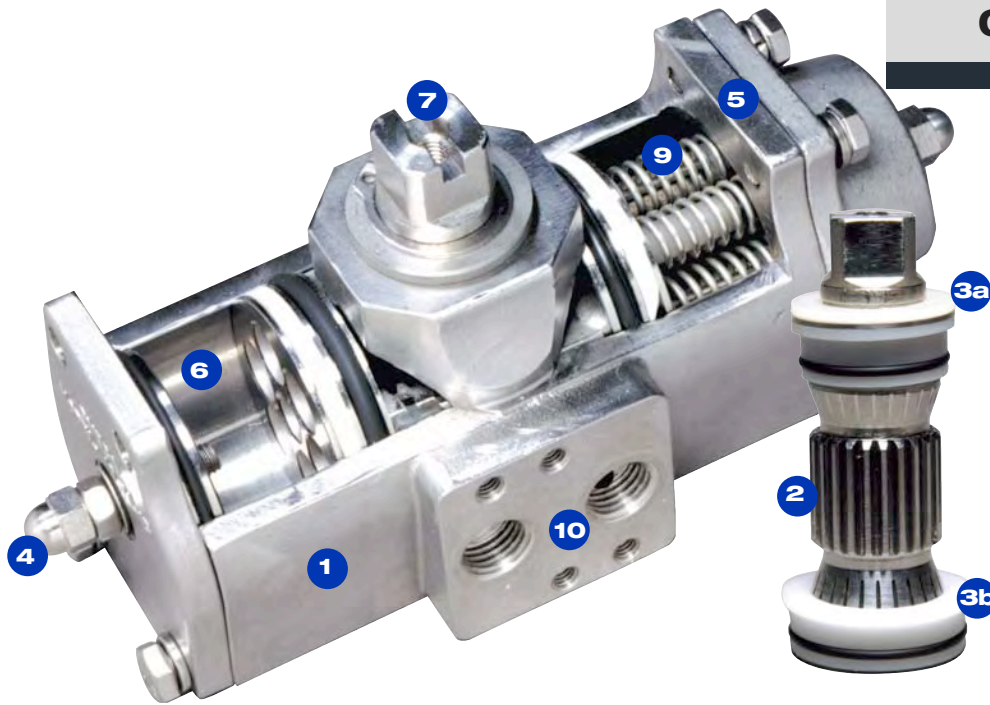


### "Acutorque" Stainless Steel Actuator

### Design and Construction



#### 1. Investment Cast Body

Assures manufacturing of other special alloys, such as Monel

#### 2. Unique Drive Pinion

One piece stainless steel alloy shaft, precision machined gear and teeth for precise control

#### 3. Bearings

Replaceable top and bottom TFE Pinion Bearings to ensure low friction, stability above 400°F, and chemical resistance

#### 4. Travel Stops

Provides +/-4° travel adjustment in outboard direction

#### 5. Accessory Mounting

Manufactured to NAMUR to provide international standardized mounting

#### 6. Stainless Steel Pistons

Precision cast pistons are guided through full face engagement with the pinion and piston guide

#### 7. NAMUR Slotted Shaft

Standard to provide a self-centering positive drive for positioners, a variety of switches

#### 8. Actuator Mounting

Manufactured in accordance with ISO 5211 to ensure mounting the actuator directly on valves

#### 9. Pre-loaded Cartridges

Converts a standard double acting actuator to a spring return unit by simply removing the end caps and adding the spring cartridges

#### 10. NAMUR Solenoid Mounting

International standard for direct mounting of solenoid valves

## Operation

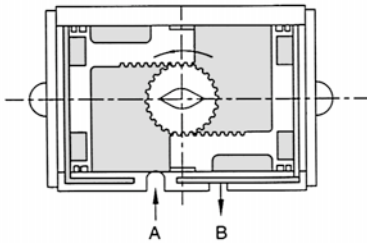
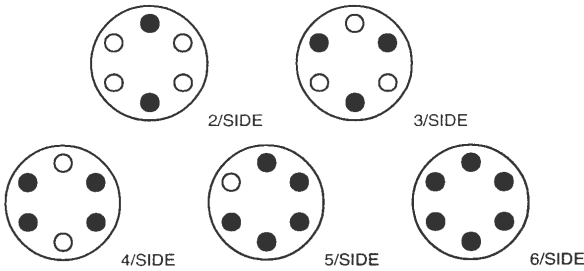
The Apollo® Acutorque actuator is manufactured with an integral and internal air manifold. The solenoid mounting pad is manufactured to Namur dimensional standards as to allow for the direct mounting of various manufacturers' solenoid valves and other flow control devices. For applications not requiring a direct mount solenoid valve, ports are tapped to NPT standards (American National Standard taper threads).

### Reverse Rotation

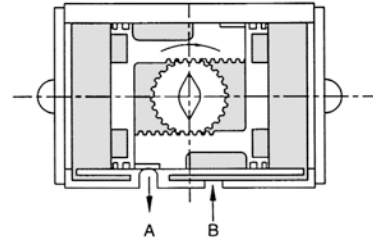
When required, a clockwise rotation of the drive pinion, by means of air to PORT A can be achieved by reversing the pistons inside the actuator body (rotate 180 degrees).

### Spring Configuration

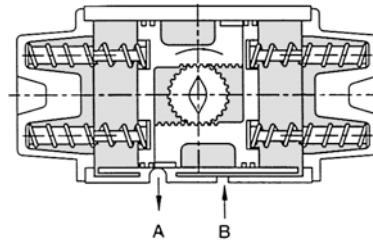
Each Acutorque actuator comes with a complete spring pack (6 springs per side with nylon retainers) unless otherwise specified. When less than the full spring pack is desired for various torque outputs (see torque chart); springs can be removed from the actuator end caps. It is very important that springs can be arranged in a symmetrical manner (positioned as shown below) so that unwarranted side-load does not occur between the pistons and actuator body. **CAUTION:** Refer to operation and maintenance instructions before disassembly and removal of springs.



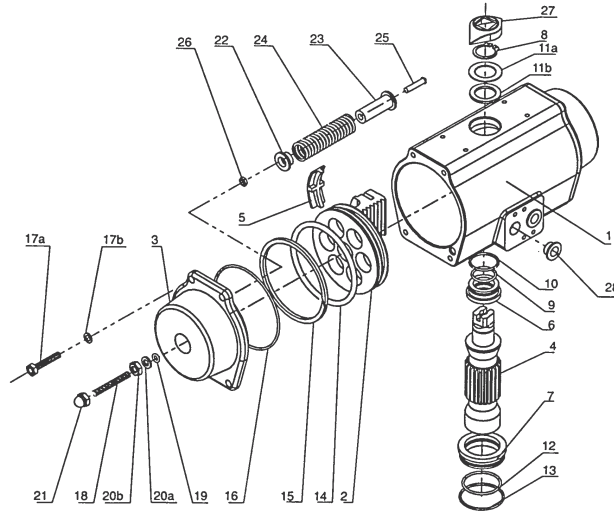
Air to PORT A - Pressure applied enters center of chamber forcing the pistons outward and rotating the drive pinion in a counter-clockwise direction and forcing exhaust air out of PORT B.



Air to PORT B - Air pressure enters the outer chambers forcing the pistons inward and rotating the drive pinion in a clockwise direction while forcing exhaust air out of PORT A.



Loss of air pressure in the center chamber allows energy in the compressed springs to force the pistons inward, resulting in a clockwise rotation of the drive pinion while exhaust air leaves via PORT A.



### Corrosion Resistance

All metal components are cast or machined from Stainless Steel or Monel, which offers excellent resistance to most corrosive chemicals as well as industrial atmospheres.

### No Lubrication

All actuators are factory lubricated for the optimum life of the actuator under normal conditions. Teflon® piston bearings are used because of their self-lubricating properties.

### Simple Maintenance

Each actuator is designed for ease of maintenance. Should you wish simply to change a spring rating or completely rebuild a unit, total disassembly and reassembly is easily performed in just minutes with standard shop tools.

### ISO/NAMUR Mounting

By using ISO/NAMUR standards, our actuators lend themselves to a host of various manufacturers' direct mount accessories. Solenoid valves, limit switches, positioners, etc. bolt directly to the actuator and in turn reduces the cost of assembly and installation of automated packages. Flexibility for future system modifications is greatly enhanced.

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### Quality

Each part of the actuator must pass a stringent quality test before it can be incorporated into an assembly. All materials used in construction must be certified and tested to prove their proper composition. Every cast part must pass an X-ray test before proceeding to the machining process. After machining every part is dimensionally calibrated in order to assure it meets acceptable tolerance.

### Safety

All actuator bodies and end caps are investment cast stainless steel, rugged and built to last. It may be argued that the mechanical properties of stainless steel permit the ability to use this wall tubing in the construction of an actuator. However, that is not the case with our actuator. Thick wall castings mean protection for actuator internal porting and components as well as maintenance and operating personnel. Our unique drive pinion design ensures blowout proof protection. Spring retainers are incorporated to allow safe removal of end caps during spring torque rating change or rebuild process.

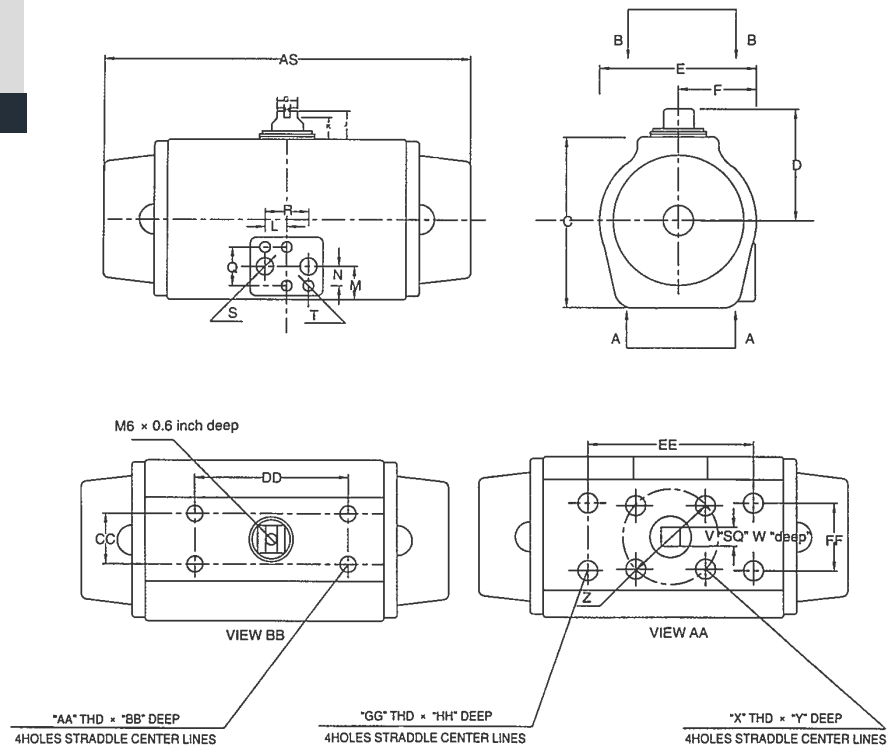
P/N	DESCRIPTION	QTY	MATERIAL	P/N	DESCRIPTION	QTY	MATERIAL
1	Body	1	304 Stainless Steel	16	O-Ring-End Cap	2	Nitrile
2	Piston	2	303 Stainless Steel	17a	Bolts-End Cap	8	Stainless Steel
3	End Caps-Double Acting	2	Stainless Steel	17b	Spring Bearing	8	Stainless Steel
4	Drive Pinion	1	17-4 Stainless Steel	18	Adjusting Travel Stop	2	Stainless Steel
5	Guide Bearing Plate	2	Nylon 6	19	O-Ring-Travel Stop	2	Nitrile
6	Pinion Bearing Top	1	Teflon	20a	Washer	2	Stainless Steel
7	Pinion Bearing Bottom	1	Teflon	20b	Nut-Travel Stop	2	Stainless Steel
8	Snap Ring	1	Stainless Steel	21	End Nut-Travel	2	Stainless Steel
9	O-Ring-Inner Top	1	Viton	22	Spring Retainer (S)	*	Nylon 6
10	O-Ring-Outer Top	1	Viton	23	Spring Retainer (L)	*	Nylon 6
11a	Washer	1	Stainless Steel	24	Spring	*	Plated CS
11b	Bearing	1	Nylon 6	25	Spring Screw	*	Stainless Steel
12	O-Ring-Inner Bottom	1	Viton	26	Spring Nut	*	Stainless Steel
13	O-Ringer-Outer Bottom	1	Viton	27	Positioner Indicator	1	Nylon
14	O-Ring-Piston	2	Viton	28	Plug	2	Nylon 6
15	Bearing-Piston	2	Nylon 6				

### Grade of Stainless Steel

Body & End Caps	304
Shaft	17-4 ph
Piston	303
Bolts	18-8

# Actuators and Controls

## Dimensional Data



## Mounting Dimensions

MODEL		R	S	T	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH
3SD04500	mm	24	1/4"NPT	M5	11	15	M5	8	42	M5	6	30	80	88.9	31.75	M5	8
3SS04560	in	0.95	1/4"NPT	M5	0.4	0.59	M5	0.31	1.65	M5	0.24	1.18	3.15	3.5	1.25	M5	0.31
3SD06000	mm	24	1/4"NPT	M5	14	15	M6	8	50	M5	6	30	80	88.9	31.75	M6	8
3SS06060	in	0.95	1/4"NPT	M5	0.55	0.59	M6	0.31	1.97	M5	0.24	1.18	3.15	3.5	1.25	M6	0.31
3SD08500	mm	24	1/4"NPT	M5	19	17	M8	12	70	M5	6	30	80	114	38	M8	12
3SS08560	in	0.95	1/4"NPT	M5	0.75	0.68	M8	0.47	2.75	M5	0.24	1.18	3.15	4.5	1.5	M8	0.47
3SD10500	mm	24	1/4"NPT	M5	19	20	M8	12	70	M5	6	30	80	114	38	M8	12
3SS10560	in	0.95	1/4"NPT	M5	0.75	0.79	M8	0.47	2.75	M5	0.24	1.18	3.15	4.5	1.5	M8	0.47
3SD12500	mm	24	1/4"NPT	M5	22	30	M8	18	102	M5	8	30	130	NA	50.8	NA	NA
3SS12560	in	0.95	1/4"NPT	M5	0.87	1.2	M8	0.71	4.02	M5	0.31	1.18	5.12		2		
3SD14000	mm	24	1/4"NPT	M5	22	27	M10	18	102	M5	8	30	130	NA	50.8	NA	NA
3SS14060	in	0.95	1/4"NPT	M5	0.87	1.06	M10	0.71	4.02	M5	0.31	1.18	5.12		2		
3SD17000	mm	24	1/4"NPT	M5	32	36	M12	24	125	M5	8	30	130	NA	76	NA	NA
3SS17060	in	0.95	1/4"NPT	M5	1.26	1.42	M12	0.95	4.92	M5	0.31	1.18	5.12		3		
3SD21000	mm	24	1/4"NPT	M5	36	43	M20	28	140	M5	8	30	130	NA	76	NA	NA
3SS21060	in	0.95	1/4"NPT	M5	1.42	1.69	M20	1.1	5.51	M5	0.31	1.18	5.12		3		