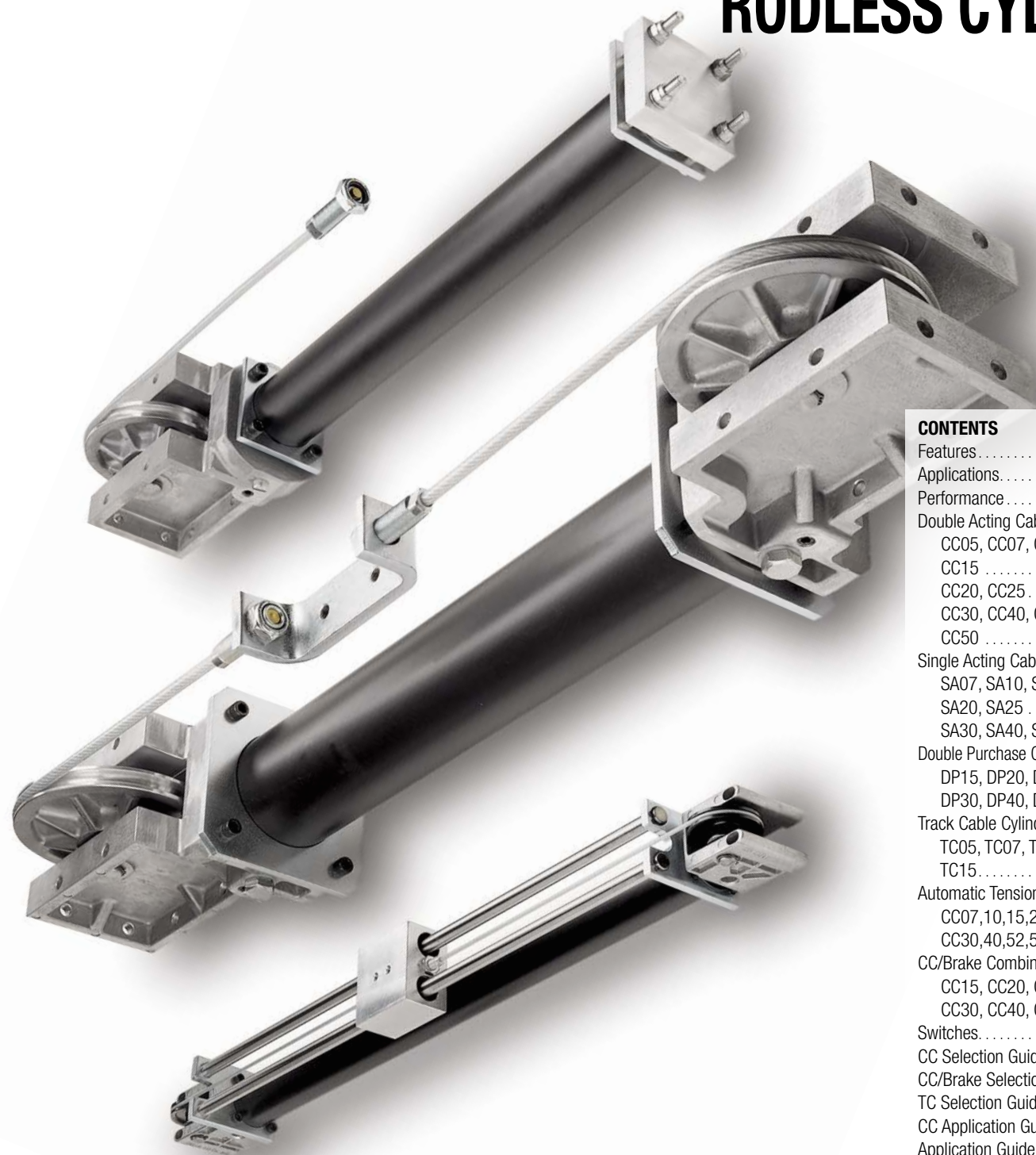


CC CABLE CYLINDER

RODLESS CYLINDER



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CABLE CYLINDER

ENDURANCE TECHNOLOGYSM

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

Tolomatic invented the first ever rodless cylinder in 1956 - the cable cylinder. First designed into the bagger/sealer used in the flour industry the cable cylinder continues to power applications in the 21st century. Built-to-order in stroke lengths up to 282 inches.

HIGH STRENGTH TUBE

- High-strength, lightweight, black anodized aluminum or steel
- Creates chamber for pneumatic or hydraulic pressure and protects piston



STEEL CLEVIS

- High strength material resists deformation
- Cable adjustment points
- Threaded holes for load attachment

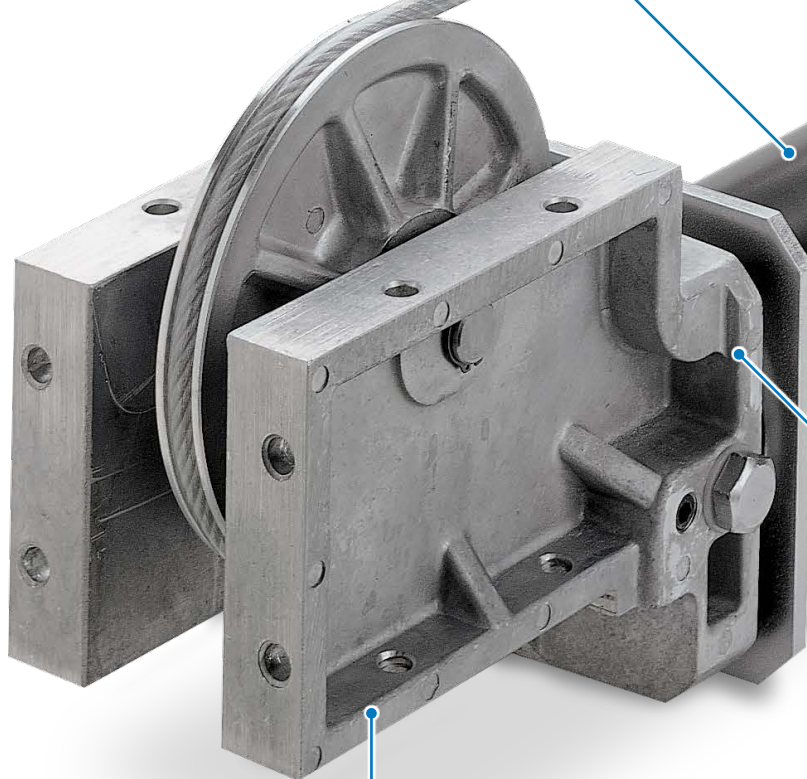
The Tolomatic double-acting cable cylinder is a versatile space saver, available in all 9 bore sizes. Enjoy cost savings over conventional rod cylinders in strokes over four feet without experiencing rod buckle.

These cylinders can be isolated from any work area with extended cable lengths and achieve strokes of up to 60 feet in length.

DOUBLE ACTING CABLE CYLINDER

PORTING CHOICES

- Choose from 2 or 3 port heads



ALUMINUM PISTON

- High-strength, lightweight aluminum
- Pulls the cables when actuated by pneumatic or hydraulic pressure



DIE CAST HEAD ASSEMBLY

- High-strength, lightweight anodized aluminum
- Protects piston and creates chamber for pneumatic or hydraulic pressure

LOCATE REMOTELY

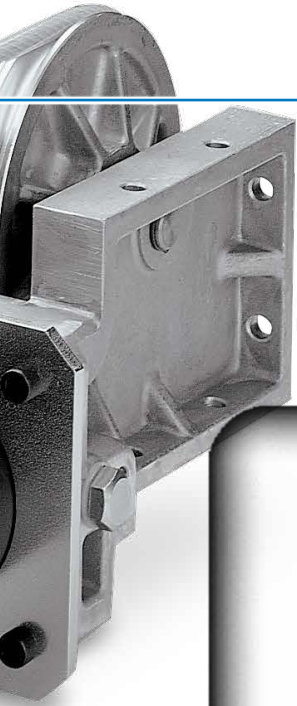
- Cylinder can be located away from work area. Useful in harsh environments and if space/weight are limited

UNIQUE GLAND SEALS

- Tight seal for cables to pass through
- Easy installation
- Snap In/Out cable seals or encapsulated gland seals depending on bore size

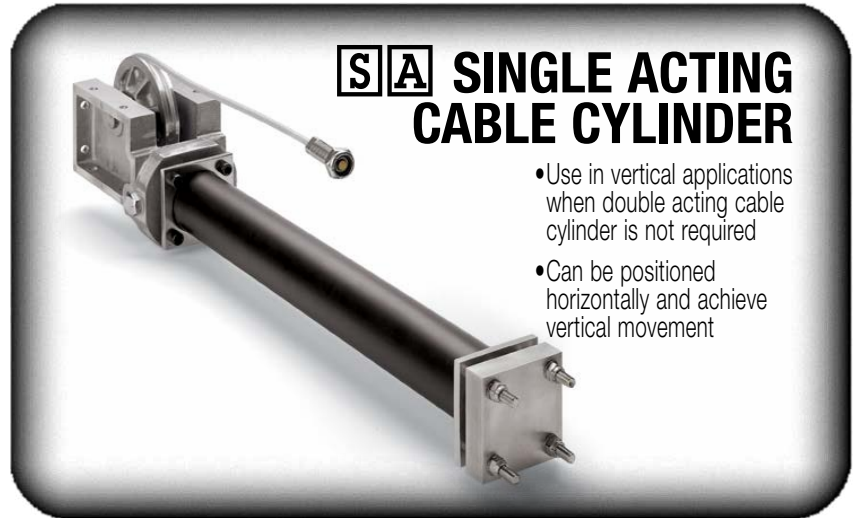


TOLOMATIC... THE RODLESS CYLINDER LEADER



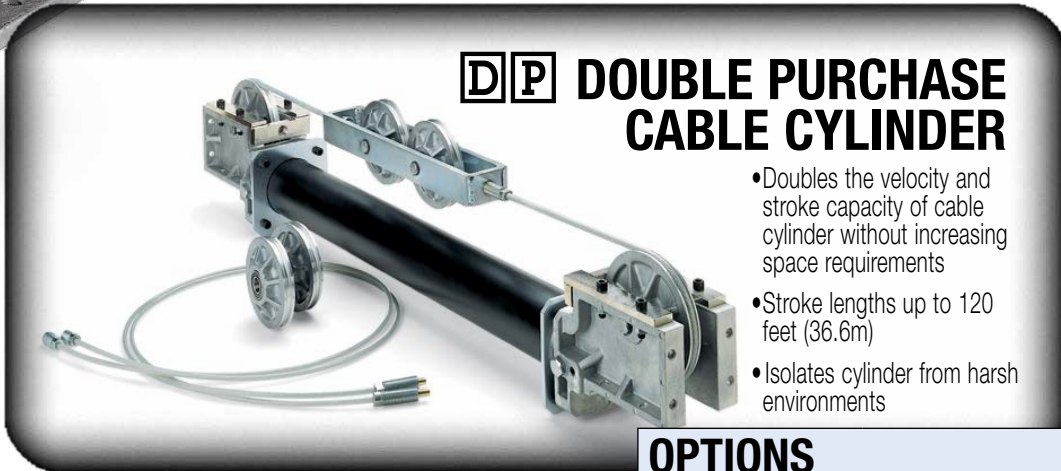
MIL SPEC CABLES

- Field proven to provide millions of cycles of uninterrupted service
- Nylon jacketed aircraft cables manufactured under Mil Spec. MIL-W-83420D



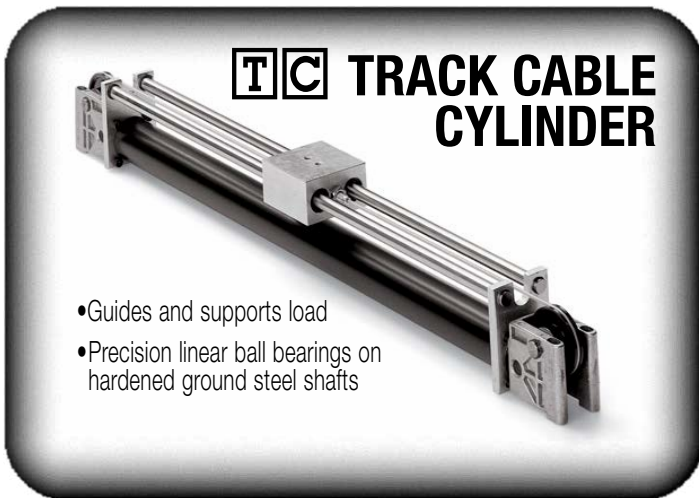
SA SINGLE ACTING CABLE CYLINDER

- Use in vertical applications when double acting cable cylinder is not required
- Can be positioned horizontally and achieve vertical movement



DP DOUBLE PURCHASE CABLE CYLINDER

- Doubles the velocity and stroke capacity of cable cylinder without increasing space requirements
- Stroke lengths up to 120 feet (36.6m)
- Isolates cylinder from harsh environments



TC TRACK CABLE CYLINDER

- Guides and supports load
- Precision linear ball bearings on hardened ground steel shafts

OPTIONS



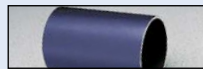
AUTO TENSIONER

- Maintains proper cable tension
- Maximizes service life of both cable and seals



CALIPER DISC BRAKE **HM HN**

- Best mounting choice in most applications



STEEL TUBE

- For extra strength & use in harsh environments



3 PORTED HEAD

- For convenient air connection



SWITCHES

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



SEALS OF VITON® MATERIAL **V**

- Long lasting seal option
- High temperature applications



EXTRA CABLE **XA XB**

- To remotely locate cable cylinder

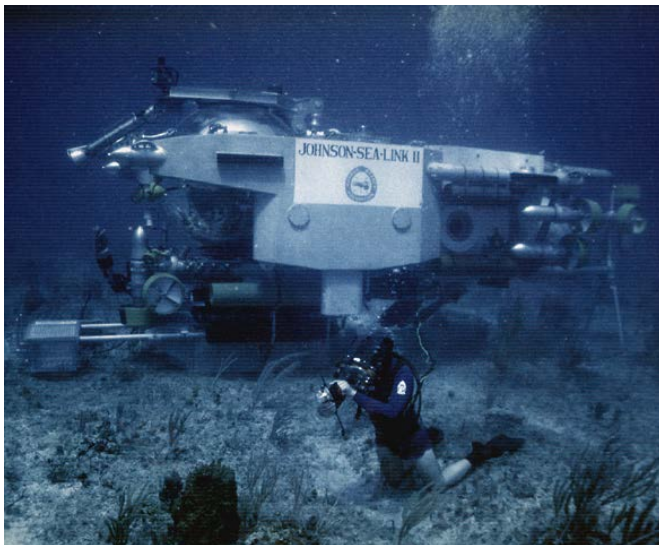
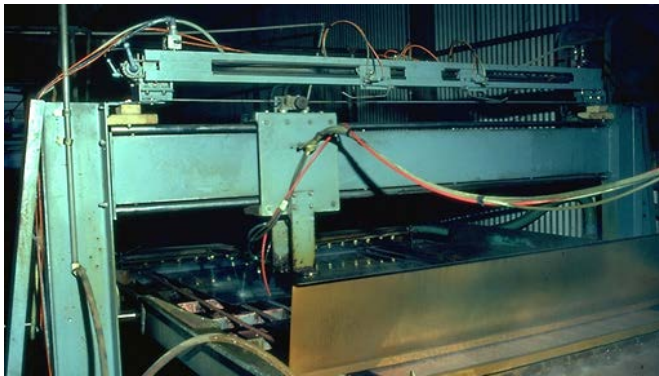
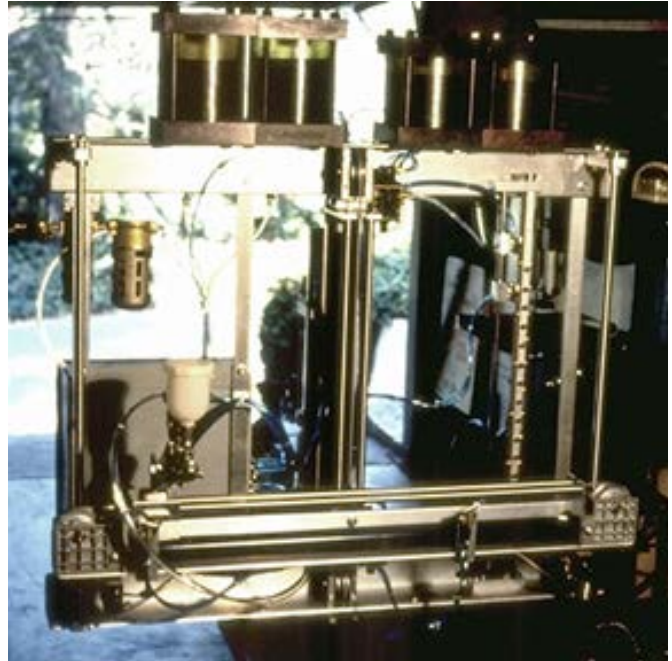
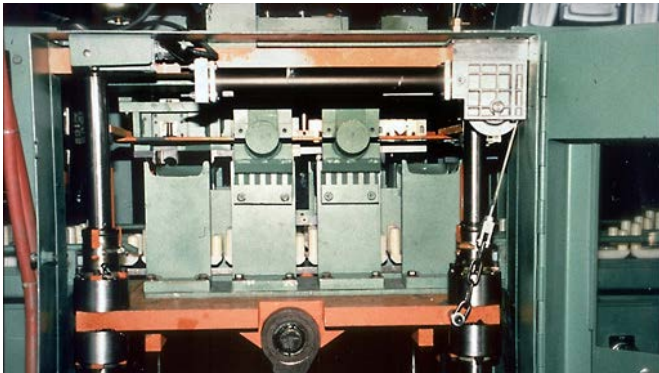


CC Cable Cylinder

APPLICATIONS

Tolomatic invented the first ever rodless cylinder in 1956 - the cable cylinder. First designed into the bagger/sealer used in the flour industry the cable cylinder continues to power applications in the 21st century. The cable cylinder has been a key component in the following industries:

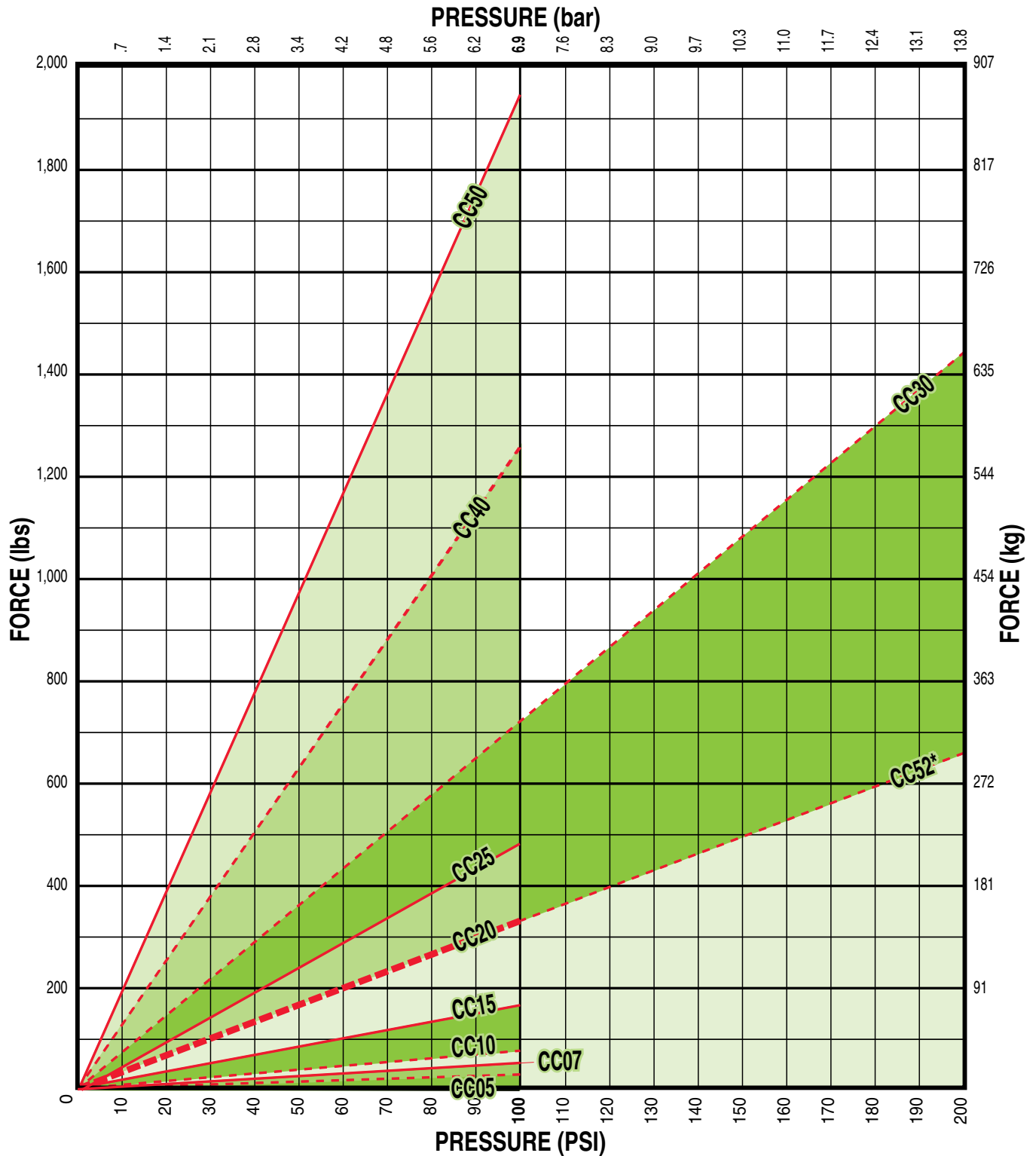
- Packaging
- Automotive
- Food & Beverage
- Material Handling & Conveying
- Plastic Injection Molding
- Metal Processing
- Paper and Textiles
- Medical
- Electronics
- Printing
- Many Others



CC Cable Cylinder

PERFORMANCE

CABLE CYLINDER THEORETICAL FORCE VS PRESSURE



*CC52 up to 500 psi

CC Double Acting Cable Cylinder - All Sizes

FEATURES AND OPTIONS



ORDER CODES

**CC05, CC07, CC10
CC15, CC20, CC25, CC30
CC40, CC52, CC50**
inch (U.S. Standard)

The Tolomatic double-acting cable cylinder is a versatile space saver, available in all 9 bore sizes. Enjoy cost savings over conventional rod cylinders in strokes over four feet with out experiencing rod buckle.

These cylinders can be isolated from any work area with extended cable lengths. Contact Tolomatic to achieve strokes of up to 60 feet in length.

| CC OPTIONS | Order Code | Page | CC05 | CC07 | CC10 | CC15 | CC20 | CC25 | CC30 | CC40 | CC52 | CC50 |
|---------------------------------------|-------------|-------|------|------|------|------|------|------|------|------|------|------|
| Auto Tensioner w/ one 1" Stroke Unit | HI, HJ | cc_22 | - | OP | OP | OP | OP | OP | OP | OP | OP | - |
| Auto Tensioner w/ two 1" Stroke Units | HI, HJ | cc_22 | - | OP | OP | OP | OP | OP | OP | OP | OP | - |
| Auto Tensioner w/ one 2" Stroke Unit | HK,HL | cc_22 | - | - | - | - | OP | OP | OP | OP | OP | OP |
| Auto Tensioner w/ two 2" Stroke Units | HK,HL | cc_22 | - | - | - | - | OP | OP | OP | OP | OP | OP |
| Caliper Disc Brake | HM, HN | cc_25 | - | - | - | OP | OP | OP | OP | OP | OP | OP |
| Switches (DC Reed & Triac) | (several) | cc_28 | OP | OP | OP | OP | OP | OP | OP | OP | OP | OP |
| Aluminum Tube | | | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| Steel Tube (Switches NOT available) | S | | - | - | OP | OP | OP | OP | OP | OP | OP | OP |
| Seals of Viton® Material | V | | - | OP | OP | OP | OP | OP | OP | OP | OP | OP |
| 3 Ported Heads | HG | | OP | OP | OP | OP | OP | OP | OP | OP | OP | OP |
| MORE INFORMATION | Page | | | | | | | | | | | |
| Application Guidelines | cc_36 | | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| Cushion Needle Adjustment | cc_38 | | - | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| Ordering | cc_40 | | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| Selection | cc_30 | | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| Caliper Disc Brake Option Selection | cc_32 | | - | - | - | OP | OP | OP | OP | OP | OP | OP |
| STANDARD FEATURE | Page | | | | | | | | | | | |
| Fixed Orifice Cushions | cc_38 | | - | ST | ST | - | - | - | - | - | - | - |
| Adjustable Cushions | cc_38 | | - | - | - | ST | ST | ST | ST | ST | ST | ST |
| Single Ported Head | | | ST | ST | ST | ST | ST | ST | ST | ST | ST | ST |

- = Not Available OP = Optional ST = Standard

Double Acting Cable Cylinder - CC05, CC07, CC10

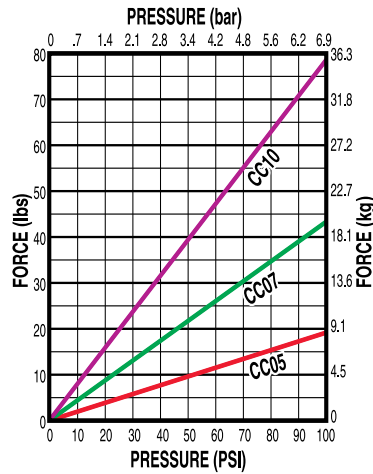
| OVERALL UNIT SPECIFICATIONS | | | | |
|-----------------------------|-------|-----------|-------|-------|
| | | CC05 | CC07 | CC10 |
| BORE SIZE | in | 0.50 | 0.75 | 1.00 |
| | mm | 12.7 | 19.0 | 25.4 |
| MAX STROKE | in | 54 | 138 | 282 |
| | mm | 1372 | 3505 | 7163 |
| BASE WEIGHT | Alum. | lb | 1.38 | 1.38 |
| | | kg | 0.63 | 0.63 |
| | Steel | lb | NA | NA |
| | | kg | NA | 0.68 |
| WEIGHT PER UNIT OF STROKE | Alum. | lb per in | 0.011 | 0.034 |
| | | g per mm | 0.197 | 0.606 |
| | Steel | lb per in | NA | NA |
| | | g per mm | NA | 2.244 |
| MAX PRESSURE | PSI | 100 | 100 | 100 |
| | bar | 6.9 | 6.9 | 6.9 |
| MAX TEMP | °F | 140 | 140 | 140 |
| | °C | 60 | 60 | 60 |
| MAX FORCE OUTPUT | lb | 19.4 | 43.5 | 77.9 |
| | N | 86.3 | 193.5 | 346.5 |

| TUBING SPECIFICATIONS | | | | |
|-----------------------|-------|--------|-------|---------------|
| | | CC05 | CC07 | CC10 |
| DEAD LENGTH* | in | 1.11 | 1.18 | 1.31 |
| | mm | 28.2 | 30 | 33.3 |
| WALL THICKNESS | in | 0.0937 | 0.125 | 0.125 |
| | mm | 2.38 | 3.175 | 3.175 |
| MATERIAL | | Alum. | Alum. | Alum or Steel |
| TUBE SUPPORT SPAN | Alum. | in | 60 | 60 |
| | | mm | 1524 | 1524 |
| | Steel | in | NA | NA |
| | | mm | NA | 1981 |

*Add to stroke length to determine overall length

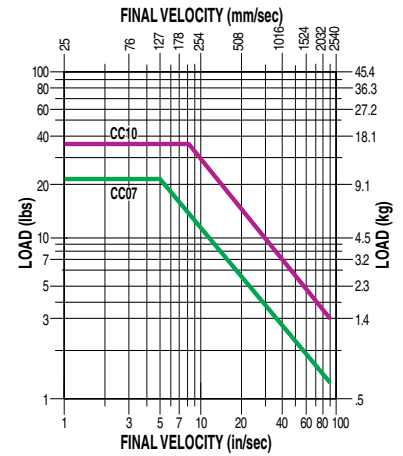
| CABLE SPECIFICATIONS | | | | |
|----------------------|-------|--------|--------|--------|
| | | CC05 | CC07 | CC10 |
| WIRE DIA | in | 0.0468 | 0.0468 | 0.0468 |
| | mm | 1.189 | 1.189 | 1.189 |
| NYLON O.D. | in | 0.0937 | 0.0937 | 0.0937 |
| | mm | 2.38 | 2.38 | 2.38 |
| STRAND CONFIGURATION | | 7 x 7 | 7 x 7 | 7 x 7 |
| TENSILE STRENGTH | lb | 270 | 270 | 270 |
| | kg | 122.47 | 122.47 | 122.47 |
| PROOF-LOAD TORQUE | in-lb | 15 | 15 | 15 |
| | N-m | 1.69 | 1.69 | 1.69 |
| PRETENSIONING TORQUE | in-lb | 2.5 | 2.5 | 2.5 |
| | N-m | 0.28 | 0.28 | 0.28 |

THEORETICAL FORCE vs PRESSURE



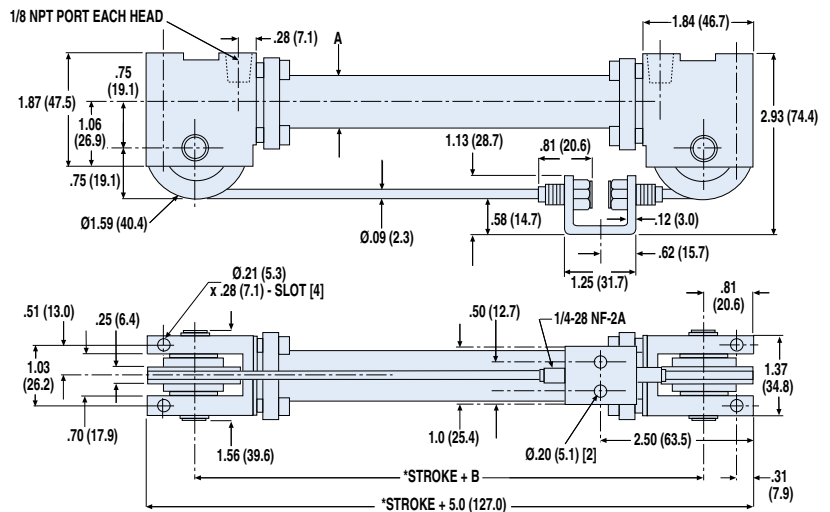
— CC10
— CC07
— CC05

CUSHION DATA



NOTE: The CC05 cylinder does not have cushions.

DIMENSIONS



*If M option (magnet) is ordered add 1.62" (41.2mm) to the overall length

| | CC05 | CC07 | CC10 |
|---|-------------|--------------|--------------|
| A | 0.63 (16.0) | 01.00 (25.4) | 01.25 (31.8) |
| B | 3.38 (85.8) | 3.43 (87.1) | 3.43 (87.1) |

Dimensions in inches, in parentheses () dimensions in millimeters

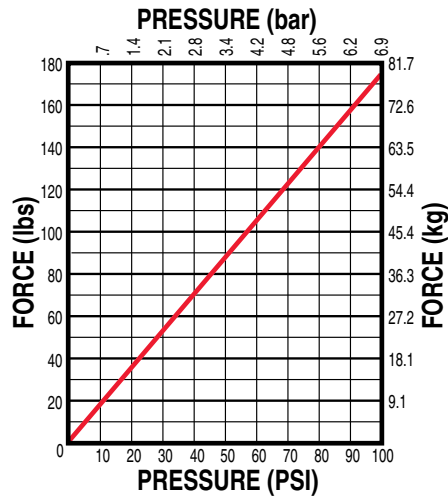


Double Acting Cable Cylinder - CC15

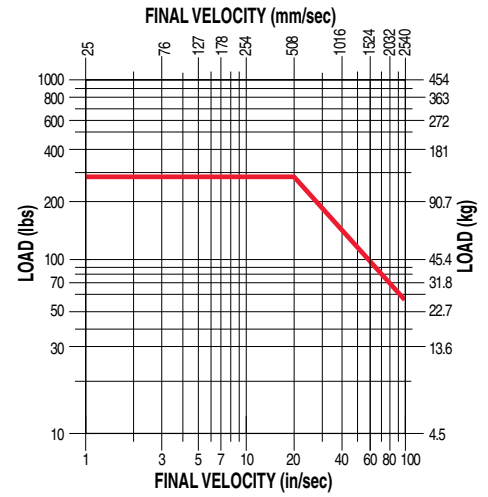
OVERALL UNIT SPECIFICATIONS

| OVERALL UNIT SPECIFICATIONS | | | CC15 |
|-----------------------------|-------|-----------|--------|
| BORE SIZE | in | | 1.50 |
| MAX STROKE | in | | 280 |
| | mm | | 7112 |
| BASE WEIGHT | Alum. | lb | 5.12 |
| | | kg | 2.32 |
| | Steel | lb | 5.27 |
| | | kg | 2.39 |
| WEIGHT PER UNIT OF STROKE | Alum. | lb per in | 0.063 |
| | | g per mm | 1.1259 |
| | Steel | lb per in | 0.181 |
| | | g per mm | 3.2322 |
| MAX PRESSURE | PSI | | 100 |
| | bar | | 6.9 |
| MAX TEMP | °F | | 140 |
| | °C | | 60 |
| MAX FORCE OUTPUT | lb | | 174 |
| | N | | 774.0 |

THEORETICAL FORCE vs PRESSURE



CUSHION DATA



TUBING SPECIFICATIONS

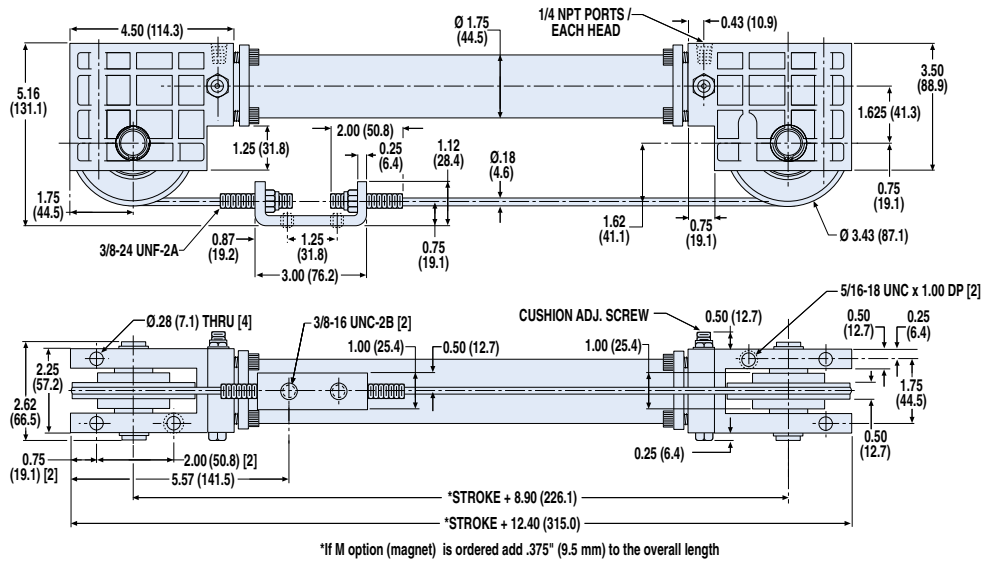
| TUBING SPECIFICATIONS | | | CC15 |
|-----------------------|-------|----|----------------|
| DEAD LENGTH* | in | | 3.40 |
| | mm | | 86.4 |
| WALL THICKNESS | in | | 0.125 |
| | mm | | 3.175 |
| MATERIAL | | | Alum. or Steel |
| TUBE SUPPORT SPAN | Alum. | in | 84 |
| | | mm | 2134 |
| | Steel | in | 90 |
| | | mm | 2286 |

*Add to stroke length to determine overall length

CABLE SPECIFICATIONS

| CABLE SPECIFICATIONS | | | CC15 |
|----------------------|-------|--|--------|
| WIRE DIA | in | | 0.0937 |
| | mm | | 2.380 |
| NYLON O.D. | in | | 0.187 |
| | mm | | 4.750 |
| STRAND CONFIGURATION | | | 7 x 7 |
| TENSILE STRENGTH | lb | | 920 |
| | kg | | 417.30 |
| PROOF-LOAD TORQUE | in-lb | | 45 |
| PRETENSIONING TORQUE | in-lb | | 8 |
| | N-m | | 0.90 |

DIMENSIONS



Dimensions in inches, in parentheses () dimensions in millimeters



Double Acting Cable Cylinder - CC20, CC25

OVERALL UNIT SPECIFICATIONS

| | | CC20 | CC25 |
|---------------------------|----------|-----------------|-------|
| BORE SIZE | in | 2.00 | 2.50 |
| | mm | 7137 | 7137 |
| MAX STROKE | in | 281 | 281 |
| | mm | 7137 | 7137 |
| BASE WEIGHT | Alum. | lb 12.44 | 12.9 |
| | kg | 5.64 | 5.85 |
| WEIGHT PER UNIT OF STROKE | Steel | lb 12.9 | 13.48 |
| | kg | 5.85 | 6.11 |
| MAX PRESSURE | Alum. | lb per in 0.083 | 0.103 |
| | g per mm | 1.482 | 1.839 |
| MAX TEMP | Steel | lb per in 0.236 | 0.292 |
| | g per mm | 4.214 | 5.214 |
| MAX FORCE OUTPUT | PSI | 200 | 200 |
| | bar | 13.8 | 13.8 |
| MAX FORCE OUTPUT | °F | 140 | 140 |
| | °C | 60 | 60 |
| MAX FORCE OUTPUT | lb | 618 | 972 |
| | N | 2749 | 4324 |

TUBING SPECIFICATIONS

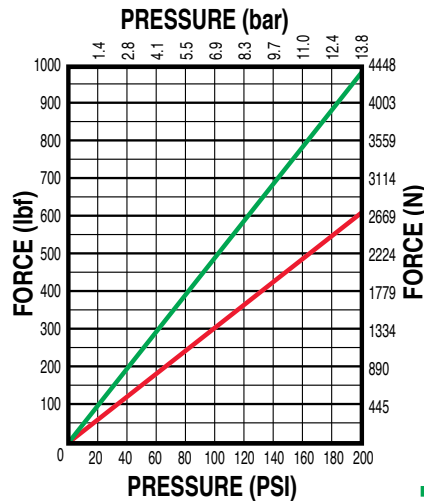
| | | CC20 | CC25 |
|-------------------|-------|---------------|---------------|
| DEAD LENGTH* | in | 3.00 | 3.00 |
| | mm | 76.2 | 76.2 |
| WALL THICKNESS | in | 0.125 | 0.125 |
| | mm | 3.175 | 3.175 |
| MATERIAL | | Alum or Steel | Alum or Steel |
| TUBE SUPPORT SPAN | Alum. | in 90 | 96 |
| | mm | 2286 | 2438 |
| TUBE SUPPORT SPAN | Steel | in 96 | 108 |
| | mm | 2438 | 2743 |

*Add to stroke length to determine overall length

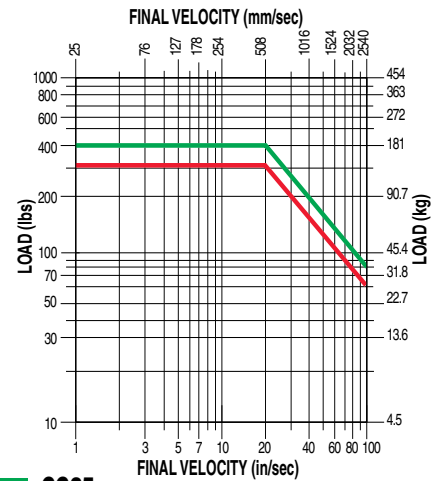
CABLE SPECIFICATIONS

| | | CC20 | CC25 |
|----------------------|-------|--------|--------|
| WIRE DIA | in | 0.125 | 0.125 |
| | mm | 3.175 | 3.175 |
| NYLON O.D. | in | 0.250 | 0.250 |
| | mm | 6.350 | 6.350 |
| STRAND CONFIGURATION | | 7 x 19 | 7 x 19 |
| | | 7 x 19 | 7 x 19 |
| TENSILE STRENGTH | lb | 2000 | 2000 |
| | kg | 907.18 | 907.18 |
| PROOF-LOAD TORQUE | in-lb | 115 | 115 |
| | N-m | 12.99 | 12.99 |
| PRETENSIONING TORQUE | in-lb | 46.0 | 73.0 |
| | N-m | 5.20 | 8.25 |

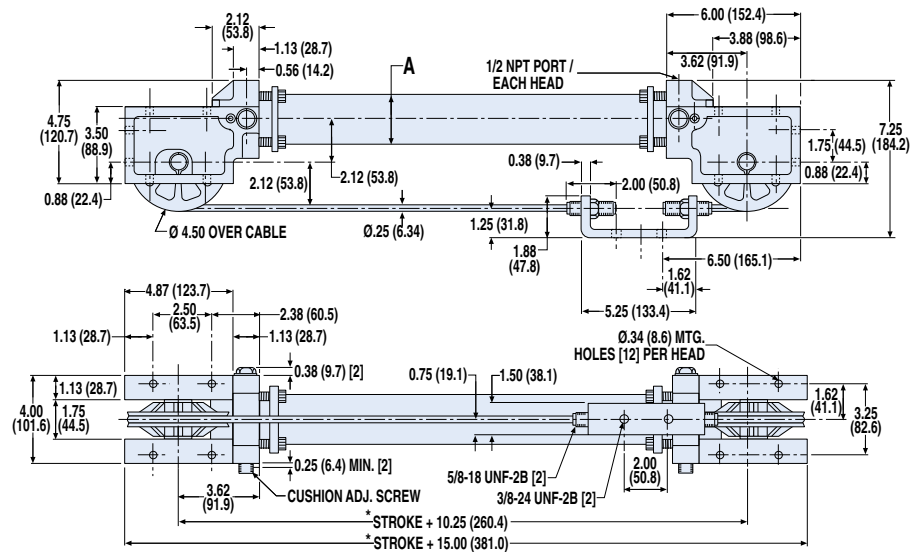
THEORETICAL FORCE vs PRESSURE



CUSHION DATA



DIMENSIONS



*If M option (magnet) is ordered add 0.375" (9.5 mm) to the overall length

| | CC20 | CC25 |
|---|--------------|--------------|
| A | Ø2.25 (57.2) | Ø2.75 (69.9) |



Double Acting Cable Cylinder - CC30, CC40, CC52

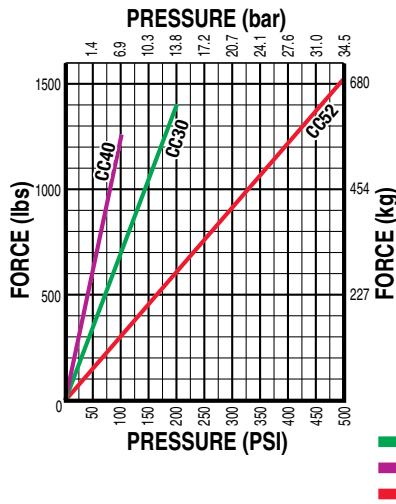
| OVERALL UNIT SPECIFICATIONS | | | | | |
|-----------------------------|-------|-----------|--------|--------|-------|
| | | CC30 | CC40 | CC52 | |
| BORE SIZE | in | 3.00 | 4.00 | 2.00 | |
| | mm | 76.2 | 101.6 | 50.8 | |
| MAX STROKE | in | 280 | 279 | 280 | |
| | mm | 7112 | 7087 | 7112 | |
| BASE WEIGHT | Alum. | lb | 18.69 | 20.75 | 12.44 |
| | | kg | 8.48 | 9.41 | 5.64 |
| | Steel | lb | 19.45 | 22.09 | 12.9 |
| | | kg | 8.82 | 10.02 | 5.85 |
| WEIGHT PER UNIT OF STROKE | Alum. | lb per in | 0.12 | 0.159 | 0.081 |
| | | g per mm | 2.143 | 2.839 | 1.446 |
| | Steel | lb per in | 0.334 | 0.459 | 0.236 |
| | | g per mm | 5.965 | 8.197 | 4.214 |
| MAX PRESSURE | PSI | 200 | 100 | 500 | |
| | bar | 13.8 | 6.9 | 34.5 | |
| MAX TEMP | °F | 140 | 140 | 140 | |
| | °C | 60 | 60 | 60 | |
| MAX FORCE OUTPUT | lb | 1398.4 | 1248.9 | 1532.4 | |
| | N | 6220 | 5555 | 6816 | |

| TUBING SPECIFICATIONS | | | | | |
|-----------------------|-------|---------------|---------------|---------------|------|
| | | CC30 | CC40 | CC52 | |
| DEAD LENGTH* | in | 3.50 | 4.50 | 3.00 | |
| | mm | 88.9 | 114.3 | 76.2 | |
| WALL THICKNESS | in | 0.125 | 0.125 | 0.125 | |
| | mm | 3.175 | 3.175 | 3.175 | |
| MATERIAL | | Alum or Steel | Alum or Steel | Alum or Steel | |
| TUBE SUPPORT SPAN | Alum. | in | 102 | 108 | 96 |
| | | mm | 2591 | 2743 | 2438 |
| | Steel | in | 120 | 132 | 96 |
| | | mm | 3048 | 3353 | 2438 |

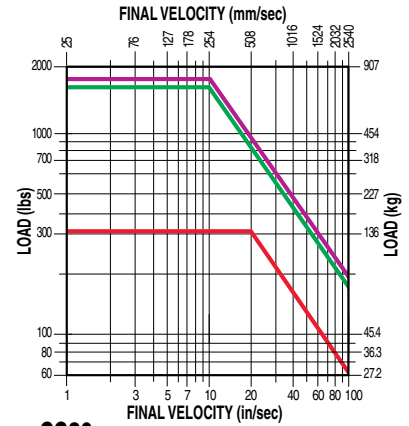
*Add to stroke length to determine overall length

| CABLE SPECIFICATIONS | | | | |
|----------------------|-------|--------|--------|--------|
| | | CC30 | CC40 | CC52 |
| WIRE DIA | in | 0.187 | 0.187 | 0.187 |
| | mm | 4.750 | 4.750 | 4.750 |
| NYLON O.D. | in | 0.312 | 0.312 | 0.312 |
| | mm | 7.925 | 7.925 | 7.925 |
| STRAND CONFIGURATION | | 7 x 19 | 7 x 19 | 7 x 19 |
| TENSILE STRENGTH | lb | 4200 | 4200 | 4200 |
| | kg | 1905 | 1905 | 1905 |
| PROOF-LOAD TORQUE | in-lb | 210 | 210 | 210 |
| | N-m | 23.73 | 23.73 | 23.73 |
| PRETENSIONING TORQUE | in-lb | 105 | 187.5 | 115 |
| | N-m | 11.86 | 21.19 | 12.99 |

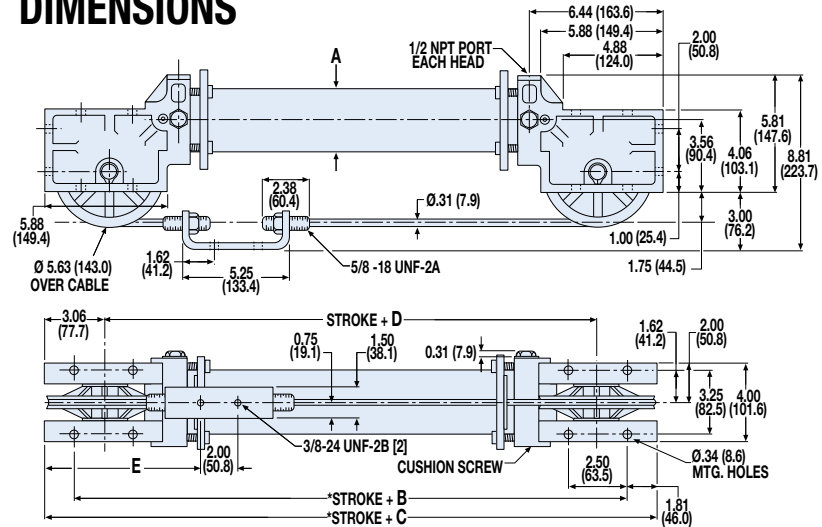
THEORETICAL FORCE vs PRESSURE



CUSHION DATA



DIMENSIONS



| | CC30 | CC40 | CC52 |
|---|---------------|---------------|---------------|
| A | Ø3.25 (82.6) | Ø4.25 (108.0) | Ø2.25 (57.2) |
| B | 13.87(352.3) | 14.87 (377.7) | 13.87 (352.3) |
| C | 17.50 (444.5) | 18.50 (469.9) | 17.50 (444.5) |
| D | 11.38 (289.1) | 12.38 (314.5) | 11.38 (289.1) |
| E | 7.75 (196.9) | 8.25 (209.6) | 7.75 (196.9) |

*If M option (magnet) is ordered add .375" (9.5 mm) to the overall length

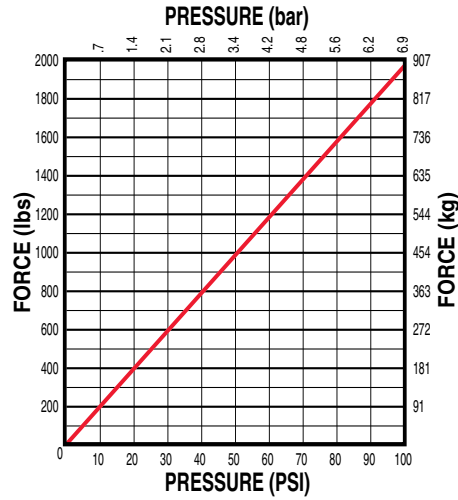


Double Acting Cable Cylinder - CC50

OVERALL UNIT SPECIFICATIONS

| | | CC50 | |
|---------------------------|-------|-----------|-------|
| BORE SIZE | in | 5.00 | |
| | mm | 127 | |
| MAX STROKE | in | 134 | |
| | mm | 3404 | |
| BASE WEIGHT | Alum. | lb | 30.75 |
| | | kg | 13.95 |
| WEIGHT PER UNIT OF STROKE | Alum. | lb per in | 0.202 |
| | | g per mm | 3.786 |
| MAX PRESSURE | | PSI | 100 |
| | | bar | 6.9 |
| MAX TEMP | | °F | 140 |
| | | °C | 60 |
| MAX FORCE OUTPUT | | lb | 1919 |
| | | N | 8536 |

THEORETICAL FORCE vs PRESSURE



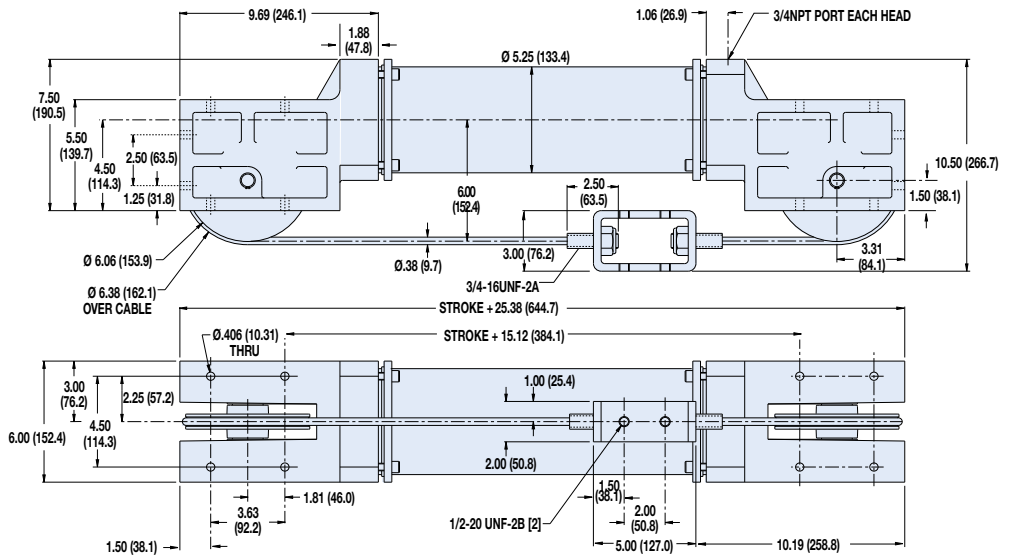
NOTE: The CC50 cylinder does not have cushions.

TUBING SPECIFICATIONS

| | | CC50 | |
|-------------------|-------|-------|-------|
| DEAD LENGTH* | in | 6.00 | |
| | mm | 152.4 | |
| WALL THICKNESS | in | 0.125 | |
| | mm | 3.175 | |
| MATERIAL | | Alum. | |
| TUBE SUPPORT SPAN | Alum. | in | 166.8 |
| | | mm | 4237 |

*Add to stroke length to determine overall length

DIMENSIONS



Dimensions in inches, in parentheses () dimensions in millimeters

CABLE SPECIFICATIONS

| | | CC50 | |
|----------------------|-------|---------|--|
| WIRE DIA | in | 0.25 | |
| | mm | 6.350 | |
| NYLON O.D. | in | 0.375 | |
| | mm | 9.525 | |
| STRAND CONFIGURATION | | 7 x 19 | |
| TENSILE STRENGTH | lb | 7000 | |
| | kg | 3175.13 | |
| PROOF-LOAD TORQUE | in-lb | 325 | |
| | N-m | 36.72 | |
| PRETENSIONING TORQUE | in-lb | 180 | |
| | N-m | 20.34 | |



SA Single Acting Cable Cylinder - All Sizes

FEATURES AND OPTIONS



ORDER CODES

SA07, SA10, SA15
SA20, SA25, SA30
SA40, SA52, SA50
inch (U.S. Standard)

When a standard double-acting cable cylinder is not necessary in vertical applications, Tolomatic single-acting cable cylinders provide a cost savings advantage. Ideal for vertical lifting applications, these cylinders may be positioned horizontally and still achieve a vertical movement. Tolomatic single-acting cylinders are available in 8 bore sizes ranging from 3/4-inch to 5 inches with optional switches.

| SA OPTIONS | Order Code | Page | SA07 | SA10 | SA15 | SA20 | SA25 | SA30 | SA40 | SA52 | SA50 |
|-------------------------------------|-------------|-------|------|------|------|------|------|------|------|------|------|
| Switches (DC Reed & Triac) | (several) | cc_28 | OP | OP | OP | OP | OP | OP | OP | OP | OP |
| Aluminum Tube | | | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| Steel Tube (Switches NOT available) | S | | - | OP | OP | OP | OP | OP | OP | OP | OP |
| Seals of Viton® Material | V | | OP | OP | OP | OP | OP | OP | OP | OP | OP |
| 3 Ported Heads | HG | | OP | OP | OP | OP | OP | OP | OP | OP | OP |
| MORE INFORMATION | Page | | | | | | | | | | |
| Application Guidelines | cc_36 | | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| Cushion Needle Adjustment | cc_38 | | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| Ordering | cc_40 | | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| Selection | cc_30 | | ST | ST | ST | ST | ST | ST | ST | ST | ST |
| STANDARD FEATURE | Page | | | | | | | | | | |
| Fixed Orifice Cushions | cc_38 | | ST | ST | - | - | - | - | - | - | - |
| Adjustable Cushions | cc_38 | | - | - | ST | ST | ST | ST | ST | ST | ST |
| Single Ported Head | | | ST | ST | ST | ST | ST | ST | ST | ST | ST |

- = Not Available OP = Optional ST = Standard

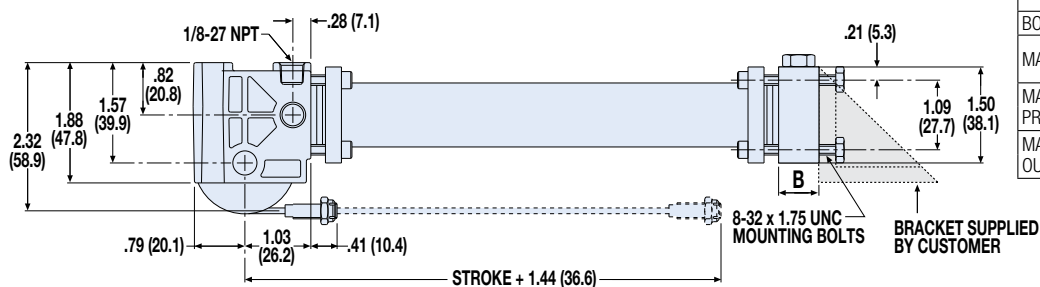
 **NOTE:** See corresponding CC (double acting cable cylinder) for performance, tubing and cable specifications Page CC_7 to Page CC_11

Single Acting Cable Cylinder - SA07, SA10, SA15



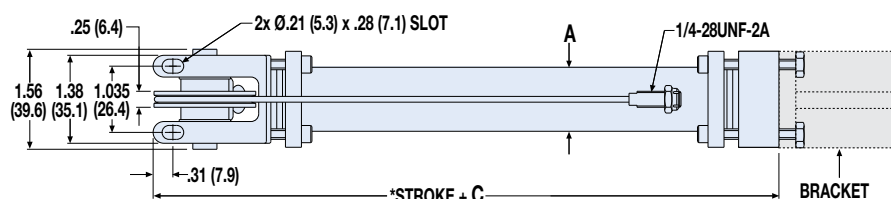
SA07, SA10

DIMENSIONS



| OVERALL UNIT SPECIFICATIONS | | | |
|-----------------------------|-----|-------|-------|
| | | SA07 | SA10 |
| BORE SIZE | in | 0.75 | 1.00 |
| | mm | 19.0 | 25.4 |
| MAX STROKE | in | 138 | 282 |
| | mm | 3505 | 7163 |
| MAX PRESSURE | PSI | 100 | 100 |
| | bar | 6.9 | 6.9 |
| MAX FORCE OUTPUT | lb | 43.5 | 77.9 |
| | N | 193.5 | 346.5 |

NOTE: Additional specifications Page CC_7



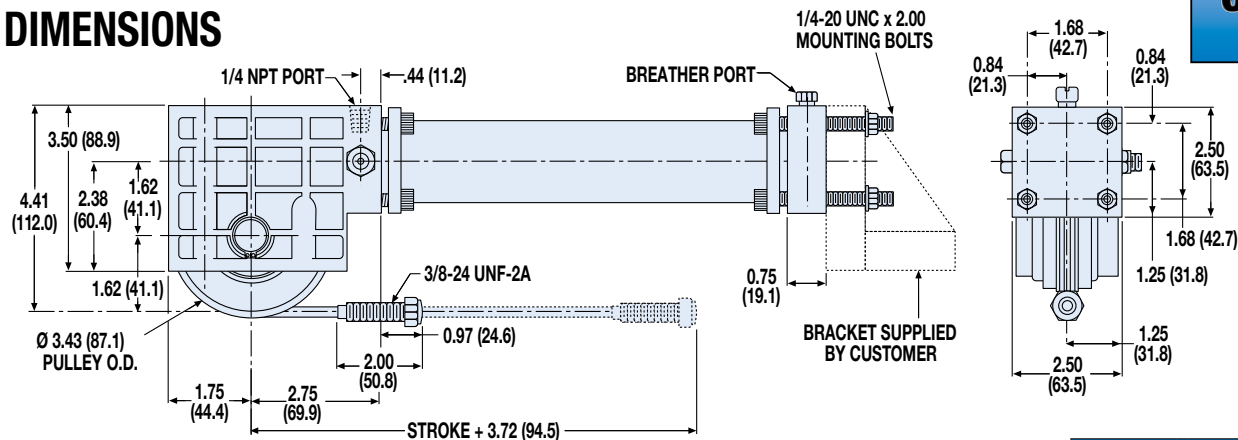
| | SA07 | SA10 |
|---|---------------|---------------|
| A | Ø 1.00 (25.4) | Ø 1.25 (31.8) |
| B | 0.50 (12.7) | 0.63 (16.0) |
| C | 3.62 (92.0) | 3.81 (96.8) |
| D | 1.46 (37.1) | 1.62 (41.2) |

Dimensions in inches, in parentheses () dimensions in millimeters

*If M option (magnet) is ordered add D to the overall length

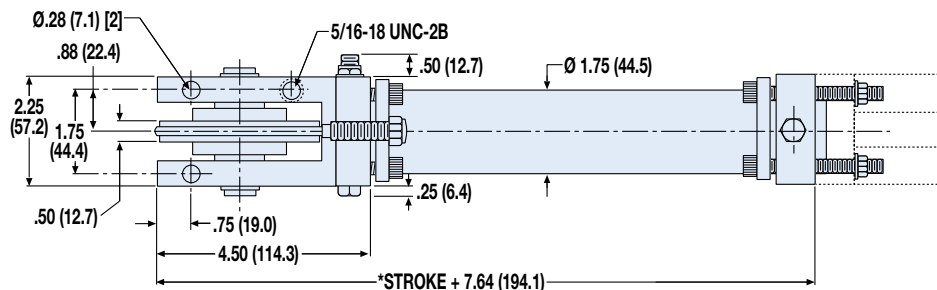
SA15

DIMENSIONS



| OVERALL UNIT SPECIFICATIONS | | | |
|-----------------------------|-----|-------|--|
| | | SA15 | |
| BORE SIZE | in | 1.50 | |
| | mm | 38.1 | |
| MAX STROKE | in | 280 | |
| | mm | 7112 | |
| MAX PRESSURE | PSI | 100 | |
| | bar | 6.9 | |
| MAX FORCE OUTPUT | lb | 174 | |
| | N | 774.0 | |

NOTE: Additional specifications Page CC_8



Dimensions in inches, in parentheses () dimensions in millimeters

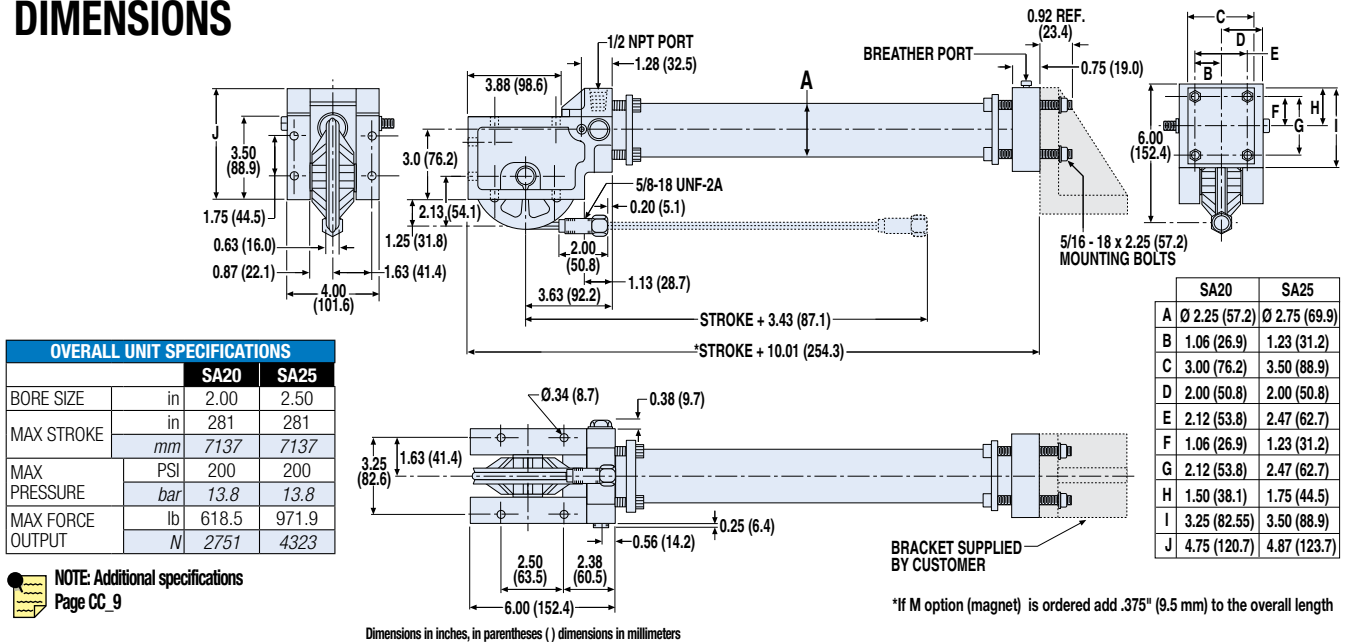
*If M option (magnet) is ordered add .375" (9.5 mm) to the overall length

Single Acting Cable Cylinder - SA20, SA25, SA30, SA40, SA52



SA20, SA25

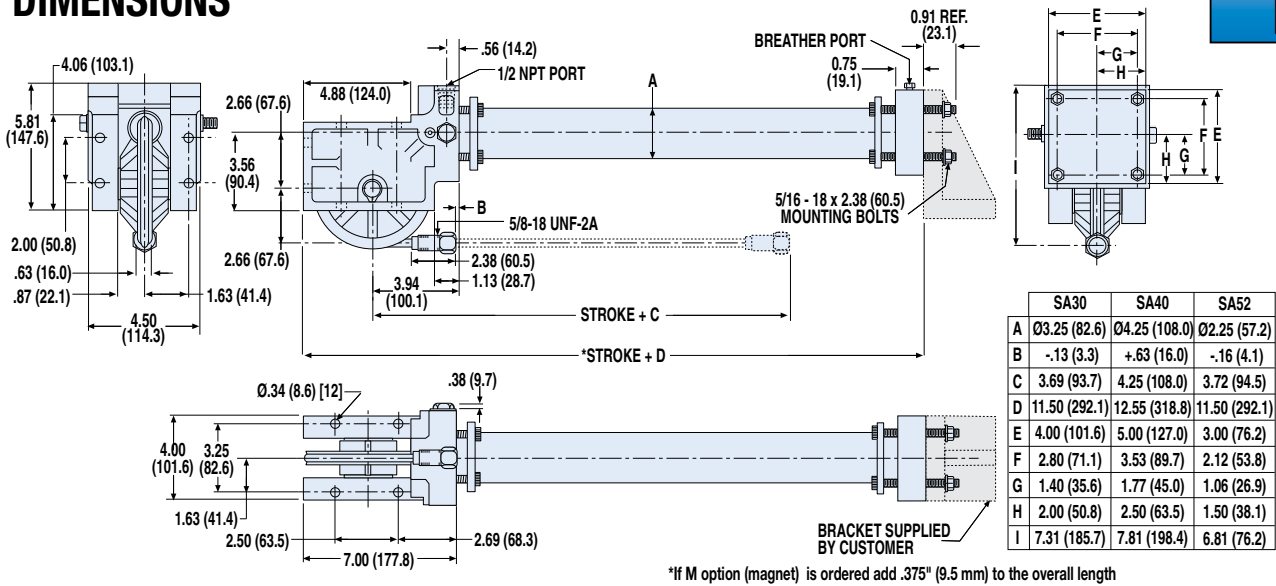
DIMENSIONS



SA30, SA40, SA52



DIMENSIONS

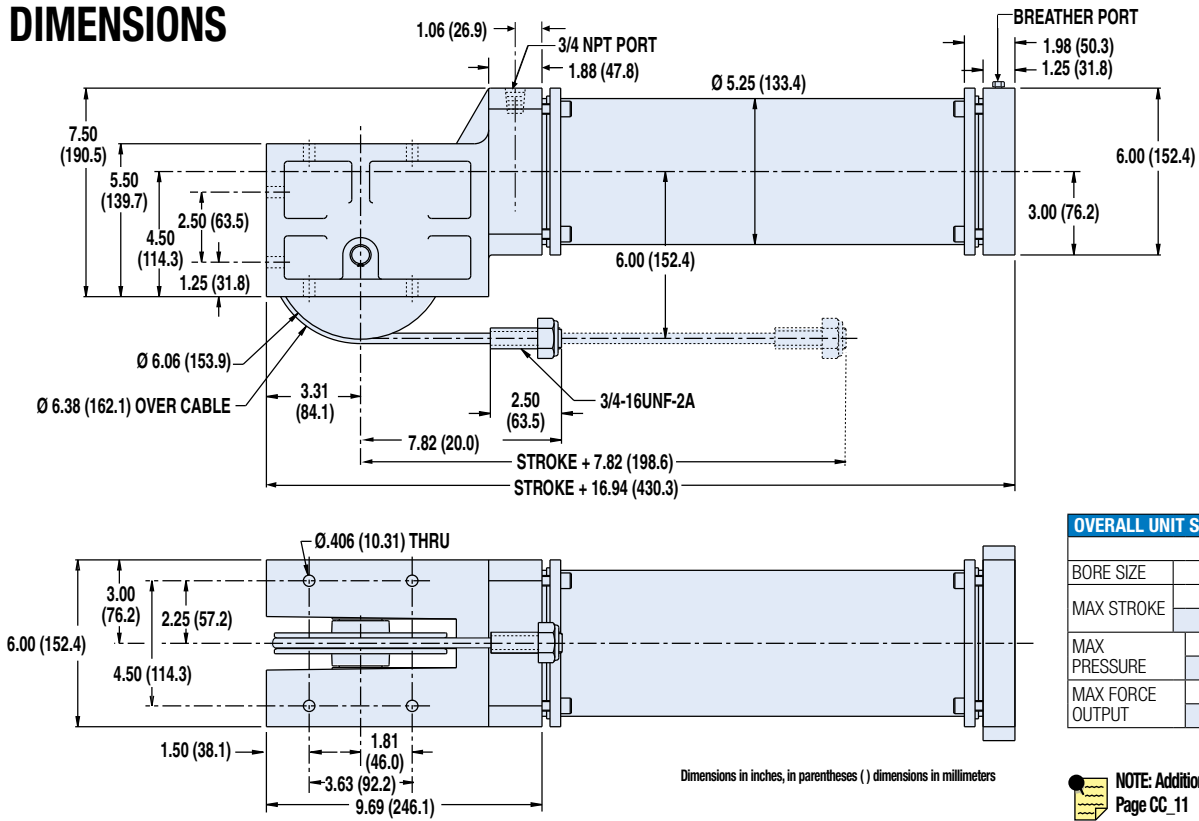


Single Acting Cable Cylinder - SA50



SA50

DIMENSIONS



NOTE: Additional specifications Page CC_11

Double Purchase Cable Cylinder - All Sizes


FEATURES AND OPTIONS




ORDER CODES

**DP15, DP20, DP25
DP30, DP40, DP52**
inch (U.S. Standard)

The Tolomatic double purchase cable cylinder doubles the velocity and stroke capacity of double-acting cylinders without increasing space requirements. Available in 5 bore sizes, these cylinders can extend stroke lengths up to 120 feet with considerable cost-saving advantages and they can be placed away from hostile environments.

 NOTE: Pulleys and cables used on double purchase cable cylinders are always from the next smaller model size.

 NOTE: For double purchase applications, select a bore size that will accommodate twice the load force.

| DP OPTIONS | Order Code | Page | DP15 | DP20 | DP25 | DP30 | DP40 | DP52 |
|---------------------------------------|-------------|-------|------|------|------|------|------|------|
| Auto Tensioner w/ one 1" Stroke Unit | HI, HJ | cc_22 | OP | OP | OP | OP | OP | OP |
| Auto Tensioner w/ two 1" Stroke Units | HI, HJ | cc_22 | OP | OP | OP | OP | OP | OP |
| Auto Tensioner w/ one 2" Stroke Unit | HK,HL | cc_22 | - | OP | OP | OP | OP | OP |
| Auto Tensioner w/ two 2" Stroke Units | HK,HL | cc_22 | - | OP | OP | OP | OP | OP |
| Caliper Disc Brake | HM, HN | cc_25 | OP | OP | OP | OP | OP | OP |
| Switches (DC Reed & Triac) | (several) | cc_28 | OP | OP | OP | OP | OP | OP |
| Aluminum Tube | | | ST | ST | ST | ST | ST | ST |
| Steel Tube (Switches NOT available) | S | | OP | OP | OP | OP | OP | OP |
| Seals of Viton® Material | V | | OP | OP | OP | OP | OP | OP |
| 3 Ported Heads | HG | | OP | OP | OP | OP | OP | OP |
| MORE INFORMATION | Page | | | | | | | |
| Application Guidelines | cc_36 | | ST | ST | ST | ST | ST | ST |
| Cushion Needle Adjustment | cc_38 | | ST | ST | ST | ST | ST | ST |
| Ordering | cc_40 | | ST | ST | ST | ST | ST | ST |
| Selection | cc_30 | | ST | ST | ST | ST | ST | ST |
| Caliper Disc Brake Option Selection | cc_32 | | OP | OP | OP | OP | OP | OP |
| STANDARD FEATURE | Page | | | | | | | |
| Fixed Orifice Cushions | cc_38 | | - | - | - | - | - | - |
| Adjustable Cushions | cc_38 | | ST | ST | ST | ST | ST | ST |
| Single Ported Head | | | ST | ST | ST | ST | ST | ST |

- = Not Available OP = Optional ST = Standard

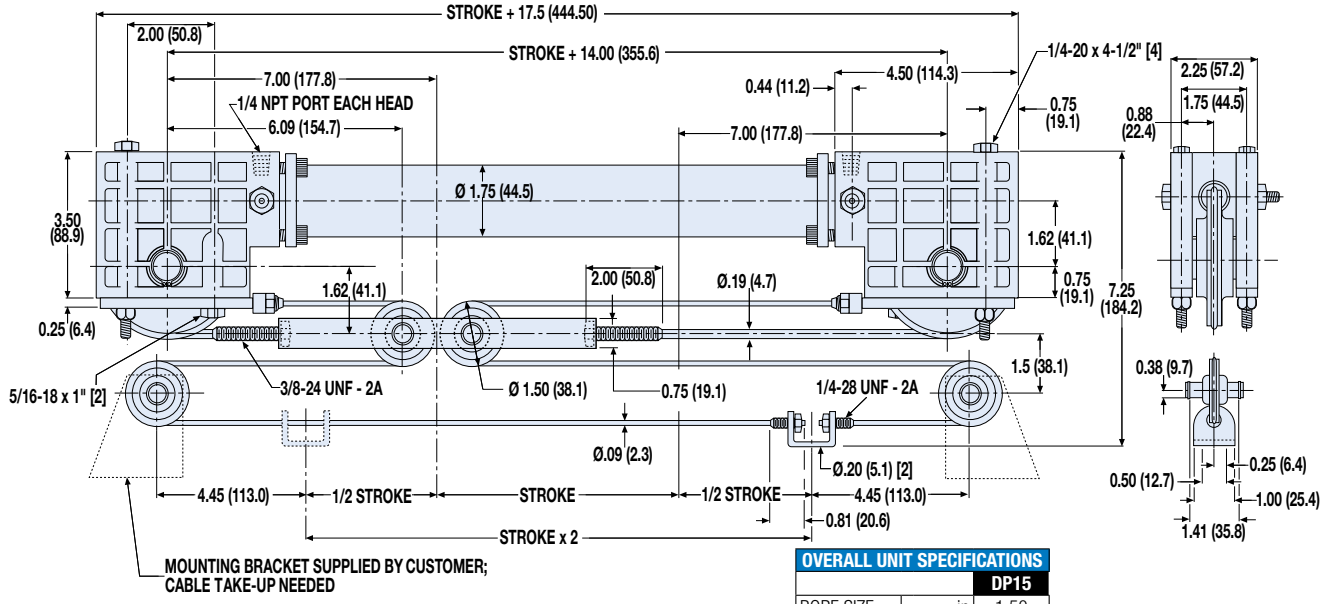
 NOTE: See corresponding CC (double acting cable cylinder) for performance, tubing and cable specifications Page CC_8 to Page CC_10

Double Purchase Cable Cylinder - DP15, DP20, DP25



DP15

DIMENSIONS



MOUNTING BRACKET SUPPLIED BY CUSTOMER;
CABLE TAKE-UP NEEDED

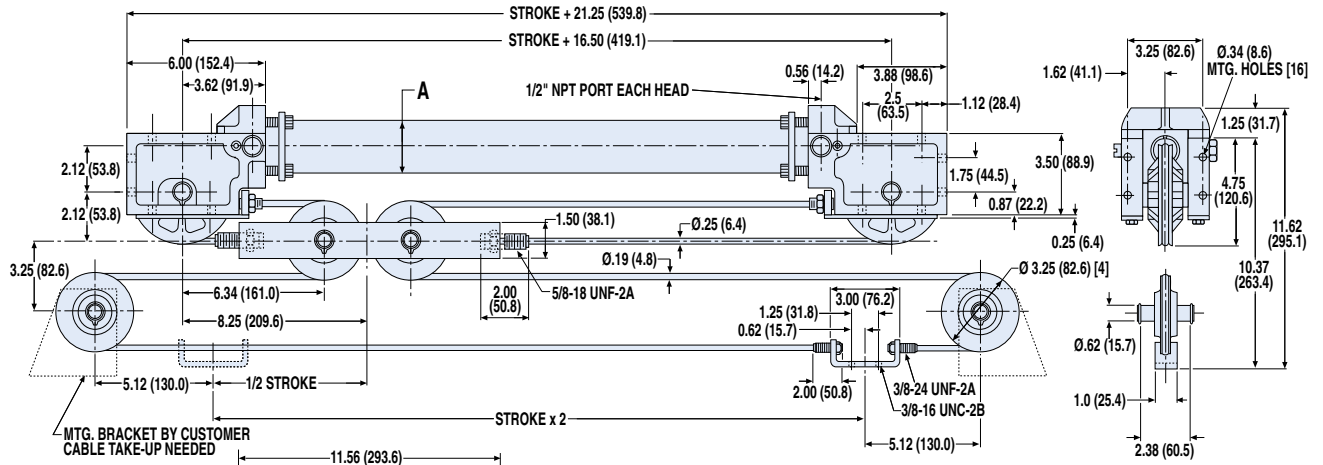
OVERALL UNIT SPECIFICATIONS

| | DP15 |
|------------------|---------|
| BORE SIZE | in 1.50 |
| | mm 38.1 |
| MAX STROKE | in 280 |
| | mm 7112 |
| MAX PRESSURE | PSI 100 |
| | bar 6.9 |
| MAX FORCE OUTPUT | lb 174 |
| | N 774.0 |

NOTE: Additional specifications Page CC_8

DP20, DP25

DIMENSIONS



MTG. BRACKET BY CUSTOMER
CABLE TAKE-UP NEEDED

OVERALL UNIT SPECIFICATIONS

| | DP20 | DP25 |
|------------------|----------|----------|
| BORE SIZE | in 2.00 | in 2.50 |
| | mm 50.8 | mm 63.5 |
| MAX STROKE | in 281 | in 281 |
| | mm 7137 | mm 7137 |
| MAX PRESSURE | PSI 100 | PSI 100 |
| | bar 6.9 | bar 6.9 |
| MAX FORCE OUTPUT | lb 618.5 | lb 971.9 |
| | N 2751 | N 4323 |

| | DP20 | DP25 |
|---|---------------|---------------|
| A | Ø 2.25 (57.2) | Ø 2.75 (69.9) |

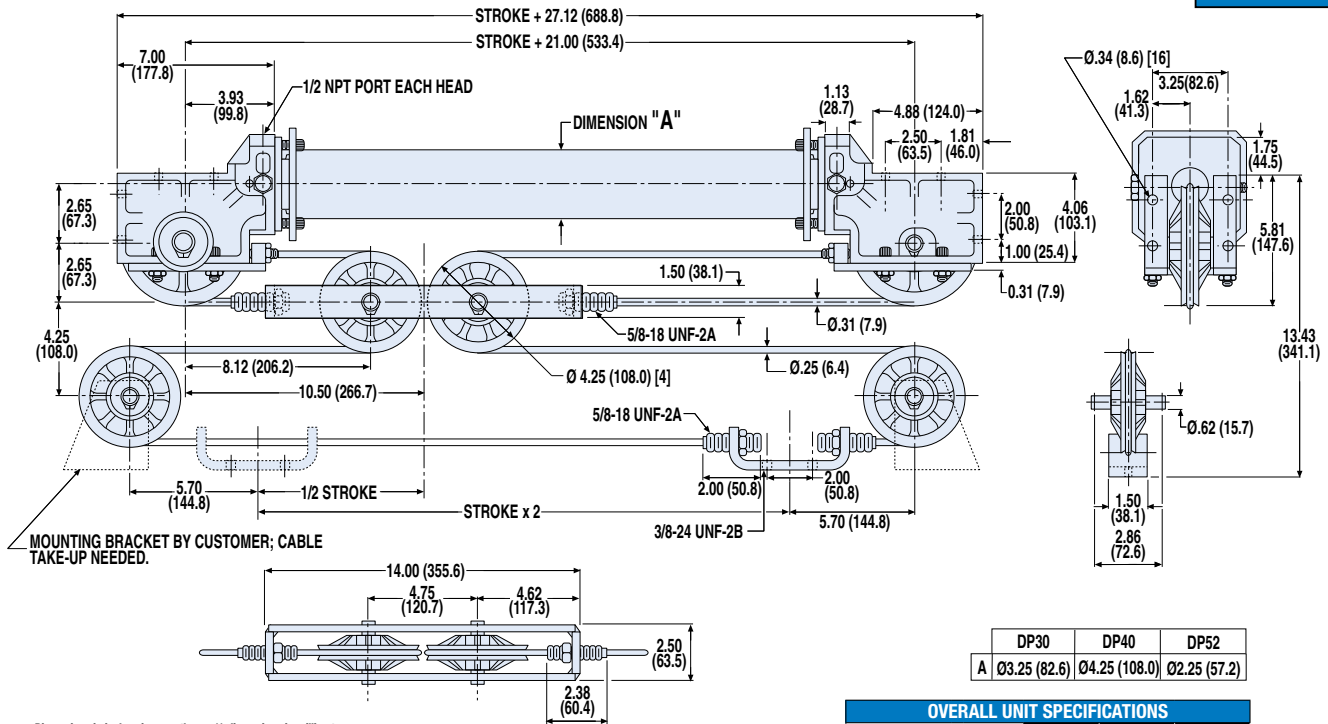
NOTE: Additional specifications Page CC_9

Double Purchase Cable Cylinder - DP30, DP40, DP52

DP30, DP40, DP52



DIMENSIONS

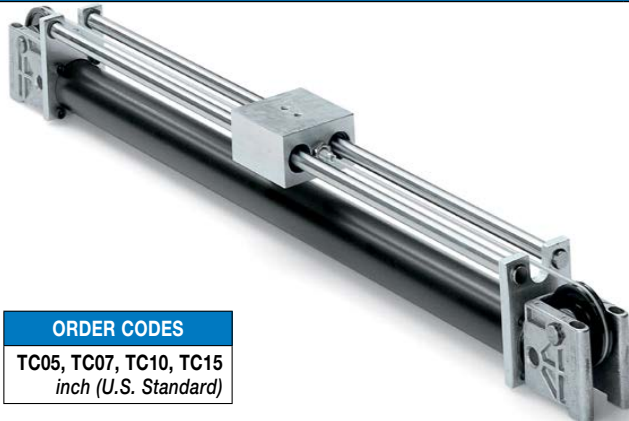


NOTE: Additional specifications
Page CC_10

| OVERALL UNIT SPECIFICATIONS | | | |
|-----------------------------|-----------|--------|--------|
| | DP30 | DP40 | DP52 |
| BORE SIZE | in 3.00 | 4.00 | 2.50 |
| MAX STROKE | in 280 | 279 | 280 |
| | mm 7112 | 7087 | 7112 |
| MAX PRESSURE | PSI 200 | 100 | 500 |
| | bar 13.8 | 6.9 | 34.5 |
| MAX FORCE | lb 1398.4 | 1248.9 | 1532.4 |
| OUTPUT | N 6220 | 5555 | 6816 |

TC Track Cable Cylinder - All Sizes

FEATURES AND OPTIONS



ORDER CODES

TC05, TC07, TC10, TC15
inch (U.S. Standard)

Tolomatic track cable cylinders provide a pre-packaged, pre-engineered guide and support system for greater bearing surface and larger load capacities.

An aluminum bearing block guides and supports loads on precision linear ball bearings with hardened ground steel shafts. Available in 4 bore sizes with automatic tensioners and caliper disc brake options on selected models.

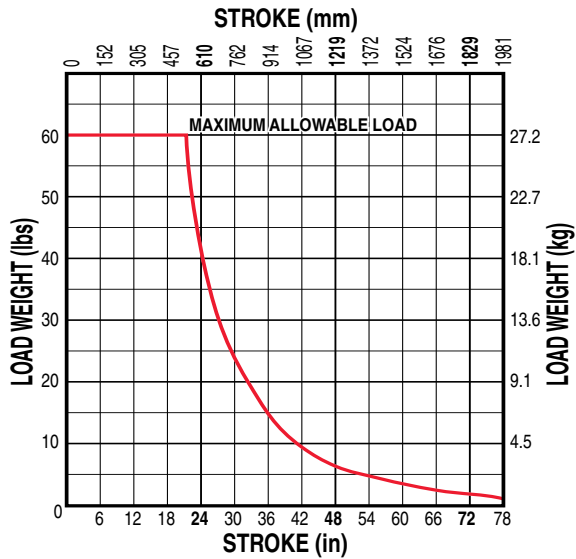
| TC OPTIONS | Order Code | Page | TC05 | TC07 | TC10 | TC15 |
|---------------------------------------|-------------|-------|------|------|------|------|
| Auto Tensioner w/ one 1" Stroke Unit | HI, HJ | cc_22 | - | OP | OP | OP |
| Auto Tensioner w/ two 1" Stroke Units | HI, HJ | cc_22 | - | OP | OP | OP |
| Caliper Disc Brake | HM, HN | cc_25 | - | - | - | OP |
| Switches (DC Reed & Triac) | (several) | cc_28 | OP | OP | OP | OP |
| Aluminum Tube | | | ST | ST | ST | ST |
| Steel Tube (Switches NOT available) | S | | - | - | OP | OP |
| Seals of Viton® Material | V | | - | OP | OP | OP |
| 3 Ported Heads | HG | | OP | OP | OP | OP |
| MORE INFORMATION | Page | | | | | |
| Application Guidelines | cc_36 | | ST | ST | ST | ST |
| Cushion Needle Adjustment | cc_38 | | - | ST | ST | ST |
| Ordering | cc_40 | | ST | ST | ST | ST |
| Selection | cc_30 | | ST | ST | ST | ST |
| Caliper Disc Brake Option Selection | cc_32 | | - | - | - | OP |
| STANDARD FEATURE | Page | | | | | |
| Fixed Orifice Cushions | cc_38 | | - | ST | ST | - |
| Adjustable Cushions | cc_38 | | - | - | - | ST |
| Single Ported Head | | | ST | ST | ST | ST |

- = Not Available OP = Optional ST = Standard

 **NOTE:** See corresponding CC (double acting cable cylinder) for performance, tubing and cable specifications Page CC_7 to Page CC_8

TC Track Cable Cylinder - TC05, TC07, TC10

LOAD WEIGHT vs STROKE TC05, TC07, TC10 (3/8" Dia. Rods at 0.30" Deflection)



NOTE: Rod deflection must not exceed .30 inches

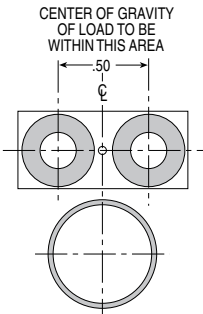
| OVERALL UNIT SPECIFICATIONS | | | | |
|-----------------------------|-----|--------|--------|--------|
| | | TC05 | TC07 | TC10 |
| BORE SIZE | in | 0.50 | 0.75 | 1.00 |
| MAX STROKE | in | 67.00 | 78.00 | 78.00 |
| | mm | 1701.8 | 1981.2 | 1981.2 |
| MAX PRESSURE | PSI | 100 | 100 | 100 |
| | bar | 6.9 | 6.9 | 6.9 |
| MAX FORCE OUTPUT | lb | 19.4 | 43.5 | 77.9 |
| | N | 86.3 | 193.5 | 346.5 |

NOTE: Additional specifications Page CC 7

NOTE: Moderate bending moments are acceptable, so long as the moment load does not exceed 190 inch-pounds.

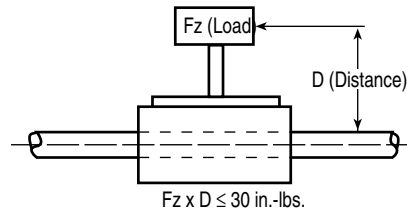
The diagrams at right, illustrate how this is calculated.

LOAD DISTRIBUTION

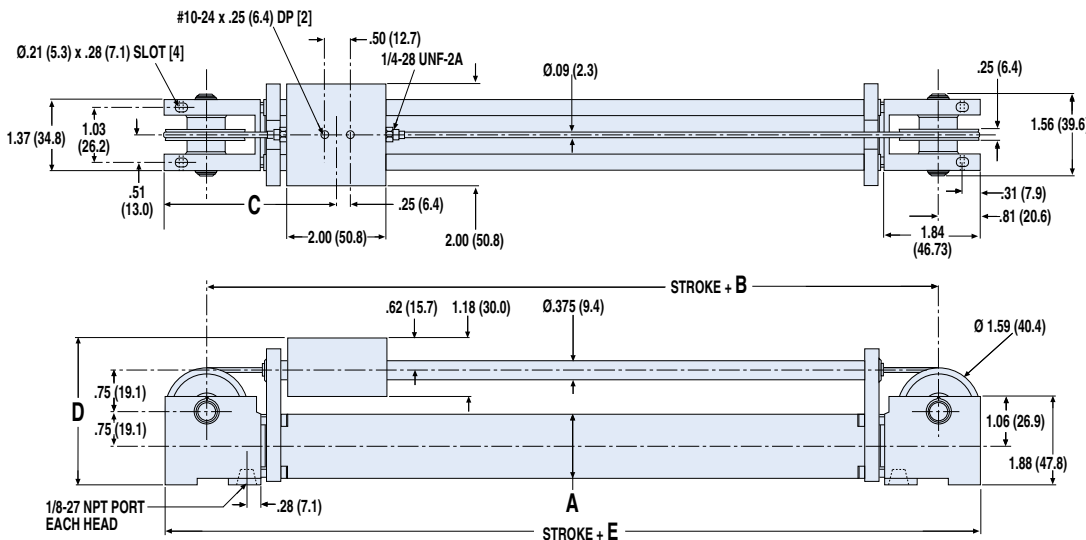


NOTE: Moderate bending moments are acceptable. The moment load must not exceed 30 inch-pounds for the 1/2", 3/4" and 1-inch bore cylinders.

The diagrams, illustrate how this is calculated.



DIMENSIONS



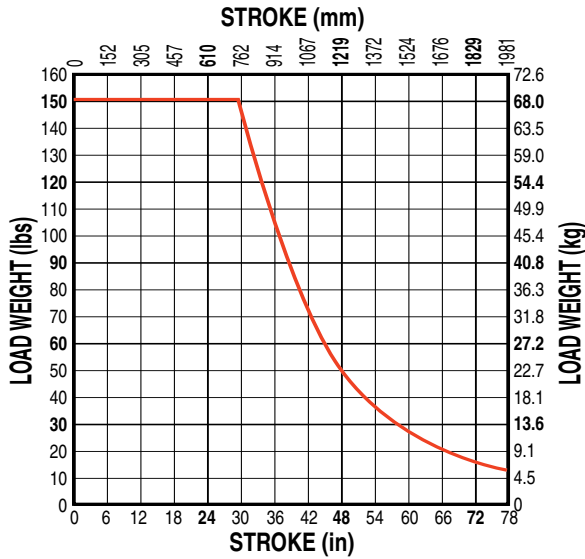
| | TC05 | TC07 | TC10 |
|-----------|--------|--------|--------|
| A | 0.625 | 1.000 | 1.250 |
| mm | 15.88 | 25.40 | 31.75 |
| B | 5.260 | 5.326 | 5.322 |
| mm | 133.60 | 135.28 | 135.18 |
| C | 3.44 | 3.46 | 3.48 |
| mm | 87.4 | 87.9 | 88.4 |
| D | 2.93 | 2.96 | 2.93 |
| mm | 74.4 | 75.2 | 74.4 |
| E | 6.870 | 6.936 | 6.932 |
| mm | 174.50 | 176.17 | 176.07 |



Dimensions in inches, in parentheses () dimensions in millimeters

TC Track Cable Cylinder - TC15

LOAD WEIGHT vs STROKE TC15 (5/8" Dia. Rods at 0.30" Deflection)

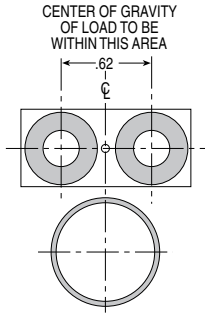


NOTE: Rod deflection must not exceed .30 inches

| OVERALL UNIT SPECIFICATIONS | | TC15 |
|-----------------------------|-----|--------|
| BORE SIZE | in | 1.50 |
| MAX STROKE | in | 78 |
| | mm | 1981.2 |
| MAX PRESSURE | PSI | 100 |
| | bar | 6.9 |
| MAX FORCE OUTPUT | lb | 174 |
| | N | 774.0 |

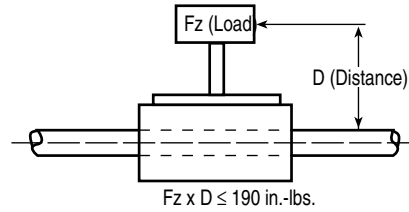
NOTE: Additional specifications Page CC 8

LOAD DISTRIBUTION

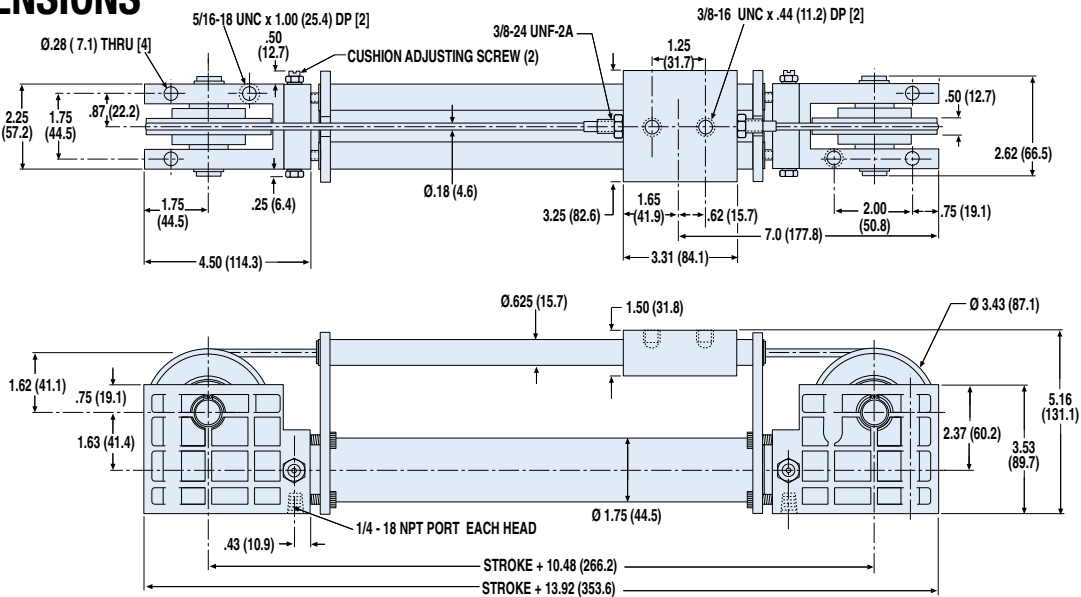


NOTE: Moderate bending moments are acceptable. The moment load must not exceed 190 inch-pounds for the 1-1/2 bore cylinder.

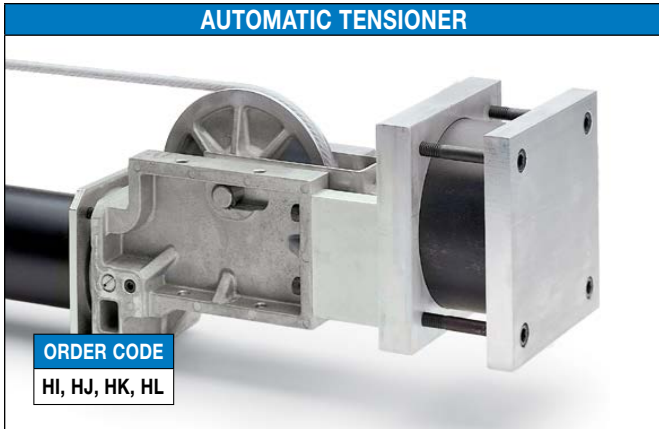
The diagrams, illustrate how this is calculated.



DIMENSIONS



CC Automatic Tensioner - All Sizes



Automatic tensioners are required when a cylinder's stroke length is beyond the maximum stroke length for full manual cable adjustment for that bore size. The AT unit keeps the cable rigid and ensures maximum service life of both the cable and gland seals. AT units are also recommended for vertical lifting or severe, high-cyclic applications.

The standard automatic tensioner unit has a 1-inch stroke, providing 2 inches of cable take-up. A 2-inch stroke AT unit may be installed on a cylinder, providing 4 inches of cable take-up. Refer to the tables below for tensioner stroke options on available bore sizes.

MAXIMUM STROKE LENGTHS FOR CYLINDERS WITH AUTO TENSIONERS

NOTE: A cable cylinder should be completely proof-loaded and pre-tensioned with either the Torque Method or the Field Method in order for the auto tensioner to achieve the maximum stroke lengths shown in

the table below. (For more information on proof-loading and pre-tensioning, please see page cc_36)

| STROKE OPTIONS | STROKE LENGTHS IN INCHES BASED ON CYLINDER'S MAXIMUM OPERATING PRESSURE | | | | | | | | | |
|---|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | CC05 | CC07 | CC10 | CC15 | CC20 | CC25 | CC30 | CC40 | CC50 | CC52 |
| Auto Tensioner with one 1" stroke unit | NA | 134.4 | 134.4 | 361.2 | 260.4 | 159.6 | 243.6 | 134.4 | NA | 266.8 |
| Auto Tensioner with two 1" stroke units | NA | 252.0 | 252.0 | 579.6 | 369.6 | 266.8 | 344.4 | 193.2 | NA | 327.6 |
| Auto Tensioner with one 2" stroke unit | NA | NA | NA | NA | 369.6 | 266.8 | 344.4 | 193.2 | 468.0 | 327.6 |
| Auto Tensioner with two 2" stroke units | NA | NA | NA | NA | 524.4 | 322.8 | 487.2 | 277.2 | 714.0 | 472.8 |

Above Dimensions in inches

| STROKE OPTIONS | STROKE LENGTHS IN METERS BASED ON CYLINDER'S MAXIMUM OPERATING PRESSURE | | | | | | | | | |
|----------------|---|------|-------|------|-------|--------|-------|--------|------|------|
| | CC05 | CC07 | CC10 | CC15 | CC20 | CC25 | CC30 | CC40 | CC50 | CC52 |
| NA 3.41 | 3.41 | 9.17 | 6.61 | 4.05 | 6.19 | 3.41 | NA | 6.78NA | 6.40 | 6.40 |
| 14.72 | 9.39 | 6.78 | 8.75 | 4.91 | NA | 8.32NA | NA | NA | NA | 9.39 |
| 6.78 | 8.75 | 4.91 | 11.89 | 8.32 | | | | | | |
| NA NA | NA | NA | 13.32 | 8.20 | 12.37 | 7.04 | 18.14 | 12.01 | | |

Above Dimensions in METERS

NOTE: Tube couplers are required on cable cylinders with strokes over 280 inches (7.11m).

Maximum stroke lengths in the above table can be extended by using the percentage of the pressure differential between the cylinder's actual operating pressure and the maximum operating pressure.

Example: If the cylinder selected is a CC15 (1 1/2-inch bore) with one 1-inch stroke AT unit:

Actual PSI: 80
 Max. PSI: 100
 Differential: 20%
 $20\% \times 361.2 \text{ in. (maximum stroke)} = 72.24 \text{ in.}$
 $72.24 \text{ in.} + 361.2 \text{ in.} = 433.44 \text{ in. (36.12 feet)}$

All AT units should be plumbed with a separate, regulated non-fluctuating pressure source which is a set percentage of the actual cylinder operating pressure. These are listed in the table at the right.

NOTE: When using an AT unit in an application where the cylinder is loaded in only one direction, it is recommended to have the AT unit located so the load direction of travel is away from the AT unit. On vertical applications, the AT unit should be located on the bottom.

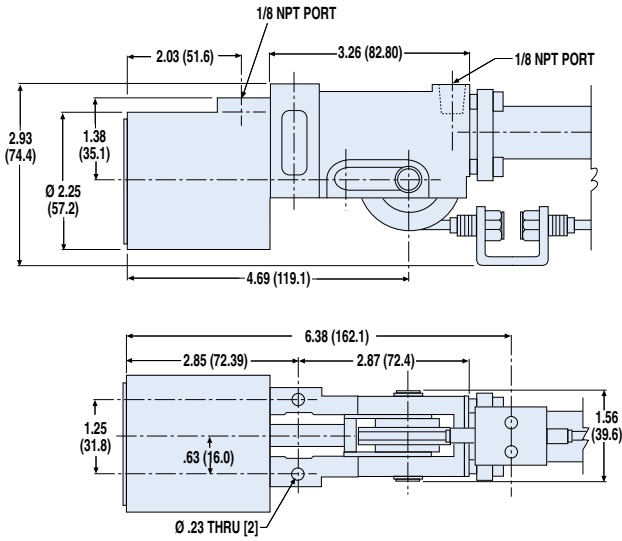
AUTO TENSIONER PRESSURE SETTINGS FOR MODEL % OF LOAD PRESSURE

CC Automatic Tensioner - CC07, CC10, CC15, CC20, CC25

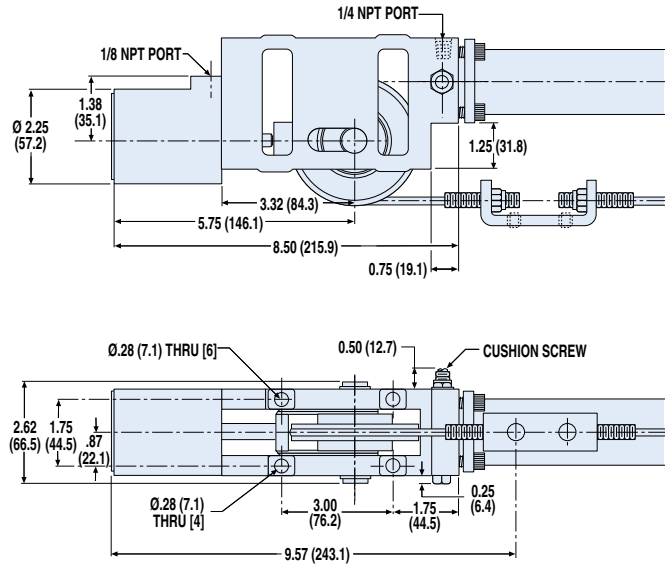


DIMENSIONS

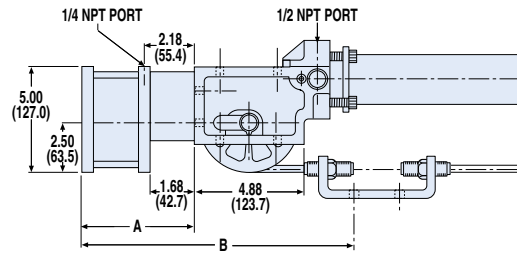
AT FOR CC07, CC10



AT FOR CC15

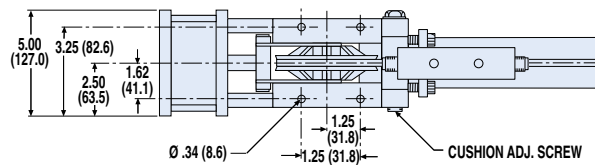


AT FOR CC20, CC25



| MODEL | A | B |
|---------------------|-------|--------|
| 1" Stroke Tensioner | 5.66" | 12.16" |
| 2" Stroke Tensioner | 6.66" | 13.16" |

| MODEL | A | B |
|---------------------|---------|---------|
| 1" Stroke Tensioner | 143.8mm | 308.9mm |
| 2" Stroke Tensioner | 169.2mm | 334.3mm |



Dimensions in inches, in parentheses () dimensions in millimeters

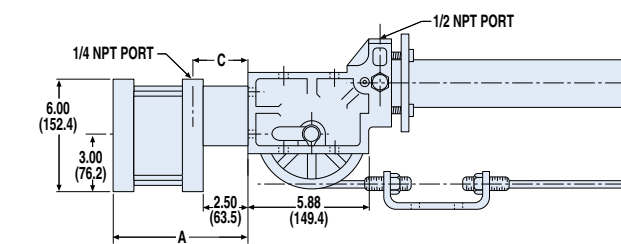
| SPACE AND WEIGHT REQUIREMENTS | | |
|-------------------------------|-------------------|--------------|
| MODEL | DEAD LENGTH (in)* | WEIGHT (lbs) |
| CC07 | 8.87 | 1.06 |
| CC10 | 8.87 | 1.06 |
| CC15 | 16.41 | 2.76 |
| CC20 | 20.66 | 8.41 |
| CC25 | 20.66 | 8.41 |

*Add dead length to stroke length to determine overall cylinder length

| SPACE AND WEIGHT REQUIREMENTS | | |
|-------------------------------|-------------------|-------------|
| MODEL | DEAD LENGTH (mm)* | WEIGHT (kg) |
| CC07 | 225 | 0.48 |
| CC10 | 225 | 0.48 |
| CC15 | 417 | 1.25 |
| CC20 | 525 | 3.81 |
| CC25 | 525 | 3.81 |

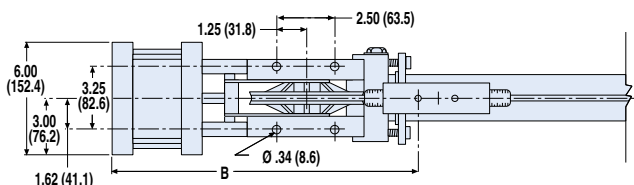
DIMENSIONS

AT FOR CC30, CC40, CC52

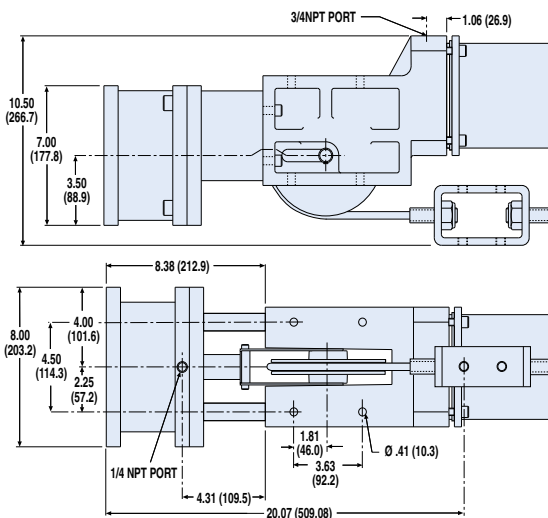


| MODEL | A | B | C |
|---------------------|-------|--------|-------|
| 1" Stroke Tensioner | 6.38" | 14.12" | 3.01" |
| 2" Stroke Tensioner | 7.38" | 15.12" | 3.50" |

| MODEL | A | B | C |
|---------------------|---------|---------|--------|
| 1" Stroke Tensioner | 162.1mm | 358.6mm | 76.5mm |
| 2" Stroke Tensioner | 187.5mm | 384.0mm | 88.9mm |



AT FOR CC50



Dimensions in inches, in parentheses () dimensions in millimeters

| SPACE AND WEIGHT REQUIREMENTS | | |
|-------------------------------|-------------------|--------------|
| MODEL | DEAD LENGTH (in)* | WEIGHT (lbs) |
| CC30 | 23.88 | 14.36 |
| CC40 | 24.88 | 14.36 |
| CC52 | 23.88 | 14.36 |
| CC50 | 33.75 | 23.68 |

*Add dead length to stroke length to determine overall cylinder length

| SPACE AND WEIGHT REQUIREMENTS | | |
|-------------------------------|-------------------|-------------|
| MODEL | DEAD LENGTH (mm)* | WEIGHT (kg) |
| CC30 | 607 | 6.51 |
| CC40 | 632 | 6.51 |
| CC52 | 607 | 6.51 |
| CC50 | 857 | 10.74 |

CC Cylinder/Brake Combinations - All Sizes

CALIPER DISC BRAKE



ORDER CODE

HM, HN

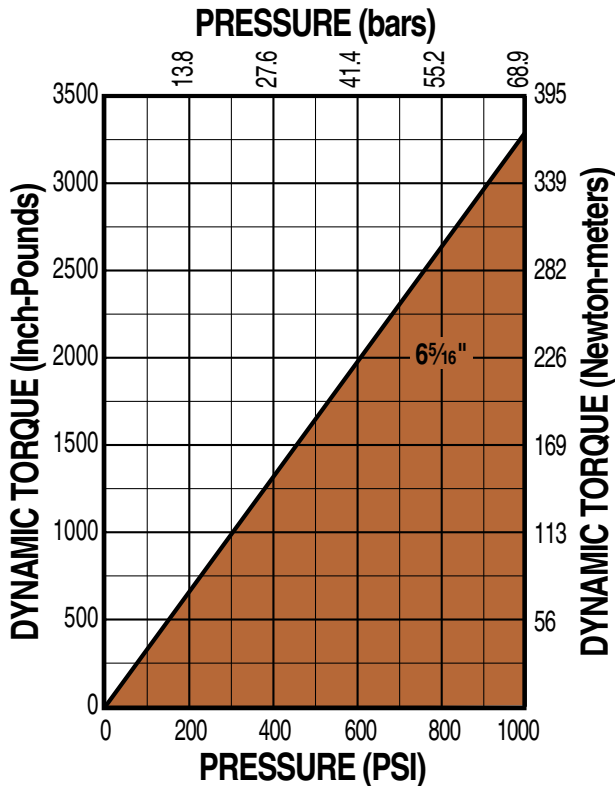
Caliper disc brakes can be used to add holding force in horizontal applications and aid in deceleration at the end of stroke. Caliper disc brakes must be used with an automatic tensioner to function properly. See page CC_32 for selection information and braking formulae.

NOTE: Tolomatic's H20DARC is used on all available models. See part numbers below:

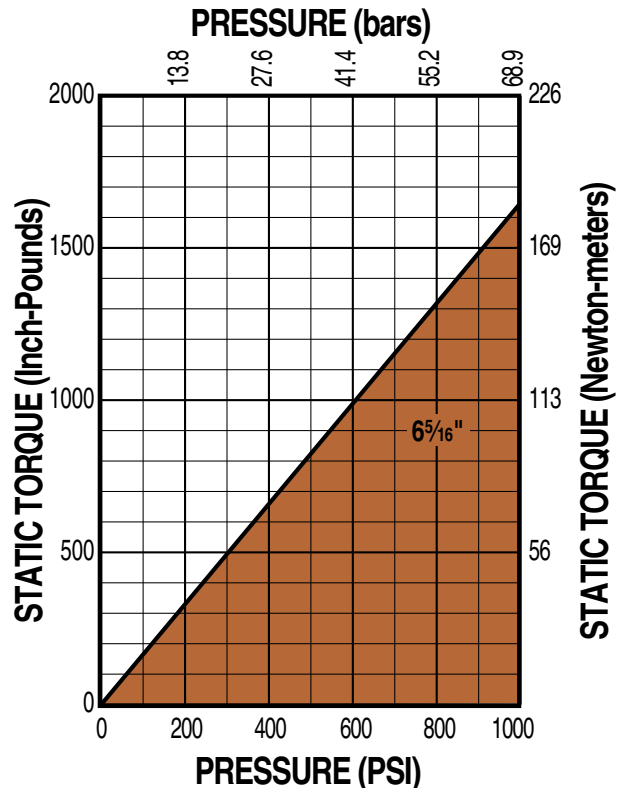
| | CC15 | CC20 | CC25 | CC30 | CC40 | CC52 |
|----------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Brake Number | 0728-0010 | 0728-0010 | 0728-0010 | 0728-0010 | 0728-0010 | 0728-0010 |
| Disc & Hub No. | 0801-0008 | 0801-0010 | 0801-0010 | 0801-0010 | 0801-0010 | 0801-0010 |

See catalog 9900-4009 for detailed information on brakes and discs.

DYNAMIC TORQUE H-20 BRAKE with 6-5/16" DISC (FOR CC15, CC20, CC25, CC30, CC40, CC52)

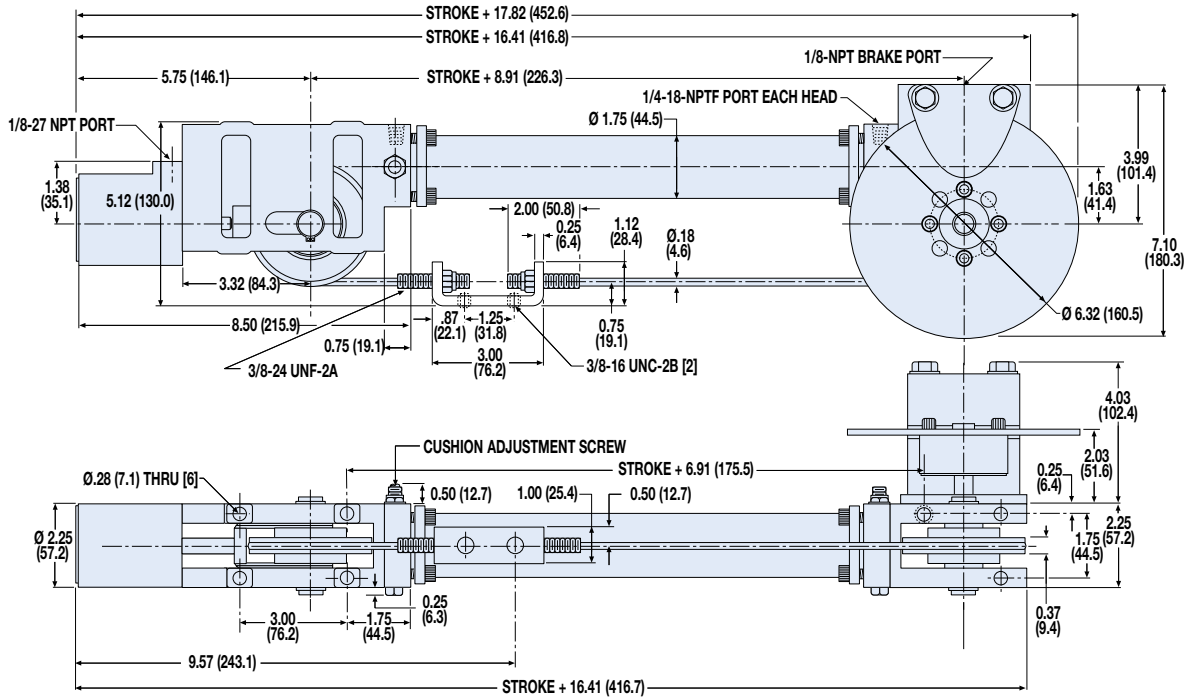


STATIC TORQUE H-20 BRAKE with 6-5/16" DISC (FOR CC15, CC20, CC25, CC30, CC40, CC52)

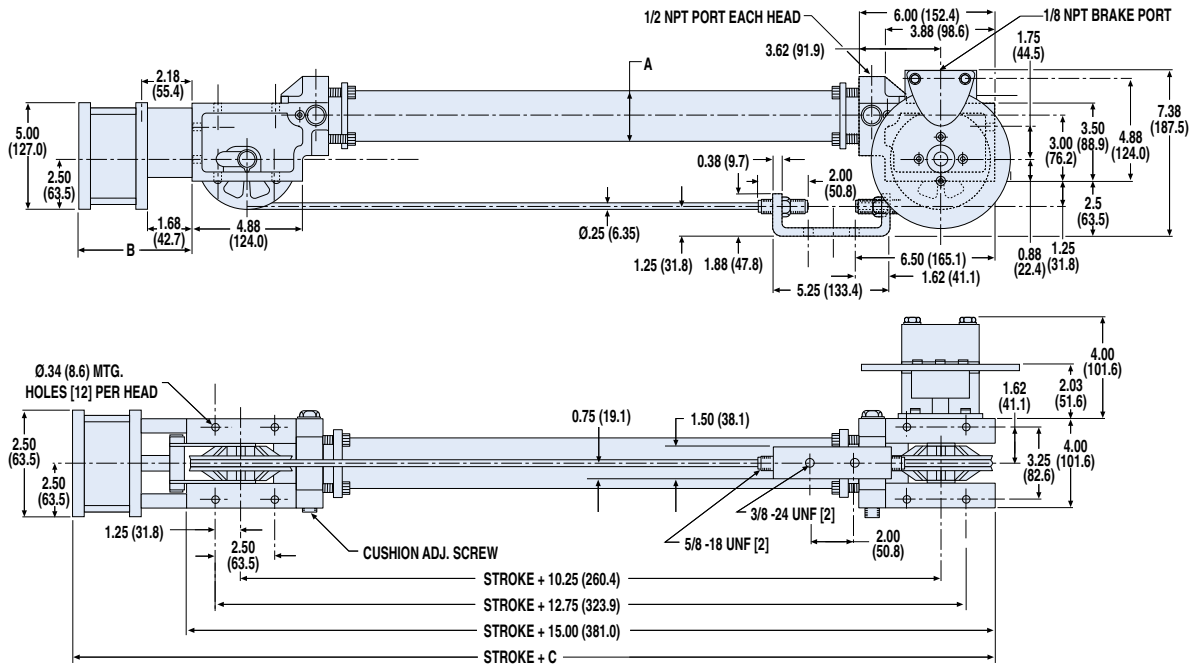


DIMENSIONS

CYLINDER/ BRAKE COMBINATION FOR CC15



CYLINDER/ BRAKE COMBINATION FOR CC20, CC25



| MODEL | A | B | C |
|-----------------------------|---------|-------|--------|
| CC20 w/ 1" Stroke Tensioner | Ø 2.25" | 5.66" | 20.86" |
| CC20 w/ 2" Stroke Tensioner | Ø 2.25" | 6.66" | 22.15" |
| CC25 w/ 1" Stroke Tensioner | Ø 2.75" | 5.66" | 20.66" |
| CC25 w/ 2" Stroke Tensioner | Ø 2.75" | 6.66" | 22.15" |

| MODEL | A | B | C |
|-----------------------------|----------|---------|---------|
| CC20 w/ 1" Stroke Tensioner | Ø 57.2mm | 143.8mm | 524.7mm |
| CC20 w/ 2" Stroke Tensioner | Ø 57.2mm | 169.2mm | 561.6mm |
| CC25 w/ 1" Stroke Tensioner | Ø 69.9mm | 143.8mm | 524.7mm |
| CC25 w/ 2" Stroke Tensioner | Ø 69.9mm | 169.2mm | 561.6mm |

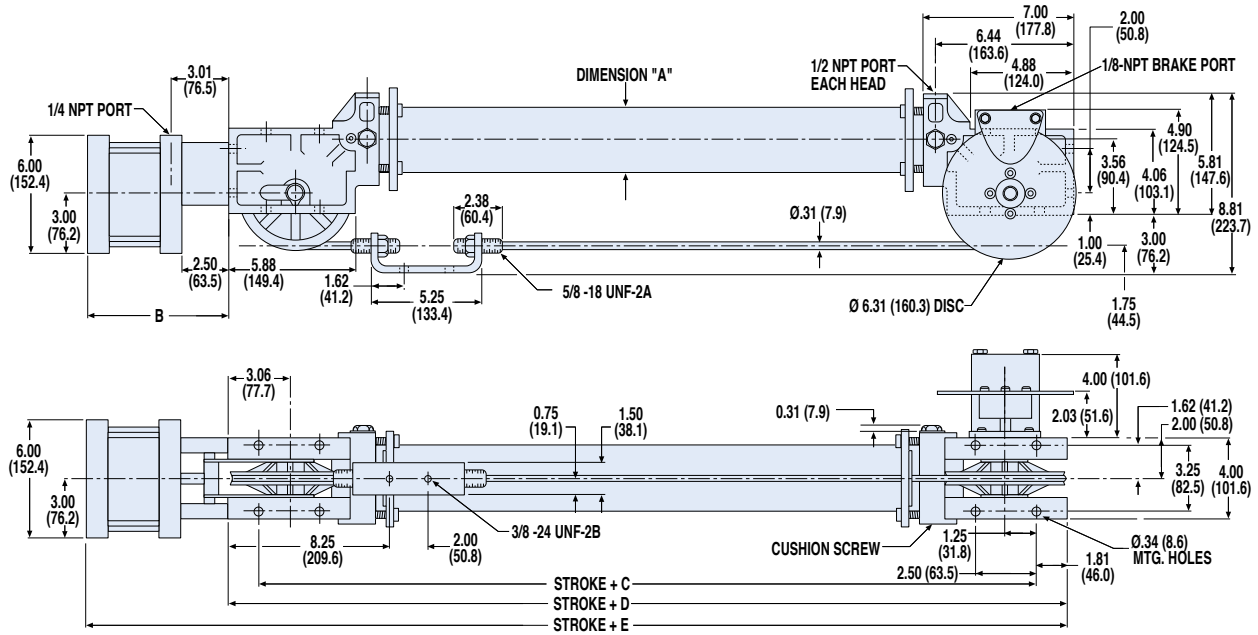
Dimensions in inches, in parentheses () dimensions in millimeters

CC Cylinder/Brake Combinations - CC30, CC40, CC52



DIMENSIONS

CYLINDER/ BRAKE COMBINATION FOR CC30, CC40, CC52



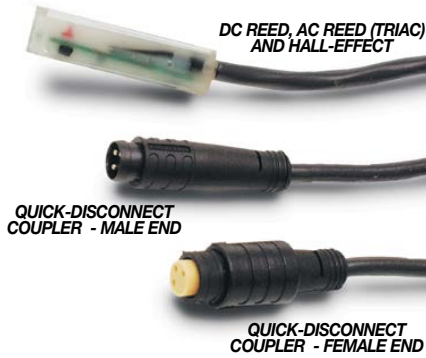
| MODEL | A | B | C | D | E |
|-----------------------------|---------|-------|--------|--------|--------|
| CC30 w/ 1" Stroke Tensioner | Ø 3.25" | 6.38" | 13.87" | 17.50" | 23.89" |
| CC30 w/ 2" Stroke Tensioner | Ø 3.25" | 7.38" | 13.87" | 17.50" | 24.89" |
| CC40 w/ 1" Stroke Tensioner | Ø 4.25" | 6.38" | 14.87" | 18.50" | 24.89" |
| CC40 w/ 2" Stroke Tensioner | Ø 4.25" | 7.38" | 14.87" | 18.50" | 25.88" |
| CC52 w/ 1" Stroke Tensioner | Ø 2.25" | 6.38" | 13.87" | 17.50" | 23.89" |
| CC52 w/ 2" Stroke Tensioner | Ø 2.25" | 7.38" | 13.87" | 17.50" | 24.09" |

| MODEL | A | B | C | D | E |
|-----------------------------|-----------|---------|---------|---------|---------|
| CC30 w/ 1" Stroke Tensioner | Ø 82.6mm | 162.1mm | 352.3mm | 444.5mm | 609.1mm |
| CC30 w/ 2" Stroke Tensioner | Ø 82.6mm | 187.5mm | 352.3mm | 444.5mm | 634.5mm |
| CC40 w/ 1" Stroke Tensioner | Ø 108.0mm | 162.1mm | 357.4mm | 469.9mm | 634.5mm |
| CC40 w/ 2" Stroke Tensioner | Ø 108.0mm | 187.5mm | 357.4mm | 469.9mm | 634.5mm |
| CC52 w/ 1" Stroke Tensioner | Ø 57.2mm | 162.1mm | 352.3mm | 444.5mm | 609.1mm |
| CC52 w/ 2" Stroke Tensioner | Ø 57.2mm | 187.5mm | 352.3mm | 444.5mm | 634.5mm |

Dimensions in inches, in parentheses () dimensions in millimeters

CC, SA, DP, TC 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 of side of actuator with scored face of switch toward internal magnet.

SPECIFICATIONS

| ORDER CODE | REED DC | | | | REED AC | |
|------------------------|----------------------------------|-----------------|----------------------------------|-----------|--------------------------|-------------------------|
| | R T | R M | B T | B M | C T | C M |
| LEAD | 5m | QD* | 5m | QD* | 5m | QD* |
| CABLE SHIELDING | Unshielded | Shielded† | Unshielded | Shielded† | Unshielded | Shielded† |
| SWITCHING LOGIC | "A" Normally Open | | "C" Normally Open or Closed | | Triac Normally Open | |
| MECHANICAL CONTACTS | Single-Pole Single-Throw | | Single-Pole Double-Throw | | Single-Pole Single-Throw | |
| COIL DIRECT | Yes | | Yes | | Yes | |
| POWER LED | None | | None | | None | |
| SIGNAL LED | Red | | None | | None | |
| OPERATING VOLTAGE | 200 Vdc max. | | 120 Vdc max. | | 120 Vac max. | |
| OUTPUT RATING | — | | — | | — | |
| OPERATING TIME | 0.6 msec max. (including bounce) | | 0.7 msec max. (including bounce) | | — | |
| OPERATING TEMPERATURE | -40°F [-40°C] to 158°F [70°C] | | | | | |
| RELEASE TIME | 1.0 msec. max. | | — | | — | |
| ON TRIP POINT | — | | — | | — | |
| OFF TRIP POINT | — | | — | | — | |
| **POWER RATING (WATTS) | 10.0 § | | 3.0 §§ | | 10.0 | |
| 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] |
| 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 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.

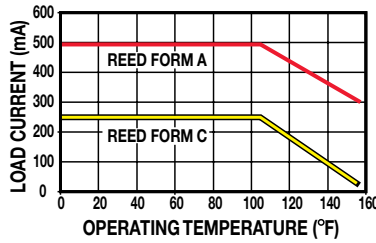
§ Maximum current 500mA (not to exceed 10VA) Refer to Temperature vs. Current graph and Voltage Derating graph

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

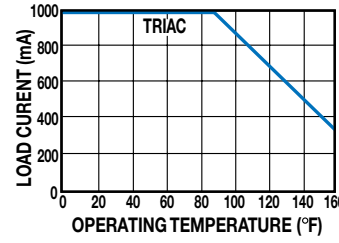
CC, SA, DP, TC Switches - All Sizes

PERFORMANCE

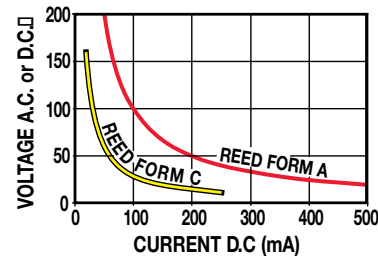
TEMP. vs CURRENT, DC REED



TEMP. vs CURRENT, AC REED

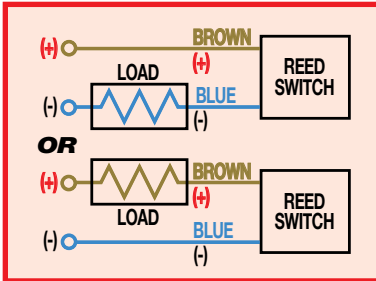


VOLTAGE DERATING, DC REED

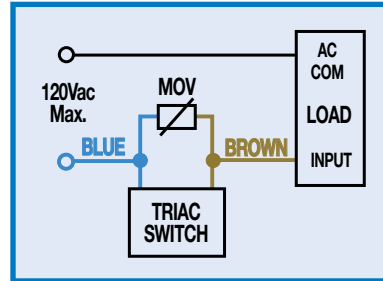


WIRING DIAGRAMS

RT & **R**M DC REED, FORM A



CT & **C**M AC REED, TRIAC

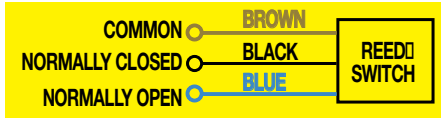


INSTALLATION INFORMATION

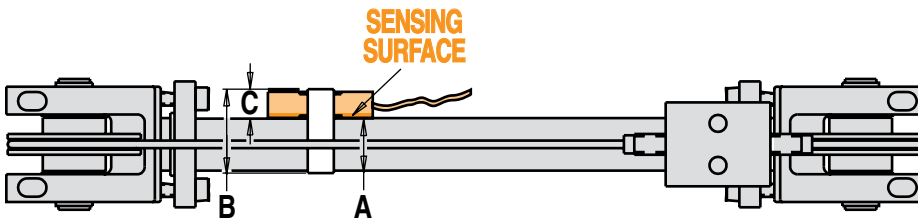
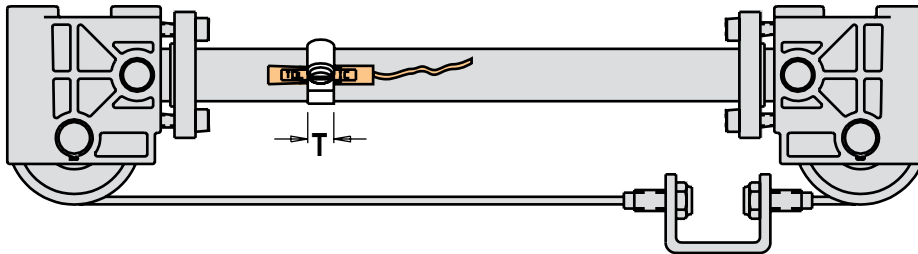


! THE NOTCHED FACE OF THE SWITCH INDICATES THE SENSING SURFACE AND MUST FACE TOWARD THE MAGNET.

BT & **B**M DC REED, FORM C



DIMENSIONS



NOTE: HALL-EFFECT SWITCHES ARE NOT AVAILABLE FOR CABLE CYLINDERS
SWITCHES ARE NOT AVAILABLE FOR CABLE CYLINDERS WITH STEEL TUBE
DEAD LENGTH WILL INCREASE ON MOST MODELS, SEE BELOW

| MODEL | BORE | A* | B | C | T |
|-------|------|------|------|------|------|
| CCM05 | 0.50 | 0.81 | 1.09 | 0.35 | 0.31 |
| CCM07 | 0.75 | 0.81 | 1.09 | 0.35 | 0.31 |
| CCM10 | 1.00 | 1.12 | 1.65 | 0.35 | 0.31 |
| CCM15 | 1.50 | 1.56 | 2.15 | 0.35 | 0.31 |
| CCM20 | 2.00 | 2.08 | 2.65 | 0.35 | 0.31 |
| CCM52 | 2.00 | 2.08 | 2.65 | 0.35 | 0.31 |
| CCM25 | 2.50 | 2.75 | 3.15 | 0.35 | 0.31 |
| CCM30 | 3.00 | 3.25 | 3.65 | 0.35 | 0.31 |
| CCM40 | 4.00 | 4.25 | 4.65 | 0.35 | 0.56 |
| CCM50 | 5.00 | 5.25 | 5.65 | 0.35 | 0.56 |

Above dimensions in inches
 *Inside Dimension ±.06"

| MODEL | BORE | A* | B | C | T |
|-------|-------|--------|--------|------|-------|
| CCM05 | 0.50" | 20.57 | 27.69 | 8.76 | 7.87 |
| CCM07 | 0.75" | 20.57 | 27.69 | 8.76 | 7.87 |
| CCM10 | 1.00" | 28.45 | 41.91 | 8.76 | 7.87 |
| CCM15 | 1.50" | 39.62 | 54.61 | 8.76 | 7.87 |
| CCM20 | 2.00" | 52.83 | 67.31 | 8.76 | 7.87 |
| CCM52 | 2.00" | 52.83 | 67.31 | 8.76 | 7.87 |
| CCM25 | 2.50" | 69.85 | 80.01 | 8.76 | 7.87 |
| CCM30 | 3.00" | 82.55 | 92.71 | 8.76 | 7.87 |
| CCM40 | 4.00" | 107.95 | 118.11 | 8.76 | 14.22 |
| CCM50 | 5.00" | 133.35 | 143.51 | 8.76 | 14.22 |

Above dimensions in millimeters
 *Inside Dimension ±1.5mm

| SPACE REQUIREMENTS - ADD DEAD LENGTH TO STROKE LENGTH | MODEL | CCM05 | CCM07 SAM07 | CCM10 SAM10 | CCM15 SAM15 | CCM20 SAM20 | CCM52 SAM52 | CCM25 SAM25 | CCM30 SAM30 | CCM40 SAM40 | CCM50 |
|---|-------|-------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------|
| | BORE | 0.50" | 0.75" | 1.00" | 1.50" | 2.00" | 2.00" | 2.50" | 3.00" | 4.00" | 5.00" |
| IN. | | 1.62 | 1.62 | 1.62 | 0.375 | 0.375 | 0.375 | 0.375 | 0.375 | 0.375 | 0 |
| MM | | 41.2 | 41.2 | 41.2 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 | 0 |

CC: Cable Cylinder Selection Guidelines - All Sizes

EXTERNAL LOAD GUIDANCE AND SUPPORT

The process of selecting a cable cylinder 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 Cable Cylinder for an application, compile the following information:

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

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 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. 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.

NOTE: The 1/2-inch and 5-inch cable cylinders and all sizes of magnetically coupled cylinders do not have internal cushions.

The 1/2-inch cable cylinder can handle only very light inertial loads (5 pounds or less). Heavier loads require external stops or shock absorbers.

4 DETERMINE THE MAXIMUM STROKE LENGTHS FOR

FULL MANUAL CABLE ADJUSTMENT (CC ONLY)

Once you have selected the proper bore size for your application and determined the cylinder's cushion capacity, you need to determine the physical stroke length limitation of the cylinder. Refer to the table below to find the bore size selected and its maximum stroke length.

NOTE: Maximum recommended stroke length for full manual cable adjustment is the maximum stroke length at which the cables can be properly proof-loaded, pretensioned and maintained at the required tension by manually adjusting the clevis terminal lock nuts. Maximum stroke length is based on the cylinder's maximum pressure rating.

If the stroke length for your application falls within the maximum stroke length for full manual cable adjustment, your model selection is complete. (Refer to graph on page cc_31.)

IMPORTANT NOTE: Once a cylinder is installed in an application, but before putting it into service, the cables must be proof-loaded and pretensioned for proper operation. Refer to Application Guidelines on page cc_36 for proof-loading and pretensioning methods.

If your stroke length is beyond the maximum stroke lengths shown, you have two options available.

1. Increase the maximum stroke length of the selected cylinder size by the percentage of the pressure differential between the cylinder's actual operating pressure and the cylinder's maximum rated operating pressure.

Example: If the cylinder selected is a CC15 (1½ - inch bore):

| | |
|------------------------------------|------------|
| Actual PSI: | 80 |
| Max. PSI: | 100 |
| Differential: | 20% |
| 20% x 126 in. (maximum stroke) | = 25.2 in. |
| 25.2 + 126 = 151.2 in. (12.6 feet) | |

2. If your required stroke length is still more than the increased stroke length determined from option "1.", an automatic tensioner (AT) or multiple tensioners may be required.

For maximum stroke lengths when using auto tensioners, refer to the chart on page cc_22.

NOTE: When using auto tensioners, the cylinder's cables must be proof-loaded and pretensioned before pressure is applied to the AT unit. Refer to Application Guidelines on page cc_36 for proper proof-loading and pretensioning methods.

Auto tensioners are strongly recommended for vertical lifting applications and severe, high-cyclic applications even when the cylinder's stroke is within the maximum stroke length at full manual cable adjustment.

5 CONSIDER OPTIONS

Available options for cable cylinders include:

- Auto Tensioner
- Caliper Disc Brake
- Switches (DC Reed & Triac)
- Steel Tube (*Switches NOT available*)
- Seals of Viton® Material
- 3 Ported Heads

CC: Cable Cylinder Selection Example

The procedure for selection of cable cylinder and magnetically coupled cylinder are very similar. For illustrative purposes, charts for the CC10 model are used in this example.

1 COMPILE APPLICATION REQUIREMENTS

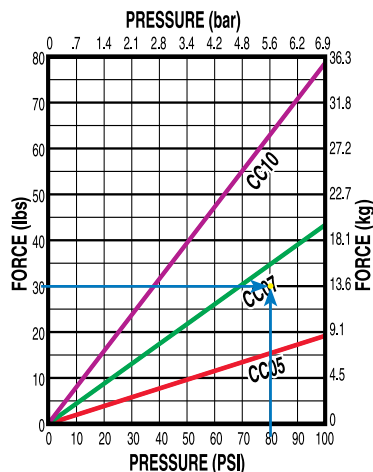
- Available pressure 80 psi
- Weight of load 30 lbs.
- Orientation of load horiz.
- Final velocity* of load 10" per sec
- Stroke length 68"

*2x average velocity, see page CC_38

2 SELECT CYLINDER SIZE

- Consult the Theoretical Force vs. Pressure charts.
- Cross-reference the load force and the available operating pressure. In this example a CC07 would accommodate this load at the available PSI.

THEORETICAL FORCE vs PRESSURE

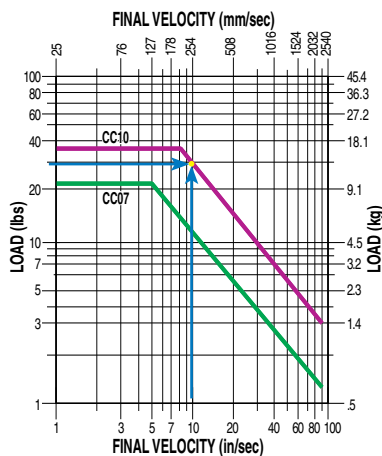


3 DETERMINE INTERNAL CUSHION CAPACITY

- Consult the Cushion Data Chart for the model selected.

In this example the calculated value for the final velocity and the load intersect at the line for the internal cushions capacity. Thus the CC10 will work for this application.

CUSHION DATA



4 DETERMINE THE MAXIMUM STROKE LENGTHS FOR FULL MANUAL CABLE ADJUSTMENT (CC ONLY)

- Consult the chart at right.

In our example we are using 80 PSI, the chart indicates a maximum of 100 PSI, so we can calculate the maximum stroke length with manual adjustment:

$$1.20 \times 20.4" = 24.48"$$

Our stroke length is 68" so it will require the automatic tensioner option.

5 CONSIDER OPTIONS

This application will use Form C dc Reed switches to signal other units in this automated system.

The final configured string will appear as follows:

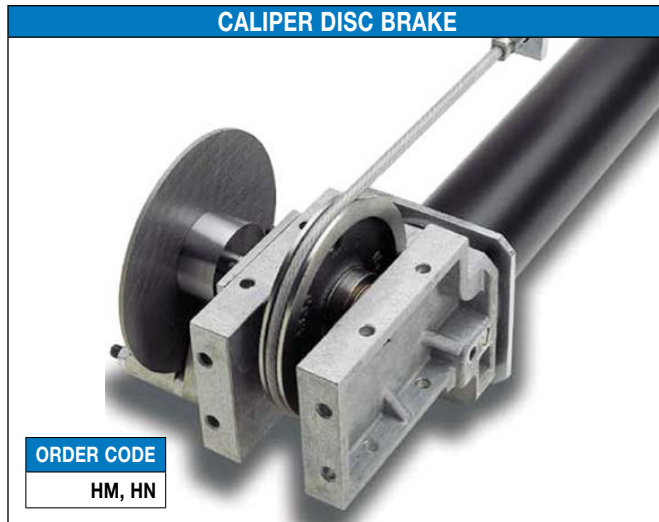
CCM10SK68.000HIBM2

CC MAXIMUM STROKE LENGTHS

For Full Manual Cable Adjustment

| | MAX PRESSURE | | MAX STROKE | |
|-------------|--------------|-----|------------|--------|
| | in | PSI | in | mm |
| CC05 | 0.50 | 100 | 20.40 | 518.2 |
| CC07 | 0.75 | 100 | 20.40 | 518.2 |
| CC10 | 1.00 | 100 | 20.40 | 518.2 |
| CC15 | 1.50 | 100 | 126.00 | 3200.4 |
| CC20 | 2.00 | 200 | 159.60 | 4053.8 |
| CC25 | 2.50 | 200 | 100.80 | 2560.3 |
| CC30 | 3.00 | 200 | 151.20 | 3840.5 |
| CC40 | 4.00 | 200 | 84.00 | 2133.6 |
| CC50 | 5.00 | 100 | 222.00 | 5638.8 |
| CC52 | 2.00 | 500 | 134.40 | 3413.8 |

CC: Caliper Disc Brake for Cable Cylinder Selection Guidelines



CALIPER DISC BRAKE

ORDER CODE

HM, HN

DETERMINE THE LOAD CONFIGURATION AND THE HOLDING CAPACITY OF THE BRAKE

The following steps will help determine the adequate stopping time and distance for the cable cylinder equipped with a caliper disc brake under various conditions and loads.

1. Select the bore size of the cable cylinder based on load to be moved. Determine load pressure. Set regulator at 25% above load pressure (P_c).

2. Calculate the unbalanced cylinder force (F_c) **only** if pressure is applied when braking. If pressure is removed prior to braking, go on to 3.

$$F_c = P_c \times A_c$$

3. Calculate the tangential braking force required. This is (F_{tr}) when pressure is removed prior to braking, or (F_{ta}) when pressure is still applied when braking. Refer to illustrations in Figure 1.

Carefully note conditions:

$$F_{tr} = W \left[\left(\frac{a}{g} - \sin \theta \right) - (f \cos \theta) \right], \text{ Horizontal or Load rising}$$

$$F_{tr} = W \left[\left(\frac{a}{g} + \sin \theta \right) - (f \cos \theta) \right], \text{ Load falling}$$

$$F_{ta} = F_c + W \left(\frac{a}{g} - f \right), \text{ Horizontal loads}$$

$$= F_c + W \left[\left(\frac{a}{g} - \sin \theta \right) - (f \cos \theta) \right], \text{ Incline load rising}$$

$$= F_c + W \left(\frac{a}{g} - 1 \right), \text{ Vertical load rising}$$

In the above expressions (a) can be calculated from:

$$a = \frac{V^2}{2S} \text{ or } \frac{V}{T}, \text{ In./Sec.}^2$$

4. Calculate the tension required in brake side cable at the time of braking.

$$L_{tr} = \frac{F_{tr}}{0.369}, \text{ lbs.; Pressure removed while braking}$$

$$L_{ta} = \frac{F_{ta}}{0.369}, \text{ lbs.; Pressure applied while braking}$$

NOMENCLATURE

a = Deceleration, in/sec²
 g = Deceleration due to gravity = 386.4 in/sec²
 f^* = Coefficient of friction of sliding load
 f_c = Coefficient of friction between cable and sheave
 F_c = Unbalanced cylinder force, lbs.
 F_{ta} = Tangential braking force required with pressure still applied when braking, lbs.
 F_{tr} = Tangential braking force required with pressure removed prior to braking, lbs.
 L_{tr} = Tension in cable of brake side half while braking with pressure removed, lbs.
 L_{ta} = Tension in cable of brake side half while braking with pressure applied, lbs.
 L_{trm} = Maximum tension in cable with pressure removed while braking, lbs.
 L_{tam} = Maximum tension in cable with pressure applied while braking, lbs.
 S = Stopping distance, inches
 T = Stopping time, seconds

V = Velocity of load, in/sec.
 W = Weight of load, lbs.
 W_e = Equivalent Load, lbs.
 $W_e = W (\sin \theta + f \cos \theta)$
 θ = Angle of inclination
 $(\theta = 0^\circ \text{ for horizontal})$
 $(\theta = 90^\circ \text{ for vertical})$
 R_s = Root radius of sheave groove, inches
 P_c = Load Pressure, PSI
 A_c = Area of cable cylinder bore, in²
 P_t = Load Pressure, PSI
 A_t = Area of tensioner cylinder, in²
 P_{ba} = Brake pressure setting. Pressure applied while braking, PSI
 P_{br} = Brake pressure setting. Pressure removed while braking, PSI

*Customer must precisely determine coefficient of friction (f), if this value is used.

CC: Caliper Disc Brake for Cable Cylinder Selection Guidelines

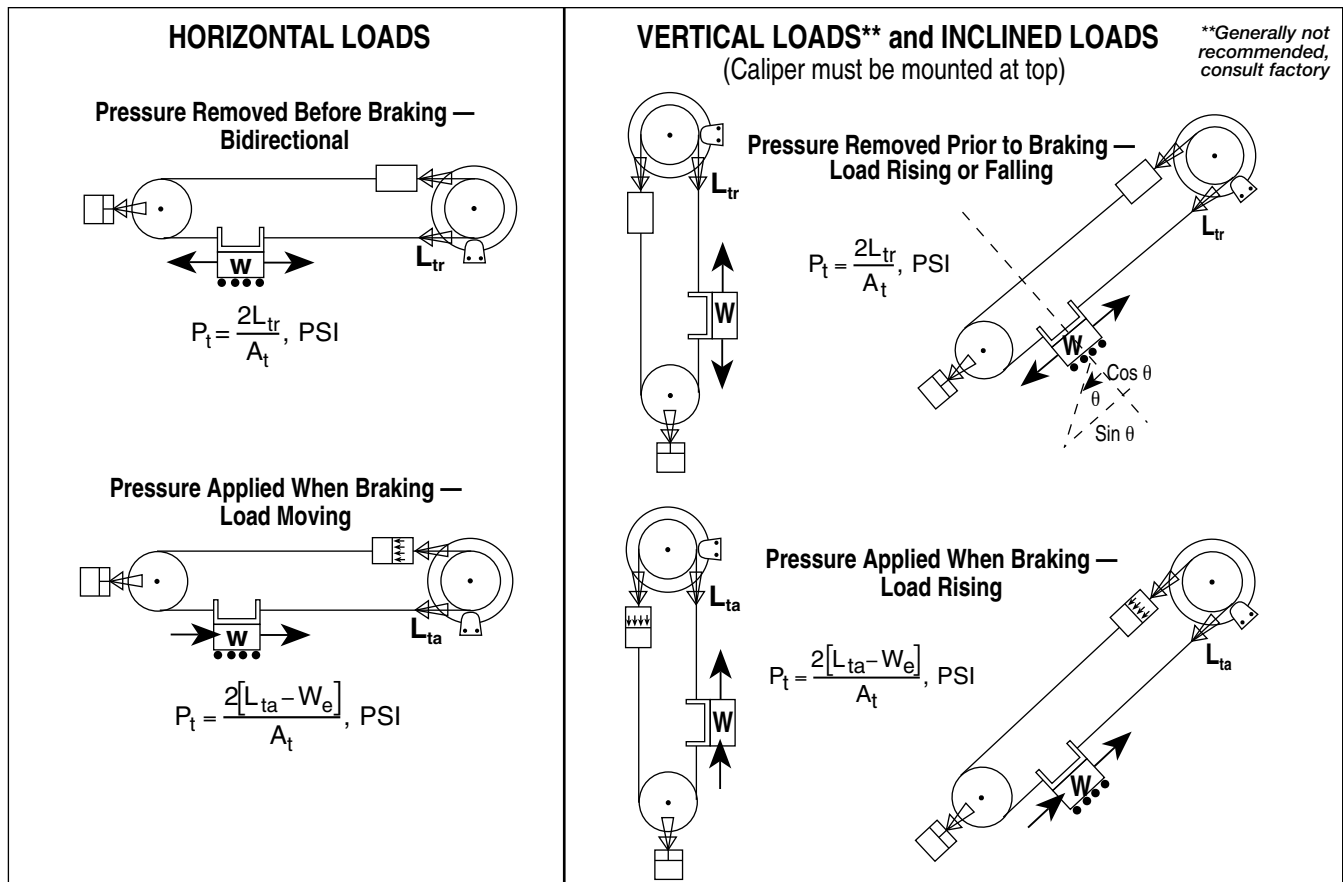


Figure 1

5. Calculate tensioner pressure setting, (P_t) based on type of load configuration. See Figure 1 and Table 1

6. Calculate maximum tension in the cable with **pressure removed** prior to braking (L_{trm}) or with **pressure applied** when braking (L_{tam}).

Horizontal Loads:

$$L_{trm} = L_{tr} + W_e, \text{ lbs.}; \text{ Pressure removed prior to braking bidirectional}$$

$$L_{tam} = L_{ta}, \text{ lbs.}; \text{ Pressure applied when braking and load moving toward caliper}$$

$$L_{tam} = L_{ta} + 2W_e, \text{ lbs.}; \text{ Pressure applied when braking and load moving away from caliper.}$$

Vertical or Inclined Loads:

$$L_{trm} = L_{tr} + W_e, \text{ lbs.}; \text{ Pressure removed prior to braking and load rising or falling}$$

$$L_{tam} = L_{ta}, \text{ lbs.}; \text{ Pressure still applied when braking and load rising}$$

7. Carefully check that (L_{trm}) or (L_{tam}) does not exceed 60% of the cable tensile strength*. If they exceed the 60% figure, either stopping time or stopping distance has to be increased. Repeat steps 1- 7.

8. Calculate the brake operating pressure. See Table 1

$$P_{br} = .113 [L_{tr} R_s], \text{ PSI}; \text{ Pressure removed prior to braking}$$

$$P_{ba} = .113 [L_{ta} R_s], \text{ PSI}; \text{ Pressure still applied when braking}$$

9. If pressure is removed prior to braking, check to see if brake can hold the load if application is either vertical or inclined.

The brake can hold the load if:

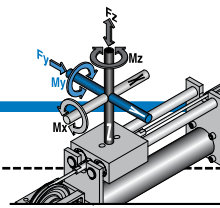
$$.369 L_{tr} \geq W_e$$

*Refer to Cable Specifications in the double-acting cable cylinder section of this catalog for cable tensile strengths.

Table 1

| | A_t ; in ² | R_s ; in. | A_c ; in ² |
|------|-------------------------|-------------|-------------------------|
| CC07 | 2.30 | | |
| CC10 | 2.30 | | |
| CC15 | 2.30 | 1.531 | 1.767 |
| CC20 | 11.96 | 2.00 | 3.142 |
| CC25 | 11.96 | 2.00 | 4.909 |
| CC30 | 16.20 | 2.50 | 7.069 |
| CC40 | 16.20 | 2.50 | 12.566 |
| CC52 | 16.20 | 2.50 | 3.142 |
| CC50 | 27.05 | | |

Application Data Worksheet



STROKE LENGTH _____

inch (S I K) millimeters
(U.S. Standard) (Metric)

AVAILABLE AIR PRESSURE _____

PSI bar
(U.S. Standard) (Metric)

REQUIRED THRUST FORCE _____

lbf N
(U.S. Standard) (Metric)

LOAD _____

lb kg
(U.S. Standard) (Metric)

LOAD CENTER OF GRAVITY DISTANCE TO CARRIER CENTER

inch millimeters
(U.S. Standard) (Metric)

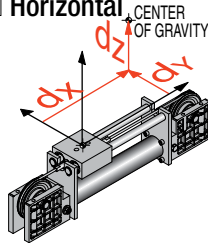
d_x _____

d_y _____

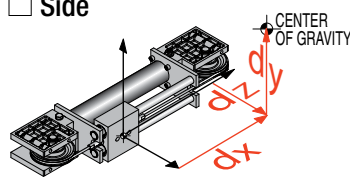
d_z _____

ORIENTATION

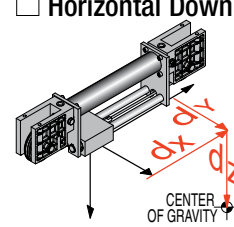
Horizontal



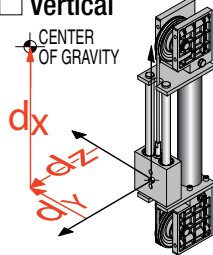
Side



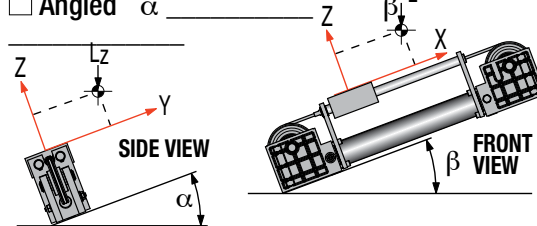
Horizontal Down



Vertical



Angled α _____



FORCES APPLIED TO CARRIER

lbf N
(U.S. Standard) (Metric)

F_z _____

F_y _____

BENDING MOMENTS APPLIED TO CARRIER

in-lbs N-m
(U.S. Standard) (Metric)

M_x _____

M_y _____

M_z _____

FINAL VELOCITY _____

in/sec mm/sec
(U.S. Standard) (Metric)

MOVE TIME sec. _____

NO. OF CYCLES _____

per minute per hour

OTHER ISSUES: (i.e. _____
Environment, _____
Temperature, _____
Contamination, etc.) _____

Contact information: _____

Fax (1-763-478-8080) or call Tolomatic (1-800-328-2174) with the above information. We will provide any assistance needed to determine the proper actuator.

TC: Track Cable Cylinder Selection Guidelines - All Sizes

PROVIDING LOAD GUIDANCE AND SUPPORT

1 COMPILE APPLICATION REQUIREMENTS

To determine the appropriate Track Cable Cylinder for an application, compile the following information:

- Available pressure (PSI)
- Weight of load (lbs. or kgs.)
- Orientation of load (Vertical, Horizontal, Incline or Remote)
- Velocity of load (in./sec. or mm/sec.)
- Stroke length (in. or mm)

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 KEEP UNDER MAXIMUM STROKE LENGTH

There are specific maximum stroke lengths for each model.
 TC05: 67.00"
 TC07: 78.00"
 TC10: 78.00"
 TC15: 282.59"

4 DETERMINE NATURE OF LOAD AND THE EFFECT OF BENDING MOMENTS

If the actuator will guide and support a load located directly over the center of carrier, bending moments will not be a factor in the actuator selection. Track Cable Cylinders perform best that way. See the Bending Moments Formulae below if your application requires the load to be away from center of the carrier.

5 DETERMINE THE BEARING ROD LOAD CAPACITY

Determine whether the Load Weight and Stroke Length will be within the load capacity for the bearing rods.

Cross reference the load weight and stroke on the Load Weight vs. Stroke chart for the selected bore size. (Page cc_20, cc_21) If the intersection falls within the curve, the cylinder will accommodate the application requirements. If the intersection falls outside the curve, consult the chart of a larger bore size that will accommodate the required load weight and stroke for your application.

The weight on the bearing rods causes them to bend or deflect slightly over their length. This deflection is increased for longer rods and/or higher weights on the bearing block. For proper operation, rod deflection must not exceed .30 of an inch.

6 DETERMINE INTERNAL CUSHION CAPACITY

- Consult the Cushion Data chart (Cushion Data for Track Cable Cylinders page cc_7 to cc_11) for the model selected. The velocities listed on the cushion charts are final or cushion impact velocities. On applications where internal cushions 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.

BENDING MOMENTS

Loading Equation Data

| MODEL | BORE SIZE | A (in.) | D (in.) | F (lbs.) | G (lbs.) |
|-------|-----------|---------|---------|----------|----------|
| TC05 | 1/2" | 1.09 | 1.0 | 14.00 | - |
| TC07 | 3/4" | 1.09 | 1.0 | 14.00 | - |
| TC10 | 1" | 1.09 | 1.0 | 14.00 | - |
| TC15 | 1-1/2" | 1.68 | 2.31 | 90.00 | - |

Loading Equation Key

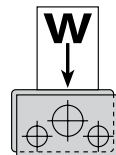
- A = Distance between shaft centers.
- B = Distance from load center to center of nearest shaft (in.); determined by application.

- L = Load per shaft (lbs.).
- W = Payload weight (lbs.).
- D = Axial distance between center of bearings (in.).

- F = Max. bearing sliding load (linear bearings) (lbs.)
- G = Max. bearing sliding load (sintered bronze bearings) (lbs.)

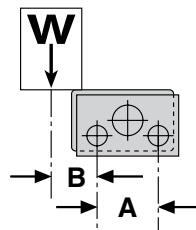
“L” MOMENT

$$L = \frac{W}{2}$$



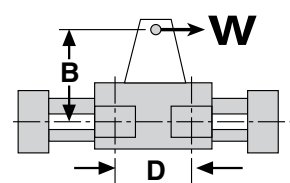
“M_x” MOMENT

$$L = \frac{WB}{A}$$



“M_y” / “M_z” MOMENT

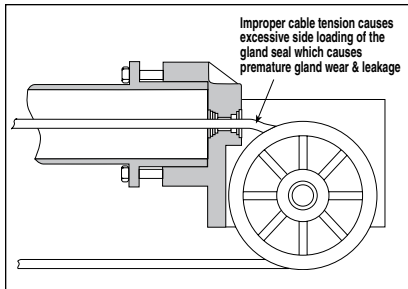
$$F \text{ or } G = 2L = \frac{WB}{D}$$



CC Cable Cylinder Application Guidelines - All Sizes

1 PROOF-LOADING AND PRETENSIONING CABLES

Once installed, but before putting in service, the cables on the cylinder should be proof-loaded and pretensioned to ensure that they are rigid for the maximum service life of the cylinder.



Proof-loading and pretensioning involve removing the two types of stretch in the cable by adjusting the clevis terminal lock nuts.

- Proof-loading – When cables are manufactured, individual wires and strands are laid in position but left slightly loose. When subjected to proof-loading the wires align themselves, tighten and constructional stretch in the cable is eliminated.
- Pretensioning— Elastic stretch in cable is inherent in the wire itself. It is removed when subjected to pretensioning.

There are two ways to proof-load and pretension a cylinder's cables — The Torque Method or The Field Method. These two methods are explained at right. Either method may be used.

All cables should be checked periodically from a preventative maintenance standpoint. When installing new cable assemblies proof-load and pretension using these same methods.

THE TORQUE METHOD

1. Tighten the clevis terminal lock nuts equally with a torque wrench to the values listed under Proof-loading torque in the Proof-loading, Pretensioning table below.
2. Let tightened nuts sit for 30 seconds.
3. Loosen the lock nuts to remove tension (but tight enough to eliminate any slack).
4. Re-torque clevis terminal lock nuts equally with a torque wrench to the total pre-tensioning figures listed in the table below.

| CC Model | Proof-loading Torque | | Pretensioning Torque | | Starting Torque of Nuts on Terminals | | Total Pretensioning Torque | |
|----------|----------------------|-------|----------------------|-------|--------------------------------------|------|----------------------------|-------|
| | in.-lbs. | N-m | in.-lbs. | N-m | in.-lbs. | N-m | in.-lbs. | N-m |
| CC05 | 15 | 1.69 | 2.5 | 0.28 | 10 | 1.13 | 12.5 | 1.41 |
| CC07 | 15 | 1.69 | 2.5 | 0.28 | 10 | 1.13 | 12.5 | 1.41 |
| CC10 | 15 | 1.69 | 2.5 | 0.28 | 10 | 1.13 | 12.5 | 1.41 |
| CC15 | 45 | 5.08 | 8.0 | 0.90 | 20 | 2.26 | 28.8 | 3.25 |
| CC20 | 115 | 12.99 | 46.0 | 5.20 | 25 | 2.82 | 71.0 | 8.02 |
| CC25 | 115 | 12.99 | 73.0 | 8.25 | 25 | 2.82 | 98.0 | 11.07 |
| CC30 | 210 | 23.73 | 105.0 | 11.86 | 25 | 2.82 | 130.0 | 14.69 |
| CC40 | 210 | 23.73 | 187.5 | 21.19 | 25 | 2.82 | 212.5 | 24.01 |
| CC50 | 325 | 36.72 | 180.0 | 20.34 | 30 | 3.39 | 210.0 | 23.73 |
| CC52 | 210 | 23.73 | 115.0 | 12.99 | 25 | 2.82 | 140.0 | 15.82 |

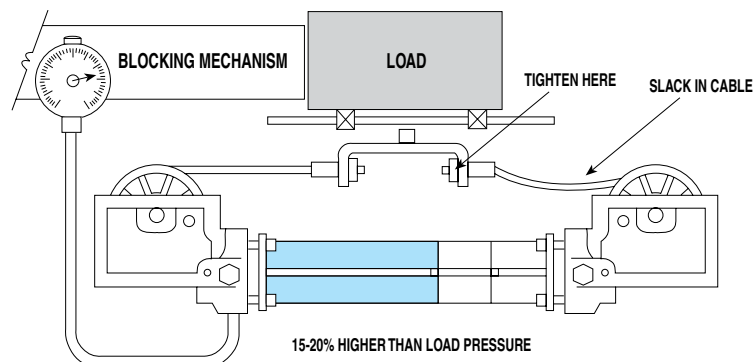
THE FIELD METHOD

The Field Method simplifies Proof-loading and Pretensioning the cable cylinder by combining the two processes.

1. Block the load some distance from the end of stroke to keep the piston from bottoming.
2. Apply a pressure that is 15% to 20% higher than the actual load pressure.

NOTE: Load pressure is defined as the pressure required to move the load. When the load is stopped externally, before the piston bottoms, the relief valve or regulator setting becomes the load pressure.

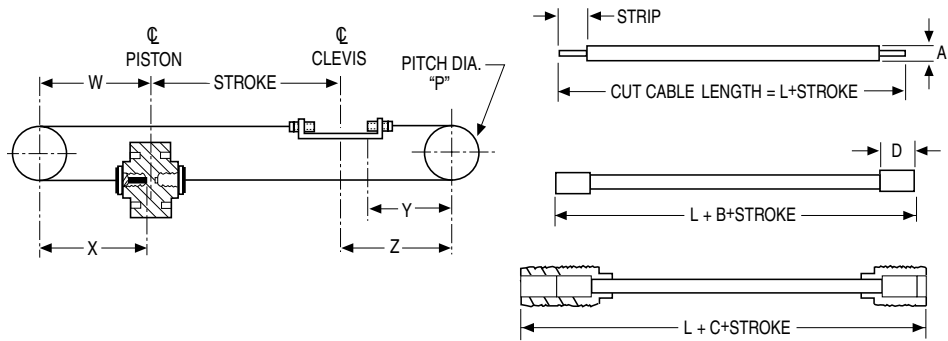
3. Upon pressurizing, one cable will become tight while the other will become slack. Manually adjust out the slack with a wrench on the clevis terminal lock nut.
4. Release the pressure, block the load on the other side and repeat steps 1 through 3. When these steps are done, turn down the regulator pressure to the normal operating pressure and remove the block.



CC Cable Cylinder Application Guidelines - All Sizes

2 DETERMINING SPECIAL CABLE LENGTHS

When an application requires a specialized cable length, use the dimensional table and illustrations to determine the proper cable length.



| MODEL | P | | W | | X | | Y | | Z | | STRIP | | A | | B | | C | | D | | L(std) + Stroke | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|------|-------|-----|-------|------|-------|------|-------|------|-----------------|-------|
| | in. | mm. | in. | mm. | in. | mm. | in. | mm. | in. | mm. | in. | mm. | in. | mm. | in. | mm. | in. | mm. | in. | mm. | in. | mm. |
| CC05 | 1.500 | 38.1 | 1.687 | 42.8 | 1.350 | 34.3 | 1.406 | 35.7 | 1.687 | 42.8 | 0.328 | 8.3 | 0.093 | 2.4 | 0.234 | 5.9 | 0.375 | 9.5 | 0.437 | 11.1 | 4.68 | 118.9 |
| CC07 | 1.500 | 38.1 | 1.687 | 42.8 | 1.350 | 34.3 | 1.406 | 35.7 | 1.687 | 42.8 | 0.328 | 8.3 | 0.093 | 2.4 | 0.234 | 5.9 | 0.375 | 9.5 | 0.437 | 11.1 | 4.68 | 118.9 |
| CC10 | 1.500 | 38.1 | 1.687 | 42.8 | 1.350 | 34.3 | 1.406 | 35.7 | 1.687 | 42.8 | 0.328 | 8.3 | 0.093 | 2.4 | 0.234 | 5.9 | 0.375 | 9.5 | 0.437 | 11.1 | 4.68 | 118.9 |
| CC15 | 3.250 | 82.6 | 4.452 | 113.1 | 4.325 | 109.9 | 3.725 | 94.6 | 4.452 | 113.1 | 0.468 | 11.9 | 0.187 | 4.7 | 0.343 | 8.7 | 0.420 | 10.7 | 0.828 | 21.0 | 12.50 | 317.5 |
| CC20 | 4.250 | 108.0 | 5.125 | 130.2 | 4.688 | 119.1 | 3.426 | 87.0 | 5.125 | 130.2 | 0.620 | 15.7 | 0.250 | 6.4 | 0.641 | 16.3 | 0.540 | 13.7 | 1.060 | 26.9 | 14.25 | 362.0 |
| CC25 | 4.250 | 108.0 | 5.125 | 130.2 | 4.688 | 119.1 | 3.426 | 87.0 | 5.125 | 130.2 | 0.620 | 15.7 | 0.250 | 6.4 | 0.641 | 16.3 | 0.540 | 13.7 | 1.060 | 26.9 | 14.25 | 362.0 |
| CC30 | 5.312 | 134.9 | 5.687 | 144.4 | 5.000 | 127.0 | 3.601 | 91.5 | 5.687 | 144.4 | 0.844 | 21.4 | 0.312 | 7.9 | 0.500 | 12.7 | 0.195 | 5.0 | 1.100 | 27.9 | 17.00 | 431.8 |
| CC40 | 5.312 | 134.9 | 6.187 | 157.1 | 5.000 | 127.0 | 4.315 | 109.6 | 6.187 | 157.1 | 0.844 | 21.4 | 0.312 | 7.9 | 0.500 | 12.7 | 0.195 | 5.0 | 1.100 | 27.9 | 17.50 | 444.5 |
| *CC50 | 6.000 | 152.4 | 9.370 | 238.0 | 8.630 | 219.2 | 7.820 | 198.6 | 9.370 | 238.0 | *1.300 | 33.0 | 0.375 | 9.5 | 1.000 | 25.4 | 0.500 | 12.7 | 1.930 | 49.0 | *25.05 | 636.3 |
| CC52 | 5.312 | 134.9 | 5.702 | 144.8 | 5.000 | 127.0 | 3.850 | 97.8 | 5.702 | 144.8 | 0.844 | 21.4 | 0.312 | 7.9 | 0.500 | 12.7 | 0.195 | 5.0 | 1.100 | 27.9 | 17.00 | 431.8 |

*For CC50, Orders shipped prior to Oct. 31, 2017 are STRIP 1.180 in [30.0 mm] and L(std) 24.55 in [623.6 mm]

3 LUBRICATION GUIDELINES

All Tolomatic cable cylinders require internal lubrication unless specified. To ensure maximum cylinder 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

External lubrication should be utilized for maximum service life of pneumatic cable cylinders.

Lubrication must be maintained in a constant supply or the results will be a dry cylinder prone to premature wear.

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.

We recommend a **non-detergent, 20cP @ 140°F** 10-weight lubricant. Optimum conditions for standard cylinder operation are **+32° to +125°F (+0° to 51.6°C)**.

• 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.

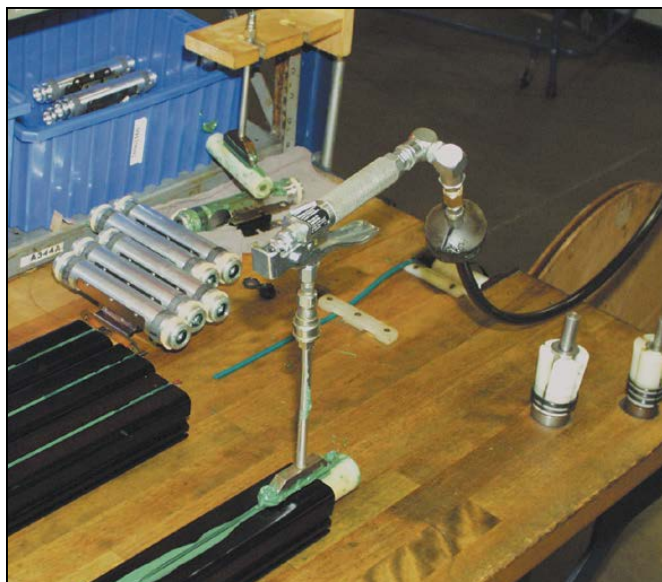
Application Guidelines

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).

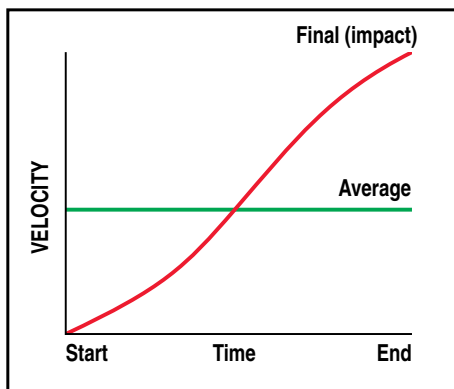
NOTE: Use of external lubricators may wash away the factory installed lubrication. External lubricants must be maintained in a constant supply or the results will be a dry actuator prone to premature wear.

• 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.

CC, SA, DP, TC Service Parts Ordering - ALL Sizes

CABLE ASSEMBLIES¹ AND REPAIR KITS² PART NUMBERS

Find the appropriate part number for the specific model and specify that part number with your stroke length when ordering.

| MODEL | CABLE ASSY. | REPAIR KITS |
|-----------|-------------|-------------|
| CC05 | CACC05 | RKCC05 |
| TC05 | CATC05 | RKTC05 |
| CCM05 | CACCM05 | RKCCM05 |
| TCM05 | CATCM05 | RKTCM05 |
| CC07 | CACC07 | RKCC07 |
| SA07 | CASA07 | RKSA07 |
| TC07 | CATC07 | RKTC07 |
| CCM07 | CACCM07 | RKCCM07 |
| SAM07 | CASAM07 | RKSAM07 |
| TCM07 | CATCM07 | RKTCM07 |
| CC10 | CACC10 | RKCC10 |
| SA10 | CASA10 | RKSA10 |
| TC10 | CATC10 | RKTC10 |
| CCM10 | CACCM10 | RKCCM10 |
| SAM10 | CASAM10 | RKSAM10 |
| TCM10 | CATCM10 | RKTCM10 |
| CC15 | CACC15 | RKCC15 |
| DP15 | CADP15 | RKDP15 |
| SA15 | CASA15 | RKSA15 |
| TC15 | CATC15 | RKTC15 |
| CCM15 | CACCM15 | RKCCM15 |
| DPM15 | CADPM15 | RKDPM15 |
| SAM15 | CASAM15 | RKSAM15 |
| TCM15 | CATCM15 | RKTCM15 |
| CC20 | CACC20 | RKCC20 |
| DP20 | CADP20 | RKDP20 |
| SA20 | CASA20 | RKSA20 |
| CCM20 | CACCM20 | RKCCM20 |
| DPM20 | CADPM20 | RKDPM20 |
| SAM20 | CASAM20 | RKSAM20 |
| CC25 | CACC25 | RKCC25 |
| DP25 | CADP25 | RKDP25 |
| SA25 | CASA25 | RKSA25 |
| CCM25 | CACCM25 | RKCCM25 |
| DPM25 | CADPM25 | RKDPM25 |
| SAM25 | CASAM25 | RKSAM25 |
| CC52 | CACC52 | RKCC52 |
| DP52 | CADP52 | RKDP52 |
| SA52 | CASA52 | RKSA52 |
| CCM52 | CACCM52 | RKCCM52 |
| DPM52 | CADPM52 | RKDPM52 |
| SAM52 | CASAM52 | RKSAM52 |
| CC30 | CACC30 | RKCC30 |
| DP30 | CADP30 | RKDP30 |
| SA30 | CASA30 | RKSA30 |
| CCM30 | CACCM30 | RKCCM30 |
| DPM30 | CADPM30 | RKDPM30 |
| SAM30 | CASAM30 | RKSAM30 |
| CC40 | CACC40 | RKCC40 |
| DP40 | CADP40 | RKDP40 |
| SA40 | CASA40 | RKSA40 |
| CCM40 | CACCM40 | RKCCM40 |
| DPM40 | CADPM40 | RKDPM40 |
| SAM40 | CASAM40 | RKSAM40 |
| CC50(ALL) | CACC50 | RKCC50 |
| SA50(ALL) | CASA50 | RKSA50 |

CONFIGURATED REPAIR KIT² ORDERING EXAMPLE:

| OPTION | MODEL, BORE | STROKE |
|--------|-------------|--------|
| RK | CCVM07 | SK42.5 |

Where **RK** is the Repair Kit code, **CCVM** is the Cable Cylinder Code with seals of Viton[®] material, 07 is the .75" bore and **SK 42.5** indicates a stroke length of 42.5 inches.



Service Parts Ordering NOTES:

- 1 Cable Assemblies contain: one Cable Assembly (specify stroke).
- 2 Repair Kits contain: two Cable Assemblies (specify stroke) and all wearable seals required to rebuild the cylinder.

SWITCH ORDERING

| 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 |

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



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)

Example: SWCCM15RT

(Hardware and Form A Reed switch with 5 meter lead for 1.5" bore cable cylinder)

Cable Cylinder Ordering - CC, SA, DP, TC - All Sizes

| MODEL, BORE, STROKE | | | | | | | | | | OPTIONS | | | | | | | | | | | | | | | | |
|---------------------|----|---|--|---|----|----|-----|---|-----|---------|---|---|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CC | CC | V | | M | 15 | SK | 125 | . | 250 | END #1 | H | J | END #2 | H | G | R | T | 2 | X | A | . | . | X | B | . | . |

MODEL

CC Double Acting Cable Cylinder
SA Single Acting Cable Cylinder
DP Double Purchase Cable Cylinder
TC Track Cable Cylinder

SEALS

V Seals of Viton® material

TUBING

S Steel Tube
✗ Not available for 05, 07 or 50 size
✗ Switches cannot be used with steel tubing

SWITCH MAGNET

M Internally Mounted Magnet
📄 Required for use with switches
📄 Magnet will increase dead length of CC, SA & DP actuator (see page CC_29)

BORE SIZE

| | |
|------------------------|----------------------------------|
| 05 0.50" (16mm) | 25 2.50" (63mm) |
| 07 0.75" (19mm) | 30 3.00" (76mm) |
| 10 1.00" (25mm) | 40 4.00" (100mm) |
| 12 1.25" (32mm) | 50 5.00" (127mm) |
| 15 1.50" (40mm) | 52 2.00" [500 PSI] (50mm) |
| 20 2.00" (50mm) | |

STROKE LENGTH

SK... Enter desired stroke length in decimal inches

📄 NOTE: Strokes over 281" (7137mm) require Tube Couplers. Consult Tolomatic for lead time. Max. stroke length varies by model and bore size, see dimensions page for specification.

HEAD OPTIONS (CC_22 & CC_25)

Single-ported heads are standard on all cylinders.
 Enter head options for [END #1, right end] and/or [END #2, left end] of the cylinder

- – standard single port head
- ^{1,3}**HG** 3-ported head
 - H1** 1" auto tensioner assembly
 - ³**HJ** 1" auto tensioner assembly with 3-ported head
 - HK** 2" auto tensioner assembly
 - ³**HL** 2" auto tensioner assembly with 3-ported head
 - ²**HM** caliper disc brake assembly
 - ^{2,3}**HN** caliper disc brake assembly with 3-ported head

¹Only head option available for single-acting cylinders
²Autotensioner assembly required on one end of the cylinder
³Cushions are removed on all 3-ported heads

SWITCHES (CC_28)

| | TYPE | QUICK-DISCONNECT | CODE | QUANTITY | LEAD LENGTH |
|-------|--------|------------------|-----------|-----------------------------------|-------------|
| REED | Form A | QD | RM | After code enter quantity desired | 5 meters |
| | | no | RT | | |
| | Form C | QD | BM | | |
| | | no | BT | | |
| TRIAC | QD | CM | | | |
| | no | CT | | | |

EXTRA CABLE

XA for extra beyond standard in inches
XB for extra beyond standard in inches

📄 Not all codes listed are compatible with all options. Contact Tolomatic with any questions.