

# MORIN

## Features and Benefits

- Ductile iron housing, piston and end caps provide long product life with durable, cost effective operation.
- Output shaft made of high strength alloy steel transmits torque without fatigue.
- Sintered bronze bushings or Teflon® composite on output shaft eliminate side loading of valve stem to maximize stem packing performance.
- Chrome-plated steel piston rod provides strength and corrosion resistance for enduring high cycle applications.
- Sintered bronze piston rod bushings provide low-friction support and precise alignment of the piston rod to increase efficiency, reduce maintenance and extend actuator life.
- Heat-treated stainless steel thrust pin and rollers transfer piston force to 17-4PH stainless steel yoke by rolling to reduce friction, for longer life and more efficient torque transmission.
- Teflon® guide bands ensure low-friction piston guidance during operation to protect cylinder walls from potential scoring and extend seal performance with a continuous cylinder wiping action.
- Bi-directional travel stops provide accurate valve rotation adjustment.
- ISO 5211 mounting pattern promotes easier valve adaptation by utilizing internationally recognized standards.
- Both Series B and C have been certified to SIL 3 ratings.



## Ductile Iron/Stainless Steel Cylinders Quarter-turn Spring Return and Double Acting Actuators Output Torques to 238,000 lb.in.



- Namur drive slot on output shaft enables accessory-driven components to maintain a compact assembly and eliminates the need for couplings.
- Tectyl-coated springs can be disarmed without special tools to safely and easily disassemble the actuator in the field, reducing down time and providing a 'man safe' spring.
- Easily removable housing cover provides effortless access for internal inspection of yoke mechanism.

### Technical Data

- Supply pressure : 40 to 160 psig (see torque charts)
- Supply medium : Air or any gas compatible with materials of construction
- Temperature rating
  - Standard range : -20°F to 210°F
  - Optional range : -65°F to 300°F
  - Angular rotation : 90 degrees ± 8 degrees

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## Morin has a Heart of Stainless Steel

### Morin Stainless Steel Yoke

The heart of any scotch yoke actuator is the yoke. Morin uses 17-4PH stainless for this critical area as standard.

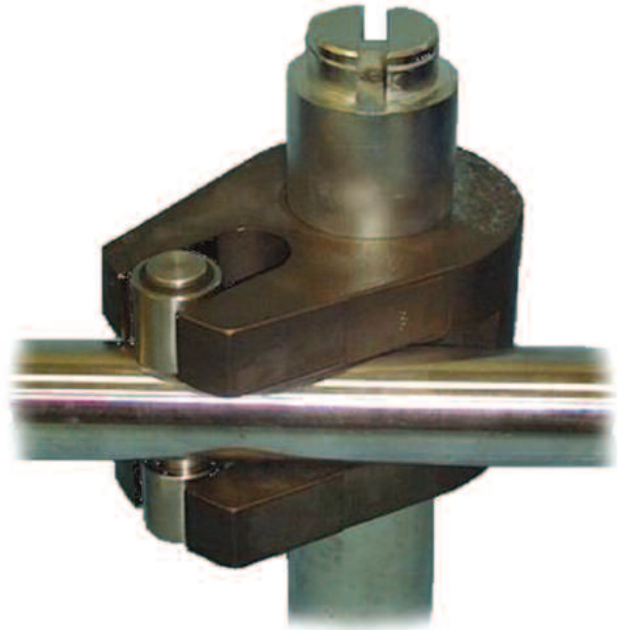
The yoke is the mechanism used to convert linear force to torque. This area is most often where the life of the actuator is controlled.

### Principles of Construction

Using high quality materials of construction and modern rugged design concepts Morin becomes the standard for low cost valve actuation while providing high quality performance.

The B, C, and HP actuator housings are all machined from ductile iron castings. This produces a rugged, low cost product through reduced machining time and by eliminating wasteful excess material.

Any components that rotate or slide during operation, such as the high strength output shaft, chrome-plated piston rod, stainless steel thrust pin or the ductile iron piston, are all supported by replaceable friction reducing bearings.

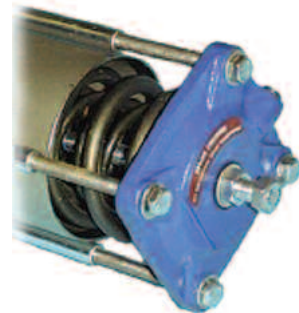


### Bi-directional Travel Stops

Adjustable stops on each end cap provide the flexibility of accurate valve rotation positioning at the end of the 'open' and 'close' stroke. Both stops are located on the cylinder centerline, the optimal position to maximize travel adjustment and eliminate any detrimental side loading on the travel stops. Adjustable from 82° to 98°.

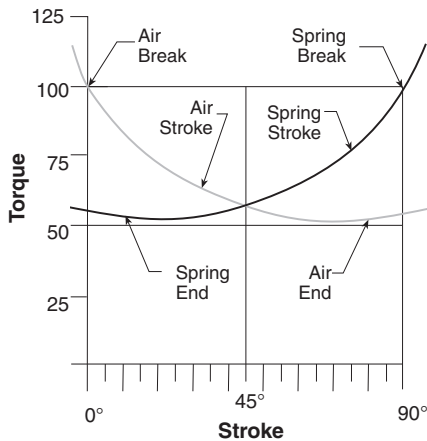
### Spring Designed for Safety

All spring return models incorporate a 'man safe' spring design that allows the actuator to be safely assembled and disassembled in the field without the need for special tools. The integral tie rods are bored and tapped to provide a means of loading and unloading the spring in a safe and convenient manner.

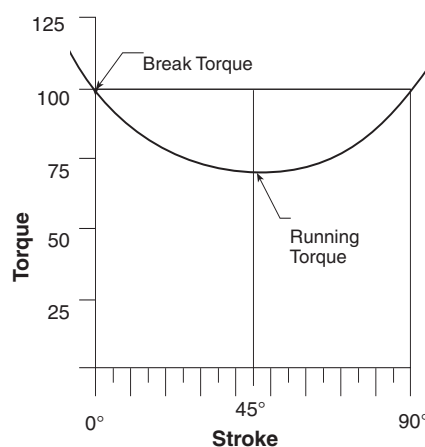


## Scotch Yoke Torque Characteristics

Single Acting Spring Return

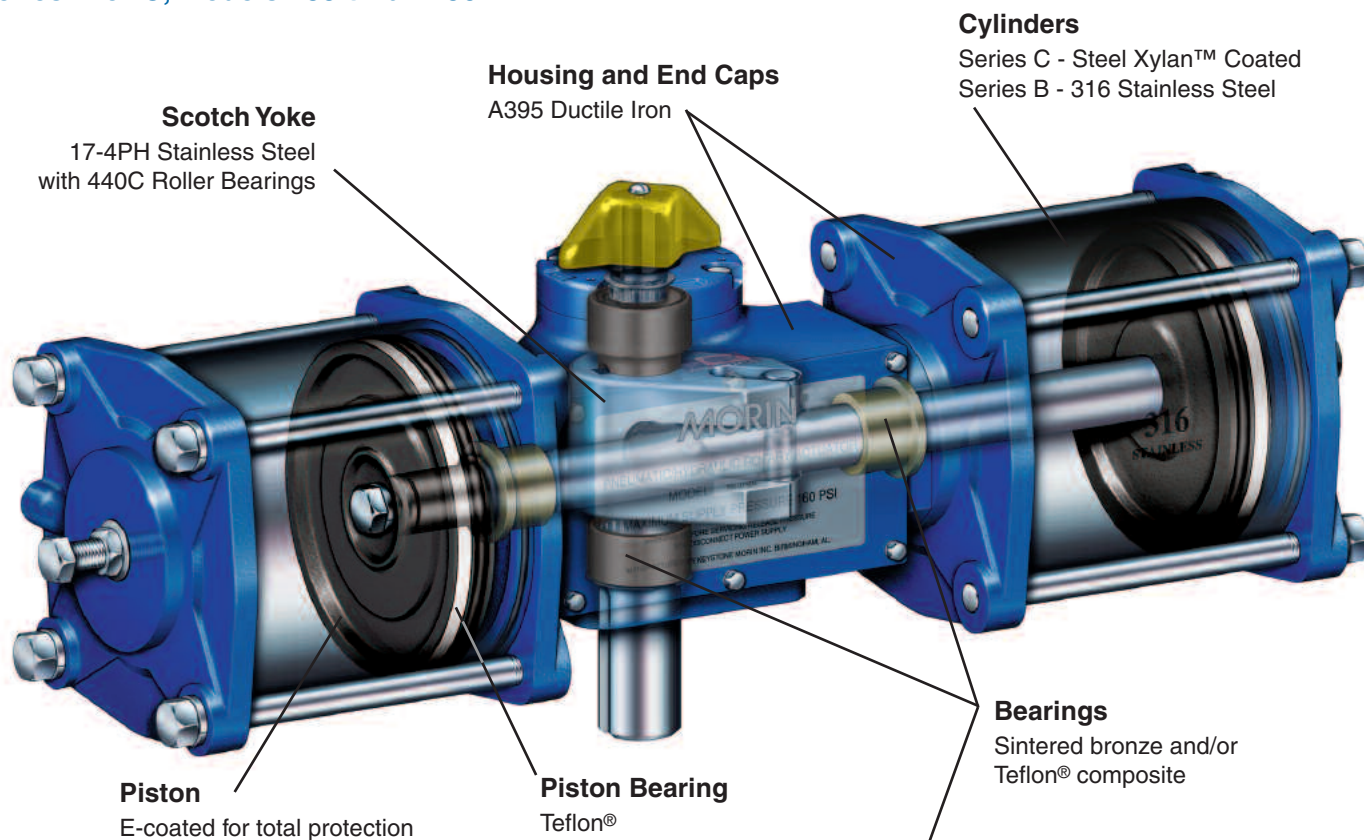


Double Acting Air to Air



Superior materials of construction offer long life, and mean less downtime

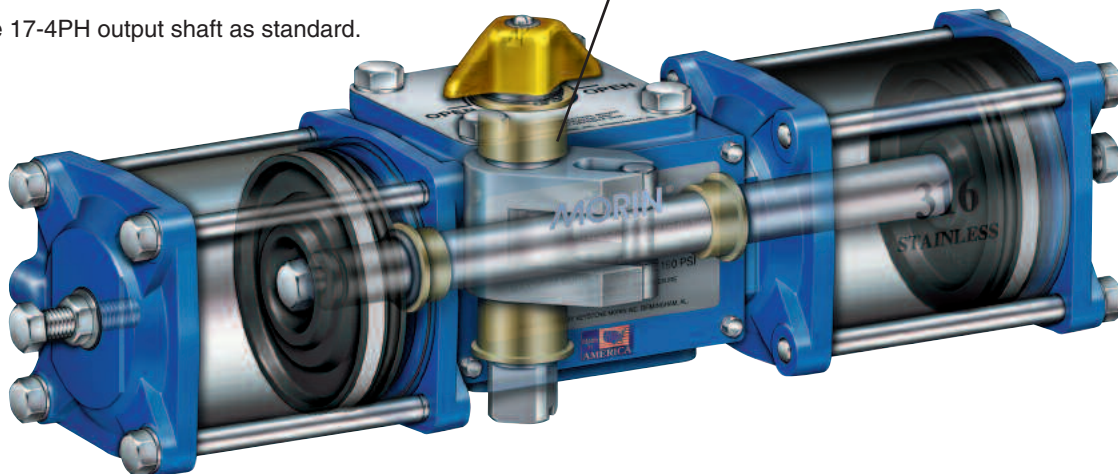
**Series B or C, Models 135 thru 1150**



**Series B, Models 006 thru 100**

Morin Series B uses construction identical to the Series C, but with 316 Stainless Steel Cylinders.

Models 006 thru 100 use 17-4PH output shaft as standard.



Note: See Morin Series B/C/S IOM for a complete bill of materials.

## Symmetrical and Canted Yokes

It's about fitting the torque curve of the actuator to the valve . . .

It's about lower cost, lighter weight, smaller actuators . . .

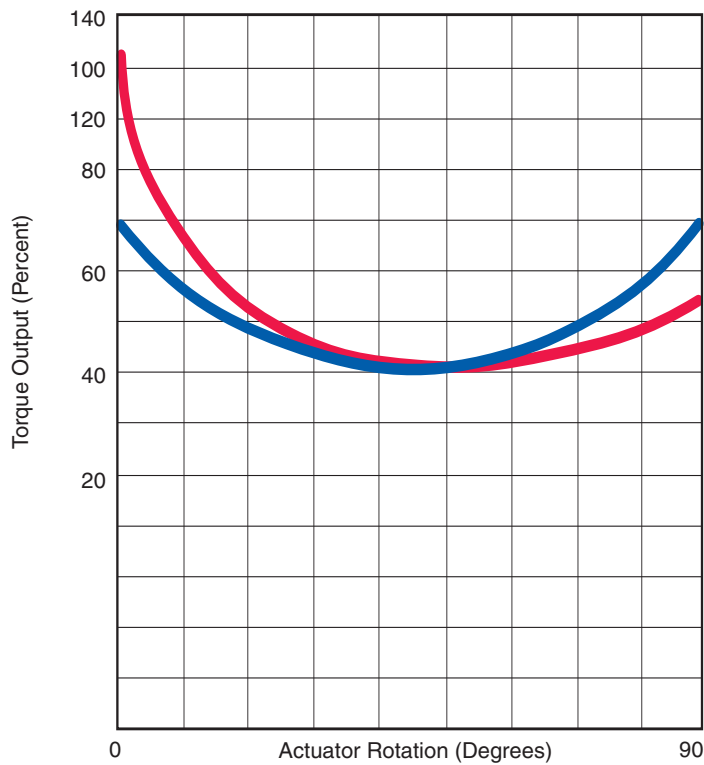
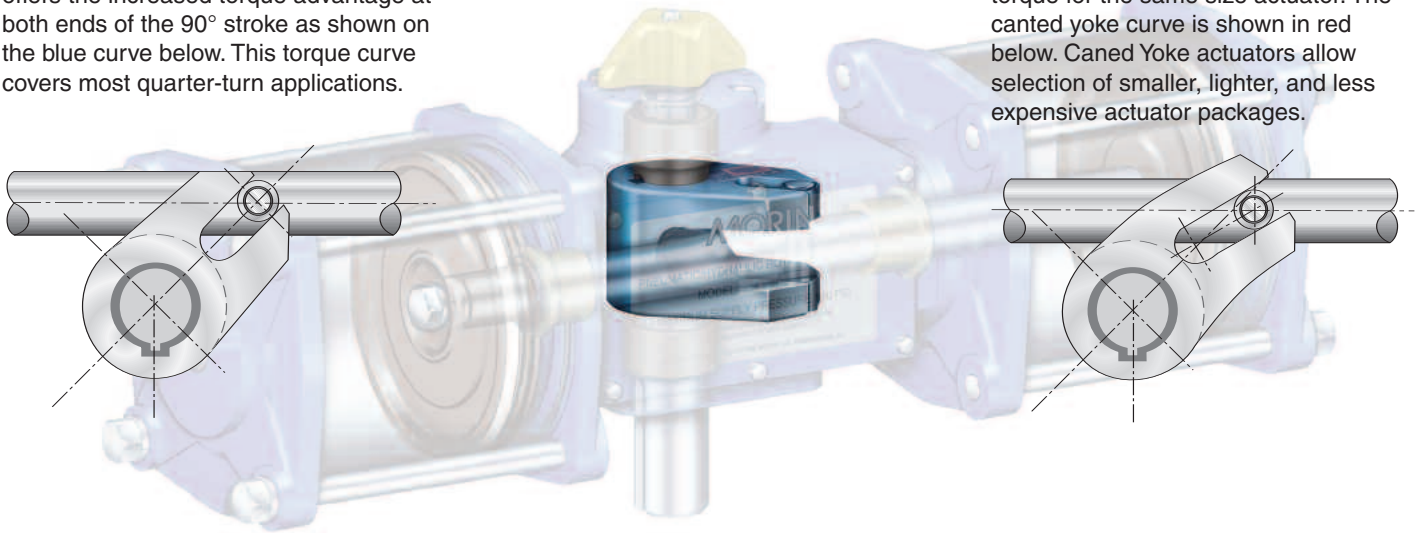
It's about CHOICE . . .

### Symmetric

Symmetrical Yoke design offers the standard torque curve seen most often in relation to scotch yoke actuators. It offers the increased torque advantage at both ends of the 90° stroke as shown on the blue curve below. This torque curve covers most quarter-turn applications.

### Canted

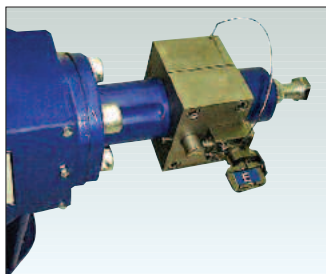
Canted Yoke design moves the torque curve to where it's needed most, gaining as much as 35% more break and reset torque for the same size actuator. The canted yoke curve is shown in red below. Canted Yoke actuators allow selection of smaller, lighter, and less expensive actuator packages.



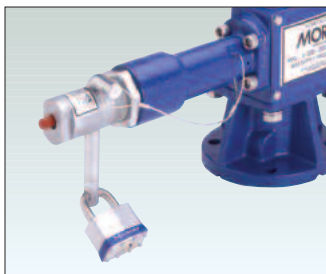
Symmetric █  
Canted █

Options

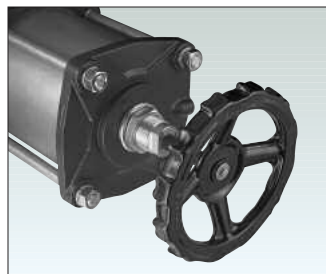
To provide the actuation package best suited for your application, the Morin line offers a full range of manual accessories.



**Partial Stroke Test Device (PSTD)**  
Provides a method of testing ESD packages without shutdown.



**Lockout**  
Integral lockout allows safe shutdowns for maintenance and isolation of systems.



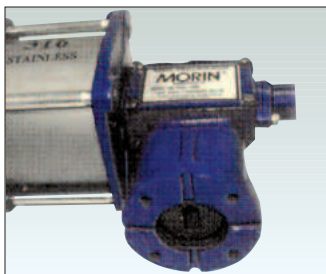
**Jackscrew Override (JSO)**  
Manual operation when power is lost. Simple and effective.



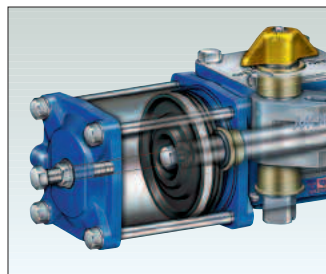
**Hydraulic Override (MHP)**  
Manual operation when power is lost. Includes speed controls.



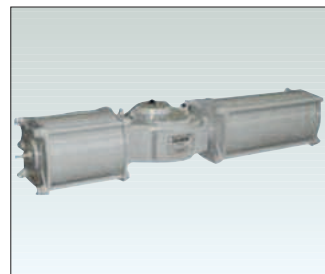
**AWWA**  
Tested per American Waterworks Association C504. Available for pneumatic or water service operation.



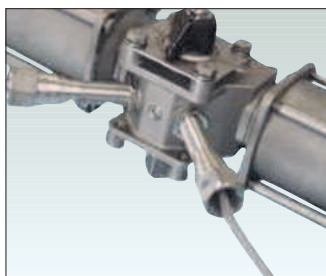
**Direct Mounting Cast Adapters**  
Many valve top works covered, including some ISO mounting. Assures economic but correct mounting alignment.



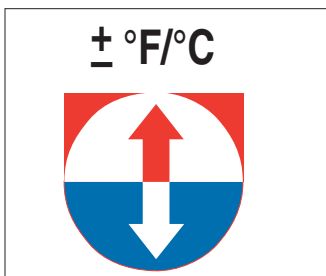
**Full Stroke Adjuster**  
Provides mechanical control of maximum and/or minimum valve stroke.



**Epoxy Painting (EX)**  
Offshore rated, three-part coating system for high level of environmental protection.



**Proximity Switch Preparation**  
Allows installation of cartridge style proximity switches. Leaves top works open for mounting of other devices.



**High or Low Temperature Ratings**  
Standard rating of -20°F to 210°F [-29°C to 99°C] covers most applications. Optional ratings down to -65°F [-54°C] and up to 300°F [149°C].



**Optional Certification for CE**  
Manufactured in accordance with the Pressure Equipment Directive 97/23/EC and ATEX 94/9/EC.

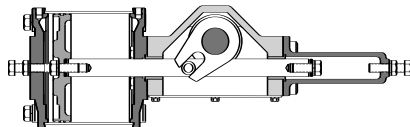
## Mechanical Data

Actuator Model	Standard End Torque Closing @ 80 psig		Number of Pistons	Cylinder Bore (inch)	Stroke (inch)	Volume <sup>1</sup> Cubic In 95° Stroke	Cycle Time <sup>2</sup> Seconds		Weight (lbs.)
	Symmetrical	Canted					90° Stroke	90° Stroke	
<b>Double Acting</b>									
006	600	-	1	2.750	2	14	0.5	11	
015	1500	-	1	4.375	2	35	1	14	
023	2300	2990	1	4.375	3	52	1	30	
036	3960	5148	1	5.438	3	78	1.5	33	
050	5000	6500	1	6.250	3	104	2.2	39	
059	5900	7670	2	4.375/5.438	3	130	2.4	36	
072	7920	9009 @ 70 psig	2	5.438	3	156	2.5	41	
100	10000	9750 @ 60 psig	2	6.250	3	215	3	49	
135	14175	18428	1	8.250	5	294	4.5	165	
210	23100	30030	1	10.250	5	412	5	185	
270	28350	36855	2	8.250	5	588	6	210	
345	36225	41206 @ 70 psig	2	8.250/10.250	5	706	7	234	
370	37000	51469	1	12.250	6	780	8	390	
420	42000	40950 @ 60 psig	2	10.250	5	825	8.5	257	
575	63825	82973	1	15.500	6	1132	9.5	519	
740	77700	101010	2	12.250	6	1560	10	530	
945	101115	98587 @ 60 psig	2	12.250/15.500	6	1912	11	653	
1150	120750	98110 @ 50 psig	2	15.500	6	2263	12	775	
1480	148000	192400	2	12.250	12	2986	20	850	
1930	193000	219538 @ 70 psig	2	12.250/15.500	12	3884	22	950	
2380	238000	232050 @ 60 psig	2	15.500	12	4781	24	1050	

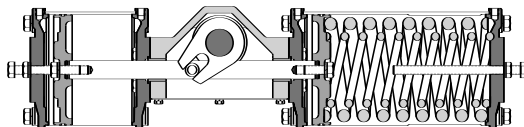
### Spring Return

006	221	-	1	2.750	2	14	0.5	13	
015	525	-	1	4.375	2	35	1	20	
023	800	1120	1	4.375	3	52	1	38	
036	1260	1764	1	5.438	3	78	1.5	46	
046	1600	2240	2	4.375	3	104	2	47	
058	1600	2240	2	5.438/4.375	3	130	2.3	54	
059	1890	2646	2	4.375/5.438	3	130	2.4	54	
072	2500	3500	2	5.438	3	156	2.5	60	
100	3500	4900	2	6.250	3	215	3	68	
135	5670	7938	1	8.250	5	294	4.5	210	
210	8085	11319	1	10.250	5	412	5	235	
270	10395	14553	2	8.250	5	588	6	250	
344	12637	17692	2	10.250/8.250	5	706	7	315	
345	13760	19264	2	8.250/10.250	5	706	7	315	
370	14893	20850	1	12.250	6	780	8	540	
420	15435	21609	2	10.250	5	825	8.5	379	
575	21131	29583	1	15.500	6	1132	9.5	779	
740	29785	41699	2	12.250	6	1560	10	660	
944	27713	38798	2	15.500/12.250	6	1912	11	871	
945	32303	45224	2	12.250/15.500	6	1912	11	871	
1150	42263	59168	2	15.500	6	2263	12	1082	
1480	51800	72520	2	12.250	12	2986	20	1650	
1929	58275	81585	2	15.500/12.250	12	3884	22	1750	
1930	62475	87465	2	12.250/15.500	12	3884	22	1750	
2380	83300	116620	2	15.500	12	4781	24	1850	

### Typical Section - Double Acting/One Piston



### Typical Section - Spring Return/Two Pistons



See Morin Torque Book (MORMC-0333-US) for complete torque selection.

## Notes

- Air Consumption:**  
Cubic inches shown in chart represent actual free air volume in cylinder between piston and end cap when furthest apart. Air consumption will vary depending on supply pressure. To determine standard cubic feet per minute use the following formula:

SCFM =

$$\left(\frac{\text{Vol. in}^3}{1728}\right)\left(\frac{\text{Supply Air psig} + 14.7}{14.7}\right)\left(\text{Strokes/Minute}\right)$$

Example: Calculate SCFM for Model 023 double acting using 80 psig air supply and 5 strokes/minute.

SCFM =

$$\left(\frac{52}{1728}\right)\left(\frac{80 + 14.7}{14.7}\right)(5) \text{ SCFM} = 0.97$$

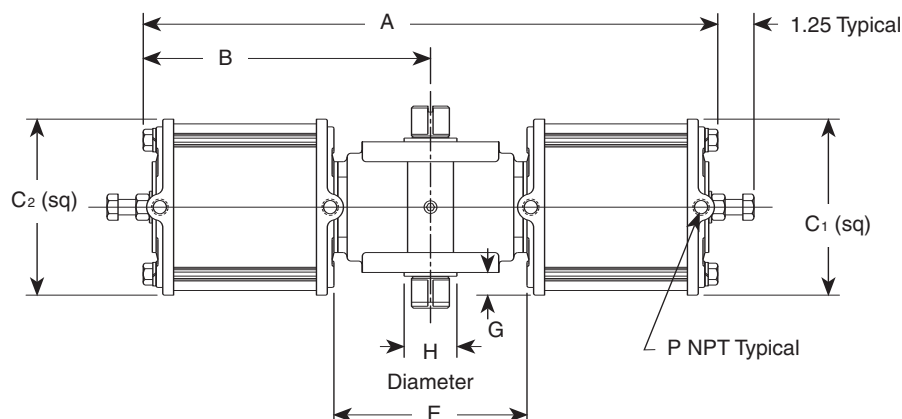
- Cycle times shown represent average time to stroke 90 degrees using standard pilot valves and should be used as a guide only. Cycle times can be increased or decreased dramatically by using speed controls, oversized pilot valves or quick exhaust valves.

## How to Order

- Double Acting (Symmetrical Yoke) example:**  
Air supply: 80 psig  
Break/end torque: 23,100 lb.in.  
B-210U-D000  
B: Series  
210: Model number  
U: UNC mounting threads  
D: Double acting  
000: No spring
- Spring Return (Symmetrical Yoke) example:**  
Air supply: 80 psig  
End torque: 8085 lb.in.  
B-210U-S080  
B: Series  
210: Model number  
U: UNC mounting threads  
S: Spring return  
080: Spring set code
- Double Acting (Canted Yoke) example:**  
Air supply: 80 psig  
Break (CCW) torque: 31,185 lb.in.  
End (CW) torque: 30,030 lb.in.  
B-210UC-D000  
B: Series  
210: Model number  
U: UNC mounting threads  
C: Canted Yoke  
D: Double acting  
000: No spring
- For all spring return models:
  - Use required torque to determine Spring Set Code.
  - All spring sets ending with '0' fail clockwise (40, 50, 60, etc.).
  - All spring sets ending with '1' fail counterclockwise (41, 51, 61, etc.).
  - All symmetrical yoke models between 006 and 100 may be mounted to fail clockwise or counterclockwise by "flipping" along the longitudinal axis.

Series B Dimensions

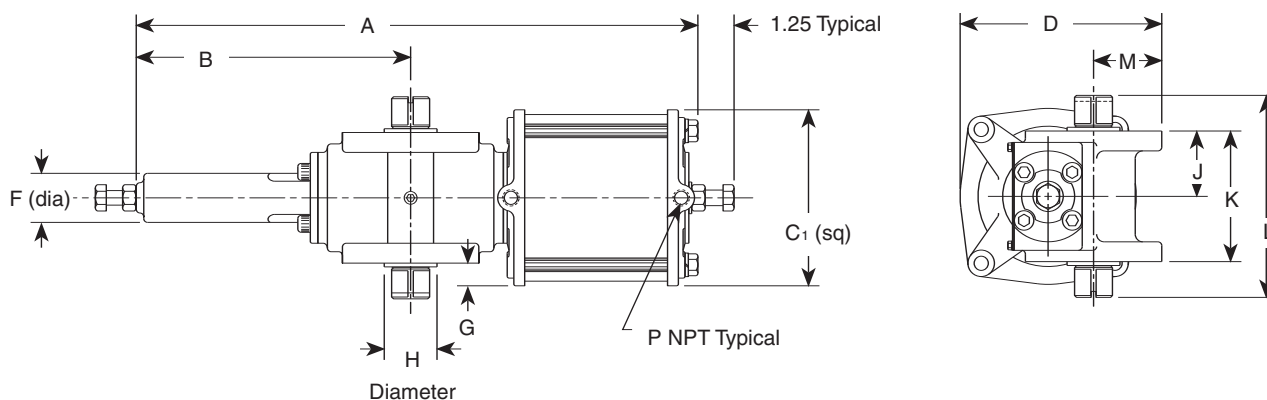
Models 046, 058, 059, 072 and 100



Notes

1. Shown without pointer for clarity.
2. For mounting dimensions, refer to page 10.

Models 006, 015, 023, 036 and 050



Dimensions (inches), Double Acting

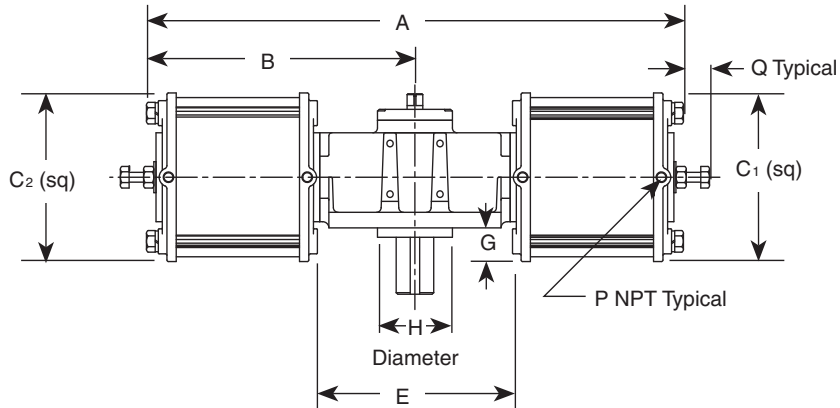
Model	A	B	C1	C2	D	E	F	G	H	J	K	L	M	P
006DA	12.87	5.28	3.18	—	3.87	—	1.09	0.18	1.50	1.50	3.00	4.75	1.31	1/8
015DA	12.31	5.28	4.81	—	4.81	—	1.09	1.00	1.50	1.50	3.00	4.75	1.31	1/4
023DA	18.54	8.88	4.81	—	6.16	—	1.75	0.25	1.75	2.16	4.31	6.69	2.25	1/4
036DA	18.60	8.88	5.81	—	6.66	—	1.75	0.75	1.75	2.16	4.31	6.69	2.25	1/4
050DA	18.55	8.88	7.12	—	7.31	—	1.75	1.38	1.75	2.16	4.31	6.69	2.25	1/4
059DA	19.40	9.66	4.81	5.81	6.66	6.34	—	0.75	1.75	2.16	4.31	6.69	2.25	1/4
072DA	19.35	9.68	5.81	5.81	6.66	6.38	—	0.75	1.75	2.16	4.31	6.69	2.25	1/4
100DA	18.98	9.68	7.12	7.12	7.31	6.38	—	1.38	1.75	2.16	4.31	6.69	2.25	1/4

Dimensions (inches), Spring Return

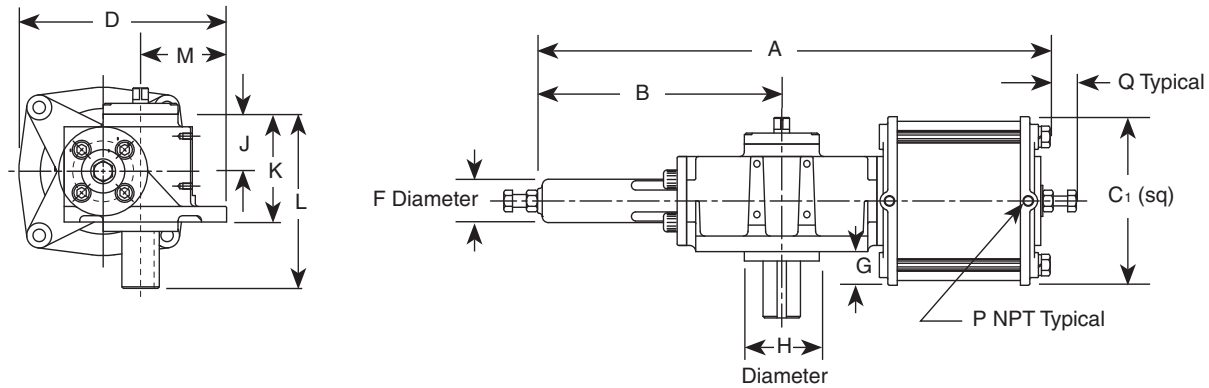
Model	A	B	C1	C2	D	E	F	G	H	J	K	L	M	P
006SR	12.87	5.28	3.18	—	3.87	—	1.09	0.18	1.50	1.50	3.00	4.75	1.31	1/8
015SR	14.50	5.28	4.81	—	4.81	—	1.09	1.00	1.50	1.50	3.00	4.75	1.31	1/4
023SR	21.95	8.88	4.81	—	6.16	—	1.75	0.25	1.75	2.16	4.31	6.69	2.25	1/4
036SR	23.65	8.88	5.81	—	6.66	—	1.75	0.75	1.75	2.16	4.31	6.69	2.25	1/4
046SR	22.73	9.66	4.81	4.81	6.16	5.58	—	0.25	1.75	2.16	4.31	6.69	2.25	1/4
058SR	22.79	9.73	5.81	4.81	6.66	5.58	—	0.75	1.75	2.16	4.31	6.69	2.25	1/4
059SR	24.44	9.66	4.81	5.81	6.66	5.44	—	0.75	1.75	2.16	4.31	6.69	2.25	1/4
072SR	24.45	9.68	5.81	5.81	6.66	5.44	—	0.75	1.75	2.16	4.31	6.69	2.25	1/4
100SR	24.51	9.73	7.12	7.12	7.31	5.44	—	1.38	1.75	2.16	4.31	6.69	2.25	1/4

Series B and C Dimensions

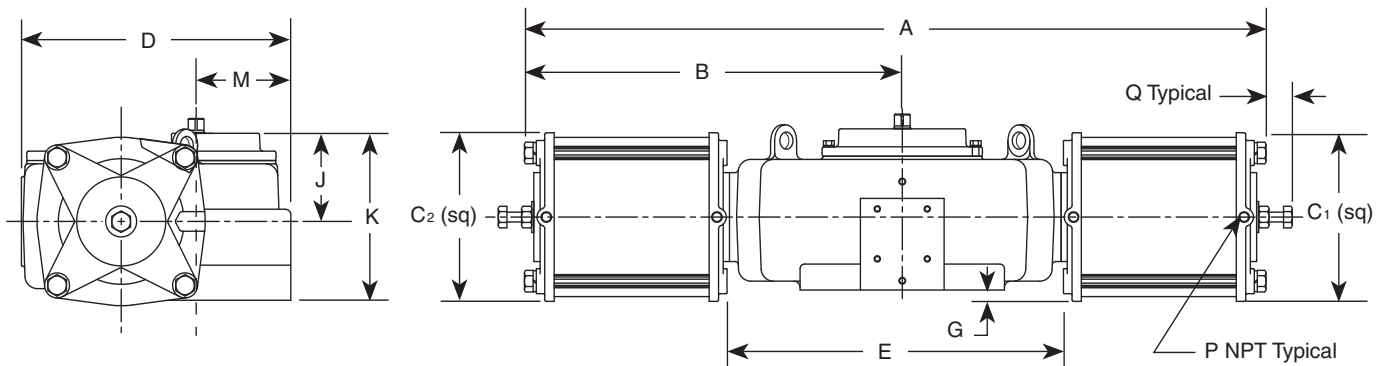
Models 270, 344, 345, 420, 740, 944, 945 and 1150



Models 135, 210, 370 and 575



Models 1480, 1929, 1930 and 2380



Notes

1. Shown without pointer for clarity.
2. For mounting dimensions, refer to pages 10 - 11.



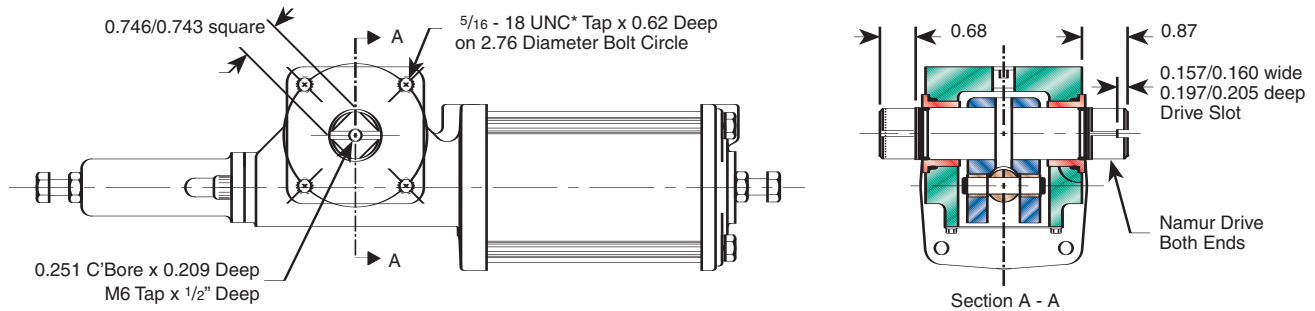
## Series B and C Dimensions

Dimensions (inches), Double Acting															
Model	A	B	C1	C2	D	E	F	G	H	J	K	L	M	P	Q
135DA	32.74	15.88	9.50	—	10.44	—	2.75	1.00	—	4.38	8.13	11.82	3.19	3/8	1.75
210DA	33.26	15.88	11.50	—	11.44	—	2.75	2.00	—	4.38	8.13	11.82	3.19	1/2	2.12
270DA	33.77	16.89	9.50	9.50	10.44	11.72	—	1.00	—	4.38	8.13	11.82	3.19	3/8	1.75
345DA	34.26	16.89	9.50	11.50	11.44	11.22	—	2.00	—	4.38	8.13	11.82	3.19	1/2	2.12
370DA	41.64	19.56	13.50	—	16.75	—	3.50	2.69	5.90	5.44	9.50	14.81	6.88	1/2	1.75
420DA	34.75	17.38	11.50	11.50	11.44	11.22	—	2.00	—	4.38	8.13	11.82	3.19	1/2	2.12
575DA	42.26	19.56	17.00	—	18.50	—	3.50	4.44	5.90	5.44	9.50	14.81	6.88	3/4	2.50
740DA	44.15	22.07	13.50	13.50	16.75	15.62	—	2.69	5.90	5.44	9.50	14.81	6.88	1/2	1.75
945DA	44.77	22.07	13.50	17.00	18.50	14.88	—	4.44	5.90	5.44	9.50	14.81	6.88	3/4	2.50
1150DA	45.39	22.69	17.00	17.00	18.50	14.88	—	4.44	5.90	5.44	9.50	14.81	6.88	3/4	2.50
1480DA	70.57	35.85	13.50	13.50	21.57	25.90	—	0.63	—	7.06	13.38	—	7.58	1/2	2.50
1930DA	71.11	35.85	13.50	17.00	22.08	25.06	—	2.19	—	7.06	13.38	—	7.58	3/4	3.05
2380DA	71.63	36.37	17.00	17.00	22.08	25.06	—	2.19	—	7.06	13.38	—	7.58	3/4	3.05

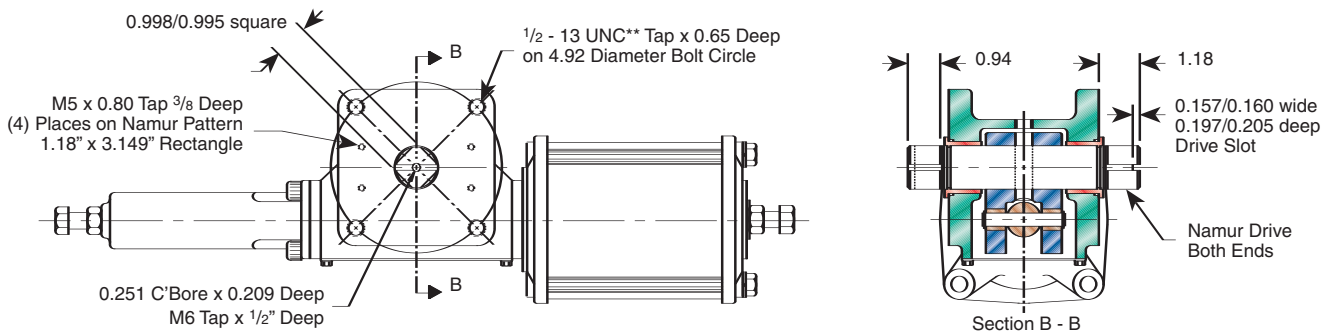
Dimensions (inches), Spring Return															
Model	A	B	C1	C2	D	E	F	G	H	J	K	L	M	P	Q
135SR	39.46	15.88	9.50	—	10.44	—	2.75	1.00	—	4.38	8.13	11.82	3.19	3/8	1.75
210SR	42.67	15.88	11.50	—	11.44	—	2.75	2.00	—	4.38	8.13	11.82	3.19	1/2	2.12
270SR	40.57	16.99	9.50	9.50	10.44	10.18	—	1.00	—	4.38	8.13	11.82	3.19	3/8	1.75
344SR	40.95	17.38	11.50	9.50	11.44	10.18	—	2.00	—	4.38	8.13	11.82	3.19	1/2	2.12
345SR	43.79	16.99	9.50	11.50	11.44	9.50	—	2.00	—	4.38	8.13	11.82	3.19	1/2	2.12
370SR	51.48	19.56	13.50	—	16.75	—	3.50	2.69	5.90	5.44	9.50	14.81	6.88	1/2	1.75
420SR	44.17	17.38	11.50	11.50	11.44	9.50	—	2.00	—	4.38	8.13	11.82	3.19	1/2	2.12
575SR	54.12	19.56	17.00	—	18.50	—	3.50	4.44	5.90	5.44	9.50	14.81	6.88	3/4	2.50
740SR	53.99	22.07	13.50	13.50	16.75	13.88	—	2.69	5.90	5.44	9.50	14.81	6.88	1/2	1.75
944SR	54.59	22.67	17.00	13.50	18.50	13.88	—	4.44	5.90	5.44	9.50	14.81	6.88	3/4	2.50
945SR	56.63	22.07	13.50	17.00	18.50	12.70	—	4.44	5.90	5.44	9.50	14.81	6.88	3/4	2.50
1150SR	57.22	22.69	17.00	17.00	18.50	12.70	—	4.44	5.90	5.44	9.50	14.81	6.88	3/4	2.50
1480SR	86.98	35.85	13.50	13.50	21.57	24.46	—	0.63	—	7.06	13.38	—	7.58	1/2	2.50
1929SR	87.50	36.37	17.00	13.50	22.08	24.46	—	2.19	—	7.06	13.38	—	7.58	3/4	3.05
1930SR	87.52	35.85	13.50	17.00	22.08	23.00	—	2.19	—	7.06	13.38	—	7.58	3/4	3.05
2380SR	88.04	36.37	17.00	17.00	22.08	23.00	—	2.19	—	7.06	13.38	—	7.58	3/4	3.05

## Series B and C Mounting Details

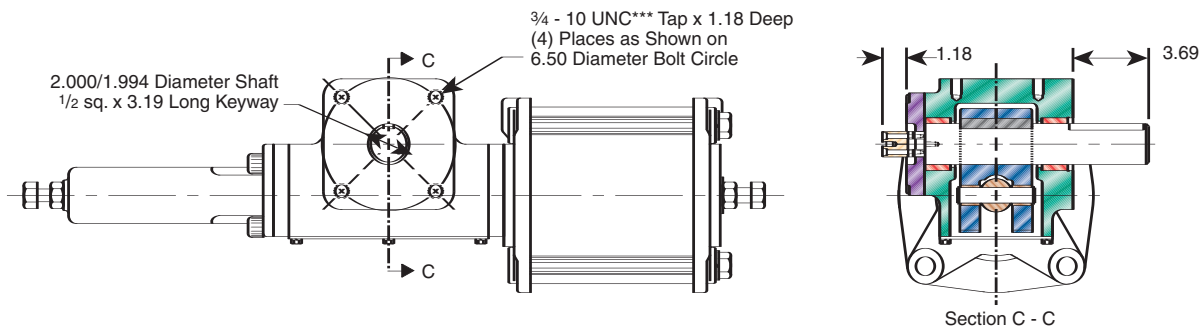
### Models 006 and 015 - Top and bottom of housing (symmetrical) ISO 5211-F07



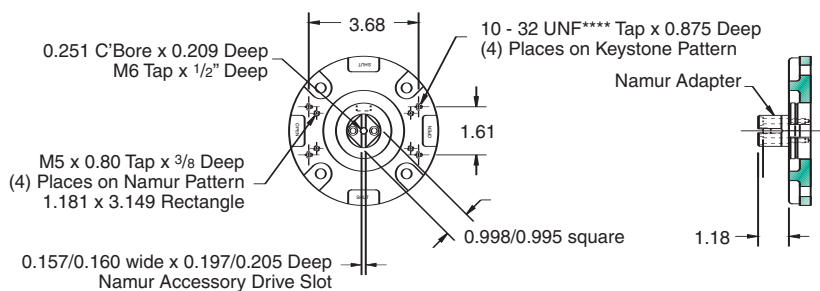
### Models 023 through 100 - Top and bottom of housing (symmetrical) ISO 5211-F12



### Models 135, 210, 270, 344, 345 and 420 - Bottom of housing ISO 5211-F16



### Models 135, 210, 270, 344, 345 and 420 - Top of housing - Mounting details



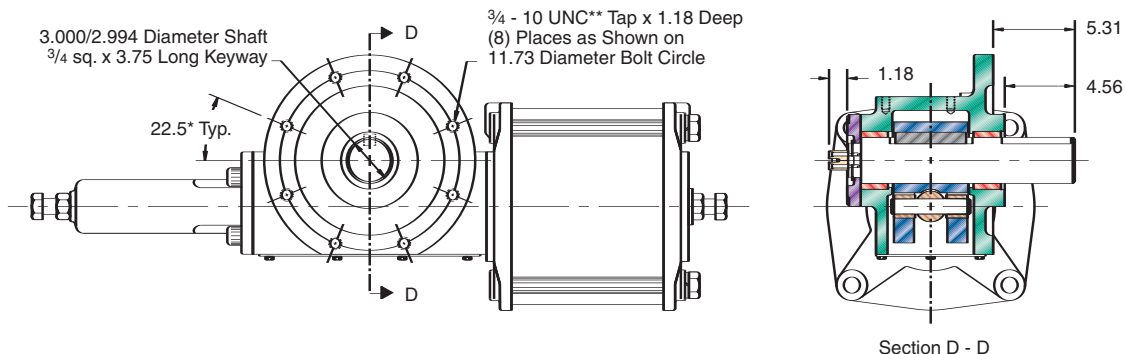
#### Metric thread option

Metric Tap	Model Number
*M8	006 and 015
**M12	023 thru 100
***M20	135 thru 1150
****M5	135 thru 1150

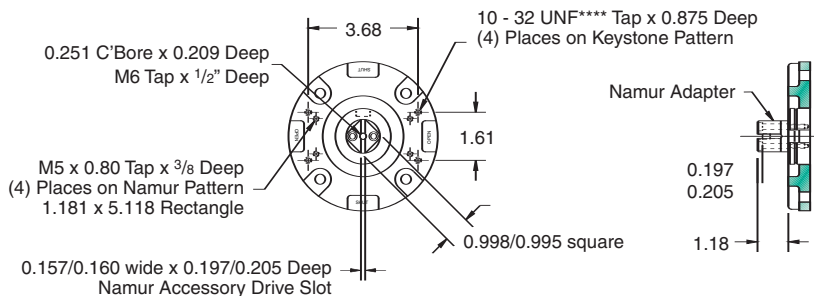
Replace 'U' with 'M' in order number designation (refer to page 6).

Series B and C Mounting Details

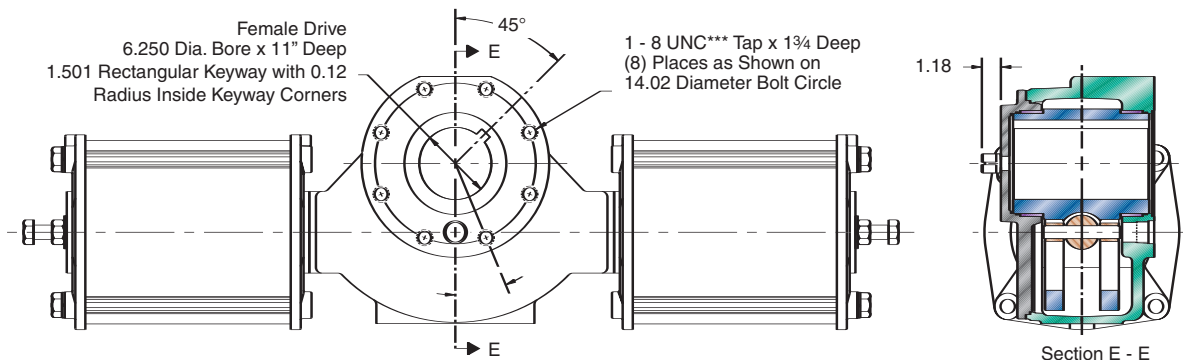
Models 370, 575, 740, 944, 945 and 1150 - Bottom of housing ISO 5211-F30



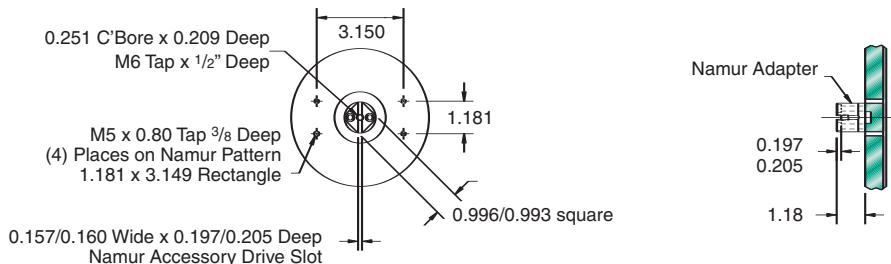
Models 370, 575, 740, 944, 945 and 1150 - Top of housing - Mounting details



Models 1480, 1929, 1930 and 2380 - Bottom of housing ISO 5211-F35



Models 1480, 1929, 1930 and 2380 - Top of housing - mounting details



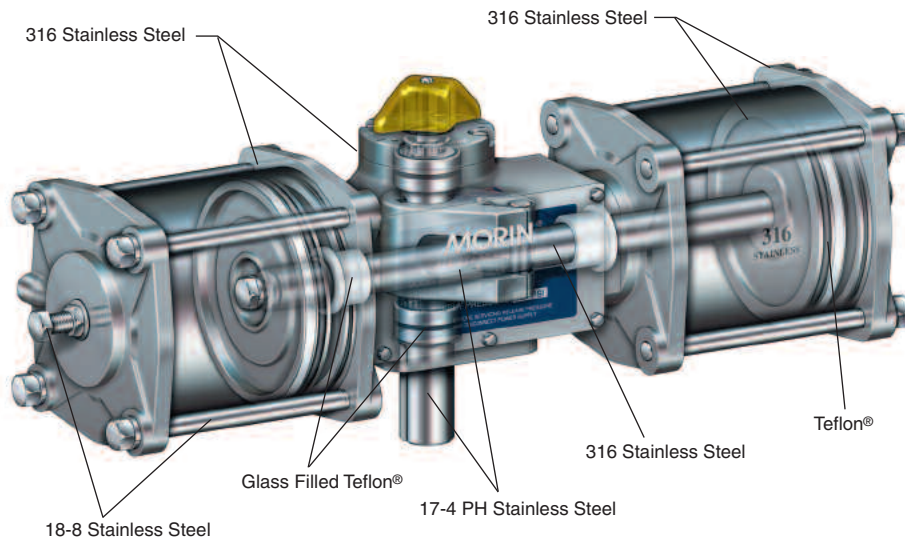
Metric thread option

Metric Tap	Model Number
**M20	370 and 575 thru 1150
***M24	1480 and 2380
****M5	370 and 575 thru 1150

Replace 'U' with 'M' in order number designation (refer to page 6).

## Also Available

### The Series S Actuator (All Stainless)



Setting an unrivaled standard in actuation at a price unexpectedly low for stainless steel.

- To 160 psig pressure rating
- Double acting break torques to 238,000 lb.in.
- Spring end torques to 104,125 lb.in.

For additional information, refer to **Publication MORMC-0024.**

### The Series B-HP Actuator



High pressure actuation with stainless steel cylinders for superior corrosion resistance.

- 1500 psig pressure rating
- Double acting torques to 238,000 lb.in.
- Spring end torques to 104,125 lb.in.

For additional information, refer to **Publication MORMC-0072.**

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