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## Series XFC

Extreme Force Electric Cylinder



ENGINEERING YOUR SUCCESS.

# XFC Extreme Force Electric Cylinders



## Introducing the XFC Series: Roller Screw Driven Cylinders

Parker is pleased to introduce a new family of high thrust electric cylinders featuring roller screw drive technology. The XFC Series further extends the feature rich and force dense offering of Parker's electric cylinder products.

The XFC Electric Cylinder is designed to provide machine builders a high force electro-mechanical solution: offering long life, minimal maintenance, low operating costs, and structural rigidity. All this, in addition to Parker's world class customer service and industry leading delivery times.

As a worldwide leader in fluid power cylinder products, Parker has combined the best of both worlds into one unique product. All the benefits of electromechanical control and cleanliness combined with the structural rigidity and durability of a traditional hydraulic tie rod cylinder.

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## Flexibility & Versatile Programmability

In applications where high loads are required, roller screws offer a very attractive solution:

- **Servo motors and controls feature simplified programming**
- **Electromechanical control systems provide infinite programmability**
- **Performance advantages not easily obtained by comparable fluid power technology include multiple move profiles, adjustable acceleration and deceleration, force control, and absolute positioning capabilities**

These features allow the system to easily adapt to changing application conditions and performance requirements with minimal modification.

## Design Considerations

### Installation

Due to the reduced number of components required for a complete system, the commissioning time required for operation is significantly reduced relative to comparable fluid power systems. This allows system builders to quickly install, troubleshoot, and test system capabilities faster and more reliably than other alternatives.

Additionally machine break-down and set-up can be accomplished with relative ease and without concern of hydraulic fluid spillage.

### Environmental Considerations

With electromechanical system technology, fluid leaks, filter changes, and air bleeding are a

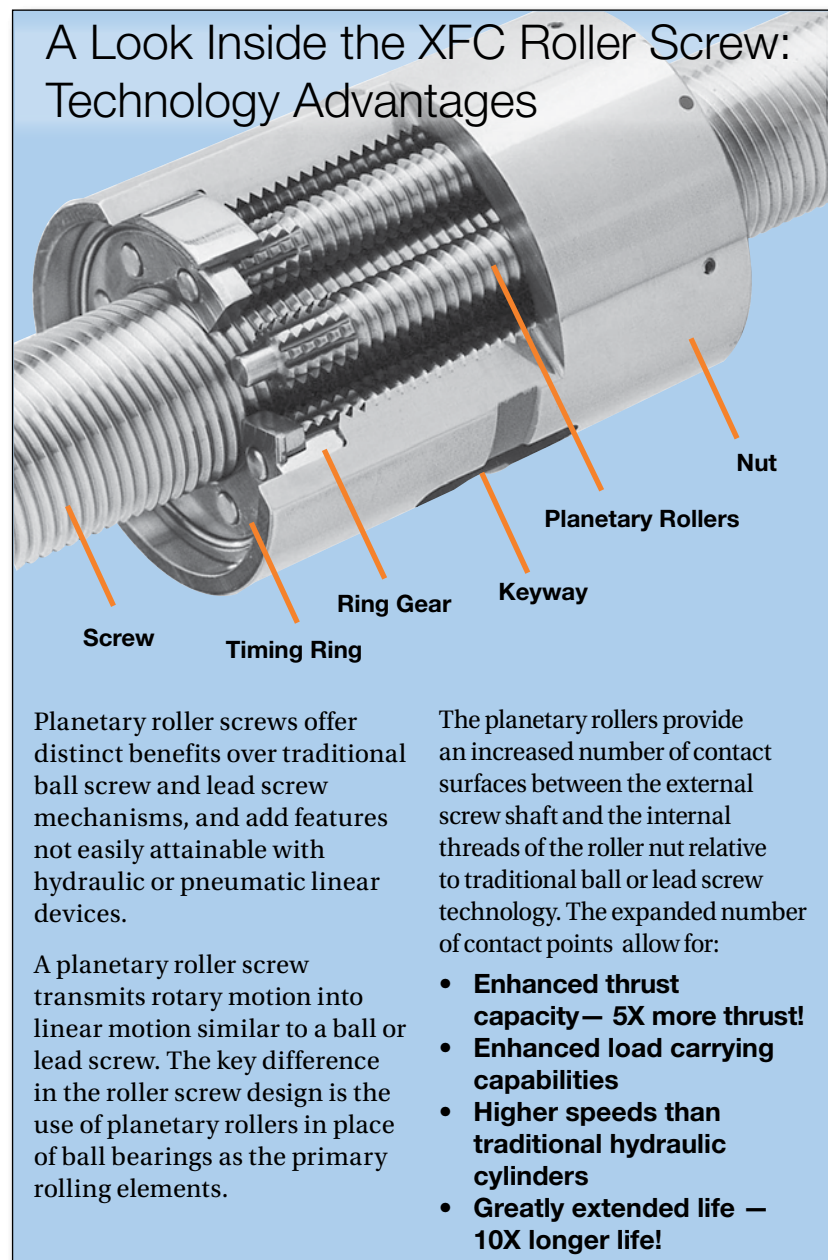
thing of the past. Simply mount the cylinder, plug in the cables, download a program and you are up and running in record time.

### Anti-Rotation

Anti-rotation can now be achieved in XFC actuators thanks to a new design that incorporates a keying feature on the internal surface of the tubular body. This option can be configured through our standard part number structure.

### Maintenance

Roller screw cylinder systems require little or no maintenance when compared to their fluid power alternatives, while still delivering long life and high performance. Series XFC cylinders are designed to be low maintenance with the factory installed full synthetic lubrication. For high duty cycle applications (>50%), oil filled cylinders are available with ports for recirculation as required.

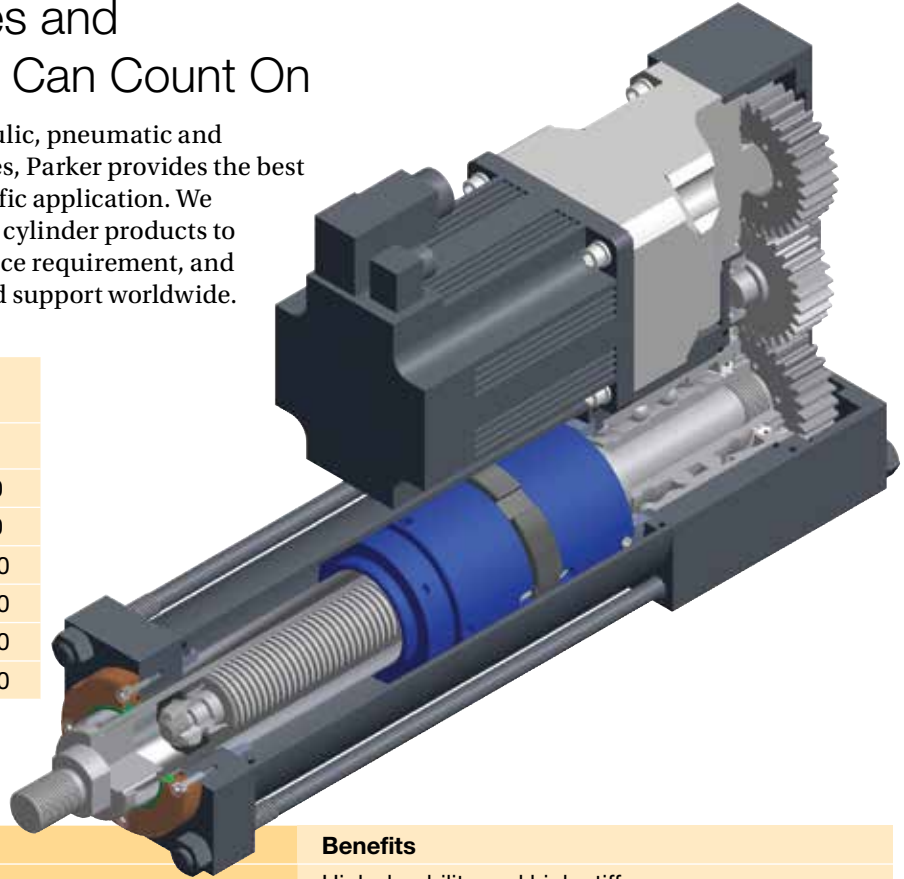


# XFC Design Features/Benefits

## Parker Capabilities and Performance You Can Count On

As an industry leader in hydraulic, pneumatic and electromechanical technologies, Parker provides the best solutions tailored to your specific application. We have an unmatched offering of cylinder products to match virtually any performance requirement, and complimentary full service and support worldwide.

| XFC Frame Size | Continuous Thrust Force |        |
|----------------|-------------------------|--------|
|                | kN                      | lb     |
| 075            | 20.0                    | 4,500  |
| 090            | 33.4                    | 7,500  |
| 115            | 53.4                    | 12,000 |
| 140            | 80.0                    | 17,500 |
| 165            | 120.0                   | 26,500 |
| 190            | 178.0                   | 40,000 |



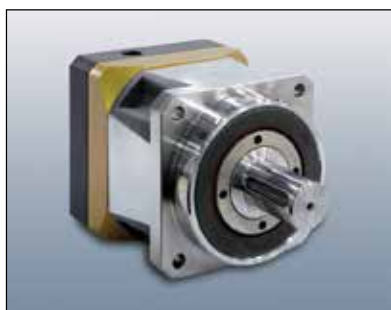
| Features                                                                    | Benefits                                                                                        |
|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| All steel construction                                                      | High durability and high stiffness                                                              |
| Elastomeric seals throughout                                                | Completely sealed (no gaskets used)                                                             |
| Standard metric hydraulic type tie rod construction                         | Structural rigidity                                                                             |
| Opposed preloaded angular contact bearings                                  | Bi-directional force capabilities                                                               |
| Roller screw drive system                                                   | Increased load, life, and shock loading capabilities compared to traditional ball screw designs |
| Inline and parallel gear drive configurations                               | Full transfer of thrust force                                                                   |
| Speeds up to 40 in/sec                                                      | Cycle time reduction                                                                            |
| Continuous thrust ratings up to 178 kN (40,000 lbs)                         | Hydraulic replacement capabilities                                                              |
| Parker Stealth family advanced planetary gearheads direct mount to cylinder | Standard reduction options from 3:1 to 10:1; ratios up to 100:1 available                       |
| Parker MPP Series brushless servo motors standard                           | Complete Parker system solution cylinder, gearhead, motor, drive and controls                   |
| Rod wiper and seal based on proven TS2000 design and composite rod bearing  | Designed to survive rugged environments with minimal maintenance for the life of the cylinder   |

# High Performance Components Make the Ultimate Cylinder System



XFC extreme force cylinders feature heavy duty components designed specifically for industrial applications. Preferred products to accompany the XFC for long, reliable service include:

## Planetary Gearheads



Parker Generation II Stealth Series provides higher radial load, increased service life and easier mounting than comparably

sized planetary gearheads. The Stealth Generation II Helical Planetary Gearheads incorporate design enhancements to provide superior performance for the most demanding high-performance applications. Generation II models are available in 60 to 142 mm and NEMA 23 to 42 frame sizes.

## Brushless Servo Motors

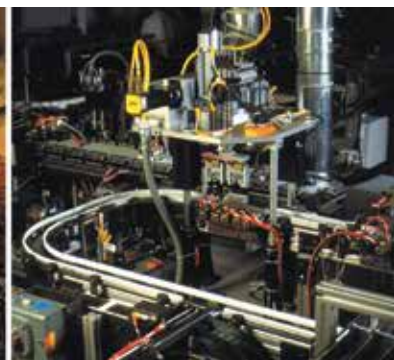


MaxPlusPlus (MPP) family of brushless servo motors is redefining performance, flexibility, and reliability. The industry's highest-performing servo motor uses eight pole segmented lamination technology, which produces more torque in a shorter package. Use MaxPlusPlus motors for higher torque applications, customized options, or when high performance is required.

## Servo Drives & Controllers



With its high performance and modular design, the Compax3 family of industrial servo drives and drive/controllers offers a new level of servo performance and flexibility. Available in single- or multi-axis configurations, with numerous expansion options, all models are rated for 120-480 VAC input, continuous current output from 2.5 A (rms) to 155 A (rms), and are CE (EMC & LVD) and UL compliant.



# XFC Product Overview

## Performance

| XFC Frame Size                                                          |                        | 075     | 090      | 115      | 140      | 165      | 190      |
|-------------------------------------------------------------------------|------------------------|---------|----------|----------|----------|----------|----------|
| Continuous Thrust                                                       | kN                     | 20      | 34       | 54       | 80       | 120      | 178      |
|                                                                         | (lbs)                  | (4,500) | (7,500)  | (12,000) | (17,500) | (26,500) | (40,000) |
| Maximum Thrust                                                          | kN                     | 40      | 68       | 108      | 160      | 240      | 356      |
|                                                                         | (lbs)                  | (9,000) | (15,000) | (24,000) | (35,000) | (53,000) | (80,000) |
| Maximum Acceleration                                                    | mm/sec <sup>2</sup>    | 19,600  | 19,600   | 19,600   | 19,600   | 19,600   | 19,600   |
|                                                                         | (in/sec <sup>2</sup> ) | (773)   | (773)    | (773)    | (773)    | (773)    | (773)    |
| Maximum Stroke <sup>1)</sup>                                            | mm                     | 1150    | 1700     | 2,000    | 2,000    | 2,000    | 2,000    |
|                                                                         | (in)                   | (55.12) | (66.93)  | (78.75)  | (78.75)  | (78.75)  | (78.75)  |
| Recommended Maximum Stroke Length of Unsupported Cylinder <sup>2)</sup> |                        | mm      | 750      | 750      | 1,000    | 1,000    | 1,250    |
|                                                                         |                        | (in)    | (29.53)  | (29.53)  | (39.37)  | (39.37)  | (49.21)  |

1) Consult factory for non-standard stroke lengths

2) Secondary support required for longer stroke lengths (consult factory)

## System Characteristics

| XFC Frame Size |      | 075     | 090     | 115     | 140     | 165     | 190     |
|----------------|------|---------|---------|---------|---------|---------|---------|
| Accuracy       | mm   | 0.08    | 0.08    | 0.08    | 0.08    | 0.13    | 0.13    |
|                | (in) | (0.003) | (0.003) | (0.003) | (0.003) | (0.005) | (0.005) |
| Repeatability  | mm   | 0.03    | 0.03    | 0.03    | 0.03    | 0.05    | 0.05    |
|                | (in) | (0.001) | (0.001) | (0.001) | (0.001) | (0.002) | (0.002) |
| Backlash       | mm   | 0.03    | 0.03    | 0.03    | 0.03    | 0.03    | 0.03    |
|                | (in) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |

## Screw Characteristics

| XFC Size | Screw Diameter mm | Standard Lead <sup>1)</sup> mm (in)/rev | Efficiency % | Ca Rating kN (lbf) | Thrust Tube Torque | Max. Speed <sup>2)</sup> mm/sec (in/sec) |
|----------|-------------------|-----------------------------------------|--------------|--------------------|--------------------|------------------------------------------|
|          |                   |                                         |              |                    | mN-m/N (lb-in/lbf) |                                          |
| 075      | 21                | 5 (0.197)                               | 88.78        | 40.4 (9,082)       | 0.889 (0.035)      | 508 (20.0)                               |
|          |                   | 10 (0.394)                              | 91.17        | 44.6 (10,026)      | 1.752 (0.069)      | 1016 (40.0)                              |
| 090      | 30                | 5 (0.197)                               | 87.05        | 73.6 (16,546)      | 0.914 (0.036)      | 356 (14.0)                               |
|          |                   | 10 (0.394)                              | 90.38        | 74.4 (16,726)      | 1.752 (0.069)      | 712 (28.0)                               |
| 115      | 39                | 5 (0.197)                               | 85.18        | 103.4 (23,245)     | 0.939 (0.037)      | 274 (10.8)                               |
|          |                   | 10 (0.394)                              | 89.37        | 116.5 (26,190)     | 1.778 (0.070)      | 548 (21.6)                               |
| 140      | 48                | 5 (0.197)                               | 82.50        | 158.5 (35,632)     | 0.965 (0.038)      | 222 (8.7)                                |
|          |                   | 10 (0.394)                              | 88.34        | 171.2 (38,487)     | 1.803 (0.071)      | 444 (17.4)                               |
| 165      | 60                | 10 (0.394)                              | 87.05        | 238.6 (53,639)     | 1.829 (0.072)      | 356 (14.0)                               |
|          |                   | 20 (0.787)                              | 90.38        | 238.6 (53,639)     | 3.531 (0.139)      | 712 (28.0)                               |
| 190      | 75                | 10 (0.394)                              | 85.45        | 356.5 (80,144)     | 1.854 (0.073)      | 284 (11.2)                               |
|          |                   | 20 (0.787)                              | 90.97        | 356.5 (80,144)     | 3.658 (0.144)      | 568 (22.4)                               |

1) Consult factory for availability of non-standard leads

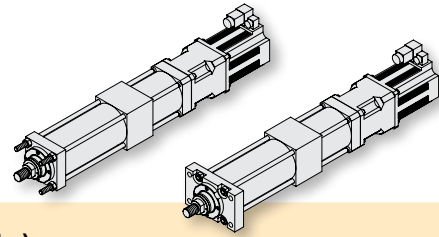
2) Speed is stroke dependant, see page 9 for speed/stroke chart

## Cylinder Temperature Rating\*

|                    |                             |
|--------------------|-----------------------------|
| Standard seals     | -23 to 73°C (-10 to 165°F)  |
| Fluorocarbon seals | -23 to 110°C (-10 to 230°F) |

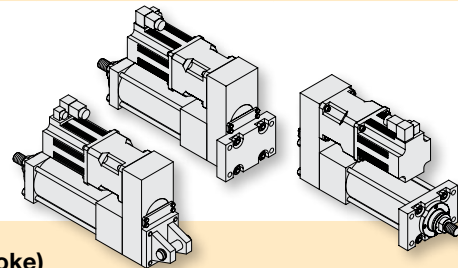
\* Verify motor and gear box performance at higher temperatures.

# Cylinder Weight — kg (lb)



## Inline Configurations

| XFC<br>Frame<br>Size | Base Weight with Mount (at Zero Stroke) |             |               |                       | Weight<br>(Per 100 mm<br>Stroke) |
|----------------------|-----------------------------------------|-------------|---------------|-----------------------|----------------------------------|
|                      | J<br>Front Flange                       | C<br>Foot   | D<br>Trunnion | K<br>Extended Tie Rod |                                  |
| 075                  | 9.1 (20)                                | 9.1 (20)    | 9.5 (21)      | 8.6 (19)              | 1.41 (3.1)                       |
| 090                  | 14.5 (32)                               | 14.1 (31)   | 14.5 (32)     | 14.1 (31)             | 1.93 (4.3)                       |
| 115                  | 27.7 (61)                               | 27.7 (61)   | 28.1 (62)     | 26.8 (59)             | 3.08 (6.8)                       |
| 140                  | 48.1 (106)                              | 47.6 (105)  | 49.4 (109)    | 46.7 (103)            | 4.53 (10.0)                      |
| 165                  | 103.4 (182)                             | 102.1 (180) | 104.3 (185)   | 100.2 (175)           | 7.17 (15.8)                      |
| 190                  | 132.9 (293)                             | 131.5 (290) | 134.3 (296)   | 127.0 (280)           | 9.48 (20.9)                      |



## Parallel Configurations

| XFC<br>Frame<br>Size | Base Weight with Mount (at Zero Stroke) |             |               |                                |                  |                  | Weight<br>(Per 100 mm<br>Stroke) |
|----------------------|-----------------------------------------|-------------|---------------|--------------------------------|------------------|------------------|----------------------------------|
|                      | J<br>Front Flange                       | C<br>Foot   | D<br>Trunnion | K, L, M<br>Extended Tie<br>Rod | H<br>Rear Flange | B<br>Rear Clevis |                                  |
| 075                  | 11.3 (25)                               | 10.9 (24)   | 11.3 (25)     | 10.9 (24)                      | 11.3 (25)        | 11.3 (25)        | 1.41 (3.1)                       |
| 090                  | 17.7 (39)                               | 17.2 (38)   | 17.7 (39)     | 17.2 (38)                      | 18.1 (40)        | 18.6 (41)        | 1.93 (4.3)                       |
| 115                  | 34.0 (75)                               | 34.0 (75)   | 34.9 (77)     | 33.1 (73)                      | 35.4 (78)        | 35.4 (78)        | 3.08 (6.8)                       |
| 140                  | 59.4 (131)                              | 58.5 (129)  | 60.3 (133)    | 57.6 (127)                     | 61.7 (136)       | 62.1 (137)       | 4.53 (10.0)                      |
| 165                  | 103.4 (228)                             | 102.1 (225) | 104.3 (230)   | 100.2 (221)                    | 107.0 (236)      | 110.7 (244)      | 7.17 (15.8)                      |
| 190                  | 163.7 (361)                             | 162.4 (358) | 170.6 (376)   | 158.8 (350)                    | 171.5 (378)      | 171.9 (379)      | 9.48 (20.9)                      |

Note: All weights above assume oil filled lubrication

# Cylinder Inertia

Inertia matching of the cylinder assembly to the motor will improve the performance of the mechanical system. The inertia ratio of the cylinder and load to the motor should be less than 10:1. A general rule for screw driven systems is 5:1.

$$I_{\text{Total}} = I_{\text{GearHead}} + \frac{(I_{\text{XFC}} + I_{\text{Mass}})}{(\text{GearHeadRatio})^2}$$

$$I_{\text{Mass}} = \text{Mass}_{\text{Load}} (\text{kg}) \left( \frac{\text{Lead (mm)}}{3141.6} \right)^3$$

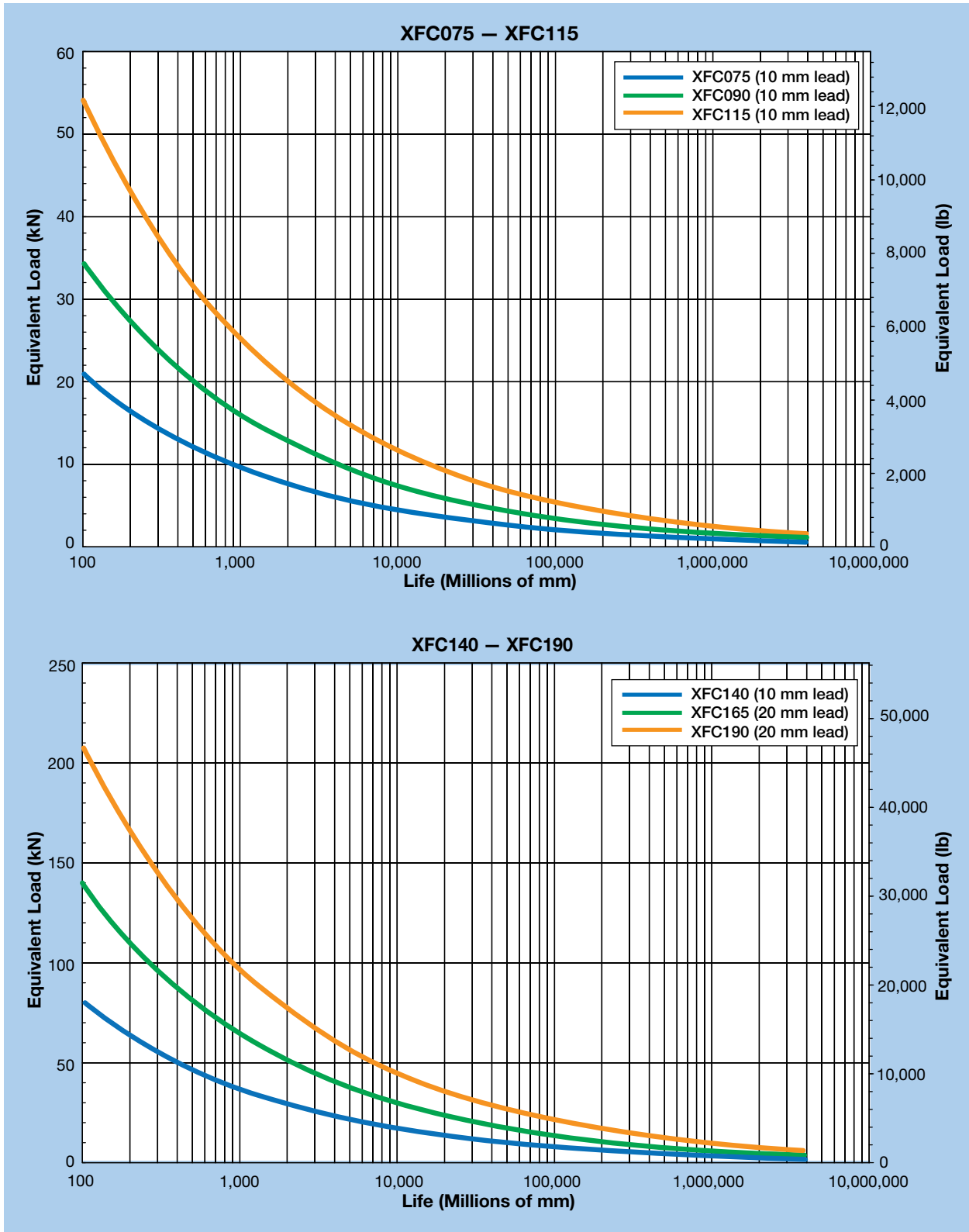
For PS Series gearhead inertia information, see:  
[www.parkermotion.com](http://www.parkermotion.com)

## XFC Inertia I (kg-m²)

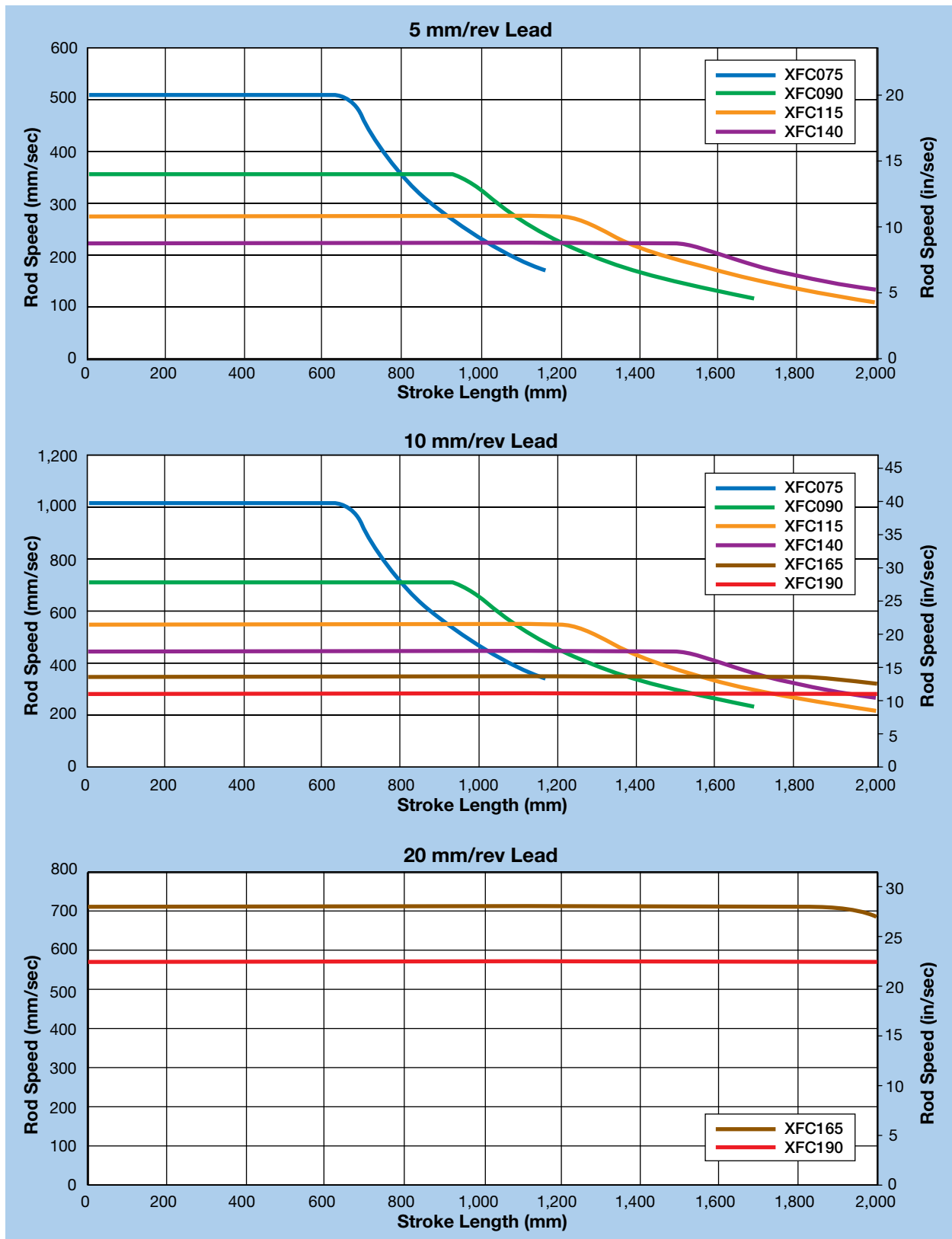
| XFC<br>Size | Inline<br>(Zero Stroke) | Parallel<br>(Zero Stroke) | Stroke<br>(Per 100 mm) |
|-------------|-------------------------|---------------------------|------------------------|
| 075         | 0.00008903              | 0.00037951                | 0.00001499             |
| 090         | 0.00031974              | 0.00089394                | 0.00006242             |
| 115         | 0.00107620              | 0.00349671                | 0.00017800             |
| 140         | 0.00229637              | 0.00923002                | 0.00040900             |
| 165         | 0.00655544              | 0.02428162                | 0.00099900             |
| 190         | 0.02702120              | 0.05552601                | 0.00244000             |

# XFC Product Overview

## Life Charts



# Maximum Speed Charts



# XFC Product Overview

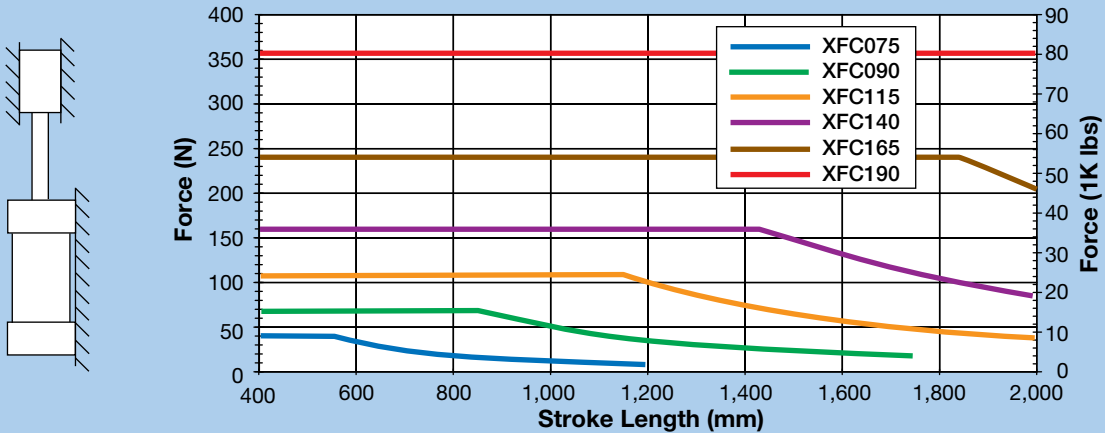
## Buckling Strength Charts

The buckling strength of the cylinder is the maximum compressive load able to be exerted through the cylinder. These values are a

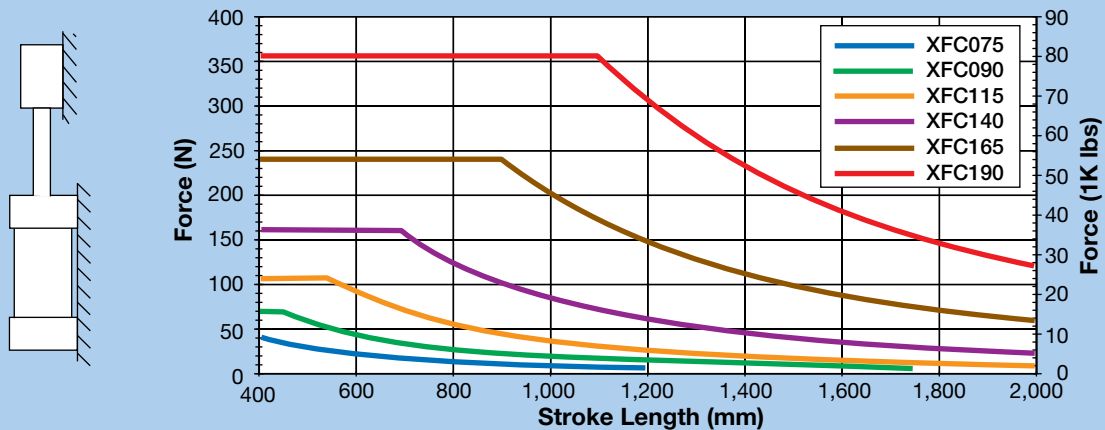
function of the screw and thrust tube size and do not account for specific motor or gearbox performance. The force value from the specific mounting

class and length of stroke should not be exceeded to ensure safe mechanical performance. Tension loads are not subject to buckling strength restrictions.

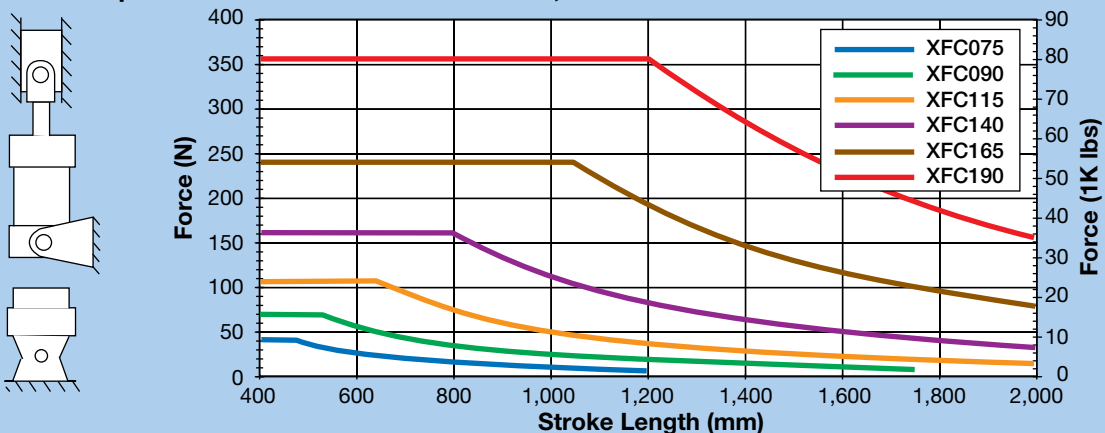
**Maximum Compressive Force – Fixed Mount, Guided**



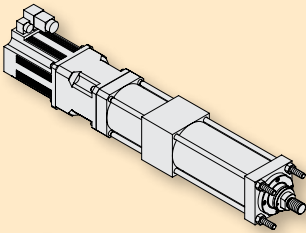
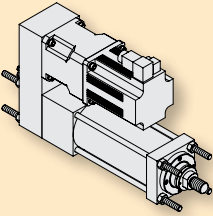
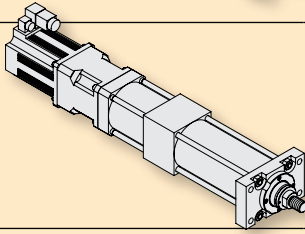
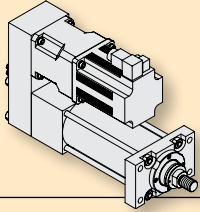
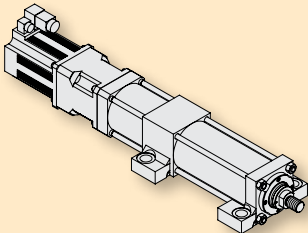
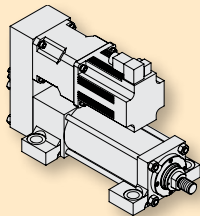
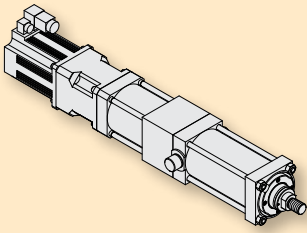
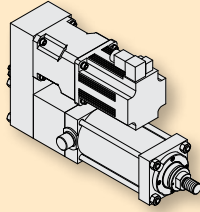
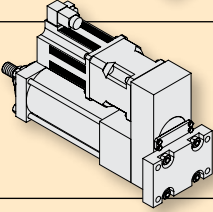
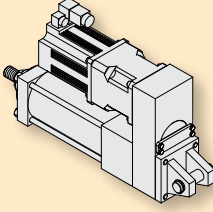
**Maximum Compressive Force – Fixed Mount, Not Guided**



**Maximum Compressive Force – Rear Pivot Mount, Guided**



## Available Mounts

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Inline                                                                               | Parallel                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <p><b>K, L, M Extended Tie Rod Mount</b></p> <p>Cylinders with Extended Tie Rods are suitable for straight line force applications, and are particularly useful where space is limited.</p> <p><b>K</b> Front Mount (inline and parallel)<br/> <b>L</b> Rear Mount (parallel only)<br/> <b>M</b> Both Front &amp; Rear Mount (parallel only)</p>                                                                                                                                           |    |    |
| <p><b>J Integral Front Flange Mount</b></p> <p>These cylinders are suitable for use on straight line force transfer applications.</p> <p><b>J</b> Front Flange Mount (inline and parallel)</p>                                                                                                                                                                                                                                                                                             |    |    |
| <p><b>Foot Mount</b></p> <p>Foot mounted cylinders do not absorb forces along their center line. As a result, the application of force by the cylinder produces a moment which attempts to rotate the cylinder about its mounting bolts. It is therefore very important that the cylinder be firmly secured to the mounting surface and the load should be rigidly guided to avoid side loads being applied to the cylinder bearings.</p> <p><b>C</b> Foot Mount (inline and parallel)</p> |   |   |
| <p><b>T Rear Trunnion Mount</b></p> <p>Trunnion mounting is used for rotary or arc-line motion and offer flexibility when designing applications that are not confined to linear movements. Consult factory to review specific applications for stroke and configuration.</p> <p><b>T</b> Rear Trunnion Mount (inline and parallel)</p>                                                                                                                                                    |  |  |
| <p><b>H Rear Flange Mount</b></p> <p>These cylinders are suitable for use on straight line force transfer applications.</p> <p><b>H</b> Rear Flange Mount (parallel only)</p>                                                                                                                                                                                                                                                                                                              |                                                                                      |  |
| <p><b>B Rear Clevis Mount</b></p> <p>Cylinders with pivot mountings, which absorb forces on their center lines, should be used where the machine member to be moved travels in a curved path. Pivot mountings may be used in tension (pull) or compression (push) applications. Cylinders using a fixed clevis may be used if the curved path of the thrust tube travels in a single plane.</p> <p><b>B</b> Rear Clevis Mount (parallel only)</p>                                          |                                                                                      |  |

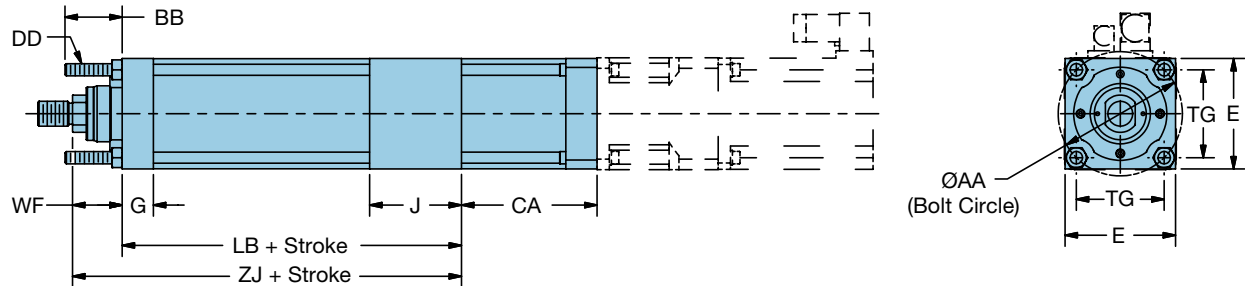
# XFC Mount Options

## Extended Tie Rod Mount — Inline

Order  
Code



### K Front Extended Tie Rods



### Dimensions — mm (in)

| XFC<br>Size | Ø<br>AA       | BB           | DD       | E               | G            | J             | TG               | WF           | Add Stroke      |                 |
|-------------|---------------|--------------|----------|-----------------|--------------|---------------|------------------|--------------|-----------------|-----------------|
|             |               |              |          |                 |              |               |                  |              | LB              | ZJ              |
| 075         | 83<br>(3.27)  | 30<br>(1.18) | M8x1     | 76.2<br>(3.00)  | 22<br>(0.87) | 62<br>(2.44)  | 58.69<br>(2.31)  | 38<br>(1.50) | 205.5<br>(8.09) | 243.5<br>(9.59) |
| 090         | 100<br>(3.94) | 35<br>(1.38) | M10x1.5  | 88.9<br>(3.50)  | 25<br>(0.98) | 74<br>(2.91)  | 70.71<br>(2.78)  | 40<br>(1.57) | 248<br>(9.76)   | 288<br>(11.34)  |
| 115         | 127<br>(5.00) | 40<br>(1.57) | M12x1.25 | 114.3<br>(4.50) | 30<br>(1.18) | 91<br>(3.58)  | 89.80<br>(3.54)  | 45<br>(1.77) | 293<br>(11.54)  | 338<br>(13.31)  |
| 140         | 155<br>(6.10) | 50<br>(1.97) | M16x1.5  | 139.7<br>(5.50) | 35<br>(1.38) | 108<br>(4.25) | 109.60<br>(4.32) | 45<br>(1.77) | 348<br>(13.70)  | 393<br>(15.47)  |
| 165         | 185<br>(7.28) | 60<br>(2.36) | M22x1.5  | 165.1<br>(6.50) | 40<br>(1.57) | 123<br>(4.84) | 130.81<br>(5.15) | 60<br>(2.36) | 417<br>(16.42)  | 477<br>(18.78)  |
| 190         | 215<br>(8.46) | 75<br>(2.95) | M22x1.5  | 190.5<br>(7.50) | 50<br>(1.97) | 152<br>(5.98) | 152.03<br>(5.99) | 62<br>(2.44) | 503<br>(19.80)  | 565<br>(22.24)  |

### Motor/Gearhead

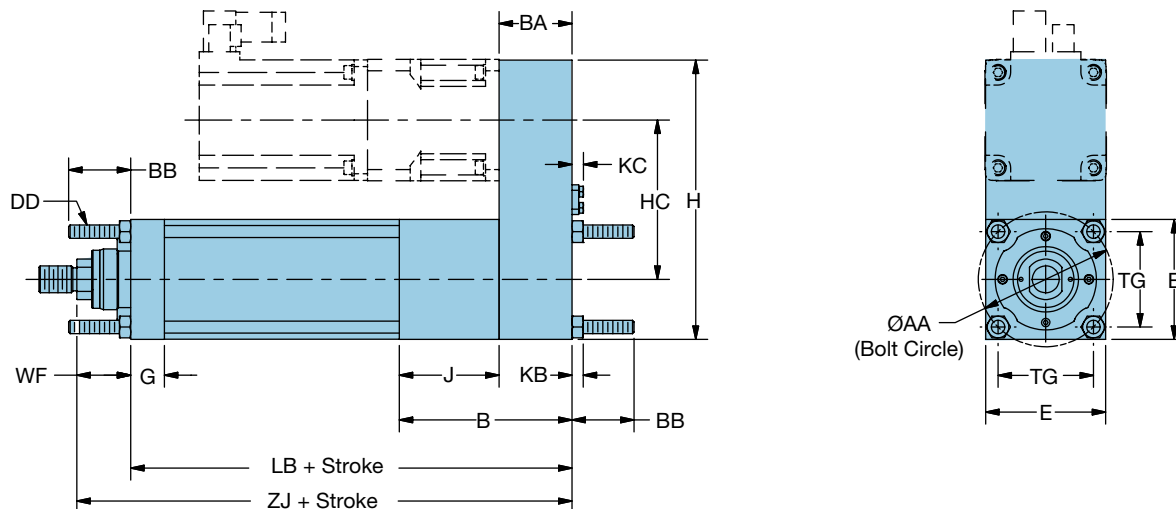
| XFC<br>Size | Dimension CA |            |            |            |       |            |            |            |            |
|-------------|--------------|------------|------------|------------|-------|------------|------------|------------|------------|
|             | PS090        | PS115      | PS142      | PS180      | PS220 | MPP115     | MPP142     | MPP190     | MPP270     |
| 075         | 113 (4.45)   | 115 (4.53) | —          | —          | —     | 98 (3.86)  | 109 (4.29) | —          | —          |
| 090         | 115 (4.53)   | 117 (4.61) | —          | —          | —     | 100 (3.94) | 111 (4.37) | —          | —          |
| 115         | —            | 130 (5.12) | 158 (6.22) | —          | —     | —          | 113 (4.45) | 136 (5.35) | —          |
| 140         | —            | —          | 161 (6.34) | 190 (7.48) | —     | —          | —          | 139 (5.47) | —          |
| 165         | —            | —          | 164 (6.46) | 193 (7.60) | —     | —          | —          | —          | 183 (7.20) |
| 190         | —            | —          | —          | 194 (7.64) | —     | —          | —          | —          | 214 (8.43) |

# Parallel Extended Tie Rod Mount — Parallel

Order  
Code



- K** Front Extended Tie Rods
- L** Rear Extended Tie Rods
- M** Both Front & Rear Extended Tie Rods



## Dimensions — mm (in)

| XFC Size | Ø AA       | B          | BA         | BB        | DD       | E            | G         | H             |
|----------|------------|------------|------------|-----------|----------|--------------|-----------|---------------|
| 075      | 83 (3.27)  | 106 (4.17) | 44 (1.73)  | 30 (1.18) | M8x1     | 76.2 (3.00)  | 22 (0.87) | 174.2 (6.86)  |
| 090      | 100 (3.94) | 128 (5.04) | 54 (2.13)  | 35 (1.38) | M10x1.5  | 88.9 (3.50)  | 25 (0.98) | 206.9 (8.15)  |
| 115      | 127 (5.00) | 154 (6.06) | 63 (2.48)  | 40 (1.57) | M12x1.25 | 114.3 (4.50) | 30 (1.18) | 271 (10.67)   |
| 140      | 155 (6.10) | 180 (7.09) | 72 (2.83)  | 50 (1.97) | M16x1.5  | 139.7 (5.50) | 35 (1.38) | 332.2 (13.08) |
| 165      | 185 (7.28) | 211 (8.31) | 88 (3.46)  | 60 (2.36) | M22x1.5  | 165.1 (6.50) | 40 (1.57) | 379.1 (14.93) |
| 190      | 215 (8.46) | 252 (9.92) | 100 (3.94) | 75 (2.95) | M22x1.5  | 190.5 (7.50) | 50 (1.97) | 455.5 (17.93) |

| XFC Size | HC           | J          | KB         | KC           | TG            | WF        | Add Stroke   |               |
|----------|--------------|------------|------------|--------------|---------------|-----------|--------------|---------------|
|          |              |            |            |              |               |           | LB           | ZJ            |
| 075      | 98 (3.86)    | 62 (2.44)  | 6.5 (0.26) | 6.93 (0.27)  | 58.69 (2.31)  | 38 (1.50) | 249.5 (9.82) | 287.5 (11.32) |
| 090      | 118 (4.65)   | 74 (2.91)  | 8 (0.31)   | 8.65 (0.34)  | 70.71 (2.78)  | 40 (1.57) | 302 (11.89)  | 342 (13.46)   |
| 115      | 156 (6.14)   | 91 (3.58)  | 10 (0.39)  | 10.15 (0.40) | 89.80 (3.54)  | 45 (1.77) | 356 (14.02)  | 401 (15.79)   |
| 140      | 192.5 (7.58) | 108 (4.25) | 13 (0.51)  | 13.65 (0.54) | 109.60 (4.32) | 45 (1.77) | 420 (16.54)  | 465 (18.31)   |
| 165      | 224 (8.82)   | 123 (4.84) | 18 (0.71)  | 13.65 (0.54) | 130.81 (5.15) | 60 (2.36) | 505 (19.88)  | 565 (22.24)   |
| 190      | 265 (10.43)  | 152 (5.98) | 18 (0.71)  | 17.18 (0.68) | 152.03 (5.99) | 62 (2.44) | 603 (23.74)  | 665 (26.18)   |

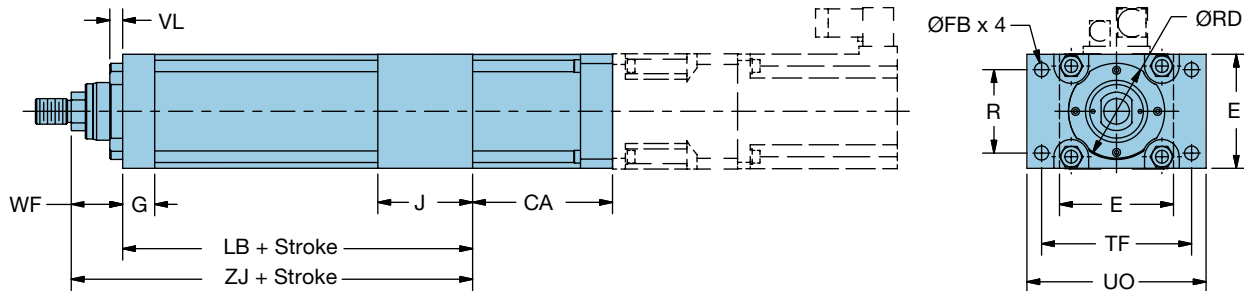
# XFC Mount Options

## Front Flange Mount — Inline

Order  
Code



**J**



### Dimensions — mm (in)

| XFC<br>Size | E               | Ø<br>FB      | G            | J             | R             | Ø<br>RD <sub>FB</sub> | TF            | UO              | VL           | WF           | Add Stroke      |                 |
|-------------|-----------------|--------------|--------------|---------------|---------------|-----------------------|---------------|-----------------|--------------|--------------|-----------------|-----------------|
|             |                 |              |              |               |               |                       |               |                 |              |              | LB              | ZJ              |
| <b>075</b>  | 76.2<br>(3.00)  | 9<br>(0.35)  | 22<br>(0.87) | 62<br>(2.44)  | 52<br>(2.05)  | 65<br>(2.559)         | 105<br>(4.13) | 125<br>(4.92)   | 10<br>(0.39) | 38<br>(1.50) | 205.5<br>(8.09) | 243.5<br>(9.59) |
| <b>090</b>  | 88.9<br>(3.50)  | 11<br>(0.43) | 25<br>(0.98) | 74<br>(2.91)  | 65<br>(2.56)  | 75<br>(2.953)         | 117<br>(4.61) | 139.7<br>(5.50) | 10<br>(0.39) | 40<br>(1.57) | 248<br>(9.76)   | 288<br>(11.34)  |
| <b>115</b>  | 114.3<br>(4.50) | 14<br>(0.55) | 30<br>(1.18) | 91<br>(3.58)  | 83<br>(3.27)  | 95<br>(3.740)         | 149<br>(5.87) | 175<br>(6.89)   | 12<br>(0.47) | 45<br>(1.77) | 293<br>(11.54)  | 338<br>(13.31)  |
| <b>140</b>  | 139.7<br>(5.50) | 18<br>(0.71) | 35<br>(1.38) | 108<br>(4.25) | 107<br>(4.21) | 110<br>(4.331)        | 172<br>(6.77) | 210<br>(8.27)   | 12<br>(0.47) | 45<br>(1.77) | 348<br>(13.70)  | 393<br>(15.47)  |
| <b>165</b>  | 165.1<br>(6.50) | 21<br>(0.83) | 40<br>(1.57) | 123<br>(4.84) | 120<br>(4.72) | 135<br>(5.315)        | 215<br>(8.46) | 260<br>(10.24)  | 14<br>(0.55) | 60<br>(2.36) | 417<br>(16.42)  | 477<br>(18.78)  |
| <b>190</b>  | 190.5<br>(7.50) | 22<br>(0.87) | 50<br>(1.97) | 152<br>(5.98) | 155<br>(6.10) | 155<br>(5.315)        | 253<br>(9.96) | 300<br>(11.81)  | 16<br>(0.63) | 62<br>(2.44) | 503<br>(19.80)  | 565<br>(22.24)  |

### Motor/Gearhead

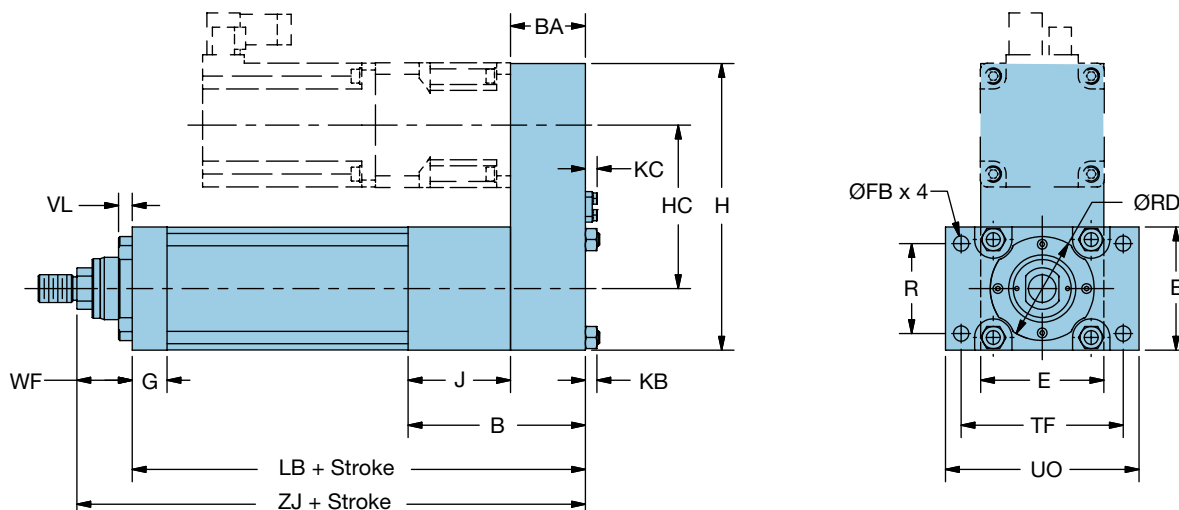
| XFC<br>Size | Dimension CA |            |            |            |       |            |            |            |            |
|-------------|--------------|------------|------------|------------|-------|------------|------------|------------|------------|
|             | PS090        | PS115      | PS142      | PS180      | PS220 | MPP115     | MPP142     | MPP190     | MPP270     |
| <b>075</b>  | 113 (4.45)   | 115 (4.53) | —          | —          | —     | 98 (3.86)  | 109 (4.29) | —          | —          |
| <b>090</b>  | 115 (4.53)   | 117 (4.61) | —          | —          | —     | 100 (3.94) | 111 (4.37) | —          | —          |
| <b>115</b>  | —            | 130 (5.12) | 158 (6.22) | —          | —     | —          | 113 (4.45) | 136 (5.35) | —          |
| <b>140</b>  | —            | —          | 161 (6.34) | 190 (7.48) | —     | —          | —          | 139 (5.47) | —          |
| <b>165</b>  | —            | —          | 164 (6.46) | 193 (7.60) | —     | —          | —          | —          | 183 (7.20) |
| <b>190</b>  | —            | —          | —          | 194 (7.64) | —     | —          | —          | —          | 214 (8.43) |

# Front Flange Mount — Parallel

Order  
Code



**J**



## Dimensions — mm (in)

| XFC Size | B          | BA         | E            | Ø FB      | G         | H             | HC           | J          | KB         |
|----------|------------|------------|--------------|-----------|-----------|---------------|--------------|------------|------------|
| 075      | 106 (4.17) | 44 (1.73)  | 76.2 (3.00)  | 9 (0.35)  | 22 (0.87) | 174.2 (6.86)  | 98 (3.86)    | 62 (2.44)  | 6.5 (0.26) |
| 090      | 128 (5.04) | 54 (2.13)  | 88.9 (3.50)  | 11 (0.43) | 25 (0.98) | 206.9 (8.15)  | 118 (4.65)   | 74 (2.91)  | 8 (0.31)   |
| 115      | 154 (6.06) | 63 (2.48)  | 114.3 (4.50) | 14 (0.55) | 30 (1.18) | 271 (10.67)   | 156 (6.14)   | 91 (3.58)  | 10 (0.39)  |
| 140      | 180 (7.09) | 72 (2.83)  | 139.7 (5.50) | 18 (0.71) | 35 (1.38) | 332.2 (13.08) | 192.5 (7.58) | 108 (4.25) | 13 (0.51)  |
| 165      | 211 (8.31) | 88 (3.46)  | 165.1 (6.50) | 21 (0.83) | 40 (1.57) | 379.1 (14.93) | 224 (8.82)   | 123 (4.84) | 18 (0.71)  |
| 190      | 252 (9.92) | 100 (3.94) | 190.5 (7.50) | 22 (0.87) | 50 (1.97) | 455.5 (17.93) | 265 (10.43)  | 152 (5.98) | 18 (0.71)  |

| XFC Size | Add Stroke   |            |                    |            |              |           |           |              |               |
|----------|--------------|------------|--------------------|------------|--------------|-----------|-----------|--------------|---------------|
|          | KC           | R          | Ø RD <sub>FB</sub> | TF         | UO           | VL        | WF        | LB           | ZJ            |
| 075      | 6.93 (0.27)  | 52 (2.05)  | 65 (2.559)         | 105 (4.13) | 125 (4.92)   | 10 (0.39) | 38 (1.50) | 249.5 (9.82) | 287.5 (11.32) |
| 090      | 8.65 (0.34)  | 65 (2.56)  | 75 (2.953)         | 117 (4.61) | 139.7 (5.50) | 10 (0.39) | 40 (1.57) | 302 (11.89)  | 342 (13.46)   |
| 115      | 10.15 (0.40) | 83 (3.27)  | 95 (3.740)         | 149 (5.87) | 175 (6.89)   | 12 (0.47) | 45 (1.77) | 356 (14.02)  | 401 (15.79)   |
| 140      | 13.65 (0.54) | 107 (4.21) | 110 (4.331)        | 172 (6.77) | 210 (8.27)   | 12 (0.47) | 45 (1.77) | 420 (16.54)  | 465 (18.31)   |
| 165      | 13.65 (0.54) | 120 (4.72) | 135 (5.315)        | 215 (8.46) | 260 (10.24)  | 14 (0.55) | 60 (2.36) | 505 (19.88)  | 565 (22.24)   |
| 190      | 17.18 (0.68) | 155 (6.10) | 155 (5.315)        | 253 (9.96) | 300 (11.81)  | 16 (0.63) | 62 (2.44) | 603 (23.74)  | 665 (26.18)   |

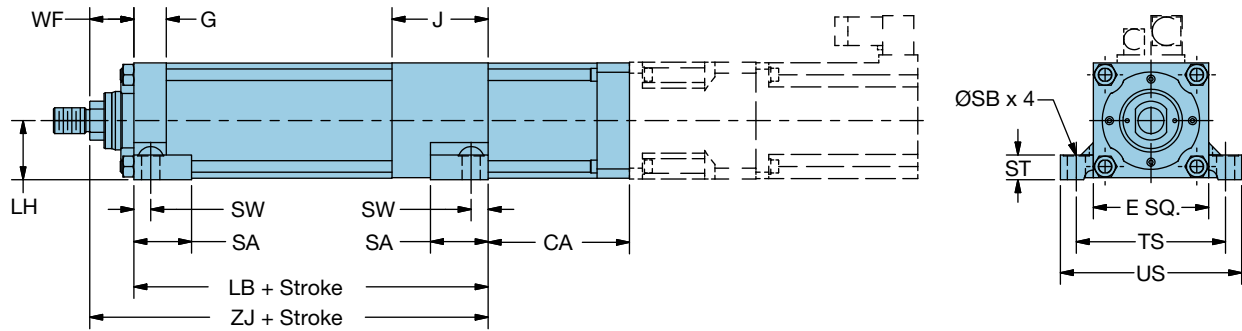
# XFC Mount Options

## Foot Mount — Inline

Order  
Code



**C**



Dimensions — mm (in)

| XFC<br>Size |                 |              |               |                   |                |              |                |              |                |                  | Add Stroke   |                 |                 |
|-------------|-----------------|--------------|---------------|-------------------|----------------|--------------|----------------|--------------|----------------|------------------|--------------|-----------------|-----------------|
|             | E               | G            | J             | LH <sub>h10</sub> | SA             | ØSB          | ST             | SW           | TS             | US               | WF           | LB              | ZJ              |
| <b>075</b>  | 76.2<br>(3.00)  | 22<br>(0.87) | 62<br>(2.44)  | 39<br>(1.535)     | 33.3<br>(1.31) | 11<br>(0.43) | 12.7<br>(0.50) | 11<br>(0.43) | 97<br>(3.82)   | 114.3<br>(4.50)  | 38<br>(1.50) | 205.5<br>(8.09) | 243.5<br>(9.59) |
| <b>090</b>  | 88.9<br>(3.50)  | 25<br>(0.98) | 74<br>(2.91)  | 45.5<br>(1.791)   | 44.5<br>(1.75) | 14<br>(0.55) | 19.1<br>(0.75) | 13<br>(0.51) | 115<br>(4.53)  | 139.7<br>(5.50)  | 40<br>(1.57) | 248<br>(9.76)   | 288<br>(11.34)  |
| <b>115</b>  | 114.3<br>(4.50) | 30<br>(1.18) | 91<br>(3.58)  | 58<br>(2.283)     | 57.2<br>(2.25) | 18<br>(0.71) | 25.4<br>(1.00) | 15<br>(0.59) | 155<br>(6.10)  | 184.2<br>(7.25)  | 45<br>(1.77) | 293<br>(11.54)  | 338<br>(13.31)  |
| <b>140</b>  | 139.7<br>(5.50) | 35<br>(1.38) | 108<br>(4.25) | 71<br>(2.795)     | 57.2<br>(2.25) | 18<br>(0.71) | 25.4<br>(1.00) | 18<br>(0.71) | 175<br>(6.89)  | 209.6<br>(8.25)  | 45<br>(1.77) | 348<br>(13.70)  | 393<br>(15.47)  |
| <b>165</b>  | 165.1<br>(6.50) | 40<br>(1.57) | 123<br>(4.84) | 83.5<br>(3.287)   | 73.0<br>(2.87) | 22<br>(0.87) | 31.8<br>(1.25) | 20<br>(0.79) | 210<br>(8.27)  | 254<br>(10.00)   | 60<br>(2.36) | 417<br>(16.42)  | 477<br>(18.78)  |
| <b>190</b>  | 190.5<br>(7.50) | 50<br>(1.97) | 152<br>(5.98) | 96.5<br>(3.799)   | 92.1<br>(3.63) | 26<br>(1.02) | 38.1<br>(1.50) | 25<br>(0.98) | 260<br>(10.24) | 304.8<br>(12.00) | 62<br>(2.44) | 503<br>(19.80)  | 565<br>(22.24)  |

### Motor/Gearhead

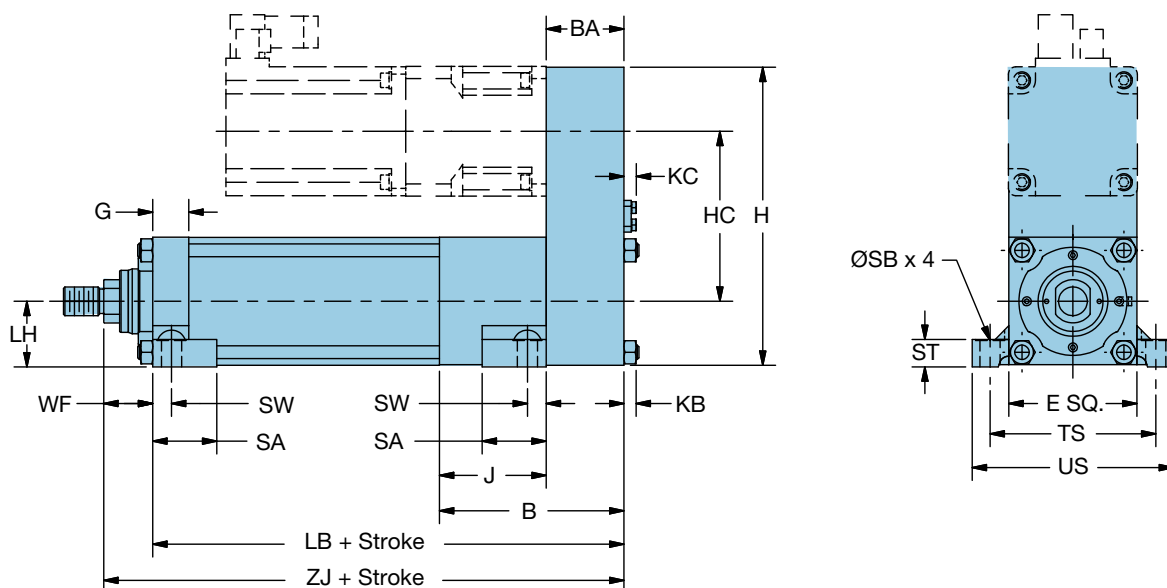
| XFC<br>Size | Dimension CA |            |            |            |       |            |            |            |            |
|-------------|--------------|------------|------------|------------|-------|------------|------------|------------|------------|
|             | PS090        | PS115      | PS142      | PS180      | PS220 | MPP115     | MPP142     | MPP190     | MPP270     |
| <b>075</b>  | 113 (4.45)   | 115 (4.53) | —          | —          | —     | 98 (3.86)  | 109 (4.29) | —          | —          |
| <b>090</b>  | 115 (4.53)   | 117 (4.61) | —          | —          | —     | 100 (3.94) | 111 (4.37) | —          | —          |
| <b>115</b>  | —            | 130 (5.12) | 158 (6.22) | —          | —     | —          | 113 (4.45) | 136 (5.35) | —          |
| <b>140</b>  | —            | —          | 161 (6.34) | 190 (7.48) | —     | —          | —          | 139 (5.47) | —          |
| <b>165</b>  | —            | —          | 164 (6.46) | 193 (7.60) | —     | —          | —          | —          | 183 (7.20) |
| <b>190</b>  | —            | —          | —          | 194 (7.64) | —     | —          | —          | —          | 214 (8.43) |

# Foot Mount — Parallel

Order  
Code



**C**



Dimensions — mm (in)

| XFC Size | B          | BA         | E            | G         | H             | HC           | J          | KB         | KC           |
|----------|------------|------------|--------------|-----------|---------------|--------------|------------|------------|--------------|
| 075      | 106 (4.17) | 44 (1.73)  | 76.2 (3.00)  | 22 (0.87) | 174.2 (6.86)  | 98 (3.86)    | 62 (2.44)  | 6.5 (0.26) | 6.93 (0.27)  |
| 090      | 128 (5.04) | 54 (2.13)  | 88.9 (3.50)  | 25 (0.98) | 206.9 (8.15)  | 118 (4.65)   | 74 (2.91)  | 8 (0.31)   | 8.65 (0.34)  |
| 115      | 154 (6.06) | 63 (2.48)  | 114.3 (4.50) | 30 (1.18) | 271 (10.67)   | 156 (6.14)   | 91 (3.58)  | 10 (0.39)  | 10.15 (0.40) |
| 140      | 180 (7.09) | 72 (2.83)  | 139.7 (5.50) | 35 (1.38) | 332.2 (13.08) | 192.5 (7.58) | 108 (4.25) | 13 (0.51)  | 13.65 (0.54) |
| 165      | 211 (8.31) | 88 (3.46)  | 165.1 (6.50) | 40 (1.57) | 379.1 (14.93) | 224 (8.82)   | 123 (4.84) | 18 (0.71)  | 13.65 (0.54) |
| 190      | 252 (9.92) | 100 (3.94) | 190.5 (7.50) | 50 (1.97) | 455.5 (17.93) | 265 (10.43)  | 152 (5.98) | 18 (0.71)  | 17.18 (0.68) |

| XFC Size | Add Stroke        |             |           |             |           |             |               |           |              |               |
|----------|-------------------|-------------|-----------|-------------|-----------|-------------|---------------|-----------|--------------|---------------|
|          | LH <sub>h10</sub> | SA          | ØSB       | ST          | SW        | TS          | US            | WF        | LB           | ZJ            |
| 075      | 39 (1.535)        | 33.3 (1.31) | 11 (0.43) | 12.7 (0.50) | 11 (0.43) | 97 (3.82)   | 114.3 (4.50)  | 38 (1.50) | 249.5 (9.82) | 287.5 (11.32) |
| 090      | 45.5 (1.791)      | 44.5 (1.75) | 14 (0.55) | 19.1 (0.75) | 13 (0.51) | 115 (4.53)  | 139.7 (5.50)  | 40 (1.57) | 302 (11.89)  | 342 (13.46)   |
| 115      | 58 (2.283)        | 57.2 (2.25) | 18 (0.71) | 25.4 (1.00) | 15 (0.59) | 155 (6.10)  | 184.2 (7.25)  | 45 (1.77) | 356 (14.02)  | 401 (15.79)   |
| 140      | 71 (2.795)        | 57.2 (2.25) | 18 (0.71) | 25.4 (1.00) | 18 (0.71) | 175 (6.89)  | 209.6 (8.25)  | 45 (1.77) | 420 (16.54)  | 465 (18.31)   |
| 165      | 83.5 (3.287)      | 73.0 (2.87) | 22 (0.87) | 31.8 (1.25) | 20 (0.79) | 210 (8.27)  | 254 (10.00)   | 60 (2.36) | 505 (19.88)  | 565 (22.24)   |
| 190      | 96.5 (3.799)      | 92.1 (3.63) | 26 (1.02) | 38.1 (1.50) | 25 (0.98) | 260 (10.24) | 304.8 (12.00) | 62 (2.44) | 603 (23.74)  | 665 (26.18)   |

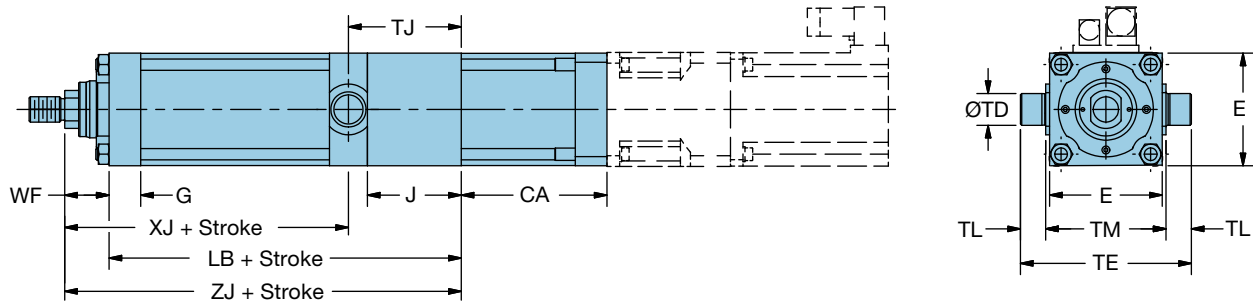
# XFC Mount Options

## Rear Trunnion Mount — Inline

Order  
Code



**T**



Dimensions — mm (in)

| XFC<br>Size | Add Stroke      |              |               |                |                       |              |                  |                 |              |                 |                |                 |
|-------------|-----------------|--------------|---------------|----------------|-----------------------|--------------|------------------|-----------------|--------------|-----------------|----------------|-----------------|
|             | E               | G            | J             | TJ             | Ø<br>TD <sub>fl</sub> | TL           | TE               | TM              | WF           | LB              | XJ             | ZJ              |
| <b>075</b>  | 76.2<br>(3.00)  | 22<br>(0.87) | 62<br>(2.44)  | 74.5<br>(2.93) | 20<br>(0.787)         | 16<br>(0.63) | 112<br>(4.41)    | 80<br>(3.15)    | 38<br>(1.50) | 205.5<br>(8.09) | 169<br>(6.65)  | 243.5<br>(9.59) |
| <b>090</b>  | 88.9<br>(3.50)  | 25<br>(0.98) | 74<br>(2.91)  | 89<br>(3.50)   | 25<br>(0.984)         | 20<br>(0.79) | 135<br>(5.32)    | 95<br>(3.74)    | 40<br>(1.57) | 248<br>(9.76)   | 199<br>(7.83)  | 288<br>(11.34)  |
| <b>115</b>  | 114.3<br>(4.50) | 30<br>(1.18) | 91<br>(3.58)  | 111<br>(4.37)  | 32<br>(1.260)         | 25<br>(0.98) | 170<br>(6.69)    | 120<br>(4.72)   | 45<br>(1.77) | 293<br>(11.54)  | 227<br>(8.94)  | 338<br>(13.31)  |
| <b>140</b>  | 139.7<br>(5.50) | 35<br>(1.38) | 108<br>(4.25) | 132<br>(5.20)  | 40<br>(1.575)         | 32<br>(1.26) | 209.4<br>(8.244) | 145.4<br>(5.72) | 45<br>(1.77) | 348<br>(13.70)  | 261<br>(10.28) | 393<br>(15.47)  |
| <b>165</b>  | 165.1<br>(6.50) | 40<br>(1.57) | 123<br>(4.84) | 152<br>(5.98)  | 50<br>(1.969)         | 40<br>(1.57) | 250<br>(9.84)    | 170<br>(6.69)   | 60<br>(2.36) | 417<br>(16.42)  | 325<br>(12.80) | 477<br>(18.78)  |
| <b>190</b>  | 190.5<br>(7.50) | 50<br>(1.97) | 152<br>(5.98) | 188<br>(7.40)  | 63<br>(2.480)         | 50<br>(1.97) | 295.4<br>(11.63) | 195.4<br>(7.69) | 62<br>(2.44) | 503<br>(19.80)  | 377<br>(14.84) | 565<br>(22.24)  |

### Motor/Gearhead

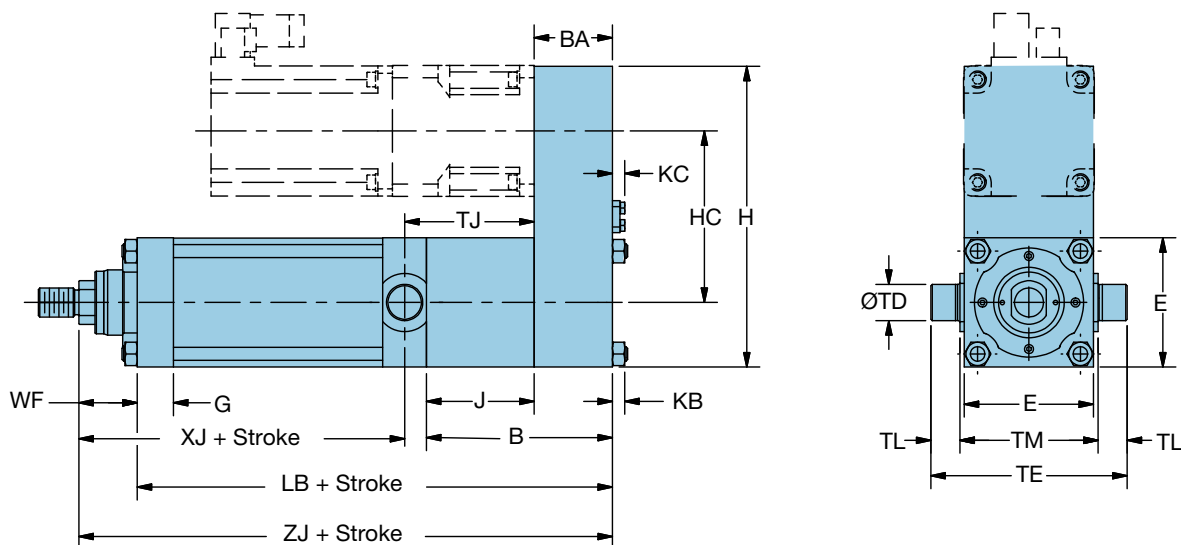
| XFC<br>Size | Dimension CA |            |            |            |       |            |            |            |            |
|-------------|--------------|------------|------------|------------|-------|------------|------------|------------|------------|
|             | PS090        | PS115      | PS142      | PS180      | PS220 | MPP115     | MPP142     | MPP190     | MPP270     |
| <b>075</b>  | 113 (4.45)   | 115 (4.53) | —          | —          | —     | 98 (3.86)  | 109 (4.29) | —          | —          |
| <b>090</b>  | 115 (4.53)   | 117 (4.61) | —          | —          | —     | 100 (3.94) | 111 (4.37) | —          | —          |
| <b>115</b>  | —            | 130 (5.12) | 158 (6.22) | —          | —     | —          | 113 (4.45) | 136 (5.35) | —          |
| <b>140</b>  | —            | —          | 161 (6.34) | 190 (7.48) | —     | —          | —          | 139 (5.47) | —          |
| <b>165</b>  | —            | —          | 164 (6.46) | 193 (7.60) | —     | —          | —          | —          | 183 (7.20) |
| <b>190</b>  | —            | —          | —          | 194 (7.64) | —     | —          | —          | —          | 214 (8.43) |

# Rear Trunnion Mount — Parallel

Order  
Code



**T**



**Dimensions — mm (in)**

| XFC Size | B          | BA         | E            | G         | H             | HC           | J          | KB         | KC           |
|----------|------------|------------|--------------|-----------|---------------|--------------|------------|------------|--------------|
| 075      | 106 (4.17) | 44 (1.73)  | 76.2 (3.00)  | 22 (0.87) | 174.2 (6.86)  | 98 (3.86)    | 62 (2.44)  | 6.5 (0.26) | 6.93 (0.27)  |
| 090      | 128 (5.04) | 54 (2.13)  | 88.9 (3.50)  | 25 (0.98) | 206.9 (8.15)  | 118 (4.65)   | 74 (2.91)  | 8 (0.31)   | 8.65 (0.34)  |
| 115      | 154 (6.06) | 63 (2.48)  | 114.3 (4.50) | 30 (1.18) | 271 (10.67)   | 156 (6.14)   | 91 (3.58)  | 10 (0.39)  | 10.15 (0.40) |
| 140      | 180 (7.09) | 72 (2.83)  | 139.7 (5.50) | 35 (1.38) | 332.2 (13.08) | 192.5 (7.58) | 108 (4.25) | 13 (0.51)  | 13.65 (0.54) |
| 165      | 211 (8.31) | 88 (3.46)  | 165.1 (6.50) | 40 (1.57) | 379.1 (14.93) | 224 (8.82)   | 123 (4.84) | 18 (0.71)  | 13.65 (0.54) |
| 190      | 252 (9.92) | 100 (3.94) | 190.5 (7.50) | 50 (1.97) | 455.5 (17.93) | 265 (10.43)  | 152 (5.98) | 18 (0.71)  | 17.18 (0.68) |

| XFC Size | TJ          | Ø TD <sub>fg</sub> | TL          | TE            | TM           | WF        | Add Stroke   |             |               |
|----------|-------------|--------------------|-------------|---------------|--------------|-----------|--------------|-------------|---------------|
|          |             |                    |             |               |              |           | LB           | XJ          | ZJ            |
| 075      | 74.5 (2.93) | 20 (0.787)         | 16 (0.63)   | 112 (4.41)    | 80 (3.15)    | 38 (1.50) | 249.5 (9.82) | 169 (6.65)  | 287.5 (11.32) |
| 090      | 89 (3.50)   | 25 (0.984)         | 20 (0.79)   | 135 (5.32)    | 95 (3.74)    | 40 (1.57) | 302 (11.89)  | 199 (7.83)  | 342 (13.46)   |
| 115      | 111 (4.37)  | 32 (1.260)         | 25 (0.98)   | 170 (6.69)    | 120 (4.72)   | 45 (1.77) | 356 (14.02)  | 227 (8.94)  | 401 (15.79)   |
| 140      | 132 (5.20)  | 40 (1.575)         | 32 (1.26)   | 209.4 (8.244) | 145.4 (5.72) | 45 (1.77) | 420 (16.54)  | 261 (10.28) | 465 (18.31)   |
| 165      | 152 (5.98)  | 50 (1.969)         | 40 (1.57)   | 250 (9.84)    | 170 (6.69)   | 60 (2.36) | 505 (19.88)  | 325 (12.80) | 565 (22.24)   |
| 190      | 155 (6.10)  | 63 (2.480)         | 155 (5.315) | 300 (11.81)   | 253 (9.96)   | 62 (2.44) | 603 (23.74)  | 377 (14.84) | 665 (26.18)   |

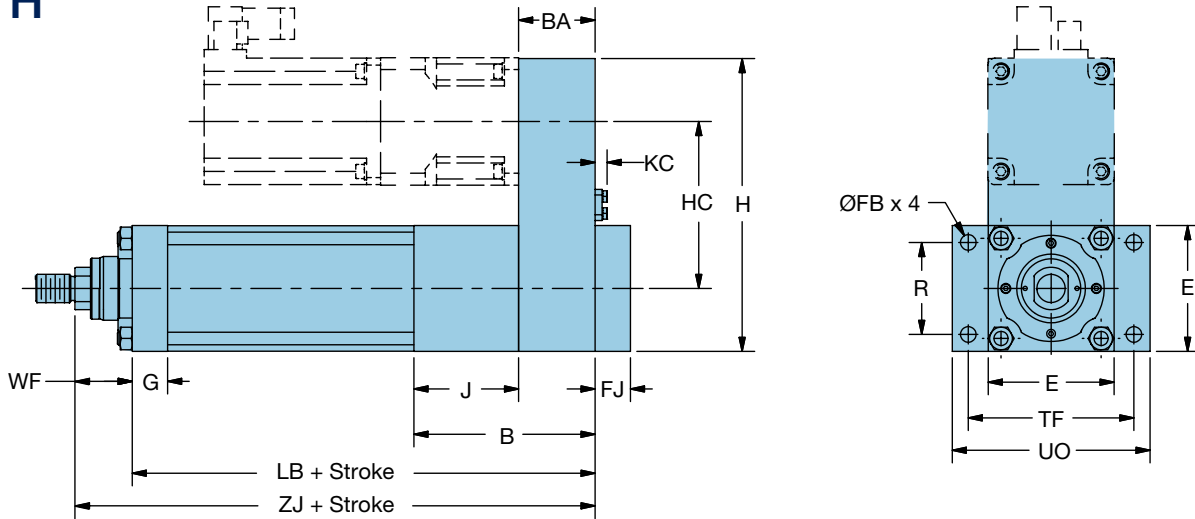
# XFC Mount Options

## Rear Flange Mount — Parallel Only

Order  
Code



**H**



Dimensions — mm (in)

| XFC Size | B             | BA            | E               | Ø FB         | FJ           | G            | H                | HC              |
|----------|---------------|---------------|-----------------|--------------|--------------|--------------|------------------|-----------------|
| 075      | 106<br>(4.17) | 44<br>(1.73)  | 76.2<br>(3.00)  | 9<br>(0.35)  | 12<br>(0.47) | 22<br>(0.87) | 174.2<br>(6.86)  | 98<br>(3.86)    |
| 090      | 128<br>(5.04) | 54<br>(2.13)  | 88.9<br>(3.50)  | 11<br>(0.43) | 14<br>(0.55) | 25<br>(0.98) | 206.9<br>(8.15)  | 118<br>(4.65)   |
| 115      | 154<br>(6.06) | 63<br>(2.48)  | 114.3<br>(4.50) | 14<br>(0.55) | 16<br>(0.63) | 30<br>(1.18) | 271<br>(10.67)   | 156<br>(6.14)   |
| 140      | 180<br>(7.09) | 72<br>(2.83)  | 139.7<br>(5.50) | 18<br>(0.71) | 20<br>(0.79) | 35<br>(1.38) | 332.2<br>(13.08) | 192.5<br>(7.58) |
| 165      | 211<br>(8.31) | 88<br>(3.46)  | 165.1<br>(6.50) | 21<br>(0.83) | 25<br>(0.98) | 40<br>(1.57) | 379.1<br>(14.93) | 224<br>(8.82)   |
| 190      | 252<br>(9.92) | 100<br>(3.94) | 190.5<br>(7.50) | 22<br>(0.87) | 30<br>(1.18) | 50<br>(1.97) | 455.5<br>(17.93) | 265<br>(10.43)  |

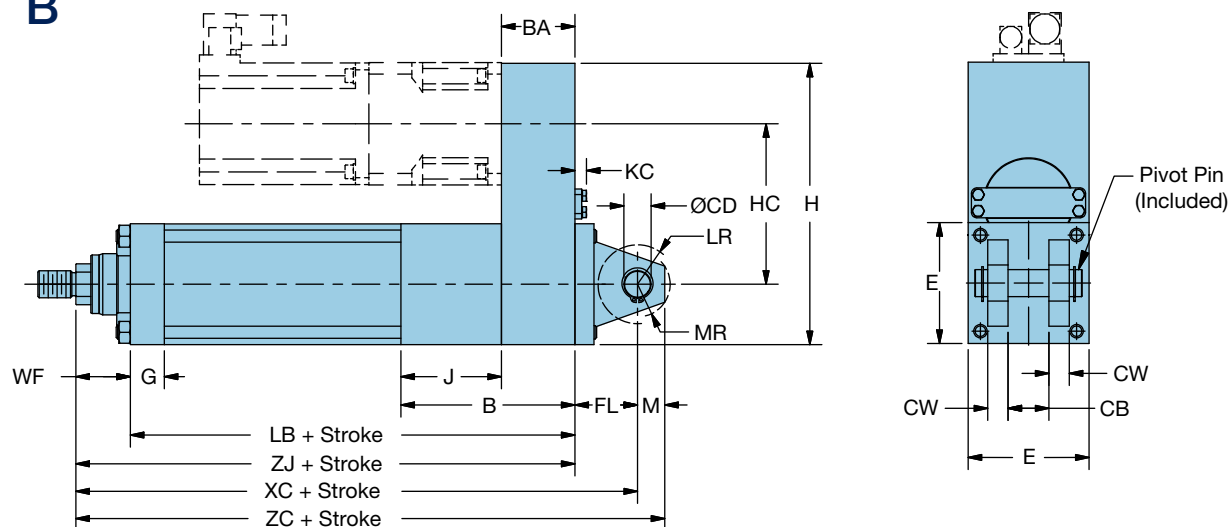
| XFC Size | Add Stroke    |                 |               |               |                 |              |                 |                  |
|----------|---------------|-----------------|---------------|---------------|-----------------|--------------|-----------------|------------------|
|          | J             | KC              | R             | TF            | UO              | WF           | LB              | ZJ               |
| 075      | 62<br>(2.44)  | 6.93<br>(0.27)  | 52<br>(2.05)  | 105<br>(4.13) | 125<br>(4.92)   | 38<br>(1.50) | 249.5<br>(9.82) | 287.5<br>(11.32) |
| 090      | 74<br>(2.91)  | 8.65<br>(0.34)  | 65<br>(2.56)  | 117<br>(4.61) | 139.7<br>(5.50) | 40<br>(1.57) | 302<br>(11.89)  | 342<br>(13.46)   |
| 115      | 91<br>(3.58)  | 10.15<br>(0.40) | 83<br>(3.27)  | 149<br>(5.87) | 175<br>(6.89)   | 45<br>(1.77) | 356<br>(14.02)  | 401<br>(15.79)   |
| 140      | 108<br>(4.25) | 13.65<br>(0.54) | 107<br>(4.21) | 172<br>(6.77) | 210<br>(8.27)   | 45<br>(1.77) | 420<br>(16.54)  | 465<br>(18.31)   |
| 165      | 123<br>(4.84) | 13.65<br>(0.54) | 120<br>(4.72) | 215<br>(8.46) | 260<br>(10.24)  | 60<br>(2.36) | 505<br>(19.88)  | 565<br>(22.24)   |
| 190      | 152<br>(5.98) | 17.18<br>(0.68) | 155<br>(6.10) | 253<br>(9.96) | 300<br>(11.81)  | 62<br>(2.44) | 603<br>(23.74)  | 665<br>(26.18)   |

# Rear Clevis Mount — Parallel Only

Order  
Code



**B**



Dimensions — mm (in)

| XFC Size   | B             | BA            | CB           | Ø CD <sub>H9</sub> | CW           | E               | FL           | G            | H                | HC              |
|------------|---------------|---------------|--------------|--------------------|--------------|-----------------|--------------|--------------|------------------|-----------------|
| <b>075</b> | 106<br>(4.17) | 44<br>(1.73)  | 20<br>(0.79) | 14<br>(0.551)      | 10<br>(0.39) | 76.2<br>(3.00)  | 31<br>(1.22) | 22<br>(0.87) | 174.2<br>(6.86)  | 98<br>(3.86)    |
| <b>090</b> | 128<br>(5.04) | 54<br>(2.13)  | 30<br>(1.18) | 20<br>(0.787)      | 15<br>(0.59) | 88.9<br>(3.50)  | 46<br>(1.81) | 25<br>(0.98) | 206.9<br>(8.15)  | 118<br>(4.65)   |
| <b>115</b> | 154<br>(6.06) | 63<br>(2.48)  | 30<br>(1.18) | 20<br>(0.787)      | 15<br>(0.59) | 114.3<br>(4.50) | 48<br>(1.89) | 30<br>(1.18) | 271<br>(10.67)   | 156<br>(6.14)   |
| <b>140</b> | 180<br>(7.09) | 72<br>(2.83)  | 40<br>(1.57) | 28<br>(1.102)      | 20<br>(0.79) | 139.7<br>(5.50) | 59<br>(2.32) | 35<br>(1.38) | 332.2<br>(13.08) | 192.5<br>(7.58) |
| <b>165</b> | 211<br>(8.31) | 88<br>(3.46)  | 50<br>(1.97) | 36<br>(1.417)      | 25<br>(0.98) | 165.1<br>(6.50) | 79<br>(3.11) | 40<br>(1.57) | 379.1<br>(14.93) | 224<br>(8.82)   |
| <b>190</b> | 252<br>(9.92) | 100<br>(3.94) | 60<br>(2.36) | 45<br>(1.772)      | 30<br>(1.18) | 190.5<br>(7.50) | 87<br>(3.43) | 50<br>(1.97) | 455.5<br>(17.93) | 265<br>(10.43)  |

| XFC Size   | Add Stroke    |                 |              |              |              |              |                 |                  |                  |                  |
|------------|---------------|-----------------|--------------|--------------|--------------|--------------|-----------------|------------------|------------------|------------------|
|            | J             | KC              | LR           | M            | MR           | WF           | LB              | XC               | ZC               | ZJ               |
| <b>075</b> | 62<br>(2.44)  | 6.93<br>(0.27)  | 17<br>(0.67) | 14<br>(0.55) | 17<br>(0.67) | 38<br>(1.50) | 249.5<br>(9.82) | 318.5<br>(12.54) | 332.5<br>(13.09) | 287.5<br>(11.32) |
| <b>090</b> | 74<br>(2.91)  | 8.65<br>(0.34)  | 29<br>(1.14) | 20<br>(0.79) | 25<br>(0.98) | 40<br>(1.57) | 302<br>(11.89)  | 388<br>(15.28)   | 408<br>(16.06)   | 342<br>(13.46)   |
| <b>115</b> | 91<br>(3.58)  | 10.15<br>(0.40) | 29<br>(1.14) | 20<br>(0.79) | 25<br>(0.98) | 45<br>(1.77) | 356<br>(14.02)  | 449<br>(17.68)   | 469<br>(18.46)   | 401<br>(15.79)   |
| <b>140</b> | 108<br>(4.25) | 13.65<br>(0.54) | 34<br>(1.34) | 28<br>(1.10) | 34<br>(1.34) | 45<br>(1.77) | 420<br>(16.54)  | 524<br>(20.63)   | 552<br>(21.73)   | 465<br>(18.31)   |
| <b>165</b> | 123<br>(4.84) | 13.65<br>(0.54) | 50<br>(1.97) | 36<br>(1.42) | 45<br>(1.77) | 60<br>(2.36) | 505<br>(19.88)  | 644<br>(25.35)   | 680<br>(26.77)   | 565<br>(22.24)   |
| <b>190</b> | 152<br>(5.98) | 17.18<br>(0.68) | 53<br>(2.09) | 45<br>(1.77) | 54<br>(2.13) | 62<br>(2.44) | 603<br>(23.74)  | 752<br>(29.61)   | 797<br>(31.38)   | 665<br>(26.18)   |

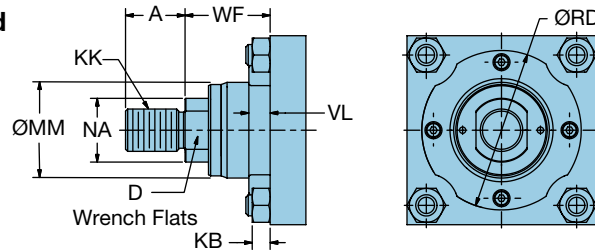
# XFC Rod End Options & Accessories

## Male Rod End

Order  
Code



- A** Metric Thread  
**B** Imperial Thread



Dimensions — mm (in)

| XFC<br>Size | KK           |              |               |         |          |               |              |                   |              |              |
|-------------|--------------|--------------|---------------|---------|----------|---------------|--------------|-------------------|--------------|--------------|
|             | A            | D            | KB            | A       | B        | ØMM           | NA           | ØRD <sub>f8</sub> | VL           | WF           |
| <b>075</b>  | 22<br>(0.87) | 19<br>(0.75) | 6.5<br>(0.26) | M16x1.5 | 5/8-18   | 36<br>(1.42)  | 24<br>(0.94) | 65<br>(2.558)     | 10<br>(0.39) | 38<br>(1.50) |
| <b>090</b>  | 28<br>(1.10) | 24<br>(0.94) | 8 (0.31)      | M20x1.5 | 3/4-16   | 45<br>(1.77)  | 30<br>(1.18) | 75<br>(2.952)     | 10<br>(0.39) | 40<br>(1.57) |
| <b>115</b>  | 36<br>(1.42) | 32<br>(1.26) | 10<br>(0.39)  | M27x2   | 1-14     | 56<br>(2.20)  | 40<br>(1.57) | 95<br>(3.739)     | 12<br>(0.47) | 45<br>(1.77) |
| <b>140</b>  | 45<br>(1.77) | 39<br>(1.54) | 13<br>(0.51)  | M33x2   | 1 1/4-12 | 70<br>(2.76)  | 49<br>(1.93) | 110<br>(4.329)    | 12<br>(0.47) | 45<br>(1.77) |
| <b>165</b>  | 56<br>(2.21) | 48<br>(1.89) | 18<br>(0.71)  | M42x2   | 1 1/2-12 | 90<br>(3.54)  | 60<br>(2.36) | 135<br>(5.313)    | 14<br>(0.55) | 60<br>(2.36) |
| <b>190</b>  | 63<br>(2.48) | 55<br>(2.17) | 18<br>(0.71)  | M48x2   | 1 3/4-12 | 110<br>(4.33) | 70<br>(2.76) | 155<br>(6.101)    | 16<br>(0.63) | 62<br>(2.44) |

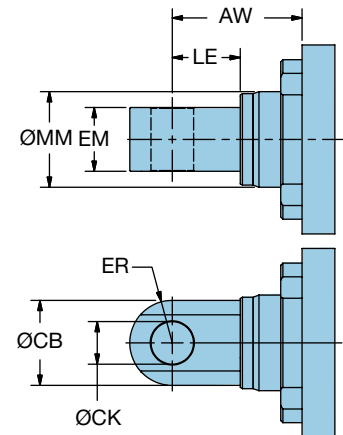
## Rod Eye

Order  
Code

**C**

Dimensions — mm (in)

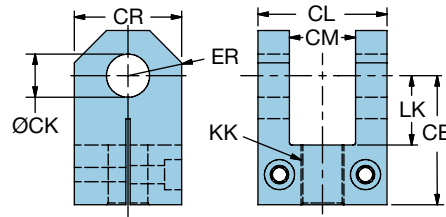
| XFC<br>Size | AW            | ØCB           | ØCK <sub>H9</sub> | EM <sub>h13</sub> | ER <sub>MAX</sub> | LE           | ØMM           |
|-------------|---------------|---------------|-------------------|-------------------|-------------------|--------------|---------------|
| <b>075</b>  | 48<br>(1.89)  | 32<br>(1.26)  | 14<br>(0.551)     | 20<br>(0.787)     | 16<br>(0.63)      | 19<br>(0.75) | 36<br>(1.42)  |
| <b>090</b>  | 61<br>(2.40)  | 40<br>(1.57)  | 20<br>(0.787)     | 30<br>(1.181)     | 20<br>(0.79)      | 32<br>(1.26) | 45<br>(1.77)  |
| <b>115</b>  | 66<br>(2.60)  | 45<br>(1.77)  | 20<br>(0.787)     | 30<br>(1.181)     | 23<br>(0.89)      | 32<br>(1.26) | 56<br>(2.20)  |
| <b>140</b>  | 73<br>(2.87)  | 60<br>(2.36)  | 28<br>(1.102)     | 40<br>(1.575)     | 30<br>(1.18)      | 39<br>(1.53) | 70<br>(2.76)  |
| <b>165</b>  | 99<br>(3.90)  | 80<br>(3.15)  | 36<br>(1.417)     | 50<br>(1.969)     | 40<br>(1.57)      | 54<br>(2.13) | 90<br>(3.54)  |
| <b>190</b>  | 104<br>(4.09) | 100<br>(3.94) | 45<br>(1.772)     | 60<br>(2.362)     | 50<br>(1.97)      | 57<br>(2.24) | 110<br>(4.33) |



# Mounting Accessories

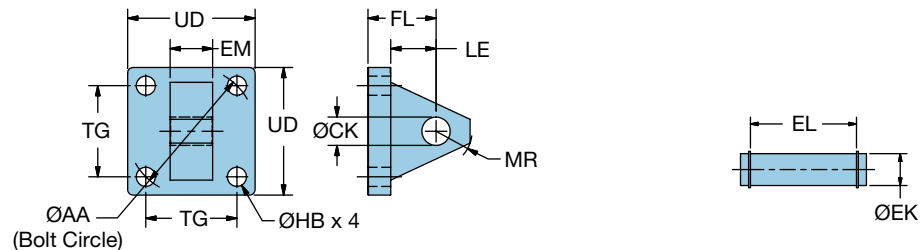


## Dimensions — mm (in)



### Rod Clevis

| XFC Size | Part No.   | CE            | CL            | CM <sub>A16</sub> | ØCK <sub>H9</sub> | CR              | LK <sub>MIN</sub> | ER <sub>MAX</sub> | KK      | Load Rating<br>kN (lb) |
|----------|------------|---------------|---------------|-------------------|-------------------|-----------------|-------------------|-------------------|---------|------------------------|
| 075      | 0950250075 | 41<br>(1.61)  | 40<br>(1.57)  | 20<br>(0.787)     | 14<br>(0.551)     | 30<br>(1.18)    | 19<br>(0.75)      | 15.53<br>(0.61)   | M16x1.5 | 20<br>(4,500)          |
| 090      | 0950250090 | 60<br>(2.36)  | 60<br>(2.36)  | 30<br>(1.181)     | 20<br>(0.787)     | 50<br>(1.97)    | 32<br>(1.26)      | 25.32<br>(1.00)   | M20x1.5 | 34<br>(7,500)          |
| 115      | 0950250115 | 68<br>(2.68)  | 60<br>(2.36)  | 30<br>(1.181)     | 20<br>(0.787)     | 50<br>(1.97)    | 32<br>(1.26)      | 25.71<br>(1.01)   | M27x2   | 54<br>(12,000)         |
| 140      | 0950250140 | 84<br>(3.31)  | 83<br>(3.27)  | 40<br>(1.575)     | 28<br>(1.102)     | 60<br>(2.36)    | 39<br>(1.54)      | 32.50<br>(1.28)   | M33x2   | 80<br>(17,500)         |
| 165      | 0950250165 | 110<br>(4.33) | 103<br>(4.06) | 50<br>(1.969)     | 36<br>(1.417)     | 76<br>(2.99)    | 54<br>(2.13)      | 41.04<br>(1.62)   | M42x2   | 120<br>(26,500)        |
| 190      | 0950250190 | 120<br>(4.72) | 123<br>(4.84) | 60<br>(2.362)     | 45<br>(1.772)     | 101.5<br>(4.00) | 57<br>(2.24)      | 51.83<br>(2.04)   | M48x2   | 178<br>(40,000)        |



### Clevis Bracket

| XFC<br>Size | Part No.   | Ø             |                  |              |              |                |                   |                   |                 |               |
|-------------|------------|---------------|------------------|--------------|--------------|----------------|-------------------|-------------------|-----------------|---------------|
|             |            | ØAA           | CK <sub>H9</sub> | EM           | FL           | ØHB            | LE <sub>MIN</sub> | MR <sub>MAX</sub> | TG              | UD            |
| 075         | 1448100000 | 59<br>(2.32)  | 14<br>(0.551)    | 20<br>(0.79) | 29<br>(1.14) | 9<br>(0.35)    | 19<br>(0.75)      | 17<br>(0.67)      | 41.7<br>(1.64)  | 64<br>(2.52)  |
| 090         | 1448110000 | 74<br>(2.91)  | 20<br>(0.787)    | 30<br>(1.18) | 48<br>(1.89) | 13.5<br>(0.53) | 32<br>(1.26)      | 29<br>(1.14)      | 52.3<br>(2.06)  | 75<br>(2.95)  |
| 115         | 1448120000 | 91<br>(3.58)  | 20<br>(0.787)    | 30<br>(1.18) | 48<br>(1.89) | 13.5<br>(0.53) | 32<br>(1.26)      | 29<br>(1.14)      | 64.3<br>(2.53)  | 90<br>(3.54)  |
| 140         | 1448130000 | 117<br>(4.61) | 28<br>(1.102)    | 40<br>(1.58) | 59<br>(2.32) | 17.5<br>(0.69) | 39<br>(1.54)      | 34<br>(1.34)      | 82.7<br>(3.26)  | 115<br>(4.53) |
| 165         | 1448140000 | 137<br>(5.39) | 36<br>(1.417)    | 50<br>(1.97) | 79<br>(3.11) | 17.5<br>(0.69) | 54<br>(2.13)      | 50<br>(1.97)      | 96.9<br>(3.82)  | 127<br>(5.00) |
| 190         | 1448150000 | 178<br>(7.01) | 45<br>(1.772)    | 60<br>(2.36) | 87<br>(3.43) | 26<br>(1.02)   | 57<br>(2.24)      | 53<br>(2.09)      | 125.9<br>(4.96) | 165<br>(6.50) |

### Pivot Pin

| Part No.   | Ø<br>EK <sub>f8</sub> | EL            |
|------------|-----------------------|---------------|
| 1434790000 | 14<br>(0.551)         | 45<br>(1.77)  |
| 1434800000 | 20<br>(0.787)         | 66<br>(2.60)  |
| 1434800000 | 20<br>(0.787)         | 66<br>(2.60)  |
| 1434810000 | 28<br>(1.102)         | 87<br>(3.43)  |
| 1434820000 | 36<br>(1.417)         | 107<br>(4.21) |
| 1434830000 | 45<br>(1.772)         | 129<br>(5.08) |

# Motors, Gearheads & Adapter Plates

Motor and gearhead selection is critical to the performance of the XFC electromechanical cylinder and must be sized based on the application requirements.

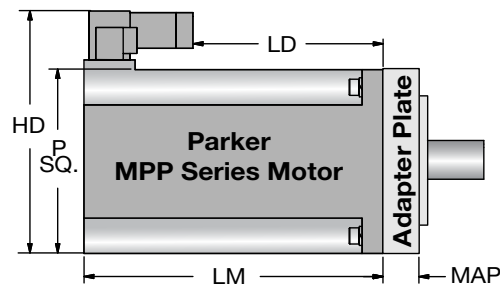
The tables below and on the next page provide information on Parker MPP motors or PS Series gearheads that are appropriate with the XFC.

A motor-only selection is typically used in high-speed/low-force applications, whereas a motor/gearhead combination is beneficial for slow speed/high force.

Standard configurations are available if a number is listed in the adapter plate columns (MAP, LAP). This number represents the adapter plate width and corresponds to the appropriate size motor and gearhead.

If the number is zero, the motor or gearhead combination is possible, but an adapter plate is not required. A dash indicates that a suitable combination is not available as a standard configuration.

*Consult the factory to inquire about other options or configurations.*



## MPP Series Motors

### Dimensions — mm (in)

| MPP Motor |   | LM               | LD               | HD               | P                | MAP          |              |              |              |              |     |              |              |     |              |     |     |
|-----------|---|------------------|------------------|------------------|------------------|--------------|--------------|--------------|--------------|--------------|-----|--------------|--------------|-----|--------------|-----|-----|
|           |   |                  |                  |                  |                  | Inline       |              |              |              |              |     | Parallel     |              |     |              |     |     |
|           |   |                  |                  |                  |                  | 075          | 090          | 115          | 140          | 165          | 190 | 075          | 090          | 115 | 140          | 165 | 190 |
| 115       | 2 | 152.4<br>(6.00)  | 89.2<br>(3.51)   | 159.0<br>(6.26)  | 113.0<br>(4.45)  | 0.0          | 0.0          | —            | —            | —            | —   | 12<br>(0.47) | 12<br>(0.47) | —   | —            | —   | —   |
|           | 3 | 177.8<br>(7.00)  | 115.2<br>(4.54)  |                  |                  |              |              | —            | —            | —            | —   |              |              | —   | —            | —   |     |
|           | 4 | 203.2<br>(8.00)  | 140.2<br>(5.52)  |                  |                  |              |              | —            | —            | —            | —   |              |              | —   | —            | —   |     |
| 142       | 2 | 172.9<br>(6.81)  | 109.9<br>(4.33)  | 188.8<br>(7.43)  | 142.7<br>(5.62)  | 16<br>(0.63) | 16<br>(0.63) | 16<br>(0.63) | —            | —            | —   | 16<br>(0.63) | 16<br>(0.63) | —   | —            | —   |     |
|           | 4 | 223.7<br>(8.81)  | 160.8<br>(6.33)  |                  |                  |              |              |              | —            | —            | —   |              |              | —   | —            | —   |     |
|           | 6 | 274.5<br>(10.81) | 211.9<br>(8.34)  |                  |                  |              |              |              | —            | —            | —   |              |              | —   | —            | —   |     |
|           | 8 | 325.3<br>(12.81) | 261.9<br>(10.31) |                  |                  |              |              |              | —            | —            | —   |              |              | —   | —            | —   |     |
| 190       | 4 | 224.0<br>(8.82)  | 110.3<br>(4.34)  | 260.1<br>(10.24) | 184.9<br>(7.28)  | —            | —            | 25<br>(0.98) | 25<br>(0.98) | —            | —   | 25<br>(0.98) | 25<br>(0.98) | —   | —            |     |     |
|           | 6 | 275.0<br>(10.83) | 161.3<br>(6.35)  |                  |                  | —            | —            |              |              | —            | —   |              |              | —   | —            |     |     |
|           | 8 | 325.3<br>(12.81) | 211.3<br>(8.32)  |                  |                  | —            | —            |              |              | —            | —   |              |              | —   | —            | —   |     |
| 270       | 6 | 293.3<br>(11.55) | 175.3<br>(6.90)  | 335.9<br>(13.22) | 266.7<br>(10.50) | —            | —            | —            | 30<br>(1.18) | 30<br>(1.18) | —   | —            | —            | —   | 30<br>(1.18) | —   |     |
|           | 8 | 344.1<br>(13.55) | 255.5<br>(10.06) |                  |                  | —            | —            | —            |              |              | —   | —            | —            | —   |              | —   |     |

Note: Make sure the output torque on the motor is sufficient for the application. MPP torque information can be found at [www.parkermotion.com](http://www.parkermotion.com)

### Motor Brake Option

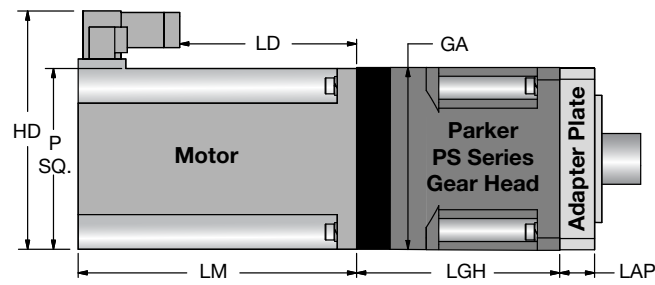
For vertical applications, a static brake should be used to resist back-driving the screw mechanism. A motor brake increases the overall length of the motor as indicated in the chart.

### Brake Option Additional Motor Length

| Motor size             | 092            | 100            | 115            | 142            | 190            | 270             |
|------------------------|----------------|----------------|----------------|----------------|----------------|-----------------|
| LM and LD Increase by: | 34.5<br>(1.36) | 48.5<br>(1.91) | 48.5<br>(1.91) | 51.6<br>(2.03) | 89.0<br>(3.50) | 127.0<br>(5.00) |

*For specific motor holding torque, refer to MPP motor data at [www.parkermotion.com](http://www.parkermotion.com)*

# PS Series Gearheads



Dimensions — mm (in)

| Gear size | MPP Motor |        |               |               |               |               |            |              | LAP <sup>1</sup> |           |           |            |            |     |
|-----------|-----------|--------|---------------|---------------|---------------|---------------|------------|--------------|------------------|-----------|-----------|------------|------------|-----|
|           | Size      | Length | LM            | LD            | HD            | P             | GA         | LGH          | 075              | 090       | 115       | 140        | 165        | 190 |
| PS90      | 092       | 1      | 127.2 (5.01)  | 64.2 (2.53)   | 136.4 (5.37)  | 88.8 (3.50)   | 90 (3.54)  | 89.5 (3.52)  | 19 (0.75)        | 0.0       | —         | —          | —          | —   |
|           |           | 2      | 152.6 (6.01)  | 90.2 (3.55)   |               |               |            |              |                  |           | —         | —          | —          | —   |
|           |           | 3      | 178.0 (7.01)  | 115.2 (4.52)  |               |               |            |              |                  |           | —         | —          | —          | —   |
|           | 100       | 2      | 149.1 (5.87)  | 86.2 (3.39)   | 143.8 (5.66)  | 97.8 (3.85)   |            | 98 (3.86)    |                  |           | —         | —          | —          | —   |
|           |           | 3      | 174.5 (6.87)  | 111.2 (4.38)  | —             | —             |            | —            |                  |           | —         |            |            |     |
| PS115     | 092       | 1      | 127.2 (5.01)  | 64.2 (2.53)   | 136.4 (5.37)  | 88.8 (3.50)   | 115 (4.53) | 114.2 (4.50) | 24 (0.94)        | 22 (0.87) | 0.0       | —          | —          | —   |
|           |           | 2      | 152.6 (6.01)  | 90.2 (3.55)   |               |               |            |              |                  |           |           | —          | —          | —   |
|           |           | 3      | 178.0 (7.01)  | 115.2 (4.52)  |               |               |            |              |                  |           |           | —          | —          | —   |
|           | 100       | 2      | 149.1 (5.87)  | 86.2 (3.39)   | 143.8 (5.66)  | 97.8 (3.85)   |            | —            |                  |           |           | —          | —          |     |
|           |           | 3      | 174.5 (6.87)  | 111.2 (4.38)  | —             | —             |            | —            |                  |           |           |            |            |     |
|           | 115       | 2      | 152.4 (6.00)  | 89.2 (3.51)   | 159.0 (6.26)  | 113.0 (4.45)  |            | —            |                  |           |           | —          | —          |     |
|           |           | 3      | 177.8 (7.00)  | 115.2 (4.54)  |               |               |            | —            |                  |           |           | —          | —          |     |
|           |           | 4      | 203.2 (8.00)  | 140.2 (5.52)  |               |               |            | —            |                  |           |           | —          | —          |     |
| PS142     | 100       | 2      | 149.1 (5.87)  | 86.2 (3.39)   | 143.8 (5.66)  | 97.8 (3.85)   | 142 (5.59) | 133.7 (5.26) | —                | —         | —         | —          | —          |     |
|           |           | 3      | 174.5 (6.87)  | 111.2 (4.38)  | —             | —             |            |              | —                |           |           |            |            |     |
|           | 115       | 2      | 152.4 (6.00)  | 89.2 (3.51)   | 159.0 (6.26)  | 113.0 (4.45)  |            |              | —                | —         | —         | —          |            |     |
|           |           | 3      | 177.8 (7.00)  | 115.2 (4.54)  |               |               |            |              | —                | —         | 29 (1.14) | 5.0 (0.20) | 5.0 (0.20) | —   |
|           |           | 4      | 203.2 (8.00)  | 140.2 (5.52)  |               |               |            |              | —                | —         | —         | —          |            |     |
|           | 142       | 2      | 172.9 (6.81)  | 109.9 (4.33)  | —             | —             |            |              | —                | —         | —         | —          |            |     |
|           |           | 4      | 223.7 (8.81)  | 160.8 (6.33)  | 188.8 (7.43)  | 142.7 (5.62)  |            |              | —                | —         | —         | —          |            |     |
|           |           | 6      | 274.5 (10.81) | 211.9 (8.34)  | —             | —             |            |              | —                | —         | —         |            |            |     |
|           |           | 8      | 325.3 (12.81) | 261.9 (10.31) | —             | —             |            |              | —                | —         |           |            |            |     |
| PS180     | 115       | 2      | 152.4 (6.00)  | 89.2 (3.51)   | 159.0 (6.26)  | 113.0 (4.45)  | 182 (7.17) | 148.5 (5.85) | —                | —         | —         | —          | —          |     |
|           |           | 3      | 177.8 (7.00)  | 115.2 (4.54)  |               |               |            |              | —                | —         | —         | —          |            |     |
|           |           | 4      | 203.2 (8.00)  | 140.2 (5.52)  |               |               |            |              | —                | —         | —         | —          |            |     |
|           | 142       | 2      | 172.9 (6.81)  | 109.9 (4.33)  | 188.8 (7.43)  | 142.7 (5.62)  |            | 151 (5.95)   | —                | —         | —         | 24 (0.94)  | 24 (0.94)  | 0.0 |
|           |           | 4      | 223.7 (8.81)  | 160.8 (6.33)  |               |               |            |              | —                | —         | —         | —          |            |     |
|           |           | 6      | 274.5 (10.81) | 211.9 (8.34)  |               |               |            |              | —                | —         | —         | —          |            |     |
|           | 190       | 8      | 325.3 (12.81) | 261.9 (10.31) | 260.1 (10.24) | 184.9 (7.28)  |            | 192.5 (7.58) | —                | —         | —         | —          | —          |     |
|           |           | 4      | 224.0 (8.82)  | 110.3 (4.34)  |               |               |            |              | —                | —         | —         | —          |            |     |
|           |           | 6      | 275.0 (10.83) | 161.3 (6.35)  |               |               |            |              | —                | —         | —         | —          |            |     |
| PS220     | 190       | 8      | 325.3 (12.81) | 211.3 (8.32)  | 220 (8.66)    | 266.7 (10.50) | 212 (8.35) | —            | —                | —         | —         | —          | 36 (1.42)  |     |
|           |           | 6      | 275.0 (10.83) | 161.3 (6.35)  |               |               |            | —            | —                | —         | —         |            |            |     |
|           |           | 8      | 325.3 (12.81) | 211.3 (8.32)  |               |               |            | —            | —                | —         | —         |            |            |     |
|           | 270       | 6      | 293.3 (11.55) | 175.3 (6.90)  |               |               | 252 (9.92) | —            | —                | —         | —         |            |            |     |
|           |           | 8      | 344.1 (13.55) | 255.5 (10.06) |               |               |            | —            | —                | —         | —         |            |            |     |

<sup>1</sup> LAP dimension is required for parallel mounting only; 0.0 means no adapter plate required. Inline configurations do not require adapter plates.

Note: Make sure the output torque on the gear head is sufficient for the application. PS torque information can be found at [www.parkermotion.com](http://www.parkermotion.com)

# Compax3 Drive/Controller



## Compax3 Power Range

| Compax3 Device      | Current A <sub>RMS</sub> |                         | Supply Voltage |
|---------------------|--------------------------|-------------------------|----------------|
|                     | I <sub>cont</sub>        | I <sub>peak</sub> (<5s) |                |
| S025V2              | 2.5                      | 5.5                     | 1Ø 230/240VAC  |
| S063V2              | 6.3                      | 12.6                    |                |
| S100V2              | 10                       | 20                      | 3Ø 230/240VAC  |
| S150V2              | 15                       | 30                      |                |
| S038V4 <sup>1</sup> | 3.8                      | 9.0                     | 3Ø 400/480VAC  |
| S075V4 <sup>1</sup> | 7.5                      | 15                      |                |
| S150V4 <sup>1</sup> | 15                       | 30                      |                |
| S300V4 <sup>1</sup> | 30                       | 60                      | 3Ø 400/480VAC  |
| H050V4 <sup>1</sup> | 50                       | 75                      |                |
| H090V4 <sup>1</sup> | 90                       | 135                     |                |
| H125V4 <sup>1</sup> | 125                      | 187.5                   |                |
| H155V4 <sup>1</sup> | 155                      | 232.5                   |                |

<sup>1</sup>Rated at 400 VAC

## Standard Features

- Power range of 1kW...75kW
- 8 digital inputs, 4 digital outputs
- Available with ETHERNET Powerlink, and EtherCat
- RS232 / RS485 – interfaces
- 2 analog inputs (+/-10V, 14 bits)
- 2 analog outputs (+/-10V, 8 bits)
- Encoder input or output
- Motors supported:
  - Synchronous servo motors
  - Asynchronous motors
  - Linear motors
  - Torque motors
- Position sensing at the motor shaft via:
  - Resolver
  - Rotary/linear encoder
  - Sine-cosine feedback
  - Hiperface interface
  - EnDat 2.2 interface
  - Compatible with most feedback systems
- Support for SSI feedback

## Extensions

- Real-time bus for axis coupling
- Scalable technology and control functions
- Integrated or external controls

## Functions (summary)

- Programmable according to IEC61131-3
- Reg-related positioning, electronic gearing, dynamic positioning (motion superimposition) and torque-force control
- Cam – modular, with coupling and decoupling functions, cam switching mechanism

## Technologies

- T10: Step/Direction and Analog Command Input
- T11: Positioning indexer
- T30: IEC61131-3 Positioning with function modules according to PLCopen
- T40: IEC61131-3 Positioning plus Cam function modules

For further information on Compax3 Drive/Controllers or assistance with sizing and selection, please consult [parkermotion.com](http://parkermotion.com), or consult the factory

## Complementary Parker Products

Parker offers HMI solutions for any application from simple push button replacement through sophisticated networking, multimedia and data logging requirements. Products range from entry level embedded displays through full Windows-based Industrial PC solutions.



Parker offers a broad family of motors with unparalleled performance, a torque range of 1.2 in-lbs to 4000 in-lbs and complete customization capabilities. For higher torque requirements, Parker's Stealth gearheads are the perfect solution.

# Solid State Switches

## Global Drop-In Solid State Switches



### Specifications

| Switch Classification       | Standard PNP or NPN              |
|-----------------------------|----------------------------------|
| Type                        | Electronic                       |
| Output Function             | Normally Open/Closed             |
| Switch Output               | PNP/NPN                          |
| Operating Voltage           | 10 - 30VDC                       |
| Continuous Current          | 100 mA max.                      |
| Response Sensitivity        | 28 Gauss min.                    |
| Switching Frequency         | 5 KHz                            |
| Power Consumption           | 10 mA max.                       |
| Voltage Drop                | 2.5 VDC max.                     |
| Ripple                      | 10% of Operating Voltage         |
| Hysteresis                  | 1.5 mm max.                      |
| Repeatability               | 0.1 mm max.                      |
| EMC                         | EN 60 947-5-2                    |
| Short-circuit Protection    | Yes                              |
| Power-up Pulse Suppression  | Yes                              |
| Reverse Polarity Protection | Yes                              |
| Enclosure Rating            | IP68                             |
| Shock and Vibration Stress  | 30g, 11 ms, 10 to 55Hz, 1 mm     |
| Operating Temperature Range | -25°C to +75°C (-13°F to +167°F) |
| Housing Material            | PA 12 Black                      |
| Connector Cable             | PVC                              |
| Connector                   | PUR                              |

Global solid state switch outputs may be influenced by an external magnetic field. Care must be taken to avoid external magnetic field exposure.

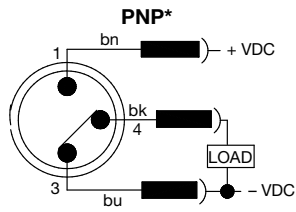
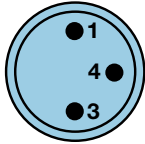
### Solid State Switch Ordering Information

|                                | PNP*         |                 | NPN           |                 |
|--------------------------------|--------------|-----------------|---------------|-----------------|
|                                | Nomally Open | Normally Closed | Normally Open | Normally Closed |
| 3 m Flying Leads               | P8S-GPFX     | P8S-GQFIX       | P8S-GNFX      | P8S-GMFX        |
| 10 m Flying Leads              | P8S-GPFTX    | —               | P8S-GNFTX     | —               |
| 0.3 m Lead with 8 mm connector | P8S-GPSHX    | P8S-GQSHX       | P8S-GNSHX     | P8S-GMSHM       |
| 1 m Lead with 8 mm connector   | P8S-GPSCX    | —               | P8S-GNSCX     | —               |
| Compax3 Compatible             | Yes          | Yes             | No            | No              |

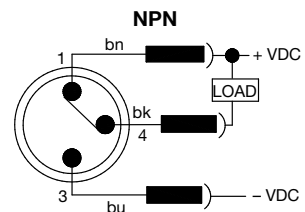
\*PNP needed for Compax3 Servo Drive.

## Wiring Connection

Flying Lead or 8 mm Connector (shown)

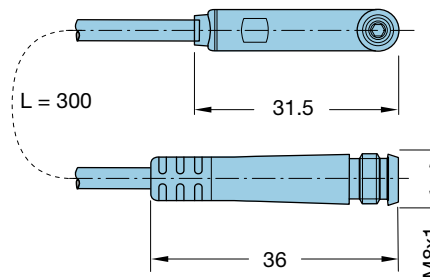
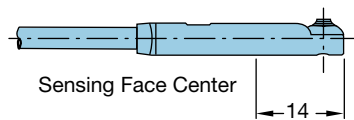
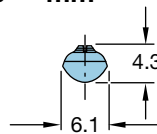


\*PNP needed for Compax3 Servo Drive



| Pin | Wire  | Function                 |
|-----|-------|--------------------------|
| 1   | Brown | Operating Voltage (+VDC) |
| 4   | Black | Output signal (N.O.)     |
| 3   | Blue  | -VDC                     |

## Dimensions — mm



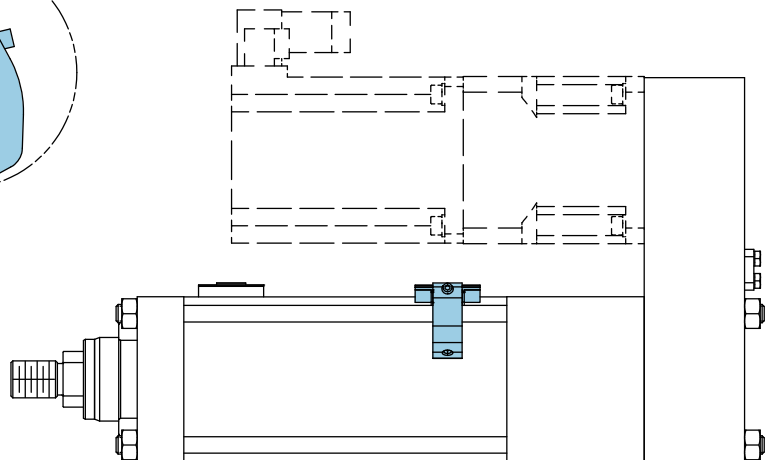
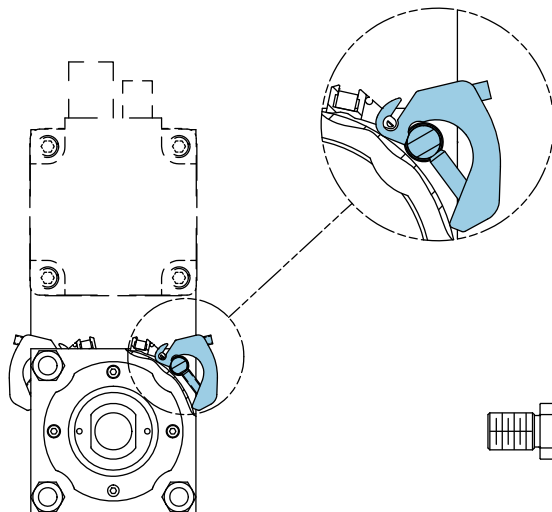
## 8 mm Threaded Cord Set to Flying Leads

|            |         |
|------------|---------|
| 086620T002 | 2 meter |
| 086620T005 | 5 meter |

## Tie Rod Bracket Assembly

Global switch bracket fits XFC 075 - 115 cylinders. Global switches and bracket assemblies must be ordered separately.

|           |                          |
|-----------|--------------------------|
| P8S-TMA0X | Tie Rod Bracket Assembly |
|-----------|--------------------------|



# Application Worksheet

**Email: [ddlcat@parker.com](mailto:ddlcat@parker.com) Fax: 724-861-3330**

(Temperature, Humidity, Washdown, etc.)

Expected Life: \_\_\_\_\_ (cycles) (years)

[illegible]

# Life Calculations

L<sub>10</sub> life ratings are based on 90% rolling elements achieving the service life before showing signs of material failure. The service life of the cylinder can be determined by known forces exerted on the cylinder and mechanical system.

Most often, the load is not constant across the range of motion the cylinder experiences and these loading changes affect the life of the cylinder. In order to determine the loading of the cylinder, an equivalent load method is used to model loading on the system.

## Life Calculations (millions of revolutions)

$$L_{10} = \left( \frac{C_a}{F_m} \right)^3$$

## Life Calculations (millions of mm)

$$L_{10} = \left( \frac{C_a}{F_m} \right)^3 \times \text{Screw Lead}$$

L<sub>10</sub> = Life (Millions of Revolutions)

C<sub>a</sub> = Basic Dynamic Load Rating (from page 6)

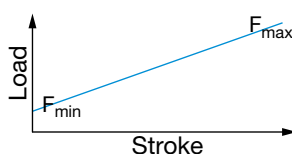
F<sub>m</sub> = Equivalent Load (see Load Calculation below)

Please consult factory for advanced life calculations.

# Equivalent Load Calculations

## Simple Load Calculation

$$F_m = \frac{F_{\min} + 2F_{\max}}{3}$$



## Complex Load Calculation

To model complex loads, the formula to calculate the equivalent load on the cylinder is:

$$F_m = \sqrt[3]{\frac{(F_1^3 \cdot x_1) + (F_2^3 \cdot x_2) + (F_3^3 \cdot x_3) + (F_n^3 \cdot x_n) + \dots}{(x_1 + x_2 + x_3 + x_n) + \dots}}$$

F<sub>m</sub> = Equivalent load used for life calculations

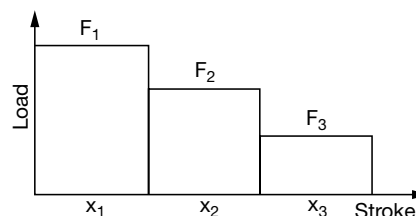
F<sub>n</sub> = Force exerted over segment of distance x<sub>n</sub>

x<sub>n</sub> = Distance over which F<sub>n</sub> is exerted

### Example:

A cylinder is subjected to 5 kN over 100 mm, 10 kN over the next 100 mm and 20 kN over the next 100 mm. The equivalent load is calculated by:

$$F_m = \sqrt[3]{\frac{(5\text{kN}^3 \cdot 100\text{mm}) + (10\text{kN}^3 \cdot 100\text{mm}) + (20\text{kN}^3 \cdot 100\text{mm})}{(100\text{mm} + 100\text{mm} + 100\text{mm})}}$$



# XFC Cylinder Sizing

## Thrust Calculations

Calculate the thrust generated by the application. Total thrust generally consists of three components:

### Acceleration Thrust

$$F_a = L/g \times V/T_a$$

### Thrust Due to Gravity

$$F_g = L \sin \alpha$$

(Horizontal applications do not apply.)

### Thrust Due to Friction

$$F_f = \mu_s L \cos \alpha$$

---


$$\text{Total Thrust} = F_t = F_a + F_g + F_f$$


---

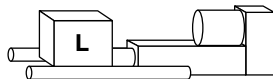
### Definitions:

|                      |                                                                                   |
|----------------------|-----------------------------------------------------------------------------------|
| <b>F<sub>t</sub></b> | Total (maximum) Thrust Force (N, lb)                                              |
| <b>F<sub>f</sub></b> | Friction Force (N, lb)                                                            |
| <b>F<sub>g</sub></b> | Force of Gravity (N, lb)                                                          |
| <b>F<sub>a</sub></b> | Acceleration Thrust (N, lb)                                                       |
| <b>α</b>             | Angle of Inclination (see Angular Cylinder Orientation illustration below)        |
| <b>μ<sub>s</sub></b> | Coefficient of Sliding Friction (see chart below)                                 |
| <b>L</b>             | Actual Weight (N, lb)                                                             |
| <b>g</b>             | Acceleration Due to Gravity (9800 mm/sec <sup>2</sup> , 386 in/sec <sup>2</sup> ) |
| <b>V</b>             | Velocity (mm/sec, inch/sec)                                                       |
| <b>T<sub>a</sub></b> | Acceleration Time (sec)                                                           |
| <b>D</b>             | Move Distance (mm, in)                                                            |
| <b>t</b>             | Move Time (sec)                                                                   |
| <b>A</b>             | Acceleration (mm/sec <sup>2</sup> , inch/sec <sup>2</sup> )                       |

## Cylinder Orientation

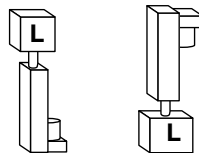
The terms used and their values depend upon the orientation of the cylinder. Refer to the illustrations and equations to determine the form of the thrust equation.

### Horizontal



$$F_t = F_a + F_f$$

### Vertical



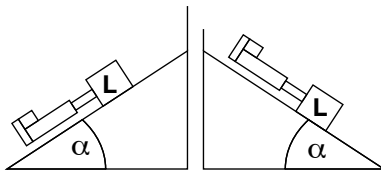
#### Upward

$$F_t = F_a + F_g + F_f$$

#### Downward

$$F_t = F_a - F_g + F_f$$

### Angular



#### Upward

$$F_t = F_a + F_g + F_f$$

#### Downward

$$F_t = F_a - F_g + F_f$$

### Friction Coefficients μ<sub>s</sub>

| Material                        | μ <sub>s</sub> |
|---------------------------------|----------------|
| <b>Dry contact unless noted</b> |                |
| Steel on steel                  | 0.80           |
| Steel on steel (lubricated)     | 0.16           |
| Aluminum on steel               | 0.45           |
| Copper on steel                 | 0.22           |
| Brass on steel                  | 0.35           |
| PTFE on steel                   | 0.04           |

# Motor Speed Calculation

$$\text{Speed} = \frac{\text{VL} \times \text{Ratio}}{\text{Lead}}$$

**Where:**

**Lead** Screw lead mm/rev (in/rev)

**VL** Maximum linear velocity in mm/s (in/sec)

**Ratio** Reduction ratio, if any (i.e. 3:1, Ratio = 3)

**Speed** Required motor speed in rev/sec

# Motor Torque Calculation

$$T = \frac{\text{Thrust} \times \text{Lead}}{\eta_s \times \eta_b \times 2\pi \times \text{Ratio}}$$

**Where:**

**T** Input torque required, Nm (in-lb)

**Lead** Screw lead in mm/rev (in/rev)

**Thrust** Calculated thrust value in kN (lbf)

$$F_a + F_g + F_f$$

**F<sub>a</sub>** (Acceleration Thrust) =

$$\text{Load} / (9800 \text{ mm/sec}^2) \times \text{Velocity} / \text{Acceleration Time}$$

**F<sub>g</sub>** (Force of Gravity) = Load  $\times \sin \alpha$

**F<sub>f</sub>** (Friction Force) =  $\mu_s \times \text{Load} \times \cos \alpha$

**$\eta_b$**  Gear Efficiency Coefficient:

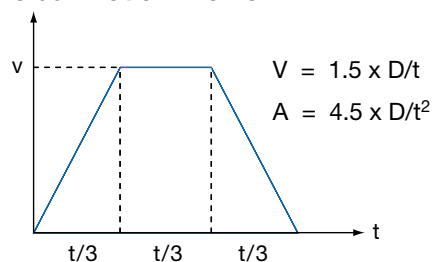
0.95 (or 95%) for parallel driven versions

1.0 (100%) for inline versions

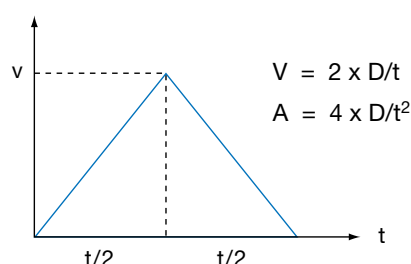
**$\eta_s$**  Screw Efficiency Coefficient

**Ratio** Drive Ratio (if reducer is used)

## Trapezoidal Motion Profile



## Triangular Motion Profile



$$\text{Acceleration} \leq 1 \text{ g } (9.8 \text{ m/sec}^2)$$

## Common Equivalent units:

|                |                                                |
|----------------|------------------------------------------------|
| <b>Mass</b>    | 1 kg = 2.2046 lb                               |
| <b>Force</b>   | 1 kN = 224.81 lbf                              |
| <b>Length</b>  | 1 mm = 0.03937 in                              |
| <b>Speed</b>   | 1 mm/sec = 0.03937 in/sec                      |
| <b>Torque</b>  | 1 N-m = 0.7376 lbf-ft                          |
| <b>Power</b>   | 1 kW = 1.341 hp                                |
| <b>Inertia</b> | 1 kg-m <sup>2</sup> = 23.73 lb-ft <sup>2</sup> |

# XFC Ordering Information

## Ordering Information

Select an order code from each of the numbered fields to create a complete XFX model order number. Include hyphens and non-selective characters as shown in example below.

|                                                                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ①                                                                        | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | ⑨ | ⑩ | ⑪ | ⑫ | ⑬ | ⑭ | ⑮ | ⑯ |
| <b>Order Example:</b> XFC 075 LA 05 J N A A N XXXX – A 03 – A09A A 1 – A |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

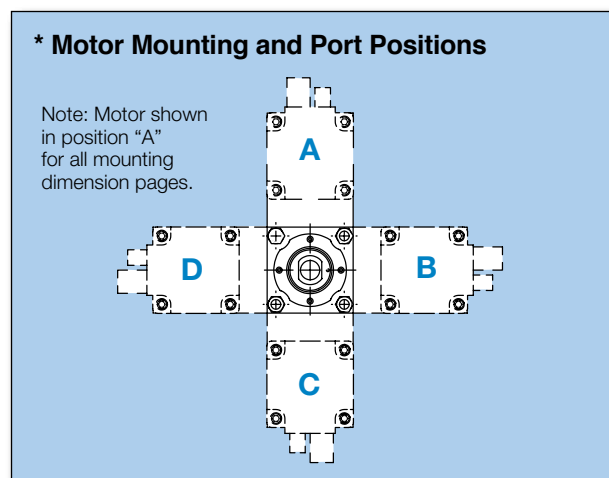
|                       |                                              |
|-----------------------|----------------------------------------------|
| ①                     | <b>Series</b>                                |
| XFC                   | Extreme Force Cylinder                       |
| ②                     | <b>Frame Size</b>                            |
| 075                   | 75 mm                                        |
| 090                   | 90 mm                                        |
| 115                   | 115 mm                                       |
| 165                   | 165 mm                                       |
| 190                   | 190 mm                                       |
| ③                     | <b>Configuration</b>                         |
| <b>Inline Motor</b>   |                                              |
| LA                    | Mounting Position A*                         |
| LB                    | Mounting Position B*                         |
| LC                    | Mounting Position C*                         |
| LD                    | Mounting Position D*                         |
| <b>Parallel Motor</b> |                                              |
| PA                    | Mounting Position A*                         |
| PB                    | Mounting Position B*                         |
| PC                    | Mounting Position C*                         |
| PD                    | Mounting Position D*                         |
| ④                     | <b>Screw Lead</b>                            |
| 05                    | 5 mm Lead (XFC075, 090, 115, 140)            |
| 10                    | 10 mm Lead (XFC075, 090, 115, 140, 165, 190) |
| 20                    | 20 mm Lead (XFC165 & 190)                    |

|                                     |                                                    |
|-------------------------------------|----------------------------------------------------|
| ⑤                                   | <b>Primary Mount</b>                               |
| ⑥                                   | <b>Secondary Mount</b>                             |
| <b>Inline Motor Configuration</b>   |                                                    |
| C                                   | Foot Mount                                         |
| J                                   | Front Flange Mount                                 |
| K                                   | Extended Tie Rod Mount (Front)                     |
| T                                   | Rear Trunnion Mount                                |
| N                                   | No Secondary Mount                                 |
| <b>Parallel Motor Configuration</b> |                                                    |
| B                                   | Rear Clevis                                        |
| C                                   | Foot Mount                                         |
| H                                   | Rear Flange                                        |
| J                                   | Front Flange Mount                                 |
| K                                   | Extended Tie Rod Mount (Front)                     |
| L                                   | Extended Tie Rod Mount (Rear)                      |
| M                                   | Extended Tie Rod Mount (Front & Rear)              |
| T                                   | Rear Trunnion Mount                                |
| N                                   | No Secondary Mount                                 |
| ⑦                                   | <b>Rod End</b>                                     |
| A                                   | Metric Thread – Male End                           |
| B                                   | Imperial Thread – Male End                         |
| C                                   | Rod Eye                                            |
| X                                   | Special                                            |
| ⑧                                   | <b>Lubrication</b>                                 |
| A                                   | Oil Filled Port Position A*                        |
| B                                   | Oil Filled Port Position B*                        |
| C                                   | Oil Filled Port Position C*                        |
| D                                   | Oil Filled Port Position D*                        |
| E                                   | Grease Filled (required for vertical applications) |

\*Refer to illustration page 34. For parallel configurations, the oil fill port position and the motor mount position cannot be the same.

|   |                                            |
|---|--------------------------------------------|
| ⑨ | <b>Options</b>                             |
| A | Prepped for Limit Switches*                |
| B | Fluorocarbon Seals                         |
| C | Fluorocarbon Seals and Limit Switch Ready* |
| N | None                                       |

\*Options A and C are only available with XFC 075, 090 and 115 with grease-filled lubrication



|                             |                                                                                                       |
|-----------------------------|-------------------------------------------------------------------------------------------------------|
| <b>⑩ Stroke Length — mm</b> |                                                                                                       |
| <b>XXXX</b>                 | 50 – 2000 mm (See page 6 for max stroke by bore size. For stroke <50 or >2000 please consult factory) |

|                                            |                                        |
|--------------------------------------------|----------------------------------------|
| <b>⑪ Gearhead Frame Size <sup>1)</sup></b> |                                        |
| <b>A</b>                                   | PS90 Frame for Size XFC075 & 090       |
| <b>B</b>                                   | PS115 Frame for Size XFC075, 090 & 115 |
| <b>C</b>                                   | PS142 Frame for Size XFC115, 140 & 165 |
| <b>D</b>                                   | PS180 Frame for Size XFC140, 165 & 190 |
| <b>E</b>                                   | PS220 Frame for Size XFC190            |
| <b>X</b>                                   | Special                                |
| <b>N</b>                                   | No Gearhead (Motor only)               |

|                         |                          |
|-------------------------|--------------------------|
| <b>⑫ Gearhead Ratio</b> |                          |
| <b>00</b>               | No Gearhead              |
| <b>03</b>               | Gearhead with 3:1 ratio  |
| <b>04</b>               | Gearhead with 4:1 ratio  |
| <b>05</b>               | Gearhead with 5:1 ratio  |
| <b>07</b>               | Gearhead with 7:1 ratio  |
| <b>10</b>               | Gearhead with 10:1 ratio |
| <b>XX</b>               | Custom Gear Ratio        |

| ⑬ Motor Selection* 1) |          |         |          |
|-----------------------|----------|---------|----------|
| 240 VAC               |          | 460 VAC |          |
| A09A                  | MPP0921C | A09B    | MPP0921R |
| A09C                  | MPP0922D | A09D    | MPP0922R |
| A09E                  | MPP0923D | A09F    | MPP0923R |
| A10A                  | MPP1002D | A10B    | MPP1002R |
| A10C                  | MPP1003C | A10D    | MPP1003R |
| A11A                  | MPP1152D | A11B    | MPP1152R |
| A11C                  | MPP1153C | A11D    | MPP1153R |
| A11E                  | MPP1154B | A11F    | MPP1154P |
| A14A                  | MPP1422C | A14B    | MPP1422R |
| A14C                  | MPP1424C | A14D    | MPP1424R |
| A14E                  | MPP1426B | A14F    | MPP1426P |
| —                     | —        | A14G    | MPP1428Q |
| —                     | —        | A19A    | MPP1904P |
| A19B                  | MPP1906B | A19C    | MPP1906P |
| —                     | —        | A19D    | MPP1908P |
|                       | —        | A27A    | MPP2706P |
| —                     | —        | A27B    | MPP2708N |
| X00X                  | Special  | X00X    | Special  |

\*Refer to page 24-25 for motor pairing options by bore size.

|                                       |                                            |
|---------------------------------------|--------------------------------------------|
| <b>⑭ Motor Feedback <sup>2)</sup></b> |                                            |
| <b>A</b>                              | 2000 Count Encoder (1E)                    |
| <b>B</b>                              | 2000 Count Encoder – Serial Interface (3E) |
| <b>C</b>                              | Single Speed Resolver (41)                 |
| <b>D</b>                              | Multi-Turn Absolute Encoder (6S)           |
| <b>E</b>                              | Single-Turn Absolute Encoder (9S)          |
| <b>N</b>                              | No Motor or Special Motor                  |

|                                       |                                     |
|---------------------------------------|-------------------------------------|
| <b>⑮ Motor Options* <sup>2)</sup></b> |                                     |
| <b>1</b>                              | No Brake                            |
| <b>2</b>                              | 24 VDC Brake (B)                    |
| <b>3</b>                              | Shaft Seal (V)                      |
| <b>4</b>                              | 24 VDC Brake (B) and Shaft Seal (V) |
| <b>0</b>                              | No Motor or Special Motor           |

\*Brake required for vertical applications

|                              |                                                                                                                                                                                                                                   |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>⑯ Revision Identifier</b> |                                                                                                                                                                                                                                   |
| <b>A</b>                     | Standard Cylinder                                                                                                                                                                                                                 |
| <b>B</b>                     | Anti-rotation Option (When selecting anti-rotation option, grease filled option must also be selected [Option “E” from ⑧ Lubrication section]. Consult factory for rotation torque greater than stated catalog values on page 6.) |

1) Includes proper mounting surface for selected gearhead and motor.

2) For customer supplied motors, not provided by Parker, select option “N” for **Motor Feedback** and “0” for **Motor Options**.

# Cylinder Safety Guidelines

## For Proper Selection and Use of Hydraulic, Pneumatic & Electromechanical Cylinders and their Accessories



### WARNING

**Failure of the cylinder, its parts, its mounting, its connections to other objects, or its controls can result in:**

- **Unanticipated or uncontrolled movement of the cylinder or objects connected to it.**
- **Falling of the cylinder or objects held up by it.**
- **Fluid escaping from the cylinder, potentially at high velocity.**

**These events could cause death or personal injury by, for example, persons falling from high locations, being crushed or struck by heavy or fast moving objects, being pushed into dangerous equipment or situations, or slipping on escaped fluid.**

Before selecting or using Parker Hannifin Corporation (the Company) cylinders or related accessories, it is important that you read, understand and follow the following safety information. Training is advised before selecting and using the Company's products.

### 1.0 General Instructions

**1.1 Scope:** This safety guide provides instructions for selecting and using (including assembling, installing, and maintaining) cylinder products. This safety guide is a supplement to and is to be used with the specific Company publications for the specific cylinder products that are being considered for use.

**1.2 Fail Safe:** Cylinder products can and do fail without warning for many reasons. All systems and equipment should be designed in a fail-safe mode so that if the failure of a cylinder product occurs people and property won't be endangered.

**1.3 Distribution:** Provide a free copy of this safety guide to each person responsible for selecting or using cylinder products. Do not select or use the Company's cylinders without thoroughly reading and understanding this safety guide as well as the specific Company publications for the products considered or selected.

**1.4 User Responsibility:** Due to very wide variety of cylinder applications and cylinder operating conditions, the Company does not warrant that any particular cylinder is suitable for any specific application. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The electromechanical cylinders outlined in this catalog are designed to the Company's design guidelines and do not necessarily meet the design guideline of other agencies such as American Bureau of Shipping, ASME Pressure Vessel Code etc. The user, through its own analysis and testing, is solely responsible for:

- Making the final selection of the cylinders and related accessories.
- Determining if the cylinders are required to meet specific design requirements as required by the Agency(s) or industry standards covering the design of the user's equipment.
- Assuring that the user's requirements are met, OSHA requirements are met, and safety guidelines from the applicable agencies such as but not limited to ANSI are followed and that the use presents no health or safety hazards.
- Providing all appropriate health and safety warnings on the equipment on which the cylinders are used.

**1.5 Additional Questions:** Call the appropriate Company technical service department if you have any questions or require any additional information. See the Company publication for the product being considered or used, or call 1-847-298-2400, or go to [www.parker.com](http://www.parker.com), for telephone numbers of the appropriate technical service department.

### 2.0 Cylinder and Accessories Selection

**2.1 Seals:** Part of the process of selecting a cylinder is the selection of seal compounds. Before making this selection, consult the "seal information page(s)" of the publication for the series of cylinders of interest.

The application of cylinders may allow fluids such as cutting fluids, wash down fluids etc. to come in contact with the external area of the cylinder. These fluids may attack the piston rod wiper and or the primary seal and must be taken into account when selecting and specifying seal compounds.

Dynamic seals will wear. The rate of wear will depend on many operating factors. Wear can be rapid if a cylinder is misaligned or if the cylinder has been improperly serviced. The user must take seal wear into consideration in the application of cylinders.

**2.2 Piston Rods:** Possible consequences of piston rod failure or separation of the piston rod from the piston include, but are not limited to are:

- Piston rod and or attached load thrown off at high speed.
- High velocity fluid discharge.
- Piston rod extending when pressure is applied in the piston retract mode.

Piston rods or machine members attached to the piston rod may move suddenly and without warning as a consequence of other conditions occurring to the machine such as, but not limited to:

- Unexpected detachment of the machine member from the piston rod.
- Failure of the machine control system.

Piston rods are not normally designed to absorb bending moments or loads which are perpendicular to the axis of piston rod motion. These additional loads can cause the piston rod to fail. If these types of additional loads are expected to be imposed on the piston rod, their magnitude should be made known to our engineering department.

The cylinder user should always make sure that the piston rod is securely attached to the machine member.

The piston rod to piston and the stud to piston rod threaded connections are secured with an anaerobic adhesive. The strength of the adhesive decreases with increasing temperature. Cylinders which can be exposed to temperatures above +250°F (+121°C) are to be ordered with a non studded piston rod and a pinned piston to rod joint.

**2.3 Cylinder Mountings:** Some cylinder mounting configurations may have certain limitations such as but not limited to minimum stroke for side or foot mounting cylinders or pressure de-ratings for certain mounts. Carefully review the catalog for these types of restrictions.

Always mount cylinders using the largest possible high tensile alloy steel socket head cap screws that can fit in the cylinder mounting holes and torque them to the manufacturer's recommendations for their size.

### 3.0 Cylinder and Accessories Installation and Mounting

#### 3.1 Installation

3.1.1 – Cleanliness is an important consideration, and cylinders are shipped with the ports plugged to protect them from contaminants entering the ports. These plugs should not be removed until the piping is to be installed. Before making the connection to the cylinder ports, piping should be thoroughly cleaned to remove all chips or burrs which might have resulted from threading or flaring operations.

3.1.2 – Cylinders operating in an environment where air drying materials are present such as fast-drying chemicals, paint, or weld splatter, or other hazardous conditions such as excessive heat, should have shields installed to prevent damage to the piston rod and piston rod seals.

3.1.3 – Proper alignment of the cylinder piston rod and its mating component on the machine should be checked in both the extended and retracted positions. Improper alignment will result in excessive rod gland and/or cylinder bore wear. On fixed mounting cylinders attaching the piston rod while the rod is retracted will help in achieving proper alignment.

#### 3.2 Mounting Recommendations

3.2.1 – Always mount cylinders using the largest possible high tensile alloy steel socket head screws that can fit in the cylinder mounting holes and torque them to the manufacturer's recommendations for their size.

3.2.2 – Side-Mounted Cylinders – In addition to the mounting bolts, cylinders of this type should be equipped with thrust keys or dowel pins located so as to resist the major load.

3.2.3 – Tie Rod Mounting – Cylinders with tie rod mountings are recommended for applications where mounting space is limited. Nuts used for this mounting style should be torqued to the same value as the tie rods for that bore size.

3.2.4 – Flange Mount Cylinders – The controlled diameter of the rod gland extension on head end flange mount cylinders can be used as a pilot to locate the cylinders in relation to the machine. After alignment has been obtained, the flanges may be drilled for pins or dowels to prevent shifting.

3.2.5 – Trunnion Mountings – Cylinders require lubricated bearing blocks with minimum bearing clearances. Bearing blocks should be carefully aligned and rigidly mounted so the trunnions will not be subjected to bending moments. The rod end should also be pivoted with the pivot pin in line and parallel to axis of the trunnion pins.

3.2.6 – Clevis Mountings – Cylinders should be pivoted at both ends with center line of pins parallel to each other. After cylinder is mounted, be sure to check to assure that the cylinder is free to swing through its working arc without interference from other machine parts.

### 4.0 Cylinder and Accessories Maintenance, Troubleshooting and Replacement

**4.1 Storage:** At times cylinders are delivered before a customer is ready to install them and must be stored for a period of time. When storage is required the following procedures are recommended.

4.1.1 – Store the cylinders in an indoor area which has a dry, clean and noncorrosive atmosphere. Take care to protect the cylinder from both internal corrosion and external damage.

4.1.2 – Whenever possible cylinders should be stored in a vertical position (piston rod up). This will minimize corrosion due to possible condensation which could occur inside the cylinder. This will also minimize seal damage.

4.1.3 – Port protector plugs should be left in the cylinder until the time of installation.

4.1.4 – If a cylinder is stored full of hydraulic fluid, expansion of the fluid due to temperature changes must be considered. Installing a check valve with free flow out of the cylinder is one method.

4.1.5 – When cylinders are mounted on equipment that is stored outside for extended periods, exposed unpainted surfaces, e.g. piston rod, must be coated with a rust-inhibiting compound to prevent corrosion.

#### 4.2 Cylinder Trouble Shooting

##### 4.2.1 – External Leakage

4.2.1.1 – Rod seal leakage can generally be traced to worn or damaged seals. Examine the piston rod for dents, gouges or score marks, and replace piston rod if surface is rough.

Rod seal leakage could also be traced to bearing wear. If clearance is excessive, replace rod bearing and seal. Rod seal leakage can also be traced to seal deterioration. If seals are soft or gummy or brittle, check compatibility of seal material with lubricant used if air cylinder, or operating fluid if hydraulic cylinder. Replace with seal material, which is compatible with these fluids. If the seals are hard or have lost elasticity, it is usually due to exposure to temperatures in excess of 165°F. (+74°C). Shield the cylinder from the heat source to limit temperature to 350°F. (+177°C.) and replace with fluorocarbon seals.

4.2.1.2 – Cylinder body seal leak can generally be traced to a loose head. Torque the head to manufacturer's recommendation for that bore size.

Excessive pressure can also result in cylinder body seal leak. Determine maximum pressure to rated limits. Replace seals and retorque head as in paragraph above. Excessive pressure can also result in cylinder body seal leak. Determine if the pressure rating of the cylinder has been exceeded. If so, bring the operating pressure down to the rating of the cylinder and have the head replaced.

Pinched or extruded cylinder body seal will also result in a leak. Replace cylinder body seal and retorque as in paragraph above.

Cylinder body seal leakage due to loss of radial squeeze which shows up in the form of flat spots or due to wear on the O.D. or I.D. – Either of these are symptoms of normal wear due to high cycle rate or length of service. Replace seals as per paragraph above.

#### 4.3 Erratic or Chatter Operation

4.3.1 – Excessive friction at rod bearing or piston bearing due to load misalignment – Correct cylinder-to-load alignment.

4.3.2 – Cylinder sized too close to load requirements – Reduce load or install larger cylinder.

4.3.3 – Erratic operation could be traced to the difference between static and kinetic friction. Install speed control valves to provide a back pressure to control the stroke.

#### 4.4 Cylinder Modifications, Repairs, or Failed Component:

Cylinders as shipped from the factory are not to be disassembled and or modified. If cylinders require modifications, these modifications must be done at company locations or by the Company's certified facilities. The Industrial Cylinder Division Engineering Department must be notified in the event of a mechanical fracture or permanent deformation of any cylinder component (excluding seals). This includes a broken piston rod, head, mounting accessory or any other cylinder component. The notification should include all operation and application details. This information will be used to provide an engineered repair that will prevent recurrence of the failure.

It is allowed to disassemble cylinders for the purpose of replacing seals or seal assemblies. However, this work must be done by strictly following all the instructions provided with the seal kits.

# Offer of Sale

The items described in this document and other documents or descriptions provided by Parker, its subsidiaries and its authorized distributors are hereby offered for sale at prices to be established by Parker Hannifin Corporation, its subsidiaries and its authorized distributors. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any such item, when communicated to Parker, its subsidiary or an authorized distributor ("Seller") verbally or in writing, shall constitute acceptance of this offer.

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and not withstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

8. Buyer's Property: Any designs, tools, patterns, materials, drawings confidential information or equipment furnished by Buyer, or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

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12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder of this Agreement may be brought by either party more than two (2) years after the cause of action accrues.



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# EM Sales Offices

## Australia

### **Parker Hannifin (Australia) Pty Ltd.**

9 Carrington Road  
Castle Hill NSW 2154  
Australia

Tel: +61 (0) 2 9634-7777  
Fax: +61 (0) 2 9634 3749

## Brazil

### **Parker Hannifin Ind. Com Ltda.**

Av. Lucas Nogueira Garcez 2181  
Esperança  
12325-900 Jacareí, SP

Tel: 12 3954 5100  
Fax: 12 3954 5262  
Email: automation.brazil@parker.com

## Canada

### **Parker Hannifin (Canada) Inc.**

160 Chisholm Dr  
Milton, Ontario L9T 3G9

Tel: 905-693-3000  
Fax: 905-876-1958  
Email: miltoncustservice@parker.com

## China

### **Parker Hannifin Motion & Control**

(Shanghai) Co., Ltd  
280 Yunqiao Rd. Jin Qiao Export  
Processing Zone  
Shanghai 201206, China  
Tel: (86-21) 50312525  
Fax: (86-21) 64459717

## France

### **Parker SSD Parvex**

8 avenue du Lac  
B.P. 249  
F-21007 Dijon Cedex  
Tel: +33 (0) 3 80 42 41 40  
Fax: +33 (0) 3 80 42 41 23

## Germany

### **Electromechanical Europe Parker Hannifin GmbH & Co KG**

Robert-Bosch-Strasse 22  
D-77656 Offenburg  
Germany  
Tel: +49 (0) 781 509 0  
Fax: +49 (0) 781 509 98176  
Email: em-motion@parker.com

## India

### **Parker Hannifin India Pvt. Ltd Automation Group-SSD Drives Div.**

133 & 151 Developed Plots Estate  
Perungudi, Chennai 600 096

Tel: 044-4391-0799  
Fax: 044-4391-0700

## Italy

### **Parker Hannifin SpA**

Via Gounod 1  
20092 Cinsello Balsamo  
Milano, Italy

Tel: +39 02 361081  
Fax: +39 02 36108400  
Email: em-motion@parker.com

## Korea

### **Parker Hannifin Korea**

9th Floor KAMCO Yangjae Tower  
949-3 Dogok 1-dong Gangnam-gu

Seoul 135-860, Korea  
Tel: 82-2-559-0454  
Fax: 82-2-556-8187

## Mexico

### **Parker Hannifin de Mexico**

Eje uno Norte No.100  
Parque Industrial Toluca 2000  
Toluca, CP 50100 México  
Tel: 52-722-275-4200  
Fax: 52-722-279-0316

## Singapore

### **Parker Hannifin Singapore Pte Ltd**

11, Fourth Chin Bee Road  
Singapore 619702  
Tel: (65) 6887 6300  
Fax: (65) 6265 5125/6261 4929

## Taiwan

### **Parker Hannifin Taiwan Co., Ltd**

No. 40, Wuchiuan 3rd Road  
Wuku Industrial Park  
Taipei County, Taiwan 248  
ROC  
Tel: 886 2 2298 8987  
Fax: 886 2 2298 8982

## Thailand

### **Parker Hannifin (Thailand) Co., Ltd.**

1265 Rama 9 Road  
Suanluang, Bangkok 10250  
Thailand

Tel: (66) 2 186 7000  
Fax: (66) 2 374 1645

## UK

### **Parker Hannifin Ltd.**

Tachbrook Park Drive  
Tachbrook Park  
Warwick CV34 6TU  
Tel: +44 (0) 1926 317970  
Fax: +44 (0) 1926 317980

## USA

### **Parker Hannifin Electromechanical Automation Division Main Office**

5500 Business Park Drive  
Rohnert Park, CA 94928 USA  
Tel: 707-584-7558  
800-358-9070  
Fax: 707-584-8015  
Email: emn\_support@parker.com

### **Parker Hannifin Electromechanical Automation Division**

1140 Sandy Hill Road  
Irwin, PA 15642  
Tel: 724-861-8200  
800-245-6903  
Fax: 724-861-3330  
Email: emn\_support@parker.com

