aerospace
climate control
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filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

Series XFC

Extreme Force Electric Cylinder

Parker

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.

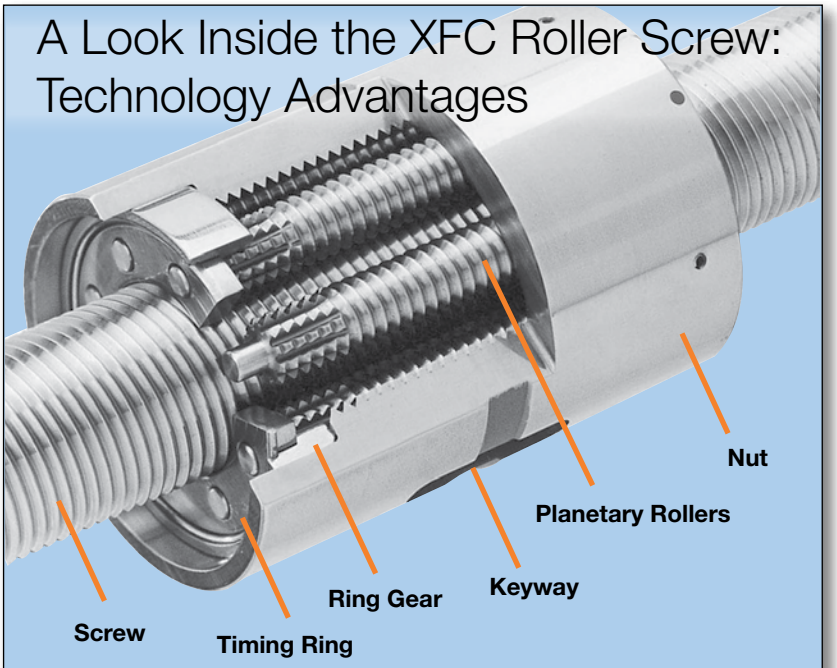
Anti-Rotation

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.

A Look Inside the XFC Roller Screw: Technology Advantages



Planetary roller screws offer distinct benefits over traditional ball screw and lead screw mechanisms, and add features not easily attainable with hydraulic or pneumatic linear devices.

A planetary roller screw transmits rotary motion into linear motion similar to a ball or lead screw. The key difference in the roller screw design is the use of planetary rollers in place of ball bearings as the primary rolling elements.

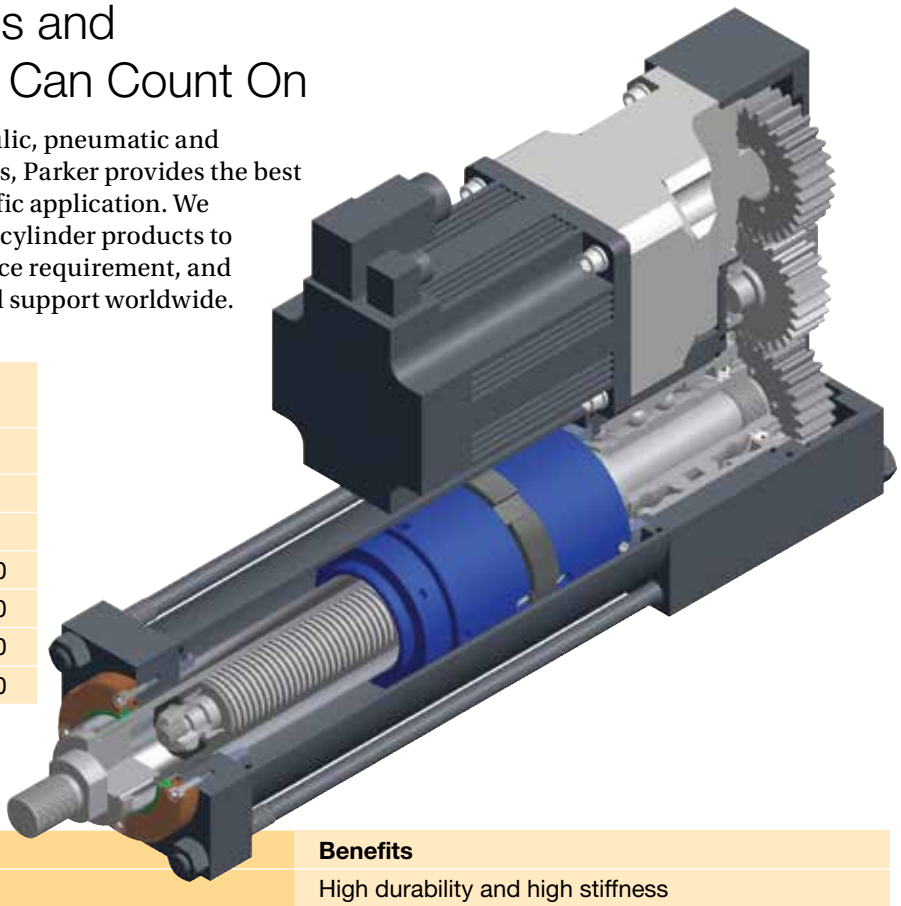
The planetary rollers provide an increased number of contact surfaces between the external screw shaft and the internal threads of the roller nut relative to traditional ball or lead screw technology. The expanded number of contact points allow for:

- **Enhanced thrust capacity— 5X more thrust!**
- **Enhanced load carrying capabilities**
- **Higher speeds than traditional hydraulic cylinders**
- **Greatly extended life — 10X longer life!**

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.



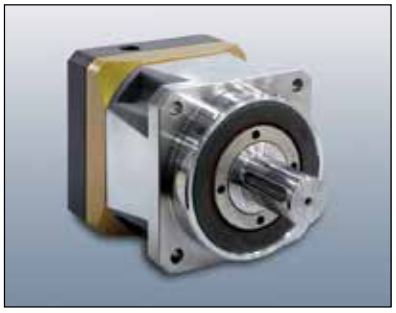
XFC Frame Size	Continuous Thrust Force	
	kN	lb
075	20.0	4,500
090	33.4	7,500
115	53.4	12,000
140	80.0	17,500
165	120.0	26,500
190	178.0	40,000

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 (lbs)	20 (4,500)	34 (7,500)	54 (12,000)	80 (17,500)	120 (26,500)	178 (40,000)
Maximum Thrust	kN (lbs)	40 (9,000)	68 (15,000)	108 (24,000)	160 (35,000)	240 (53,000)	356 (80,000)
Maximum Acceleration	mm/sec^2 (in/sec^2)	19,600 (773)	19,600 (773)	19,600 (773)	19,600 (773)	19,600 (773)	19,600 (773)
Maximum Stroke [1]	mm (in)	1150 (55.12)	1700 (66.93)	2,000 (78.75)	2,000 (78.75)	2,000 (78.75)	2,000 (78.75)
Recommended Maximum Stroke Length of Unsupported Cylinder [2]	mm (in)	750 (29.53)	750 (29.53)	750 (29.53)	1,000 (39.37)	1,000 (39.37)	1,250 (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 (in)	0.08 (0.003)	0.08 (0.003)	0.08 (0.003)	0.08 (0.003)	0.13 (0.005)	0.13 (0.005)
Repeatability	mm (in)	0.03 (0.001)	0.03 (0.001)	0.03 (0.001)	0.03 (0.001)	0.05 (0.002)	0.05 (0.002)
Backlash	mm (in)	0.03 (0.001)	0.03 (0.001)	0.03 (0.001)	0.03 (0.001)	0.03 (0.001)	0.03 (0.001)

Screw Characteristics

XFC Size	Screw Diameter mm	Standard Lead [1] mm (in)/rev	Efficiency %	Ca Rating kN (lbf)	Thrust Tube Torque mN-m/N (lb-in/lbf)	Max. Speed [2] mm/sec (in/sec)
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)

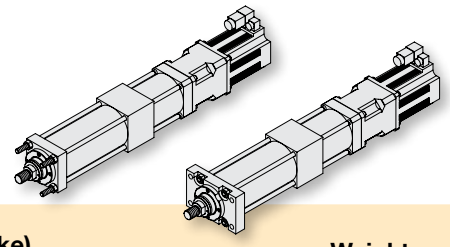
1) Consult factory for availability of non-standard leads
2) Speed is stroke dependant, see page 9 for speed/stroke chart

Cylinder Temperature Rating*

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

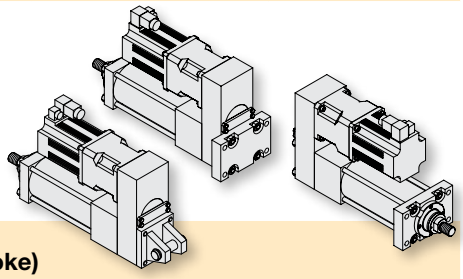
* Verify motor and gear box performance at higher temperatures.

Cylinder Weight — kg (lb)



Inline Configurations

XFC Frame Size	Base Weight with Mount (at Zero Stroke)				Weight (Per 100 mm Stroke)
	J Front Flange	C Foot	D Trunnion	K 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 Frame Size	Base Weight with Mount (at Zero Stroke)						Weight (Per 100 mm Stroke)
	J Front Flange	C Foot	D Trunnion	K, L, M Extended Tie Rod	H Rear Flange	B 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.

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

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

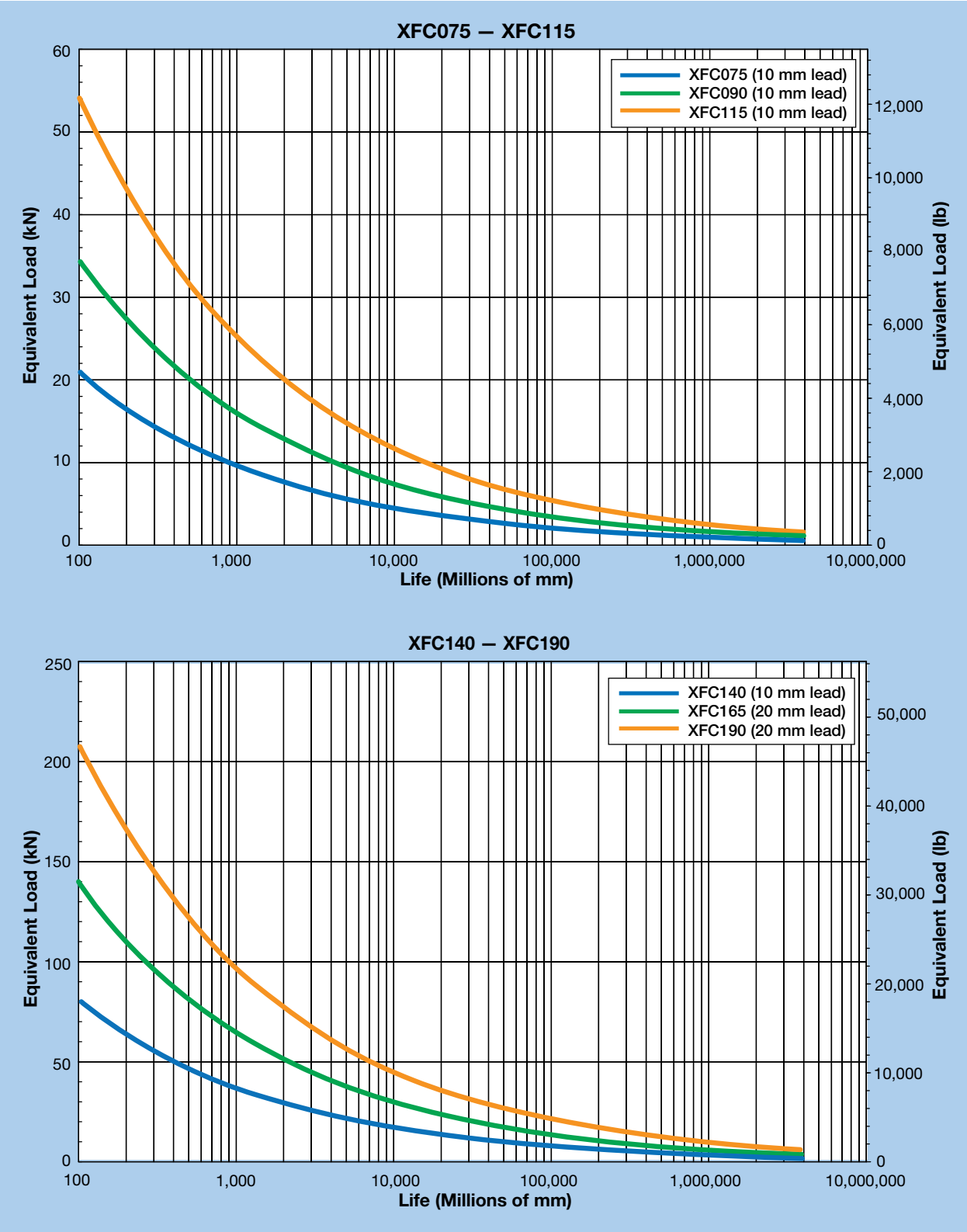
For PS Series gearhead inertia information, see: www.parkermotion.com

XFC Inertia I (kg-m^2)

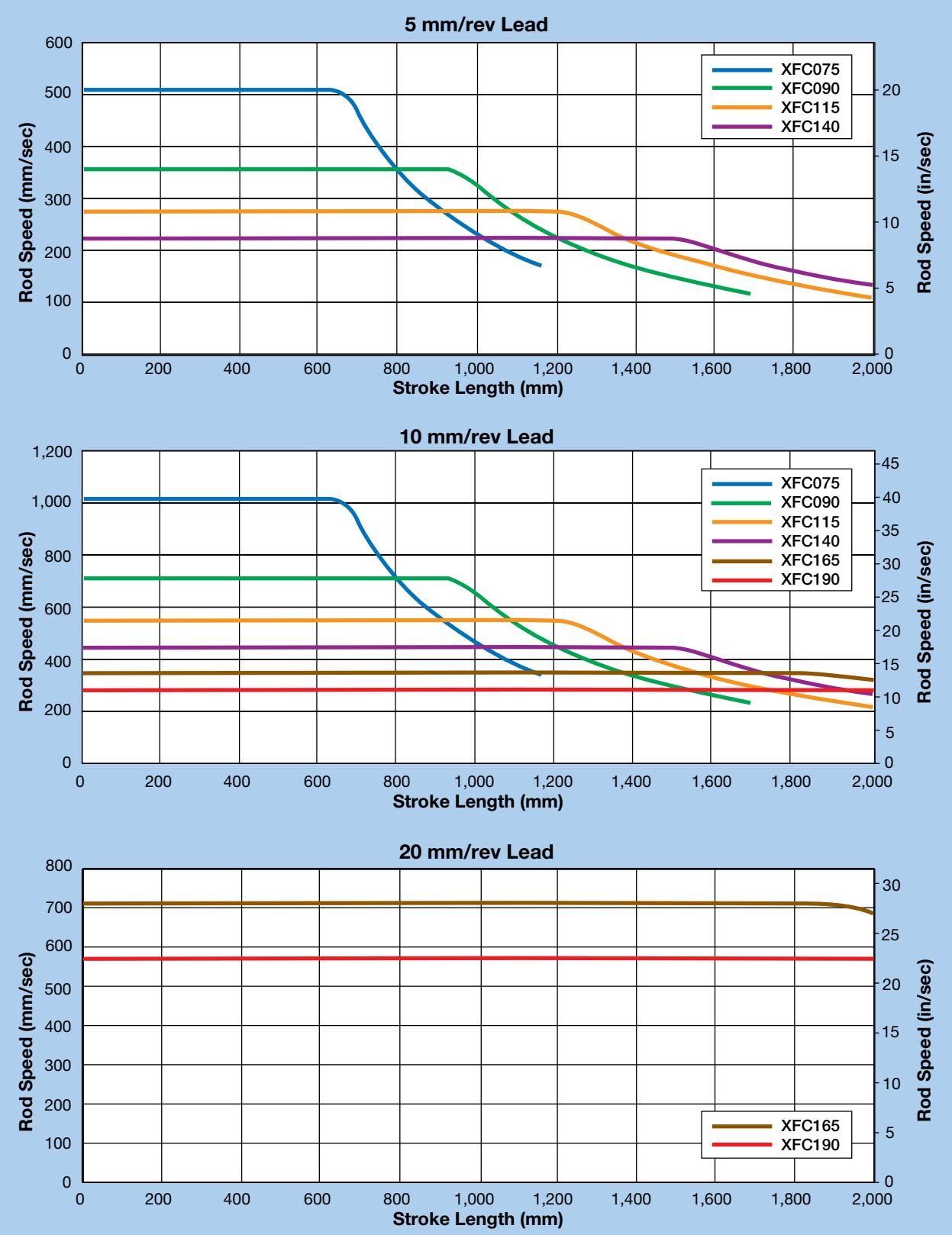
XFC Size	Inline (Zero Stroke)	Parallel (Zero Stroke)	Stroke (Per 100 mm)
075	0.00008903	0.00037951	0.00001499
090	0.00031974	0.00089394	0.00006242
115	0.00107620	0.00349671	0.00017800
140	0.00229637	0.00923002	0.00040900
165	0.00655544	0.02428162	0.00099900
190	0.02702120	0.05552601	0.00244000

XFC Product Overview

Life Charts



Maximum Speed Charts

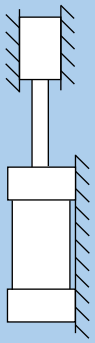


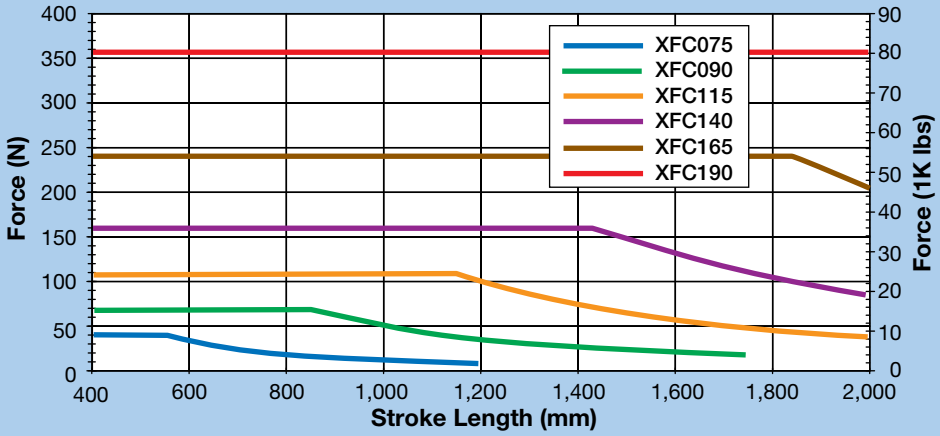
XFC Product Overview

Buckling Strength Charts

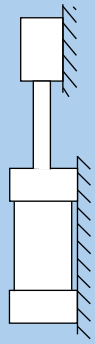
The buckling strength of the cylinder is the maximum compressive load able to be exerted through the cylinder. These values are a function of the screw and thrust tube size and do not account for specific motor or gearbox performance. The force value from the specific mounting class and length of stroke should not be exceeded to ensure safe mechanical performance. Tension loads are not subject to buckling strength restrictions.

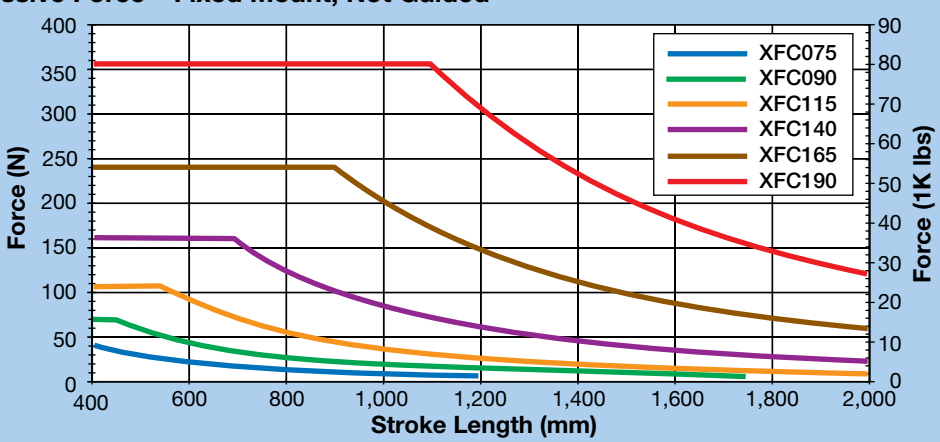
Maximum Compressive Force – Fixed Mount, Guided



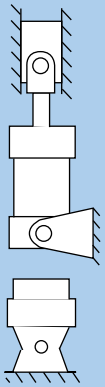


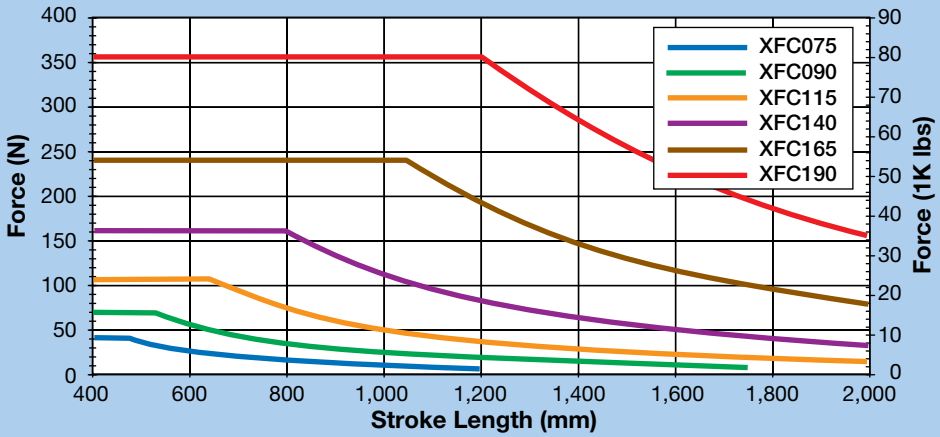
Maximum Compressive Force – Fixed Mount, Not Guided





Maximum Compressive Force – Rear Pivot Mount, Guided





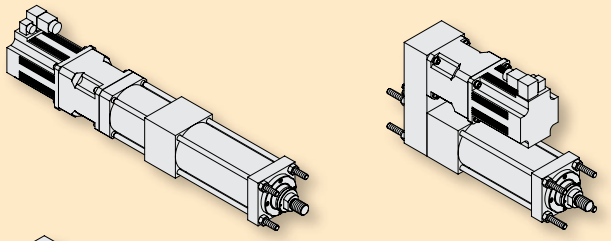
Available Mounts

Inline **Parallel**

K, L, M Extended Tie Rod Mount

Cylinders with Extended Tie Rods are suitable for straight line force applications, and are particularly useful where space is limited.

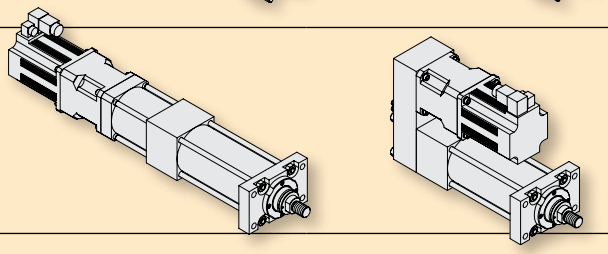
K Front Mount (inline and parallel)
L Rear Mount (parallel only)
M Both Front & Rear Mount (parallel only)



J Integral Front Flange Mount

These cylinders are suitable for use on straight line force transfer applications.

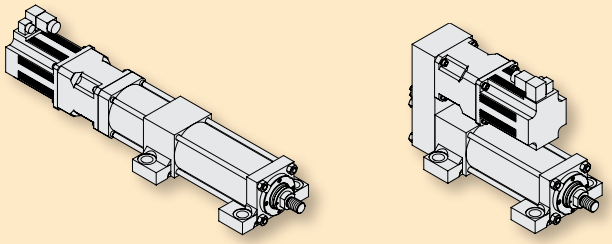
J Front Flange Mount (inline and parallel)



Foot Mount

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.

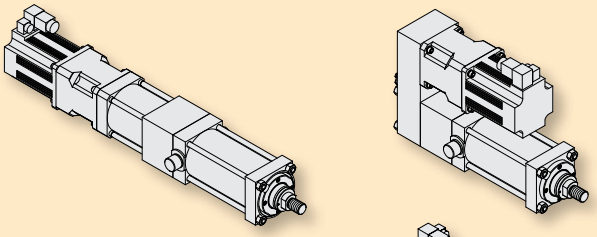
C Foot Mount (inline and parallel)



T Rear Trunnion Mount

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.

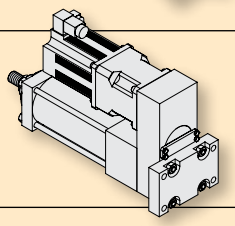
T Rear Trunnion Mount (inline and parallel)



H Rear Flange Mount

These cylinders are suitable for use on straight line force transfer applications.

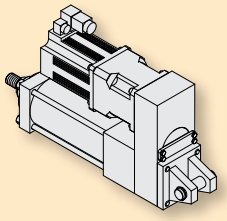
H Rear Flange Mount (parallel only)



B Rear Clevis Mount

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.

B Rear Clevis Mount (parallel only)



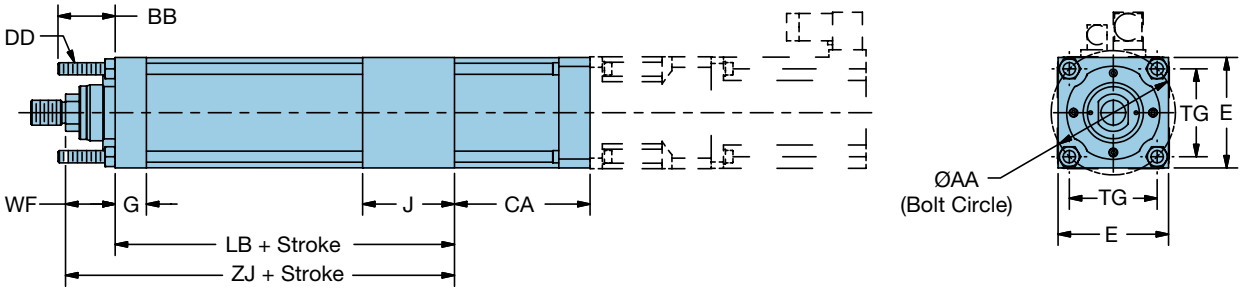
XFC Mount Options

Extended Tie Rod Mount — Inline

Order Code

FIRST ANGLE VIEW PROJECTION

K **Front Extended Tie Rods**



Dimensions — mm (in)

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

Motor/Gearhead

XFC 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

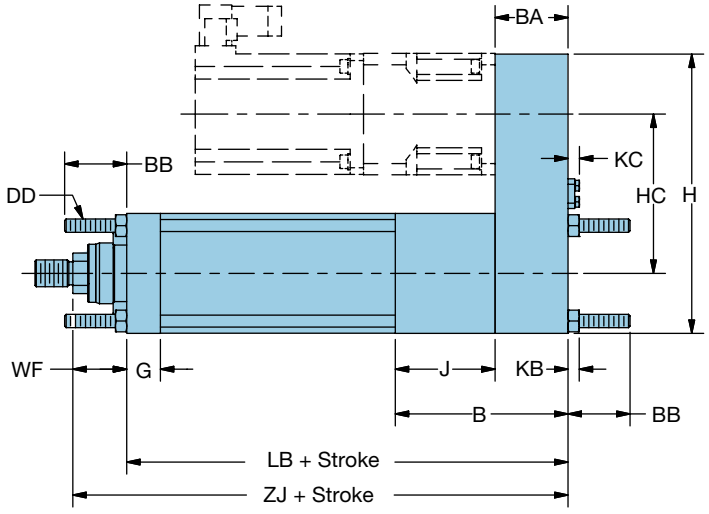
Order Code

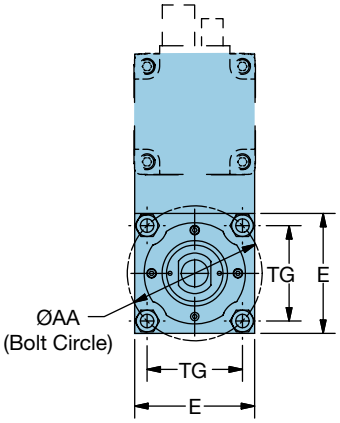
FIRST ANGLE VIEW PROJECTION

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							Add Stroke	
	HC	J	KB	KC	TG	WF	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)

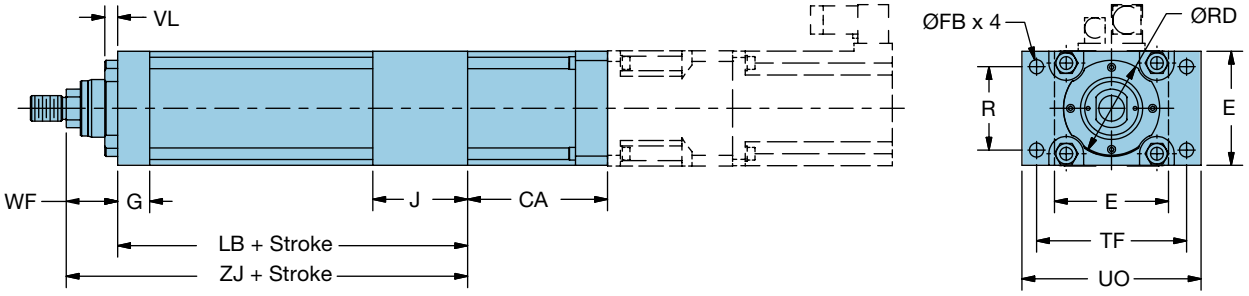
XFC Mount Options

Front Flange Mount — Inline

Order Code

J

FIRST ANGLE VIEW PROJECTION



Dimensions — mm (in)

XFC Size	E	Ø FB	G	J	R	Ø RD_{f8}	TF	UO	VL	WF	Add Stroke LB	Add Stroke ZJ
075	76.2 (3.00)	9 (0.35)	22 (0.87)	62 (2.44)	52 (2.05)	65 (2.559)	105 (4.13)	125 (4.92)	10 (0.39)	38 (1.50)	205.5 (8.09)	243.5 (9.59)
090	88.9 (3.50)	11 (0.43)	25 (0.98)	74 (2.91)	65 (2.56)	75 (2.953)	117 (4.61)	139.7 (5.50)	10 (0.39)	40 (1.57)	248 (9.76)	288 (11.34)
115	114.3 (4.50)	14 (0.55)	30 (1.18)	91 (3.58)	83 (3.27)	95 (3.740)	149 (5.87)	175 (6.89)	12 (0.47)	45 (1.77)	293 (11.54)	338 (13.31)
140	139.7 (5.50)	18 (0.71)	35 (1.38)	108 (4.25)	107 (4.21)	110 (4.331)	172 (6.77)	210 (8.27)	12 (0.47)	45 (1.77)	348 (13.70)	393 (15.47)
165	165.1 (6.50)	21 (0.83)	40 (1.57)	123 (4.84)	120 (4.72)	135 (5.315)	215 (8.46)	260 (10.24)	14 (0.55)	60 (2.36)	417 (16.42)	477 (18.78)
190	190.5 (7.50)	22 (0.87)	50 (1.97)	152 (5.98)	155 (6.10)	155 (5.315)	253 (9.96)	300 (11.81)	16 (0.63)	62 (2.44)	503 (19.80)	565 (22.24)

Motor/Gearhead

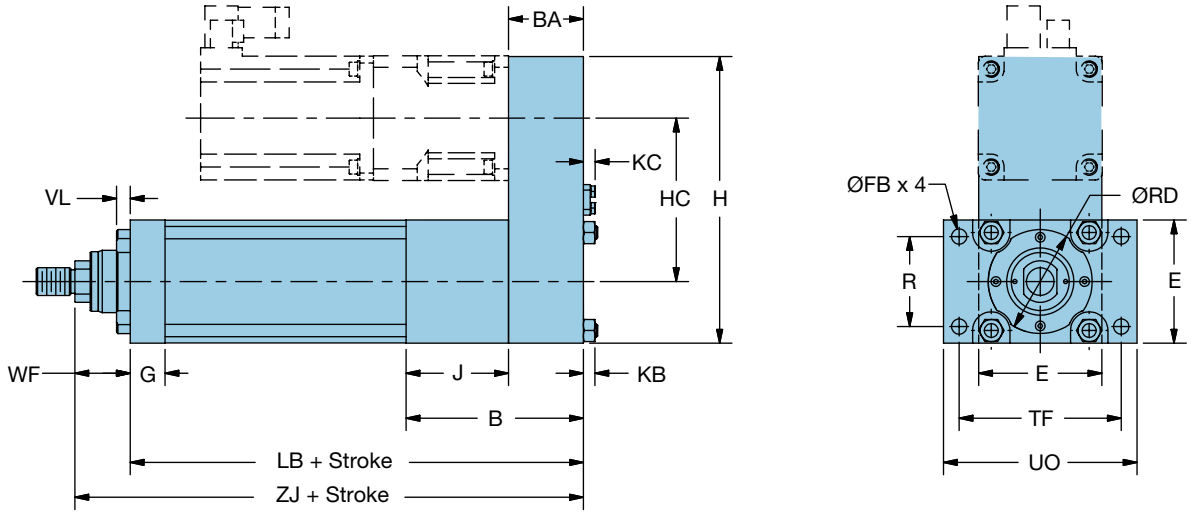
XFC Size	Dimension CA PS090	PS115	PS142	PS180	PS220	MPP115	MPP142	MPP190	MPP270
075	113 (4.45)	115 (4.53)	—	—	—	98 (3.86)	109 (4.29)	—	—
090	115 (4.53)	117 (4.61)	—	—	—	100 (3.94)	111 (4.37)	—	—
115	—	130 (5.12)	158 (6.22)	—	—	—	113 (4.45)	136 (5.35)	—
140	—	—	161 (6.34)	190 (7.48)	—	—	—	139 (5.47)	—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

Front Flange Mount — Parallel

Order Code

FIRST ANGLE VIEW PROJECTION

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	KC	R	Ø RD_{f8}	TF	UO	VL	WF	Add Stroke LB	Add Stroke 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)

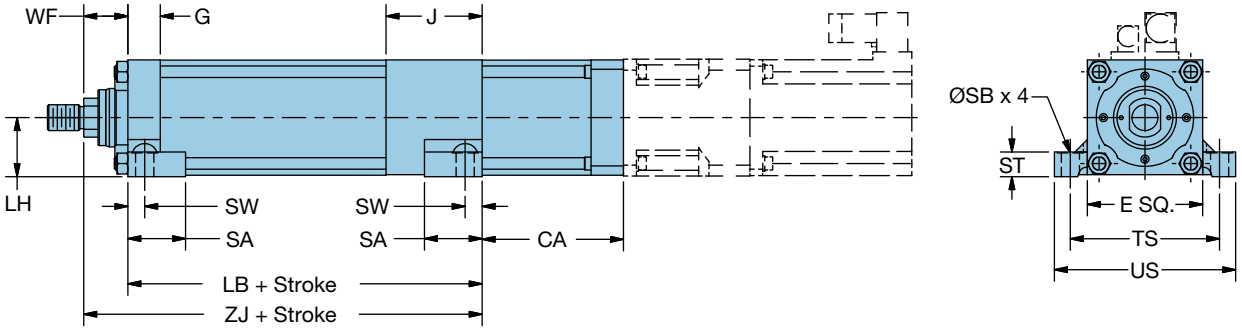
XFC Mount Options

Foot Mount — Inline

Order Code

C

FIRST ANGLE VIEW PROJECTION



Dimensions — mm (in)

XFC Size	E	G	J	LH_{h10}	SA	ØSB	ST	SW	TS	US	WF	Add Stroke LB	Add Stroke ZJ
075	76.2 (3.00)	22 (0.87)	62 (2.44)	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)	205.5 (8.09)	243.5 (9.59)
090	88.9 (3.50)	25 (0.98)	74 (2.91)	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)	248 (9.76)	288 (11.34)
115	114.3 (4.50)	30 (1.18)	91 (3.58)	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)	293 (11.54)	338 (13.31)
140	139.7 (5.50)	35 (1.38)	108 (4.25)	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)	348 (13.70)	393 (15.47)
165	165.1 (6.50)	40 (1.57)	123 (4.84)	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)	417 (16.42)	477 (18.78)
190	190.5 (7.50)	50 (1.97)	152 (5.98)	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)	503 (19.80)	565 (22.24)

Motor/Gearhead

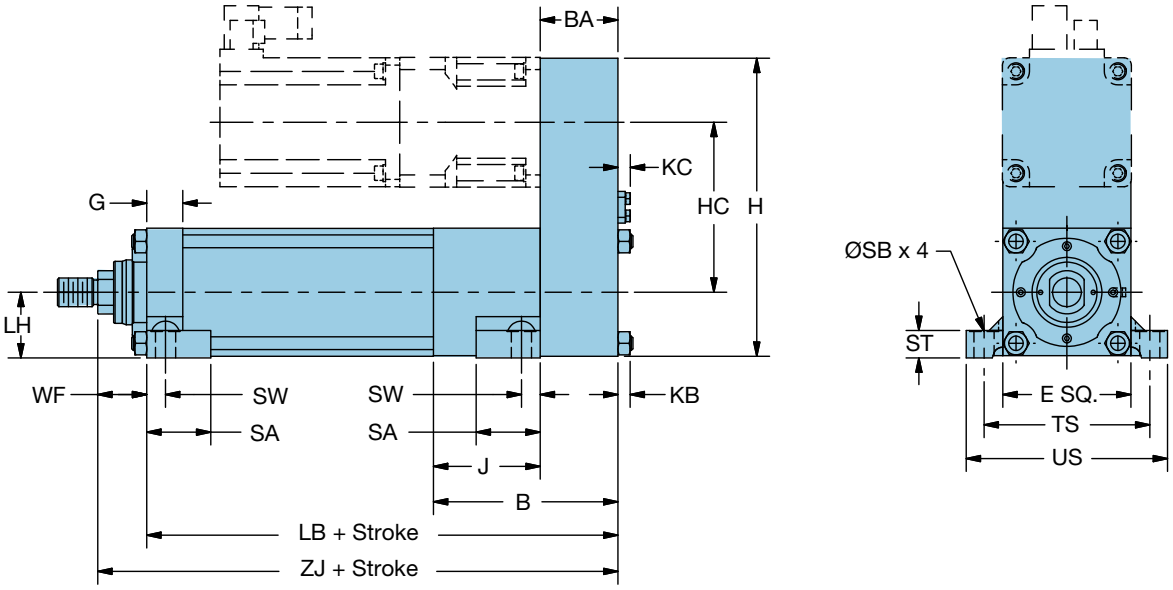
XFC Size	Dimension CA PS090	PS115	PS142	PS180	PS220	MPP115	MPP142	MPP190	MPP270
075	113 (4.45)	115 (4.53)	—	—	—	98 (3.86)	109 (4.29)	—	—
090	115 (4.53)	117 (4.61)	—	—	—	100 (3.94)	111 (4.37)	—	—
115	—	130 (5.12)	158 (6.22)	—	—	—	113 (4.45)	136 (5.35)	—
140	—	—	161 (6.34)	190 (7.48)	—	—	—	139 (5.47)	—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

Foot Mount — Parallel

Order Code

C

FIRST ANGLE VIEW PROJECTION



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	LH_{h10}	SA	ØSB	ST	SW	TS	US	WF	Add Stroke LB	Add Stroke 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)

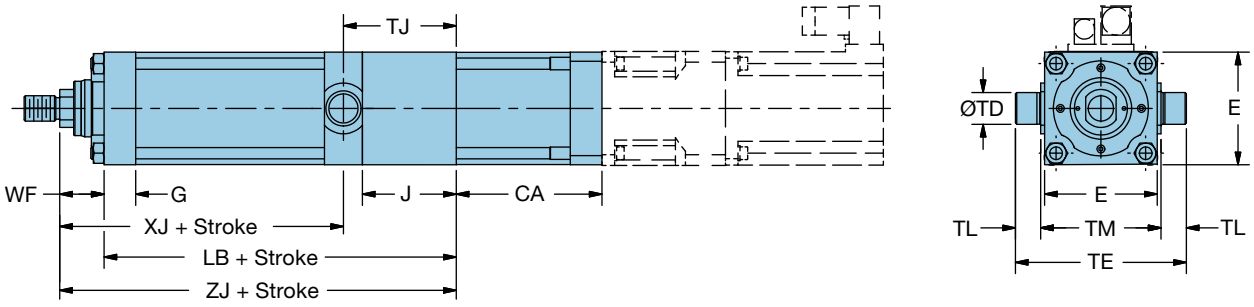
XFC Mount Options

Rear Trunnion Mount — Inline

Order Code

T

FIRST ANGLE VIEW PROJECTION



Dimensions — mm (in)

XFC Size	E	G	J	TJ	Ø TD_{f8}	TL	TE	TM	WF	Add Stroke LB	Add Stroke XJ	Add Stroke ZJ
075	76.2 (3.00)	22 (0.87)	62 (2.44)	74.5 (2.93)	20 (0.787)	16 (0.63)	112 (4.41)	80 (3.15)	38 (1.50)	205.5 (8.09)	169 (6.65)	243.5 (9.59)
090	88.9 (3.50)	25 (0.98)	74 (2.91)	89 (3.50)	25 (0.984)	20 (0.79)	135 (5.32)	95 (3.74)	40 (1.57)	248 (9.76)	199 (7.83)	288 (11.34)
115	114.3 (4.50)	30 (1.18)	91 (3.58)	111 (4.37)	32 (1.260)	25 (0.98)	170 (6.69)	120 (4.72)	45 (1.77)	293 (11.54)	227 (8.94)	338 (13.31)
140	139.7 (5.50)	35 (1.38)	108 (4.25)	132 (5.20)	40 (1.575)	32 (1.26)	209.4 (8.244)	145.4 (5.72)	45 (1.77)	348 (13.70)	261 (10.28)	393 (15.47)
165	165.1 (6.50)	40 (1.57)	123 (4.84)	152 (5.98)	50 (1.969)	40 (1.57)	250 (9.84)	170 (6.69)	60 (2.36)	417 (16.42)	325 (12.80)	477 (18.78)
190	190.5 (7.50)	50 (1.97)	152 (5.98)	188 (7.40)	63 (2.480)	50 (1.97)	295.4 (11.63)	195.4 (7.69)	62 (2.44)	503 (19.80)	377 (14.84)	565 (22.24)

Motor/Gearhead

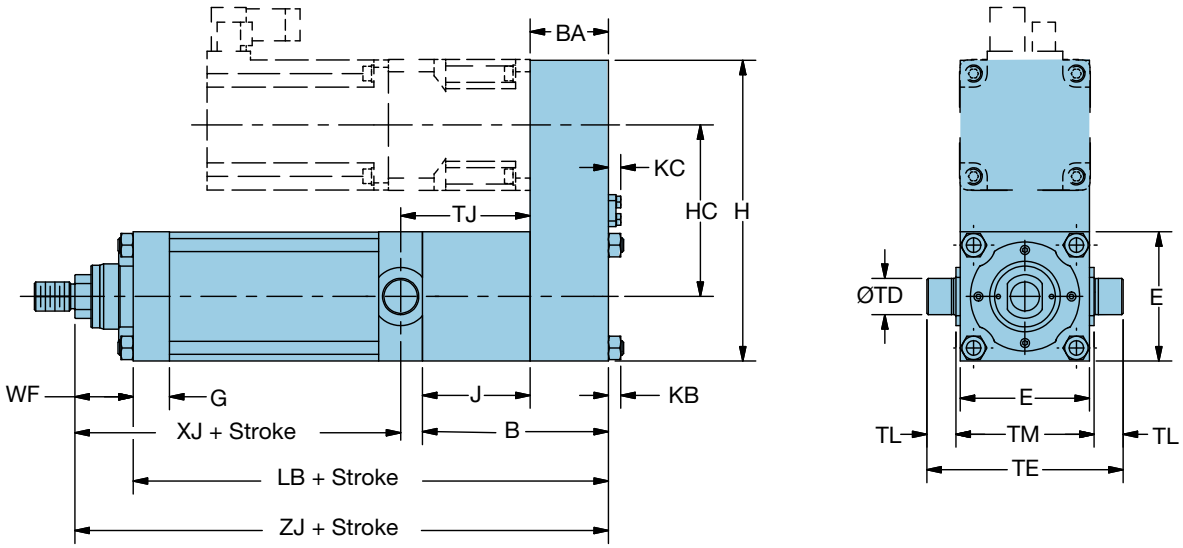
XFC Size	Dimension CA PS090	PS115	PS142	PS180	PS220	MPP115	MPP142	MPP190	MPP270
075	113 (4.45)	115 (4.53)	—	—	—	98 (3.86)	109 (4.29)	—	—
090	115 (4.53)	117 (4.61)	—	—	—	100 (3.94)	111 (4.37)	—	—
115	—	130 (5.12)	158 (6.22)	—	—	—	113 (4.45)	136 (5.35)	—
140	—	—	161 (6.34)	190 (7.48)	—	—	—	139 (5.47)	—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

Rear Trunnion Mount — Parallel

Order Code

T

FIRST ANGLE VIEW PROJECTION



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_{f8}	TL	TE	TM	WF	Add Stroke LB	Add Stroke XJ	Add Stroke 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)

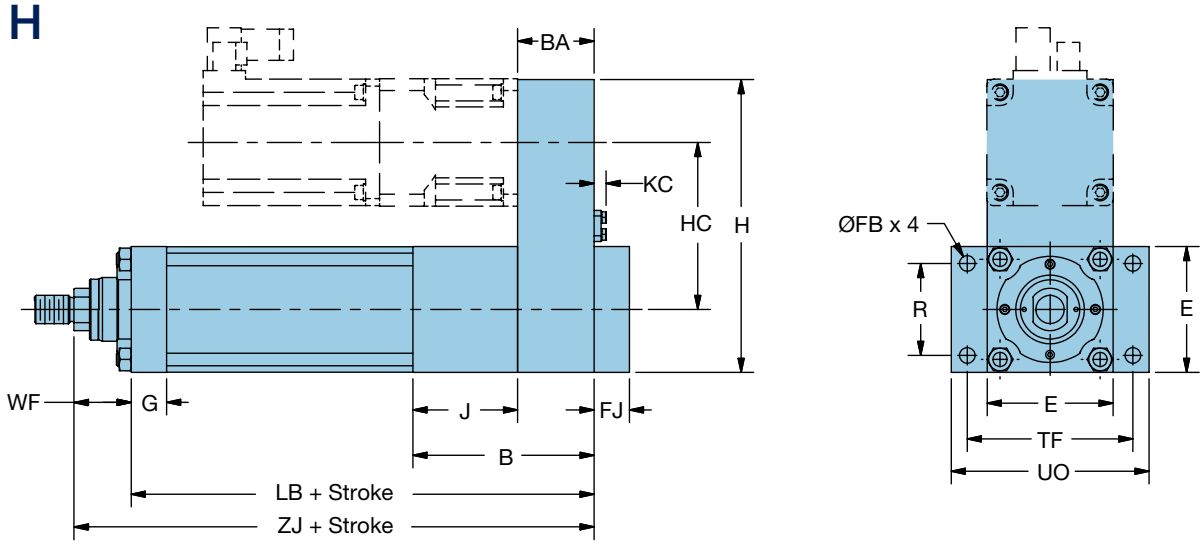
XFC Mount Options

Rear Flange Mount — Parallel Only

Order Code

H

FIRST ANGLE VIEW PROJECTION



Dimensions — mm (in)

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

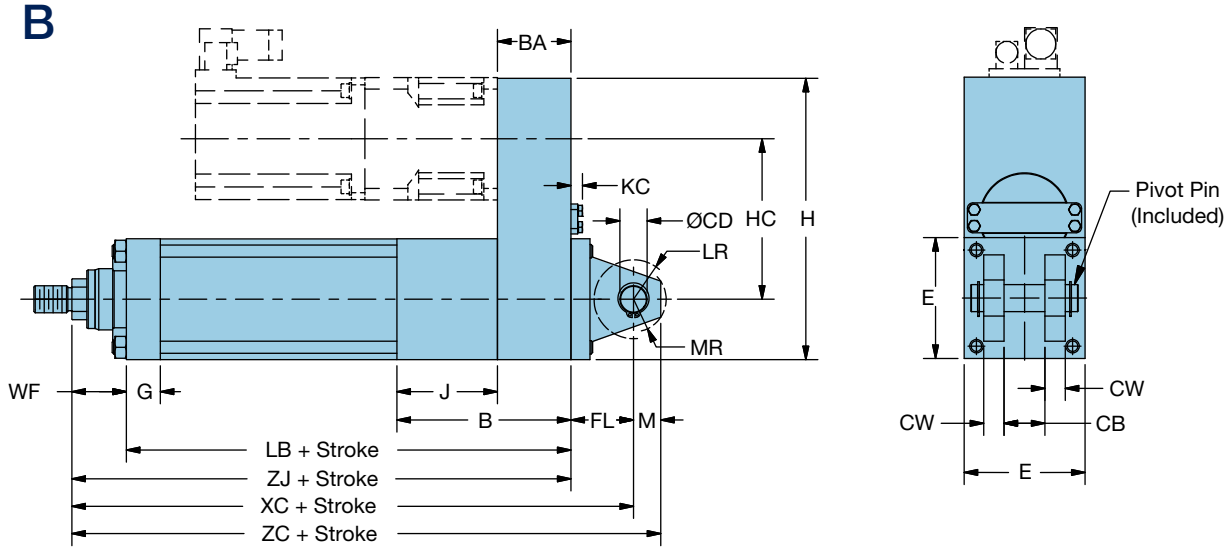
XFC Size	J	KC	R	TF	UO	WF	Add Stroke LB	Add Stroke ZJ
075	62 (2.44)	6.93 (0.27)	52 (2.05)	105 (4.13)	125 (4.92)	38 (1.50)	249.5 (9.82)	287.5 (11.32)
090	74 (2.91)	8.65 (0.34)	65 (2.56)	117 (4.61)	139.7 (5.50)	40 (1.57)	302 (11.89)	342 (13.46)
115	91 (3.58)	10.15 (0.40)	83 (3.27)	149 (5.87)	175 (6.89)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

Rear Clevis Mount — Parallel Only

Order Code

FIRST ANGLE VIEW PROJECTION

B



Dimensions — mm (in)

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

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

XFC Rod End Options & Accessories

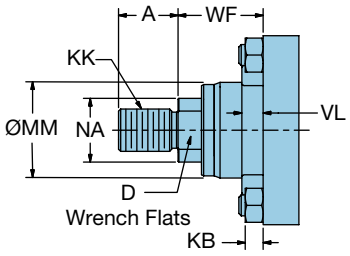
Male Rod End

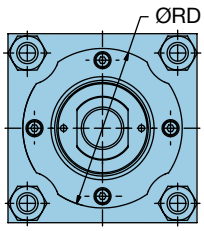
Order Code

FIRST ANGLE VIEW PROJECTION

A **Metric Thread**

B **Imperial Thread**





Dimensions — mm (in)

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

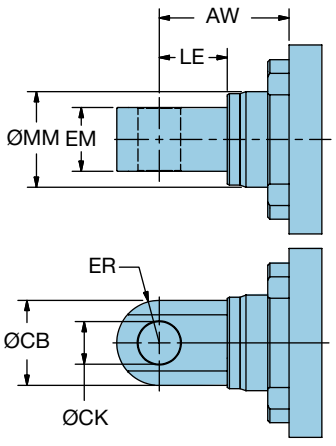
Rod Eye

Order Code

C

Dimensions — mm (in)

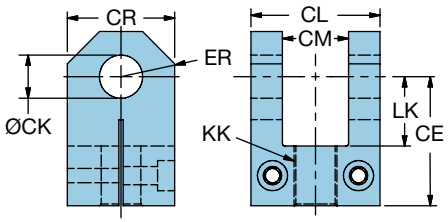
XFC Size	AW	ØCB	$ØCK_{H9}$	EM_{h13}	ER_{MAX}	LE	ØMM
075	48 (1.89)	32 (1.26)	14 (0.551)	20 (0.787)	16 (0.63)	19 (0.75)	36 (1.42)
090	61 (2.40)	40 (1.57)	20 (0.787)	30 (1.181)	20 (0.79)	32 (1.26)	45 (1.77)
115	66 (2.60)	45 (1.77)	20 (0.787)	30 (1.181)	23 (0.89)	32 (1.26)	56 (2.20)
140	73 (2.87)	60 (2.36)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



Mounting Accessories

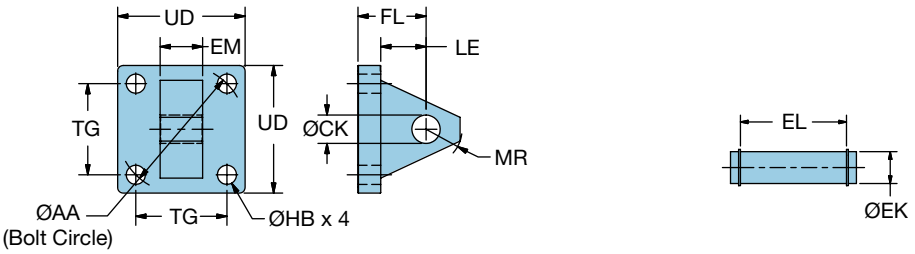
FIRST ANGLE VIEW PROJECTION

Dimensions — mm (in)



Rod Clevis

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



Clevis Bracket

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

Pivot Pin

Part No.	Ø EK_{f8}	EL
1434790000	14 (0.551)	45 (1.77)
1434800000	20 (0.787)	66 (2.60)
1434800000	20 (0.787)	66 (2.60)
1434810000	28 (1.102)	87 (3.43)
1434820000	36 (1.417)	107 (4.21)
1434830000	45 (1.772)	129 (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.

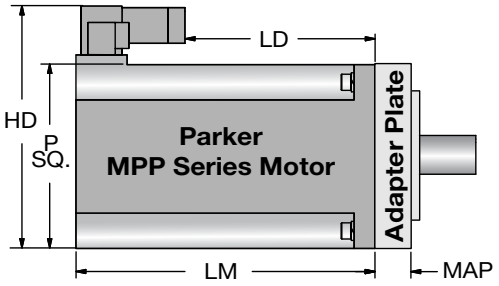
The tables below and on the next page provide information on Parker MPP motors or PS Series gearheads that are appropriate with the XFC.

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						MAP											
						Inline						Parallel					
Size	Length	LM	LD	HD	P	075	090	115	140	165	190	075	090	115	140	165	190
115	2	152.4 (6.00)	89.2 (3.51)	159.0 (6.26)	113.0 (4.45)	0.0	0.0	—	—	—	—			—	—	—	—
	3	177.8 (7.00)	115.2 (4.54)					—	—	—	—	12 (0.47)	12 (0.47)	—	—	—	—
	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)	16 (0.63)	16 (0.63)	16 (0.63)	—	—	—	—	16 (0.63)	16 (0.63)	—	—	—
	4	223.7 (8.81)	160.8 (6.33)						—	—	—	—			—	—	—
	6	274.5 (10.81)	211.9 (8.34)						—	—	—	—			—	—	—
	8	325.3 (12.81)	261.9 (10.31)						—	—	—	—			—	—	—
190	4	224.0 (8.82)	110.3 (4.34)	260.1 (10.24)	184.9 (7.28)	—	—			—	—	—	—			—	—
	6	275.0 (10.83)	161.3 (6.35)			—	—	25 (0.98)	25 (0.98)	—	—	—	—	25 (0.98)	25 (0.98)	—	—
	8	325.3 (12.81)	211.3 (8.32)			—	—			—	—	—	—			—	—
270	6	293.3 (11.55)	175.3 (6.90)	335.9 (13.22)	266.7 (10.50)	—	—	—	30 (1.18)	30 (1.18)	—	—	—	—	—	30 (1.18)	—
	8	344.1 (13.55)	255.5 (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

Motor Brake Option

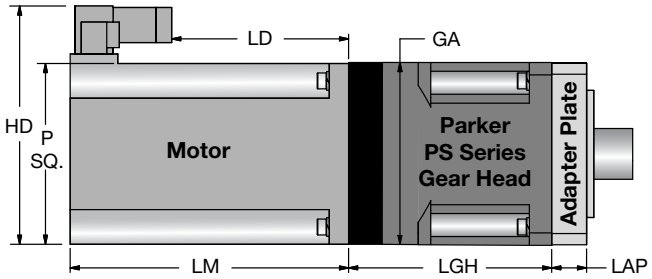
For vertical applications, a static brake should be used to resist back-driving the screw mechanism. A motor brake increases the overall length of the motor as indicated in the chart.

Brake Option Additional Motor Length

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

For specific motor holding torque, refer to MPP motor data at www.parkermotion.com

PS Series Gearheads



Dimensions — mm (in)

Gear size	MPP Motor Size	MPP Motor Length	LM	LD	HD	P	GA	LGH	LAP[1] 075	LAP[1] 090	LAP[1] 115	LAP[1] 140	LAP[1] 165	LAP[1] 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)	—	—	29 (1.14)	5.0 (0.20)	5.0 (0.20)	—
		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)					—	—				—
	142	2	172.9 (6.81)	109.9 (4.33)	188.8 (7.43)	142.7 (5.62)			—	—				—
		4	223.7 (8.81)	160.8 (6.33)					—	—				—
		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)	—	—	—	24 (0.94)	24 (0.94)	0.0
		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)	—	—	—			
		4	223.7 (8.81)	160.8 (6.33)					—	—	—			
		6	274.5 (10.81)	211.9 (8.34)					—	—	—			
		8	325.3 (12.81)	261.9 (10.31)					—	—	—			
	190	4	224.0 (8.82)	110.3 (4.34)	260.1 (10.24)	184.9 (7.28)		192.5 (7.58)	—	—	—			
		6	275.0 (10.83)	161.3 (6.35)					—	—	—			
		8	325.3 (12.81)	211.3 (8.32)					—	—	—			
PS220	190	4	224.0 (8.82)	110.3 (4.34)	260.1 (10.24)	184.9 (7.28)	220 (8.66)	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)	335.9 (13.22)	266.7 (10.50)		252 (9.92)	—	—	—	—	—	
		8	344.1 (13.55)	255.5 (10.06)					—	—	—	—	—	

[1] 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

Compax3 Drive/Controller

Compax3 Power Range

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

[1]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**

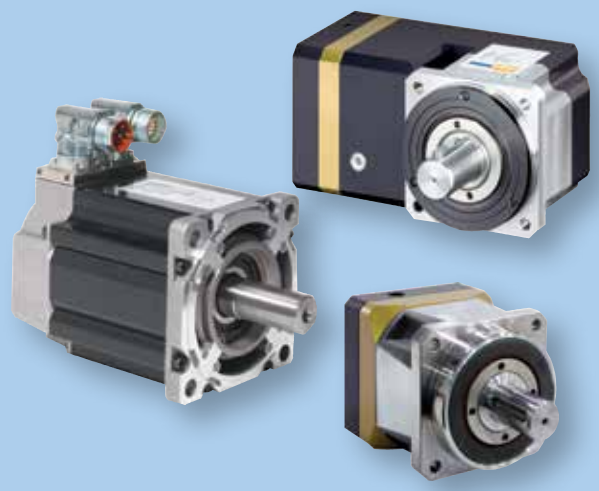
Technologies

- **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, 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.

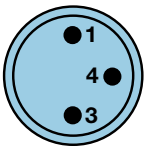
Solid State Switch Ordering Information

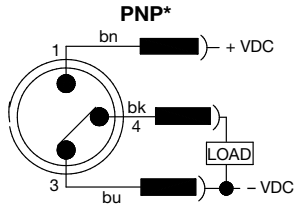
	PNP*		NPN	
	Nomally Open	**Normally Closed**	**Normally Open**	**Normally Closed**
3 m Flying Leads	P8S-GPFIX	P8S-GQFIX	P8S-GNFIX	P8S-GMFIX
10 m Flying Leads	P8S-GPFTX	—	P8S-GNFTX	—
0.3 m Lead with 8 mm connector	P8S-GPSHX	P8S-GQSHX	P8S-GNSHX	P8S-GMSHM
1 m Lead with 8 mm connector	P8S-GPSCX	—	P8S-GNSCX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

*PNP needed for Compax3 Servo Drive.

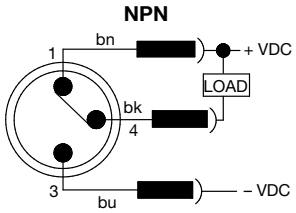
Wiring Connection

Flying Lead or 8 mm Connector (shown)



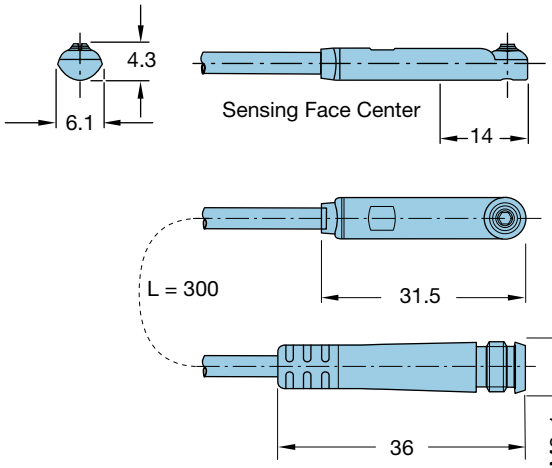


*PNP needed for Compax3 Servo Drive



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

Dimensions — mm



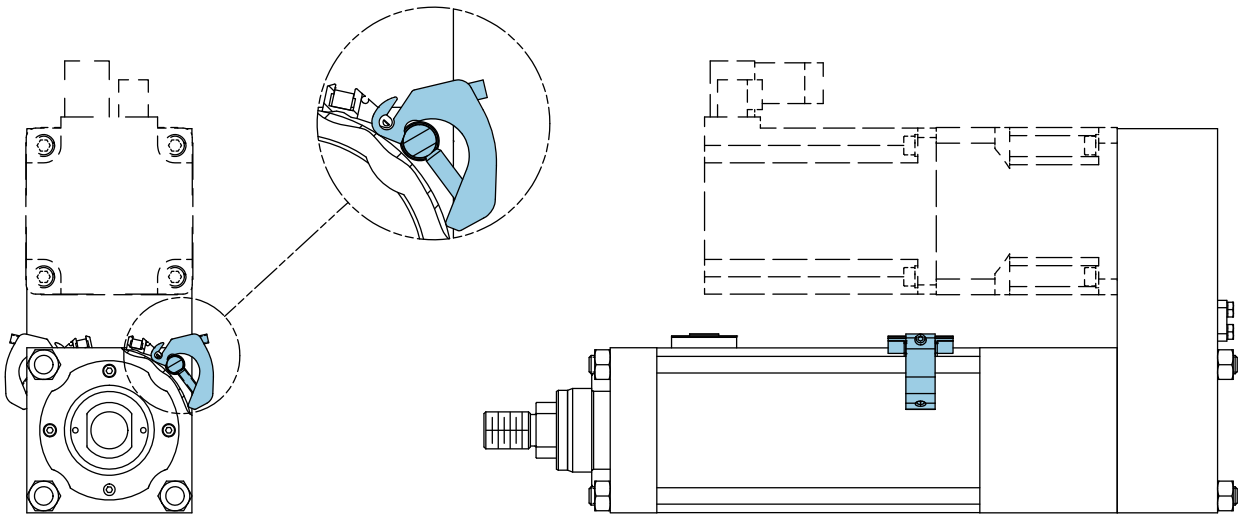
8 mm Threaded Cord Set to Flying Leads

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



XFC Cylinder Sizing

Application Worksheet

Please use this worksheet to provide as much information as possible about your application. Our application engineers will assist you in developing the best solution to meet your requirements.

Email: ddlcat@parker.com Fax: 724-861-3330

Customer Information

Company Name _____
(Or Customer #)

Contact: _____

Phone: _____ **Fax:** _____

E-Mail: _____

Address: _____

_____

Cylinder Information: Qty: _____

Move Distance: Circle one – (in) (mm) _____
or
Overall Stroke: Circle one – (in) (mm) _____

Rod End:
❑ Male ❑ English
❑ Female ❑ Metric
❑ Rod Eye
❑ Other: _____

Mounting
Primary: _____

Secondary: _____

Rod Orientation: Horizontal: ❑ Up Down
Angle: _____ Degrees

Environmental: _____

_____
(Temperature, Humidity, Washdown, etc.)

Application Information:

Circle one:

Force Required: _____ (lbs) (kN)

External Applied Force: _____ (lbs) (kN)

Load/Fixture Weight: _____ (lbs) (kN)

Speed:
Maximum: _____ (in/sec) (mm/sec)

Minimum: _____ (in/sec) (mm/sec)

Move Time: _____ sec

Total Cycle Time: _____ sec

Repeatability: _____ (in) (mm)

Accuracy: _____ (in) (mm)

Load Guided? ❑ Yes ❑ No

Rod Side Loading? ❑ Yes ❑ No
If ues, Value: _____ (lbs) (kN)

Motor Mounting: ❑ Inline ❑ Parallel

AC Drive Power:
❑ 230V / 1 ❑ 50 Hz
❑ 230V / 3 ❑ 60 Hz
❑ 460V / 3
Other: _____

Expected Life: _____ (cycles) (years)

Application Sketch and Notes:

Life Calculations

L_{10} 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)

$$L10 = \left(\frac{Ca}{Fm}\right)^3$$

Life Calculations (millions of mm)

$$L10 = \left(\frac{Ca}{Fm}\right)^3 \times \text{Screw Lead}$$

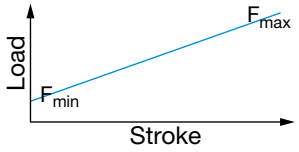
L10 = Life (Millions of Revolutions)
Ca = Basic Dynamic Load Rating (from page 6)
Fm = Equivalent Load (see Load Calculation below)

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:

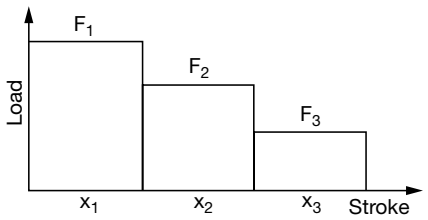
$$F_m = \sqrt[3]{\frac{(F1^3 * x_1) + (F_2{}^3 * x_2) + (F_1{}^3 * x_3) + (Fn^3 * x_n) + \ldots}{(x_1 + x_2 + x_3 + x_n) + \ldots}}$$

F_m = Equivalent load used for life calculations
F_n = Force exerted over segment of distance x_n
x_n = Distance over which F_n 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:

$$F_m = \sqrt[3]{\frac{(5kn^3 * 100mm) + (10kn^3 * 100mm) + (5kn^3 * 100mm)}{(100mm + 100mm + 100mm)}}$$



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

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

Total Thrust = $F_t = F_a + F_g + F_f$

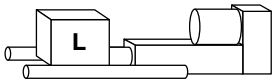
Definitions:

F_t	Total (maximum) Thrust Force (N, lb)
F_f	Friction Force (N, lb)
F_g	Force of Gravity (N, lb)
F_a	Acceleration Thrust (N, lb)
α	Angle of Inclination (see Angular Cylinder Orientation illustration below)
μ_s	Coefficient of Sliding Friction (see chart below)
L	Actual Weight (N, lb)
g	Acceleration Due to Gravity (9800 mm/sec^2, 386 in/sec^2)
V	Velocity (mm/sec, inch/sec)
T_a	Acceleration Time (sec)
D	Move Distance (mm, in)
t	Move Time (sec)
A	Acceleration (mm/sec^2, inch/sec^2)

Cylinder Orientation

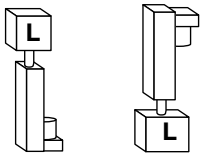
The terms used and their values depend upon the orientation of the cylinder. Refer to the illustrations and equations to determine the form of the thrust equation.

Horizontal



$$F_t = F_a + F_f$$

Vertical



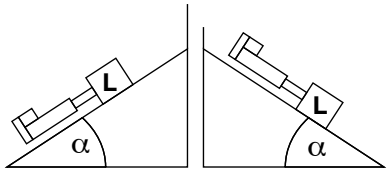
Upward

$$F_t = F_a + F_g + F_f$$

Downward

$$F_t = F_a - F_g + F_f$$

Angular



Upward

$$Ft = Fa + Fg + Ff$$

Downward

$$Ft = Fa - Fg + Ff$$

Friction Coefficients μs

Material Dry contact unless noted	μs
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

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

Where:

T Input torque required, Nm (in-lb)
Lead Screw lead in mm/rev (in/rev)
Thrust Calculated thrust value in kN (lbf)

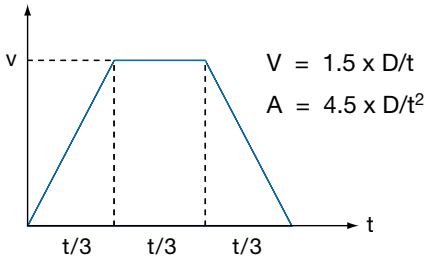
$F_a + F_g + F_f$

F_a (Acceleration Thrust) = Load/(9800mm/sec^2) × Velocity/Acceleration Time
F_g (Force of Gravity) = Load × sin α
F_f (Friction Force) = μs × Load × cos α

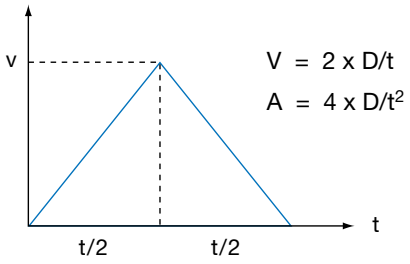
η_b Gear Efficiency Coefficient:
0.95 (or 95%) for parallel driven versions
1.0 (100%) for inline versions

η_s Screw Efficiency Coefficient
Ratio Drive Ratio (if reducer is used)

Trapezoidal Motion Profile



Triangular Motion Profile



Acceleration ≤ 1 g (9.8 m/sec^2)

Common Equivalent units:

Mass	1 kg = 2.2046 lb
Force	1 kN = 224.81 lbf
Length	1 mm = 0.03937 in
Speed	1 mm/sec = 0.03937 in/sec
Torque	1 N-m = 0.7376 lbf-ft
Power	1 kW = 1.341 hp
Inertia	1 kg-m2 = 23.73 lb-ft^2

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
Order Example:	XFC	075	LA	05	J	N	A	A	N	XXXX	–	A	03	–	A09A	A	1	–	A

① Series

XFC	Extreme Force Cylinder

② Frame Size

075	75 mm
090	90 mm
115	115 mm
165	165 mm
190	190 mm

③ Configuration

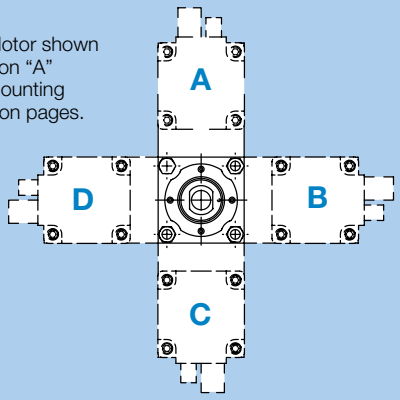
Inline Motor	
LA	Mounting Position A*
LB	Mounting Position B*
LC	Mounting Position C*
LD	Mounting Position D*
Parallel Motor	
PA	Mounting Position A*
PB	Mounting Position B*
PC	Mounting Position C*
PD	Mounting Position D*

④ Screw Lead

05	5 mm Lead (XFC075, 090, 115, 140)
10	10 mm Lead (XFC075, 090, 115, 140, 165, 190)
20	20 mm Lead (XFC165 & 190)

*** Motor Mounting and Port Positions**

Note: Motor shown in position "A" for all mounting dimension pages.



⑤ Primary Mount
⑥ Secondary Mount

Inline Motor Configuration	
C	Foot Mount
J	Front Flange Mount
K	Extended Tie Rod Mount (Front)
T	Rear Trunnion Mount
N	No Secondary Mount
Parallel Motor Configuration	
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 Rod End

A	Metric Thread – Male End
B	Imperial Thread – Male End
C	Rod Eye
X	Special

⑧ Lubrication

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 Options

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

⑩ Stroke Length — mm

XXXX	50 – 2000 mm (See page 6 for max stroke by bore size. For stroke <50 or >2000 please consult factory)

⑪ Gearhead Frame Size [1)]

A	PS90 Frame for Size XFC075 & 090
B	PS115 Frame for Size XFC075, 090 & 115
C	PS142 Frame for Size XFC115, 140 & 165
D	PS180 Frame for Size XFC140, 165 & 190
E	PS220 Frame for Size XFC190
X	Special
N	No Gearhead (Motor only)

⑫ Gearhead Ratio

00	No Gearhead
03	Gearhead with 3:1 ratio
04	Gearhead with 4:1 ratio
05	Gearhead with 5:1 ratio
07	Gearhead with 7:1 ratio
10	Gearhead with 10:1 ratio
XX	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.

⑭ Motor Feedback [2)]

A	2000 Count Encoder (1E)
B	2000 Count Encoder – Serial Interface (3E)
C	Single Speed Resolver (41)
D	Multi-Turn Absolute Encoder (6S)
E	Single-Turn Absolute Encoder (9S)
N	No Motor or Special Motor

⑮ Motor Options* [2)]

1	No Brake
2	24 VDC Brake (B)
3	Shaft Seal (V)
4	24 VDC Brake (B) and Shaft Seal (V)
0	No Motor or Special Motor

*Brake required for vertical applications

⑯ Revision Identifier

A	Standard Cylinder
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, 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.

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