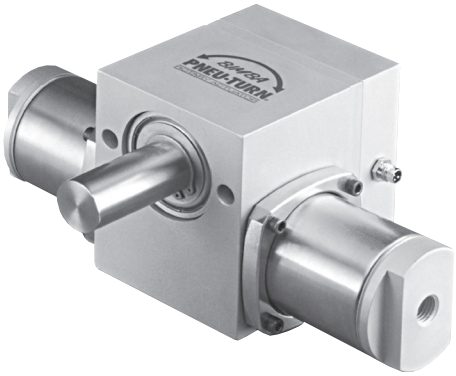
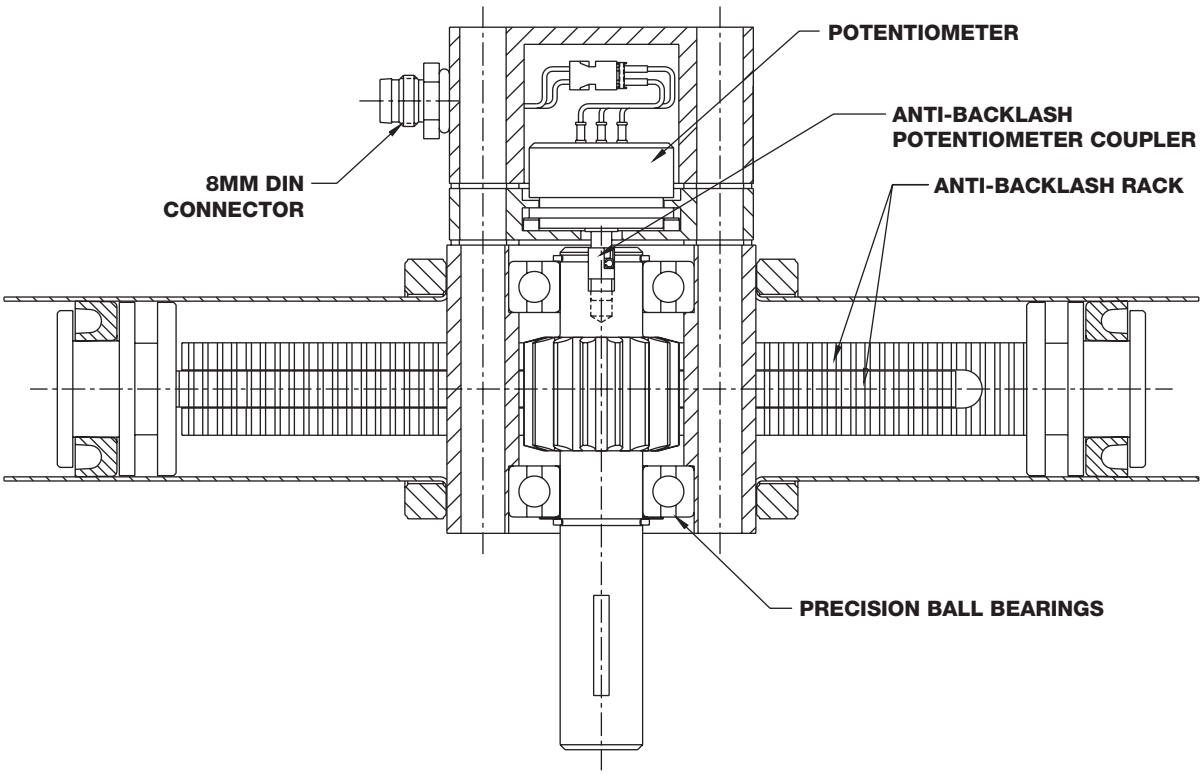
Pneu-Turn® Position Feedback Rotary Actuator (PTF Models)



The IMI Bimba Pneu-Turn® position feedback rotary actuator (PTF) provides continuous shaft position sensing. Standard features include shaft ball bearings and the elimination of mid-rotational backlash. Use the IMI Bimba PTF in conjunction with IMI Bimba's Pneumatic Control System (PCS) to achieve rotary shaft positioning accuracy within ±0.5°.



Engineering Specifications (PTF Models)

Repeatability:	± 0.01° (of potentiometer itself)
Nonlinearity:	± 88° (± 0.25% of 340±4°)
Resolution:	Infinite
Signal Input:	10 VDC typical
Input Impedance Required:	100 Kohm
Signal Output:	0 to 10 VDC FS (depends on FS mechanical rotation)
Rated Life of Potentiometer:	10 million cycles
Temperature Coefficient:	± 600 ppm/°C
Electrical Rotation:	340° ±4°

General Specifications

Rotary action of the Pneu-Turn rotary actuator is achieved through the use of a rack and pinion assembly. Just as with any hydraulic or pneumatic cylinder, the speed of rotation may be controlled through the use of flow controls. The PTF may also be controlled with IMI Bimba's Pneumatic Control System, Model PCS.

Care should be taken to insure that the inertial force does not exceed the published torque capacity.

Port Positioning

Ports on the PTF may be repositioned to accommodate any air line configuration by loosening the three body retainer screws. Once desired port positions are obtained, screws must be tightened to specified torque values in the table below.

Lubrication

The PTF is prelubricated 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 the oil to the actuator every 500 hours of operation. Recommended oils for Buna N seals are medium to heavy inhibited hydraulic or general purpose oil.

The rack and pinion gear and ball bearings are prelubricated at the factory for extensive maintenance free operation. If additional lubrication is 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.

Ratings

Pressure Rating: 150 psi air or oil with S Option

Rotation Tolerance: 1-1/16" - 2" bore is -0° to +10 °. The Angle Adjustment Option allows 45° of adjustability. If cushions are ordered in conjunction with the angle adjustment option, adjustability will be 10°.

Temperature Range: Standard Seals: -20° to 200° F; V Option High Temp seals: 0° to 250°. NOTE: If used for positioning applications, it is recommended to use low temperature lubricant for temperatures less than 35° F.

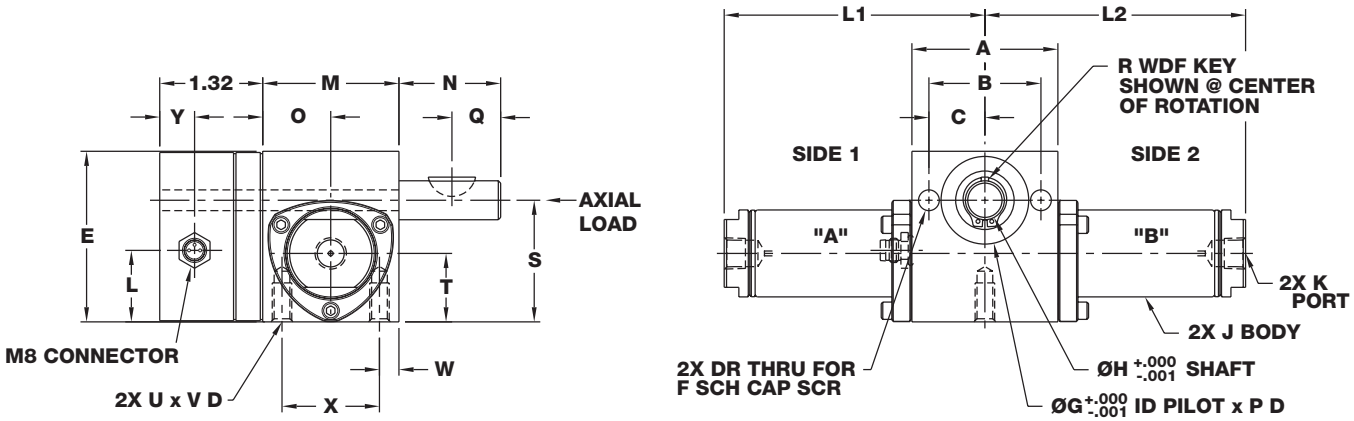
Backlash: Both single and double rack models have zero mid-rotational and end of rotation backlash.

Breakaway: Less than 3 PSI.

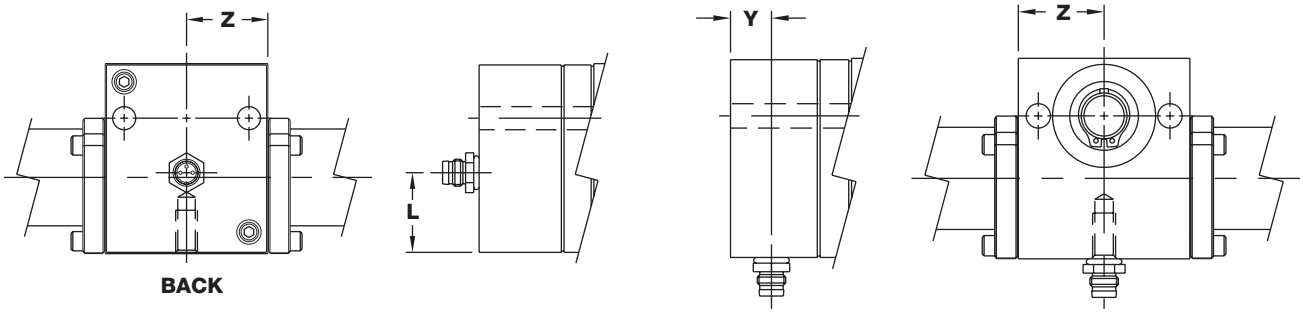
Series	**1-1/2"**		**2"**	
	(098)	**(196)**	**(247)**	**(494)**
Theoretical Torque Capacity (in-lbs/PSI)	0.982	1.963	2.468	4.935
Bearing Load (Axial lbs)	110	110	130	130
Bearing Load (Radial lbs)	425	425	740	740
Distance between bearing midpoints (in)	1.71	1.71	1.82	1.82
Maximum rate of rotation (@ 100 PSI with no load)	1500 deg/sec	1500 deg/sec	1000 deg/sec	1000 deg/sec
Weight (approximate oz)	47	88	103	150
Body Retainer cap screw recommended tightening torque (in-lbs)	20	20	20	20

Dimensions (PTF Models)

Single Rack Models (in)



Plug connector shown in standard position. The H1 option dimensionally positions the connector on the clockwise rotation side.

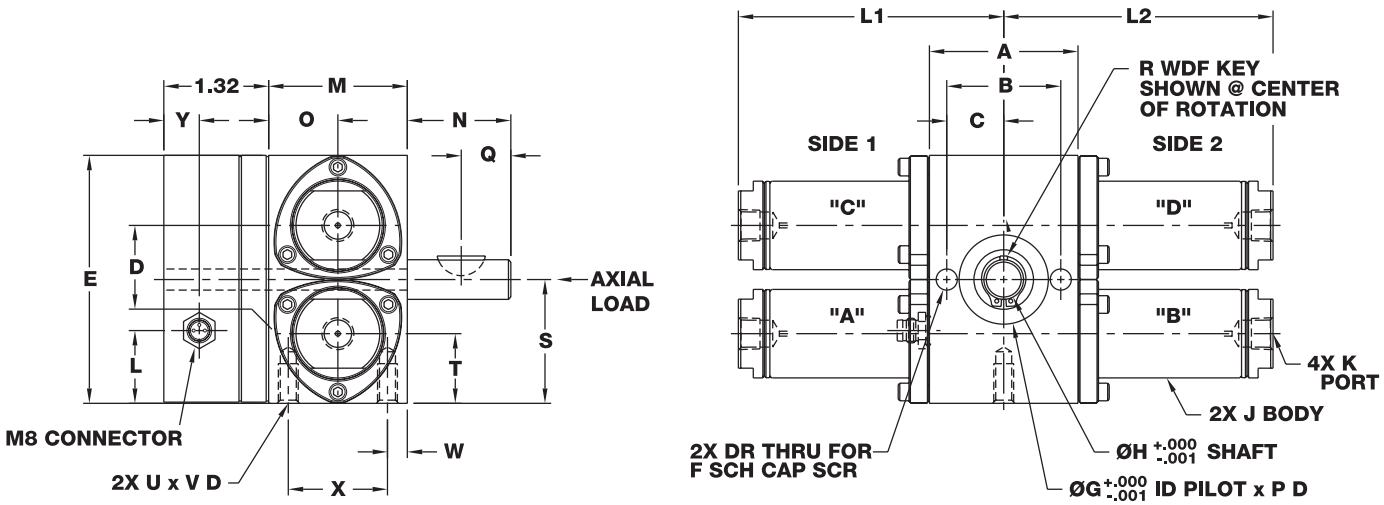


Bore	A	B	C	E	F	G (Ball Bearing I.D. Pilot)	H	J	K	L	M
1-1/2" (098)	2.38	1.81	0.90	2.84	5/16" S.H.C.S.	1.375	0.625	1.56	1/8 NPT	1.449	2.25
2" (247)	3.00	2.38	1.19	3.75	5/16" S.H.C.S.	1.875	0.875	2.08	1/4 NPT	1.918	2.56

Bore	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1-1/2" (098)	1.38	1.12	0.09	0.62	#405	2.09	1.15	5/16-18	0.62	0.31	1.62	0.45	1.19
2" (247)	2.00	1.28	0.10	0.75	#606	2.56	1.28	5/16-18	0.62	0.28	2.00	0.45	1.50

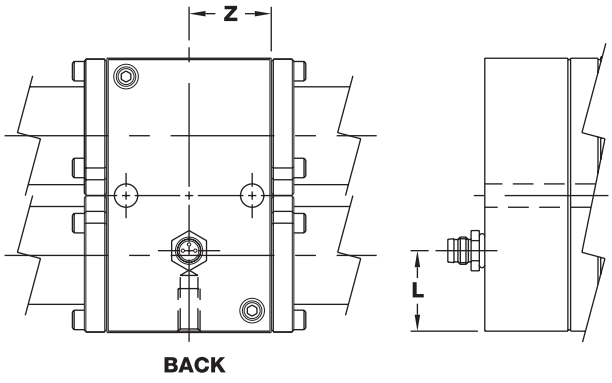
Dimensions (PTF Models)

Double Rack Models (in)

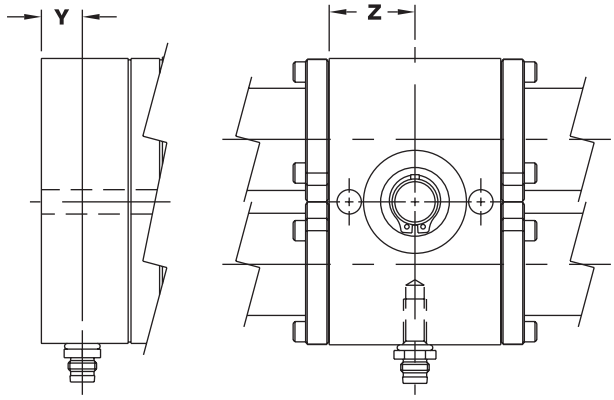


Plug connector shown in standard position. The H1 option dimensionally positions the connector on the clockwise rotation side.

H2 Option



H3 Option

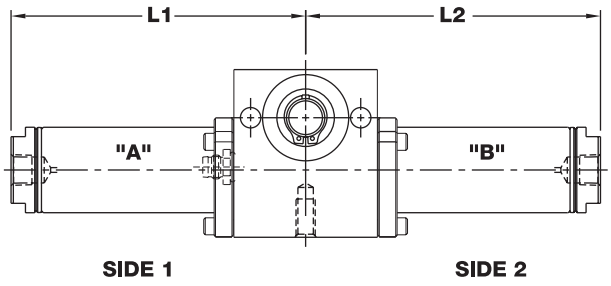


Bore	A	B	C	D	E	F	G (Ball Bearing I.D. Pilot)	H	J	K	L	M
1-1/2" (196)	2.38	1.81	0.90	1.88	4.19	5/16" S.H.C.S.	1.375	0.625	1.56	1/8 NPT	1.449	2.25
2" (494)	3.00	2.38	1.19	2.56	5.13	5/16" S.H.C.S.	1.875	0.875	2.08	1/4 NPT	1.918	2.56

Bore	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1-1/2" (196)	1.38	1.12	0.09	0.62	#405	2.09	1.15	5/16-18	0.62	0.31	1.62	0.45	1.19
2" (494)	2.00	1.28	0.10	0.75	#606	2.56	1.28	5/16-18	0.62	0.28	2.00	0.45	1.50

Position Feedback Pneu-Turn Options

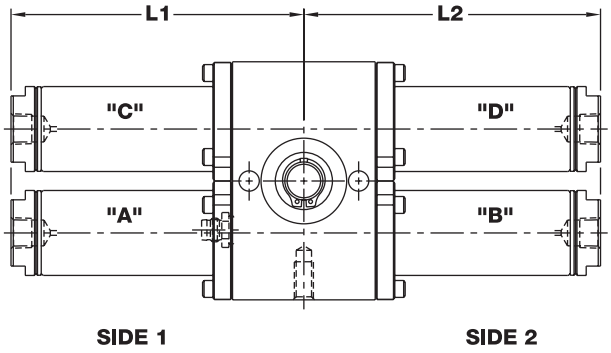
Single Rack Options (in)



(Dimensional variations from standard as shown)

	1-1/2" (098)		2" (247)	
	L1	L2	L1	L2
Adder per Degree of Rotation	0.0097	0.0097	0.0137	0.0137
Base Unit (No Options)	2.34	2.34	2.84	2.84
Bumper Both Sides (B1)	2.49	2.49	3.04	3.04
Bumper CCW Side (B2)	2.34	2.49	2.84	3.04
Bumper CW Side (B3)	2.49	2.34	3.04	2.84
Cushion Both Sides (C1)	2.98	2.98	3.65	3.65
Cushion CCW Side (C2)	2.34	2.98	2.84	3.65
Cushion CW Side (C3)	2.98	2.34	3.65	2.84
Oil Service Seals (S)	2.77	2.77	3.38	3.38
Oil Service with Angle Adjustment (AS)	3.41	3.41	4.19	4.19

Double Rack Options (in)



(Dimensional variations from standard as shown)

	1-1/2" (098)		2" (247)	
	L1	L2	L1	L2
Adder per Degree of Rotation	0.0097	0.0097	0.0137	0.0137
Base Unit (No Options)	2.34	2.39	2.84	2.89
Bumper Both Sides (B1)	2.49	2.39	3.04	2.89
Bumper CCW Side (B2)	2.49	2.39	3.04	2.89
Bumper CW Side (B3)	2.49	2.39	3.04	2.89
Cushion Both Sides (C1)	2.98	2.39	3.65	2.89
Cushion CCW Side (C2)	2.98	2.39	3.65	2.89
Cushion CW Side (C3)	2.98	2.39	3.65	2.89
Oil Service Seals (S)	2.77	2.39	3.38	2.89
Oil Service with Angle Adjustment (AS)	3.41	2.39	4.19	2.89

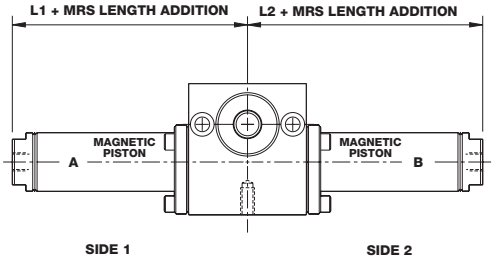
"CCW Side" refers to the extreme rotation of the shaft in the counter-clockwise direction as viewed from the mounting pilot side of the actuator. The location of the optional feature chosen will be on tube B for single rack models and tube C for double rack models.

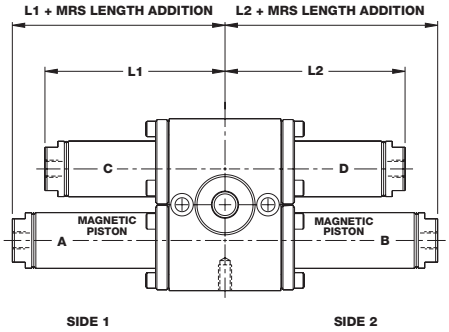
"CW Side" refers to the extreme rotation of the shaft in the clockwise direction as viewed from the mounting pilot side of the actuator. The location of the optional feature chosen will be on tube A for both single and double rack models.

Position Feedback Pneu-Turn 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.

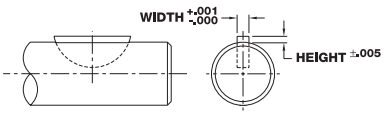




MRS® Length Adder (in)

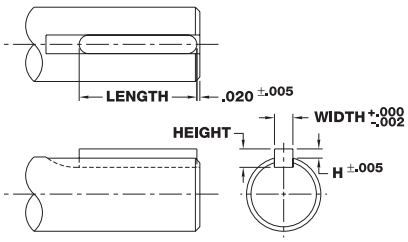
Degrees	098/196	247/494
45º	0.75	0.75
90º	0.53	0.44
180º	0.09	0.00
325º	0.00	0.00

Woodruff Key (in)



Key No.	Width	Height
405	0.1250	0.063
606	0.1875	0.094

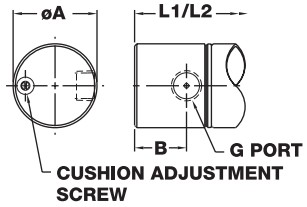
Square Key (in)



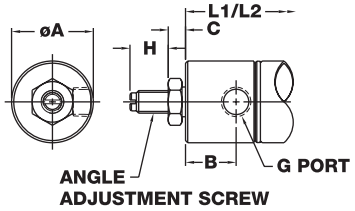
Bore Size	Length	Width	Height	H
1-1/2" (098/196)	0.797	0.188	0.188	0.094
2" (247/494)	1.781	0.250	0.250	0.125

Position Feedback Pneu-Turn Option Dimensions

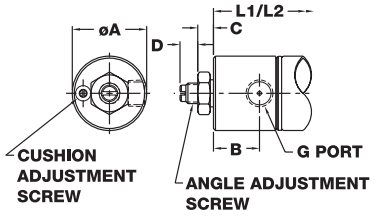
Cushion (C Option) (in)



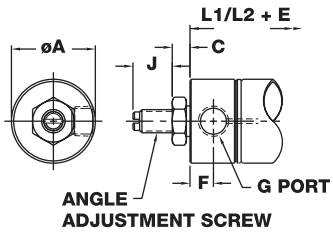
Angle Adjustment with Oil Service Seals (AS Option) (in)



Angle Adjustment with Cushion (AC Option) (in)



Angle Adjustment (A Option) (in)



Bore Size	A	B	C	D	E	F	G	H	J
1-1/2" (098 and 196)	1.56	0.77	0.27	0.33	0.42	0.34	1/8 NPT	0.67	0.67
2" (247 and 494)	2.08	0.87	0.31	0.49	0.53	0.41	1/4 NPT	0.97	0.97

The model number of Pneu-Turn rotary actuators with shaft position feedback capabilities consists of an alphanumeric cluster designating product type, 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 Position Feedback Pneu-Turn unit with 1-1/2" bore, single rack, 180° rotation, and additional options is shown below.

PTF - 098 180 - A1H1

Bore Size	
098	1-1/2" bore, single rack
196	1-1/2" bore, double rack
247	2" bore, single rack
494	2" bore, double rack

Standard Stroke Lengths*	
045	45°
090	90°
180	180°
325	325°

* Larger rotational angles are available. Contact your IMI Bimba distributor.

Options	
A1	Angle adjustment, both sides
A2	Angle adjustment, counter-clockwise rotation
A3	Angle adjustment, clockwise rotation
B1	Bumpers, both sides
B2	Bumpers, counter-clockwise rotation
B3	Bumpers, clockwise rotation
C1	Cushion, both sides[1]
C2	Cushion, counter-clockwise rotation[1]
C3	Cushion, clockwise rotation[1]
G	Magnalube® G lubrication
H1	Plug connector, clockwise side
H2	Plug connector, back of plate
H3	Plug connector, bottom of plate
K	Square key
M	MRS® magnetic position sensing
S	Seals, oil service[2]
V	High temperature option (0° F to 250° F)

®Magnalube is a registered trademark of Carleton Stuart Corporation.

Option Combination Availability

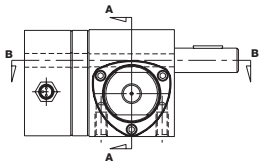
Due to design or compatibility restrictions, the following options may not be ordered in combination. For example, C (Cushions) and B (Bumpers) are not available in combination.

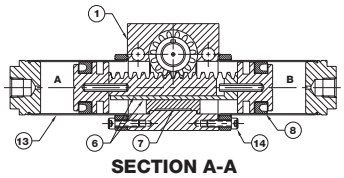
	Option						
Series	**A**	**B**	**C**	**K**	**M**	**S**	**V**
1-1/2" (098)	N/A	C,S	B,S	N/A	V	B,C	M
1-1/2" (196)	N/A	C,S	B,S	N/A	V	B,C	M
2" (247)	N/A	C,S	B,S	N/A	V	B,C	M
2" (494)	N/A	C,S	B,S	N/A	V	B,C	M

NOTE: Temperature range of ball bearing units with high temperature option is 0° F to 250° F.

Position Feedback Cylinder Repair Parts

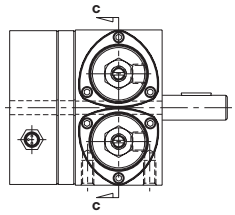
Single Rack Model

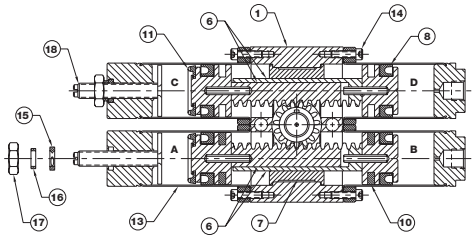




SECTION A-A

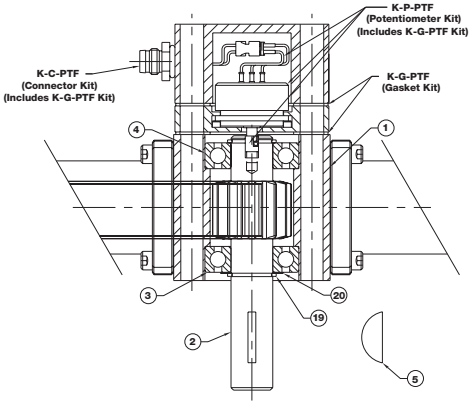
Double Rack Model





SECTION C-C

Ball Bearing® Option



SECTION B-B

No.	Part Description	Quantity Required	
		Single	Double
PT-1-R	Actuator Body	1	1
PTF-2	Shaft/Pinion Assembly	1	1
PT-3-R	Front Shaft Ball Bearing	1	1
PT-4-R	Rear Shaft Ball Bearing	1	1
PT-5	Shaft Key	1	1
PT-7-X	Rack Support	1	2
PTF-8	Piston Seal[1]	2	4
PT-9	Piston Wear Ring (required for oil service only)	2	2
PT-10	Magnet	2	2
PT-11	Bumper	2	2
PT-13	Cylinder Body Assembly (includes Body, End Cap, and Retainer Ring)	2	4
PT-14	Cylinder Body Retainer Cap Screw[2]	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	Retainer Ring	2	2
PT-20	Shim Package	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] 2" bore requires 8 or 16.

Repair Kits

Bearing Kit (K-A-PT-R)		
PT-3-R	Front Shaft Ball Bearing	1
PT-4-R	Rear Shaft Ball Bearing	1

Shaft Kit (K-S-PTF)		
PTF-2	Shaft/Pinion Assembly	1
PT-5	Shaft Key	1

Seal Kit (K-L-PTF)		
PTF-8	Piston Seals	2

Gasket Kit (K-G-PTF)	
Gasket	1

Connector Kit (K-C-PTF)	
Connector Assembly	1
Gasket	2

Potentiometer Kit (K-P-PTF)	
Pin Header	1
Potentiometer Assembly	1
Potentiometer Coupler	1
Gasket	2