BIFFI MORIN A SERIES ACTUATORS

A series - Carbon steel w/ stainless steel cylinders
Spring return and double acting actuators
Quarter-turn output torques to 42,000 lb.in.

FEATURES AND BENEFITS

- Carbon steel 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 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.

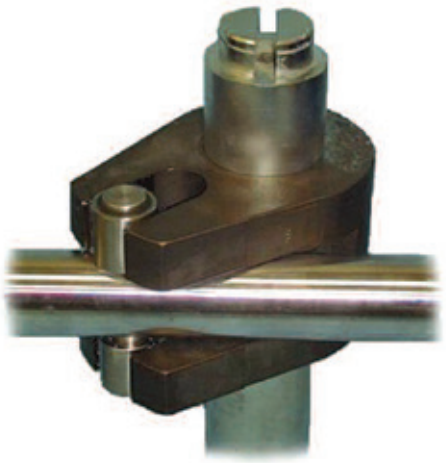
GENERAL APPLICATIONS

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 175 psig (see torque chart)
Supply medium:	Air or any gas compatible with materials of construction
Temperature rating	
Standard range:	-20°F to 210°F
Optional range:	-76°F to 300°F
Angular rotation:	90 degrees (adjustable between 82 and 98 degrees)
Mounting pattern:	ISO 5211
Protection:	IP66/67M
Certification:	SIL3 rated

DESIGNED WITH A RUGGED HEART



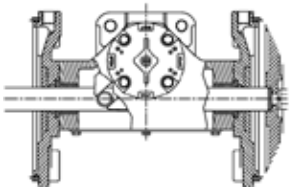
Scotch yoke design
The heart of any scotch yoke actuator is the yoke. A series actuators use 17-4PH for this critical area as standard.
The yoke is the mechanism used to convert linear force to torque. The yoke is critical to actuator performance, it must be rugged yet precisely machined to give long life 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 carbon steel 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 carbon steel piston, are all supported by replaceable friction reducing bearings.

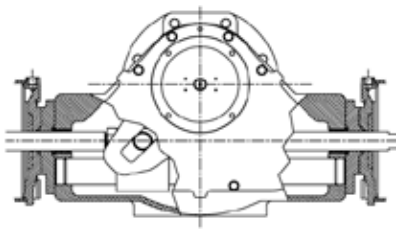
Bi-directional travel stops
Adjustable stops on each end cap provide the flexibility of accurate valve rotation positioning at the end of the 'open' and 'close' stroke. Both stops are located on the cylinder centerline, the optimal position to maximize travel adjustment and eliminate any detrimental 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 with economic cost.



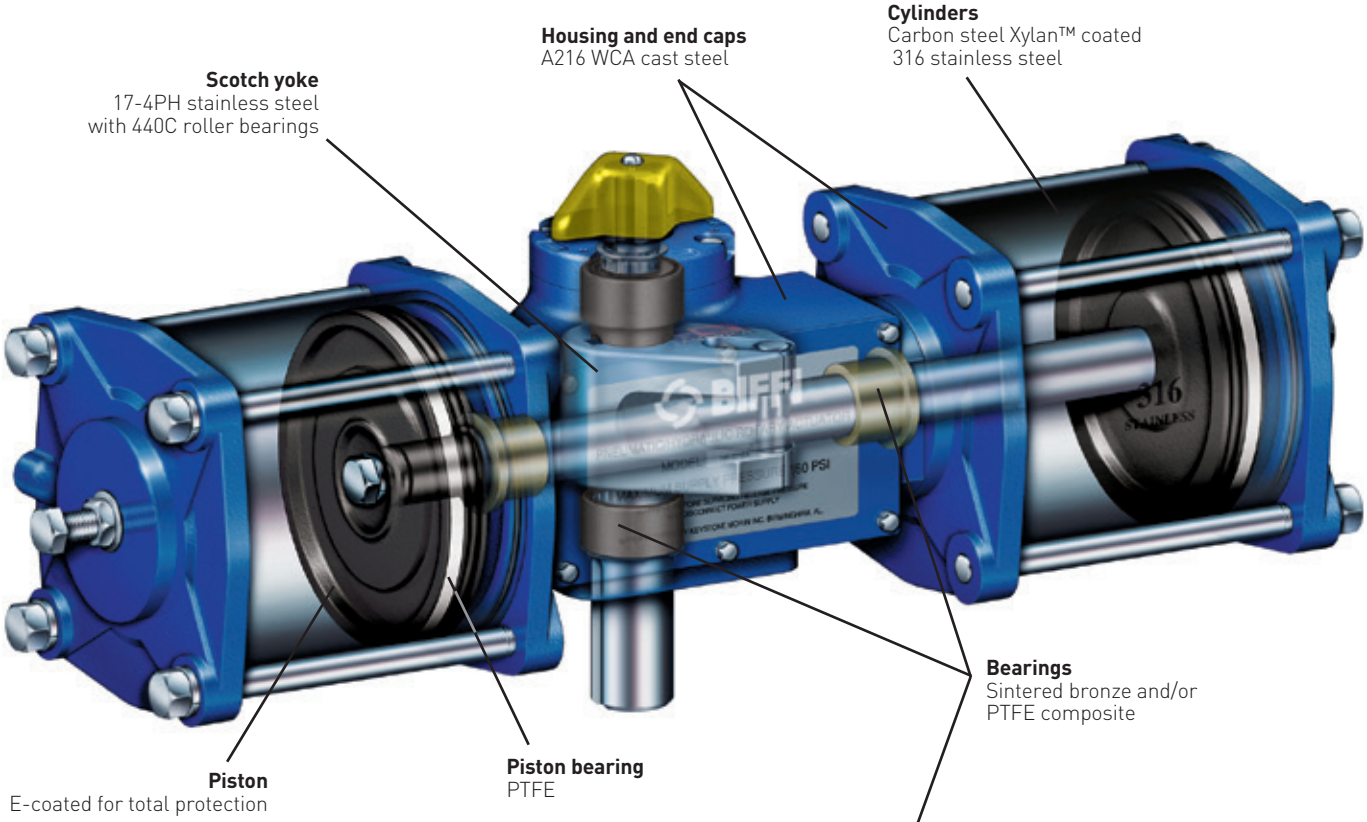
STANDARD DESIGN, SCOTCH YOKE



GUIDE BAR DESIGN, SCOTCH YOKE

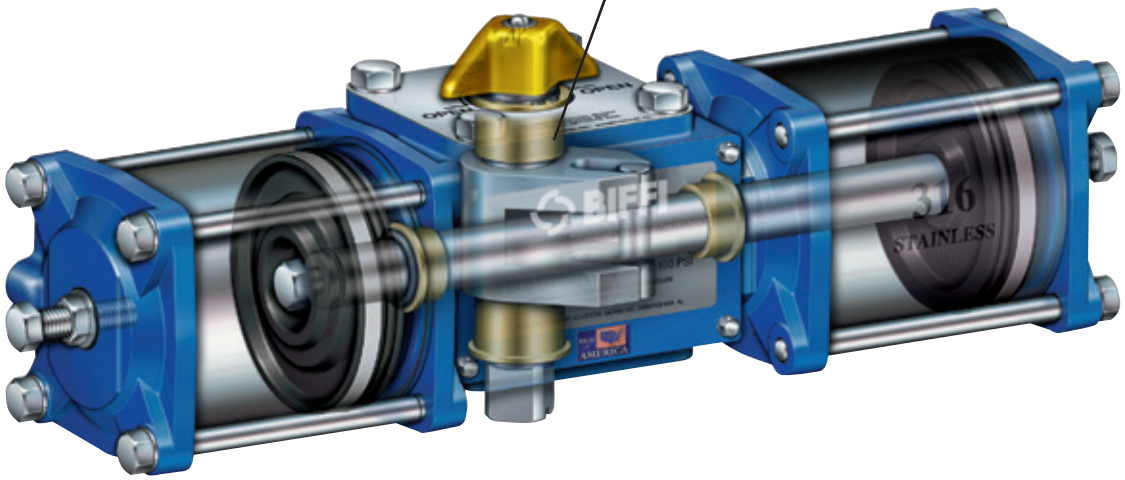
Superior materials of construction offer long life, and mean less downtime

A SERIES, MODELS 135 TO 420



A SERIES MODELS 006 TO 072

MODELS 006 TO 072 USE 36 stainless steel cylinders as standard.



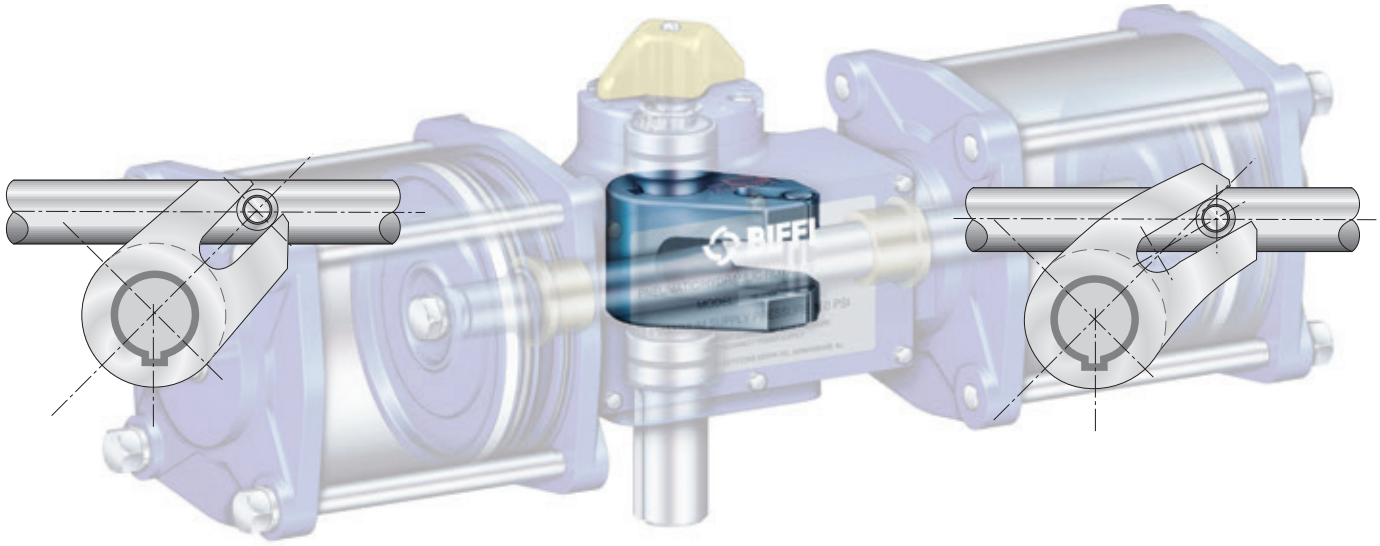
NOTE
See A/B/C/S series IOM for a complete bill of materials.

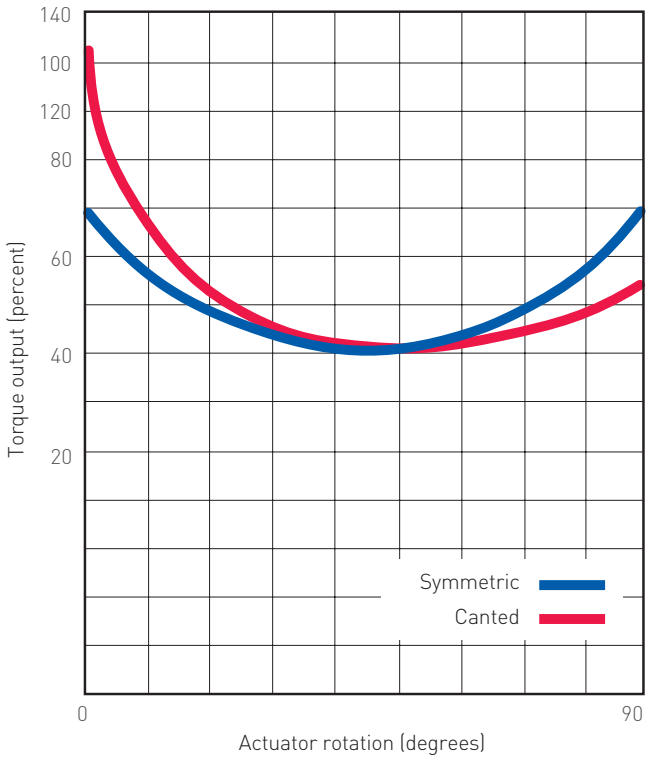
SYMMETRICAL AND CANTED YOKES

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.

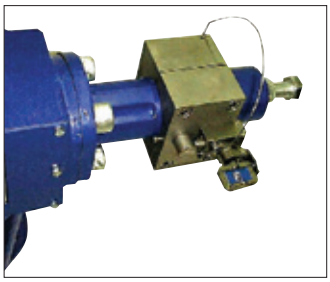
Canted
Canted yoke design moves the torque curve to where it's needed most, gaining as much as 35% more break and reseat torque for the same size actuator. The canted yoke curve is shown in red below. Canted yoke actuators allow selection of smaller, lighter, and less expensive actuator packages.





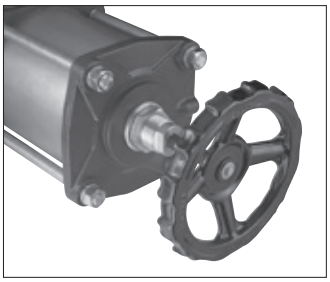
OPTIONS

To provide the actuation package best suited for your application, we offer a full range of manual accessories.

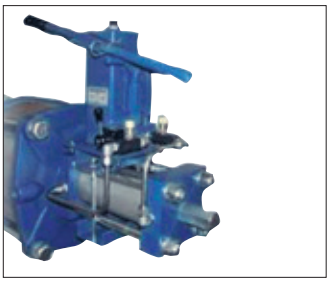


Partial stroke test device (PSTD)
Provides a method of testing ESD packages without shutdown.

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

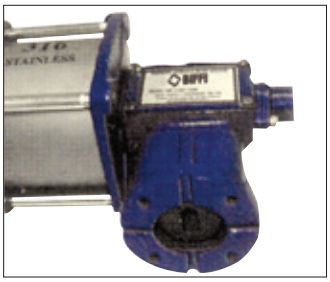


Jackscrew override (JSO)
Manual operation when power is lost. Simple and effective.

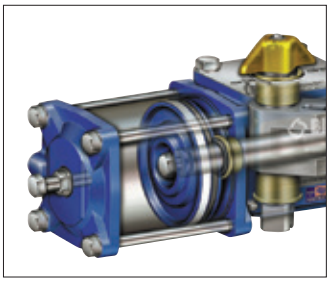


Hydraulic override (MHP)
Manual operation when power is lost. Includes speed controls.

AWWA
Tested per American Waterworks Association C540. Available for pneumatic or water service operation.

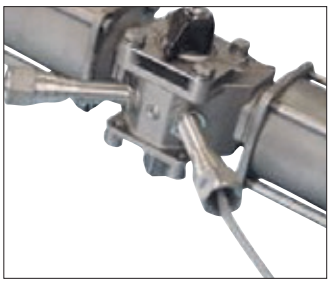


Direct mounting cast adapters
Many valve top works covered, including some ISO mounting. Assures economic but correct mounting alignment.

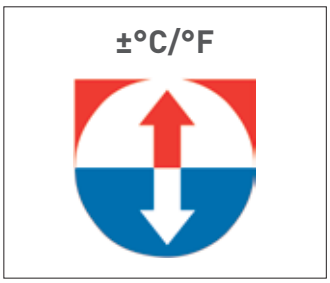


Full stroke adjuster
Provides mechanical control of maximum and/or minimum valve stroke.

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 -29°C to 99°C [-20°F to 210°F] covers most applications. Optional ratings down to -60°C [-76°F] and up to 149°C [300°F].

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

MECHANICAL DATA

Actuator model	Closing torque at 80 psig Symmetrical	Canted	Number of pistons	Cylinder bore (inch)	Stroke (inch)	Volume[1] (liters) 90° stroke	Cycle time[2] (seconds) 90° stroke	Weight (lbs)
Double acting								
006	600	-	1	2.750	2	12	0.5	11
012	1200	-	2	2.750	2	24	0.75	13
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
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
* at 70 psig; ** at 60 psig; *** at 50 psig; **** at 90 psig								
Spring return								
006	221	-	1	2.750	2	12	0.5	13
012	462	-	2	2.750	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	2240	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
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

NOTES

1. Air consumption:
   Cubic inches 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 second use the following formula:

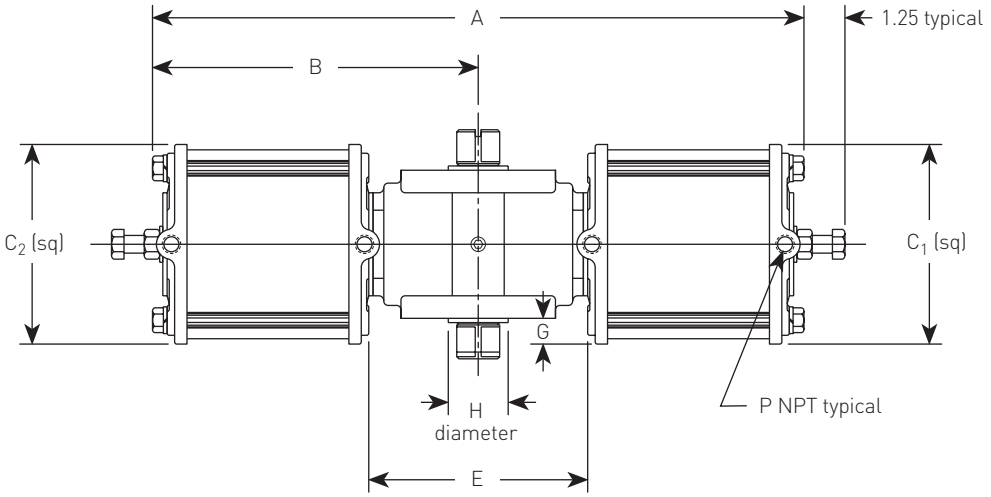
$$SCFM = \left(\frac{\text{Vol. in}^3}{1728}\right)\left(\frac{\text{Supply air barg} + 14.7}{14.7}\right)\left(\text{Strokes/min}\right)$$

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

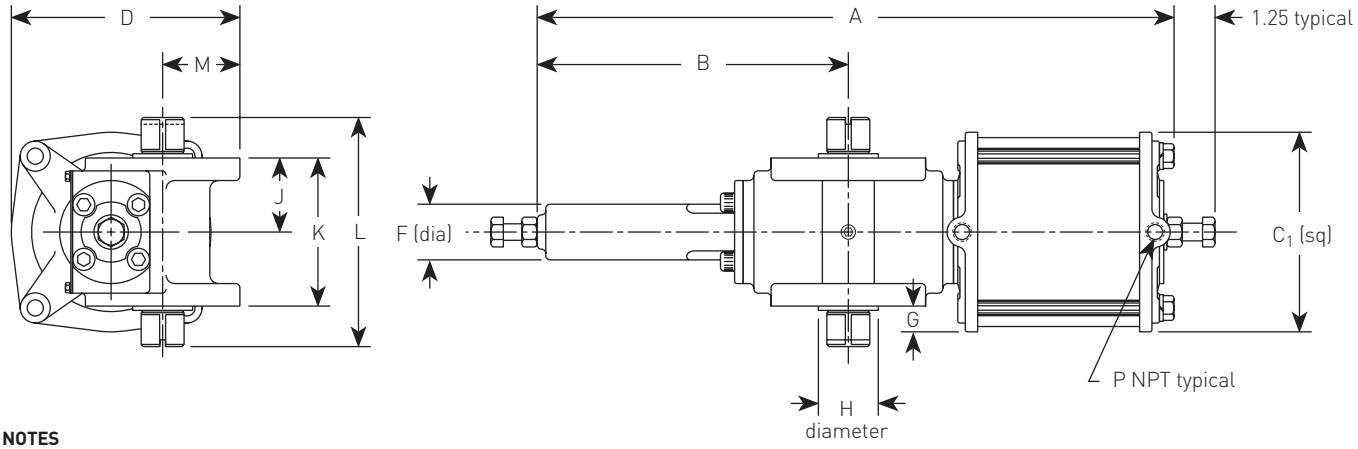
$$SCFM = \left(\frac{45}{1728}\right)\left(\frac{80 + 14.7}{14.7}\right)\left(5\right) = 0.84$$

2. 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.

MODELS 046, 058, 059 AND 072



MODELS 006, 012, 023, 036 AND 050



NOTES

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

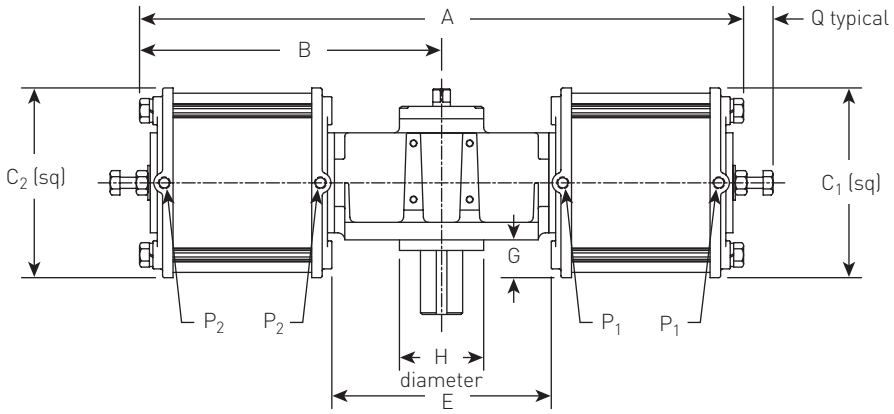
DIMENSIONS (inches) DOUBLE ACTING

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	⅛
012DA	12.31	5.28	4.81	-	4.81	-	1.09	1.00	1.50	1.50	3.00	4.75	1.31	¼
023DA	18.54	8.88	4.81	-	6.16	-	1.75	0.25	1.75	2.16	4.31	6.69	2.25	¼
036DA	18.60	8.88	5.81	-	6.66	-	1.75	0.75	1.75	2.16	4.31	6.69	2.25	¼
050DA	18.55	8.88	7.12	-	7.31	-	1.75	1.38	1.75	2.16	4.31	6.69	2.25	¼
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	¼
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	¼

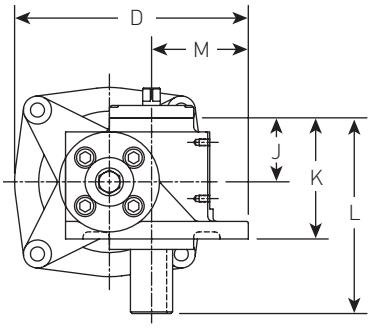
DIMENSIONS (inches) SPRING RETURN

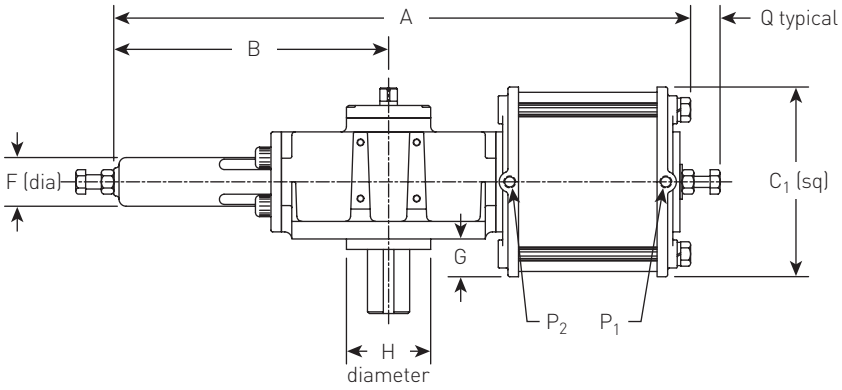
Model	A	B	C_1	C_2	D	E	F	G	H	J	K	L	M	P
006SR	12.87	5.28	3.18	-	3.87	-	1.09	0.18	1.50	1.50	3.00	4.75	1.31	⅛
012SR	14.50	5.28	4.81	-	4.81	-	1.09	1.00	1.50	1.50	3.00	4.75	1.31	¼
023SR	21.95	8.88	4.81	-	6.16	-	1.75	0.25	1.75	2.16	4.31	6.69	2.25	¼
036SR	23.65	8.88	5.81	-	6.66	-	1.75	0.75	1.75	2.16	4.31	6.69	2.25	¼
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	¼
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	¼
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	¼
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	¼

MODELS 270, 344, 345 AND 420



MODELS 135 AND 210





NOTES

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

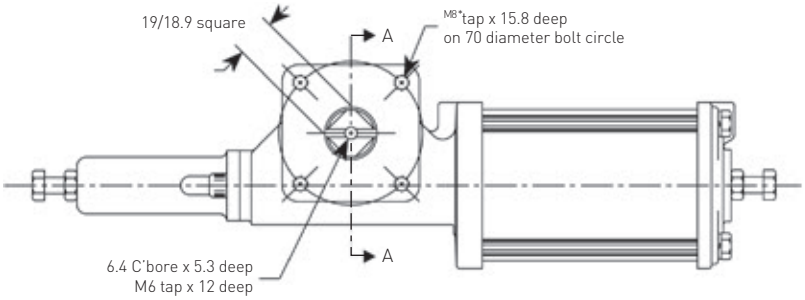
DIMENSION (inches) DOUBLE ACTING

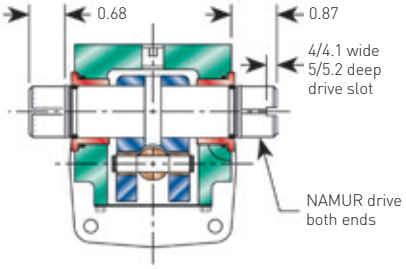
Model	A	B	C_1	C_2	D	E	F	G	H	J	K	L	M	P_1	P_2	Q
135DA	32.74	15.88	9.50	-	10.44	-	2.75	1.00	-	4.38	8.13	11.82	3.19	⅜	⅜	1.75
210DA	33.26	15.88	11.50	-	11.44	-	2.75	2.00	-	4.38	8.13	11.82	3.19	½	½	2.12
270DA	33.77	16.89	9.50	9.50	10.44	11.72	-	1.00	-	4.38	8.13	11.82	3.19	⅜	⅜	1.75
345DA	34.26	16.89	9.50	11.50	11.44	11.47	-	2.00	-	4.38	8.13	11.82	3.19	⅜	½	2.12
420DA	34.75	17.38	11.50	11.50	11.44	11.22	-	2.00	-	4.38	8.13	11.82	3.19	½	½	2.12

DIMENSIONS (inches) 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	⅜	⅜	1.75
210SR	42.67	15.88	11.50	-	11.44	-	2.75	2.00	-	4.38	8.13	11.82	3.19	½	½	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	⅜	⅜	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	½	⅜	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	⅜	½	2.12
420SR	44.17	17.38	11.50	11.50	11.44	10.36	-	2.00	-	4.38	8.13	11.82	3.19	½	½	2.12

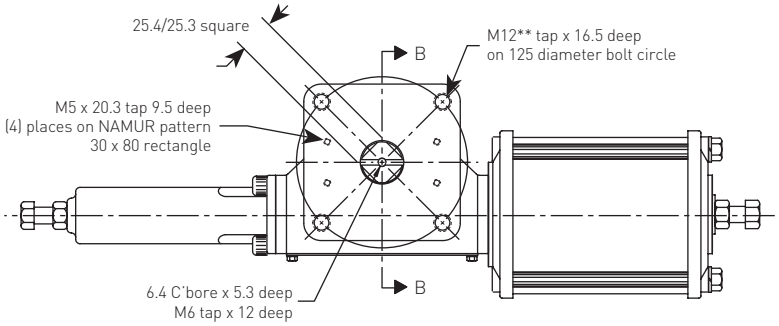
MODELS 006 AND 012 - TOP AND BOTTOM OF HOUSING (SYMMETRICAL) ISO 5211-F07

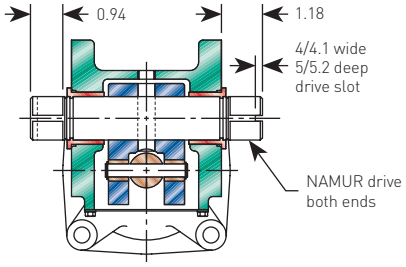




Section A - A

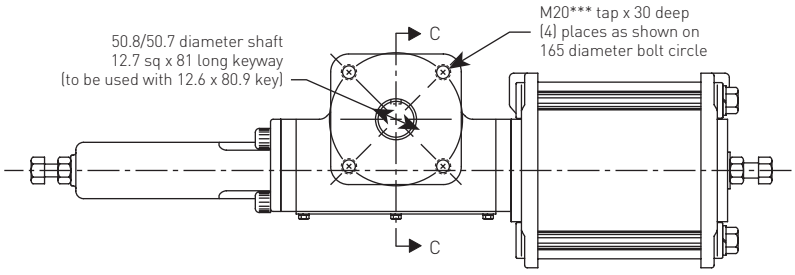
MODELS 023 THROUGH 100 - TOP AND BOTTOM OF HOUSING (SYMMETRICAL) ISO 5211-F12

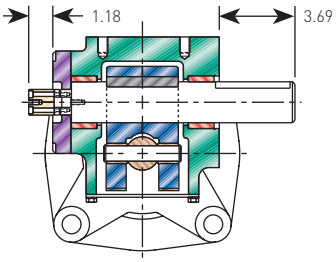




Section B - B

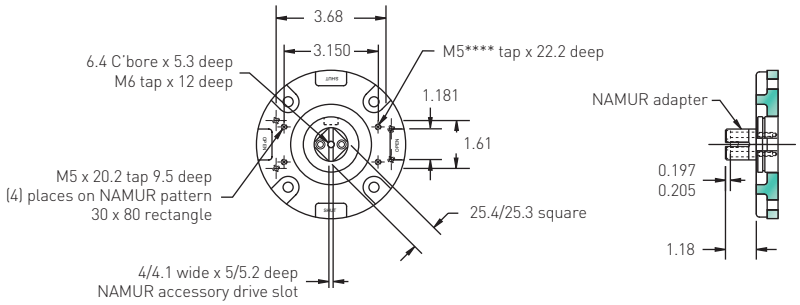
MODELS 135, 210, 270, 344, 345 AND 420 - BOTTOM OF HOUSING ISO 5211-F16





Section C - C

MODELS 135, 210, 270, 344, 345 AND 420 - TOP OF HOUSING - MOUNTING DETAILS

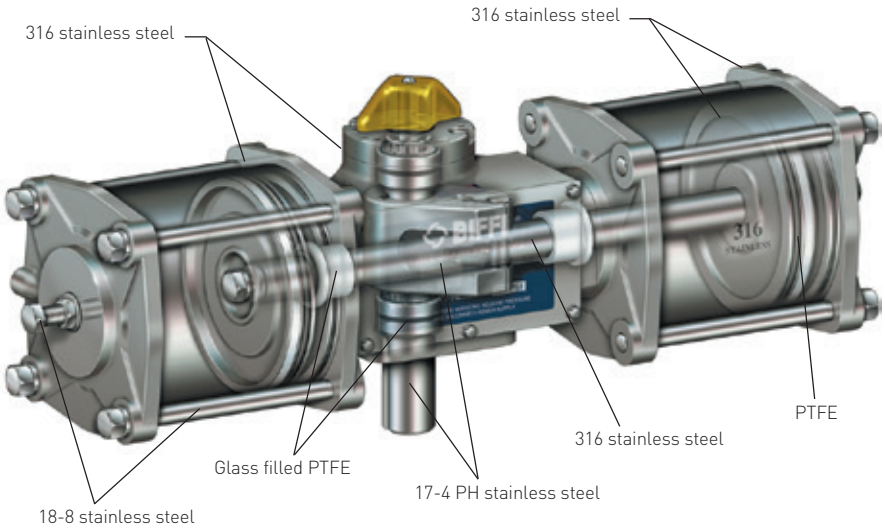


IMPERIAL THREAD OPTION

Standard tap		Model number
*	5/16 - 18 UNC	006 and 015
**	½ - 13 UNC	023 to 100
***	¾ - 10 UNC	135 to 1150
****	10 - 32 UNC	135 to 1150

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

THE S SERIES ACTUATOR (ALL STAINLESS)



Setting an unrivaled standard in actuation at a price unexpectedly low for stainless steel.
- Up to 11 barg max operating pressure (see torque chart).
- Double acting break torques to 27120 Nm.
- Spring end torques to 11766 Nm.

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 155 bar max operating pressure (see torque chart).
- Double acting torques to 90400 Nm.
- Spring end torques to 45200 Nm.

For additional information, refer to HP series data sheet.

HOW TO ORDER

1. Double acting (symmetrical yoke) example:
   Air supply: 5.5 barg
   Break/end torque: 2610 Nm
   A-210M-D000
   A Series
   210 Model number
   M Metric mounting threads
   D Double acting
   000 No spring

2. Spring return (symmetrical yoke) example:
   Air supply: 5.5 barg
   End torque: 914 Nm
   A-210M-S080
   A Series
   210 Model number
   M Metric mounting threads
   S Spring return
   080 Spring set code

3. Double acting (canted yoke) example:
   Air supply: 5.5 barg
   Break (CCW) torque: 3524 Nm
   End (CW) torque: 3393 Nm
   A-210MC-D000
   A Series
   210 Model number
   M Metric mounting threads
   C Canted yoke
   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 72 may be mounted to fail clockwise or counterclockwise by 'flipping' along the longitudinal axis.