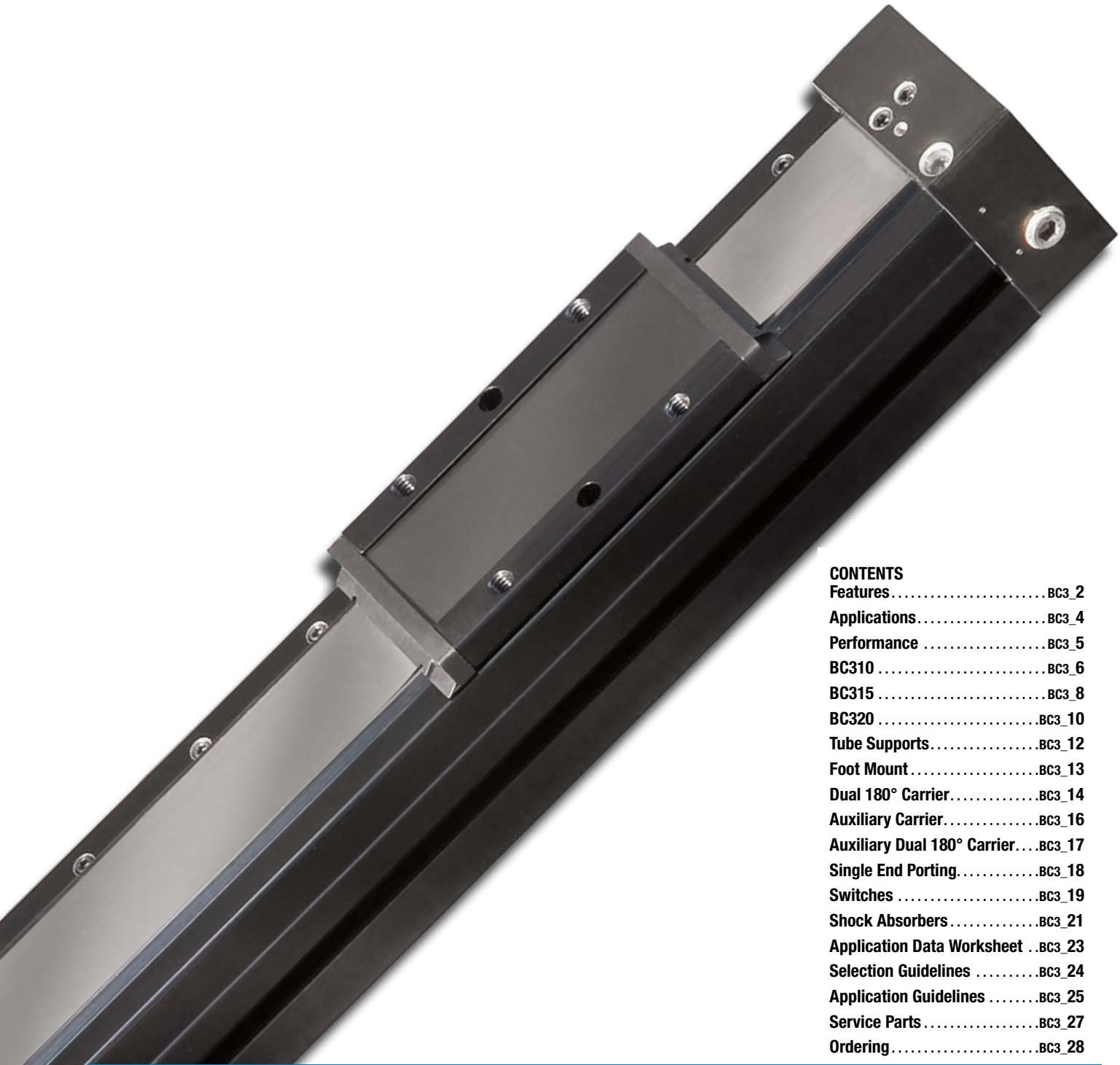


BC3 RECIRCULATING BALL BEARING RODLESS CYLINDER



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Features	BC3_2
Applications	BC3_4
Performance	BC3_5
BC310	BC3_6
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BC3 BAND CYLINDER

ENDURANCE TECHNOLOGYSM

A Tolomatic Design Principle

Endurance Technology features are designed for maximum durability to provide extended service life.

The BC3 is the most capable pneumatic rodless cylinder in the industry today. Featuring durable stainless steel bands, a reliable recirculating ball bearing design and smooth, low breakaway pressure the BC3 is a great solution for applications with high load and bending moment requirements. Built-to-order in stroke lengths up to 205 inches.



TOLOMATIC...THE RODLESS CYLINDER LEADER

LOAD-BEARING CARRIER DESIGN

- Load and piston are independent - piston floats, resulting in less friction and longer seal life
- Recirculating ball bearing system guides and supports load for consistent long term performance
- Constant level of friction is maintained even when load orientation changes

ADJUSTABLE CUSHIONS

- Adjustable cushions are standard, not optional
- Easy screw adjustment for end-of-stroke deceleration
- Protects actuator and load from damage

PATENTED WEDGE BEARING SYSTEM

- Bearing surfaces adjusted at the factory for optimum pre-load
- Bearing surfaces adjusted by and supported by a steel wedge assuring long term stability



OPTIONS



AUXILIARY CARRIER

- Substantially higher load capacity
- Substantially higher bending moment capacity



DUAL 180° CARRIER

- Substantially higher load capacity
- Substantially higher bending moment capacity



AUXILIARY DUAL 180°

- Highest load capacity
- Highest bending moment capacity



TUBE SUPPORT MOUNTS

- Used for intermediate support



FOOT MOUNTS

- For end mounting of band cylinder



SHOCK ABSORBERS

- Smooth deceleration, higher productivity
- Allows increased operating speed
- Self-compensates for load or speed changes
- Minimizes impact load to equipment
- Adjustable position shocks available



SWITCHES

- Available in Reed, Hall-effect and Triac
- 15ft. cable with flying leads; available with quick-disconnect couplers

BC3 Recirculating Ball Bearing Rodless Cylinder

APPLICATIONS

Material Handling



Automatic sorting of products on conveyors.

Customer Challenge:

A manufacturer of sorting equipment had created some in-house automation solutions on their sorting equipment but they could not achieve the speed or reliability to keep up with their distribution requirements. They needed to speed up production and find a way to sort to more locations with limited floor space.

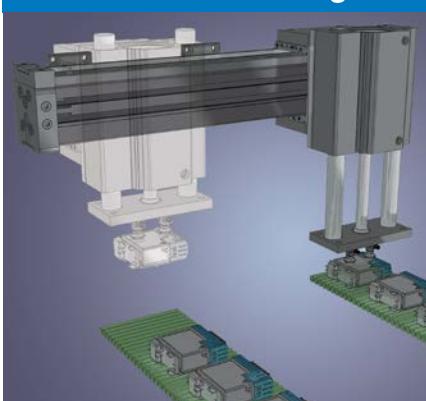
Tolomatic Solution:

A BC3 rodless pneumatic cylinder with was selected for this application because of their space-saving characteristics. The BC3 cylinder sits parallel over the top of the conveyor and is fitted with a paddle. The BC3 cylinder moves the paddle which pushes product both directions to different conveyors. Speed requirements of 30 in/sec were achieved easily achieved.

Result:

The rodless approach provided long-lasting durability for reliable performance at the required speed. The customer achieved flexibility on the number of products they could sort and increased the number of sorting locations maximizing their limited floor space. Most important, they were able to meet their distribution demands. The customer ordered 300 units for a total of \$400,000.

Material Handling



A pick and place application for moving product between conveyors.

Customer Challenge:

A manufacturer of consumer electronic equipment needed a method to move finished product from one conveyor to another quickly without damage or waste.

Application Requirements:

- Fast response, throughput of 20 products per minute
- Consistent positioning
- End-of-stroke adjustment to accommodate varying product lines

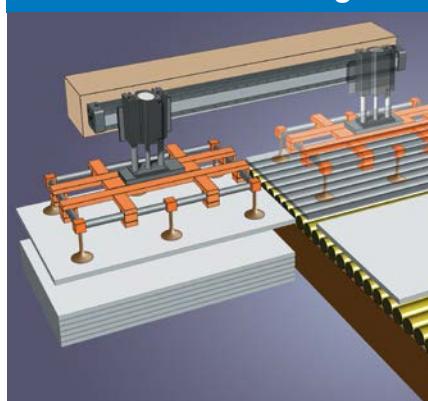
Tolomatic Solution:

This side mounted BC3D Band Cylinder with dual 180° option provides the motion along the X axis and support for the PB2 rod cylinder slide which provides the Y axis motion. In this application dual vacuum cups are used, however they are often replaced with a gripper unit with custom tooled fingers for product that does not present a smooth flat surface.

Result:

This continuing customer is pleased with the durability, price and delivery that the BC3 and PB2 actuators manufactured by Tolomatic provide.

Material Handling



Vacuumized sheet transfer application.

Customer Challenge:

A manufacturer of battery chargers needed a method of taking sheet metal off of pallets and placing onto the assembly line. Speed is critical and end-of-stroke position must be consistent, thus, Tolomatic pneumatic products were chosen for this system.

Application Requirements:

- Fast response, 1 part must be reoriented and moved each 3 seconds
- Movement from end-of-stroke to end-of-stroke with consistent positioning
- Low cost
- End-of-stroke adjustment

Tolomatic Solution:

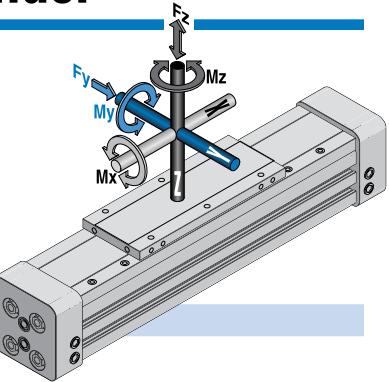
This application uses a Tolomatic PB2 Rod Cylinder Slide, attached to a BC3 Band Cylinder with adjustable shocks. This actuator assembly moves the vacuum grid attachment that holds the sheet metal.

Result:

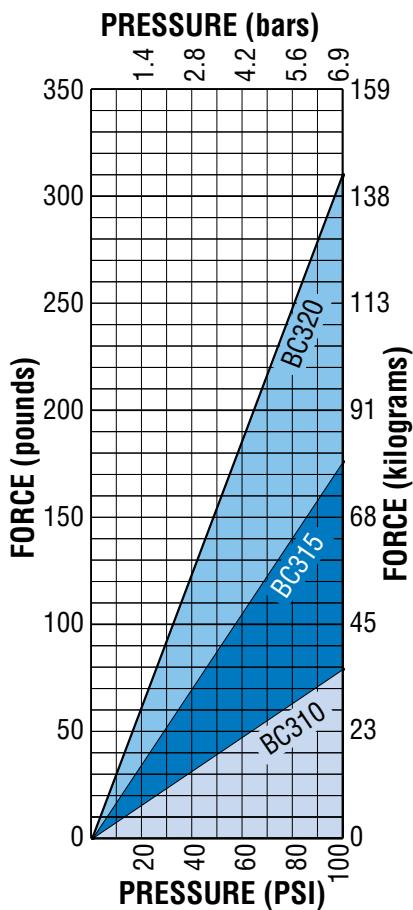
The BC3 and PB2 has long-lasting durability for reliable performance at the required speed. This continuing customer is pleased with the price and delivery that Tolomatic provides.

BC3 Recirculating Ball Bearing Rodless Cylinder

PERFORMANCE



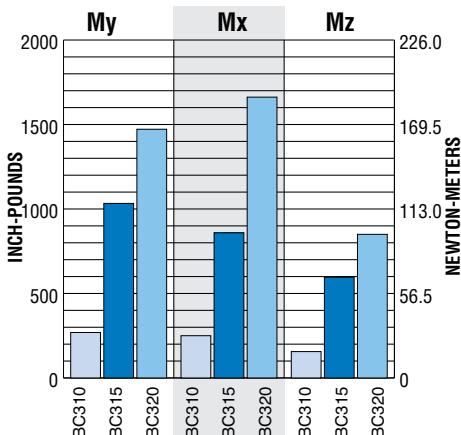
THEORETICAL FORCE vs PRESSURE



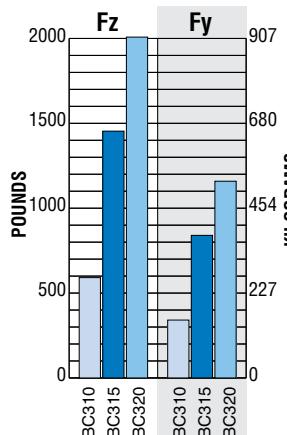
BENDING MOMENTS, LOAD

STANDARD ACTUATOR

BENDING MOMENTS

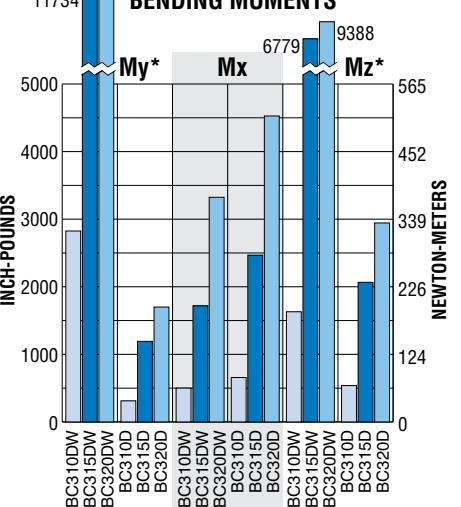


MAX. LOAD

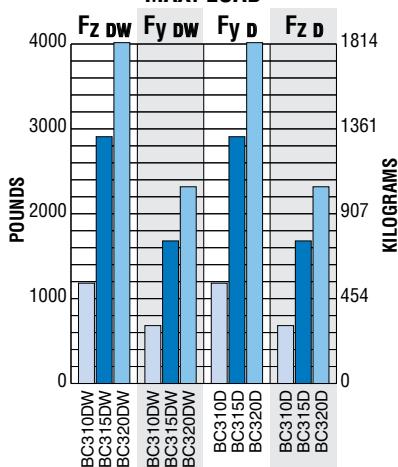


AUXILIARY CARRIER & DUAL 180° CARRIER** OPTIONS

BENDING MOMENTS



MAX. LOAD



*Auxiliary carrier bending moments indicated are at minimum center to center distance. Additional My + Mz load capacity can be obtained by increasing "D" dimension. Refer to auxiliary carrier data on page BC3_5.

**Dual 180° carrier bending moments are not an exact comparison with other types of carriers. See page BC3_5.

BC310 Band Cylinder

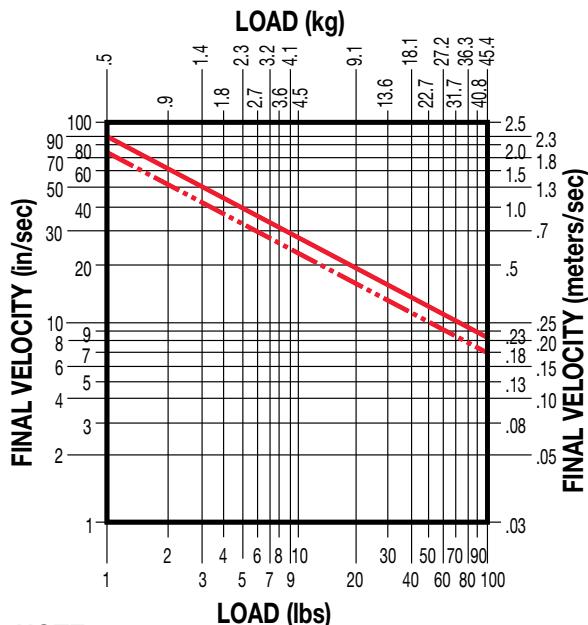
PERFORMANCE

BC310



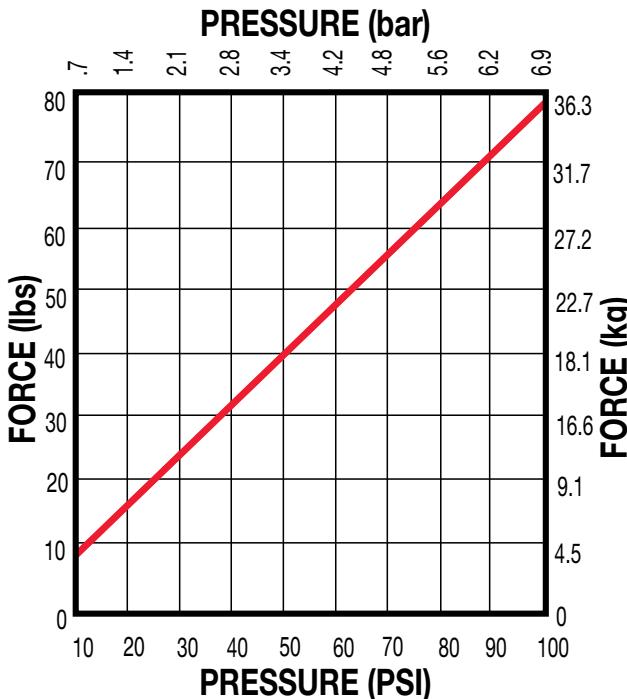
BC310 OPTIONS		Page
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Auxiliary Dual 180° Carrier		BC3_17
Dual 180° Carrier		BC3_14
Foot Mounts		BC3_13
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STANDARD FEATURE		Page
Single End Porting		BC3_18

CUSHION DATA

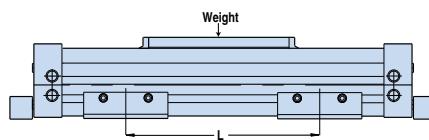
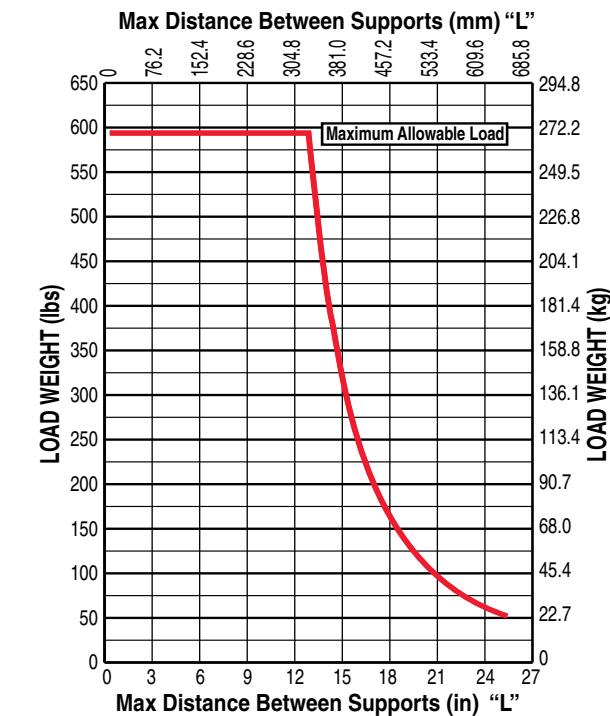
**NOTE:**

- Max. for any application
- - - Max. for continuously cycled application

THEORETICAL FORCE vs PRESSURE

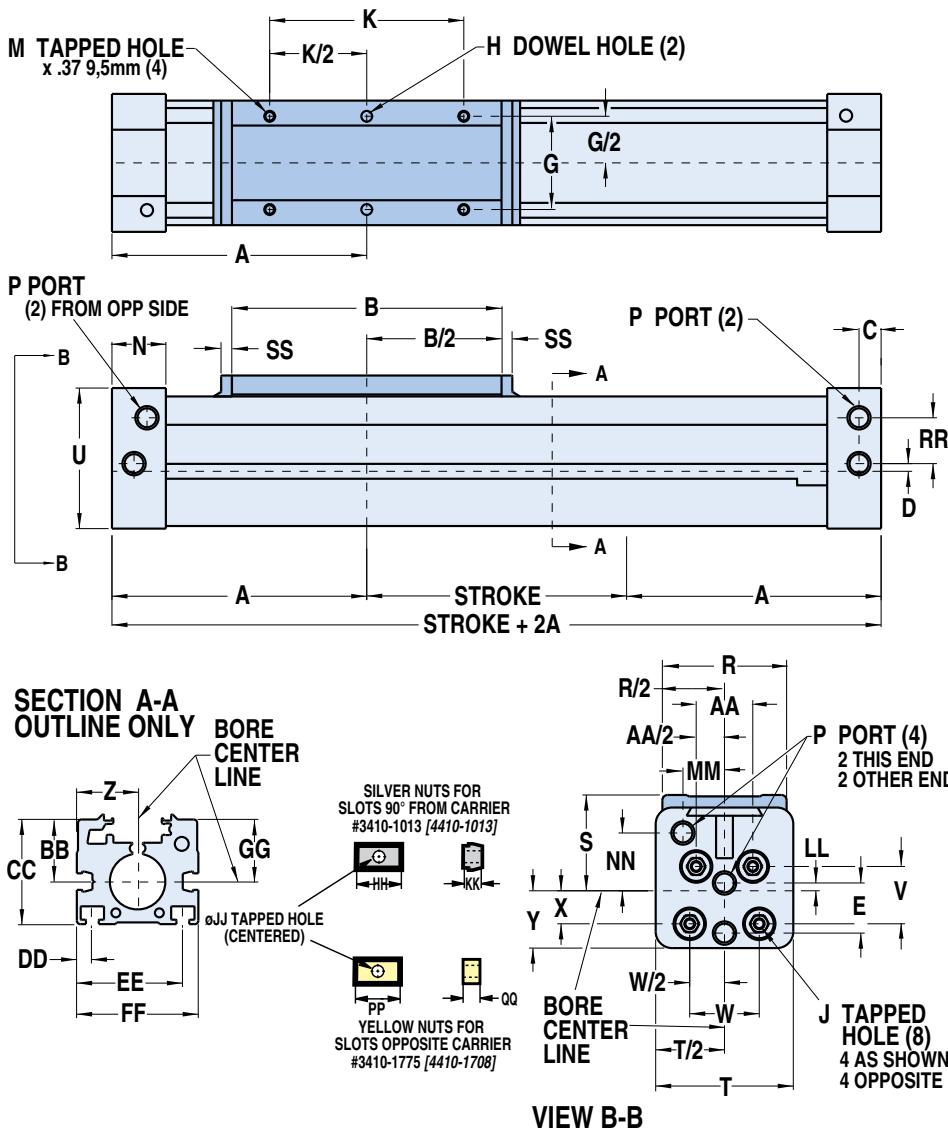


TUBE SUPPORT REQUIREMENTS



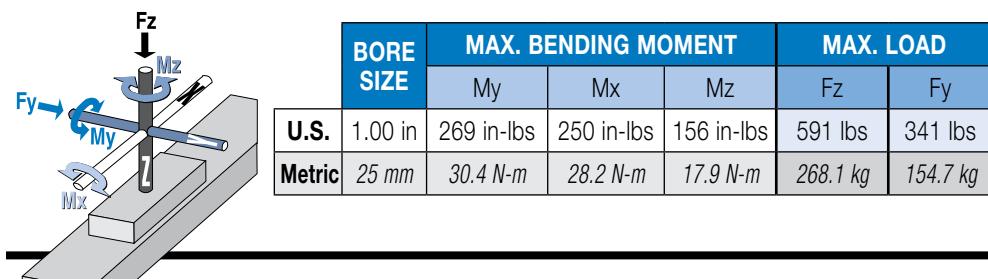
BC310 Band Cylinder

DIMENSIONS



SPECIFICATIONS

BC310 BENDING MOMENTS AND LOAD



MODELS	
U.S Standard	Metric
A	3.94
B	3.67
C	.45
D	.047
E	.611
G	1.781
H*	.252/.251 x .25
J	10-24 x .43
K	2.250
M	1/4-20
N	1.00
P	1/8-27 NPT
R	2.16
S	1.54
T	2.19
U	2.17
V	.750
W	1.250
X	.330
Y	.76
Z	1.094
AA	1.063
BB	1.12
CC	1.88
DD	.266
EE	1.922
FF	2.19
GG	1.12
HH	.66
JJ	10-24
KK	.25
LL	.142
MM	.547
NN	.890
PP	.75
QQ	.188
RR	.845
SS	.203
INCHES	
MILLIMETERS	

*DOWEL PINS .003 .076

	BORE SIZE	WEIGHT		MAX. STROKE LENGTH**	MAX. PRESSURE	TEMPERATURE RANGE
		BASE	PER UNIT OF STROKE			
U.S. Standard	1.00 in	2.71 lbs	0.23 lbs/in	205 in	100 PSI	20° to 140° F
Metric	25 mm	1.23 kg	0.0041 kg/mm	5207 mm	6.895 bar	-7° to 60° C

**For longer strokes, alternate materials, mounting and/or fasteners – consult Tolomatic

BC315 Band Cylinder

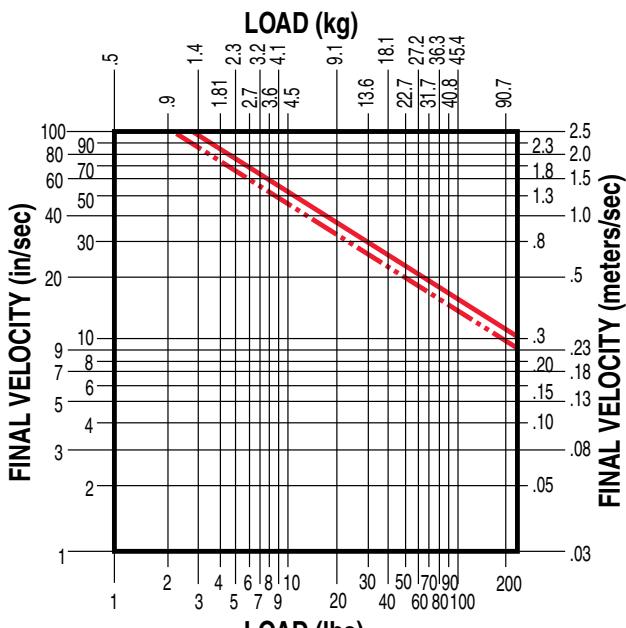
PERFORMANCE

BC315

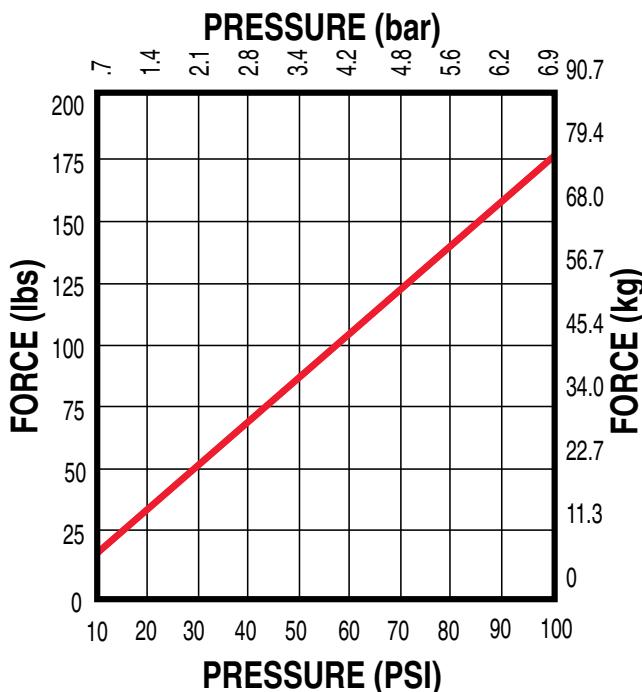


BC315 OPTIONS	Page
Auxiliary Carrier	BC3_16
Auxiliary Dual 180° Carrier	BC3_17
Dual 180° Carrier	BC3_14
Foot Mounts	BC3_13
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Single End Porting	BC3_18

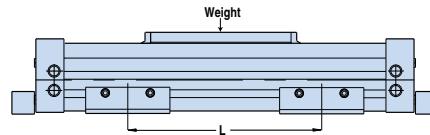
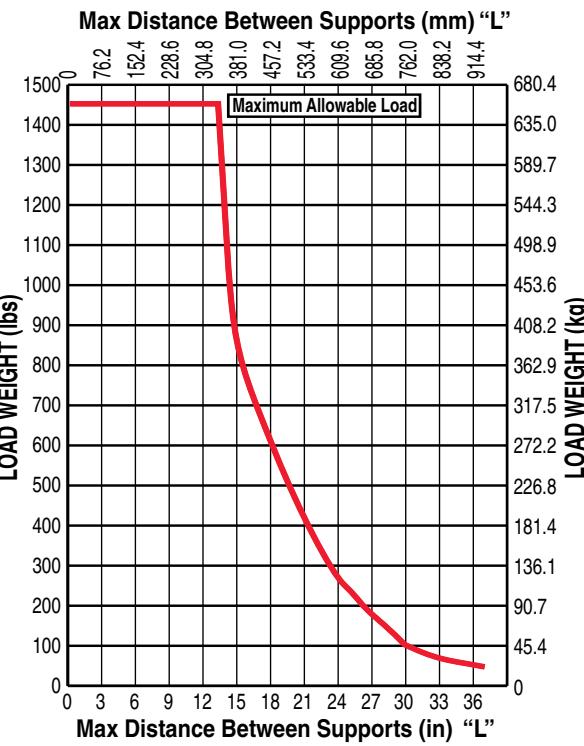
CUSHION DATA



THEORETICAL FORCE vs PRESSURE

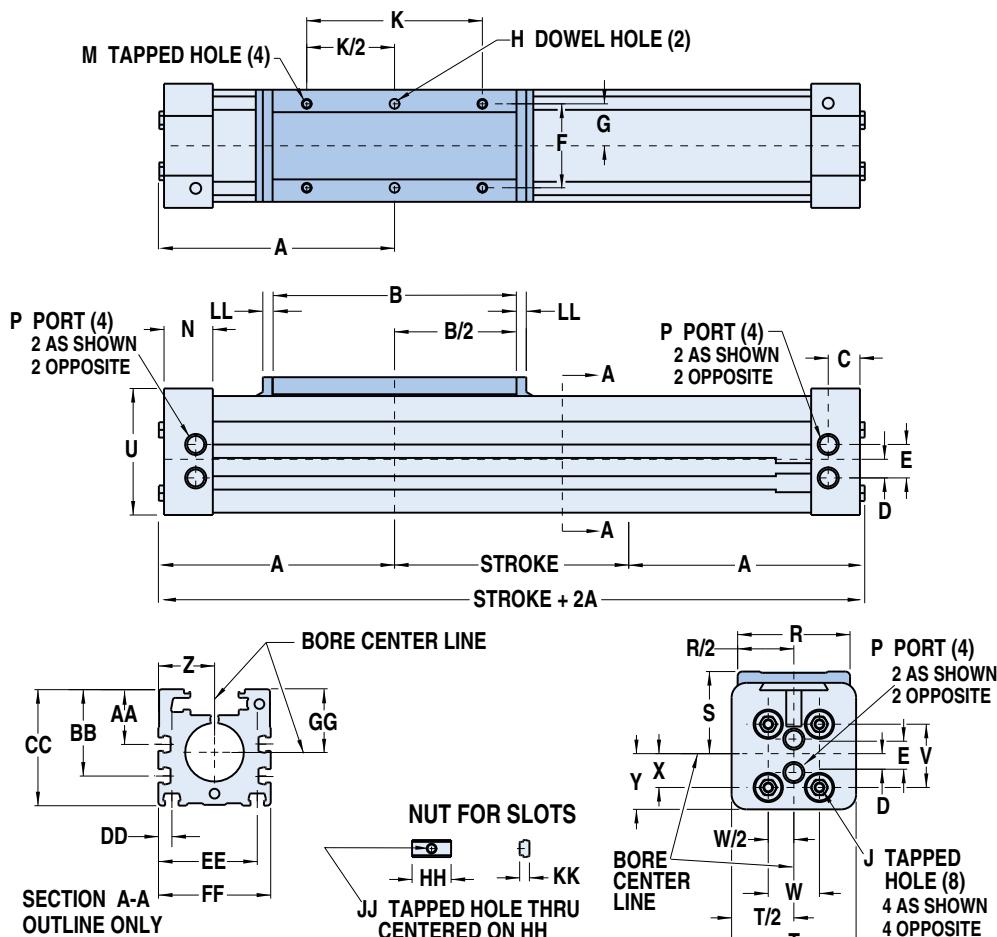


TUBE SUPPORT REQUIREMENTS



BC315 Band Cylinder

DIMENSIONS

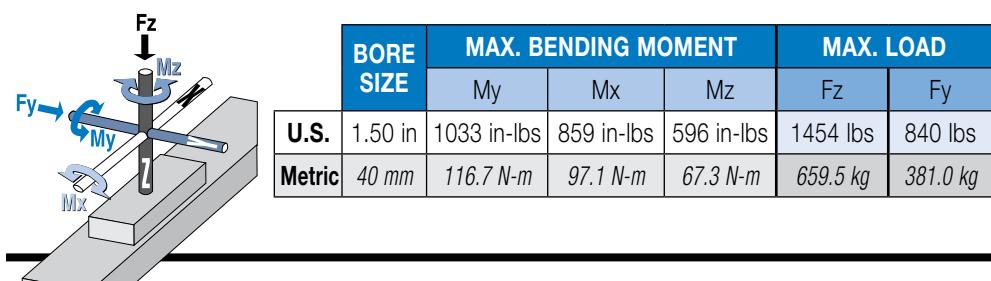


MODELS		
	U.S. Std.	Metric
A	5.93	150.7
B	6.25	158.8
C	.84	21.3
D	.48	12.2
E	.86	21.8
F	2.156	54.76
G	1.078	27.38
H*	.252-.251 x .25	6.045-6.020 x 6.4
J	1/4-20 x .47	M6-1 x 12
K	4.500	114.30
M	1/4-20 X .44	M6- x 11
N	1.27	32.3
P	1/4-18 NPT	TP 1/4-19 BSPT GP 1/4-19 BSPP
R	2.88	73.0
S	2.109	53.57
T	3.19	81.0
U	3.25	82.6
V	1.625	41.28
W	1.313	33.35
X	.875	22.23
Y	1.46	37.1
Z	1.44	36.5
AA	1.41	35.81
BB	2.22	56.38
CC	2.99	75.95
DD	.35	8.9
EE	2.53	64.3
FF	2.88	73.0
GG	1.62	41.15
HH	.75	19.1
JJ	1/4-20	M6-1
KK	.25	6.4
LL	.25	6.4
	INCHES	MILLIMETERS

*DOWEL PINS .003 (M)
 .076 (M)

SPECIFICATIONS

BC315 BENDING MOMENTS AND LOAD



	BORE SIZE	WEIGHT		MAX. STROKE LENGTH**	MAX. PRESSURE	TEMPERATURE RANGE
		BASE	PER UNIT OF STROKE			
U.S. Standard	1.50 in	10.94 lbs	0.53 lbs/in	202 in	100 PSI	20° to 140° F
Metric	40 mm	4.96 kg	0.0095 kg/mm	5130 mm	6.895 bar	-7° to 60° C

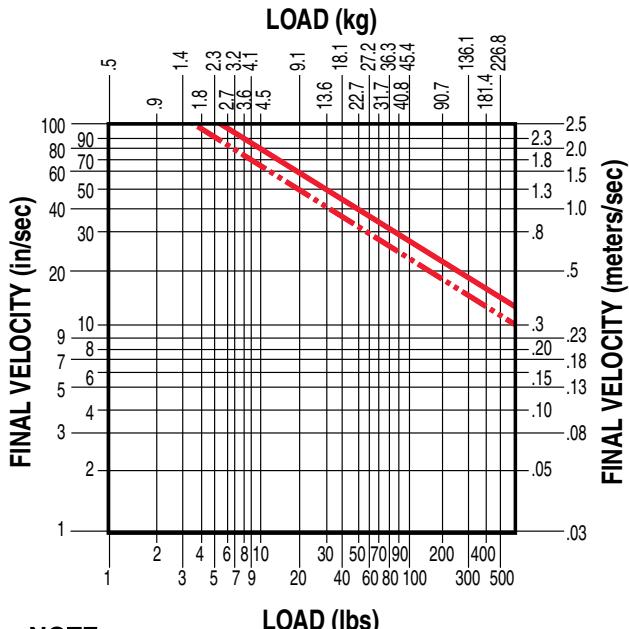
**For longer strokes, alternate materials, mounting and/or fasteners – consult Tolomatic

BC320 Band Cylinder

PERFORMANCE

BC320	
	
ORDER CODES	
BC320	inch (U.S. Standard)
BC3M20	(metric with taper port)
BC3MM20	(metric with parallel port)
BC320 OPTIONS	Page
Auxiliary Carrier	BC3_16
Auxiliary Dual 180° Carrier	BC3_17
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Switches	BC3_19
Tube Supports	BC3_12
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Application Guidelines	BC3_25
Cushion Needle Adjustment	BC3_25
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Selection	BC3_24
STANDARD FEATURE	Page
Single End Porting	BC3_18

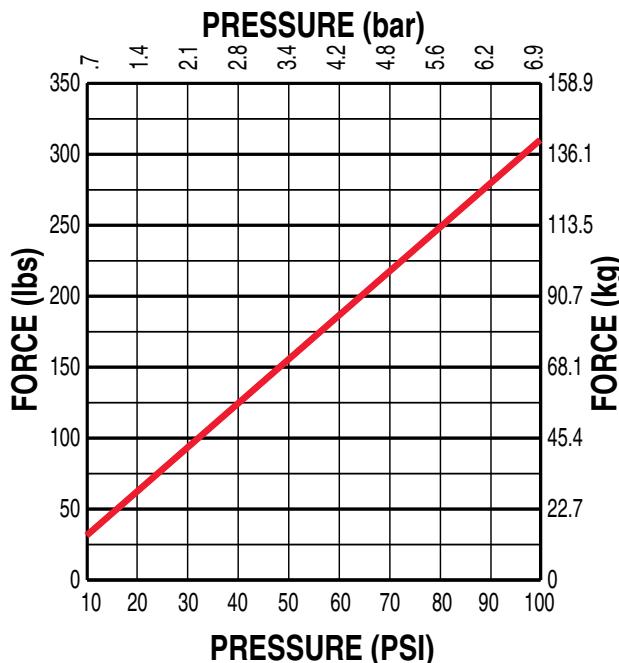
CUSHION DATA



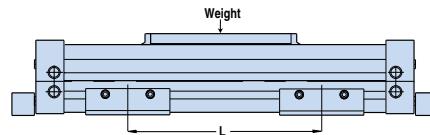
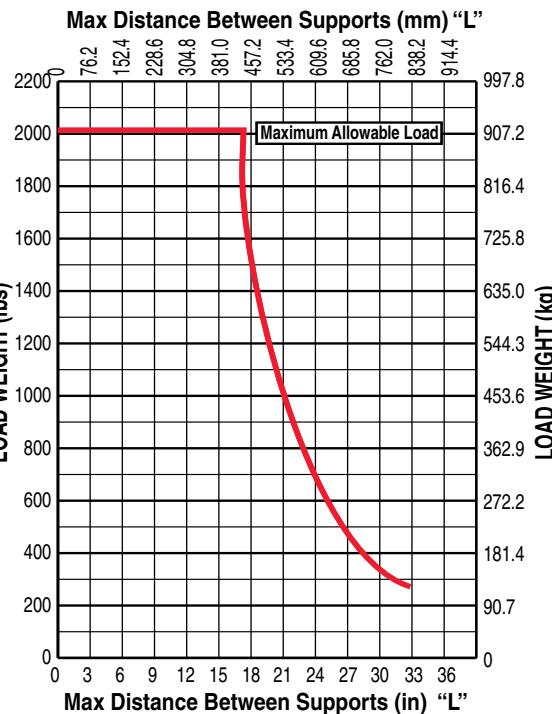
NOTE:

- Max. for any application
- - - Max. for continuously cycled application

THEORETICAL FORCE vs PRESSURE

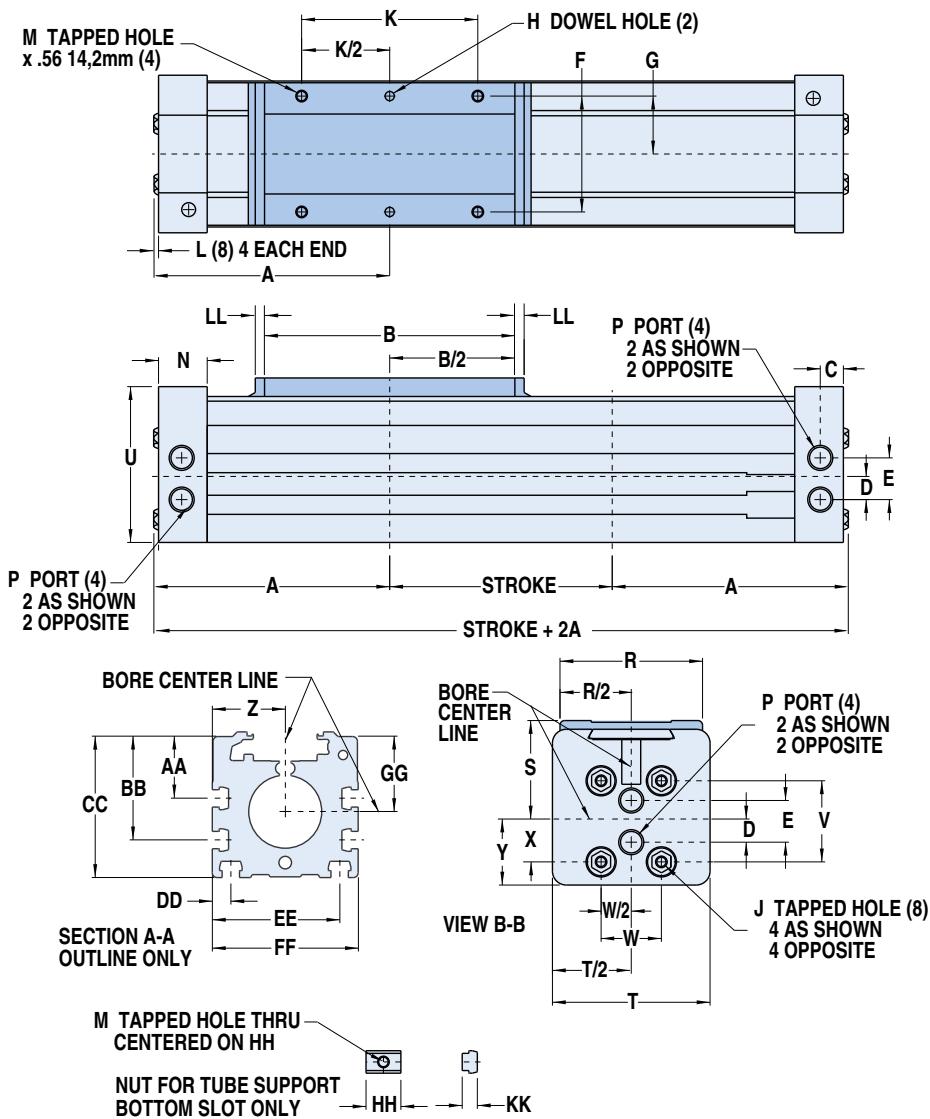


TUBE SUPPORT REQUIREMENTS



BC320 Band Cylinder

DIMENSIONS



SPECIFICATIONS

BC320 BENDING MOMENTS AND LOAD

Diagram illustrating the bending moments and load for the BC320 band cylinder. The cylinder is shown being bent, with force vectors F_z , F_y and moments M_z , M_y indicated.

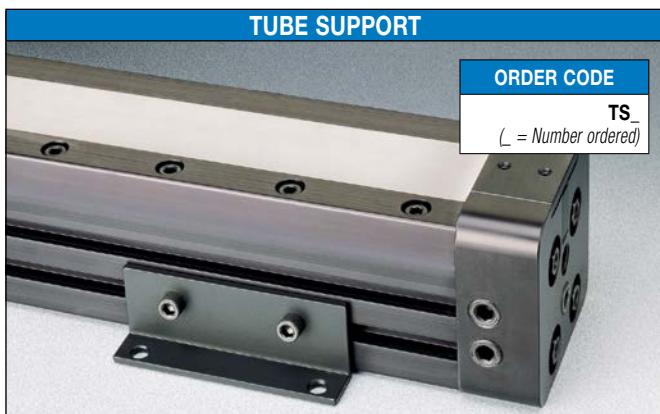
BORE SIZE	MAX. BENDING MOMENT			MAX. LOAD	
	M_y	M_x	M_z	F_z	F_y
U.S. 2.00 in	1472 in-lbs	1662 in-lbs	850 in-lbs	2008 lbs	1159 lbs
Metric 50 mm	166.3 N-m	187.8 N-m	96.0 N-m	910.8 kg	525.77 kg

*DOWEL PINS  .003 
 .076 

BORE SIZE	WEIGHT		MAX. STROKE LENGTH**	MAX. PRESSURE	TEMPERATURE RANGE
	BASE	PER UNIT OF STROKE			
U.S. Standard 2.00 in	17.00 lbs	0.86 lbs/in	142 in	100 PSI	20° to 140° F
Metric 50 mm	7.71 kg	0.0154 kg/mm	3606 mm	6.895 bar	-7° to 60° C

**For longer strokes, alternate materials, mounting and/or fasteners – consult Tolomatic

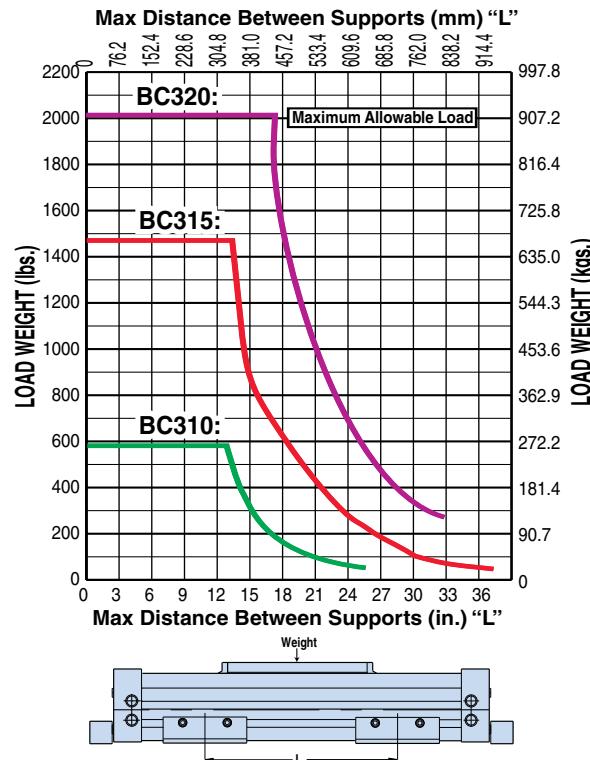
BC3 TUBE SUPPORTS - All Sizes



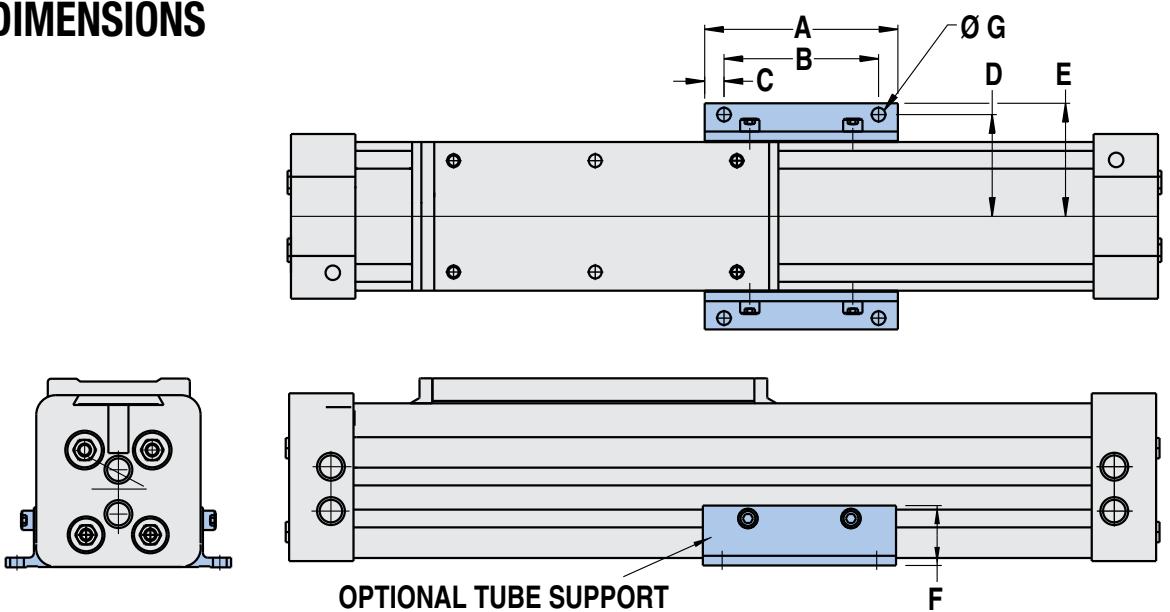
For intermediate support, tube support brackets can be mounted to the BC3 model. Made of black-anodized aluminum, the brackets are attached to the bottom and sides of the cylinder tube with rail nuts. The number of tube support brackets required and their placement depends on the overall length of the BC3 model and the load weight being moved and supported. Refer to the tube support data chart below. Note: Switches cannot be mounted on the same face of the actuator as tube supports.

PERFORMANCE

TUBE SUPPORT REQUIREMENTS



DIMENSIONS



BORE SIZE	A	B	C	D	E	F	G	
10	1.00	2.75	2.250	0.25	1.53	1.76	1.09	0.206
15	1.50	3.75	3.000	0.38	1.97	2.19	1.16	0.266
20	2.00	4.00	3.375	0.31	2.56	2.84	1.50	0.328

Dimensions in inches

BORE SIZE	A	B	C	D	E	F	G	
10	25	69.85	57.15	6.4	38.9	44.7	27.7	5.232
15	40	95.30	76.20	9.7	50.0	55.6	29.5	6.756
20	50	101.60	85.73	7.9	65.0	72.1	38.1	8.331

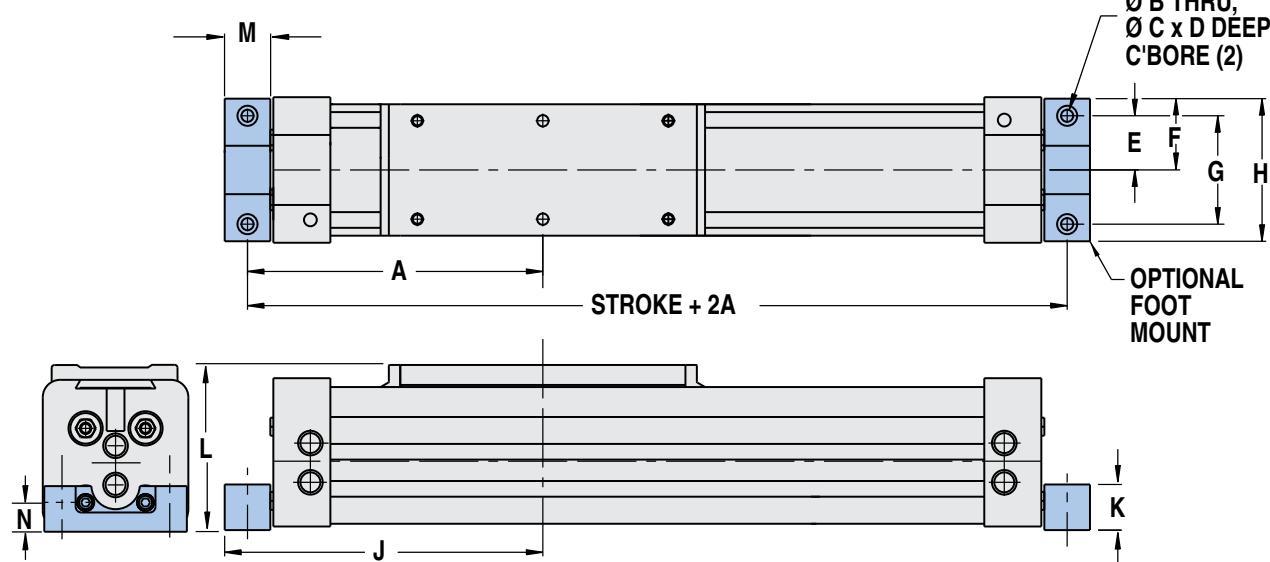
Dimensions in millimeters

BC3 FOOT MOUNT KIT - All Sizes



Foot mounts are an option on BC3 Series Band Cylinders when an application requires the mounting to be different than flush. They may be specified on one or both ends of the cylinder.

DIMENSIONS



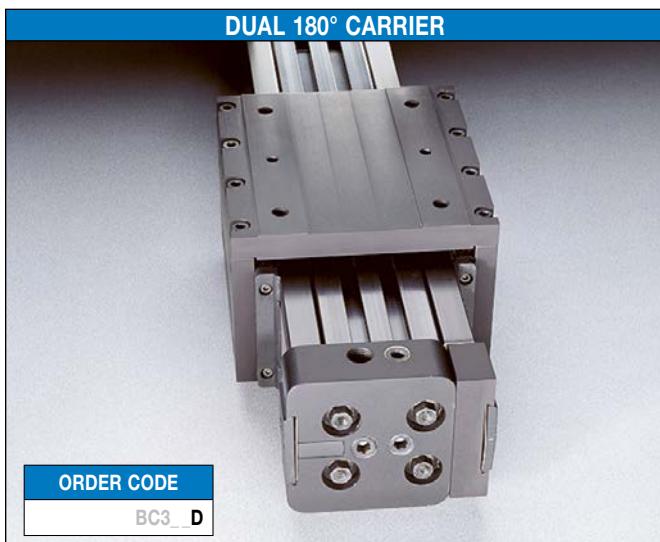
BORE SIZE	A	B	C	D	E	F	G	H	J	K	L	M	N	
10	1.00	4.31	Ø .206	Ø .38	0.22	0.906	1.095	1.812	2.19	4.69	0.88	2.44	0.75	0.574
15	1.25	6.43	Ø .266	Ø .44	0.28	1.188	1.560	2.375	3.13	6.93	1.00	3.63	1.00	0.641
20	1.50	6.80	Ø .328	Ø .53	0.34	1.500	2.000	3.000	4.00	7.30	1.13	4.53	1.00	0.719

Dimensions in inches

BORE SIZE	A	B	C	D	E	F	G	H	J	K	L	M	N	
10	25	109.5	Ø 5.23	Ø 9.7	5.6	23.01	27.8	46.02	55.6	119.1	22.4	62.0	19.1	14.6
15	32	163.4	Ø 6.76	Ø 11.2	7.1	30.18	39.7	60.33	79.4	176.1	25.4	92.2	25.4	16.3
20	40	172.7	Ø 8.33	Ø 13.5	8.6	38.10	50.8	76.20	101.6	185.4	28.7	115.1	25.4	18.3

Dimensions in millimeters

BC3 DUAL 180° CARRIER - All Sizes



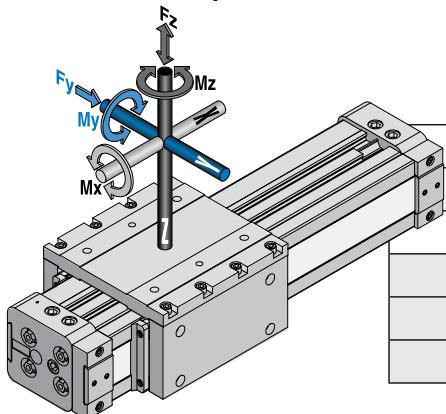
DUAL 180° CARRIER

The Dual 180° Carrier option may be used when load factors exceed those of a single carrier actuator. This option allows the load to be rotated 90° from the cylinder's carrier providing an additional load bearing mounting surface.

NOTE: The Dual 180° Carrier option requires its own proprietary tube supports and foot mounts. See dimensional information below. Breakaway pressure will increase when using the Dual 180° Carrier option.

PERFORMANCE

BC3D (DUAL 180° CARRIER) BENDING MOMENTS AND LOAD



BORE SIZE	MAX. BENDING MOMENT			MAX. LOAD	
	My	Mx	Mz	Fz	Fy
BC310D	1.00 in.	312 in.-lbs.	657 in.-lbs.	1182 lbs.	682 lbs.
BC315D	1.50 in.	1192 in.-lbs.	2468 in.-lbs.	2908 lbs.	1680 lbs.
BC320D	2.00 in.	1700 in.-lbs.	4527 in.-lbs.	2944 in.-lbs.	4016 lbs.
BC310D	25mm	35.3 N·m	74.2 N·m	60.8 N·m	536.1 kgs.
BC315D	40mm	134.7 N·m	278.9 N·m	233.4 N·m	1319.0 kgs.
BC320D	50mm	192.1 N·m	511.5 N·m	332.6 N·m	1821.6 kgs.
					1051.4 kgs.

BORE SIZE	WEIGHT**		MAX. STROKE LENGTH*	MAX. PRESSURE	TEMPERATURE RANGE
	BASE	PER UNIT OF STROKE			
BC310D	1.00 in.	5.37 lbs.	0.32 lbs.	205 in	100 PSI 20° to 140° F
BC315D	1.50 in.	17.2 lbs.	0.69 lbs.	202 in	
BC320D	2.00 in.	28.9 lbs.	1.12 lbs.	142 in	
BC310D	25mm	2.43 kgs.	0.14 kgs.	5207 mm	6.895 bar -7° to 60° C
BC315D	40mm	7.76 kgs.	0.31 kgs.	5130 mm	
BC320D	50mm	13.11 kgs.	0.50 kgs.	3606 mm	

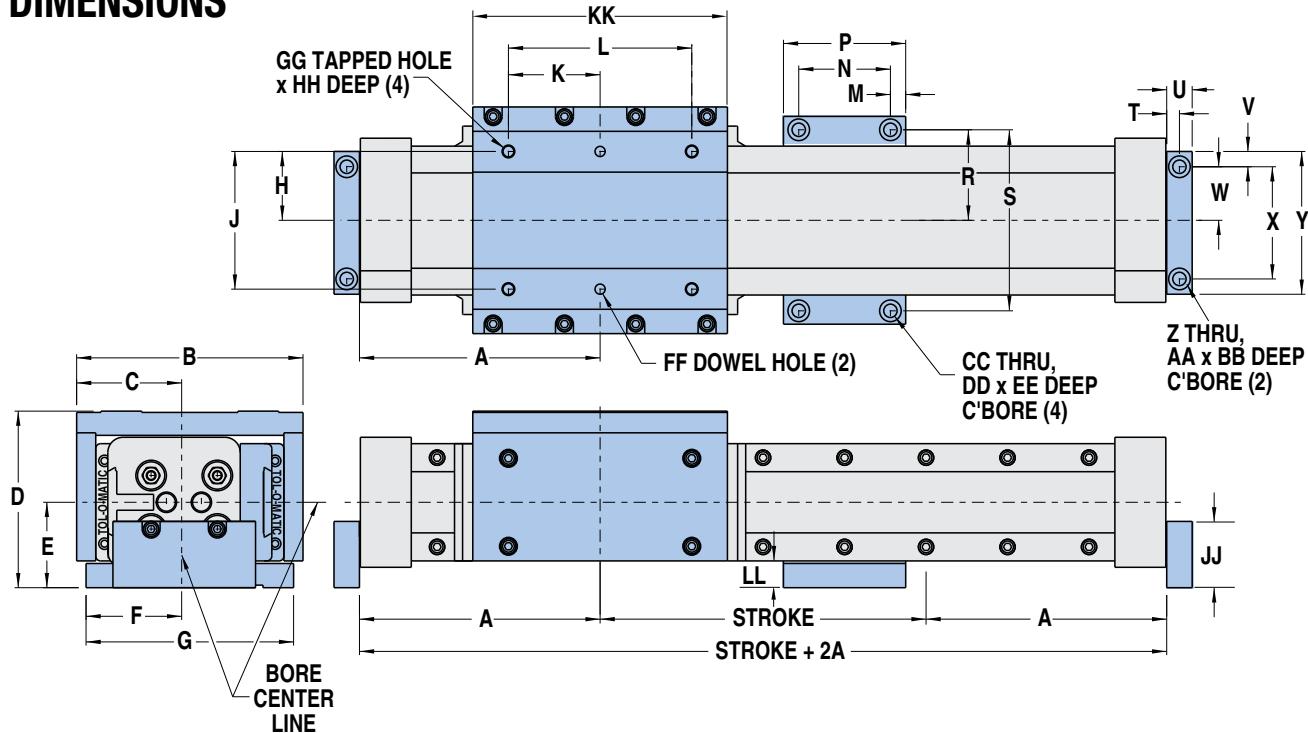
*For longer strokes, alternate materials, mounting and/or fasteners – consult Tolomatic



**Use these figures to calculate actuator weight instead of standard weights on pages BC3_14, BC3_14, BC3_14

BC3 DUAL 180° CARRIER - All Sizes

DIMENSIONS



NOTE: In vertical mounting applications, supplemental mounting may be required besides factory foot mounts.

Optional Tube Supports and Foot Mounts are shown.

MODELS	BORE	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S
BC310	1.0 in.	3.93	4.31	2.13	3.33	1.61	1.75	3.50	1.192	2.437	1.531	3.062	.28	2.563	3.12	1.469	2.937
BC315	1.5 in.	5.93	6.00	2.78	4.33	2.09	2.35	5.09	1.48	3.375	2.250	4.500	.38	2.250	3.00	2.02	4.437
BC320	2.0 in.	6.27	7.41	3.51	5.30	2.59	2.80	6.00	2.358	5.125	3.000	6.000	.38	2.250	3.00	2.422	5.250

MODELS	BORE	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF*	GG	HH	JJ	KK	LL
BC310	1.0 in.	.307	.62	.28	.891	1.688	2.25	.266	.44	.28	.266	.44	.28	.252/.251 x .25	1/4-20	.47	1.25	3.67	.52
BC315	1.5 in.	.312	.62	.38	1.312	2.750	3.50	.266	.44	.28	.328	.53	.34	.252/.251 x .25	5/16-18	.59	1.62	6.25	.66
BC320	2.0 in.	.312	.62	.31	1.625	3.375	4.00	.328	.53	.34	.391	.63	.41	.252/.251 x .25	3/8-16	.66	2.00	6.75	.63

Dimensions in inches

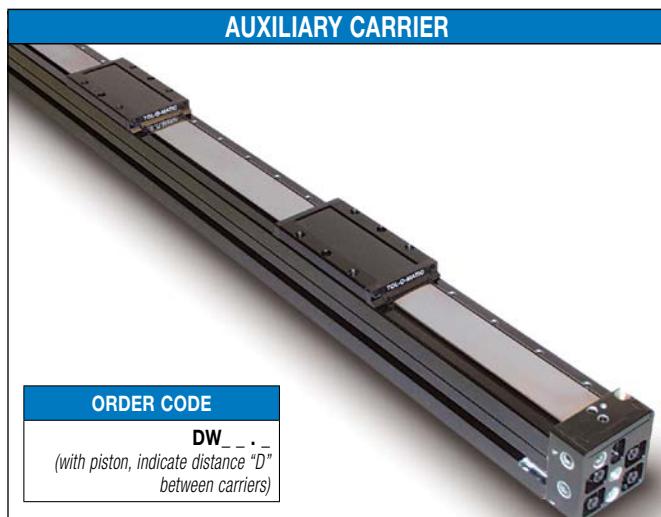
MODELS	BORE	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S
BC310	25 mm	99.8	109.5	54.1	84.6	40.9	44.5	88.9	30.28	61.90	38.89	77.77	7.1	65.10	79.2	37.31	74.60
BC315	40 mm	150.6	152.4	70.61	110.0	53.1	59.7	129.3	37.59	85.73	57.15	114.30	9.7	57.15	76.2	51.31	112.70
BC320	50 mm	159.3	188.2	89.15	135.6	68.8	71.1	152.4	59.89	130.18	76.20	152.40	9.7	57.15	76.2	61.52	133.35

MODELS	BORE	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF*	GG	HH	JJ	KK	LL
BC310	25 mm	7.80	15.7	7.1	22.63	42.88	57.2	6.76	11.2	7.1	6.8	11.2	7.1	6.045/6.020 x 6.4	M6 x 1.00	11.9	31.8	93.2	13.2
BC315	40 mm	7.92	15.7	9.7	33.32	69.85	88.9	6.76	11.2	7.1	8.33	13.5	8.6	6.045/6.020 x 6.4	M8 x 1.25	15.0	41.1	158.8	16.8
BC320	50 mm	7.92	15.7	7.9	41.28	85.73	101.6	8.33	13.5	8.6	9.93	16.0	10.4	6.045/6.020 x 6.4	M10 x 1.50	16.8	50.8	171.8	16.0

*DOWEL PINS  .003 (M)  .076 (M)

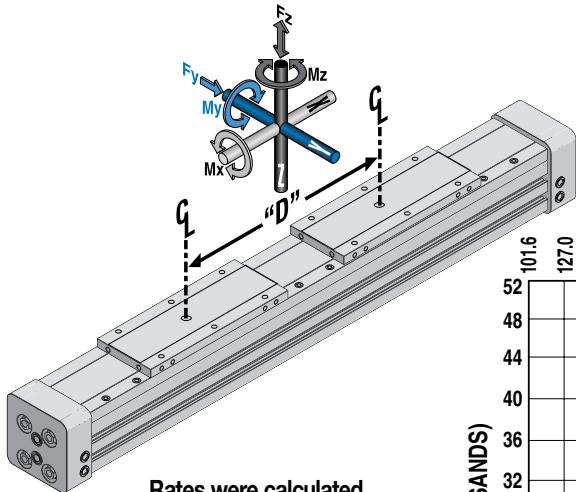
Dimensions in millimeters

BC3 AUXILIARY CARRIER - All Sizes



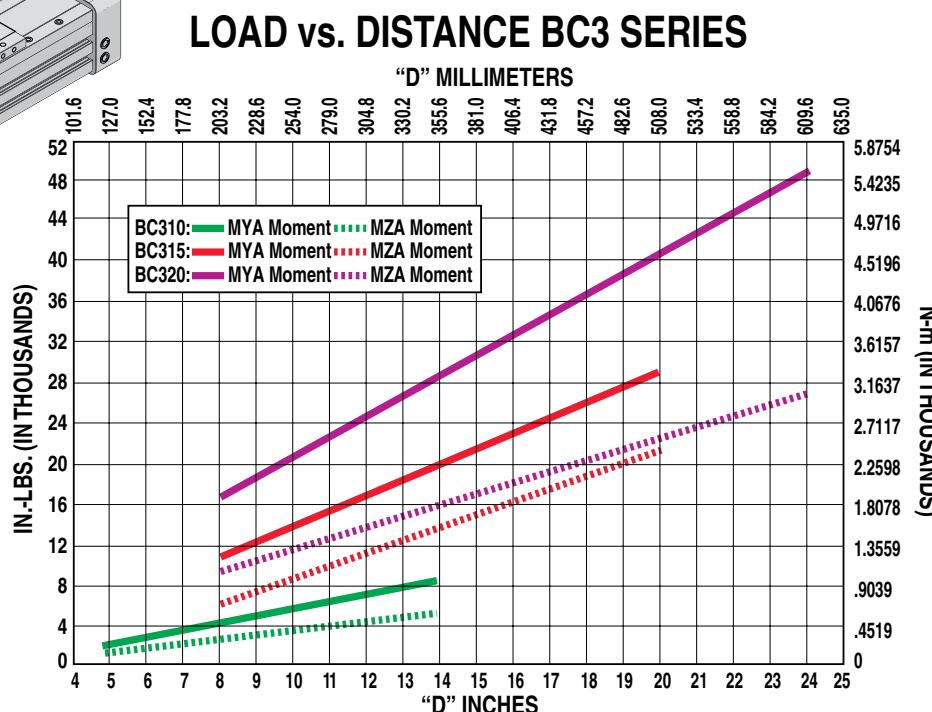
PERFORMANCE

BC3--DW (AUXILIARY CARRIER) BENDING MOMENTS AND LOAD



Rates were calculated with the following assumptions:

- 1.) Coupling between carriers is rigid.
- 2.) Load is equally distributed between carriers.
- 3.) Coupling device applies no misalignment loads to carriers.

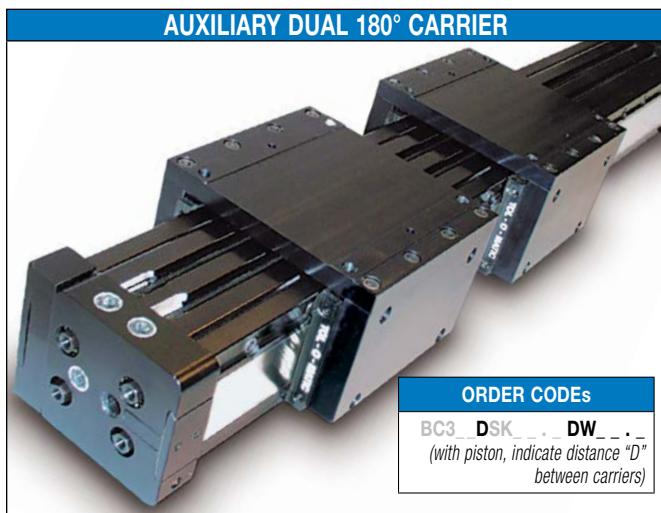


MODEL NO.	“D”* MIN.	MAXIMUM BENDING MOMENT			MAXIMUM LOAD	
		M _{YA} **	M _{XA}	M _{ZA} **	F _{ZA}	F _{YA}
BC310DW	4.88 in.	2825 in.-lbs.	500 in.-lbs.	1630 in.-lbs.	1182 lbs.	682 lbs.
BC315DW	8.07 in.	11734 in.-lbs.	1718 in.-lbs.	6779 in.-lbs.	2908 lbs.	1680 lbs.
BC320DW	8.10 in.	16265 in.-lbs.	3324 in.-lbs.	9388 in.-lbs.	4016 lbs.	2318 lbs.
BC310DW	124.0mm	319.2 N·m	56.5 N·m	184.2 N·m	536.1 kgs.	309.3 kgs.
BC315DW	205.0mm	1325.8 N·m	194.1 N·m	765.9 N·m	1319.0 kgs.	762.0 kgs.
BC320DW	205.7mm	1837.8 N·m	375.6 N·m	1060.8 N·m	1821.6 kgs.	1051.4 kgs.

* D is distance between carriers.

** Loads calculated are at minimum “D”, for substantially higher My + Mz loads increase “D” and refer to graph at left

BC3 AUXILIARY DUAL 180° CARRIER - All Sizes



AUXILIARY DUAL 180° CARRIER

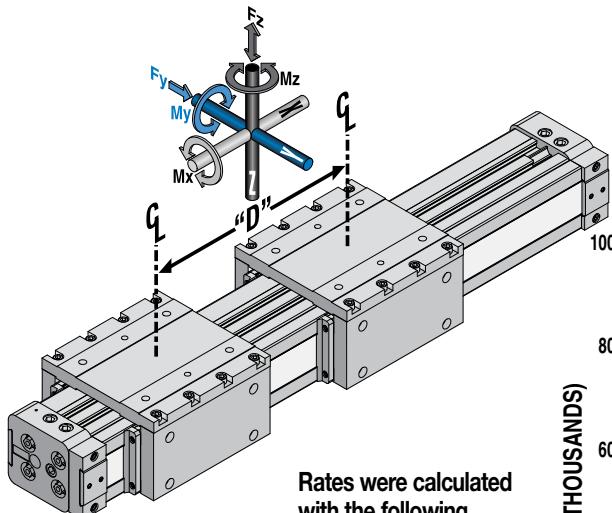
The auxiliary dual 180° carrier option substantially increases load carrying capacity and bending moments. Auxiliary carriers can only be ordered with an internal piston. When ordering, determine the minimum distance required between carriers (dimension "D" in Auxiliary Dual 180° Carrier Bending Moments chart below). Determine your working stroke. Enter

ORDERING PROCEDURE these into your configuration string. (Example BC3D15SK50.00DW10.00) The configurator will calculate the overall length of the actuator.

 NOTE: Breakaway pressure will increase when using auxiliary dual 180° carriers.

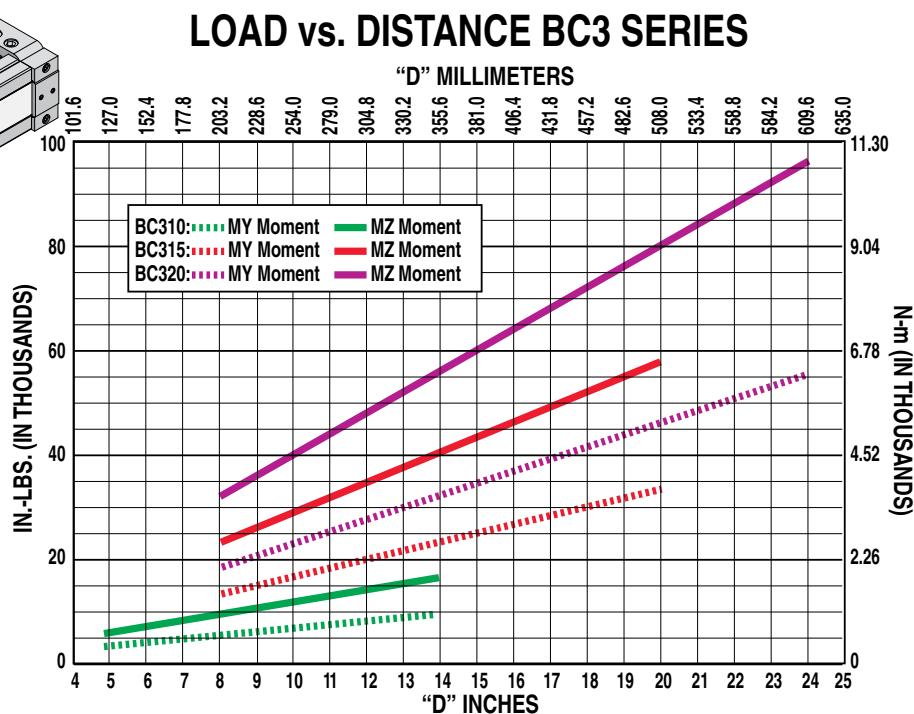
PERFORMANCE

BC3D--DW (DUAL 180°, AUXILIARY CARRIER) BENDING MOMENTS AND LOAD



Rates were calculated with the following assumptions:

- 1.) Coupling between carriers is rigid.
- 2.) Load is equally distributed between carriers.
- 3.) Coupling device applies no misalignment loads to carriers.

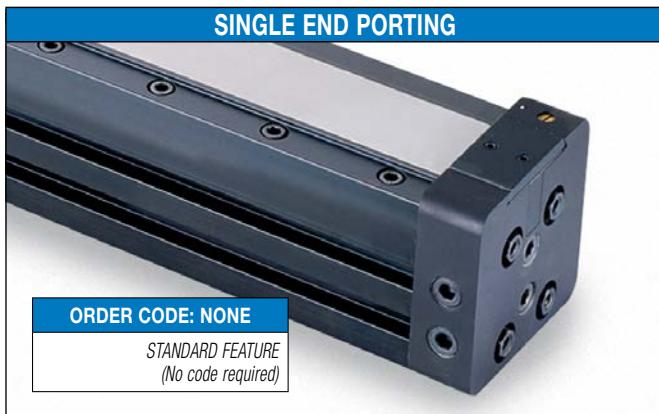


MODEL NO.	"D"** MIN.	MAXIMUM BENDING MOMENT			MAXIMUM LOAD	
		M _y **	M _x	M _z **	F _z	F _y
BC3D10DW	4.88 in.	3328 in.-lbs.	1314 in.-lbs.	5768 in.-lbs.	1364 lbs.	2364 lbs.
BC3D15DW	8.07 in.	13558 in.-lbs.	4936 in.-lbs.	23468 in.-lbs.	3360 lbs.	5816 lbs.
BC3D20DW	8.10 in.	18776 in.-lbs.	9054 in.-lbs.	32530 in.-lbs.	4636 lbs.	8032 lbs.
BC3D10DW	124.0mm	373 N-m	147 N-m	646 N-m	619 kgs.	1072 kgs.
BC3D15DW	205.0mm	1518 N-m	553 N-m	2628 N-m	1524 kgs.	2638 kgs.
BC3D20DW	205.7mm	2103 N-m	1014 N-m	3643 N-m	2103 kgs.	3643 kgs.

* D is distance between carriers.

** Loads calculated are at minimum "D", for substantially higher My + Mz loads increase "D" and refer to graph at left

BC3 SINGLE END PORTING - All Sizes



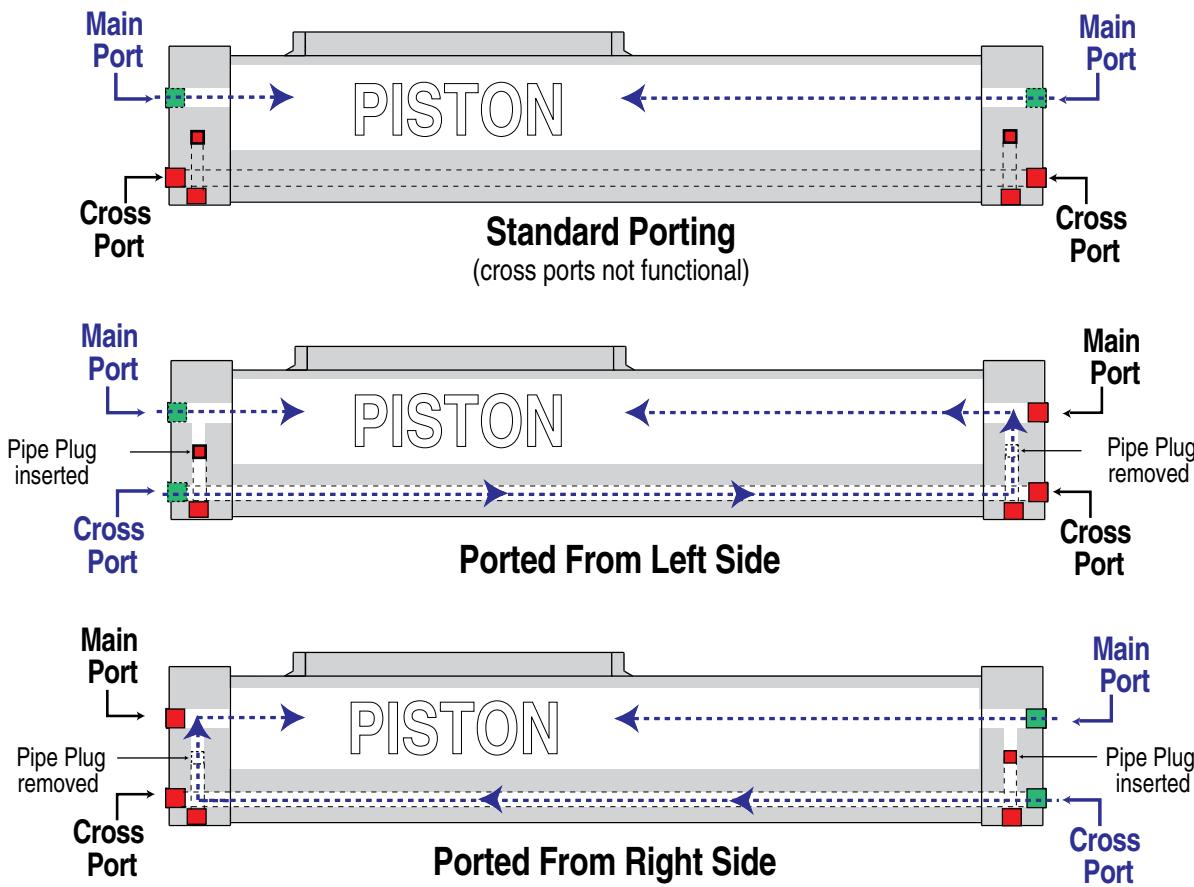
The BC3 is uniquely designed for multiple port locations including single end porting. This is a standard feature on all bore sizes of the BC3. The lower ports on the head assembly only function when used to cross port the cylinder for single end porting.

To convert to single end porting, remove access pipe plug fitting from the opposite head assembly that the air lines will be installed into. Then remove the internal port pipe plug. Reinstall access pipe plug into the bottom of the head. Remove pipe plug from the head that the air lines will be installed.

AIR FLOW DIAGRAMS

SINGLE END PORTING ALLOWS THE GREATEST FLEXIBILITY IN AIR HOOK UP

Converting from Standard porting to Left or Right side porting can be achieved if plugs are placed as in the diagram below.

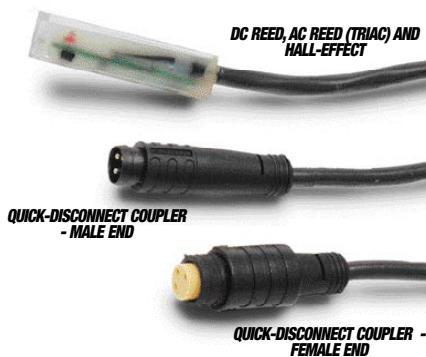


Note: Standard porting may be field converted to ported from left or ported from right.

For complete instructions refer to parts sheet.

BC3 SWITCHES - All Sizes

SWITCHES



There are 10 sensing choices: DC reed, form A (open) or form C (open or closed); AC reed (Triac, open); Hall-effect, sourcing, PNP (open); Hall-effect, sinking, NPN (open); each with either flying leads or QD (quick disconnect). Commonly used to send analog signals to PLC (programmable logic controllers), TLL, CMOS circuit or other controller device. These switches are activated by the actuator's magnet.

Switches contain reverse polarity protection. QD cables are shielded; shield should be terminated at flying lead end.

If necessary to remove factory installed switches, be sure to reinstall on the same side of actuator with scored face of switch toward internal magnet.

SPECIFICATIONS

ORDER CODE	REED DC		REED AC		HALL-EFFECT DC												
	R T	R M	B T	B M	C T	C M	T T	T M	K T	K M							
LEAD	5m	QD*	5m	QD*	5m	QD*	5m	QD*	5m	QD*							
CABLE SHIELDING	Unshielded	Shielded†	Unshielded	Shielded†	Unshielded	Shielded†	Unshielded	Shielded†	Unshielded	Shielded†							
SWITCHING LOGIC	"A" Normally Open		"C" Normally Open or Closed		Triac Normally Open			PNP (Sourcing) Normally Open									
MECHANICAL CONTACTS	Single-Pole Single-Throw			Single-Pole Double-Throw			NO, These Are Solid State Components										
COIL DIRECT	Yes		Yes		Yes		—										
POWER LED	None	Red 	None	None	None	None	None 	None 	None	None 							
SIGNAL LED	Red 																
OPERATING VOLTAGE	200 Vdc max.	120 Vdc max.		120 Vac max.		5 - 25 Vdc											
OUTPUT RATING	—		—		—		25 Vdc, 200mA dc										
OPERATING TIME	0.6 msec max. (including bounce)	0.7 msec max. (including bounce)		—		< 10 micro sec.											
OPERATING TEMPERATURE	-40°F [-40°C] to 158°F [70°C]					0°F [-18°C] to 150°F [66°C]											
RELEASE TIME	1.0 msec. max.		—		—		—										
ON TRIP POINT	—		—		—		150 Gauss maximum										
OFF TRIP POINT	—		—		—		40 Gauss minimum										
**POWER RATING (WATTS)	10.0 §	3.0 §§		10.0		5.0											
VOLTAGE DROP	2.6 V typical at 100 mA	NA		—		—											
RESISTANCE	0.1 Ω Initial (Max.)		—		—		—										
CURRENT CONSUMPTION	—		1 Amp at 86°F [30°C]		0.5 Amp at 140°F [60°C]		200 mA at 25 Vdc										
FREQUENCY	—		47 - 63 Hz		—		—										
CABLE MIN. BEND RADIUS	STATIC	0.630" [16mm]					—										
	DYNAMIC	Not Recommended					—										

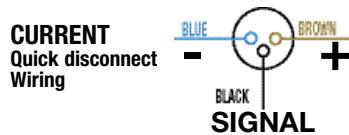
⚠ CAUTION: DO NOT OVER TIGHTEN SWITCH HARDWARE WHEN INSTALLING!

⚠ ** WARNING: Do not exceed power rating (Watt = Voltage X Amperage). Permanent damage to sensor will occur.

*QD = Quick Disconnect; Male coupler is located 6" [152mm] from sensor,

Female coupler to flying lead (part #2503-1025) distance is 197" [5m] also see Cable Shielding specification above

⚠ REPLACEMENT OF QD SWITCHES MANUFACTURED BEFORE JULY 1, 1997: It will be necessary to replace or rewire the female end coupler.



Reed Switch Life Expectancy: Up to 200,000,000 cycles (depending on load current, duty cycle and environmental conditions)

†Shielded from the female quick disconnect coupler to the flying leads. Shield should be terminated at flying lead end.

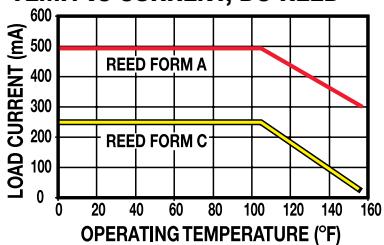
§ Maximum current 500mA (not to exceed 10VA) Refer to Temperature vs. Current graph and Voltage Derating graph

§§ Maximum current 250mA (not to exceed 3VA) Refer to Temperature vs. Current graph and Voltage Derating graph

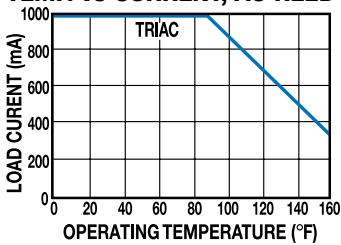
BC3 SWITCHES - All Sizes

PERFORMANCE

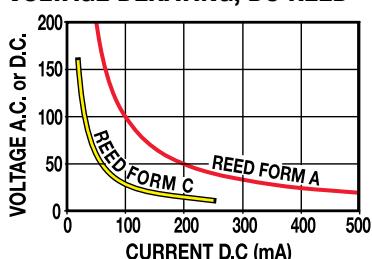
TEMP. vs CURRENT, DC REED



TEMP. vs CURRENT, AC REED

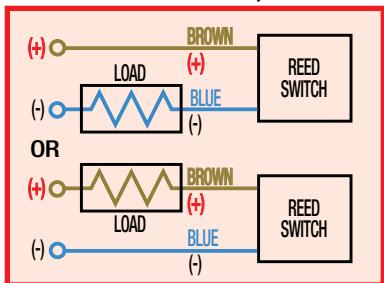


VOLTAGE DERATING, DC REED

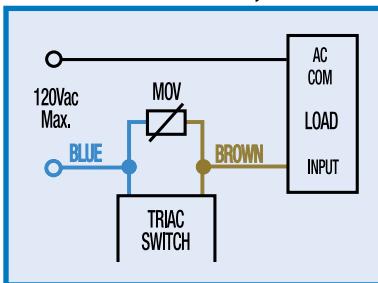


WIRING DIAGRAMS

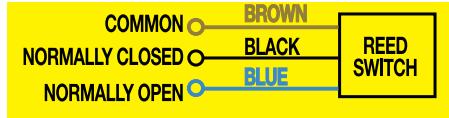
R[T] & R[M] DC REED, FORM A



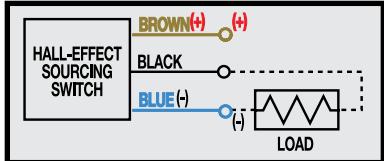
C[T] & C[M] AC REED, TRIAC



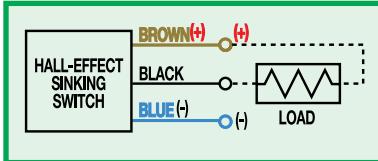
B[T] & B[M] DC REED, FORM C



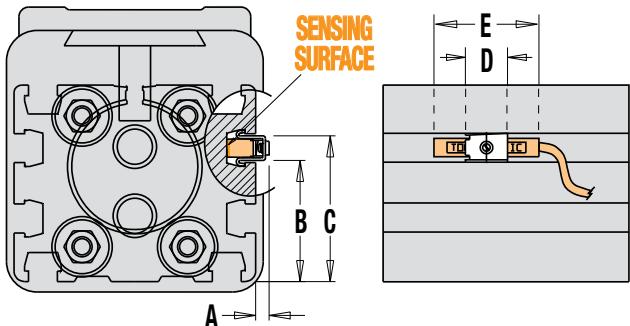
T[T] & T[M] HALL-EFFECT, SOURCING, PNP



K[T] & K[M] HALL-EFFECT, SINKING, NPN



DIMENSIONS



SIZE	BORE	A	B	C	D	E
10	1.000	0.194	0.822	0.906	0.500	1.250
15	1.500	0.160	1.428	1.721	0.500	1.250
20	2.000	0.036	1.994	2.287	0.500	1.250

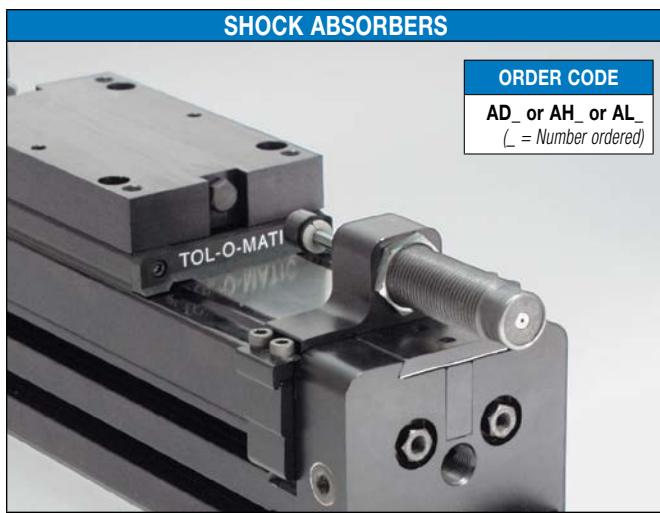
Dimensions in inches

SIZE	BORE	A	B	C	D	E
10	25	4.93	20.88	23.01	12.70	31.75
15	40	4.06	36.27	43.71	12.70	31.75
20	50	0.91	50.65	58.09	12.70	31.75

Dimensions in millimeters

Some actuators may require switch mounting on a specific side of the assembly. Call Tolomatic for details.

BC3 SHOCK ABSORBERS - All Sizes



SHOCK ABSORBERS

ORDER CODE

AD_ or AH_ or AL_
(_ = Number ordered)

Rodless cylinders with standard internal cushion offer an effective method of decelerating loads. However, all Tolomatic rodless cylinders are capable of carrying heavier loads at higher velocities than the cylinder cushion can absorb. Optional shock absorbers can be used to increase the cylinder's life and broaden the application range for the cylinder model you have chosen.

Tolomatic offers adjustable shock absorbers for the BC3. They allow the shock to be positioned at any point along the cylinder.

A shock stop plate must be used in conjunction with the BC3 shock to provide a stopping surface on the carrier.

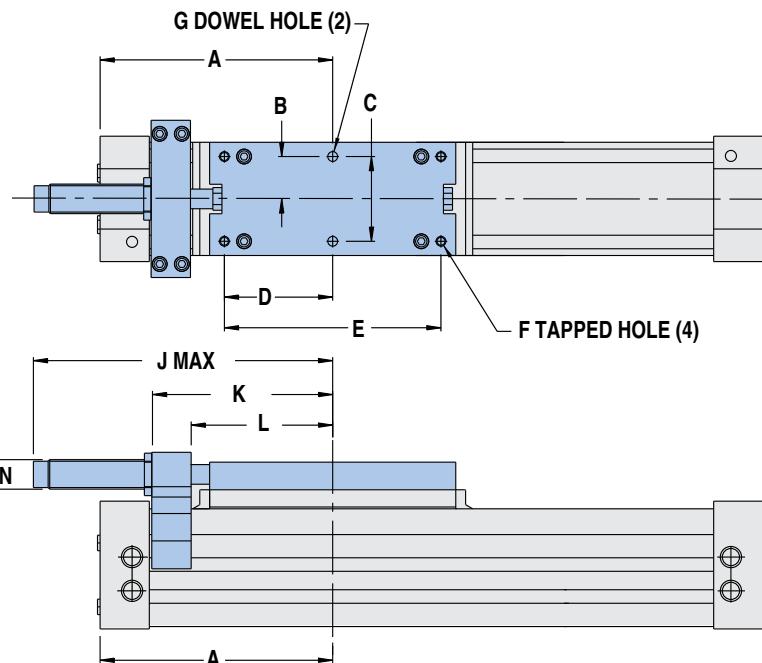
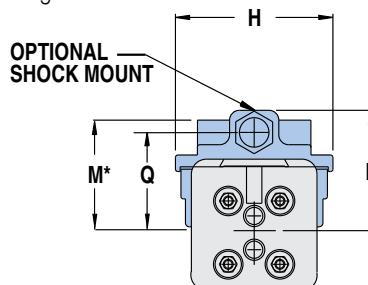
Typical shock absorber life varies between 1-2 million cycles (depending on environment) appropriate preventative maintenance should be considered in high cyclic applications.

NOTE: When 2 shock absorbers are ordered, the unit will be assembled with NO internal cushions.

CAUTION: In applications which result in a load bending moment at deceleration, care should be taken to decelerate the load rather than the carrier of the band cylinder.

DIMENSIONS

*NOTE: Shock Absorber option will increase the overall carrier height "M".



SIZE	BORE	A	B	C	D	E	F	G**	H	J	K	L	M	N	P	Q
10	1.00	3.93	0.890	1.781	1.562	3.125	1/4-20 x .50DP	.252-.251 x .25	3.09	5.47	2.91	2.22	2.223	0.50	2.46	1.964
15	1.50	5.93	1.078	2.156	2.750	5.500	1/4-20 x .50DP	.252-.251 x .25	4.00	7.65	4.59	3.59	2.812	0.75	3.06	2.495
20	2.00	6.27	1.563	3.125	2.938	5.875	5/16-18 x .75DP	.252-.251 x .69	5.06	8.14	4.88	3.88	3.594	1.00	3.88	3.230

**DOWEL PINS .003

Dimensions in inches

SIZE	BORE	A	B	C	D	E	F	G**	H	J	K	L	M	N	P	Q
10	25	99.8	22.62	45.24	39.69	79.38	M6-1.0 x 12.7DP	6.05-6.02 x 6.4	78.5	138.9	73.9	56.4	56.46	14.0	62.5	49.89
15	40	150.7	27.38	54.76	69.85	139.70	M6-1.0 x 12.7DP	6.05-6.02 x 6.4	101.6	194.2	116.6	91.2	71.42	20.0	77.7	63.37
20	50	159.3	39.69	79.38	76.62	149.23	M8-1.25 x 19.1DP	6.05-6.02 x 17.5	128.5	206.8	124.0	98.6	91.29	25.4	98.6	82.04

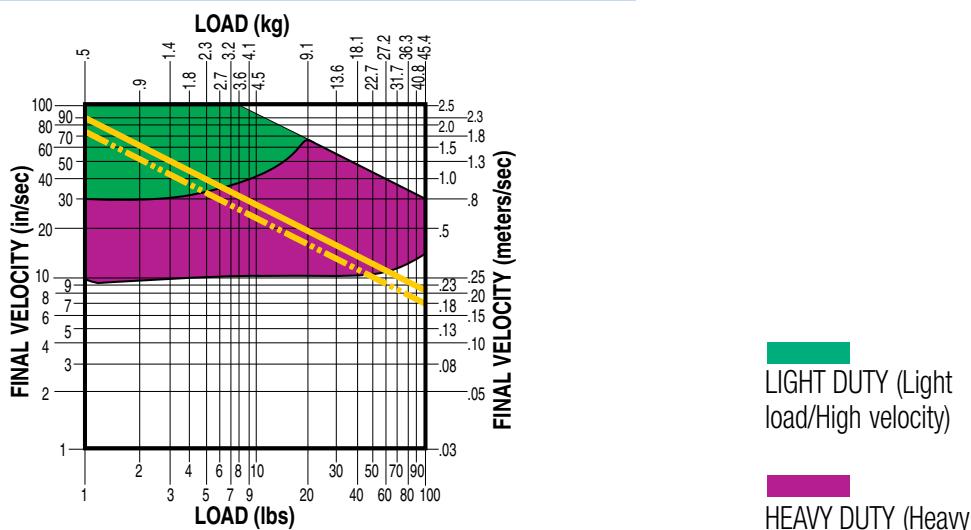
**DOWEL PINS .076

Dimensions in millimeters

BC3 Shock Absorbers - All Sizes - PERFORMANCE

VELOCITY vs LOAD

BC310

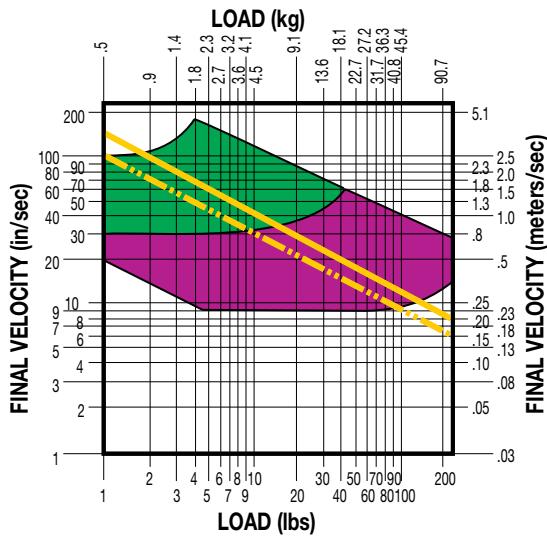


LIGHT DUTY (Light load/High velocity)

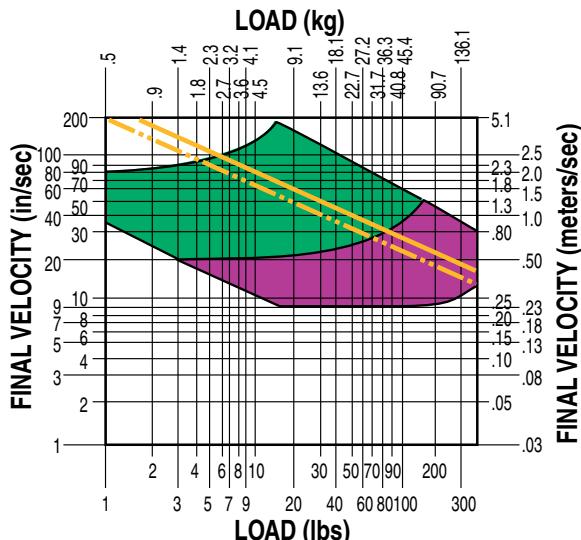
HEAVY DUTY (Heavy load/Low velocity)

AIR CUSHION DATA

BC315



BC320



 NOTE: If final (or impact) velocity cannot be calculated directly, a reasonable guideline to use is 2 x average velocity.

Rodless Cylinder Selection Guidelines - BC2, BC3, BC4, LS - All Sizes

PROVIDING LOAD GUIDANCE AND SUPPORT

The process of selecting a load bearing actuator for a given application can be complex. It is highly recommended that you contact Tolomatic or a Tolomatic Distributor for assistance in selecting the best actuator for your application. The following overview of the selection guidelines are for educational purposes only.

1 COMPILE APPLICATION REQUIREMENTS

To determine the appropriate Band Cylinder or Linear Slide model for an application, compile the following information:

- Available pressure (PSI)
- Weight of load (lbs or kg)
- Orientation of load (lbs or kgs)
- Velocity of load (in/sec or mm/sec)
- Stroke length (in or mm)

HINT: Use Tolomatic sizing and selection software, download at: tolomatic.com

2 SELECT CYLINDER SIZE

- Consult the Theoretical Force vs. Pressure charts.
- Cross-reference the load force (or load weight if force is not known) and the available operating pressure. If the intersection falls below the diagonal line, and if moments do not exceed maximum values listed for that model (see Step 3), the actuator will accommodate the application.

If the intersection is above the diagonal line, a larger cylinder bore size should be considered.

NOTE: Additional force may be required to obtain the necessary acceleration for vertical or horizontal loads.

3 DETERMINE NATURE OF LOAD AND THE EFFECT OF BENDING MOMENTS

If the cylinder will guide and support a load located directly over the center of carrier, bending moments will not be a factor in the cylinder selection.

NOTE: The maximum load "L" must not exceed the capacity limits of the cylinder selected.

- Bending Moments

For off center or side loads, determine the distance from the center of mass of the load to the center of the carrier bracket. This measurement is needed to calculate the torque for bending moments. (Refer to Bending Moment chart for each model.)

Should the resulting maximum bending moment exceed figures indicated on the chart, external guides, auxiliary carrier/s or a larger cylinder should be considered.

- Auxiliary Carrier Bending Moments

The auxiliary carrier option (available on most models) increases load carrying capacity and bending moments. Auxiliary carriers can be ordered with or without an internal piston. (Auxiliary

carriers without a piston have no internal cushion on the cylinder end closest to the auxiliary carrier.)

IMPORTANT: When ordering, determine the working stroke, then the minimum distance required between carriers (dimension "D" in Auxiliary Carrier Bending Moments chart). When ordered, Tolomatic's configurator will calculate the overall length of the actuator.

NOTE: breakaway pressure will increase when using auxiliary carriers.

4 DETERMINE INTERNAL CUSHION CAPACITY

- Consult the Cushion Data chart for the model selected. The velocities listed on the cushion charts are final or cushion impact velocities. On applications where the internal cushions or bumpers are to be used, be sure the actual, final or impact velocity is known. If the velocity is not known, use of limit switches with valve deceleration circuits or shock absorbers should be considered. NOTE: The BC205 uses external bumpers in place of internal cushions, LS10 does not have cushions or bumpers.

- Cross-reference the final velocity and weight of the load. If the intersection is below the diagonal lines, the internal cushions on the actuator may be used. If the point falls above the dashed diagonal line or if the velocity is not known, use deceleration circuits, external shock absorbers or select a

larger cylinder with greater cushion capacity. On high-cyclic applications, use of external stops is strongly recommended.

5 DETERMINE TUBE SUPPORT REQUIREMENTS

- Consult the Tube Support chart for the model selected.
- Cross reference the load weight and maximum distance between supports.

6 CONSIDER OPTIONS

- Switches- dc Reed, Hall-effect or ac Triac
- Band Cylinders and Linear Slides each have different standard features and options. Check the options section for the actuator you have selected.
- Shock Absorbers- if needed.
 - Foot Mounting Kits
 - Floating Mount Bracket – use when lack of parallelism occurs between the cylinder and an external guided and supported load.
 - Single End Porting (BC3, BC4)
 - Long Carrier (BC4)
 - Proximity Sensors (LS)
 - Dual 180° Carrier (BC3)

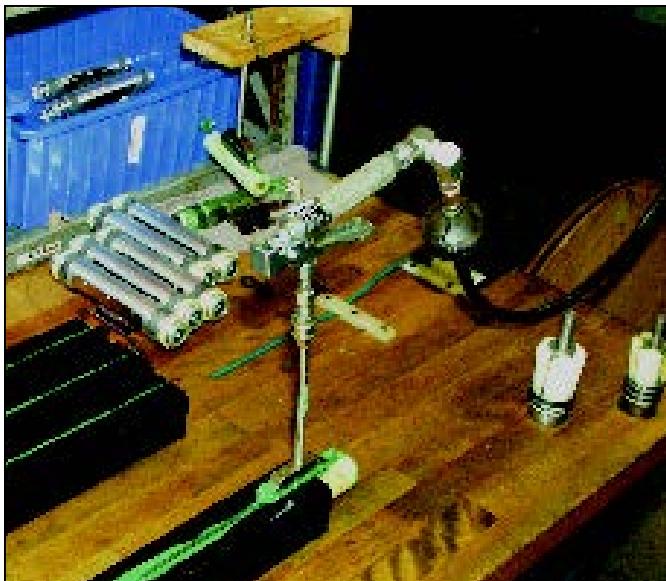
Application Guidelines

The following conditional statements are intended as general guidelines for use of Tolomatic actuators. Since all applications have their own specific operating requirements, consult Tolomatic, Inc. or your local Tolomatic distributor if an application is unconventional or if questions arise regarding the selection process.

CUSHION NEEDLE ADJUSTMENT (BC2, BC3, BC4, CC, SA, DP, TC ONLY)



Adjust the cushion needles in the cylinder heads carefully to obtain a smooth, hesitation free deceleration for your particular application. If there are questions on proper adjustment, please consult Tolomatic, Inc.



LUBRICATION GUIDELINES

All Tolomatic actuators (except Cable Cylinders) are prelubricated at the factory. To ensure maximum actuator life, the following guidelines should be followed.

• Filtration

We recommend the use of dry, filtered air in our products. "Filtered air" means a level of 10 Micron or less. "Dry" means air should be free of appreciable amounts of moisture. Regular maintenance of installed

filters will generally keep excess moisture in check.

• External Lubricators (optional)

The factory prelubrication of Tolomatic actuators will provide optimal performance without the use of external lubrication. However, external lubricators can further extend service life of pneumatic actuators if the supply is kept constant.

Oil lubricators, (mist or drop) should supply a minimum of 1 drop per 20 standard cubic feet per minute to the

cylinder. As a rule of thumb, double that rate if water in the system is suspected. Demanding conditions may require more lubricant.

If lubricators are used, we recommend a non-detergent, 20cP @ 140°F 10-weight lubricant. Optimum conditions for standard cylinder operation are +32° to +150°F (+0° to 65.5°C).

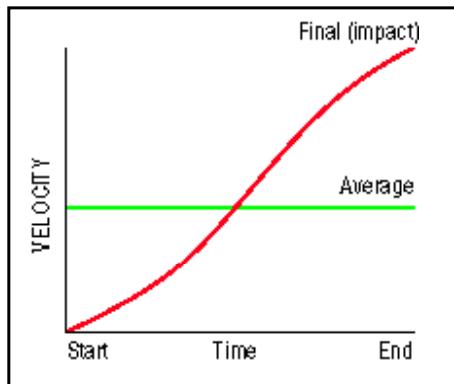
 **NOTE:** Use of external lubricators may wash away the factory installed lubrication. External lubricants must be maintained in a constant supply or the results will be a dry actuator prone to premature wear.

• Sanitary Environments

Oil mist lubricators must dispense "Food Grade" lubricants to the air supply. Use fluids with ORAL LD50 toxicity ratings of 35 or higher such as Multitherm® PG-1 or equivalent. Demanding conditions can require a review of the application.

FINAL VELOCITY CALCULATION

Velocity calculations for all rodless cylinders need to differentiate between final velocity and average velocity. For example: Stroking a 100-inch BC3 model in one second yields an average velocity of 100 inches per second. To properly determine the inertial forces for cushioning, it is important to know the



final (or impact) velocity. Rodless cylinders accelerate and decelerate at each end of the stroke. Therefore this acceleration must be considered (see diagram).

If final (or impact) velocity cannot be calculated directly, a reasonable guideline is to use 2 x average velocity.

BC3 APPLICATION GUIDELINES

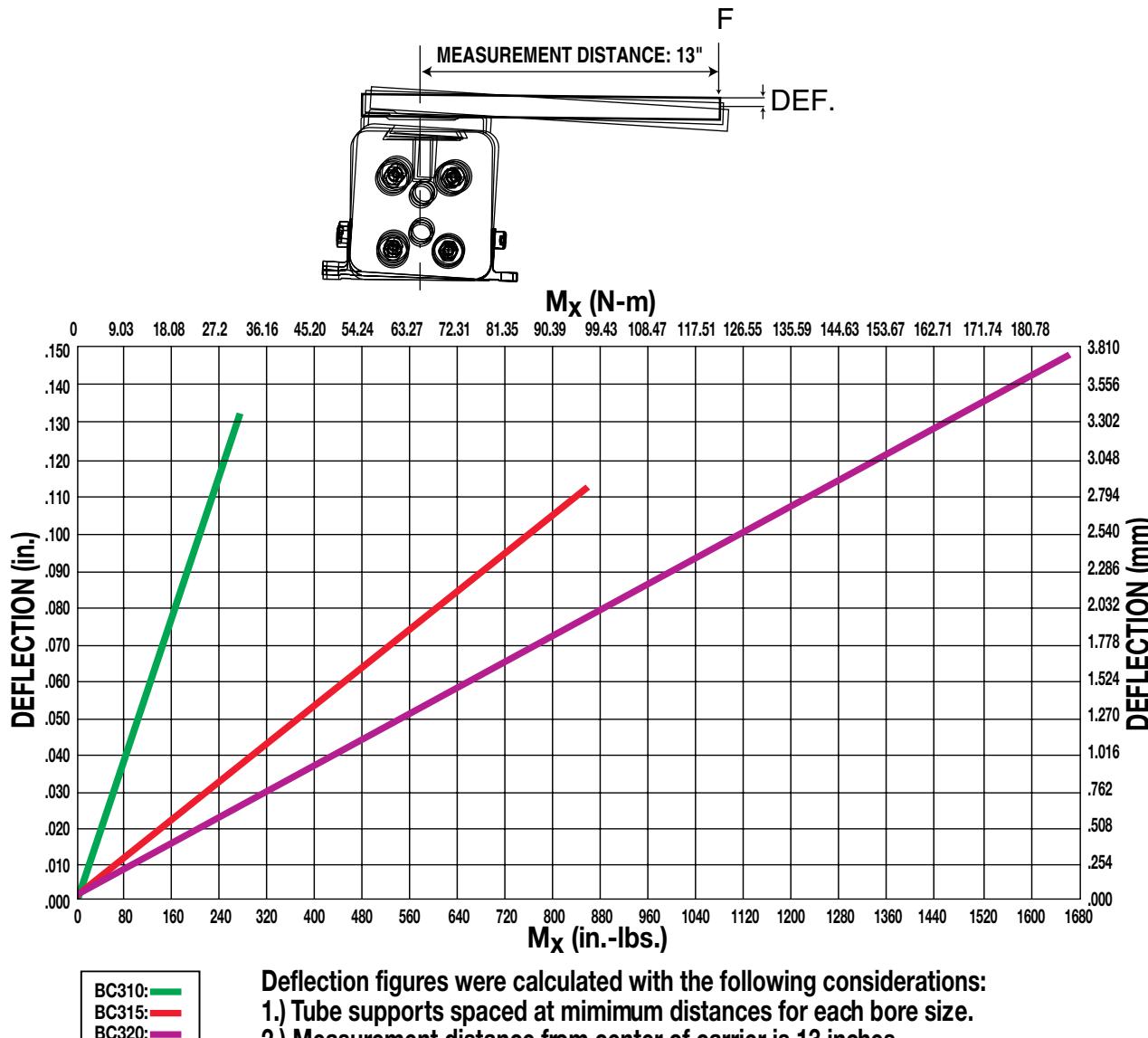
BC3 DECELERATION CONSIDERATIONS

While the BC3 is capable of carrying very large loads, consideration must be given to how to stop the load at the end of stroke. If Tolomatic cushions or shocks are to be used, please stay within the specifications on page BC3_26. If you should decide to utilize another type of shock absorber, be sure that the deceleration of the load is smooth and over adequate distance.

CAUTION: In applications which result in a load bending moment at deceleration, care should be taken to decelerate the load rather than the carrier of the band cylinder.

PERFORMANCE

BC3 CYLINDER/LOAD DEFLECTION



BC3 Service Parts Ordering - ALL Sizes

Inch (U.S. Standard)	SIZE	10	D10	15	D15	20	D20
Foot Mount Kits ¹		3410-9005	3410-9025	3415-9005	3415-9025	3420-9005	3420-9025
Shock Mount Kit w/ Shock ² – Heavy Duty		3410-9013	3410-9013	3415-9013	3415-9013	3420-9013	3420-9013
Shock Mount Kit w/ Shock ² – Light Duty		3410-9010	3410-9010	3415-9010	3415-9010	3420-9010	3420-9010
Shock Mount Kit w/o Shock ³ (Hardware Only)		3410-9003	3410-9003	3415-9003	3415-9003	3420-9003	3420-9003
Shock Stop Plate Kit ⁴		3410-9004	3410-9004	3415-9004	3415-9004	3420-9004	3420-9004
Tube Supports ⁵		3410-9006	3410-9026	3415-9006	3415-9026	3420-9006	3420-9026
Repair Kit ⁶		RKBC310NP	RKBC3D10NP	RKBC315NP	RKBC3D15NP	RKBC320NP	RKBC3D20NP

Metric	SIZE	10	10D	15	15D	20	20D
Foot Mount Kits ¹		4410-9005	4410-9025	4415-9005	4415-9025	4420-9005	4420-9025
Shock Mount Kit w/ Shock ² – Heavy Duty		4410-9013	4410-9013	4415-9013	4415-9013	4420-9013	4420-9013
Shock Mount Kit w/ Shock ² – Light Duty		4410-9010	4410-9010	4415-9010	4415-9010	4420-9010	4420-9010
Shock Mount Kit w/o Shock ³ (Hardware Only)		4410-9003	4410-9003	4415-9003	4415-9003	4420-9003	4420-9003
Shock Stop Plate Kit ⁴		4410-9004	4410-9004	4415-9004	4415-9004	4420-9004	4420-9004
Tube Supports ⁵		4410-9006	4410-9026	4415-9006	4415-9026	4420-9006	4420-9026
Repair Kit ⁶		RKBC310TP(GP)	RKBC310DTP(GP)	RKBC315TP(GP)	RKBC315DTP(GP)	RKBC320TP(GP)	RKBC320DTP(GP)



Service Parts Ordering NOTES:

- 1 Foot Mount Kit contains one bracket and mounting hardware.
- 2 Shock Field Retrofit Kit contains one shock absorber and mounting hardware.
- 3 Shock Field Mount Kit contains one set of mounting hardware.
- 4 Shock Stop Plate Kit contains shock plate, impact bolts, screws and dowel pins.
- 5 Contains one tube support and mounting hardware.
- 6 Repair Kit contains external dust band, internal seal band, wipers, end caps and internal soft seals.
Stroke length must be indicated after repair kit code.

Repair Kit ordering method: **R K B C 3 □ □ □ S □ □ □ □ □ □ □ □ D W □ □ □ □ □**

EXAMPLE: R K B C 3 4 0 S S M 2 0 0 7 · 0 2 D W 2 1 5 · 9

Repair Kit	Bore Size	Stroke Length	Auxiliary Carrier Length
Model	Bear. Type		

Switch Ordering NOTES:

To order field retrofit switch and hardware kits for all Tolomatic actuators: SW (Then the model and bore size, and type of switch required)

Switch ordering method*: **S W B C 3 □ □ □ □ □**

EXAMPLE: S W B C 3 2 5 N R K 2

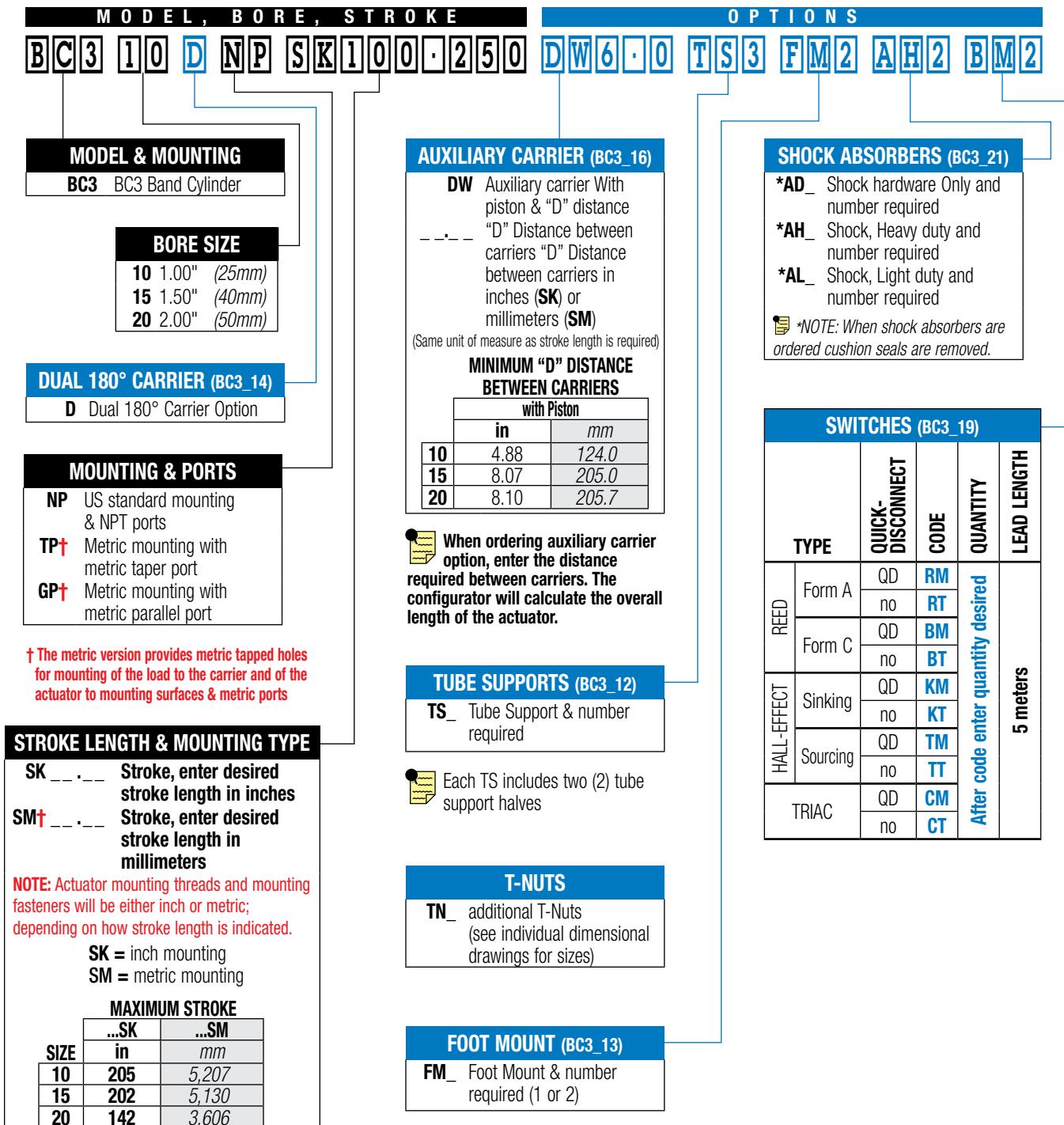
Switch Kit	Bore Size	Switch Type	Quantity
Model	Bear. Type		

*Hardware and Form A Reed switch with 5 meter lead for 1.5" bore BC3 band cylinder

	CONFIG. CODE ORDERING	
	Mounting Hardware & FE conn. included	
DESCRIPTION	CODE	
Switch Kit, Reed, Form C, 5m	BT	
Switch Kit, Reed, Form C, Male Conn.	BM	
Switch Kit, Reed, Form A, 5m	RT	
Switch Kit, Reed, Form A, Male Conn.	RM	
Switch Kit, Triac, 5m	CT	
Switch Kit, Triac, Male Conn.	CM	
Switch Kit, Hall-effect, Sinking, 5m	KT	
Switch Kit, Hall-effect, Sinking, Male Conn.	KM	
Switch Kit, Hall-effect, Sourcing, 5m	TT	
Switch Kit, Hall-effect, Sourcing, Male Conn.	TM	

NOTE: When kit is ordered female connector & all mounting hardware is included

BC3 Ordering - ALL Sizes



		TYPE	QUICK-DISCONNECT	CODE	QUANTITY	LEAD LENGTH
REED	Form A	QD	RM			
	no	no	RT			
FORM C	QD	BM				
	no	BT				
HALL-EFFECT	Sinking	QD	KM			
	no	no	KT			
SOURCING	QD	TM				
	no	TT				
TRIAC	QD	CM				
	no	CT				

After code enter quantity desired
5 meters