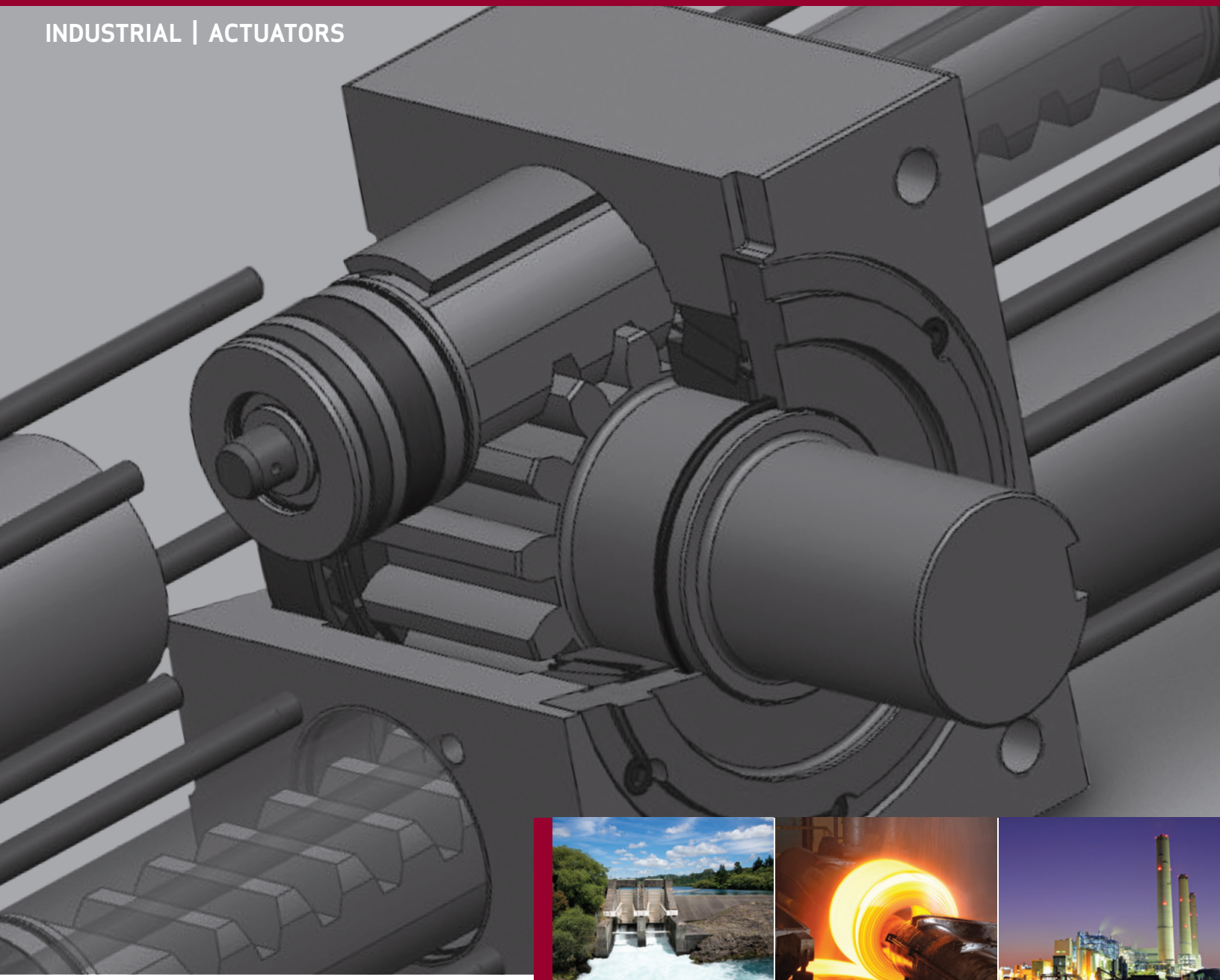


HYDRAULIC SERIES ROTARY ACTUATORS

MOOG
FLO-TORK

HYDRAULIC ROTARY ACTUATORS

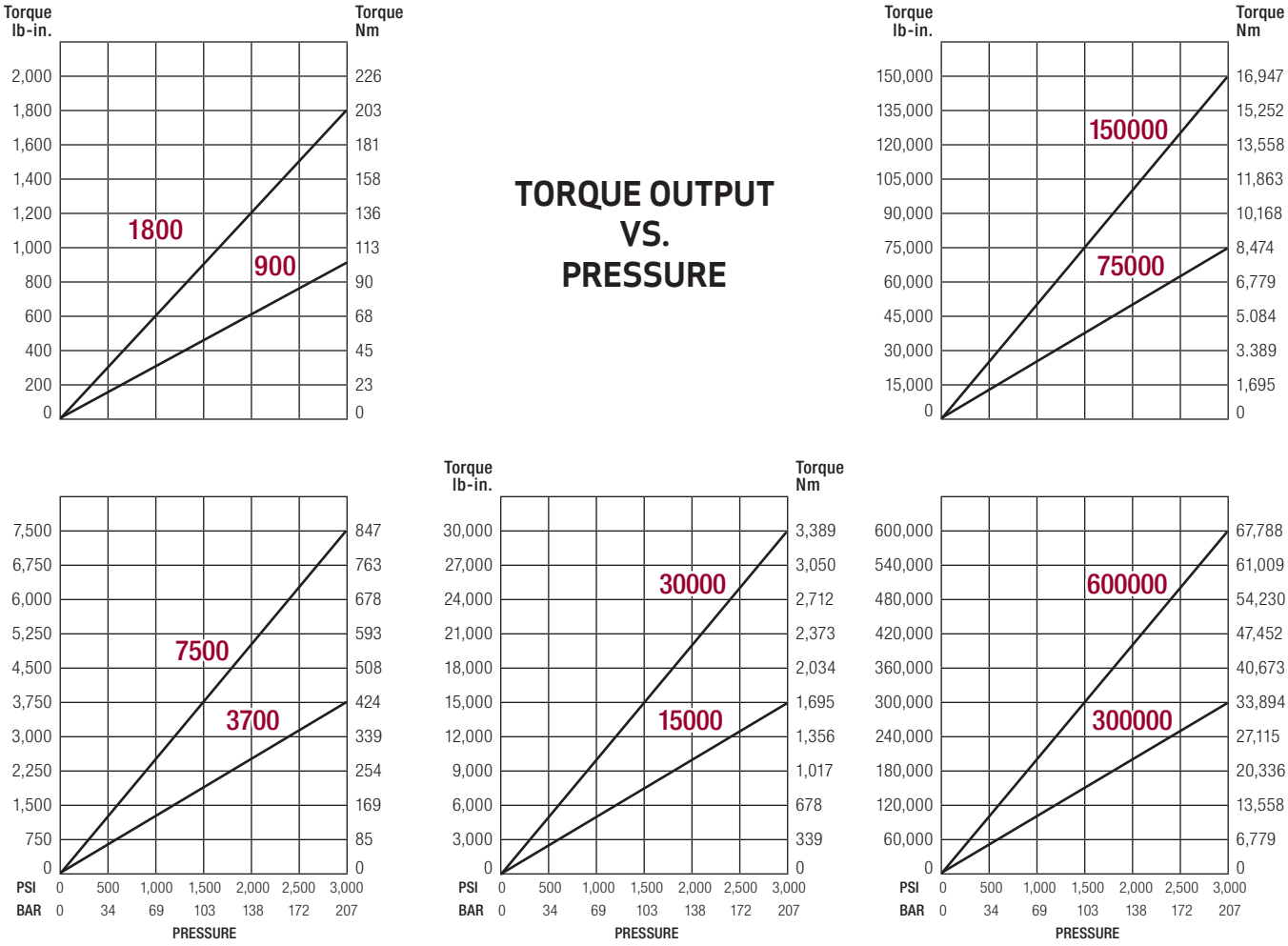
DESIGN FEATURES

- Heavy Duty Hydraulic – 3000 psi max.
- Torque Range – 900 to 600000 lb-in. @ 3,000 psi
- Standard Rotations – 90˚, 180˚, 360˚
- Rack & Pinion – high mechanical efficiency
- Zero Leakage – high volumetric efficiency
- Anti-Friction Bearings – high external load capability
- Gearing – single tooth full load capacity
- Through Shaft – position readout source
- Minimum Breakaway Pressure – 50 psi
- Operating Temperature – 0 to 200˚ F

STANDARD OPTIONS

- Decelerating cushions
- Stroke adjustors
- Cushions & stroke adjustors
- NPT or SAE O-Ring ports
- End ports or side ports
- Mounting variations
- Shafting variations
- Customer specified rotations
- Custom sealing arrangements
- Air bleeds
- Special coatings

TYPICAL PERFORMANCE



Model No.	Torque Factor	Output Torque (lb-in.) @ Various Pressure*				
		500	750	1,500	2,500	3,000
900	.30	150	225	450	750	900
1800	.60	300	450	900	1,500	1,800
3700	1.23	615	923	1,845	3,075	3,700
7500	2.50	1,250	1,875	3,750	6,250	7,500
15000	5.00	2,500	3,750	7,500	12,500	15,000
30000	10.00	5,000	7,500	15,000	25,000	30,000
75000	25.00	12,500	18,750	37,500	62,500	75,000
150000	50.00	25,000	37,500	75,000	125,000	150,000
300000	100.00	50,000	75,000	150,000	250,000	300,000
600000	200.00	100,000	150,000	300,000	500,000	600,000

* Output Torque (lb-in.) = Torque Factor x Operating Pressure (psi).
Example: Model 30000 @ 1,500 psi delivers (10.0 x 1,500=) 15,000 lb-in. torque.

Model No.	Displacement Factor	Displacement (in^3) Stroke*		
		90	180	360
900	.0063	.57	1.13	2.27
1800	.0126	1.13	2.27	4.54
3700	.0252	2.27	4.54	9.07
7500	.0504	4.54	9.07	18.14
15000	.0973	8.76	17.51	35.03
30000	.1946	17.51	35.03	70.06
75000	.4762	42.84	85.68	171.36
150000	.9520	85.68	171.36	342.72
300000	1.9051	171.46	342.92	685.84
600000	3.8102	342.92	685.84	1,371.67

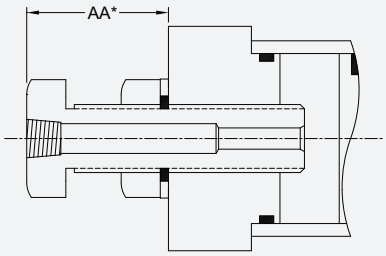
* Displacement (in^3) = Displacement Factor x Rotational Arc (degrees) .
Example: 15000 x 180º displaces .0973 in^3 / degrees x 180º = 17.51 in^3.

END CAP OPTIONS

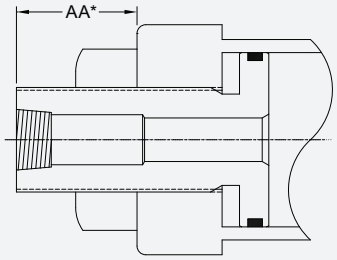
EXTERNAL STROKE ADJUSTORS

External stroke adjustors permit 0-30º of adjustment at the end of rotation. The adjustor stop, which contains the port, is set in position with a wrench on external flats and locked in place with a jam nut against a thread seal.

DRAWINGS



MODELS 900 TO 7500

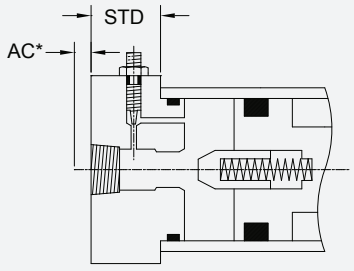


MODELS 15000 AND UP

CUSHIONS

Cushions are designed to provide smooth deceleration, external energy absorption and noise reduction, over the last 15º of rotation. Cushions trap fluid at the end of stroke by locking or restricting the discharge port. The trapped fluid is diverted through a small needle valve which generates a back pressure on the discharge side of the piston. This back pressure resists the forces exerted on the internal parts of the rotary actuator, thus causing a slowing of the external mass.

DRAWING

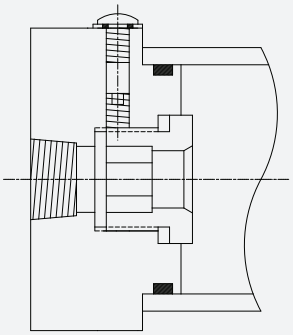


ADJUSTABLE CUSHION

Internal Stroke Adjustors

Internal stroke adjustors permit 0-5º of adjustment. A threaded bushing within the end cap is set in position by a hex wrench inserted through the port and locked in place with a set screw.

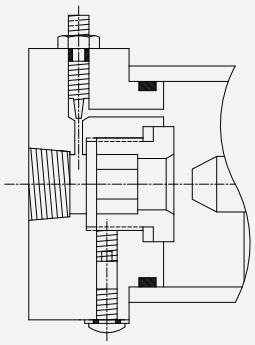
DRAWING



Internal Stroke Adjustor & Adjustable Cushion

The 0-5º internal stroke adjustor and the adjustable cushion are combined into a single option. This design permits the full cushioning effect at any stroke adjustment setting.

DRAWING



Caution: Cushion needles should be set between one half and one full turn from seated position. Setting should result in continuous speed reduction throughout the cushion length. Needle adjustment is set too far closed when there is an abrupt change in speed as the actuator enters the cushion. Never operate with needle in seated position or unscrewed beyond the point where the seal relief in the thread is visible.

Caution: Cushion needle adjustment is a crucial factor in achieving optimum cushion performance. If the needle valve setting is too far open, cushion capacity will be reduced, or rendered ineffective; if set too far closed, cushion action will generate shock and pressure spikes in excess of actuator rating.

***Note:** When ordering a double rack model with stroke adjustors it is necessary to order end of stroke adjustors for both cylinders. When only one stroke adjustor is used for end of stroke adjustment on a double rack model the maximum operating pressure must be limited to 1500 psi.

***Note:** Cushions and external stroke adjustors are not available on the same cylinder end cap for standard models. Consult factory for special design considerations.

***Note:** Add on dimensions shown on page 11.

POSITION IDENTIFICATION AND PORTING

The following identification codes are used to specify the location of cushions, cushion adjustments, side ports and mountings.

SURFACE IDENTIFICATION

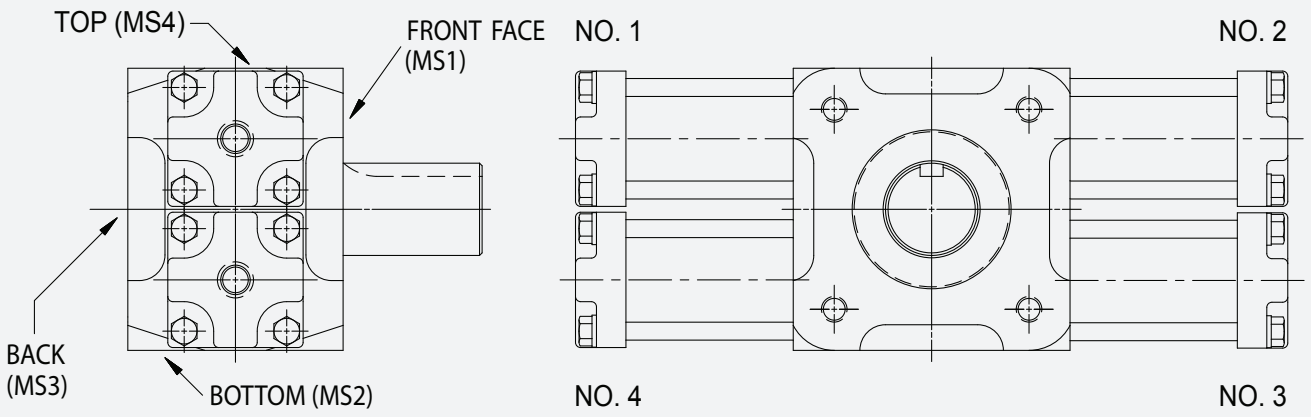
MS1 – Front surface or face - bearing cap side
MS2 – Bottom surface - opposite keyway when actuator is at mid-rotation (applies to standard keyway location only)
MS3 – Back surface - opposite of bearing cap side
MS4 – Top surface - opposite bottom surface

CYLINDER END IDENTIFICATION

Cylinder ends are numerically identified as shown below. On double rack units the upper left hand cylinder end is designated as No. 1. Continuing clockwise, the upper right hand cylinder is No. 2, the lower right hand cylinder end is No. 3, and the lower left hand cylinder end is No. 4.

On single rack Hydraulic units the lower rack is used. The right cylinder end is No. 3 and the left cylinder end is No. 4.

PORTS - HYDRAULIC ROTARY ACTUATORS DRAWINGS



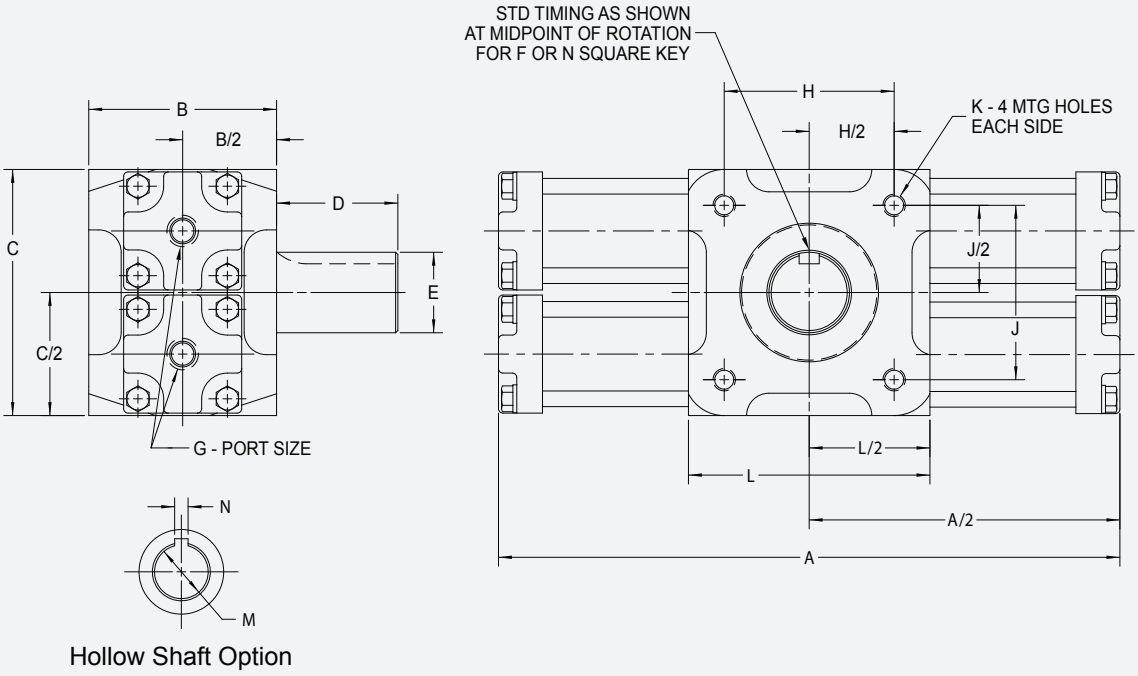
STANDARD AND OPTIONAL PORT CONFIGURATIONS FOR MOOG FLO-TORK HYDRAULIC ROTARY ACTUATORS

Model	Standard NPT Port	Optional* SAE Port Dia. – Thd./in	Recommended Tube Size O.D.	External Stroke Adjustors Maximum Port Size*		Side Port Maximum Port Size*	
				NPT	SAE	NPT	SAE
900 & 1800	1/4"	1/2" – 20	5/16"	1/8"	3/8" – 24	1/4"	7/16" – 20
3700 & 7500	1/4"	1/2" – 20	5/16"	1/4"	9/16" – 18	1/4"	7/16" – 20
15000 & 30000	1/2"	7/8" – 14	5/8"	1/2"	7/8" – 14	3/8"	9/16" – 18
75000 & 150000	3/4"	1 1/16" – 12	3/4"	3/4"	1 1/16" – 12	1/2"	7/8" – 14
300000 & 600000	1"	1 5/16" – 12	1"	1"	1 5/16" – 12	3/4"	1 1/16" – 12

*Consult factory for special porting requirements. Sizes shown for external stroke adjustors and side ports are maximum standard port sizes.

ENVELOPE DIMENSIONS

STANDARD ENVELOPE DRAWINGS



Hollow Shaft Option

STANDARD ENVELOPE DIMENSIONS

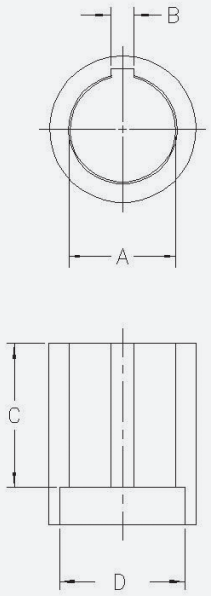
Model No.	Rotation Degrees	A in.	A [mm]	B in. [mm]	C in. [mm]	D in. [mm]	E in. [mm]	F in.	G in.	H in. [mm]	J in. [mm]	K in.	L in. [mm]	M in. [mm]	N in. [mm]
900 & 1800	90˚ 180˚ 360˚	6.31 8.19 11.96	[160.27] [208.03] [303.78]	2.98 [75.69]	3.00 [76.20]	1.31 [33.27]	.8735-.8750 [22.19-22.23]	1/4" X 1"	1/4" NPT Optional SAE 1/2"-20	2.63 [66.80]	2.38 [60.45]	5/16" NC X 1/2" DP	3.38 [85.85]	.625-.627 [15.88-15.93]	.187-.188 [4.75-4.78]
3700 & 7500	90˚ 180˚ 360˚	8.49 11.24 16.73	[215.65] [285.50] [424.94]	3.94 [100.08]	4.50 [114.30]	1.88 [47.75]	1.248-1.250 [31.70-31.75]	5/16" X 1-1/2"	1/4" NPT Optional SAE 1/2"-20	3.00 [76.20]	3.63 [92.20]	3/8" NC X 5/8" DP	3.82 [97.03]	.875-.877 [22.23 22.28]	.187-.188 [4.75-4.78]
15000 & 30000	90˚ 180˚ 360˚	12.79 17.19 25.99	[324.87] [436.63] [660.15]	5.25 [133.35]	6.88 [174.75]	3.38 [85.85]	2.248-2.250 [57.10-57.15]	9/16" X 2-3/8"	1/2" NPT Optional SAE 7/8"-14	4.75 [120.65]	4.88 [123.95]	3/4" NC X 1-3/16" DP	6.75 [171.45]	1.500-1.503 [38.10 38.18]	.375-.376 [9.53-9.55]
75000 & 150000	90˚ 180˚ 360˚	24.60 33.39 50.99	[624.84] [848.11] [1295.15]	8.63 [219.20]	11.50 [292.10]	4.50 [114.30]	2.998-3.000 [76.15-76.20]	3/4" X 3-3/8"	3/4" NPT Optional SAE 1-1/16"-12	7.38 [187.45]	9.13 [231.90]	1" NC X 1-5/8" DP	9.63 [244.60]	2.750-2.752 [69.85 69.90]	.625-.626 [15.88-15.90]
300000 & 600000	90˚ 180˚ 360˚	34.93 45.93 67.93	[887.20] [1166.60] [1725.40]	14.50 [368.30]	16.50 [419.10]	7.50 [190.50]	4.998-5.000 [126.95-127.00]	1-1/4" X 6"	1" NPT Optional SAE 1-5/16"-12	13.00 [330.20]	13.50 [342.90]	1-1/4" NC X 1-3/4" DP	15.88 [403.35]	3.750-3.754 [95.25 95.35]	.750-.751 [19.05-19.08]

"A" Dimensions increase .84" per cushion end for Models 900 and 1800. (See Options pages 4-6 and 8-9.)
"C" Dimensions are "As Cast". (See Options page 9 when optional mounting configurations are used.)
Models 900/1800 and 3700/7500 have relief valve mounted on MS4 surface which is not include in the C dimension
First model in model pairings have 1 rack, second models have 2 racks

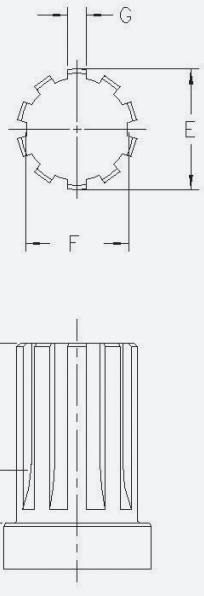
SHAFT OPTIONS

STANDARD SHAFT DRAWINGS

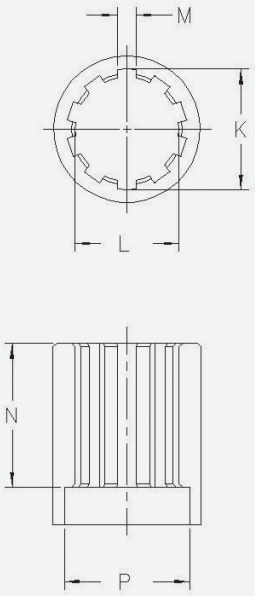
HOLLOW KEYED



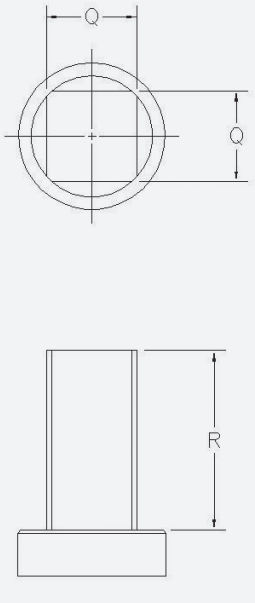
MALE SPLINE SAE 10B



FEMALE SPLINE SAE 10B



SQUARE

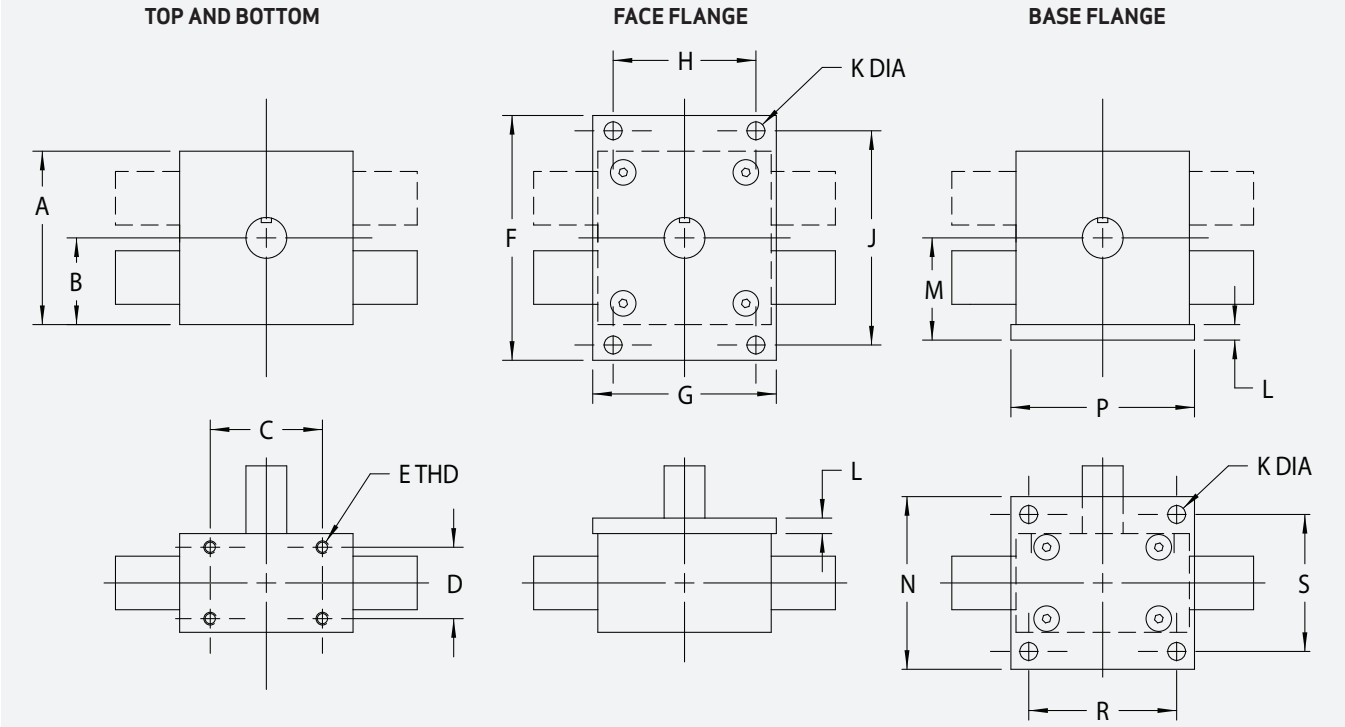


STANDARD SHAFT DIMENSIONS

Model No.	A in. [mm]	B in. [mm]	C in. [mm]	D in. [mm]	E in [mm]	F in. [mm]	G in. [mm]	H in. [mm]	J in. [mm]	K in. [mm]	L in. [mm]	M in. [mm]	N in. [mm]	P in. [mm]	R in. [mm]	S in. [mm]
900 & 1800	.625-.627 [15.88-15.93]	.187-.188 [4.75-4.78]	2.90 [73.66]	NO INTERNAL RELIEF DIAMETER	.872-.873 [22.15-22.17]	.742-.747 [18.85-18.97]	.132-.134 [3.35-3.40]	.87 [22.10]	1.31 [33.27]	.749-.750 [19.02-19.05]	.682-.683 [17.32-17.35]	.115-.117 [2.92-2.97]	1.25 [31.75]	.750 [19.05]	.623-.625 [15.82 15.88]	1.25 [31.75]
3700 & 7500	.875-.877 [22.23-22.28]	.187-.188 [4.75-4.78]	3.85 [97.79]		1.246-1.248 [31.65-31.70]	1.069 MAX [27.15]	.190-.192 [4.83-4.88]	1.25 [31.75]	1.88 [47.75]	.874-.875 [22.20-22.23]	.752-.753 [19.10-19.13]	.135-.137 [3.43-3.48]	1.50 [38.10]	.881 [22.38]	.995-1.000 [25.27 25.40]	1.88 [47.75]
15000 & 30000	1.500-1.503 [38.10-38.18]	.375-.376 [9.53-9.55]	5.19 [131.83]		2.245-2.247 [57.02-57.07]	1.928 MAX [48.97]	.345-.347 [8.76-8.81]	2.25 [57.15]	3.38 [85.85]	1.750-1.755 [44.45-44.58]	1.504-1.509 [38.20-38.33]	2.71-2.73 [6.88-6.93]	1.75 [44.45]	1.81 [45.97]	1.745-1.750 [44.32 44.45]	3.38 [85.85]
75000 & 150000	2.750-2.752 [69.85-69.90]	.625-.626 [15.88-15.90]	8.56 [217.42]		2.995-2.997 [76.07-76.12]	2.573 MAX [65.35]	.462-.464 [11.73-11.79]	3.00 [76.20]	4.50 [114.30]	3.000-3.004 [76.20-76.30]	2.583-2.588 [65.61-65.74]	.465-.468 [11.81-11.89]	3.00 [76.20]	3.03 [76.96]	2.495-2.499 [63.37 63.47]	3.75 [95.25]
300000 & 600000	3.750-3.754 [95.25-95.35]	.750-.751 [19.05-19.08]	14.44 [366.78]		4.992-4.994 [126.80-126.85]	4.290 MAX [108.97]	.774-.776 [19.66-19.71]	5.00 [127.00]	7.50 [190.50]	3.997-4.000 [101.52-101.60]	3.430-3.437 [87.12-87.30]	.621-.624 [15.77-15.85]	4.00 [101.60]	4.06 103.12	3.995-4.000 [101.47 101.60]	7.38 [187.45]

MOUNTING OPTIONS

STANDARD MOUNTING DRAWINGS



STANDARD MOUNTING DIMENSIONS

Model No.	A in. [mm]	B in. [mm]	C in. [mm]	D in. [mm]	E in.	F in. [mm]	G in. [mm]	H in. [mm]	J in. [mm]	K in. [mm]	L in. [mm]	M in. [mm]	N in. [mm]	P in. [mm]	R in. [mm]	S in. [mm]
900 & 1800	2.98 [75.69]	1.48 [37.59]	2.63 [66.80]	2.38 [60.45]	5/16" NC X 1/2" DP	4.75 [120.65]	3.50 [88.90]	2.50 [63.50]	4.00 [101.60]	.44 [11.18]	.38 [9.65]	1.88 [47.75]	4.75 [120.65]	3.50 [88.90]	2.50 [63.50]	4.00 [101.60]
3700 & 7500	4.50 [114.30]	2.25 [57.15]	3.00 [76.20]	3.00 [76.20]	3/8" NC X 5/8" DP	7.25 [184.15]	4.38 [111.25]	3.00 [76.20]	5.75 [146.05]	.56 [14.22]	.50 [12.70]	2.75 [69.85]	6.50 [165.10]	4.38 [11.25]	3.00 [76.20]	5.00 [127.00]
15000 & 30000	6.76 [171.70]	3.38 [85.85]	4.75 [120.65]	3.75 [95.25]	3/4" NC X 13/16" DP	9.50 [241.30]	6.75 [171.45]	4.75 [120.65]	8.25 [209.55]	.69 [17.53]	.63 [16.00]	4.00 [101.60]	7.75 [196.85]	6.75 [171.45]	5.25 [133.35]	6.75 [171.45]
75000 & 150000	11.31 [287.27]	5.66 [143.76]	7.38 [187.45]	6.25 [158.75]	1" NC X 1-3/4" DP	14.75 [374.65]	11.25 [285.75]	9.25 [234.95]	13.38 [339.85]	.81 [20.57]	1.00 [25.40]	6.66 [169.16]	11.75 [298.45]	11.25 [285.75]	9.25 [234.95]	10.50 [266.70]
300000 & 600000	16.26 [413.00]	8.13 [206.50]	10.00 [254.00]	11.50 [292.10]	1-1/4" NC X 1-3/4" DP	23.25 [590.55]	18.00 [457.20]	15.00 [381.00]	21.25 [539.75]	1.06 [26.92]	1.25 [31.75]	9.38 [238.25]	19.50 [495.30]	18.00 [457.20]	12.00 [304.80]	16.50 [419.10]

NOTE: Dimensions are symmetrical about the centerline of the pinion.

HOW TO ORDER

Order Example: 15000 – 180 – AICQ – ET – MS1 3 – RKS – N – AB

FIELD 1 FIELD 2 FIELD 3 FIELD 4 FIELD 5 FIELD 6 FIELD 7 FIELD 8

FIELD 1

HYDRAULIC SERIES

Model	Torque Output at 3,000 PSI	Number of Racks
900	900 lb-in.	1
1800	1,800 lb-in.	2
3700	3,700 lb-in.	1
7500	7,500 lb-in.	2
15000	15,000 lb-in.	1
30000	30,000 lb-in.	2
75000	75,000 lb-in.	1
150000	150,000 lb-in.	2
300000	300,000 lb-in.	1
600000	600,000 lb-in.	2

FIELD 2

ROTATIONAL ARC

Code	Description
900	90˚ (-0/+2º)
180	180˚ (-0/+2º)
360	360˚ (-0/+2º)
___	Other Specify

FIELD 3

CUSHIONS

Code	Description
OO	Omit
CL	Counter-clockwise stroke
CR	Clockwise stroke
CB	Both ends of stroke
CQ	Four cushions (two rack units only)
X	Special cushions*

NOTE: Cushion needle adjustment faces front (bearing retainer side) in standard assembly. Refer to mounting surface call out to specify other orientation.
Example 1: two cushions, back facing — CB3;
Example 2: four cushions, top and bottom facing — CQ24.

STROKE ADJUSTOR**

Code	Description
OO	Omit
AIL	Counter-clockwise stroke (0-5º internal)
AIR	Clockwise stroke (0-5º internal)
AIB	Both ends of stroke (0-5º internal)
AIQ	Four internal adjustors (two rack units only)
AEL	Counter-clockwise stroke (0-30º external)
AER	Clockwise stroke (0-30º external)
AEB	Both ends of stroke (0-30º external)
AEQ	Four external adjustors (two rack units only)
X	Special adjustors

CUSHIONS & INTERNAL ADJUSTORS**

Code	Description
OO	Omit
AICL	Counter-clockwise stroke (0-5º internal) & cushions
AICR	Clockwise stroke (0-5º internal) & cushions
AICB	Both ends of stroke (0-5º internal) & cushions
AICQ	Four internal adjustors & cushions (two rack units only)
X	Special cushions & adjustors*

CUSHIONS & EXTERNAL ADJUSTORS

Not available on same end

FIELD 4

PORTING

Model	Torque Output at 3,000 PSI
ET	End ports, NPT threads – (standard)
ST	Side ports, NPT threads
ES	End ports, SAE threads
SS	Side ports, SAE threads
X	Special porting*

NOTE: Side ports not available when cushions are specified.

FIELD 5

MOUNTING

Code	Description
MS1	Front face mount (bearing cap side) – (standard)
MS2	Bottom face mount
MS3	Back face mount - standard
MS4	Top face mount
MF1	Front flange mount
MF2	Bottom flange mount
MF3	Back flange mount
MF4	Top flange mount
MXF	Foot mount
X	Special configuration*

FIELD 6

SHAFT CONFIGURATION

Code	Description
RKS	Single end, keyed – (standard)
SBS	Single end, external spline
SQS	Single end, square
RKD	Double end, both ends keyed
SBD	Double end, both external spline
SQD	Double end, both square
SQH	Hollow, internal square
SBH	Hollow, internal spline
RKH	Hollow, keyed
X	Special shaft*

FIELD 7

SEALS

Code	Description
N	Nitrile (Buna-N) – (standard)
F	Fluoroelastomer (Viton)
NL	Nitrile (Buna-N) Lip Seals Standard 3700 & 7500
X	Special seals*

FIELD 8

SPECIAL MODIFICATIONS

Code	Description
AB	Air bleeds
LS	Limit switch
XT	Special timing
XB	Special bearings
XM	Special materials
XP	Special coating
PT	Position transducer drive
SR	Spring return
X	Special features*

* NOTE: The letter "x" appearing as a suffix in each field of the model code requires additional information or a serial number for complete model identification, i.e. CBX on a double rack model would require identification as to which two cylinders include the cushions.

* NOTE: When ordering a double rack model with stroke adjustors it is necessary to order end of stroke adjustors for both cylinders. When only one stroke adjustor is used for end of stroke adjustment on a double rack model the maximum operating pressure must be limited to 1500 psi.

** When ordering double rack units with cushions and adjustors, specify location by cylinder number.

DIMENSIONS – CUSHIONS AND STROKE ADJUSTORS

HYDRAULIC SERIES – ENVELOPE DIMENSIONS – CUSHIONS AND STROKE ADJUSTORS

Model No.	Standard 'A' Dim 90° in. [mm]	Standard 'A' Dim 180° in. [mm]	Standard 'A' Dim 360° in. [mm]	"AA" Adjustor* Add-On in. [mm]	"AC" Cushion* Add-On in. [mm]
900 & 1800	6.31 [160.27]	8.19 [208.03]	11.96 [303.78]	1.01 [25.65]	.84 [21.34]
3700 & 7500	8.49 [215.65]	11.24 [285.50]	16.73 [424.94]	1.81 [45.97]	THESE DIM ARE THE SAME AS STANDARD 'A' DIM.
15000 & 30000	12.79 [324.87]	17.19 [436.63]	25.99 [660.15]	2.39 [60.71]	
75000 & 150000	24.60 [624.84]	33.39 [848.11]	50.99 [1295.15]	1.87 [47.50]	
300000 & 600000	34.93 [887.22]	45.93 [1166.62]	67.93 [1725.42]	2.34 [59.44]	

* "AA" (Adjustor) and "AC" (Cushion) dimensions are individual dimensions and are to be added to the standard 'A' dimension for each adjustor or cushion.

UNIT WEIGHTS

HYDRAULIC SERIES

Model No.	90° lbs.	90° KG	180° lbs.	180° KG	360° lbs.	360° KG
900	8	3.63	10	4.54	11	4.99
1800	9	4.08	11	4.99	12	5.44
3700	18	8.16	20	9.07	26	11.79
7500	22	9.98	24	10.89	28	12.70
15000	61	27.67	64	29.03	74	33.57
30000	78	35.38	81	36.74	97	44.00
75000	270	122.47	288	130.64	323	146.51
150000	330	149.69	361	163.75	397	180.08
300000	943	427.74	1013	459.50	1162	527.08
600000	1144	518.92	1286	583.33	1582	717.60

Note: Approximate weights shown above are based on standard models.

HYDRAULIC ROTARY ACTUATOR

DESIGN FEATURES

- Heavy Duty Hydraulic – 3000 psi max.
- Torque Range – 1,000,000 to 50,000,000 lb-in.
- Standard Rotations – 90˚, 180˚, 360˚
- Rack & Pinion – high mechanical efficiency
- Zero Leakage – high volumetric efficiency
- Pistol Seals – pre-loaded lip seals
- Gearing – single tooth full load capacity
- Hollow Shaft – eliminates costly coupling
- Compact Design – highest torque per cu. ft. of space
- Temperature Range – 0 to 200˚ F

OPTIONAL FEATURES

- Adjustable cushions
- Tie rod or mill type cylinders
- Custom rotational arcs
- Custom mounting arrangements
- Custom end cap valves and ports
- Self contained hydraulic power units
- Custom mountings
- Custom shaft configuration
- Custom designsfor pressure, torque , and dimensional requirements
- Custom corrosion protection
- Designsfor 4:1 pressure vessel safety factor

MEGATORK® APPLICATION

Moog FLO-TORK Megatork actuators are designed to meet the needs of each individual application. Because of this we have included the following information sheet to help us in assisting you in sizing the correct actuator for your application. Please fill in the data sheet and forward it to us at sales@ft.moog.com for review. We will contact you to discuss the specifics of your application.

Company: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone Number: _____ Fax Number: _____

Name: _____ E-Mail: _____

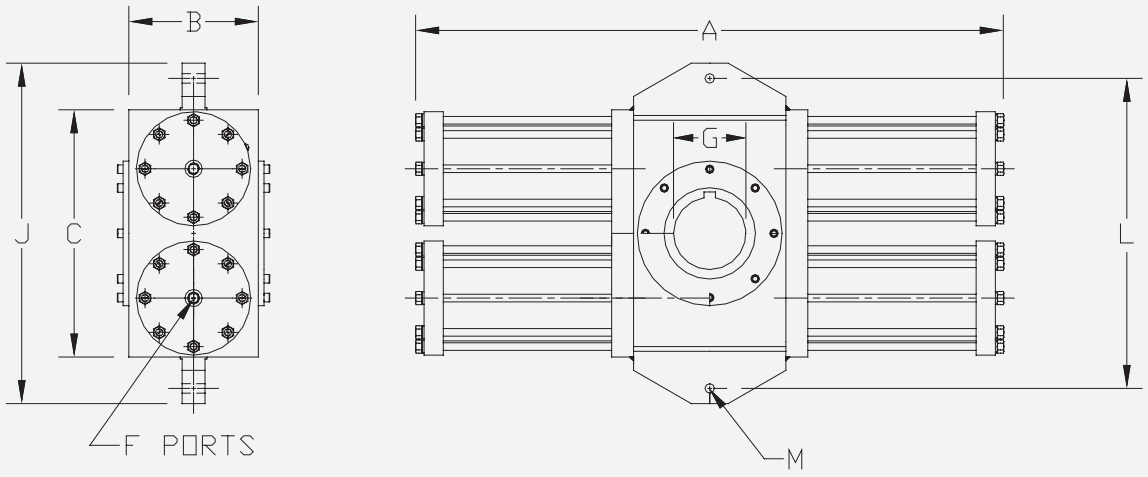
APPLICATION INFORMATION

Torque Required: _____

Rotation required: _____

Operating Pressure (psi): _____

DIMENSIONS



Dimensional Data: _____ Units of Measure: _____ Metric: _____

A: _____ B: _____ C: _____

F: _____ G: _____ J: _____

L: _____ M: _____

Please fill in the envelope dimensions that you require for your specific application to assist us in sizing your actuator

APPLICATION DESCRIPTION

_____

_____

_____

_____

TYPICAL PERFORMANCE

OUTPUT TORQUE

Model No.	Torque Factor*	Output Torque (lb-in.) @ Various Pressures*				
		1,000 psi	1,500 psi	2,000 psi	2,500 psi	3,000 psi
1M	333	333,000	499,500	666,000	832,500	1,000,000
1.5M	500	500,000	750,000	1,000,000	1,250,000	1,500,000
2M	667	667,000	1,000,500	1,334,000	1,667.500	2,000,000
3M	1,000	1,000,000	1,500,000	2,000,000	2,500,000	3,000,000
4M	1,333	1,333,000	1,999,500	2,666,000	3,332,500	4,000,000
5M	1,667	1,667,000	2,500,500	3,334,000	4,167,500	5,000,000
6M	2,000	2,000,000	3,000,000	4,000,000	5,000,000	6,000,000
7M	2,333	2,333,000	3,499,500	4,666,000	5,832,500	7,000,000
8M	2,667	2,667,000	4,000,500	5,334,000	6,667,500	8,000,000
9M	3,000	3,000,000	4,500,000	6,000,000	7,500,000	9,000,000
10M	3,333	3,333,000	4,999,500	6,666,000	8,332,500	10,000,000
15M	5,000	5,000,000	7,500,000	10,000,000	12,500,000	15,000,000
20M	6,667	6,667,000	10,000,500	13,334,000	16,667,500	20,000,000
25M	8,333	8,333,000	12,499,500	16,666,000	20,832,500	25,000,000
30M	10,000	10,000,000	15,000,000	20,000,000	25,000,000	30,000,000
40M	13,333	13,333,000	19,999,500	26,666,000	33,332,500	40,000,000
50M	16,667	16,667,000	25,000,500	33,334,000	41,667,500	50,000,000

*Output Torque (lb-in.) = Torque Factor x Operating Pressure (psi)
Example: Model 9M @ 2,500 psi delivers (3,000 x 2,500=) 7,500,000 lb-in. torque.

VOLUMETRIC DISPLACEMENT

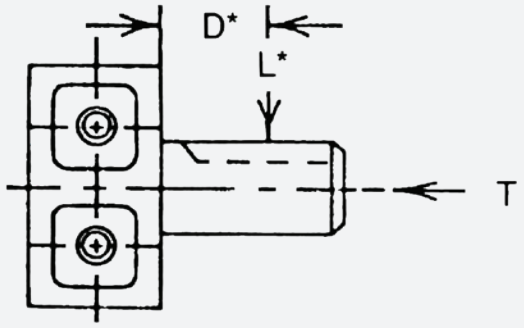
Model No.	Displacement Factor*	Model Displacement Displacement (gal.) Per Stroke*			
		90˚	180˚	270˚	360˚
1M	gal/degree	gal.	gal.	gal.	gal.
	0.03	2.52	5.04	7.56	10.08
1.5M	0.04	3.60	7.20	10.80	14.40
2M	0.05	4.82	9.65	14.47	19.30
3M	0.08	7.20	14.40	21.60	28.80
4M	0.11	9.90	19.80	29.70	39.60
5M	0.14	12.33	24.66	36.99	49.32
6M	0.16	14.76	29.52	44.28	59.04
7M	0.19	17.10	34.20	51.30	68.40
8M	0.23	20.34	40.68	61.02	81.36
9M	0.25	22.23	44.46	66.69	88.92
10M	0.28	25.29	50.58	75.87	101.16
15M	0.39	34.74	69.48	104.22	138.96
20M	0.58	51.84	103.68	155.52	207.36
25M	0.67	60.03	120.06	180.09	240.12
30M	0.79	71.19	142.38	213.57	284.76
40M	1.18	106.29	212.58	318.87	425.16
50M	1.37	123.03	246.06	369.09	492.12

*Displacement (gal) = Displacement Factor x Rotational Arc (degrees).
Example: 10M x 270º displaces 0.281 gal./degree x 270º = 75.9 gal.

BEARING LOAD CAPACITIES

Moog FLO-TORK hydraulic rotary actuator bearings are sized to accept external loads. This feature often allows the shaft to be mounted directly to the rotary actuator without flexible couplings and outboard bearings, utilizing the Moog FLO-TORK actuator as the bearing.

DRAWING



MAXIMUM EXTERNA L RADIAL LOAD L*

Model No.		900		1800		3700		7500		15000		30000		75000		150000		300000		600000	
Dim "D" in. [mm]		.812	[20.62]	.812	[20.62]	1.125	[28.58]	1.125	[28.58]	2.195	[55.75}	2.195	[55.75]	2.812	[71.42]	2.812	[71.42]	4.50	[114.3]	4.50	[114.3]
psi	bar	lbs.	KG	lbs.	KG	lbs.	KG	lbs.	KG	lbs.	KG	lbs.	KG	lbs.	KG	lbs.	KG	lbs.	KG	lbs.	KG
0	0	1,349	612	1,349	612	1,856	842	1,856	842	3,959	1,796	3,959	1,796	22,349	10,138	22,349	10,138	41,038	18,615	41,038	18,615
1,000	69	1,188	539	1,349	612	1,479	671	1,856	842	2,890	1,311	3,959	1,796	19,895	9,024	22,349	10,138	31,216	14,160	41,038	18,615
2,000	138	1,027	466	1,349	612	1,102	500	1,856	842	1,821	826	3,959	1,796	17,441	7,911	22,349	10,138	21,394	9,704	41,038	18,615
3.000	207	865	392	1,349	612	725	329	1,856	842	752	341	3,959	1,796	14,987	6,798	22,349	10,138	11,571	5,249	41,038	18,615
		MAXIMUM EXTERNA L THRUST LOAD T*																			
0	0	2,595	1,177	2,595	1,177	4,140	1,878	4,140	1,878	7,605	3,450	7,605	3,450	36,825	16,704	36,825	16,704	39,612	17,968	39,612	17,968
1,000	69	2,421	1,098	2,595	1,177	3,669	1,664	4,140	1,878	6,455	2,928	7,605	3,450	33,396	15,148	36,825	16,704	31,338	14,215	39,612	17,968
2,000	138	2,247	1,019	2,595	1,177	3,198	1,451	4,140	1,878	5,305	2,406	7,605	3,450	29,870	13,549	36,825	16,704	23,098	10,477	39,612	17,968
3,000	207	2,073	940	2,595	1,177	2,727	1,237	4,140	1,878	4,155	1,885	7,605	3,450	26,344	11,950	36,825	16,704	14,860	6,740	39,612	17,968

CAUTION: L is the maximum allowable external radial load at the maximum distance D (distance from housing to middle of keyway as shown on the chart as dimension D). To find L match the model and maximum operating pressure to find the maximum external radial load L on the rotary actuator. T is the maximum allowable external thrust load. To find T, match the model and maximum operating pressure to find the maximum thrust load on the rotary actuator. For combined radial and thrust loads consult factory.

LOCATIONS

Argentina
Australia
Austria
Brazil
Canada
Finland
France
Germany
India
Ireland
Italy
Japan
Luxembourg
The Netherlands
Norway
Philippines
Singapore
South Africa
South Korea
Spain
Sweden
Switzerland
United Arab Emirates
United Kingdom
United States

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