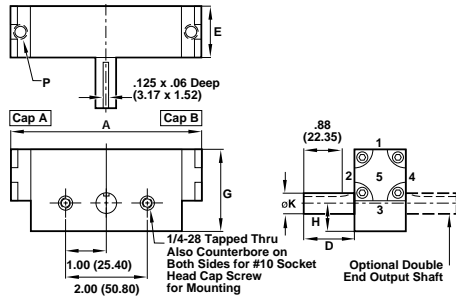


Rack & Pinion Rotary Actuators

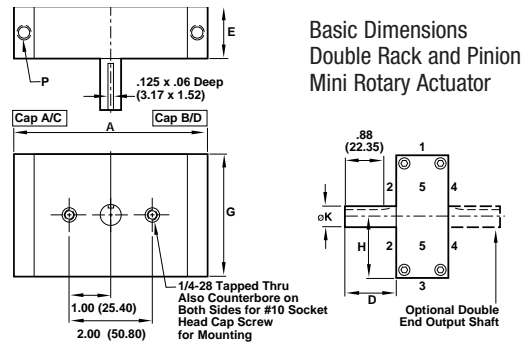
Single, Double, and Integral Air/Oil Tandem Rack & Pinion Mini Rotary Actuators

($\varnothing 1/2"$ & $3/4"$ Bores)

Basic Dimensions Single Rack and Pinion Mini Rotary Actuator



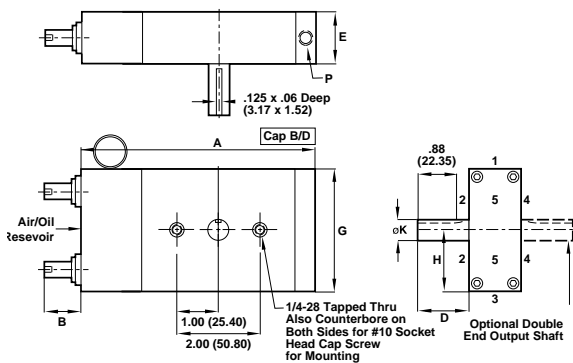
Bore	A	D	E	G	H	$\varnothing K$	P
1/2"	3.50 (89)	1.06 (27)	1.00 (25)	1.50 (38)	.59 (15)	.375 (9.53)	10-32
3/4"	4.88 (124)	1.25 (32)	1.25 (32)	2.00 (51)	.69 (18)	.500 (12.70)	1/8 NPT



Basic Dimensions Double Rack and Pinion Mini Rotary Actuator

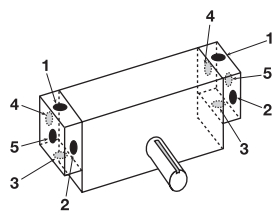
Bore	A	D	E	G	H	$\varnothing K$	P
1/2"	3.75 (95)	1.06 (27)	1.00 (25)	2.50 (64)	1.25 (32)	.375 (9.53)	1/8 NPT
3/4"	4.75 (121)	1.25 (32)	1.25 (32)	3.00 (76)	1.50 (38)	.500 (12.70)	1/8 NPT

Basic Dimensions Double Rack and Pinion Mini Rotary Actuator with Integral Air-Oil Tandem

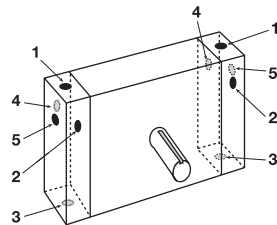


Bore	A	B	D	E	G	H	$\varnothing K$	P
3/4"	5.75 (121)	.3125 (8)	1.25 (32)	1.25 (32)	3.00 (76)	1.50 (38)	.500 (12.70)	1/8 NPT

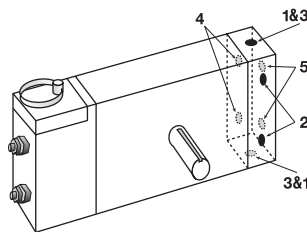
Port Positions Single Rack



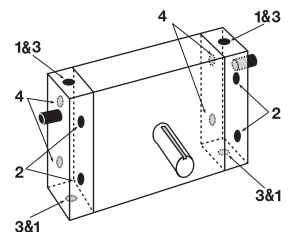
Port Positions Double Rack without Rotation Adjustment



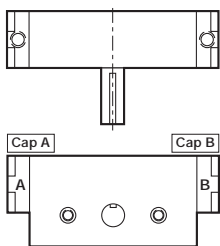
Port Positions Integral Double Rack



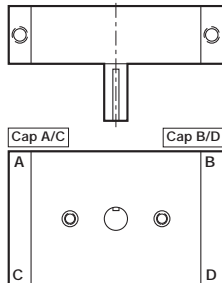
Port Positions Double Rack with Rotation Adjustment



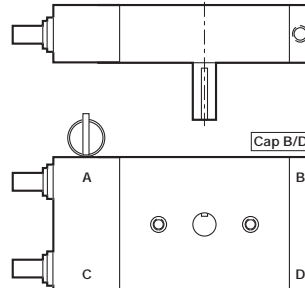
Single Rack



Double Rack



Integral Air/Oil Tandem Double Rack



Rack & Pinion Rotary Actuators

Single, Double, and Integral Air/Oil Tandem Rack & Pinion Rotary Actuators

(ø1-1/2" & 2-1/2" Bores)

Features

- Single Rack and Pinion Rotary Actuators are designed for non-lube added service.
- Rotation angles 45°, 90°, 180°, 270°, and 360° standard.
- Urethane Noise Dampening Bumpers optional.
- Viton® Seals optional for higher temperatures.
- Optional Low Friction Seals.
- Body Mount or optional Angle Bracket, Front and Rear Flange Mountings.
- Adjustable Cushions optional Flow Controls
- Optional Integral Air/Oil optional

Technical data

Medium:
 Filtered compressed air to 150 PSI Petroleum based hydraulic fluid to 400 PSI

Operating Temperature:
 -20° to 200°F (-29°C to 93°C) with Standard Nitrile Seals
 -20° to 400°F (-29°C to 204°C) with Viton® Seals
 -20° to 250°F (-29°C to 121°C) with Low Friction Seals

Operating Pressure:
 150 PSI (10 Bar)
 400 PSI (27.6 Bar) Hydraulic (non-shock)

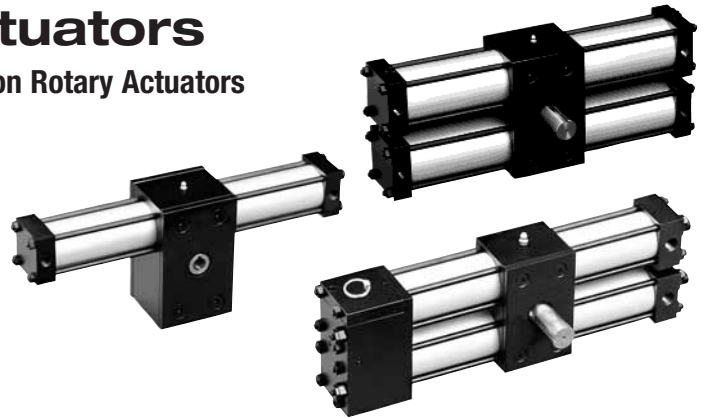
Angle of Rotation:
 45°, 90°, 180°, 270°, 360° Standard
 Any rotation up to 1080° can be supplied

Rotational Tolerance:
 -0° + 10°

Backlash Between Rack & Pinion:
 1-1/8" Bore 2 position units 1° of arc maximum
 1-1/2" – 2-1/2" Bore 2 position units 30 minutes of arc maximum

Lubrication:
 None required
 Norgren Rotary Actuators are rated for "no lube added" service. All internal components are lubricated at the time of assembly with a Teflon® based grease. Should additional lubrication become necessary between the radial surface of the rack gear and the rack/pinion mesh area due to severe operating conditions, a grease fitting is provided.

Materials
 End Caps: Black anodized 6061-T6 aluminum
 Body: 6061-T6 aluminum alloy, entirely hard coat anodized
 Gear Rack: Ground and polished stress-proof steel
 Pinion Gear and Output Shaft: Manufactured from high-strength steel.
 Shaft Bearings: Sealed, single row ball bearings
 Standard Seals: Nitrile
 Tube: 6063-T832 aluminum alloy
 Tie Rods: Stress-proof steel
 Floating Pistons: Solid aluminum alloy



Ordering information

Model codes

2 5 0 C B - 1 B B - A D 3 M E
 1 2 3 4 5 6 7 8 9 10 11 12 13

Bore	
1-1/8"	2
1-1/2"	3
2"	4
2-1/2"	5
Rack/Rotary Type	
Single Rack Standard Seals	0
Single Rack Low Friction Seals	1
Double Rack Low Friction Seals	2
Double Rack Standard Seals	5
Standard Air/Oil Tandem	6
Integral Air/Oil Tandem	7
Special	X
Multiple Position Actuator	
2 Position	0
3 Position	3
4 Position	4
5 Position	5
Special	X
Rotation	
45°	A
90°	B
180°	C
270°	D
360°	E
Special	X
Output Shaft	
Single End Keyway Standard	A
Double End Keyway	B
Hollow Internal Keyway	C
Cross Keyway	D
Preloaded Keyway	E
Special	X
Mounting	
Standard	1
Front Flange	2
Rear Flange	3
Bottom Flange	4
Special	X
Port Location	
Position	1 2 3 4 5
Standard	A B* C D F
Oversized	E G H J K
Special	X

Options	
No Option	0
Electroless Nickel	E
O-Ring Loaded Piston Seals	P
Viton® Seals	V
Special (Specify)	X

Magnetic Option	
No Magnet	0
Standard Magnetic Piston in Position A & B	M
Integral Air/Oil Tandems in Position B & D	

Rotation Adjustments	
No Adjustment	1
End Cap A	2
End Cap B	3
End Caps A & B	4
End Caps B & D	5
Special	X

Note: Standard rotation adjustments provide 30° of angle reduction.

Bumper	
No Bumpers	A
End Cap A	B
End Cap B	C
All Caps	D
Special	X

Flow Controls	
Needle Position	1 2 3 4
No Flow Controls	A
End Cap A	B C D E
End Cap B	G H J K
End Caps	
A & B	M N P R
Special	X

Note: Flow Controls must be 90° to Port Location. Flow controls are Standard on all Air/ Oil Tandems. Standard Air/ Oil Tandem Flow Controls are in end caps A & C in position #2. Integral Air/ Oil Tandem Flow Controls are in position #5.

Cushions	
Needle Position	1 2 3 4
No Cushions	A
End Cap A	B C D E
End Cap B	G H J K
End Caps A & B	N M P R
Special	X

Note: Cushions & Rotation Adjustment cannot be located in same end cap.

*Standard Port Size and Location.

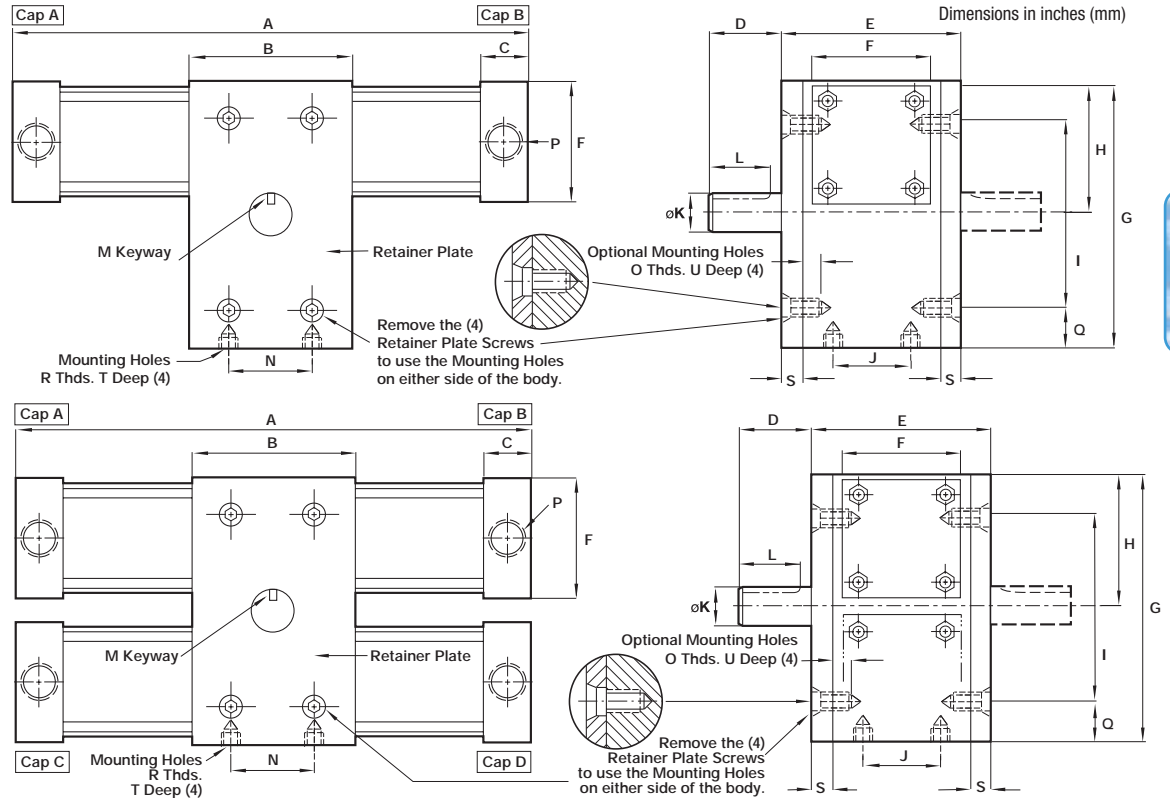
EXAMPLE: 11/8" Bore – Double Rack with Standard Seals – 2 Position Rotary Actuator – 180° Rotation – Double End Keyway – Standard Mounting – Standard Port Located at Position 2 – Cushion Position 1 in End Cap A – No Flow Controls – Bumpers on All Caps – End Cap B Rotation Adjustments – Standard Magnetic Piston Option – Electroless Nickel Plated.

Rack & Pinion Rotary Actuators

Single, Double, and Integral Air/Oil Tandem Rack & Pinion Rotary Actuators

($\phi 1\text{-}1/2\text{'}$ & $2\text{-}1/2\text{'}$ Bores)

Basic Dimensions for Single and Double Rack and Pinion Rotary Actuator



Dimension	Degree Rotation	1-1/8" Bore Single Rack		1-1/2" Bore Single Rack		2" Bore Single Rack		2-1/2" Bore Single Rack	
A	0°	4.500	(114)	6.500	(165)	7.750	(197)	8.000	(203)
	45°	5.590	(142)	8.025	(204)	10.195	(259)	10.445	(265)
	90°	6.571	(167)	9.397	(239)	12.395	(315)	12.645	(321)
	180°	8.533	(217)	12.142	(308)	16.796	(427)	17.046	(433)
	270°	10.495	(267)	14.887	(378)	21.197	(538)	21.447	(545)
	360°	12.457	(316)	17.632	(448)	25.598	(650)	25.848	(657)
	Add per °	.0218	(0.55)	.0305	(0.77)	.0489	(1.24)	.0489	(1.24)
AA		.312	(7.92)	.500	(12.70)	.688	(17.48)	1.000	(25.40)
B		2.250	(57)	2.750	(70)	4.000	(102)	4.000	(102)
BB		.093	(2.36)	.125	(3.18)	.187	(4.75)	.187	(4.75)
C		.625	(16)	1.000	(25)	1.000	(25)	1.000	(25)
CC		.047	(1.19)	.060	(1.52)	.093	(2.36)	.093	(2.36)
D		.875	(22)	1.750	(44)	2.031	(52)	2.031	(52)
DD		.234	(5.94)	.250	(6.35)	.500	(12.70)	.500	(12.70)
E		2.250	(57)	2.687	(68)	3.718	(94)	3.718	(94)
EE		.250	(6.35)	.250	(6.35)	.437	(11.10)	.437	(11.10)
F		1.500	(38)	2.000	(51)	2.500	(64)	3.000	(76)
FF		.500	(12.70)	.750	(19.15)	1.125	(28.58)	1.125	(28.58)
G		3.312	(84)	4.375	(111)	6.604	(168)	6.604	(168)
H		1.656	(42)	2.187	(56)	3.302	(84)	3.302	(84)
I		2.406	(61)	3.187	(81)	4.878	(124)	4.878	(124)
J		1.000	(25)	1.500	(38)	1.500	(38)	1.500	(38)
øK		.500	(12.70)	.875	(22.23)	1.125	(28.58)	1.125	(28.58)
L		.625	(16)	1.500	(38)	1.625	(67)	1.625	(67)
M		1/8 x 1/16		3/16 x 3/32		1/4 x 1/8		1/4 x 1/8	
N		1.500	(38)	1.500	(38)	2.000	(51)	2.000	(51)
O		1/4-20		1/4-20		7/16-14		7/16-14	
P		1/8 NPT		1/4 NPT		1/4 NPT		1/4 NPT	
Q		.453	(12)	.594	(15)	.863	(22)	.863	(22)
R		1/4-20		5/16-24		1/2-20		1/2-20	
S		.250	(6)	.250	(6)	.375	(10)	.375	(10)
T		.250	(6)	.313	(8)	.500	(13)	.500	(13)
U		.250	(6)	.438	(11)	.438	(11)	.438	(11)

Rack & Pinion Rotary Actuators

Single, Double, and Integral Air/Oil Tandem Rack & Pinion Rotary Actuators

(ϕ 1-1/2" & 2-1/2" Bores)

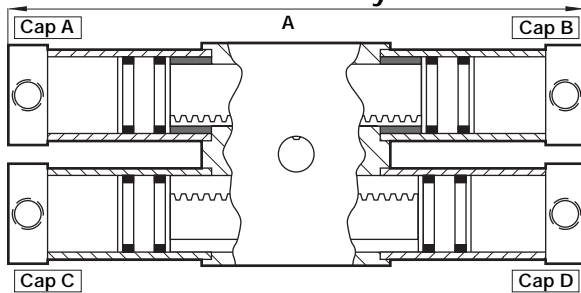
4-Position Rotary Actuator

R° = Rotation of base unit in degrees
(Positions 1 and 4)
 S° = Change in rotation of base unit
(Position 2)
 T° = Change in rotation of base unit
(Position 3)

5-Position Rotary Actuator

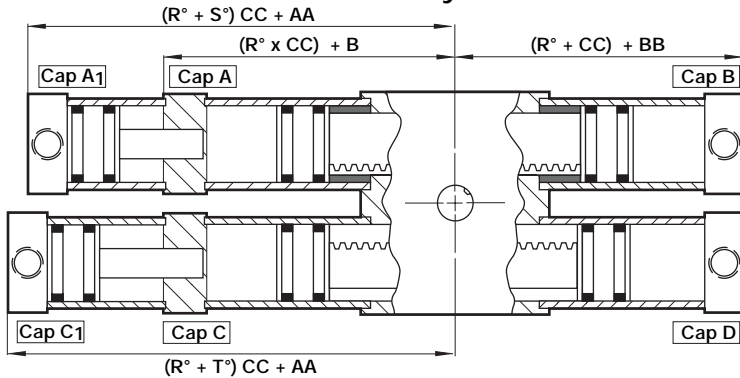
R° = Rotation of base unit in degrees
 S° = Change in rotation of base unit
(Position 2)
 T° = Change in rotation of base unit
(Position 3)
 Z° = Change in rotation of base unit
(Position 4)

3 Position Rotary Actuator*

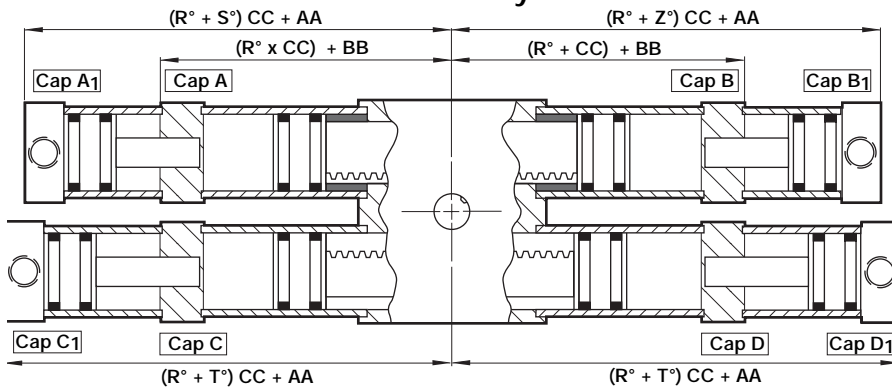


*3 position actuator is dimensionally interchangeable with 2 position.

4 Position Rotary Actuator



5 Position Rotary Actuator



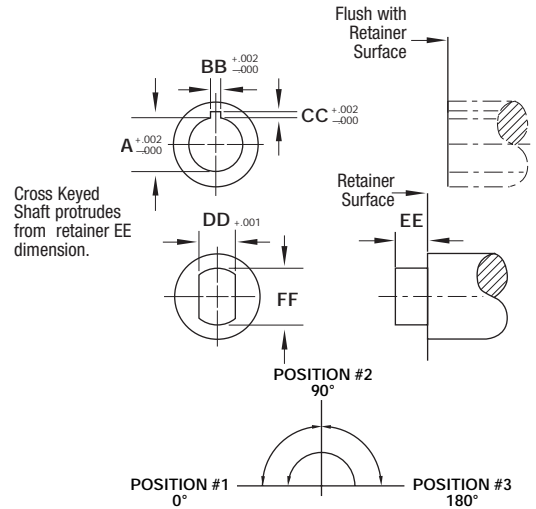
Shaft Options

Internal Keyed Hollow

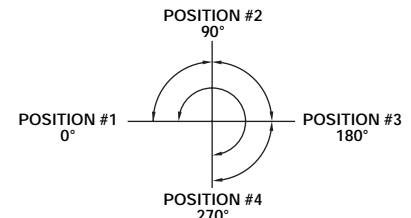
Shaft can be utilized from either side and is flush with retaining plates.

2" bore - 1.00" (25.4) hollow-optional

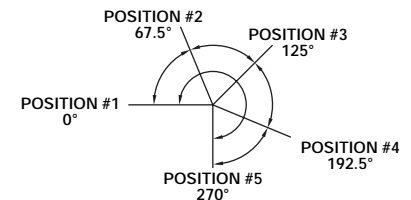
2-1/2" bore - .688" (17.48) hollow-optional



Output Shaft Position Number	Pressurize Port(s) in Cap(s)	Exhaust
1	C	All other ports
2	A & B	All other ports
3	D	All other ports



Output Shaft Position Number	Pressurize Port(s) in Cap(s)	Exhaust
1	C	All other ports
2	A ₁ & C ₁	All other ports
3	A & B	All other ports
4	D	All other ports



Output Shaft Position Number	Pressurize Port(s) in Cap(s)	Exhaust
1	C	All other ports
2	A ₁ & C ₁	All other ports
3	A & B	All other ports
4	B ₁ & D ₁	All other ports
5	D	All other ports

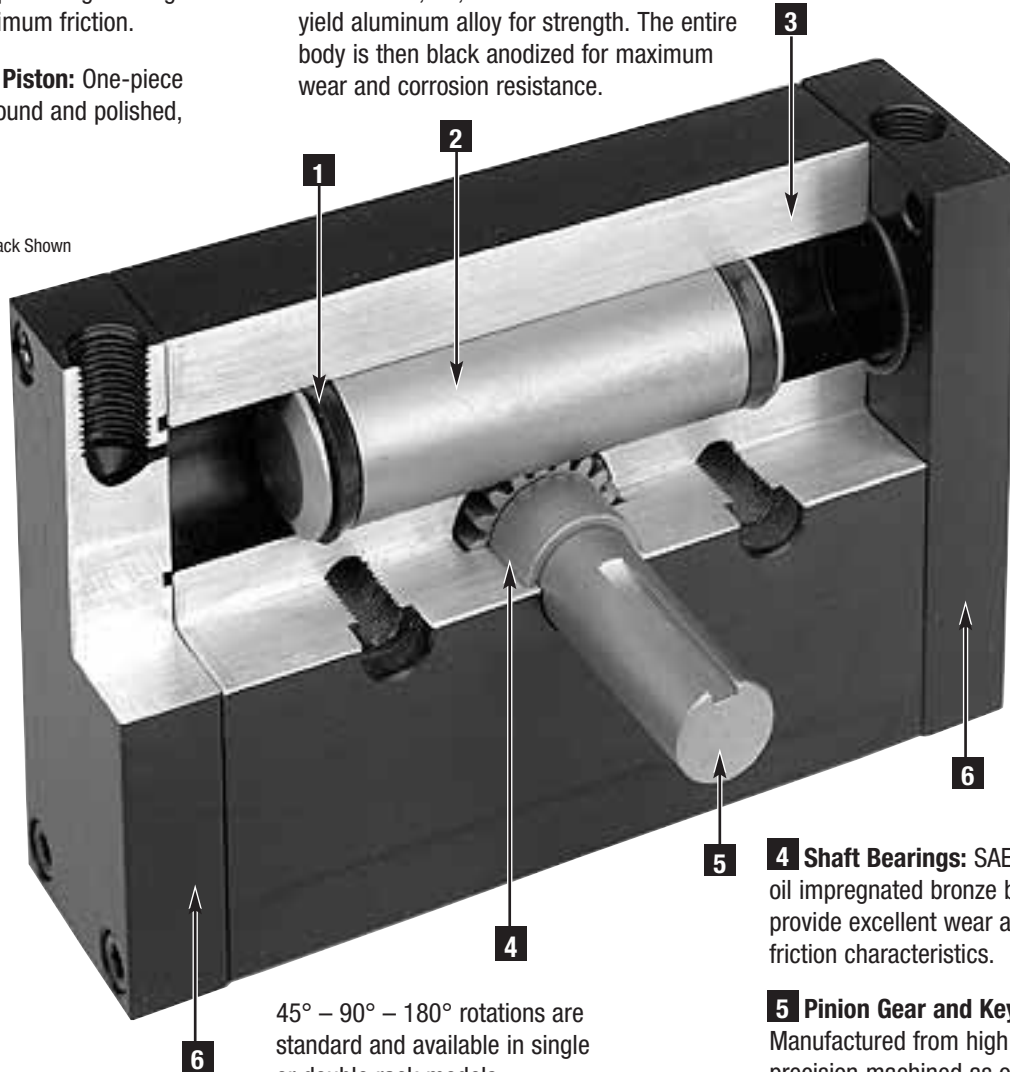
Mini Rotary Actuators are constructed with the finest materials for each component!

1 Seals: Lip type, pressure sensitive nitrile seals are wear compensating for long service life and minimum friction.

2 Gear Rack and Piston: One-piece construction, ground and polished, stress-proof steel.

3 Actuator Body: Precision machined from 6061-T6, 40,000 PSI minimum yield aluminum alloy for strength. The entire body is then black anodized for maximum wear and corrosion resistance.

Double Rack Shown



45° – 90° – 180° rotations are standard and available in single or double rack models.

4 Shaft Bearings: SAE 841 oil impregnated bronze bearings provide excellent wear and low friction characteristics.

5 Pinion Gear and Keyed Output Shaft: Manufactured from high strength steel and precision machined as one piece. The gear/shaft can be easily removed and reinserted to satisfy a variety of keyway orientation requirements.

6 End Caps: Machined from 6061-T6 solid aluminum bar that is anodized for corrosion resistance.

Seal Kits

Bore	Standard Part No.	Low Friction Part No.	Viton® Part No.	Air/Oil Tandem Part No.
1/2" Single Rack	000SK	000TK	000VK	We recommend that Air/Oil Tandems are returned to the factory for repair.
1/2" Double Rack	050SK	050TK	050VK	
3/4" Single Rack	100SK	100TK	100VK	
3/4" Double Rack	150SK	150TK	150VK	

Torque Output

Theoretical Torque Output in Inch-pounds (Newton-meters)

Bore Size	Series	PSI (bar)							Inch pounds per PSI	(Newton-meters per Bar)
		40(2.8)	60(4.1)	80(5.5)	90(6.2)	100(6.9)	125(8.6)	150 (10.3)		
1/2" Single Rack	000	2.0 (.23)	2.9 (.33)	3.9 (.44)	4.4 (.50)	4.9 (.50)	6.1 (.69)	7.4 (.84)	.049	(.080)
1/2" Double Rack	050	4.0 (.45)	5.8 (.66)	7.8 (.88)	8.8 (1.00)	9.8 (1.11)	12.2 (1.38)	14.8 (1.67)	.098	(.160)
3/4" Single Rack	100	6.6 (.75)	9.9 (1.12)	13.3 (1.50)	14.9 (1.68)	16.5 (1.86)	20.7 (2.33)	24.8 (2.80)	.165	(.270)
3/4" Double Rack	150	13.2 (1.49)	19.8 (2.24)	26.6 (3.0)	29.8 (3.37)	33.0 (3.73)	41.4 (4.68)	49.6 (5.60)	.330	(.540)

NOTE: Deduct 10% from torque output for frictional loss. 3/4" Air/Oil Tandem has the torque output of a Single Rack unit; deduct 20% for frictional loss.