

B AND C SERIES ACTUATORS

B Series - Ductile iron with stainless steel cylinders

C Series - Ductile iron with carbon steel cylinders

Spring-return and double-acting actuators

Quarter-turn output torques to 1400000 lb·in



B SERIES



C SERIES

GENERAL APPLICATIONS

For remote control of any quarter-turn application: ball, butterfly, rotary plug or damper style valves, etc. for use in chemical process, food and beverage, iron and steel, pharmaceutical, power, oil and gas, pulp and paper and textile industries.

TECHNICAL DATA

Supply pressure:	40 to 160 psig (see torque chart on page 4)
Supply medium:	Air or any gas compatible with materials of construction
Temperature rating	
Standard range:	-20 to 210 °F
Optional range:	-65 to 300 °F
Angular rotation:	90° (adjustable between 82° and 98°)
Mounting pattern:	ISO 5211
Protection:	IP66
Certification:	SIL3 capable



FEATURES AND BENEFITS

- Ductile iron housing, piston and end caps provide long life and durable, cost-effective operation.
- High strength alloy steel or 17-4PH stainless output shaft transmits torque without fatigue.
- Sintered bronze or PTFE (Polytetrafluoroethylene) composite output shaft bushings eliminate side loading of valve stem to maximize stem packing performance.
- Strong, corrosion-resistant chrome-plated steel piston rod for enduring high cycle applications.
- Sintered bronze piston rod bushings provide low-friction support and precise alignment to increase efficiency, reduce maintenance and extend actuator life.
- Heat-treated stainless steel thrust pin and rollers transfer piston force to yoke to reduce friction for longer life and more efficient torque transmission.
- PTFE guide bands ensure low-friction piston guidance, protecting cylinder walls from scoring and extending seal performance with a continuous cylinder wiping action.
- Bi-directional travel stops provide accurate valve rotation adjustment.
- NAMUR drive slot maintains a compact assembly for accessory-driven components with no couplings necessary.
- Tectyl-coated springs need no special tools to be disarmed safely and easily, reducing down time.
- Easily removable housing cover provides easy access for yoke mechanism inspection.

ALGA/ALGAS models available over the 1150 size.

B AND C SERIES ACTUATORS

DESIGNED WITH A RUGGED HEART

Scotch yoke design

The heart of any scotch yoke actuator is the yoke. B and C Series actuators use either 17-4PH or ductile iron for this critical area as standard.

The yoke is the mechanism used to convert linear force to torque. The yoke is critical to actuator performance, it must be rugged yet precisely machined to last long at high efficiency - all our yoke designs meet this test.

Principles of construction

Using high-quality materials of construction and modern rugged design concepts, provides the standard for high-quality, low-cost valve actuation.

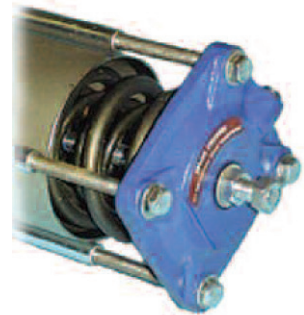
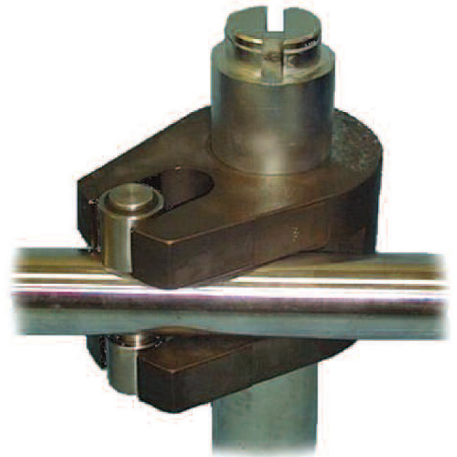
The actuator housings are all machined from ductile iron castings. This produces a rugged, low cost product through reduced machining time and by eliminating wasteful excess material. Any components that rotate or slide during operation, such as the high strength output shaft, chrome-plated piston rod, 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°.

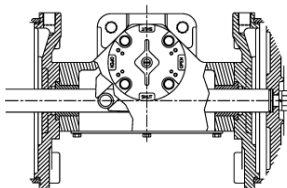
Spring designed for safety

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.

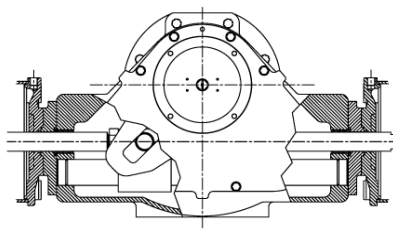


Experts in actuator design

We understand that the most efficient design for one torque range is not the most efficient for another. Our actuators use the standard scotch yoke design for lower torque ranges and a guide bar design for the higher torque ranges. This gives a rugged design at an economic cost.



STANDARD DESIGN, SCOTCH YOKE

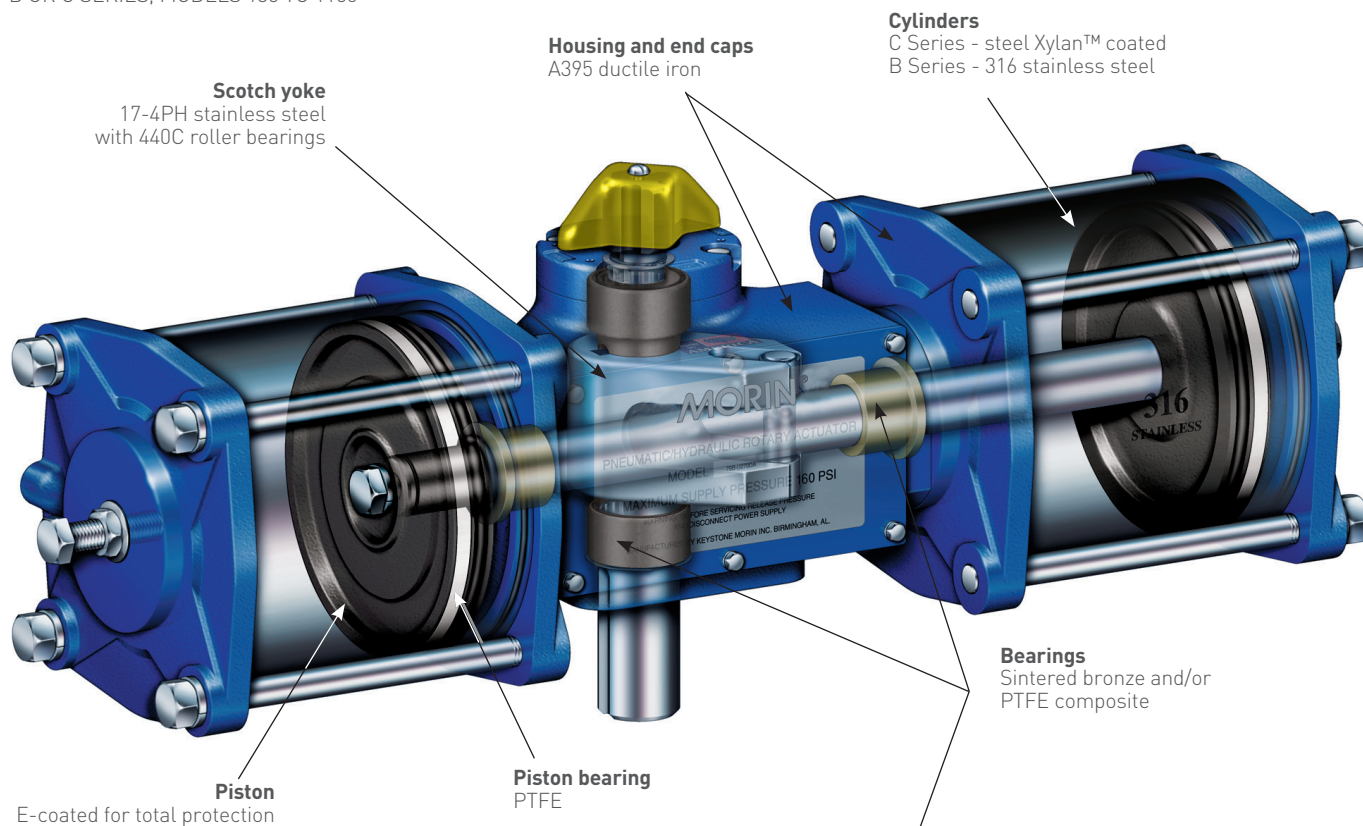


GUIDE BAR DESIGN, SCOTCH YOKE

B AND C SERIES ACTUATORS

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

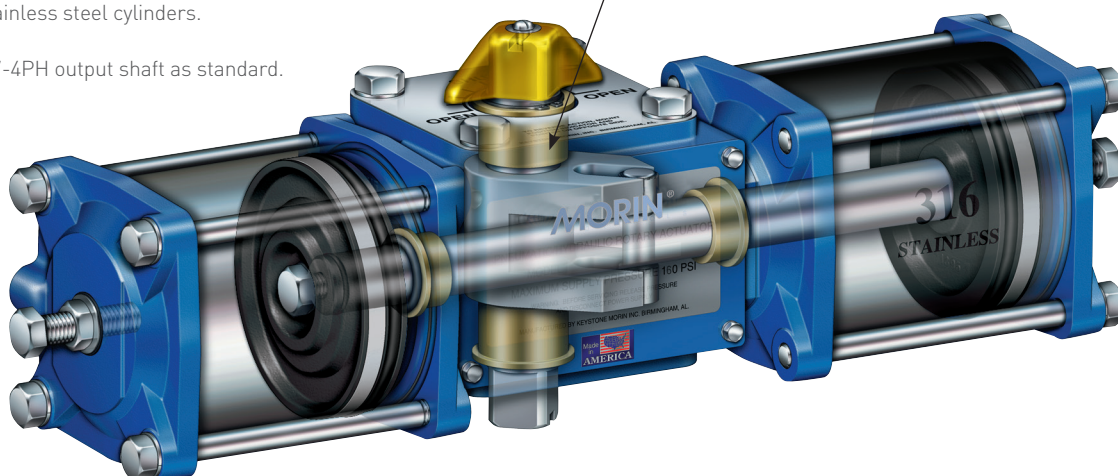
B OR C SERIES, MODELS 135 TO 1150



B SERIES MODELS 006 TO 100

B Series actuators use construction identical to the C Series, but with 316 stainless steel cylinders.

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



NOTE

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

B AND C SERIES ACTUATORS

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 . . .

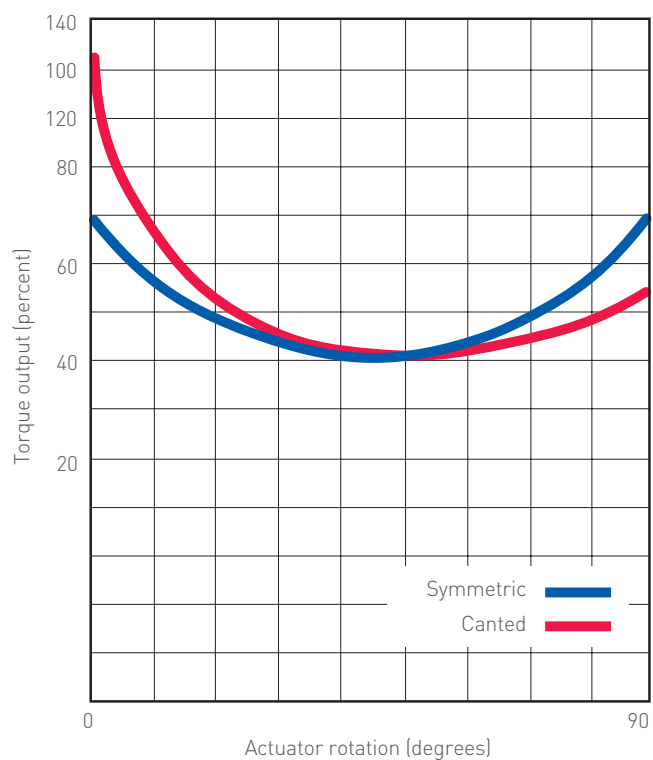
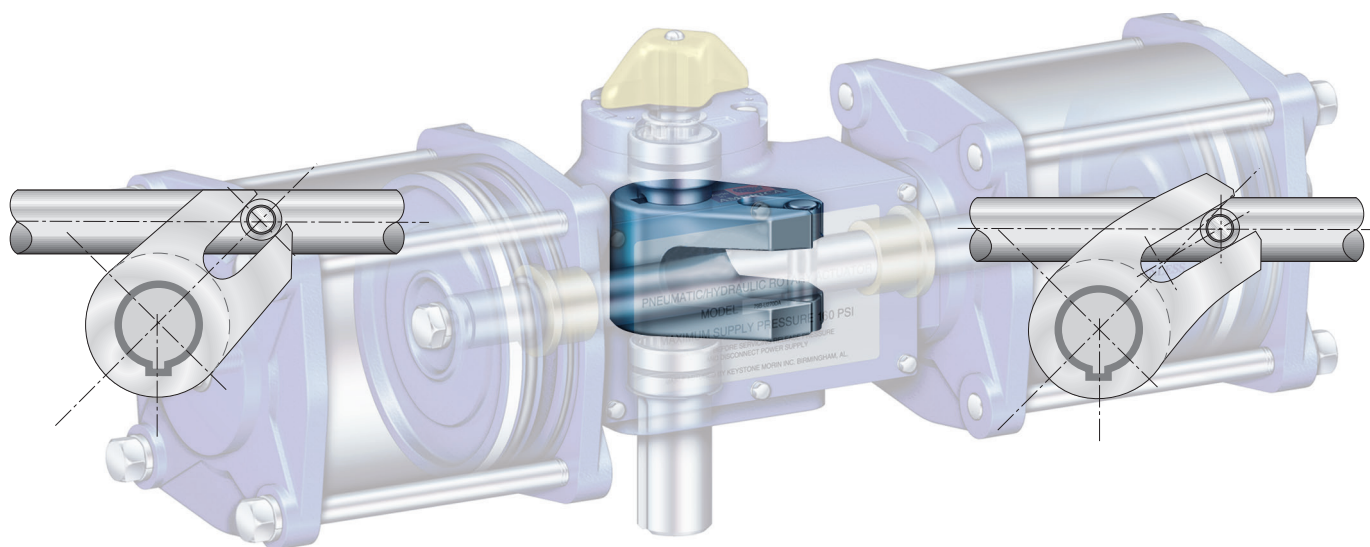
It's about CHOICE . . .

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

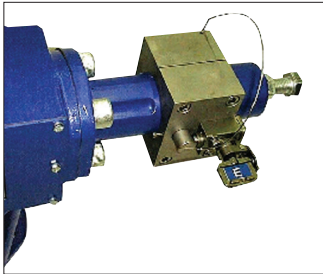
Canted yoke design moves the torque curve to where it's the needed most, gaining as much as 35% more break and reseal torque for the same size actuator. The canted yoke curve is shown in red below. Canted yoke actuators allow selection of smaller, lighter and less expensive actuator packages.



B AND C SERIES ACTUATORS

OPTIONS

To provide the actuation package best suited for your application, we offer 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.



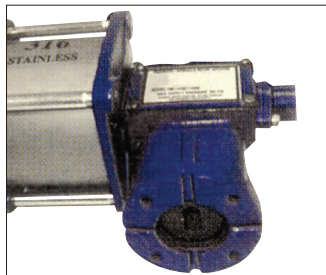
Jackscrew override (JSO)
Manual operation when power is lost. Simple and effective.



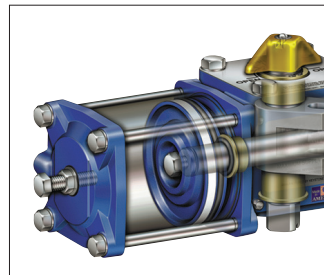
Hydraulic override (MHP)
Manual operation when power is lost. Includes speed controls.



AWWA (American Waterworks Association)
Tested per American Waterworks Association C541. Available for pneumatic or water service operation.



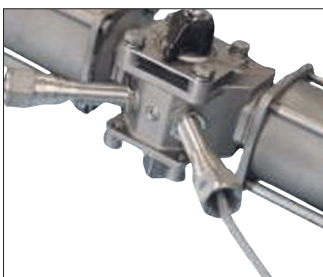
Direct mounting cast adapters
Many valve top works covered, including some ISO mounting. Assures economic but correct mounting alignment.



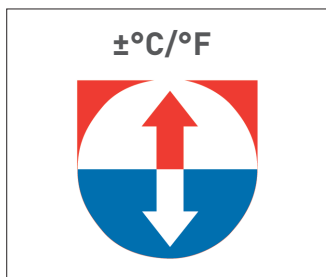
Full stroke adjuster
Provides mechanical control of maximum and/or minimum valve stroke.



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 to 210 °F / -29 to 99 °C covers most applications. Optional ratings down from -65 to 300 °F / -54 to 149 °C.



Optional certification for CE
Manufactured in accordance with the Pressure Equipment Directive 2014/68/EU and ATEX 2014/34/EU.

B AND C SERIES ACTUATORS

MECHANICAL DATA

Actuator model	Closing torque at 80 psig		Number of pistons	Cylinder bore (in.)	Stroke (in.)	Volume ^[1] (cu. in.) 90° stroke	Cycle time ^[2] (seconds)	Weight (lb)
	Symmetrical	Canted					90° stroke	
Double-acting								
006	600	-	1	2.750	2	12	0.5	11
015	1500	-	1	4.375	2	30	1	14
023	2300	2990	1	4.375	3	45	1	30
036	3960	5148	1	5.438	3	70	1.5	33
050	5000	6500	1	6.250	3	92	2.2	39
059	5900	7670	2	4.375/5.438	3	112	2.4	36
072	7920	*9009	2	5.438	3	137	2.5	41
100	10000	**9750	2	6.250	3	182	3	49
135	14175	18428	1	8.250	5	267	4.5	165
210	23100	30030	1	10.250	5	413	5	185
270	28350	36855	2	8.250	5	526	6	210
345	36225	*41206	2	8.250/10.250	5	671	7	234
370	37000	51469	1	12.250	6	707	8	390
420	42000	**40950	2	10.250	5	816	8.5	257
575	63825	82973	1	15.500	6	1132	9.5	519
740	77700	101010	2	12.250	6	1395	10	530
945	101115	**98587	2	12.250/15.500	6	1820	11	653
1150	120750	***98110	2	15.500	6	2245	12	775
1485	•	•	•	•	•	•	•	•
1935	•	•	•	•	•	•	•	•
2385	•	•	•	•	•	•	•	•
3071	•	•	•	•	•	•	•	•
3731	•	•	•	•	•	•	•	•
4534	•	•	•	•	•	•	•	•
5336	•	•	•	•	•	•	•	•
7114	•	•	•	•	•	•	•	•

NOTES:

- Use ALGA model

1. 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:

$$\left(\frac{\text{Vol. in}^3}{1728} \right) \left(\frac{\text{Supply air barg} + 14.7}{14.7} \right) \left(\text{Strokes/min} \right)$$

Example: calculate SCFM for model 023 double-acting using 80 psig air supply and 5 strokes/minute.

SCFM =

$$\left(\frac{45}{1728} \right) \left(\frac{80 + 14.7}{14.7} \right) \left(5 \right) = 0.97$$

2. Cycle times shown represent average time to stroke 90° 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.

* at 70 psig *** at 50 psig

** at 60 psig **** at 90 psig

B AND C SERIES ACTUATORS

MECHANICAL DATA

Actuator model	Closing torque at 80 psig		Number of pistons	Cylinder bore (in.)	Stroke (in.)	Volume ^[1] (cu. in.) 90° stroke	Cycle time ^[2]	Weight (lb)
	Symmetrical	Canted					(seconds) 90° stroke	
Spring-return								
006	221	-	1	2.750	2	12	0.5	13
015	525	-	1	4.375	2	30	1	20
023	800	1120	1	4.375	3	45	1	38
036	1260	1764	1	5.438	3	70	1.5	46
046	1600	2083	2	4.375	3	88	2	47
058	*1600	*2240	2	5.438/4.375	3	112	2.3	54
059	1890	2646	2	4.375/5.438	3	112	2.4	54
072	2500	3500	2	5.438	3	137	2.5	60
100	3500	4900	2	6.250	3	182	3	86
135	5670	7938	1	8.250	5	267	4.5	210
210	8085	11319	1	10.250	5	413	5	235
270	10395	14553	2	8.250	5	526	6	250
344	12637	17692	2	10.250/8.250	5	671	7	315
345	****13760	****19264	2	8.250/10.250	5	671	7	315
370	14893	20850	1	12.250	6	707	8	540
420	15435	21609	2	10.250	5	816	8.5	379
575	21131	27512	1	15.500	6	1132	9.5	779
740	29785	41699	2	12.250	6	1395	10	660
944	*27713	*38798	2	15.500/12.250	6	1820	11	871
945	32303	45224	2	12.250/15.500	6	1820	11	871
1150	42263	59168	2	15.500	6	2245	12	1082
1485	✧	✧	✧	✧	✧	✧	✧	✧
1934	✧	✧	✧	✧	✧	✧	✧	✧
1935	✧	✧	✧	✧	✧	✧	✧	✧
2385	✧	✧	✧	✧	✧	✧	✧	✧
3071	✧	✧	✧	✧	✧	✧	✧	✧
3072	✧	✧	✧	✧	✧	✧	✧	✧
3731	✧	✧	✧	✧	✧	✧	✧	✧
4534	✧	✧	✧	✧	✧	✧	✧	✧
5336	✧	✧	✧	✧	✧	✧	✧	✧
6044	✧	✧	✧	✧	✧	✧	✧	✧
7114	✧	✧	✧	✧	✧	✧	✧	✧

NOTES:

✧ Use ALGA model

1. 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:

$$\left(\frac{\text{Vol. in}^3}{1728} \right) \left(\frac{\text{Supply air barg} + 14.7}{14.7} \right) \left(\text{Strokes/min} \right)$$

Example: calculate SCFM for model 023 double-acting using 80 psig air supply and 5 strokes/minute.

SCFM =

$$\left(\frac{45}{1728} \right) \left(\frac{80 + 14.7}{14.7} \right) \left(5 \right) = 0.97$$

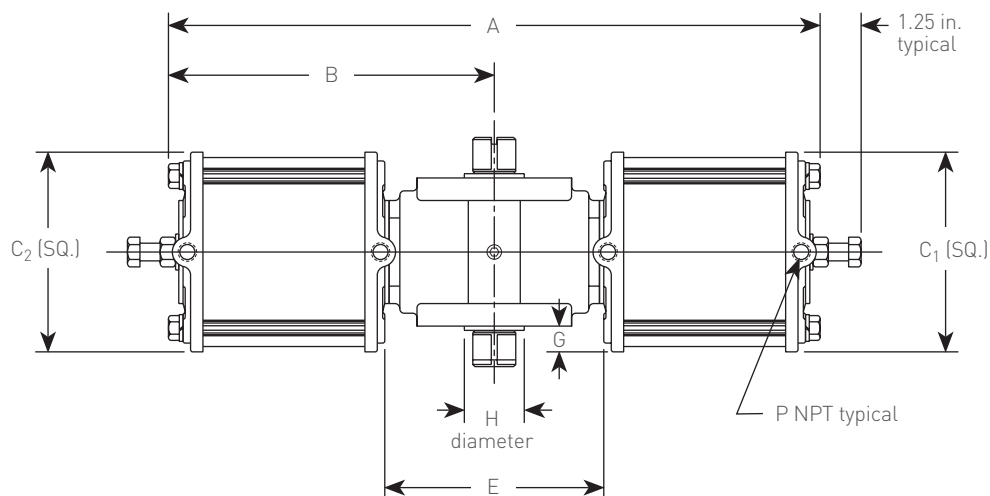
2. Cycle times shown represent average time to stroke 90° using standard pilot valves and should be used as a guide only. Cycle times can be increased or decreased dramatically by using speed controls, oversized pilot valves or quick exhaust valves.

* at 70 psig *** at 50 psig
 ** at 60 psig **** at 90 psig

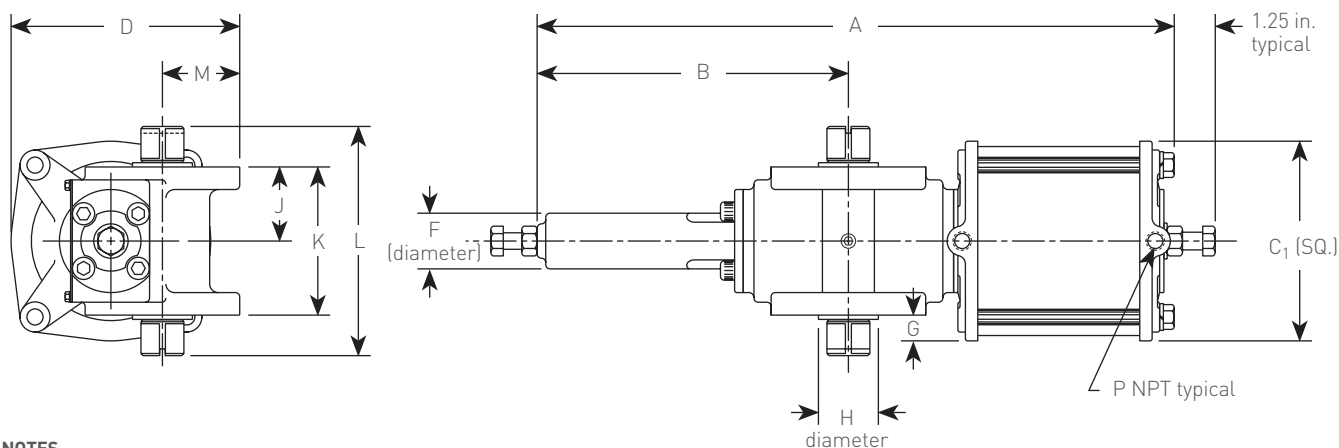
B AND C SERIES ACTUATORS

DIMENSIONS

MODELS 046, 058, 059, 072 AND 100



MODELS 006, 015, 023, 036 AND 050



NOTES

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

DIMENSIONS (in.) DOUBLE-ACTING

Model	A	B	C ₁	C ₂	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

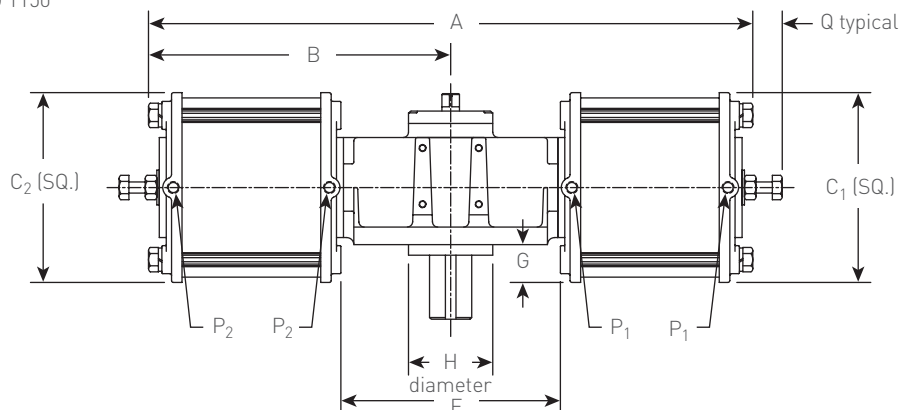
DIMENSIONS (in.) SPRING-RETURN

Model	A	B	C ₁	C ₂	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

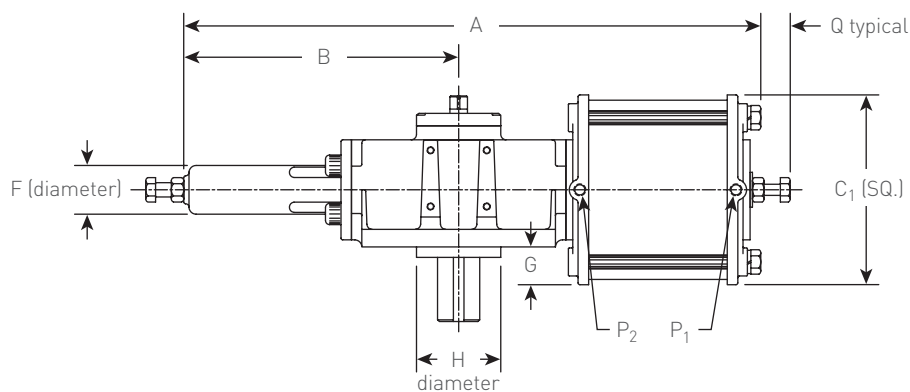
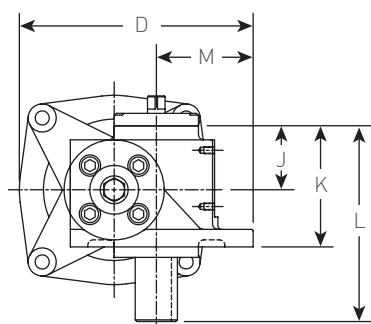
B AND C SERIES ACTUATORS

DIMENSIONS

MODELS 270, 344, 345, 420, 740, 944, 945 AND 1150



MODELS 135, 210, 370 AND 575



NOTES

1. Shown without pointer for clarity.
2. For mounting dimensions, refer to pages 10-12.

DIMENSIONS (in.) DOUBLE-ACTING

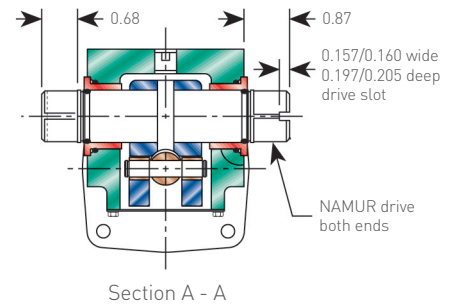
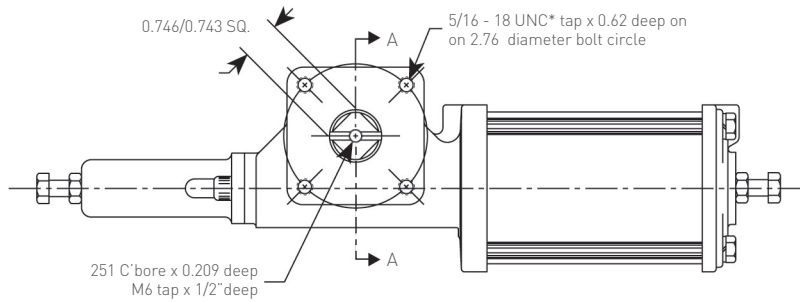
Model	A	B	C ₁	C ₂	D	E	F	G	H	J	K	L	M	P ₁	P ₂	Q
135DA	32.74	15.88	9.50	-	10.44	-	2.75	1.00	-	4.38	8.13	11.82	3.19	3/8	3/8	1.75
210DA	33.26	15.88	11.50	-	11.44	-	2.75	2.00	-	4.38	8.13	11.82	3.19	1/2	1/2	2.12
270DA	33.77	16.89	9.50	9.50	10.44	11.72	-	1.00	-	4.38	8.13	11.82	3.19	3/8	3/8	1.75
345DA	34.26	16.89	9.50	11.50	11.44	11.47	-	2.00	-	4.38	8.13	11.82	3.19	3/8	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	1/2	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	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	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	1/2	1.75
945DA	44.77	22.07	13.50	17.00	18.50	15.25	-	4.44	5.90	5.44	9.50	14.81	6.88	1/2	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	3/4	2.50

DIMENSIONS (in.) SPRING-RETURN

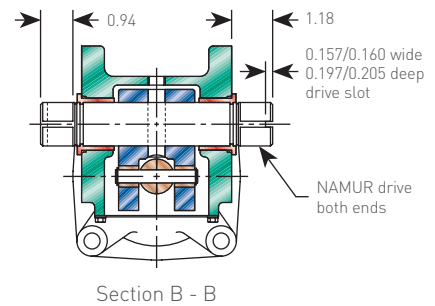
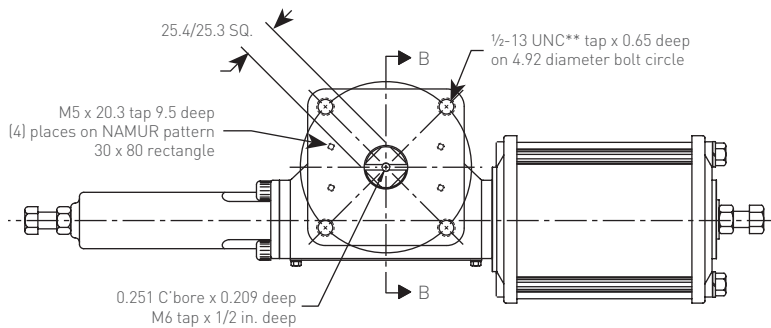
Model	A	B	C ₁	C ₂	D	E	F	G	H	J	K	L	M	P ₁	P ₂	Q
135SR	39.46	15.88	9.50	-	10.44	-	2.75	1.00	-	4.38	8.13	11.82	3.19	3/8	3/8	1.75
210SR	42.67	15.88	11.50	-	11.44	-	2.75	2.00	-	4.38	8.13	11.82	3.19	1/2	1/2	2.12
270SR	40.57	16.99	9.50	9.50	10.44	10.95	-	1.00	-	4.38	8.13	11.82	3.19	3/8	3/8	1.75
344SR	40.95	17.38	11.50	9.50	11.44	10.70	-	2.00	-	4.38	8.13	11.82	3.19	1/2	3/8	2.12
345SR	43.79	16.99	9.50	11.50	11.44	10.61	-	2.00	-	4.38	8.13	11.82	3.19	3/8	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	1/2	1.75
420SR	44.17	17.38	11.50	11.50	11.44	10.36	-	2.00	-	4.38	8.13	11.82	3.19	1/2	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	3/4	2.50
740SR	53.99	22.07	13.50	13.50	16.75	14.75	-	2.69	5.90	5.44	9.50	14.81	6.88	1/2	1/2	1.75
944SR	54.59	22.67	17.00	13.50	18.50	14.37	-	4.44	5.90	5.44	9.50	14.81	6.88	3/4	1/2	2.50
945SR	56.63	22.07	13.50	17.00	18.50	14.16	-	4.44	5.90	5.44	9.50	14.81	6.88	1/2	3/4	2.50
1150SR	57.22	22.69	17.00	17.00	18.50	13.79	-	4.44	5.90	5.44	9.50	14.81	6.88	3/4	3/4	2.50

B AND C SERIES ACTUATORS MOUNTING DETAILS

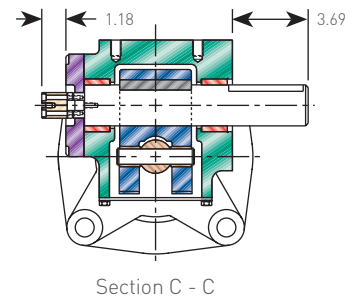
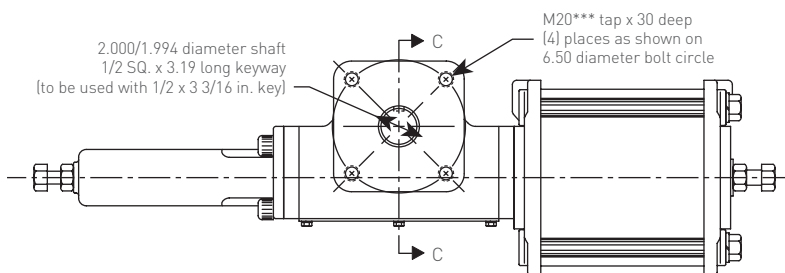
MODELS 006 AND 015 - TOP AND BOTTOM OF HOUSING (SYMMETRICAL) ISO 5211-F07



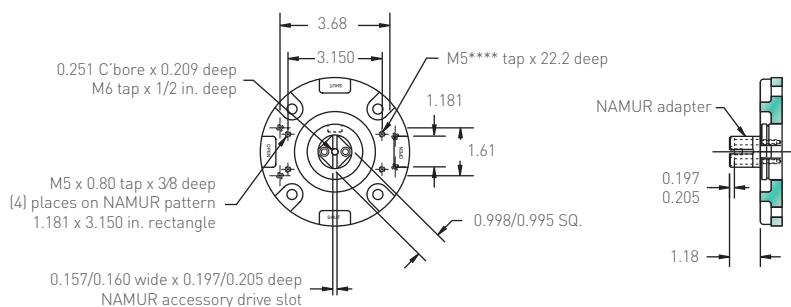
MODELS 023 THROUGH 100 - TOP AND BOTTOM OF HOUSING (SYMMETRICAL) ISO 5211-F12



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



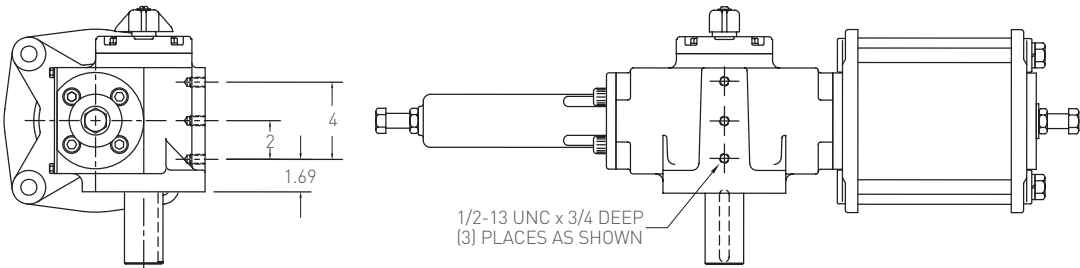
METRIC THREAD OPTION

Metric tap	Model number
* M8	006 and 015
** M12	023 to 100
*** M20	135 to 1150
**** M5	135 to 1150

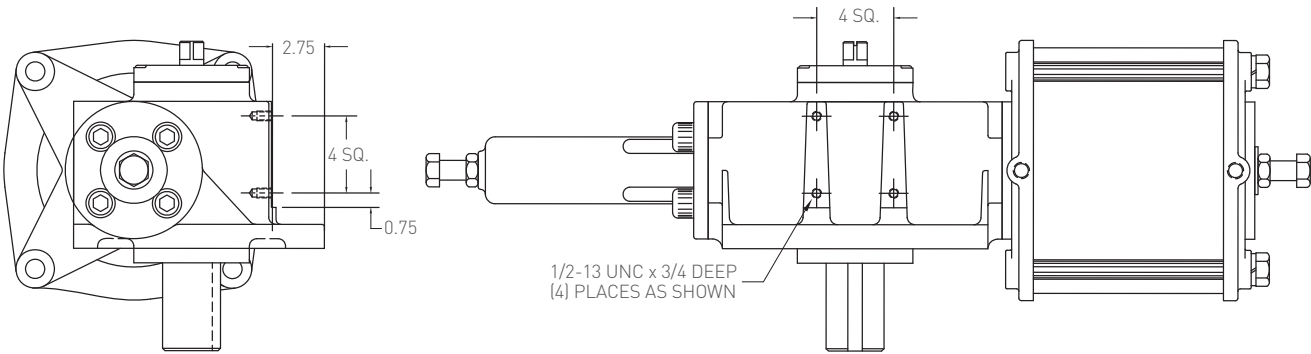
Replace 'U' with 'M' in order number designation (refer to page 13).

B AND C SERIES ACTUATORS MOUNTING
DETAILS

MODELS 135, 210, 270, 344, 345, 420



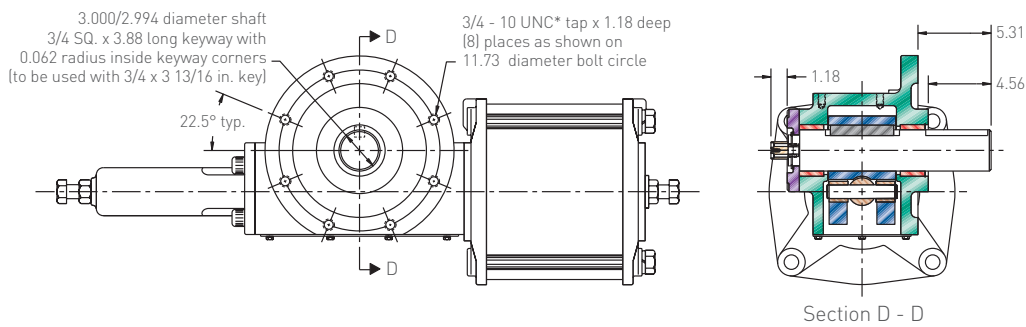
MODELS 370, 575, 740, 944, 945, 1150



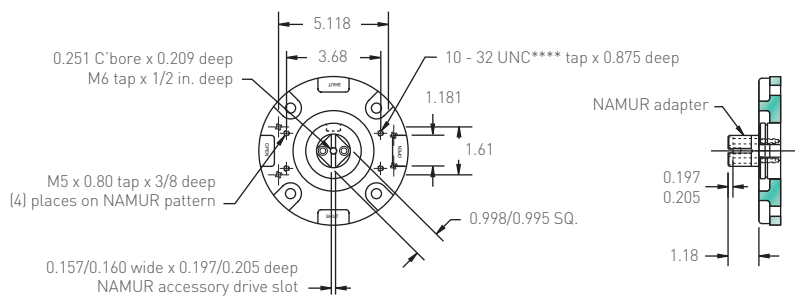
NOTE:
All dimensions except threads are in inches.

B AND C SERIES ACTUATORS 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



IMPERIAL THREAD OPTION

Standard tap	Model number
* M20	370 and 575 to 1150
*** M30	1485 to 5336
**** M5	135 to 1150

Replace 'U' with 'M' in order number designation
(refer to page 13).

B AND C SERIES ACTUATORS ORDERING INFORMATION

SELECTION GUIDE

Actuator model									
B- C-	Actuator size Model code based on approximate torque of symmetrical double-acting at 80 psig								
	270	006	059	370					
		012	072	420					
		015	100	575					
		023	135	740					
		036	210	944					
		046	270	945					
		050	344	1150					
		058	345						
	Interface bolting								
	U – UNC mounting threads								
	M – Metric mounting threads								
Yoke design									
	(blank) – Symmetrical yoke								
	C – Canted yoke								
Function									
	D – Double-acting								
	S – Spring-return								
Spring code									
	00	00 – No spring - Double-acting							
		04 – 40 pound spring							
		05 – 50 pound spring							
		06 – 60 pound spring							
	Etc. see Morin Torque Book for available springs								
Spring-return failure rotation									
	0 –	No spring (double-acting OR actuator rotates clockwise on loss of air)							
	1 –	Actuator rotates counterclockwise on loss of air							
Option									
	(blank) – No options (standard configuration)								
	See complete modules code listing								
	Note: Some codes can be used in combination. Indicate by “stacking” separated by “-”.								
	Consult factory for possible combinations combinations.								
B-	270	U	C	-	D	00	0	-	JSO = Model number S-270UC-D000-JSO

HOW TO ORDER

1. Double-acting (symmetrical yoke) example	2. Spring-return (symmetrical yoke) example	3. Double-acting (canted yoke) example
Air supply: 80 psig Break/end torque: 23100 lb-in.	Air supply: 80 psig End torque: 8085 lb-in.	Air supply: 80 psig Break (CCW) torque: 31185 lb-in. End (CW) torque: 30030 lb-in.
B-210U-D000	B-210U-S080	B-210UC-D000
B Series	B Series	B Series
210 Model number	210 Model number	210 Model number
U UNC mounting threads	U UNC mounting threads	U UNC mounting threads
D Double-acting	S Spring-return	C Canted yoke
000 No spring	080 Spring set	D Double-acting
		000 No spring

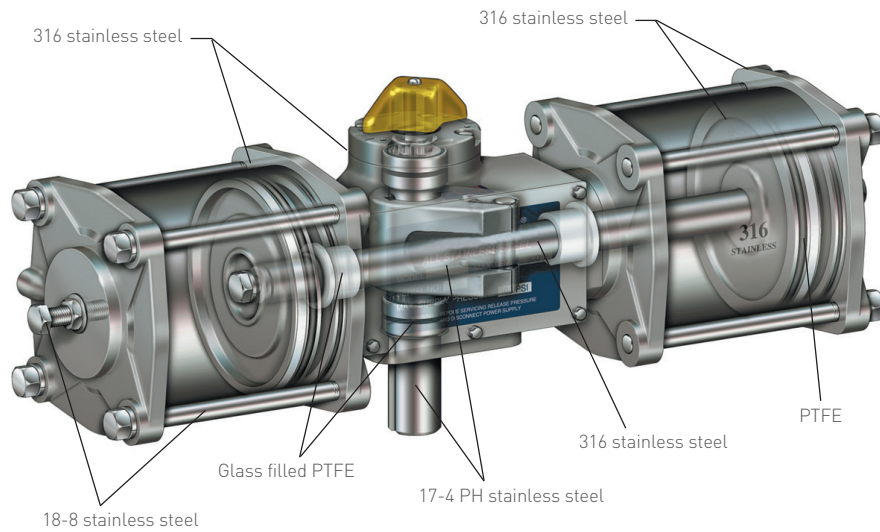
4. For all spring-return models

Use required torque to determine spring set code (see torque chart)
 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

B AND C SERIES ACTUATORS

ALSO AVAILABLE

THE S SERIES ACTUATOR (ALL STAINLESS)



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

- Up to 160 psig max operating pressure (see torque chart on page 4).
- Double-acting break torques to 240000 lb-in.
- Spring end torques to 104125 lb-in.

For additional information, refer to S Series data sheet.

THE HP SERIES ACTUATOR



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

- Up to 2250 psig max operating pressure (see torque chart on page 4).
- Double-acting torques to 800000 lb-in.
- Spring end torques to 400000 lb-in.

For additional information, refer to HP Series data sheet.