BCS/MCS Screw Drives

OVERVIEW

APPLICATION BENEFITS

- Moderate load carrying capabilities at an economical price
- Easily retrofittable and interchangeable
- Adjustable carrier and self-lubricating bearings for easy maintenance

GUIDANCE SYSTEM

A patented* adjustable carrier bracket transmits the load to the cylinder body, instead of the screw for true tracking, superior load support and controlled minimum friction load. Two self-lubricating Delrin bearing rods, pass force directly to the cylinder tube. Patented** Band Retention system uses a T-shaped elastomer strip bonded to a stainless steel band, inserted directly into the body housing forming a tight metal-to-metal seal for clean operation.

* U.S. Patent No. 4724744 **U.S. Patent No. 4545290

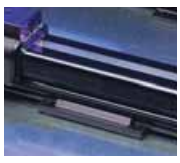
STANDARD MOUNTING

Mounting holes are provided on the underside of the cylinder heads. To mount, transfer the location of holes to the receiving surface. Drill mounting holes 1/32" larger than diameter of the mounting screws and attach securely with appropriate screws.

ACTUATOR/MOTOR FACTORS

- Actuator's operating temperature range (40-130° F, 4-54° C) should take into consideration heat generated by the motor and drive, linear velocity and work cycle time.
- For large frame motors or small actuators, cantilevered motors need to be supported, if subjected to continuous rapid reversing duty and/or under dynamic conditions.

AVAILABLE OPTIONS



Tube Supports: Provide intermediate support of actuator body at the recommended intervals. They are designed to fit into the dove-tailed grooves running the entire length of the cylinder tube.

Mounting Plates: Provide clearance height for motors and motor mounts when mounting an actuator on a flush surface. Mounted to the tapped holes in cylinder heads, they provide the means for top mounting access. Kits include plates and mounting screws.

Floating Mount Bracket: Compensates for non-parallelism between the actuator and an external support/guidance system. These mounts should be used on independently-guided loads to eliminate actuator binding. Use of the Float Mount, adds 0.014" (0.36 mm) to the backlash.

Auxiliary Carrier: Increases rigidity, load-carrying capacity and bending moments

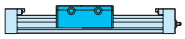
Motor Mounting and Gearhead Reduction:

In-line Motor Mounting— This motor mounting option uses a spacer and coupler to join the motor to the actuator shaft.

Reverse-parallel Motor Mounting—These factory assembled configurations allow offset mounting of the motor to either side of, or below the actuator. Available in 1:1 or 2:1 drive ratios, they offer quiet, zero-backlash coupling of the motor to the actuator screw shaft.

Gearhead Reduction—Gearheads are available for applications requiring reduction for inertia matching or higher torque at lower speeds. High efficiency, single stage, true planetary gearheads are available in 5.5:1 and 10:1 ratios for reduction solutions with most Tolomatic NEMA 23 and 34 face motors.
See page F-10.

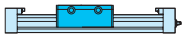
Switches: Reed, dc Hall-effect and ac TRIAC.
See section I.



BCS/MCS Screw Drives

ACME SCREW/NUT COMBINATIONS

ACME SCREW CRITICAL SPEED CAPACITIES

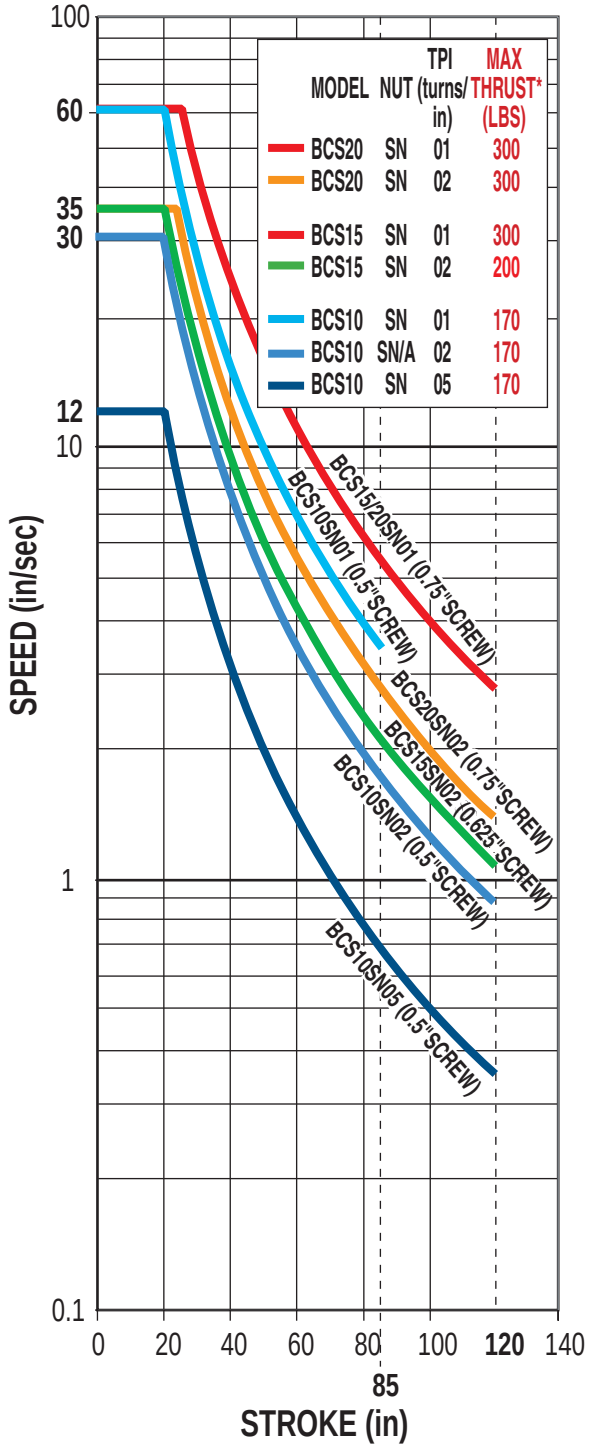


RODLESS

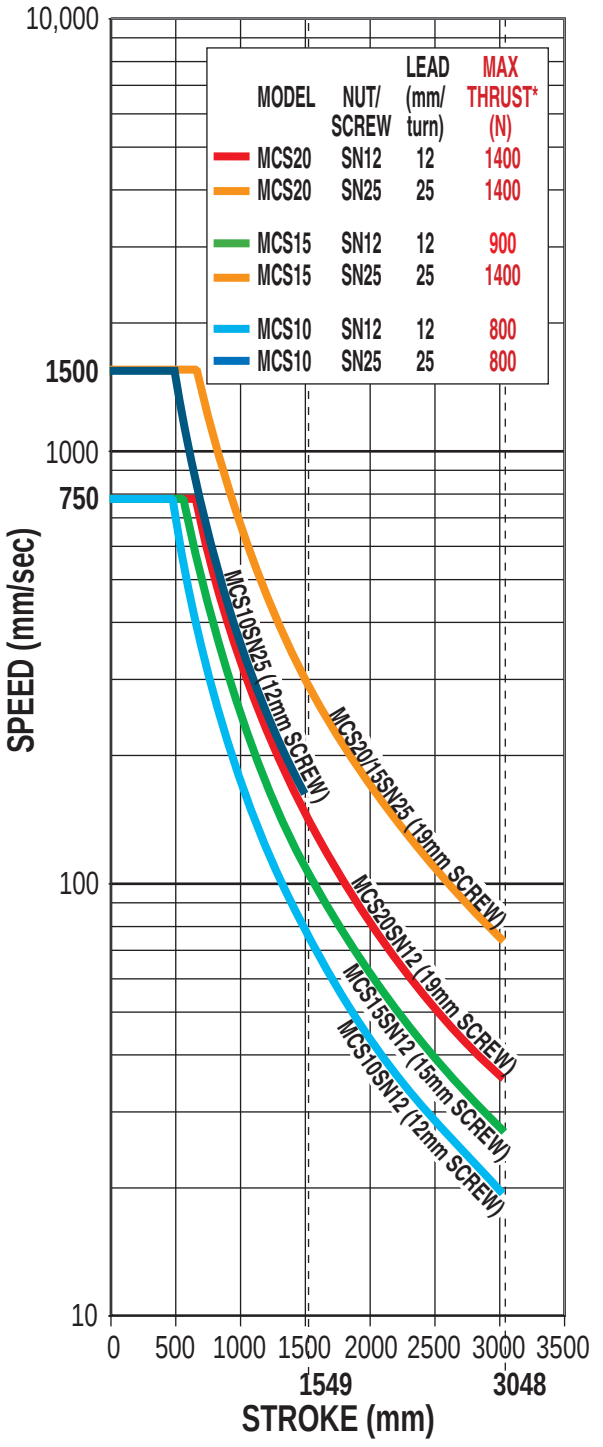
BCS/MCS Series

- Acme critical speed capacities

CRITICAL SPEED WITH ENGLISH ACME SCREW



CRITICAL SPEED WITH METRIC ACME SCREW



**** Maximum thrust is the maximum continuous dynamic thrust subject to Thrust x Velocity limitation.***

Dotted lines represent maximum stroke for screw selections.

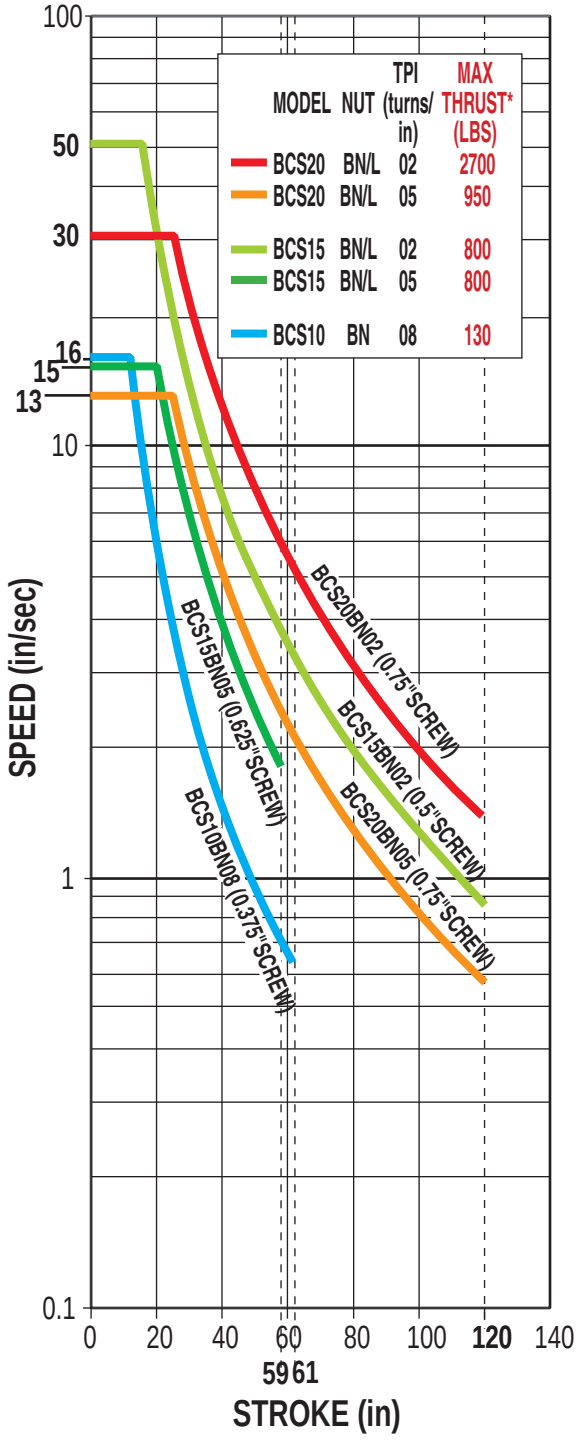
For Screw PV limits, refer to the individual charts located in the technical section for each actuator body size.

BCS/MCS Screw Drives

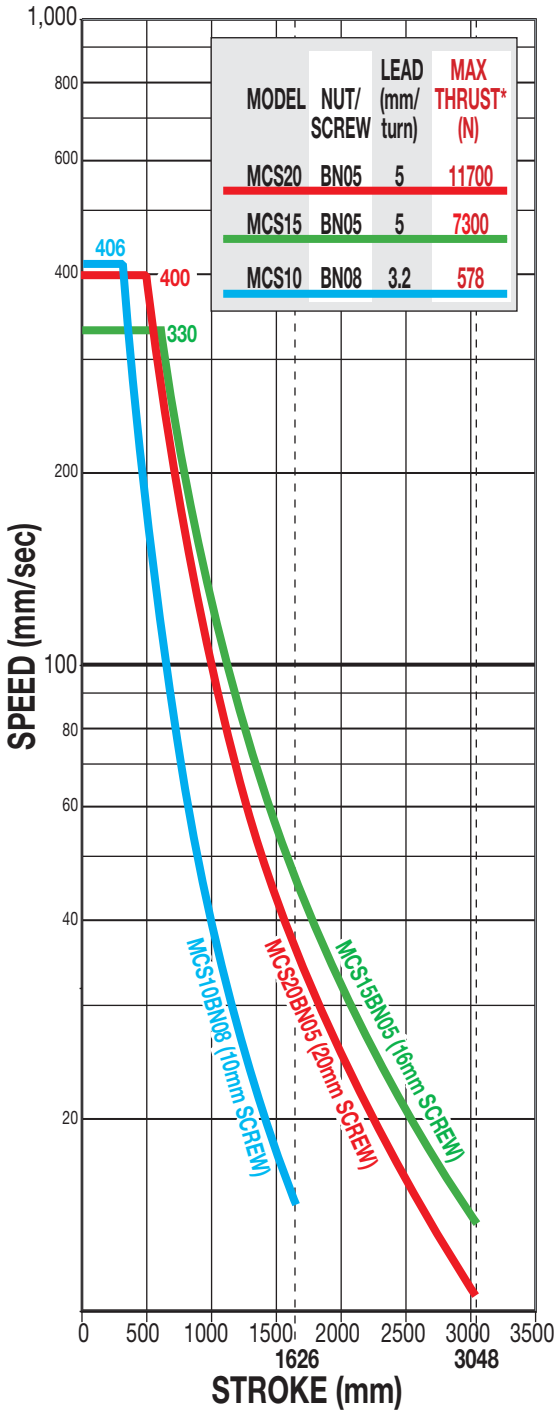
BALL SCREW/NUT COMBINATIONS

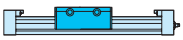
BALL SCREW CRITICAL SPEED CAPACITIES

CRITICAL SPEED WITH ENGLISH BALL SCREW



CRITICAL SPEED WITH METRIC BALL SCREW





RODLESS

BCS/MCS Series

- Ball screw critical speed capacities

**** Maximum thrust reflects 90% reliability for 1 million linear inches of travel.***

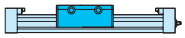
Dotted lines represent maximum stroke for screw selections.

Refer to the technical section for each actuator body size for details on life calculations for individual screws.

BCS/MCS Screw Drives

BALL SCREW SPECIFICATIONS

BALL SCREW LIFE CALCULATION

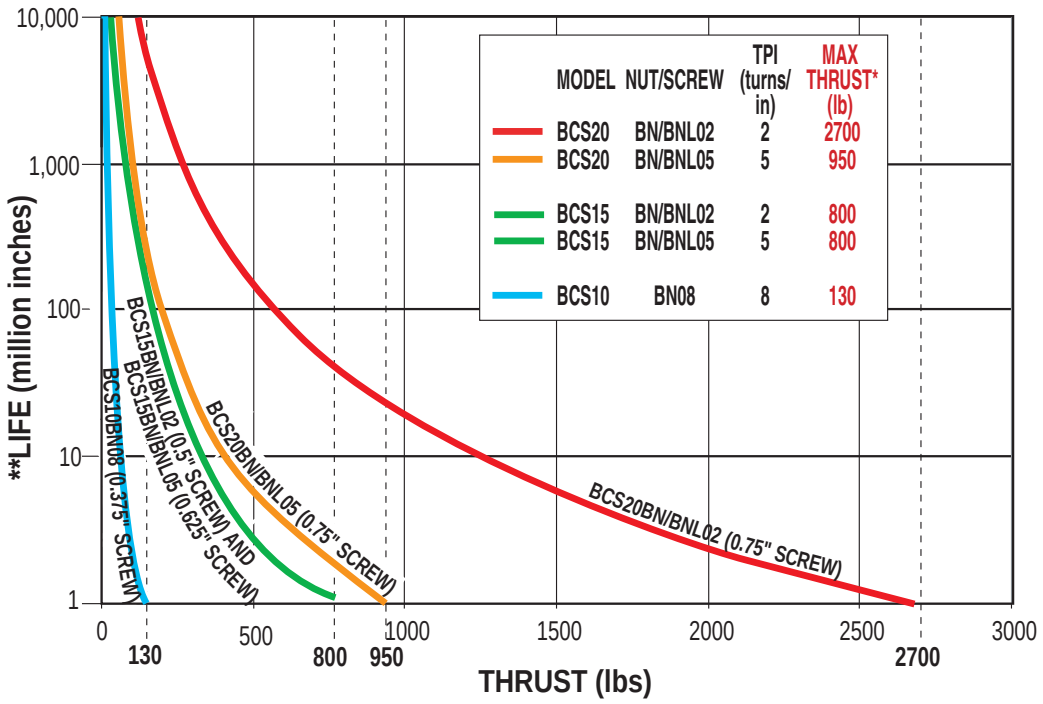


RODLESS

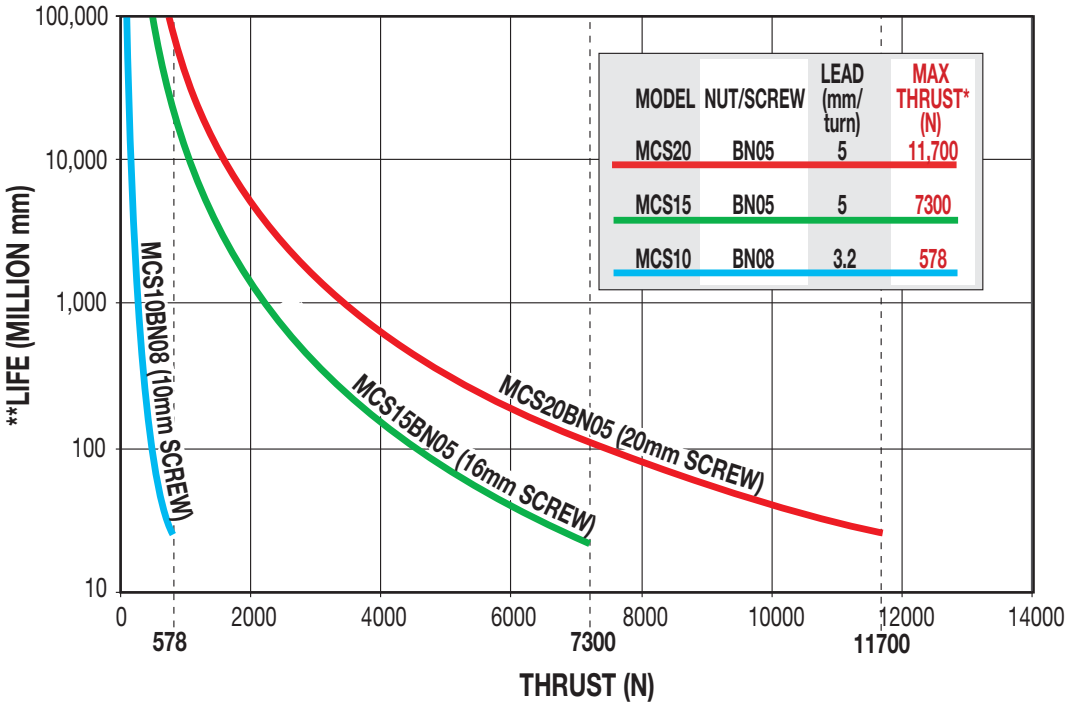
BCS/MCS Series

- Ball screw life calculations

LIFE CAPACITIES WITH ENGLISH BALL SCREW



LIFE CAPACITIES WITH METRIC BALL SCREW



Maximum thrust reflects 90% reliability for 1 million linear inches of travel.

Dotted lines represent maximum thrust for screw selections.

****Life indicates theoretical maximum life of screw only, under ideal conditions and does not indicate expected life of actuator.***

BCS/MCS Screw Drives

OVERALL SERIES SPECIFICATIONS

SPECIFICATIONS RELATED TO ACTUATOR SIZE AND SCREW SELECTION

ENGLISH LEAD SCREWS

ACTUATOR SERIES	SCREW DIA. (in)	SCREW TYPE	TPI (turns/ in)	LEAD ACCURACY (in/ft)	BACKLASH (in)	MAXIMUM THRUST* (lb)	MAXIMUM STROKE (in)	INERTIA (lb-in²) BASE ACTUATOR In Line	INERTIA (lb-in²) BASE ACTUATOR Rev. Parallel	INERTIA (lb-in²) PER/in OF STROKE	BREAKAWAY TORQUE (lb-in)
BCS10	0.375	BN	08	0.004	0.015	130	61	0.0046	0.0054	0.0005	1.000
	0.375	BNL	08	0.004	0.002	130	61	0.0046	0.0054	0.0005	1.000
	0.500	SN	01	0.006	0.007	170	85	0.0321	0.0348	0.0017	1.857
	0.500	SN	02	0.005	0.007	170	120	0.0190	0.0217	0.0017	1.563
	0.500	SNA	02	0.005	0.003	170	120	0.0190	0.0217	0.0017	1.563
	0.500	SN	05	0.006	0.007	170	120	0.0153	0.0180	0.0017	1.125
BCS15	0.500	BN	02	0.003	0.015	800	59	0.0299	0.0327	0.0017	1.375
	0.500	BNL	02	0.003	0.002	800	59	0.0299	0.0327	0.0017	1.375
	0.625	BN	05	0.003	0.015	800	59	0.0455	0.0524	0.0042	1.188
	0.625	BNL	05	0.003	0.002	800	59	0.0455	0.0524	0.0042	1.188
	0.625	SN	02	0.005	0.007	200	120	0.0558	0.0627	0.0042	1.563
	0.750	SN	01	0.005	0.007	300	120	0.1391	0.1536	0.0087	2.188
BCS20	0.750	BN	02	0.004	0.015	2700	120	0.1241	0.1374	0.0087	1.750
	0.750	BNL	02	0.004	0.002	2700	120	0.1241	0.1374	0.0087	1.750
	0.750	BN	05	0.003	0.015	950	120	0.1091	0.1224	0.0087	1.563
	0.750	BNL	05	0.003	0.002	950	120	0.1091	0.1224	0.0087	1.563
	0.750	SN	01	0.005	0.007	300	120	0.1775	0.1908	0.0087	3.125
	0.750	SN	02	0.005	0.007	300	120	0.1241	0.1374	0.0087	2.188

METRIC LEAD SCREWS

ACTUATOR SERIES	SCREW DIA. (mm)	SCREW TYPE	LEAD (mm/ turn)	LEAD ACCURACY (mm/300)	BACKLASH (mm)	MAXIMUM THRUST* (N)	MAXIMUM STROKE (mm)	INERTIA (kg-m² x 10⁻⁶) BASE ACTUATOR In Line	INERTIA (kg-m² x 10⁻⁶) BASE ACTUATOR Rev. Parallel	INERTIA (kg-m² x 10⁻⁶) PER/mm OF STROKE	BREAKAWAY TORQUE (N-m)
MCS10	10	BN	3.2	0.13	0.38	578	1549	31.94	37.50	3.472	0.11
	10	BNL	3.2	0.13	0.05	578	1549	31.94	67.50	3.472	0.11
	12	SN	12	0.13	0.18	800	3048	4.53	5.18	0.410	0.20
	12	SN	25	0.13	0.18	800	1626	8.34	8.98	0.410	0.28
MCS15	15	SN	12	0.13	0.18	900	3048	13.22	14.83	0.966	0.27
	16	BN	5	0.13	0.38	7300	1499	13.69	15.77	1.258	0.16
	16	BNL	5	0.13	0.05	7300	1499	13.69	15.77	1.258	0.16
	19	SN	25	0.13	0.18	1400	3048	39.98	44.17	2.517	0.32
MCS20	19	SN	12	0.13	0.18	1400	3048	35.42	39.28	2.517	0.39
	19	SN	25	0.13	0.18	1400	3048	50.95	54.81	2.517	0.57
	20	BN	5	0.13	0.38	11700	3048	38.61	43.32	3.102	0.25
	20	BNL	5	0.13	0.05	11700	3048	38.61	43.32	3.102	0.25

SCREW CODE	*DESCRIPTION*
SN	*Solid Nut*
SNA	*Anti-backlash Solid Nut*
BN	*Ball Nut*
BNL	*Low-Backlash Ball Nut*

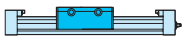
Contact the factory for higher accuracy and lower backlash options.

**** For Acme screws, maximum thrust is the maximum continuous dynamic thrust subject to Thrust x Velocity limitation.***

For ball screws, maximum thrust reflects 90% reliability for 1 million linear inches of travel.

BCS/MCS Screw Drives

OVERALL SERIES SPECIFICATIONS



RODLESS

BCS/MCS Series

- General actuator specifications
- Friction force
- Support recommendations

GENERAL ACTUATOR SPECIFICATIONS

BCS ENGLISH ACTUATORS					
ACTUATOR SERIES	CARRIER WEIGHT (lb)	BASE WEIGHT (lb) (Including Carrier)	WEIGHT PER/IN OF STROKE (lb)	TEMPERATURE RANGE* (F°)	IP RATING**
BCS10	0.69	2.91	0.176	40 - 130	44
BCS15	1.94	6.61	0.392	40 - 130	44
BCS20	2.81	14.59	0.666	40 - 130	44

MCS METRIC ACTUATORS					
ACTUATOR SERIES	CARRIER WEIGHT (kg)	BASE WEIGHT (kg) (Including Carrier)	WEIGHT PER/mm OF STROKE (g)	TEMPERATURE RANGE* (C°)	IP RATING**
MCS10	0.31	1.32	3.1	4 - 54	44
MCS15	0.88	2.90	7.0	4 - 54	44
MCS20	1.27	6.62	11.9	4 - 54	44

BCS CARRIER BRACKET BOLT ADJUSTMENT (ALL SIZES)

BCS carrier bracket adjustment bolts should be adjusted to suit each individual application, depending on the degree of rigidity required. A good starting point is to tighten the nut on the bolt until there is no lateral movement of the bolt. Then, equally tighten each nut on the carrier bolt while moving the carrier by hand along the length of the stroke. When all lateral play in the carrier is eliminated and free movement along the length of the stroke is maintained, your carrier bracket is adjusted properly. Some applications may require fine tuning of this adjustment to gain more lateral play or a higher degree of rigidity. In demanding applications, carrier adjustments should be done periodically.

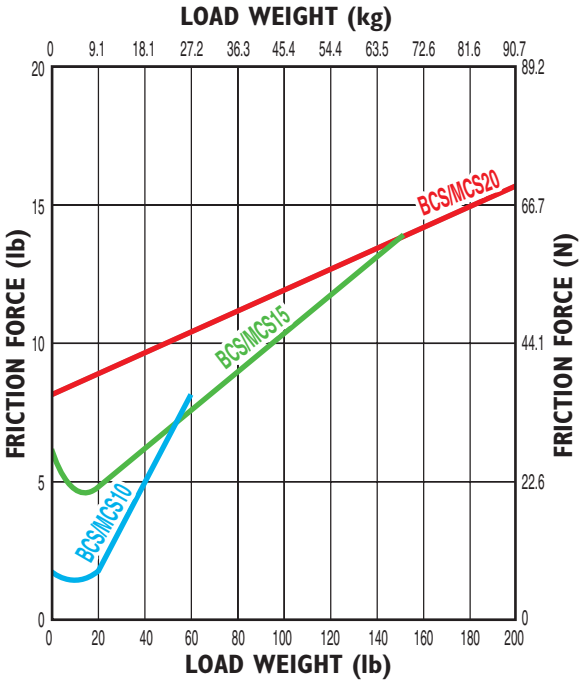
**** CAUTION:***
Over-tightening increases drive torque of motor and drive.

**** Heat generated by the motor and drive should be taken into consideration as well as linear velocity and work cycle time. For applications that require operation outside of the recommended temperature range, contact the factory.***

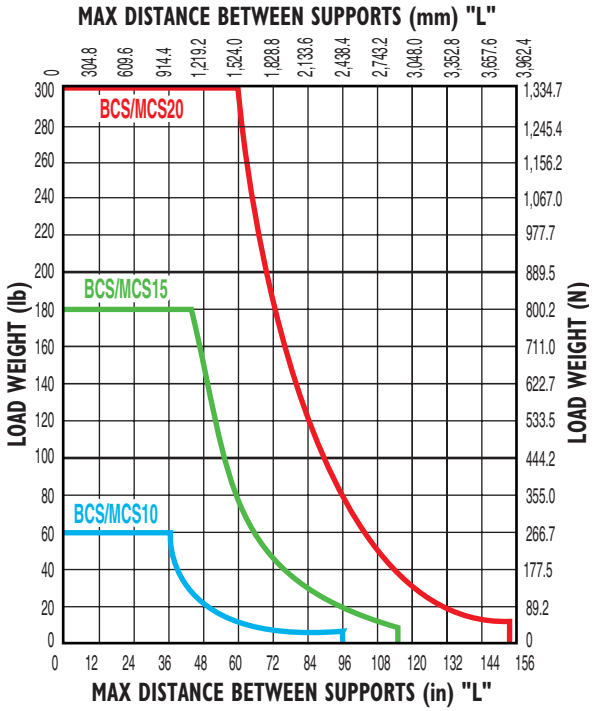
***** Protected against ingress of solid particles greater than .039 in (1mm) and splashing water***

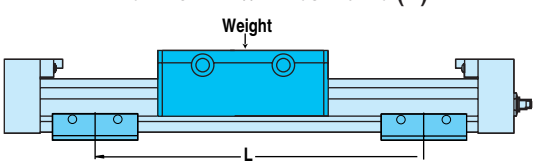
LARGE FRAME MOTORS AND SMALLER SIZE ACTUATORS: Cantilevered motors need to be supported, if subjected to continuous rapid reversing duty and/or under dynamic conditions.

FRICTION FORCE



SUPPORT RECOMMENDATIONS

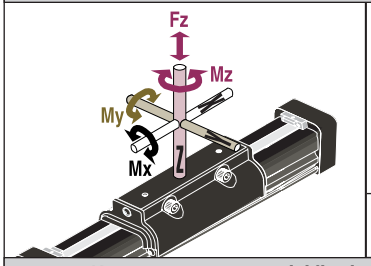
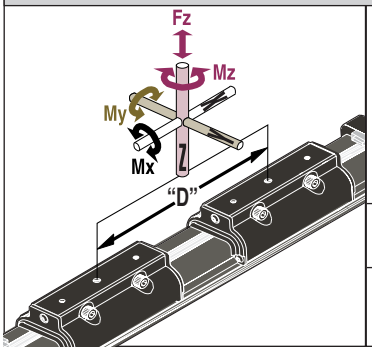




BCS/MCS Screw Drives

OVERALL SERIES SPECIFICATIONS

DYNAMIC BENDING MOMENTS AND LOADS

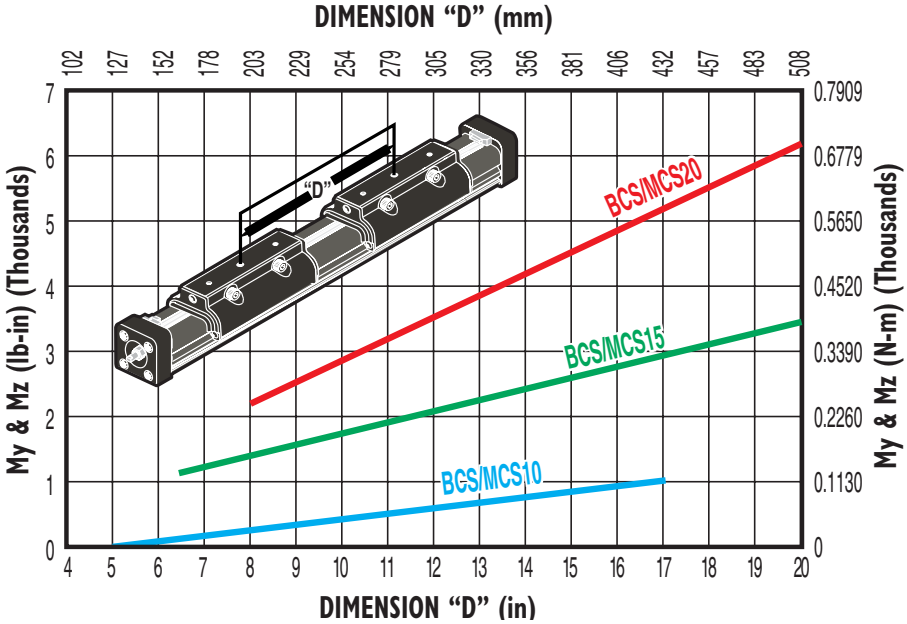
MAXIMUM BENDING MOMENTS AND LOADS		ENGLISH			METRIC		
STANDARD CARRIER		**BCS10**	**BCS15**	**BCS20**	**MCS10**	**MCS15**	**MCS20**
	**Mx Moment** (Roll) (lb-in : N-m)	55	275	300	6.2	31.1	33.9
	My Moment (Pitch) (lb-in : N-m)	100	500	1100	11.3	56.5	124.3
	Mz Moment (Yaw) (lb-in : N-m)	30	200	325	3.4	22.6	36.7
	Fz Load (Lateral) (lb : N)	60	180	300	267	801	1335
AUXILIARY CARRIER: Increases rigidity, load-carrying capacity and moments		**BCS10**	**BCS15**	**BCS20**	**MCS10**	**MCS15**	**MCS20**
	**Mx Moment** (Roll) *(lb-in : N-m)	110	550	600	12.4	62.1	67.8
	My Moment (Pitch) *(lb-in : N-m)	287	1453	2430	32.4	164.1	274.6
	Mz Moment (Yaw) *(lb-in : N-m)	287	1453	2430	32.4	164.1	274.6
	Fz Load (Lateral) (lb : N)	120	360	600	534	1602	2670
	Minimum Dimension 'D' (in : mm)	5.10	6.50	8.10	129.5	165.0	206.0

Please see BCS Carrier Bracket Bolt Adjustment on page C-108

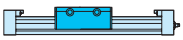
Breakaway torque will increase when using the Auxiliary carrier option. When ordering, determine your working stroke and enter this value into the configuration string. Overall actuator length will automatically be calculated.

Loads shown in table are at minimum "D" dimension, for ratings with longer "D" dimension see graph below.

AUXILIARY CARRIER: BENDING MOMENT AT 'D' DISTANCE



Rates shown on charts were calculated with these assumptions:
1.) Coupling between carriers is rigid.
2.) Load is equally distributed between carriers.
3.) Coupling device applies no misalignment loads to carriers.
* Customer must specify Dimension "D" (Distance between carrier center lines) in configuration string.



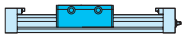
RODLESS

BCS/MCS Series

- Bending moments and loads
- Auxiliary carrier

BCS/MCS10 Series

ACME SCREW SPECIFICATIONS



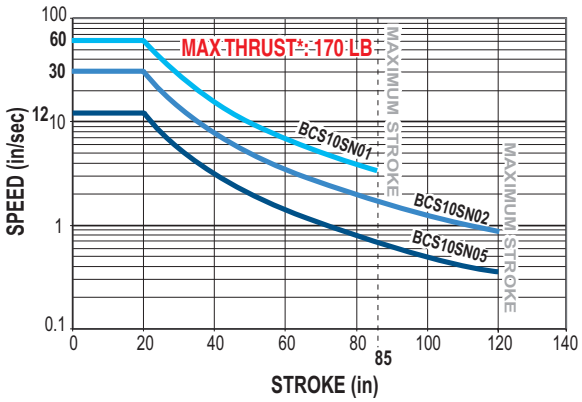
RODLESS

BCS/MCS10 Series

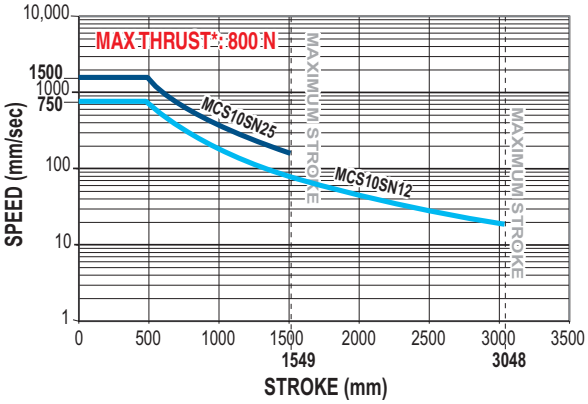
- Acme screw critical speed capacities and PV limits

BCS10/MCS10 ACME SCREW CRITICAL SPEED AND PV LIMITS

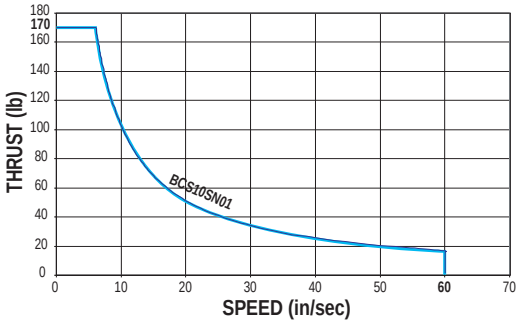
CRITICAL SPEED WITH 1/2" ENGLISH ACME SCREW



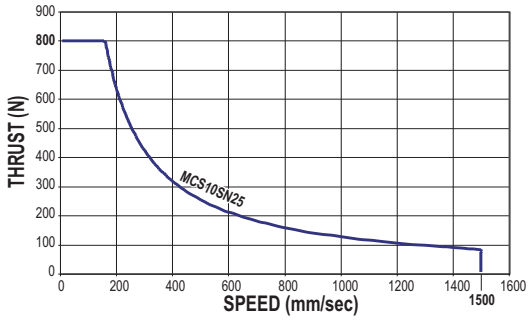
CRITICAL SPEED WITH 12mm METRIC ACME SCREW



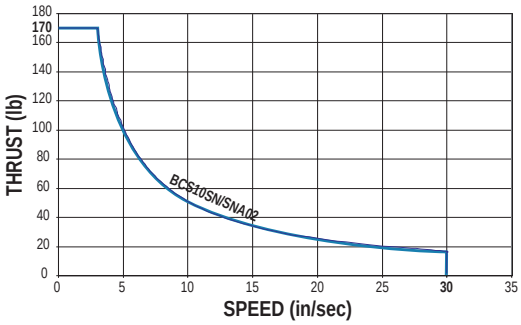
PV LIMITS: 1/2" 1 TPI ENGLISH ACME SCREW



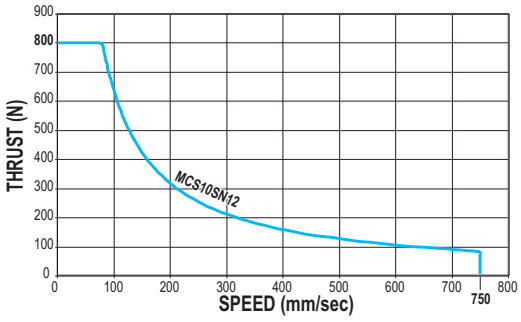
PV LIMITS: 12mm ACME METRIC SCREW w/25mm LEAD



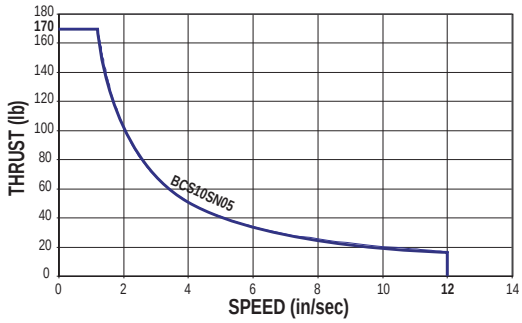
PV LIMITS: 1/2" 2 TPI ENGLISH ACME SCREW



PV LIMITS: 12mm ACME METRIC SCREW w/12mm LEAD



PV LIMITS: 1/2" 5 TPI ENGLISH ACME SCREW



SN = Solid Nut
SNA = Solid Anti-backlash Nut

**** Maximum thrust is the maximum continuous dynamic thrust subject to Thrust x Velocity limitation.***

PV LIMITS: Any material which carries a sliding load is limited by heat buildup. The factors that affect heat generation rate in an application are the pressure on the nut in pounds per square inch and the surface velocity in feet per minute. The product of these factors provides a measure of the severity of an application.

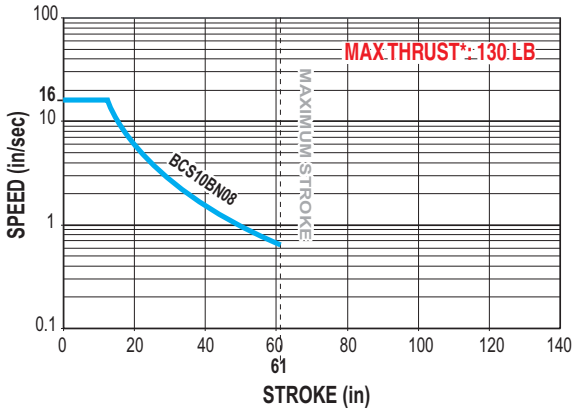
$$\left(\frac{\text{P Thrust}}{\text{(Max. Thrust Rating)}}\right) \text{x} \left(\frac{\text{V Speed}}{\text{(Max. Speed Rating)}}\right) \leq 0.1 \quad \text{x} \leq 0.1$$

BCS/MCS10 Series

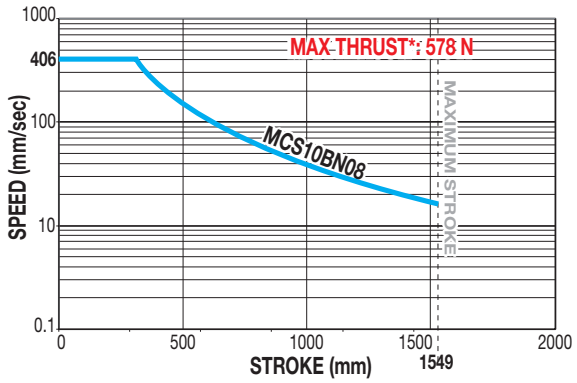
BALL SCREW SPECIFICATIONS

BCS/MCS10 BALL SCREW SPECIFICATIONS

CRITICAL SPEED WITH 3/8" ENGLISH BALL SCREW



CRITICAL SPEED WITH 10mm METRIC BALL SCREW

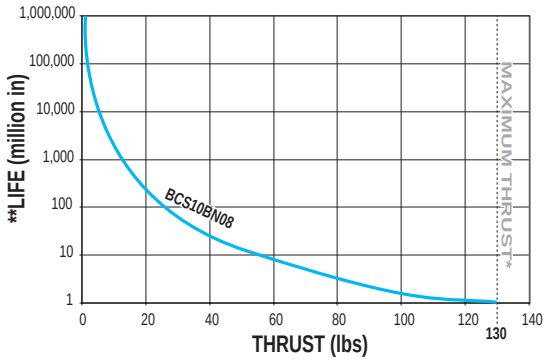


RODLESS

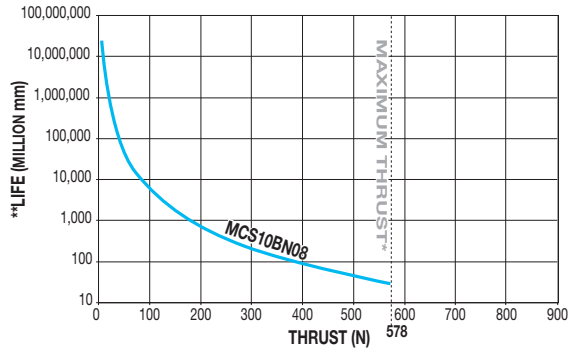
BCS/MCS10 Series

- Ball screw critical speed capacities and life calculations

LIFE CALCULATION: 3/8" 8TPI ENGLISH BALL SCREW



LIFE CALCULATION: 10mm METRIC BALL SCREW w/3.2mm LEAD



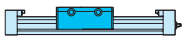
BN = Ball Nut

**** Maximum thrust reflects 90% reliability for 1 million linear inches of travel.***

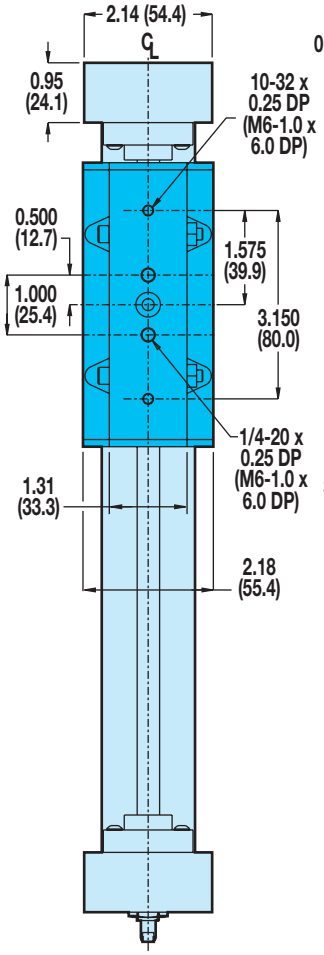
*****Life indicates theoretical maximum life of screw only, under ideal conditions and does not indicate expected life of actuator.***

DIMENSIONS

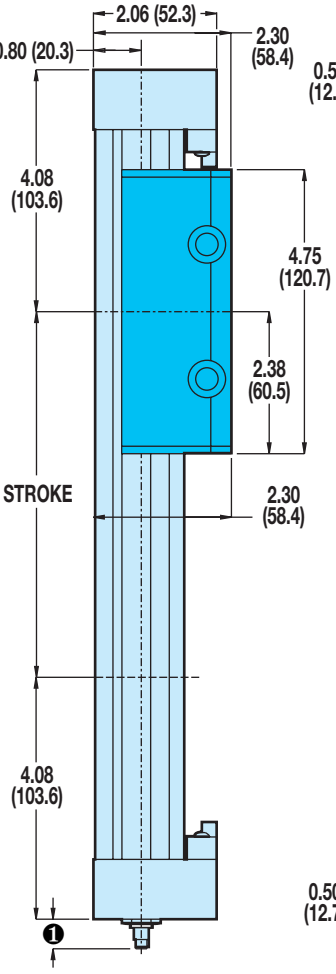
BCS10/MCS10 ACTUATOR AND OPTIONS



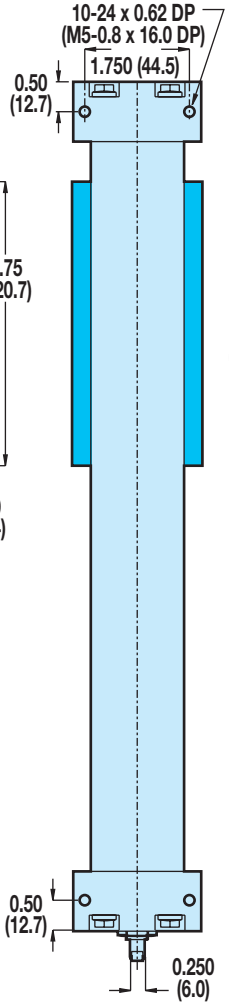
TOP VIEW



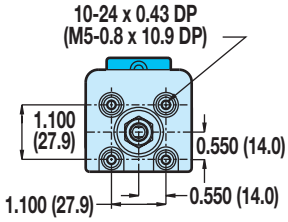
SIDE VIEW



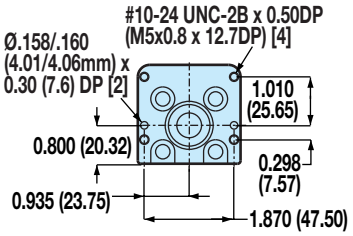
BOTTOM VIEW



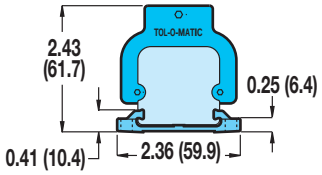
END VIEW

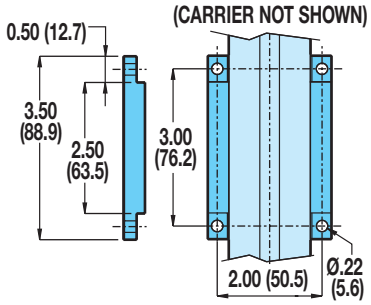


MOTOR MOUNTING

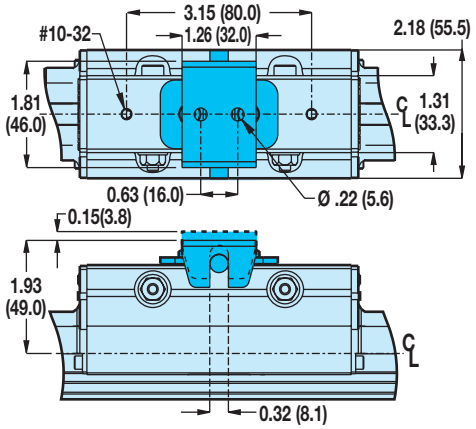


OPTIONAL TUBE SUPPORTS



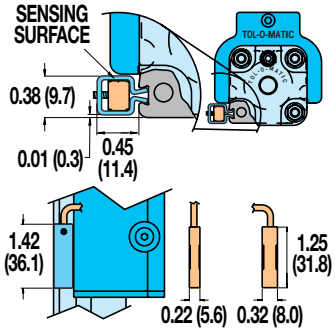


OPTIONAL FLOATING MOUNT

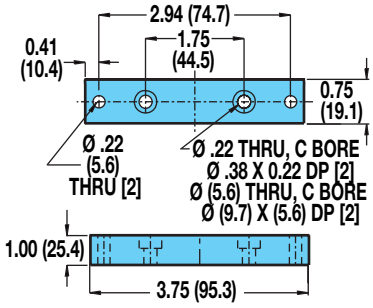


OPTIONAL SWITCH MOUNTING

❷❸❹⚠



OPTIONAL MOUNTING PLATES



❶ **SHAFT LENGTH**

In-line mounting	0.53 (13.5)
Extended shaft for RP & 23-frame motor	1.89 (48.0)
Extended shaft for RP & 34-frame motor	2.10 (53.3)
Extended shaft for purchases prior to 6/24/02	1.53 (38.9)

❷ ⚠ CAUTION: DO NOT OVERTIGHTEN SWITCH HARDWARE WHEN INSTALLING

❸ NOTE: The scored face of the switch indicates the sensing surface and must face toward the magnet

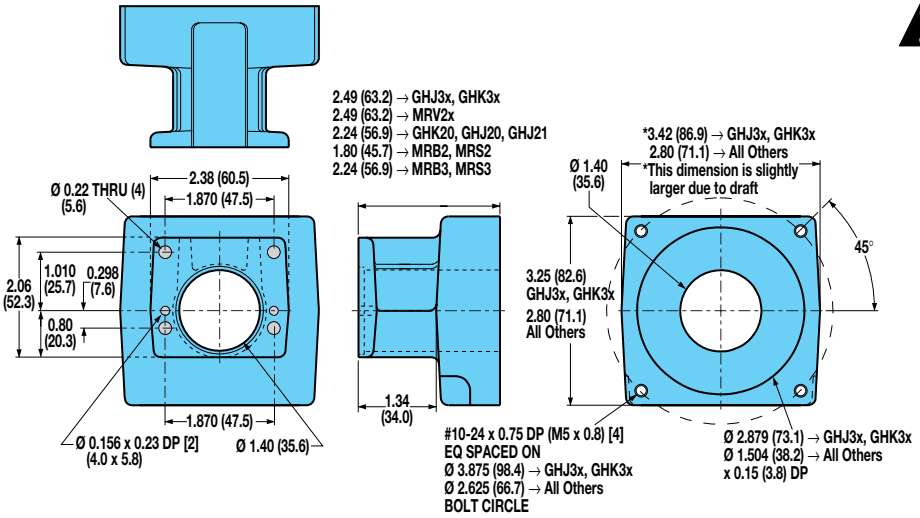
❹ NOTE: Some actuators require switch mounting on a specific side of the actuator. Call Tol-O-Matic 1-800-328-2174 for details

Unless otherwise noted, all dimensions shown are in inches (Dimensions in parenthesis are in millimeters)

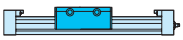
BCS/MCS10 Series

DIMENSIONS

BCS/MCS10: IN-LINE MOUNT FOR MOTORS OR GEARHEADS



For gearhead dimensions and specifications, refer to page F-10.



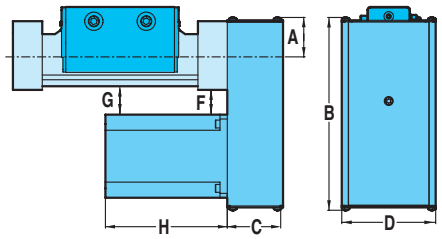
RODLESS

BCS/MCS10 Series

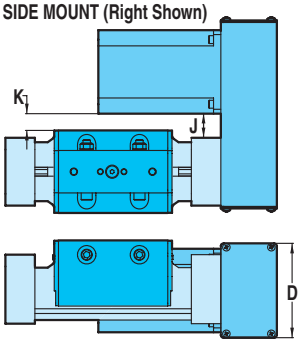
- In-line motor mounting
- Reverse parallel mounting

BCS/MCS10: REVERSE PARALLEL MOUNTING

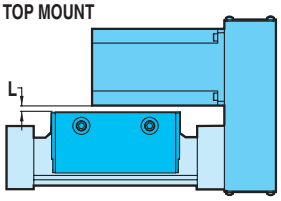
BOTTOM MOUNT



SIDE MOUNT (Right Shown)



TOP MOUNT



SPECIFICATIONS

	MOTOR	WEIGHT OF REDUCTION DRIVE				REDUCTION INERTIA AT MOTOR SHAFT			
		1:1		2:1		1:1		2:1	
		lbs	kg	lbs	kg	lb-in²	kg-cm²	lb-in²	kg-cm²
BRUSHLESS	MRV21, 22, 23, 24	2.06	0.9344	2.06	.9344	.070	.2043	.095	.2767

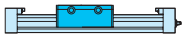
REDUCTION EFFICIENCY: 0.95

DIMENSIONS

	MOTOR	A		B		C		D		F		G		H		J		K		L	
		in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
BRUSHLESS	MRV21	1.44	36.6	6.96	176.7	2.13	54.0	3.25	82.6	1.81	45.9	1.83	46.5	4.75	120.7	1.54	39.1	1.83	46.5	1.11	28.2
	MRV22	1.44	36.6	6.96	176.7	2.13	54.0	3.25	82.6	1.81	45.9	1.83	46.5	5.75	146.1	1.54	39.1	1.83	46.5	1.11	28.2
	MRV23	1.44	36.6	6.96	176.7	2.13	54.0	3.25	82.6	1.81	45.9	1.83	46.5	6.75	171.5	1.54	39.1	1.83	46.5	1.11	28.2
	MRV24	1.44	36.6	6.96	176.7	2.13	54.0	3.25	82.6	1.81	45.9	1.83	46.5	7.75	196.9	1.54	39.1	1.83	46.5	1.11	28.2

BCS/MCS15 Series

ACME SCREW SPECIFICATIONS



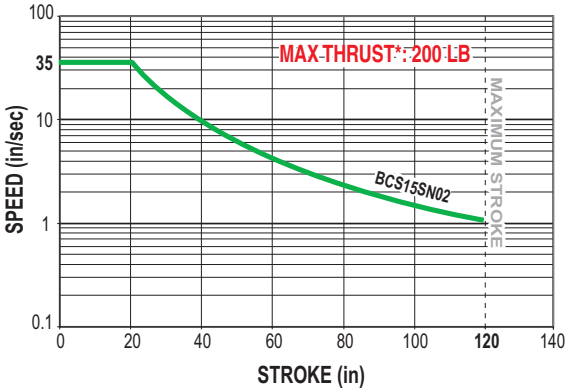
RODLESS

BCS/MC15S Series

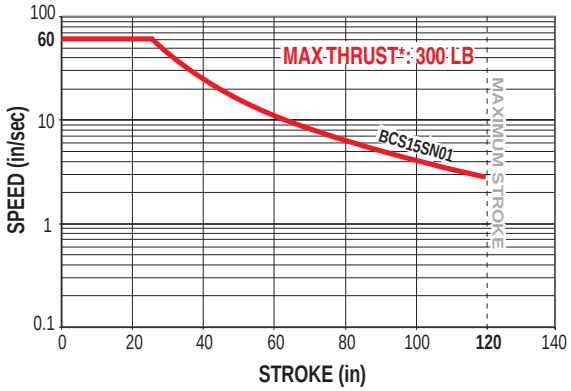
- English acme screw critical speed capacities and PV limits

BCS15 ENGLISH ACME SCREW SPECIFICATIONS

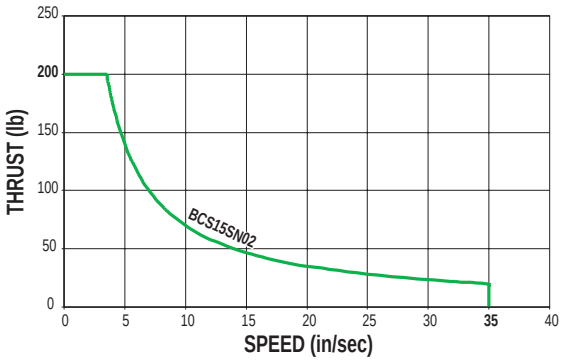
CRITICAL SPEED WITH 5/8" ENGLISH ACME SCREW



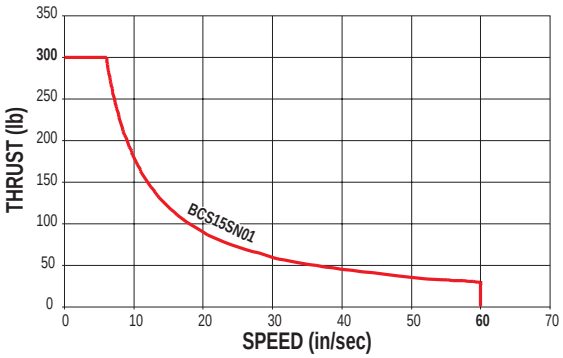
CRITICAL SPEED WITH 3/4" ENGLISH ACME SCREW



PV LIMITS: 5/8" 2TPI ENGLISH ACME SCREW



PV LIMITS: 3/4" 1TPI ENGLISH ACME SCREW



SN = Solid Nut
SNA = Solid Anti-backlash Nut

**** Maximum thrust is the maximum continuous dynamic thrust subject to Thrust x Velocity limitation.***

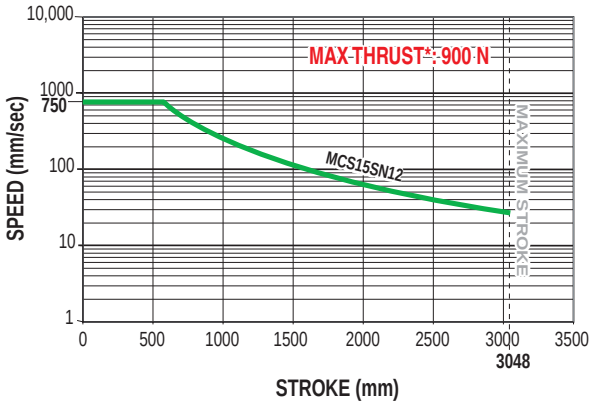
PV LIMITS: Any material which carries a sliding load is limited by heat buildup. The factors that affect heat generation rate in an application are the pressure on the nut in pounds per square inch and the surface velocity in feet per minute. The product of these factors provides a measure of the severity of an application.

$$\left(\frac{P}{\text{(Max. Thrust Rating)}}\right) \text{ x } \left(\frac{V}{\text{(Max. Speed Rating)}}\right) \leq 0.1$$

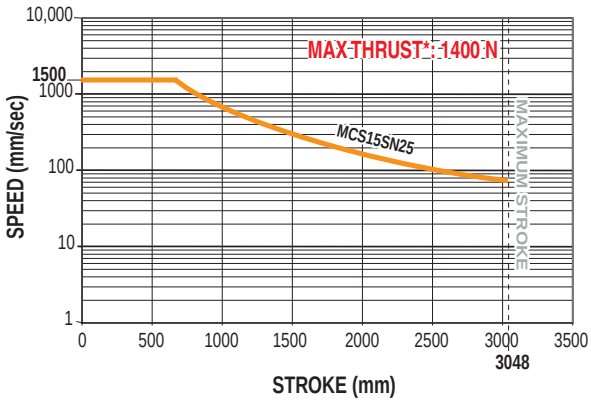
$$\frac{\text{Thrust}}{\text{(Max. Thrust Rating)}} \text{ x } \frac{\text{Speed}}{\text{(Max. Speed Rating)}} \leq 0.1$$

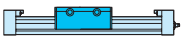
MCS15 METRIC ACME SCREW SPECIFICATIONS

CRITICAL SPEED WITH 15mm METRIC ACME SCREW



CRITICAL SPEED WITH 19mm METRIC ACME SCREW



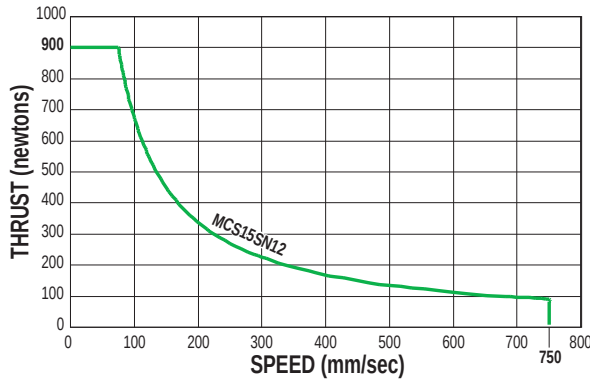


RODLESS

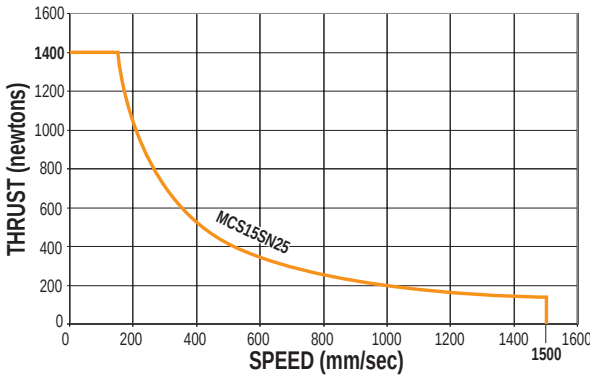
BCS/MCS15 Series

- Metric acme screw critical speed capacities and PV limits

PV LIMITS: 15mm METRIC ACME SCREW w/12mm LEAD



PV LIMITS: 19mm METRIC ACME SCREW w/25mm LEAD



SN = Solid Nut

**** Maximum thrust is the maximum continuous dynamic thrust subject to Thrust x Velocity limitation.***

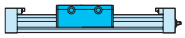
PV LIMITS: Any material which carries a sliding load is limited by heat buildup. The factors that affect heat generation rate in an application are the pressure on the nut in pounds per square inch and the surface velocity in feet per minute. The product of these factors provides a measure of the severity of an application.

$$\left(\frac{P}{\text{Thrust}}\right) \text{ x } \left(\frac{V}{\text{Speed}}\right) \leq 0.1$$

$$\left(\frac{P}{\text{(Max. Thrust Rating)}}\right) \text{ x } \left(\frac{V}{\text{(Max. Speed Rating)}}\right) \leq 0.1$$

BCS/MCS15 Series

BALL SCREW SPECIFICATIONS



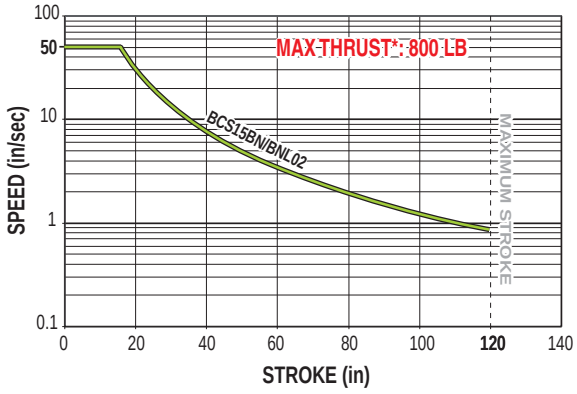
RODLESS

BCS/MCS15 Series

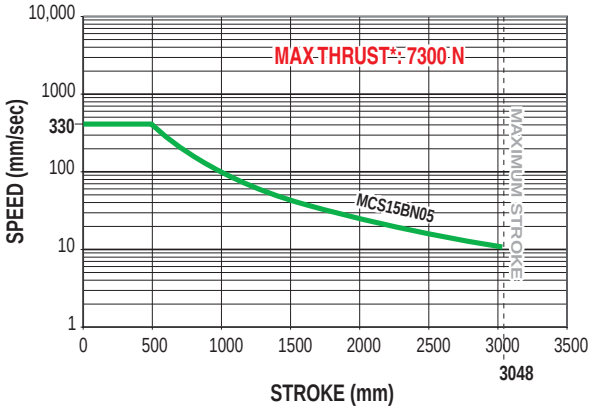
- Ball screw critical speed capacities and life calculations

BCS/MCS15 BALL SCREW SPECIFICATIONS

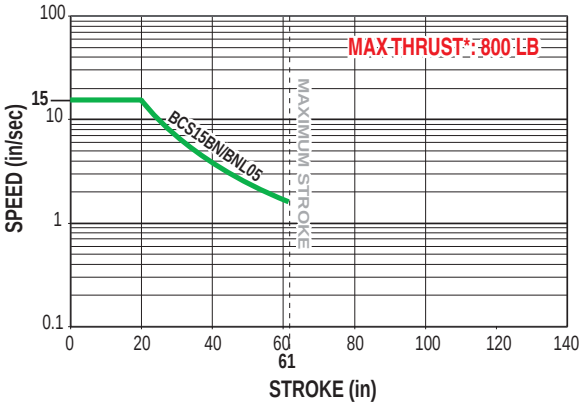
CRITICAL SPEED WITH 1/2" ENGLISH BALL SCREW



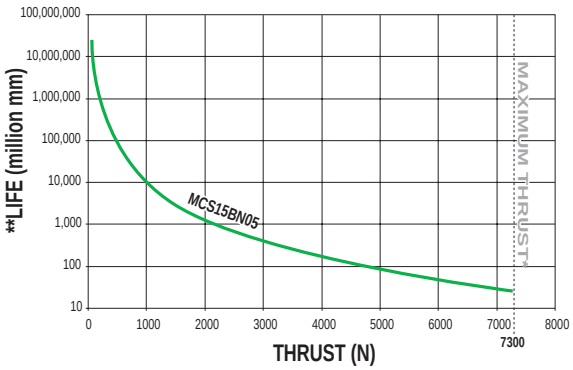
CRITICAL SPEED WITH 16mm METRIC BALL SCREW



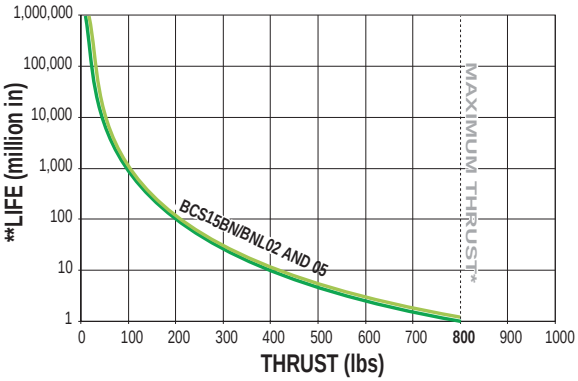
CRITICAL SPEED WITH 5/8" ENGLISH BALL SCREW



LIFE CALCULATION: 16mm METRIC BALL SCREW w/5mm LEAD



LIFE CALCULATION: 1/2" w/2TPI & 5/8" w/5TPI ENGLISH BALL SCREW

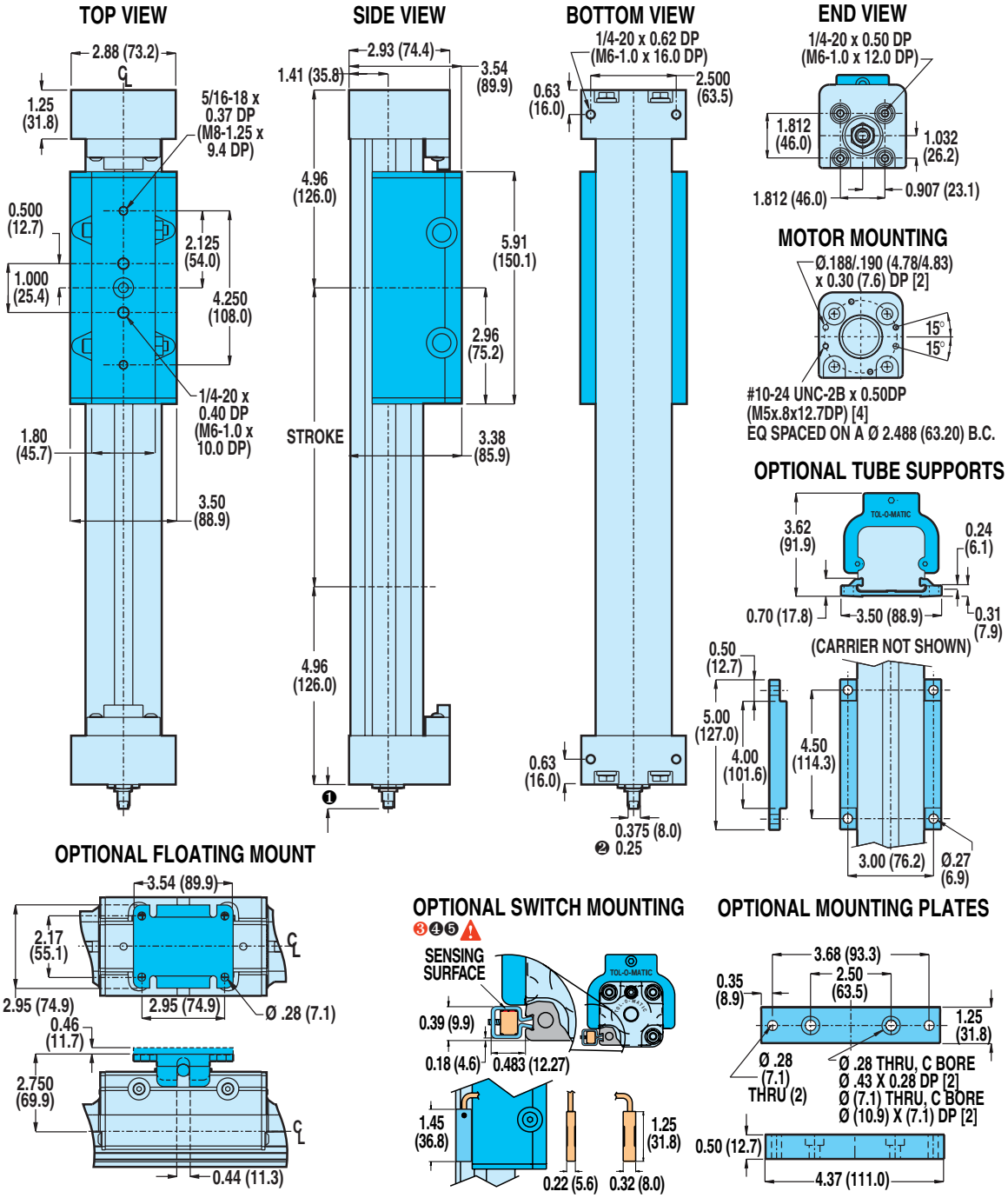


BN = Ball Nut
BNL = Ball Nut with Low-Backlash

**** Maximum thrust reflects 90% reliability for 1 million linear inches of travel.***

*****Life indicates theoretical maximum life of screw only, under ideal conditions and does not indicate expected life of actuator.***

BCS15/MCS15 ACTUATOR AND OPTIONS



❶ SHAFT LENGTH

In-line mounting	0.65 (16.5)
Extended shaft for RP & 23-frame motor	1.94 (49.3)
Extended shaft for RP & 34-frame motor	2.15 (54.6)
Extended shaft for RP & 40-frame motor	2.31 (58.7)
Extended shaft for purchases prior to 6/24/02	1.90 (48.2)

❷ FOR 1/2" 2TPI BALL-SCREW STYLE ONLY

❸ CAUTION: DO NOT OVERTIGHTEN SWITCH HARDWARE WHEN INSTALLING

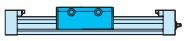
❹ NOTE: The scored face of the switch indicates the sensing surface and must face toward the magnet

❺ NOTE: Some actuators require switch mounting on a specific side of the actuator. Call Tol-O-Matic 1-800-328-2174 for details

Unless otherwise noted, all dimensions shown are in inches (Dimensions in parenthesis are in millimeters)

BCS/MCS15 Series

DIMENSIONS

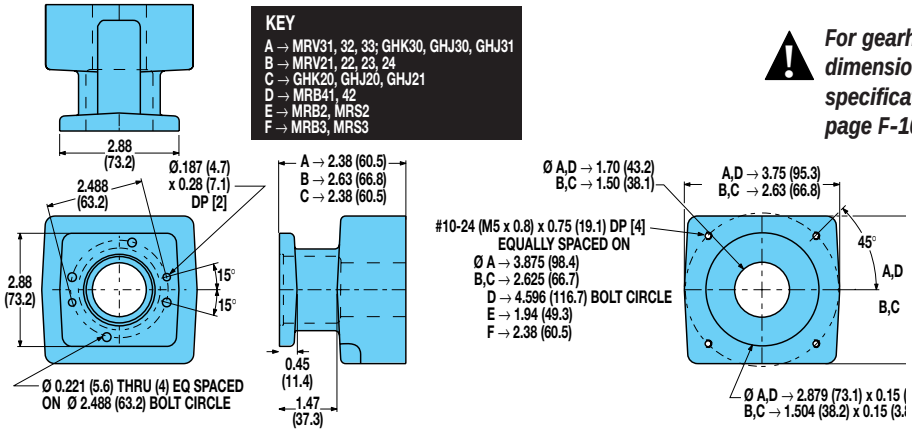


RODLESS

BCS/MCS15 Series

- In-line motor mounting
- Reverse parallel mounting dimensions

BCS/MCS15: IN-LINE MOUNT FOR MOTORS AND GEARHEADS



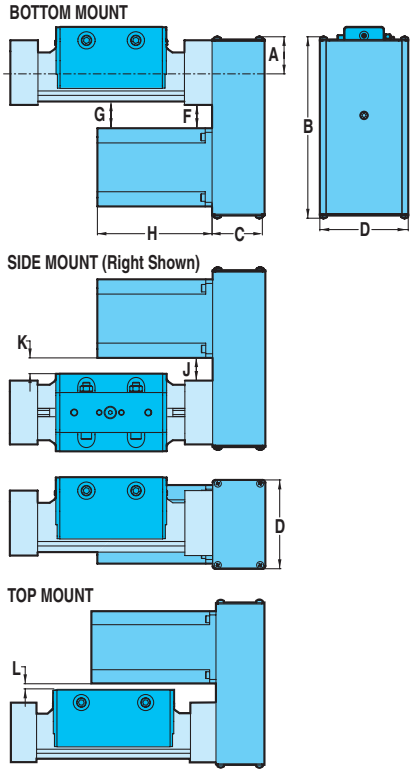
For gearhead dimensions and specifications, refer to page F-10.

BCS/MCS15: REVERSE PARALLEL MOUNTING

SPECIFICATIONS

	MOTOR	WEIGHT OF REDUCTION DRIVE				REDUCTION INERTIA AT MOTOR SHAFT			
		1:1		2:1		1:1		2:1	
		lbs	kg	lbs	kg	lb-in²	kg-cm²	lb-in²	kg-cm²
BRUSHLESS	MRV21, 22, 23, 24	2.17	0.9843	2.40	1.0886	.070	.2043	.095	.2767
	MRV31, 32, 33	2.61	1.1839	2.84	1.2882	.070	.2043	.095	.2767

REDUCTION EFFICIENCY: 0.95



DIMENSIONS

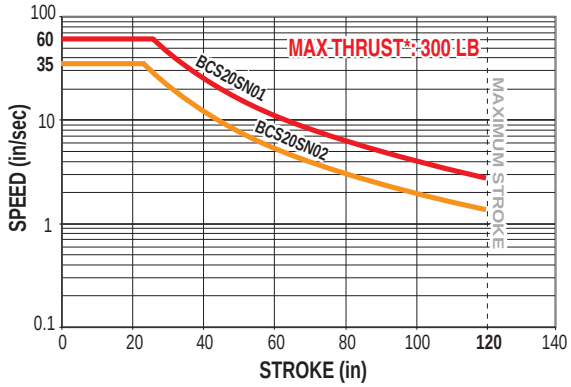
	MOTOR	A		B		C		D		F		G		H		J		K		L	
		in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
BRUSHLESS	MRV21	1.44	36.6	7.46	189.4	2.13	54.0	3.25	82.6	1.70	43.2	1.85	47.0	4.75	120.7	1.67	42.4	1.86	47.2	0.98	25.3
	MRV22	1.44	36.6	7.46	189.4	2.13	54.0	3.25	82.6	1.70	43.2	1.85	47.0	5.75	146.1	1.67	42.4	1.86	47.2	0.98	25.3
	MRV23	1.44	36.6	7.46	189.4	2.13	54.0	3.25	82.6	1.70	43.2	1.85	47.0	6.75	171.5	1.67	42.4	1.86	47.2	0.98	25.3
	MRV24	1.44	36.6	7.46	189.4	2.13	54.0	3.25	82.6	1.70	43.2	1.85	47.0	7.75	196.9	1.67	42.4	1.86	47.2	0.98	25.3
	MRV31	2.12	53.8	8.14	206.6	2.38	60.3	4.00	101.6	1.05	26.7	1.21	30.7	6.11	155.2	1.02	25.9	1.21	30.7	0.33	8.9
	MRV32	2.12	53.8	8.14	206.6	2.38	60.3	4.00	101.6	1.05	26.7	1.21	30.7	7.36	186.9	1.02	25.9	1.21	30.7	0.33	8.9
	MRV33	2.12	53.8	8.14	206.6	2.38	60.3	4.00	101.6	1.05	26.7	1.21	30.7	8.61	218.7	1.02	25.9	1.21	30.7	0.33	8.9

BCS/MCS20 Series

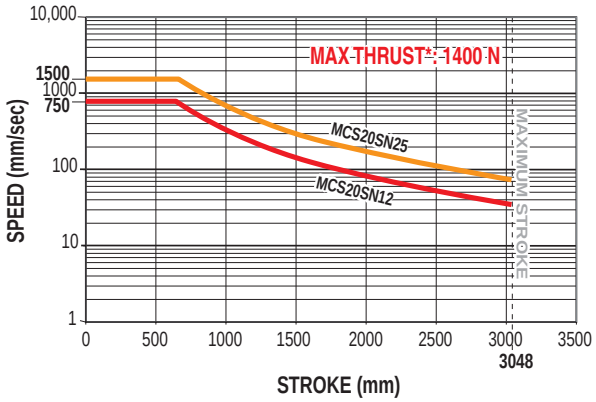
ACME SCREW SPECIFICATIONS

BCS/MCS20 ACME SCREW SPECIFICATIONS

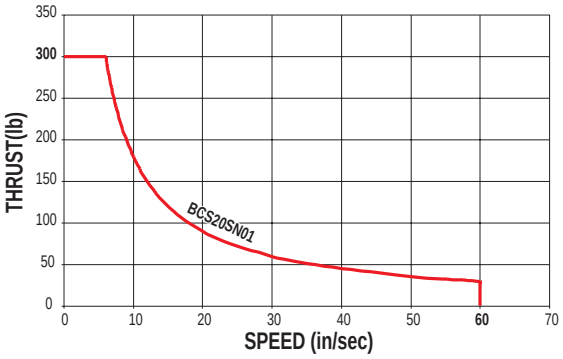
CRITICAL SPEED WITH 3/4" ENGLISH ACME SCREW



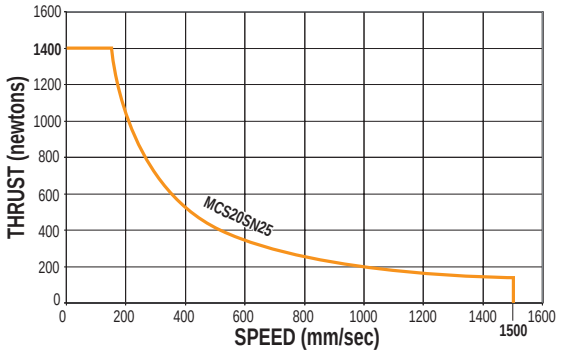
CRITICAL SPEED WITH 19mm METRIC ACME SCREW



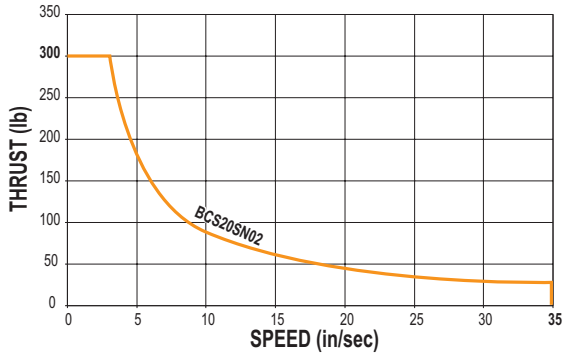
PV LIMITS: 3/4" 1TPI ENGLISH ACME SCREW



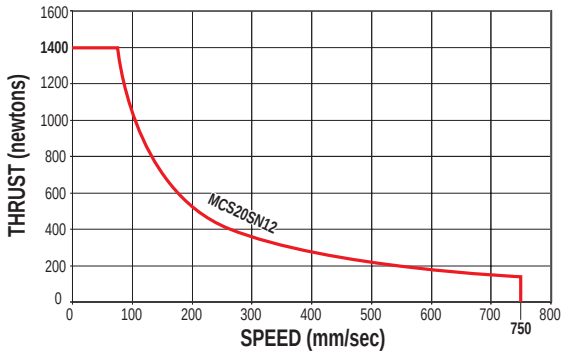
PV LIMITS: 19mm METRIC ACME SCREW w/25mm LEAD



PV LIMITS: 3/4" 2TPI ENGLISH ACME SCREW



PV LIMITS: 19mm METRIC ACME SCREW w/12mm LEAD

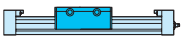


SN = Solid Nut
SNA = Solid Anti-backlash Nut

** Maximum thrust is the maximum continuous dynamic thrust subject to Thrust x Velocity limitation.*

***PV LIMITS:** Any material which carries a sliding load is limited by heat buildup. The factors that affect heat generation rate in an application are the pressure on the nut in pounds per square inch and the surface velocity in feet per minute. The product of these factors provides a measure of the severity of an application.*

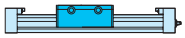
$$\left(\frac{P}{\text{Thrust}}\right) \text{ x } \left(\frac{V}{\text{Speed}}\right) \leq 0.1$$
$$\text{(Max. Thrust Rating)} \qquad \text{(Max. Speed Rating)}$$
$$\text{x} \leq 0.1$$



RODLESS

BCS/MCS20 Series

- Acme screw critical speed capacities and PV limits



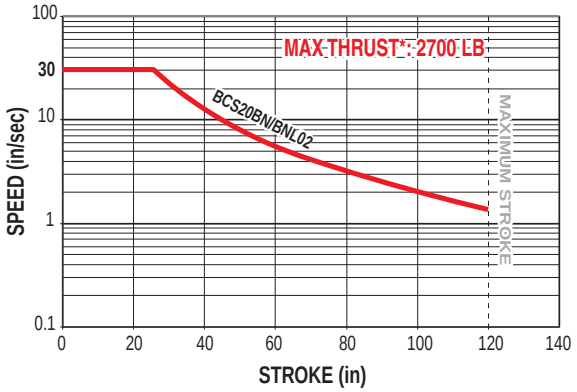
RODLESS

BCS/MCS20 Series

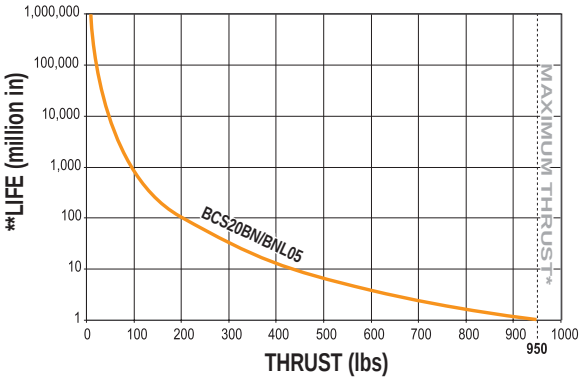
- Ball screw critical speed capacities and life calculations

BCS20/MCS20 BALL SCREW SPECIFICATIONS

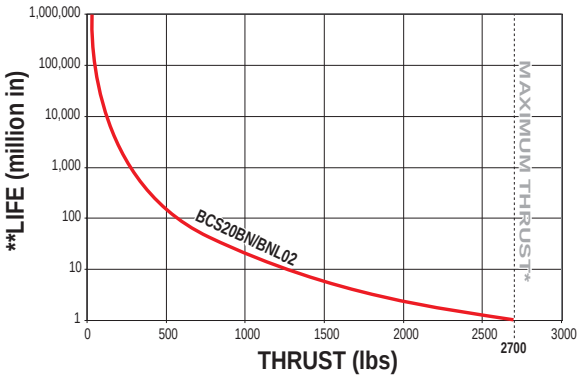
CRITICAL SPEED WITH 3/4" ENGLISH BALL SCREW, 2TPI



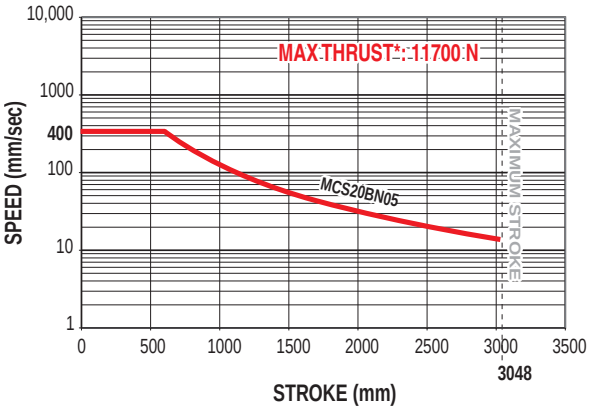
LIFE CALCULATION: 3/4" ENGLISH BALL SCREW, 5TPI



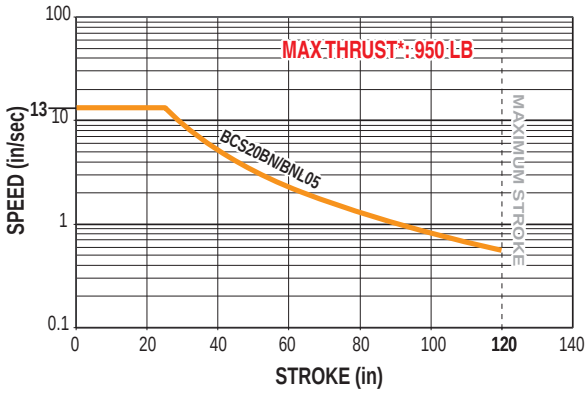
LIFE CALCULATION: 3/4" ENGLISH BALL SCREW, 2TPI



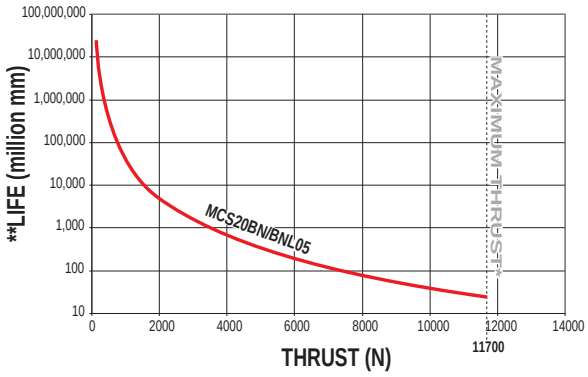
CRITICAL SPEED WITH 20mm METRIC BALL SCREW



CRITICAL SPEED WITH 3/4" ENGLISH BALL SCREW, 5TPI



LIFE CALCULATION: 20mm METRIC BALL SCREW w/5mm LEAD



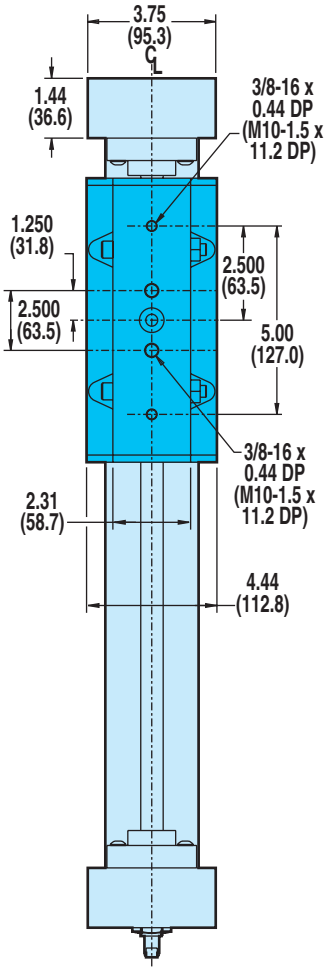
BN = Ball Nut
BNL = Ball Nut with Low-Backlash

**** Maximum thrust reflects 90% reliability for 1 million linear inches of travel.***

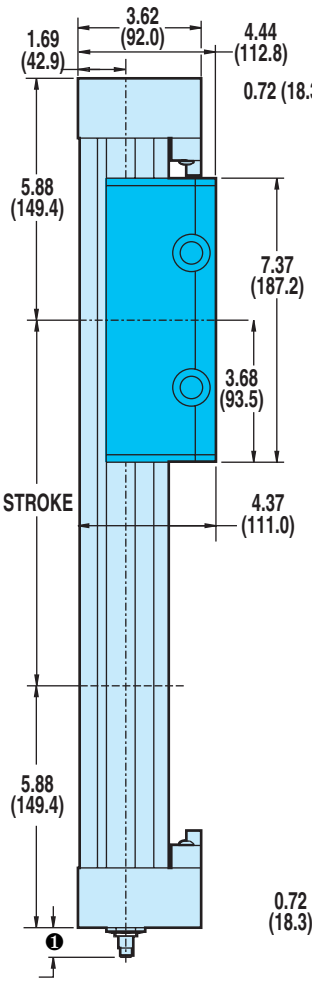
*****Life indicates theoretical maximum life of screw only, under ideal conditions and does not indicate expected life of actuator.***

BCS20 ACTUATOR AND OPTIONS

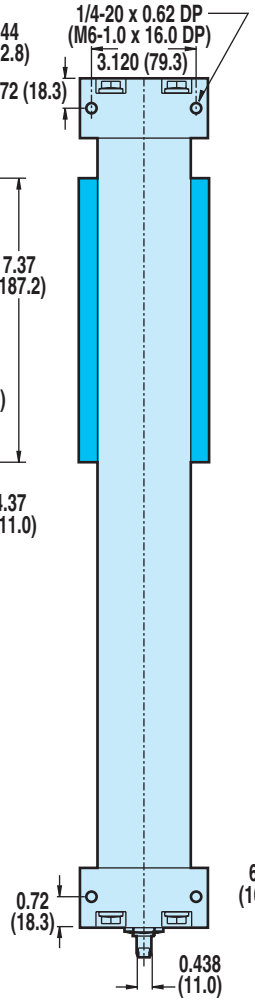
TOP VIEW



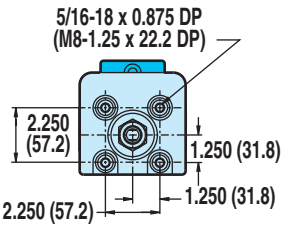
SIDE VIEW



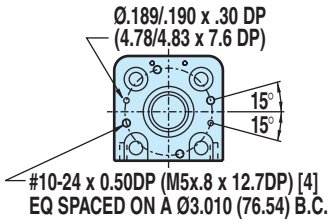
BOTTOM VIEW



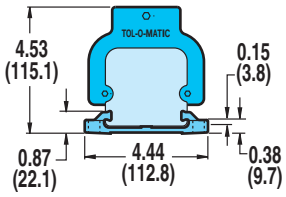
END VIEW

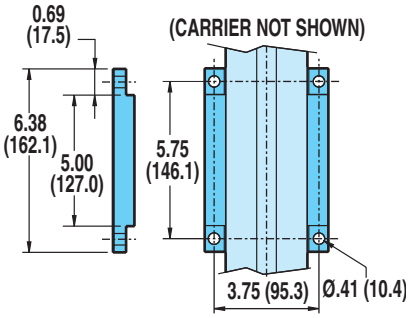


MOTOR MOUNTING

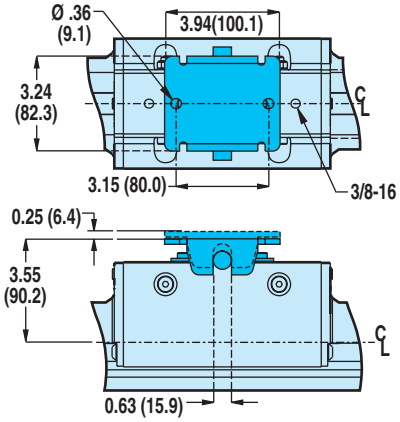


OPTIONAL TUBE SUPPORTS



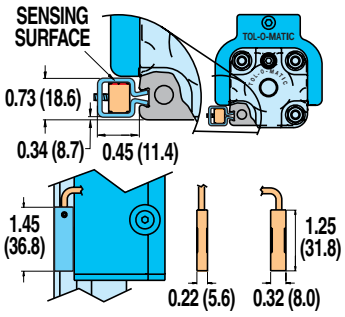


OPTIONAL FLOATING MOUNT

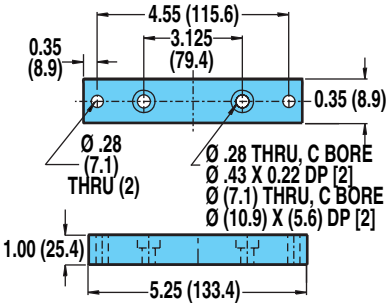


OPTIONAL SWITCH MOUNTING

❷❸❹⚠



OPTIONAL MOUNTING PLATES



❶ SHAFT LENGTH

In-line mounting	0.78 (19.8)
Extended shaft for RP & 23-frame motor	2.16 (54.9)
Extended shaft for RP & 34-frame motor	2.16 (54.9)
Extended shaft for RP & 40-frame motor	2.31 (58.7)
Extended shaft for purchases prior to 6/24/02	2.28 (57.9)

❷⚠ CAUTION: DO NOT OVERTIGHTEN SWITCH HARDWARE WHEN INSTALLING

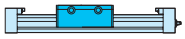
❸ NOTE: The scored face of the switch indicates the sensing surface and must face toward the magnet

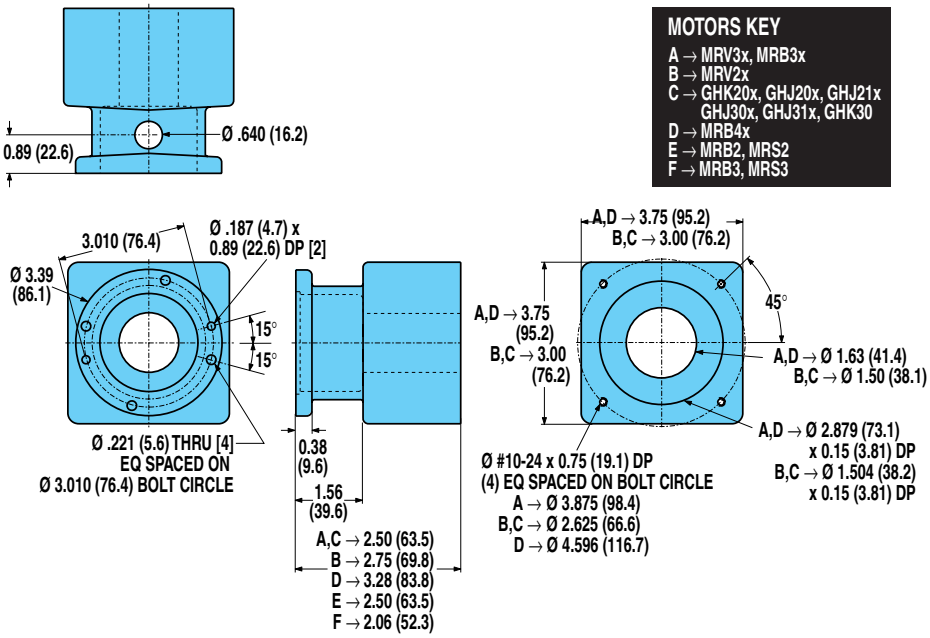
❹ NOTE: Some actuators require switch mounting on a specific side of the actuator. Call Tol-O-Matic 1-800-328-2174 for details

Unless otherwise noted, all dimensions shown are in inches (Dimensions in parenthesis are in millimeters)

DIMENSIONS

BCS/MCS20: IN-LINE MOUNT FOR MOTORS AND GEARHEADS





MOTORS KEY

A → MRV3x, MRB3x
B → MRV2x
C → GHK20x, GHJ20x, GHJ21x
GHJ30x, GHJ31x, GHK30
D → MRB4x
E → MRB2, MRS2
F → MRB3, MRS3

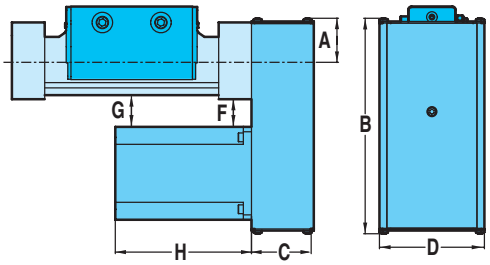
For gearhead dimensions and specifications, refer to page F-10.

BCS/MCS20 Series

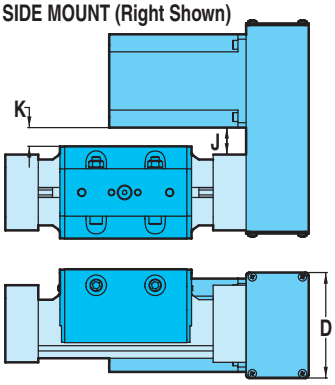
DIMENSIONS

BCS/MCS20: REVERSE PARALLEL MOUNTING

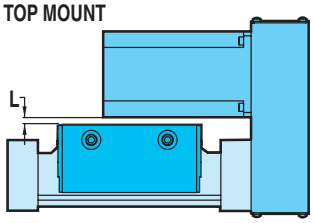
BOTTOM MOUNT



SIDE MOUNT (Right Shown)



TOP MOUNT



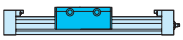
SPECIFICATIONS

	MOTOR	WEIGHT OF REDUCTION DRIVE				REDUCTION INERTIA AT MOTOR SHAFT			
		1:1		2:1		1:1		2:1	
		lbs	kg	lbs	kg	lb-in²	kg-cm²	lb-in²	kg-cm²
BRUSHLESS	MRV21, 22, 23, 24	3.11	1.41	3.27	1.48	.118	.3447	.100	.2928
BRUSHLESS	MRV31, 32, 33	3.18	1.44	3.34	1.51	.118	.3447	.100	.2928

REDUCTION EFFICIENCY: 0.95

DIMENSIONS

	MOTOR	A		B		C		D		F		G		H		J		K		L	
		in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
BRUSHLESS	MRV21	1.44	36.6	9.31	236.5	2.38	60.3	4.00	101.6	2.44	61.8	2.50	63.5	4.75	120.7	2.25	57.2	2.56	65.0	1.38	34.9
BRUSHLESS	MRV22	1.44	36.6	9.31	236.5	2.38	60.3	4.00	101.6	2.44	61.8	2.50	63.5	5.75	146.1	2.25	57.2	2.56	65.0	1.38	34.9
BRUSHLESS	MRV23	1.44	36.6	9.31	236.5	2.38	60.3	4.00	101.6	2.44	61.8	2.50	63.5	6.75	171.5	2.25	57.2	2.56	65.0	1.38	34.9
BRUSHLESS	MRV24	1.44	36.6	9.31	236.5	2.38	60.3	4.00	101.6	2.44	61.8	2.50	63.5	7.75	196.9	2.25	57.2	2.56	65.0	1.38	34.9
BRUSHLESS	MRV31	1.96	49.7	9.83	249.6	2.38	60.3	4.00	101.6	1.79	45.5	1.86	47.2	6.11	155.2	1.61	40.9	1.92	48.8	0.73	18.5
BRUSHLESS	MRV32	1.96	49.7	9.83	249.6	2.38	60.3	4.00	101.6	1.79	45.5	1.86	47.2	7.36	186.9	1.61	40.9	1.92	48.8	0.73	18.5
BRUSHLESS	MRV33	1.96	49.7	9.83	249.6	2.38	60.3	4.00	101.6	1.79	45.5	1.86	47.2	8.61	218.7	1.61	40.9	1.92	48.8	0.73	18.5



RODLESS

BCS/MCS20 Series

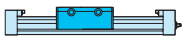
- Reverse parallel mounting

BCS/MCS Screw Drives

ORDERING

BASE MODEL SPECIFICATIONS **OPTIONS SPECIFICATIONS**

B	C	S	2	0	B	N	0	2	S	K	4	5	R	P	L	1	D	C	1	8	K	T	2	M	P	4



RODLESS

BCS/MCS Series
- Ordering

MODEL TYPE

BCS BCS Series English Screw Drive
MCS MCS Series Metric Screw Drive

TUBE BORE DIAMETER

10 1-inch (25 mm) bore
15 1-1/2-inch (40 mm) bore
20 2-inch (50 mm) bore

NUT/SCREW CONFIGURATION

ENGLISH MODELS

SOLID NUT / PITCH (turn/in)	SERIES
SN01	BCS10, 15, 20
SN02	BCS10, 15, 20
SNA02	BCS10, 15
SN05	BCS10, 15

BALL NUT / PITCH (turn/in)	SERIES
BN02	BCS15, 20
BNL02	BCS15, 20
BN05	BCS15, 20
BNL05	BCS15, 20
BN08	BCS10
BNL08	BCS10

METRIC MODELS

SOLID NUT / LEAD (mm/turn)	SERIES
SN12	MCS10, 15, 20
SN25	MCS10, 15, 20

BALL NUT / LEAD (mm/turn)	SERIES
BN08	MCS10
BNL08	MCS10
BN05	MCS15, 20
BNL05	MCS15, 20

STROKE LENGTH

SK Stroke, then enter desired stroke length in decimal inches

MOTOR MOUNTING / REDUCTIONS

(must choose one)

LMI In-Line mounting
LME23 Ext. shaft for RP & 23 frame motor
LME34 Ext. shaft for RP & 34 frame motor
LME40 Ext. shaft for RP & 40 frame motor
****LMX** Extended shaft - old style (see note)
*****For replacement actuators with extended motor shafts purchased prior to 6/24/02 use LMX***

⚠ ***A motor size and code must be selected when specifying a reverse-parallel mounting configuration. Reference the ordering pages in sections F, G and H for the motor types and selections.***

RPL1 1:1 Reverse-Parallel mount left
RPR1 1:1 Reverse-Parallel mount right
RPB1 1:1 Reverse-Parallel mount bottom
RPT1 1:1 Reverse-Parallel mount top
RPL2 2:1 Reverse-Parallel mount left
RPR2 2:1 Reverse-Parallel mount right
RPB2 2:1 Reverse-Parallel mount bottom
RPT2 2:1 Reverse-Parallel mount top

TO ORDER MOTORS/CONTROLS/INTERFACES

BRUSHLESS SERVO (SEE PAGE F-33)

AUXILIARY CARRIER

DC_ _ Auxiliary Carrier, then center-to-center spacing desired in decimal inches. (Center-to-Center spacing will add to overall dead length and will not subtract from the stroke length

SWITCHES

RM_ Reed Switch (Form A) with 5-meter lead/QD *(quick-disconnect)*, & quantity
RT_ Reed Switch (Form A) with 5-meter lead, and quantity desired
BM_ Reed Switch (Form C) with 5-meter lead/QD, and quantity desired
BT_ Reed Switch (Form C) with 5-meter lead, and quantity desired
KM_ Hall-effect Sinking Switch with 5-meter lead/QD, and quantity desired
KT_ Hall-effect Sinking Switch with 5-meter lead, and quantity desired
TM_ Hall-effect Sourcing Switch with 5-meter lead/QD, and quantity desired
TT_ Hall-effect Sourcing Switch with 5-meter lead, and quantity desired
CM_ TRIAC Switch with 5-meter lead/QD, and quantity desired
CT_ TRIAC Switch with 5-meter lead, and quantity desired

SUPPORTS AND MOUNTING PLATES

(both may be selected)
TS _ Tube Supports plus quantity desired
MP_ Mounting Plates plus quantity desired

⚠ ***Not all codes listed are compatible with all options.***

Use the Sizing Software to determine available options and accessories based on your application requirements.

FIELD RETROFIT KITS

ITEM	B3S10	B3S15	B3S20	M3S10	M3S15	M3S20
Tube Supports	4510-1010	4515-1010	4520-1010	4510-1010	4515-1010	4520-1010
Mounting Plates	0910-9133	0915-9135	0920-9038	0510-9105	0515-9138	0520-9105