.44	2.81	2.86	5.95	5.18
Cushion/Flow CCW Side (C2) (Q2)	2.28	2.33	5.03	4.44	2.81	2.86	5.95	5.18
Cushion/Flow CW Side (C3) (Q3)	2.28	2.33	5.03	4.44	2.81	2.86	5.95	5.18
Angle Adjustment Both Sides (A1)	2.28	2.33	4.80	4.44	2.81	2.86	5.66	5.18
Angle Adjustment CCW Side (A2)	2.28	2.33	4.80	4.44	2.81	2.86	5.66	5.18
Angle Adjustment CW Side (A3)	2.28	2.33	4.80	4.44	2.81	2.86	5.66	5.18

NOTE: Overall length calculator spreadsheet available. Contact the Technical Assistance Center for details.

**Select Magnetic Position Sensing adder from MRS table.*
*** Largest stop rotation is used for double rack models to calculate overall L1 and L2 length. Double rack models - one body on each side will be shorter if the shaft mid-position is not 1/2 of the total rotation, the above calculation still provides the units overall width.*

Double rack overall width calculation:**

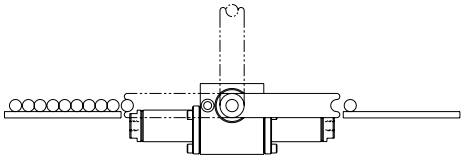
PT-196180/045-8C1--Using the chart above, calculate L1 and L2 dimensions as follows:

- L1 = Total rotation (180) * (.0097) Full rotation adder + Largest Degrees stop (135) * (.0097) stop rotation adder + Cushion adder (5.03")
- L2 = Total rotation (180) * (.0097) Full rotation adder + Largest Degrees stop (135) * (.0097) stop rotation adder + Cushion adder (4.44")
- [L1 = (1.746" + 1.310" + 5.03") = 8.086"] + [L2 = (1.746" + 1.310 + 4.44") = 7.496"]; Total width = 8.086" + 7.496" = 15.58"

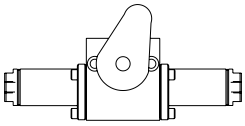
APPLICATION POSSIBILITIES

Picture the possibilities. Consider the many benefits of using the Bimba Pneu-Turn Rotary Actuator: compact, space-saving design, lightweight, corrosion-resistant components, and low cost. Now, using the pictures on this page as a springboard, you can understand that the applications are limitless. All you need is your imagination and a Bimba Pneu-Turn Rotary Actuator.

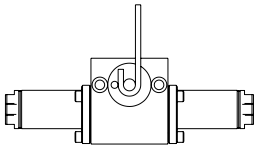
Transferring



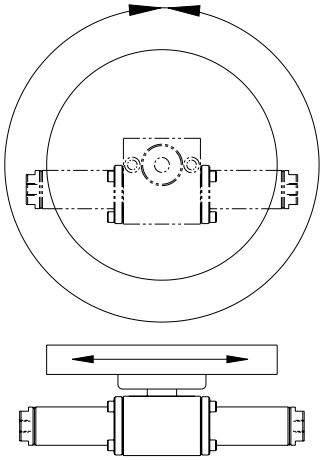
Camming



Bending (Tube or Wire)



Indexing



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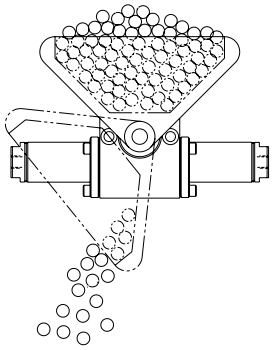
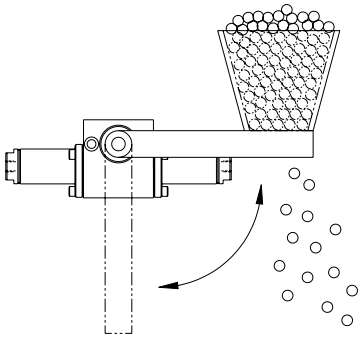
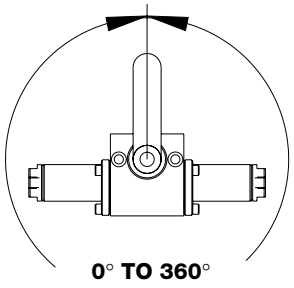


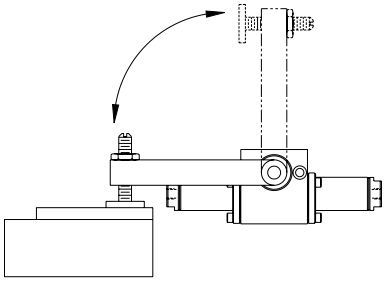
Opening/Closing



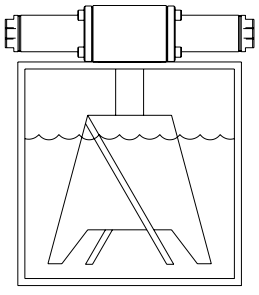
Turning



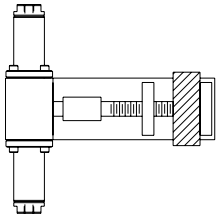
Clamping



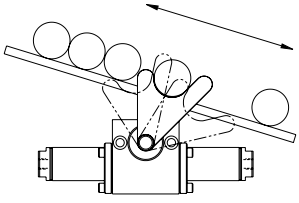
Mix/Agitate



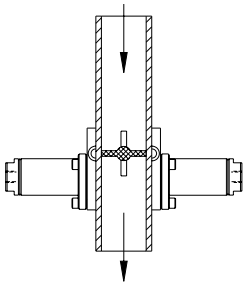
Screw/Clamping



Feeding



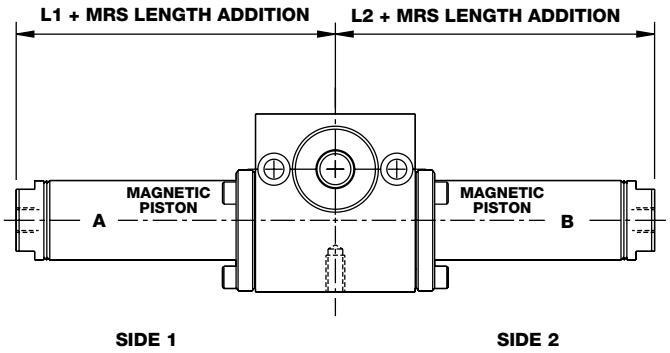
Valve Actuator

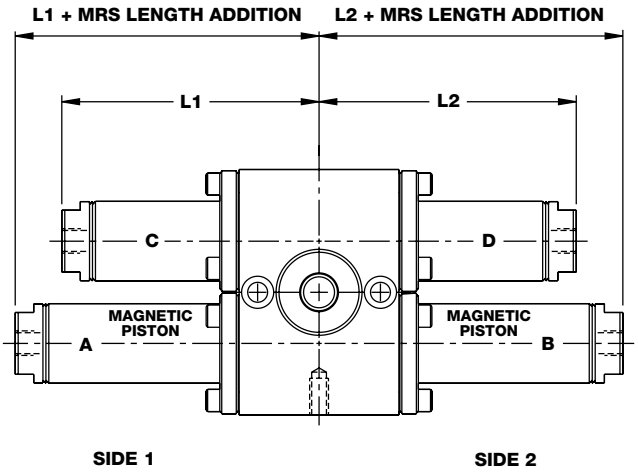


OPTIONS

MRS® Magnetic Position Sensing

Magnetic pistons are located on the A and B tubes of both the single and double rack rotary actuators, guaranteeing switch operation at any point in the rotation.

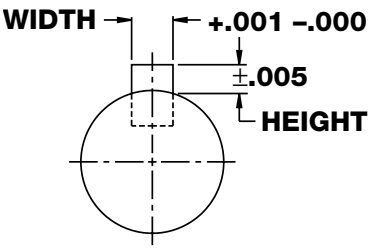




MRS® Length Adder (in)

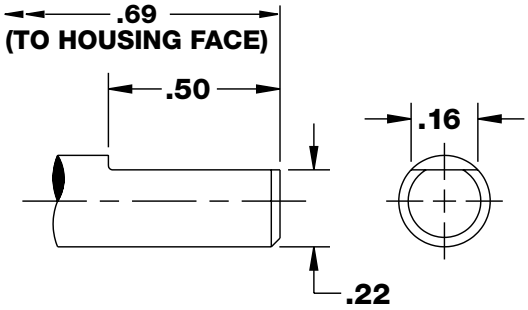
DEGREES	006/014	017/033	037/074	098/196	247/494
45°	0.66	0.66	0.75	0.75	0.75
90°	0.55	0.52	0.59	0.53	0.44
180°	0.34	0.22	0.26	0.09	0.00
270°	0.12	0.00	0.00	0.00	0.00
360°	0.00	0.00	0.00	0.00	0.00

Woodruff Key (in)



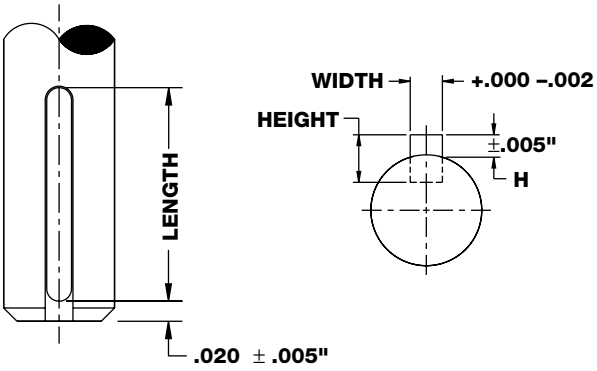
KEY NO.	WIDTH	HEIGHT
202.5	0.0625	0.032
204	0.0625	0.032
305	0.0938	0.047
405	0.1250	0.063
606	0.1875	0.094

Flat Key (in) (006 and 014)



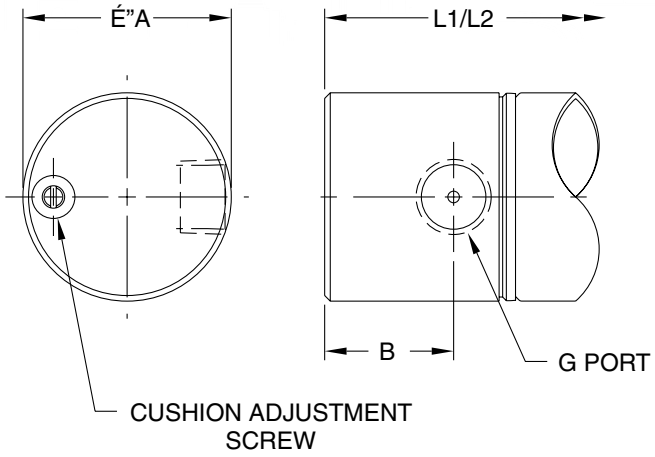
BORE SIZE	LENGTH	WIDTH	HEIGHT	H
3/4" (017 / 033)	.718	.094	.094	.047
1-1/16" (037 / 074)	.797	.125	.125	.063
1-1/2" (098 / 196)	.797	.188	.188	.094
2" (247 / 494)	1.781	.25	.25	.125

Square Key Option (in)

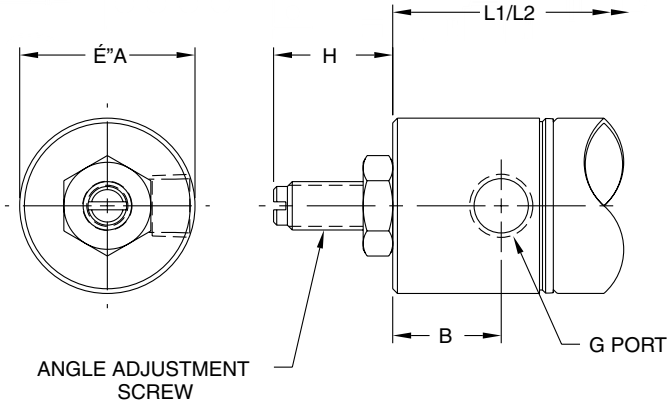


OPTION DIMENSIONS (IN.)

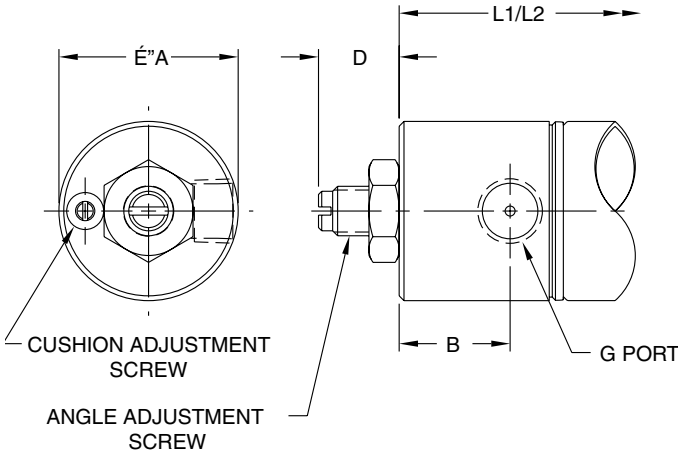
Cushion (C Option)



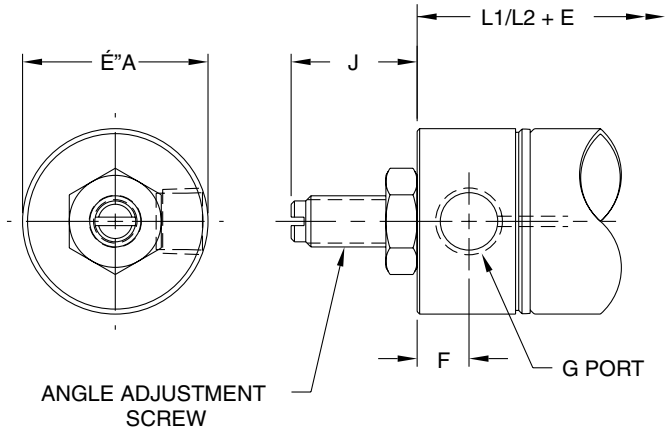
Angle Adjustment with Oil Service Seals (AS Option)



Angle Adjustment with Cushion (AC Option)



Angle Adjustment (A Option)



BORE	A	B	D	E	F	G	H	J
9/16" (006)	0.81	N/A	N/A	0.23	0.24	#10-32	N/A	0.53
9/16" (014)	0.81	N/A	N/A	0.23	0.24	#10-32	N/A	0.53
3/4" (017)	0.87	0.41	0.48	0.22	0.23	#10-32	N/A	0.71
3/4" (033)	0.87	0.41	0.48	0.22	0.23	#10-32	N/A	0.71
1-1/16" (037)	1.11	0.69	0.51	0.40	0.31	1/8 NPT	0.76	0.76
1-1/16" (074)	1.11	0.69	0.51	0.40	0.31	1/8 NPT	0.76	0.76
1-1/2" (098)	1.56	0.77	0.60	0.42	0.34	1/8 NPT	0.94	0.94
1-1/2" (196)	1.56	0.77	0.60	0.42	0.34	1/8 NPT	0.94	0.94
2" (247)	2.08	0.87	0.80	0.53	0.41	1/4 NPT	1.28	1.28
2" (494)	2.08	0.87	0.80	0.53	0.41	1/4 NPT	1.28	1.28

OPTION N

Low Temperature Seals

Option N (Low Temperature Operation) is now available as a standard catalog offering. Pneu-Turns with seals and lubricant allowing operation to -40° F can now be ordered directly from the catalog. Please note when ordering this option that cylinder performance may be affected beginning at temperatures below -20° F.

Operational Note: Dry air with a dew point below the lowest temperature the actuator will experience or dry nitrogen is recommended.

Product Availability: 3 business days

OPTION Q

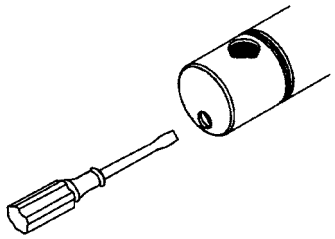
Internal Flow Control

Internal flow control is now available as a standard catalog option in bore sizes 3/4", 1-1/16", 1-1/2", and 2"; both single and double rack models. Use this option as a space saving feature and to avoid “tampering” associated with externally installed flow controls.

Flow control is achieved using a sealing disk that restricts the flow of air to the port when the piston moves towards the end cap. The restricted air is channeled through a small orifice within the end cap, on its way to the exhaust port. Controlling the flow through this orifice is achieved by adjusting a screw located on the face of the end cap. Single rack units: Clockwise (CW) and counter-clockwise (CCW) rotational flow is controlled using the end cap adjustment screw, opposite the direction of the shaft. Double rack units: CW rotation flow is adjusted using the screw in the lower end cap; CCW rotational flow is adjusted using the screw in the upper end cap. Bore sizes 3/4" and 1-1/16" provide three turns of adjustment. All larger bore sizes provide four turns of adjustment.

Option designators:
Q1 - Internal flow control (both sides)
Q2 - Internal flow control (counter-clockwise rotation)
Q3 - Internal flow control (clockwise rotation)

Product Availability: 3 business days



Option Q - Dimensional Variations from Standard (in.)

SINGLE RACK	9/16" (006)		3/4" (017)		1-1/16" (037)		1-1/2" (098)		2" (247)	
	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2
Adder per Degree of Rotation			0.0066	0.0066	0.0073	0.0073	0.0097	0.0097	0.0137	0.0137
Flow Control Both Sides (Q1)	N/A	N/A	2.16	2.16	2.66	2.66	2.98	2.98	3.65	3.65
Flow Control Both Sides (Q2)	N/A	N/A	1.63	2.16	2.03	2.66	2.34	2.98	2.84	3.65
Flow Control Both Sides (Q3)	N/A	N/A	2.16	1.63	2.66	2.03	2.98	2.34	3.65	2.84

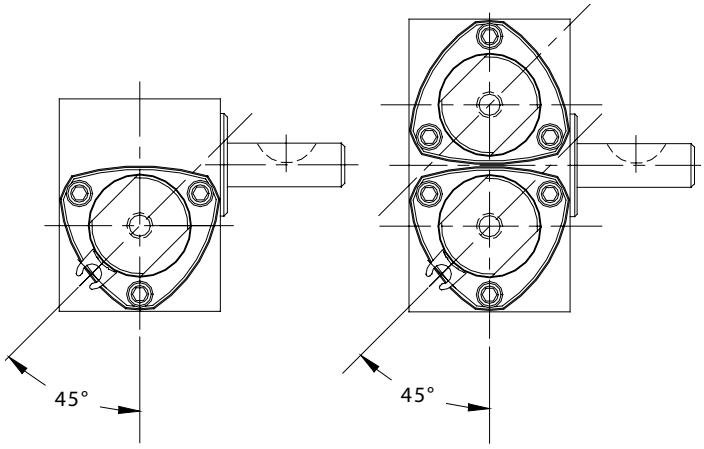
DOUBLE RACK	DEGREE OF ROTATION ADDER SAME AS SINGLE RACK									
	9/16" (014)		3/4" (033)		1-1/16" (074)		1-1/2" (196)		2" (494)	
	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2
Flow Control Both Sides (Q1)	N/A	N/A	2.16	1.68	2.66	2.08	2.98	2.39	3.65	2.89
Flow Control Both Sides (Q2)	N/A	N/A	2.16	1.68	2.66	2.08	2.98	2.39	3.65	2.89
Flow Control Both Sides (Q3)	N/A	N/A	2.16	1.68	2.66	2.08	2.98	2.39	3.65	2.89

Refer to pages XX-XX for other standard option dimensional information.

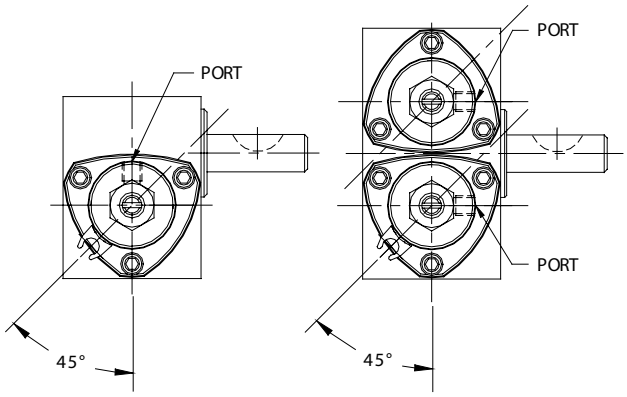
SWITCH TRACK (T OPTION)

Track Locations (All other dimensions remain unchanged)

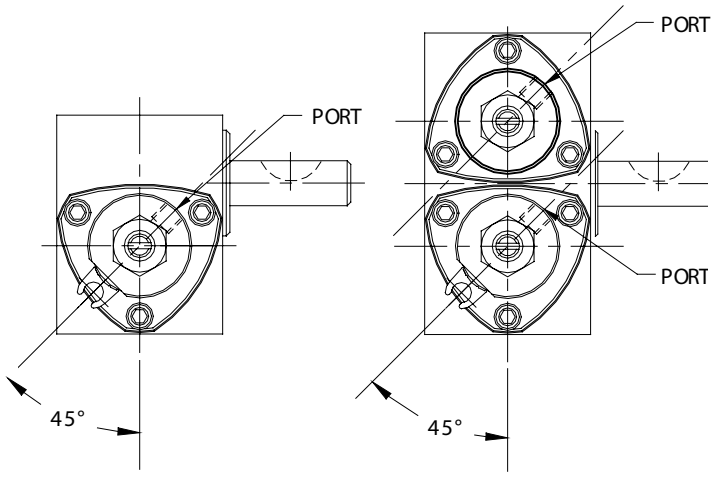
STANDARD "T" ALL BORES



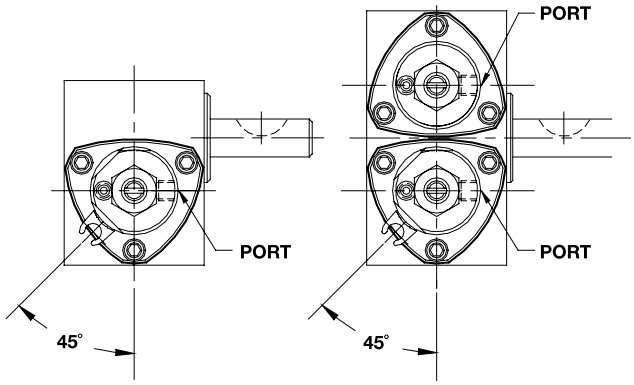
ALL OTHER OPTIONS
ALL BORES EXCEPT 3/4 & 9/16

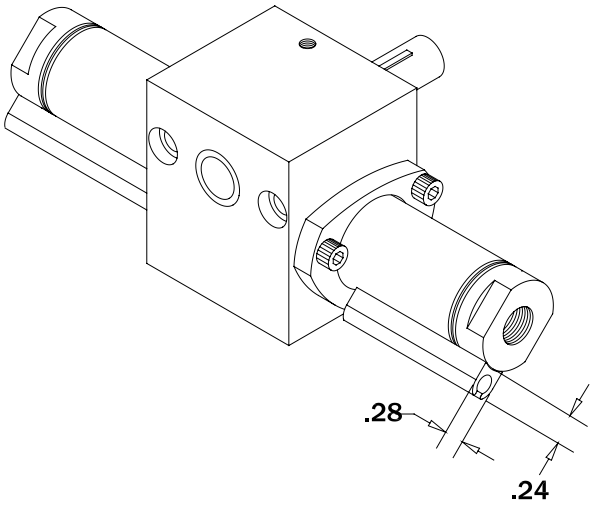


"AT" FOR 3/4 9/16 BORE



"ACT" & "CT" FOR 3/4 BORE



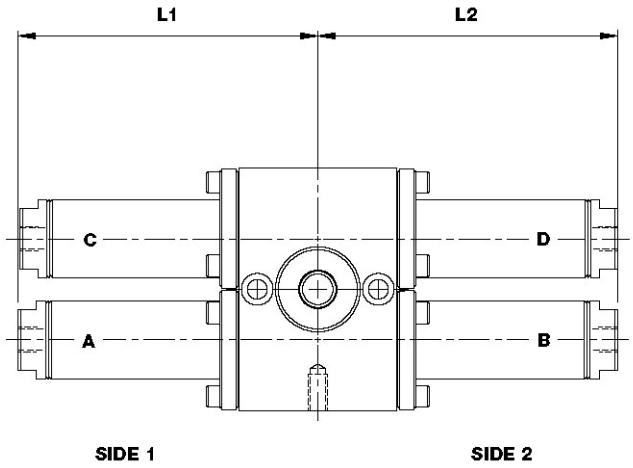


DOUBLE RACK Z2 AND Z3 OPTION (IN.)

(Dimensional variations from standard as shown.)

Z2 Option
- Adder applies to L1 and L2, bodies A and D only

Z3 Option
- Adder applies to L1 and L2, bodies C and B only

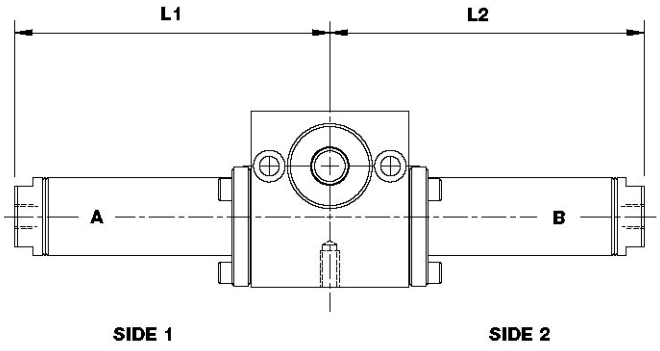


SINGLE RACK Z2 AND Z3 OPTION (IN.)

(Dimensional variations from standard as shown.)

Z2 Option
- Adder applies to L1 dimension

Z3 Option
- Adder applies to L2 dimension



Length Adder for Return Spring Option in Inches, per Body

BORE SIZE	0-75°	0-90°	0-120°	0-150°	76-150°	91-180°	151-225°	121-240°	181-270°	151-300°	226-300°	241-360°	271-360°	301-360°
9/16"		.688				1.313			1.938				2.563	
3/4"				.750						1.438				2.126
1-1/16"			.813					1.375				1.937		
1-1/2"		.751				1.439			2.127				2.815	
2"	1.262				2.262		2.512				4.450			4.812

	TORQUE GENERATED BY SPRING (IN-LBS.)	
BORE SIZE	PRE-LOAD	FINAL
9/16"	0.5	1.0
3/4"	1.0	2.0
1-1/16"	1.0	2.5
1-1/2"	4.0	8.0
2"	12.0	24.0

The model number of Pneu-Turn rotary actuators consists of an alphanumeric cluster designating product type, series, angle of rotation, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Pneu-Turn unit with 1-1/16" bore, single rack, 90° angle of rotation, angle adjustment on both sides, dual shaft, and the high temperature option is shown here.

ANGLE OF ROTATION	
045	45
090	90
180	180
270	270
360	360

PT - 037 090 - A1 D V

BORE SIZE	
006	9/16" bore, single rack
014	9/16", double rack
017	3/4" bore, single rack
033	3/4" bore, double rack
037	1-1/16" bore, single rack
074	1-1/16" bore, double rack
098	1-1/2" bore, single rack
196	1-1/2" bore, double rack
247	2" bore, single rack
494	2" bore, double rack

OPTIONS	
A1	Angle adjustment (both sides)
A2	Angle adjustment (counter-clockwise rotation)
A3	Angle adjustment (clockwise rotation)
B1	Bumpers (both sides)
B2	Bumper (counter-clockwise rotation)
B3	Bumper (clockwise rotation)
C1	Cushions (both sides)[1]
C2	Cushion (counter-clockwise rotation)[1]
C3	Cushion (clockwise rotation)[1]
D	Dual shaft
E	Rear shaft (front portion of dual shaft removed to accommodate hanging axial load)
F	Hardened shaft[2]
G	Polymer grease
K	Square key[3]
M	Magnetic position sensing[4]
N	Low temperature option (-40° F)[5]
Q1	Internal flow control (both sides)[6]
Q2	Internal flow control (counter-clockwise rotation only)[6]
Q3	Internal flow control (clockwise rotation only)[6]
R	Ball bearing[2]
S	Seals - oil serivce[7]
T	Switch track[8]
V	High temperature option (0° F to 400° F)
X	Anti-backlash (for 1-1/16" to 2" bores only)[9]
Z2[10]	Spring return, side A single rack, bodies A and D double rack
Z3[10]	Spring return, side B single rack, bodies C and B double rack

NOTES:
[1] Not available in Series 006 or 014. See below for option combination availability. See page XX and XX for explanation of clockwise/counter-clockwise.
[2] When ordering option F, option R must be ordered. Option R will include dowel pin holes. Dowel pin hole locations shown in Related Products section of this catalog.
[3] 006 and 014 have flat shaft.
[4] Option M can be ordered with option V, but option V's rating will change to 180° F.
[5] Low temperature bumpers not available.
[6] 3/4", 1-1/16", 1-1/2", 2" bore only.
[7] Oil service applications require 40 psi at all times or leakage will occur. 1/8 NPT ports provided (orifice omitted) for 9/16" and 3/4" bores. For double rack models, oil service seals and 1/8" ports provided on bodies A and C only.
[8] Option T must be ordered in conjunction with Option M. Option M can be ordered with Option V, but Option V's rating will change to 180° F. See Switch Products section of this catalog for additional switch information.
[9] Option X (Anti-backlash) is available in bore sizes 1-1/16", 1-1/2" and 2", single and double rack up to 360° rotation. This option eliminates mid-rotational and end of rotation backlash in single rack models. It also eliminates mid-rotational backlash in double rack models. Double rack models do not have end of rotation backlash. All Pneu-Turns with this option include ball bearings Option R. Use this option to provide smooth rotation along with rotational precision.
[10] Z2 and Z3 options cannot be ordered together. If spring return on both sides is desired, contact Technical Support and request a special. Z2 may be combined with A2 or B2. Z3 may be combined with A3 or B3.

HOW TO ORDER

The model number of Three Position Pneu-Turn rotary actuators consists of an alphanumeric cluster designating product type, bore size, total rotation, degrees to mid-position, position of the shaft key at the mid-rotational position, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Three Position Pneu-Turn unit with 1-1/2" bore, single rack, 225° angle of rotation, 45° rotation to middle position, key located at mid-position 8, and angle adjustment on both sides is shown here.

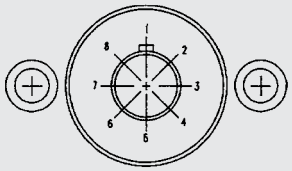
ANGLE OF TOTAL ROTATION — **DEGREES TO MID-POSITION**

PT - 098 225/045 - 8 A1

BORE SIZE	
006	9/16" bore, single rack
014	9/16", double rack
017	3/4" bore, single rack
033	3/4" bore, double rack
037	1-1/16" bore, single rack
074	1-1/16" bore, double rack
098	1-1/2" bore, single rack
196	1-1/2" bore, double rack
247	2" bore, single rack
494	2" bore, double rack

KEY LOCATION

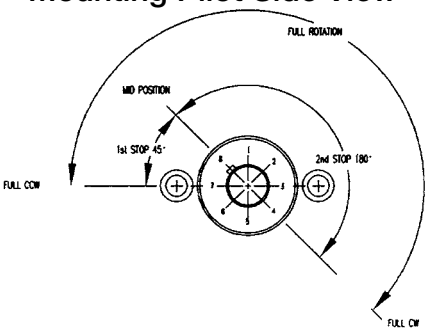
From the graphic below, select the position of the shaft key when the shaft is at the middle position:



Mounting Pilot Side

All other key positions are available. Contact your Bimba distributor.

Mounting Pilot Side View



EXAMPLE OF ROTATION FOR PT-098225/045-8A1
SHAFT FRONT VIEW

OPTIONS	
A1	Angle adjustment (both sides)
A2	Angle adjustment (counter-clockwise rotation)
A3	Angle adjustment (clockwise rotation)
B1	Bumpers (both sides)
B2	Bumper (counter-clockwise rotation)
B3	Bumper (clockwise rotation)
C1	Cushions (both sides)[1]
C2	Cushion (counter-clockwise rotation)[1]
C3	Cushion (clockwise rotation)[1]
D	Dual shaft
E	Rear shaft (front portion of dual shaft removed to accommodate hanging axial load)
F	Hardened shaft[2]
G	Polymer grease
K	Square key[3]
M	Magnetic position sensing[4]
N	Low temperature option (-40° F)[5]
Q1	Internal flow control (both sides)[6]
Q2	Internal flow control (counter-clockwise rotation only)[6]
Q3	Internal flow control (clockwise rotation only)[6]
R	Ball bearing[2]
S	Seals - oil serivce[7]
V	High temperature option (0° F to 400° F)
X	Anti-backlash (for 1-1/16" to 2" bores only)[8]
Z2[9]	Spring return, side A single rack, bodies A and D double rack
Z3[9]	Spring return, side B single rack, bodies C and B double rack

NOTES:
[1] Not available in Series 006 or 014. See below for option combination availability. See page XX and XX for explanation of clockwise/counter-clockwise.
[2] When ordering option F, option R must be ordered. Option R will include dowel pin holes. Dowel pin hole locations shown in Related Products section of this catalog.
[3] 006 and 014 have flat shaft.
[4] Option M can be ordered with option V, but option V's rating will change to 180˚F.
[5] Low temperature bumpers not available.
[6] 3/4", 1-1/16", 1-1/2", 2" bore only.
[7] Oil service applications require 40 psi at all times or leakage will occur. 1/8 NPT ports provided (orifice omitted) for 9/16" and 3/4" bores. For double rack models, oil service seals and 1/8" ports provided on bodies A and C only.
[8] Option X (Anti-backlash) is available in bore sizes 1-1/16", 1-1/2" and 2", single and double rack up to 360˚ rotation. This option eliminates mid-rotational and end of rotation backlash in single rack models. It also eliminates mid-rotational backlash in double rack models. Double rack models do not have end of rotation backlash. All Pneu-Turns with this option include ball bearings Option R. Use this option to provide smooth rotation along with rotational precision.
[9] Z2 and Z3 options cannot be ordered together. If spring return on both sides is desired, contact Technical Support and request a special. Z2 may be combined with A2 or B2. Z3 may be combined with A3 or B3.

OPTION COMBINATION AVAILABILITY

Due to design or compatibility restrictions, the following options may not be ordered in combination. For example, F and E options are not available in combination.

	OPTIONS											
SERIES	A	B	C	D	E	F	N	Q	R*	S	X	Z
9/16" (006)	S	S	N/A	E	D,F,R,X	D,E,K	B,G,M,V	N/A	E	A,B		B,C
9/16" (014)		S	N/A	E	D,F,R,X	D,E,K	B,G,M,V	N/A	E	B		B,C
3/4" (017)	S	C,S	B,Q,S	E	D,F,R,X	D,E,K	B,G,M,Q,V	A,C,N,S	E	A,B,C		B,C
3/4" (033)		C,S	B,Q,S	E	D,F,R,X	D,E,K	B,G,M,Q,V	A,C,N,S	E	B,C		B,C
1-1/16" (037)		C,S	B,Q,S	E	D,F,R,X	D,E,K,X	B,G,M,Q,V	A,C,N,S	E	B,C	E,F	B,C
1-1/16" (074)		C,S	B,Q,S	E	D,F,R,X	D,E,K,X	B,G,M,Q,V	A,C,N,S	E	B,C	E,F	B,C
1-1/2" (098)		C,S	B,Q,S	E	D,F,R,X	D,E,K,X	B,G,M,Q,V	A,C,N,S	E	B,C	E,F	B,C
1-1/2" (196)		C,S	B,Q,S	E	D,F,R,X	D,E,K,X	B,G,M,Q,V	A,C,N,S	E	B,C	E,F	B,C
2" (247)		C,S	B,Q,S	E	D,F,R,X	D,E,K,X	B,G,M,Q,V	A,C,N,S	E	B,C	E,F	B,C
2" (494)		C,S	B,Q,S	E	D,F,R,X	D,E,K,X	B,G,M,Q,V	A,C,N,S	E	B,C	E,F	B,C

** Temperature range of ball bearing option with high temperature option is 0˚F to +250˚F.*
Option T - "Switch track" should only be ordered with options M or V if the actuator will be operated between -20˚ to 85˚

OPTION COMBINATION AVAILABILITY (THREE POSITION MODELS)

This chart provides the options that cannot be combined due to design or compatibility restrictions. For example, F and E options are not available in combination.

	OPTION														
SERIES	A	B	C	D	E	F	G	K	M	N	Q	R	S	V	X
9/16" Single	S	N,Q,S	N/A	E,F	D,F,R	D,E,K	N,S	F	N	B,G,M,V	N/A	E	A,B,G	N	N/A
9/16" Double	S	N,Q,S	N/A	E,F	D,F,R	D,E,K	N,S	F	N	B,G,M,V	N/A	E	A,B,G	N	N/A
3/4" Single	Q,S	C,N,S	B,Q,S	E,F	D,F,R	D,E,K	N,S	F	N	B,G,M,Q,V	A,C,N,S	E	A,B,C,G,Q	N	N/A
3/4" Double	Q,S	C,N,S	B,Q,S	E,F	D,F,R	D,E,K	N,S	F	N	B,G,M,Q,V	A,C,N,S	E	A,B,C,G,Q	N	N/A
1-1/16" Single	Q	C,N,S	B,Q,S	E,F	D,F,R,X	D,E,K,X	N,S	F	N	B,G,M,Q,V	A,C,N,S	E	B,C,G,Q	N	E,F
1-1/16" Double	Q	C,N,S	B,Q,S	E,F	D,F,R,X	D,E,K,X	N,S	F	N	B,G,M,Q,V	A,C,N,S	E	B,C,G,Q	N	E,F
1-1/2" Single	Q	C,N,S	B,Q,S	E,F	D,F,R,X	D,E,K,X	N,S	F	N	B,G,M,Q,V	A,C,N,S	E	B,C,G,Q	N	E,F
1-1/2" Double	Q	C,N,S	B,Q,S	E,F	D,F,R,X	D,E,K,X	N,S	F	N	B,G,M,Q,V	A,C,N,S	E	B,C,G,Q	N	E,F
2" Single	Q	C,N,S	B,Q,S	E,F	D,F,R,X	D,E,K,X	N,S	F	N	B,G,M,Q,V	A,C,N,S	E	B,C,G,Q	N	E,F
2" Double	Q	C,N,S	B,Q,S	E,F	D,F,R,X	D,E,K,X	N,S	F	N	B,G,M,Q,V	A,C,N,S	E	B,C,G,Q	N	E,F

HOW TO ORDER REPAIR KITS

EXAMPLE: Customer needs to replace the upper piston/rack assembly on a PT-033-180-C1DM. Order is placed as:

PT - 6 - 33 - 180 - C1 - CD
A B C D E

A. Repair Kit Part Number
B. Series code - (Bore Size)

ENGLISH	METRIC
**006 = 06	**011 = 11
014 = 14	022= 22
**017 = 17	**027 = 27
033 = 33	054 = 54
**037 = 37	**060 = 60
074 = 74	121 = 12
**098 = 98	**161 = 16
196 = 19	321 = 32
**247 = 24	**404 = 40
494 = 49	808 = 80

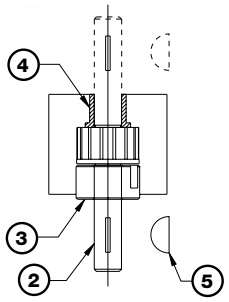
** Designates parts common to both Single and Double Rack Models. Use SINGLE Rack series code only.*
*** Single Rack Model.*
 # Used on 3/4 inch Bore with Ball Bearing Option.

C. Rotation - Rotation is only needed in **PT-6 and PT-13**
D. Options - See Chart Below. Reference **OPTION COMBINATION AVAILABILITY CHART** in catalog for option compatibility. Options A, B and C must designate a 1, 2, or 3 (e.g. A1, B1, C1).
E. Location - For Bodies & Racks on Double Rack Models (**PT-6**, AB or CD) or (**PT-13**, A, B, C, or D). For Bodies on Single Rack Models (**PT-13**, A or B).

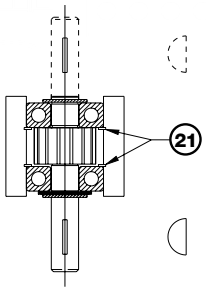
PART NO.	PART DESCRIPTION	OPTIONS	LOCATION
*PT-1	ACTUATOR BODY	only possible option needed R	
*PT-2	SHAFT/PINION ASSEMBLY	only possible options needed D, E, F, K, R	
*PT-3	FRONT SHAFT BEARING	only possible option needed R	
*PT-4	REAR SHAFT BEARING	only possible option needed R	
*PT-5	SHAFT KEY	only possible option needed K	
*PT-6	PISTON/RACK ASSEMBLY	only possible options needed B, C, M, S, X	AB or CD
*PT-7	RACK SUPPORT	only possible option needed X	
*PT-8	PISTON SEAL	only possible options needed S, V	
*PT-9	PISTON WEAR RING	no options	
*PT-10	MAGNET	no options	
*PT-11	BUMPER	only possible options needed V	
*PT-12	BEARING RETAINER SET SCREW	no options	
PT-13	BODY ASSEMBLY	only possible options needed A, B, C, M, S, T, V	A, B, C, or D
*PT-14	BODY RETAINER CAP SCREW	no options	
*PT-15	BODY THREAD SEAL	only possible options needed V	
*PT-16	BODY THREAD SEAL RING	no options	
*PT-17	BODY JAM NUT	no options	
*PT-18	ANGLE ADJ. SCREW	only possible options needed C, S (A if with S)	
*PT-19	RETAINING RING	no options	
*PT-20	SHIM PACKAGE	no options	
#PT-21	SHAFT SPACERS	no options	
*K-A-PT	BEARING KIT	only possible option needed R	
*K-L-PT	SEAL KIT	only possible options needed S, V, N	
*K-S-PT	SHAFT KIT	only possible options needed D, E, F, K, R	

Bimba Pneu-Turn actuators are repairable. A list of the individual components is given below that together make up a Pneu-Turn actuator.

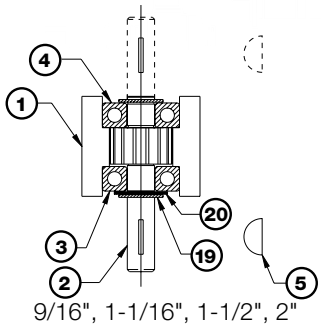
Standard Shaft



Ball Bearing (R) Option

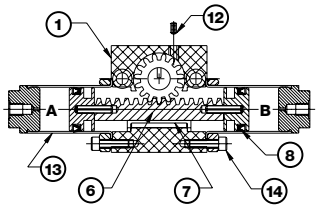


3/4" Bore Model

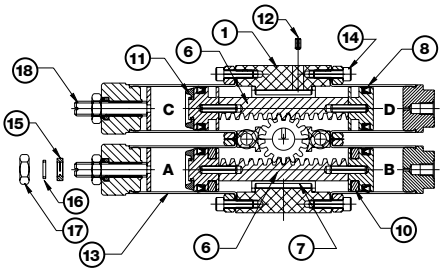


9/16", 1-1/16", 1-1/2", 2" Bore Models

Single Rack Model



Double Rack Model



REPAIR PARTS

NO.	PART DESCRIPTION	QUANTITY REQUIRED	
		SINGLE	DOUBLE
PT-1	Actuator Body	1	1
PT-2	Shaft/Pinion Assembly	1	1
PT-3	Front Shaft Bearing	1	1
PT-4	Rear Shaft Bearing	1	1
PT-5	Shaft Key	1	1
PT-6	Piston/Rack Assembly (Includes Rack, Roll Pins and 2 Pistons)	1	2
PT-7	Rack Support	1	2
PT-8	Piston Seal[1]	2	4
PT-9	Piston Wear Ring (Required for Oil Service only)	2	2
PT-10	Magnet	2	2

NO.	PART DESCRIPTION	QUANTITY REQUIRED	
		SINGLE	DOUBLE
PT-11	Bumper	2	2
PT-12	Bearing Retainer Set Screw	1	1
PT-13	Cylinder Body Assembly (Includes Body, End Cap, and Retainer Ring)	2	4
PT-14	Cylinder Body Retainer Cap Screw[3]	6	12
PT-15	Cylinder Body Thread Seal	2	2
PT-16	Cylinder Body Thread Seal Ring	2	2
PT-17	Cylinder Body Jam Nut	2	2
PT-18	Angle Adjustment Screw	2	2
PT-19	Retaining Ring	2	2
PT-20	Shim Package	1	1
PT-21	Shaft Spacers[2]	1	1

[1] Double Rack Models require two repair kits per rotary actuator. Oil Service Option: Single Rack models require four oil service seals or two oil service seal kits. Double Rack models require four oil service seals and two standard seals or two oil service seal kits and one standard seal kit.
[2] Used on 3/4" bore single and doubl rack units with Ball Bearing option.
[3] 2" bore requires 8 or 16.

REPAIR KITS

BEARING KIT (K-A-PT)4		
PT-3	Front Shaft Bearing	1
PT-4	Rear Shaft Bearing	1

SHAFT KIT (K-S-PT)		
PT-2	Shaft/Pinion Assembly	1
PT-5	Shaft Key	1

SEAL KIT (K-L-PT)[1]		
PT-8	Piston Seals	2

[4] Bearing Kit for Ball Bearings includes retaining rings and shim package.