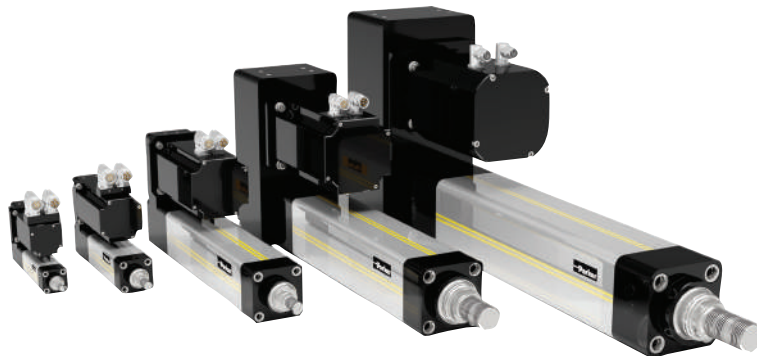


# The ETH Series

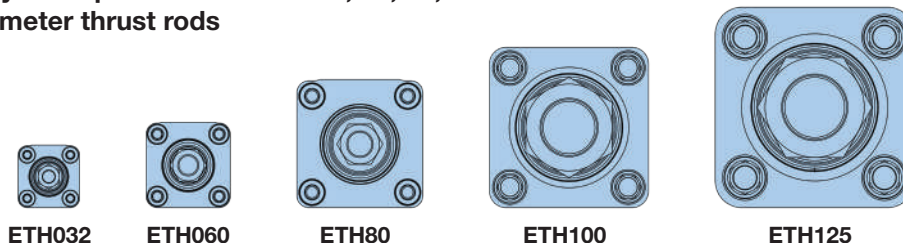
## High Force Ballscrew Driven Electric Cylinders

- Unrivaled power density – high forces and small frame sizes
- Sensor cables can be concealed in the profile
- Optimized for safe handling and simple cleaning
- Long service life
- Reduced maintenance costs with lubricating hole in the cylinder flange
- Pneumatic ISO flange norm (DIN ISO 15552:2005-12) conformity
- Anti-rotation device integrated
- Reduced noise emission
- Complete system from a single source: parker offers matching controllers, motors and gearheads for all ETH cylinders



*NEW frame sizes available! ETH cylinders are now available in five sizes with 32 up to 125 mm profiles. Both in-line and parallel motor configurations provide stroke lengths up to 2000 mm and speeds to 1.7 m/sec.*

- High mechanical efficiency up to 90%
- Strokes up to 2000 mm
- High traction/thrust force up to 114,000 N (25,628 lbs)
- Repeatability up to  $\pm 0.03$  mm
- Speeds up to 1.7 m/s
- Toothed belt drive (for parallel motor mounting)
- 5 to 32 mm screw leads offering fine resolution or high speed options
- Three ISO cylinder profile sizes with 30, 40, 60, 90 and 110 mm diameter thrust rods
- Predefined standardized motor and gearhead flanges for simplified selection. The motors are available directly from Parker (all from one source).
- Three protection classes available:
  - IP54 with galvanized steel hardware
  - IP54 with stainless steel hardware
  - IP65 epoxy coated cylinder



Series	ETH032	ETH060	ETH080	ETH100	ETH125
Maximum Travel (mm)	1,000	1,200	1,600	2,000	2,000
Maximum Payload (N)	3,700	9,300	25,100	56,000	114,000
Maximum Acceleration (m/sec <sup>2</sup> )	12	15	15	10	10

The Parker ETH series is the next generation version of the well known, widely used ET Series.

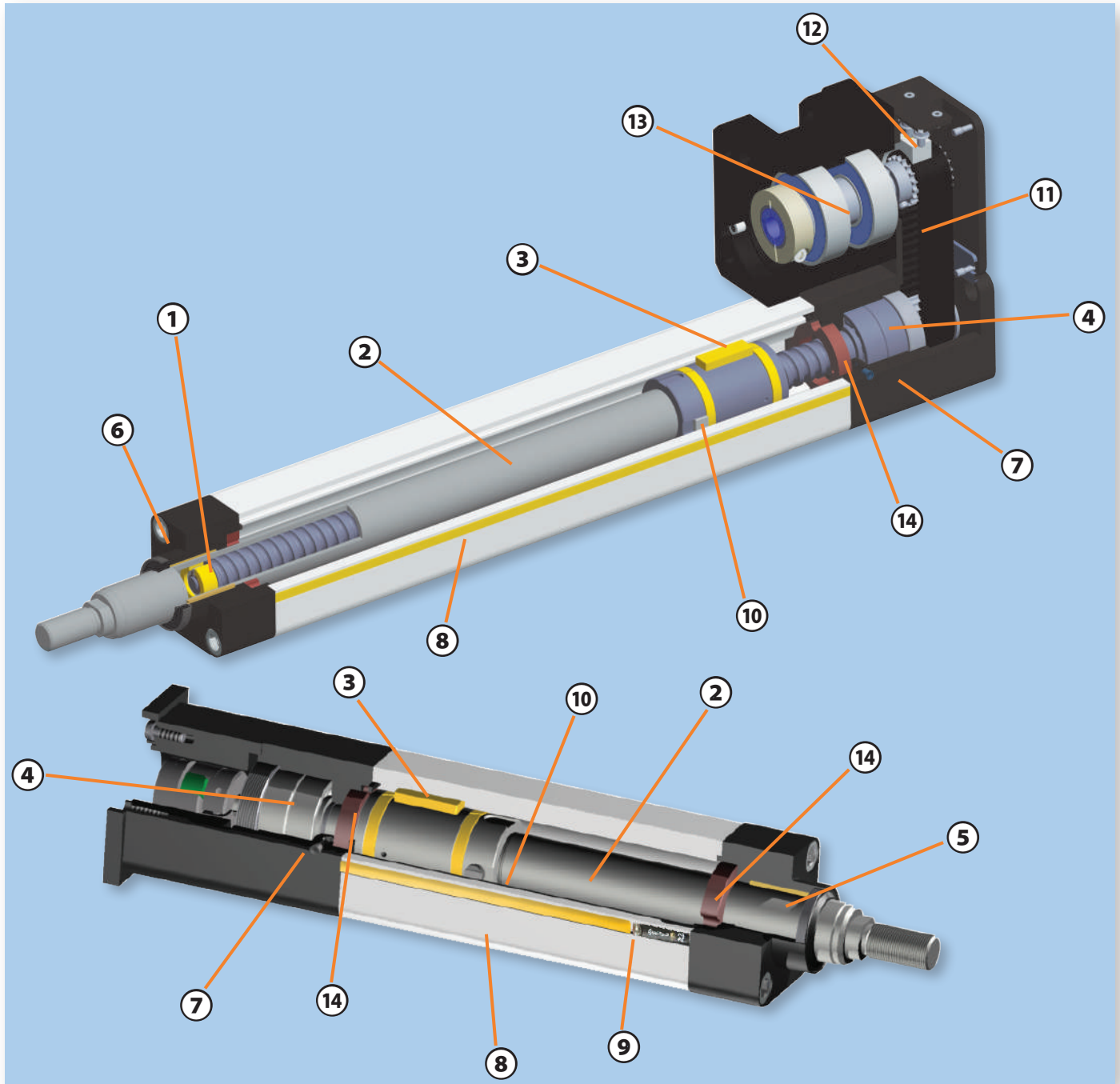
The ETH design offers unrivaled power density due to larger screw and bearing designs in smaller packages. The result is a product that offers increased force output from a given frame size or increased product life at the same force output.

The ETH is a user-friendly design offered in a diversified range of configurations in order to meet specific application requirements. Motor and cylinder design versatility and flexibility make the ETH Series the most user-friendly design.

For applications where overall length requirements restrict the actuator's footprint, the parallel motor configura-

tions are the best solution. The parallel mount configuration is offered with multiple motor options, motor locations and motor orientations. This flexibility gives the user multiple smaller package solutions for solving applications that require increased force density in space-restricted applications.

Electric Cylinders



**1 Support Bearing**

The non-motor end of the screw is supported by a hardened polymer bushing which eliminates vibration and minimizes noise for smoother, quieter motion. This also improves precision, increases dynamic performance, and lengthens screw life.

**2 Precision Ballscrew Drive**

The ETH drive train features a Class 7 ballscrew (ISO 3408) providing low frictional resistance for smooth motion over the entire speed range. This design also ensures longer product life, excellent efficiency and a lower dB rating. The ballscrew drive provides higher speeds and force capabilities than comparably-sized alternative drive mechanisms.

**3 Unique Anti-rotation Guide**

The ETH features a unique piston rod anti-rotation device. This high quality, maintenance free polymer bushing offers robust guidance that prevents the piston rod from twisting as the rod extends and retracts.

**4 Screw Support Bearing**

A set of double stacked angular contact bearings allows high thrust forces in both extend and retract directions. This design provides high force density and minimizes backlash when changing the direction of motion.

*(Continued next page)*

# SPECIFICATIONS

## SPECIFICATIONS

### Performance by Cylinder Size and Screw Lead\*



Cylinder Size		ETH032			ETH050			ETH080		
Screw Lead Designation		M05	M10	M16	M05	M10	M20 <sup>1)</sup>	M05	M10	M32
Screw Lead	mm	5	10	16	5	10	20	5	10	32
Screw Diameter	mm	16			20			32		
Available Strokes**	mm	50 – 1000			50 – 1200			50 – 1600		
<b>Max. Speed at Designated Stroke:</b>										
50 – 400 mm		333	667	1067	333	667	1333	267	533	1707
600 mm		286	540	855	333	666	1318	267	533	1707
800 mm	mm/s	196	373	592	238	462	917	267	533	1707
1000 mm		146	277	440	177	345	684	264	501	1561
1200 mm		–	–	–	139	270	536	207	394	1233
1400 mm		–	–	–	–	–	–	168	320	1006
1600 mm		–	–	–	–	–	–	140	267	841
Max. Acceleration	m/s <sup>2</sup>	4	8	12	4	8	15	4	8	15
<b>Max. Axial Traction/Thrust Force –</b>										
In-Line	N	3600	3700	2400	9300	7000	4400	17,800	25,100	10,600
Parallel			3280	2050	9300	4920	2460		11,620	3630
(@ “n” rpm	n < 100									
Motor Speed)	100 < n < 300	N	3600	2620	1640	7870	3930	1960	17,800	11,620
	n > 300		1820	1140	5480	2740	1370		10,720	3350
Axial Force – 2500 km Service Life	N	1130	1700	1610	2910	3250	2740	3140	7500	6050
<b>Max. Transmissible Torque –</b>										
In-Line	Nm	3.2	6.5	6.8	8.2	12.4	15.6	15.7	44.4	60.0
Parallel			3.5	6.4	6.4	9.1	9.3	9.3	17.5	22.8
(@ “n” rpm	n < 100									
Motor Speed)	100 < n < 300	Nm	3.5	5.2	5.2	7.7	7.7	7.7	17.5	22.8
	n > 300		3.5	3.6	3.6	5.4	5.4	5.4	17.5	21.1
Force Constant*** –										
In-Line	N/Nm	1131	565	353	1131	565	283	1131	565	177
Parallel		1018	509	318	1018	509	254	1018	509	159
Max Torque – No Load	Nm	0.77	0.85	0.94	0.85	1.28	1.70	1.87	2.13	2.38
<b>Weight – (including cylinder rod)</b>										
Base Unit with Zero Stroke	kg	1.2	1.2	1.3	2.2	2.3	2.5	6.9	7.6	8.7
Additional Stroke	kg/m	4.8	4.8	4.8	8.6	8.6	8.6	18.7	18.7	18.7
<b>Weight – (cylinder rod only)</b>										
Base Unit with Zero Stroke	kg		0.06			0.15			0.59	
Additional Stroke	kg/m		0.99			1.85			4.93	
<b>Moments of Inertia</b>										
In-line – without stroke	kgmm <sup>2</sup>	7.1	7.6	12.9	25.3	25.7	33.1	166.2	164.5	252.9
Parallel – without stroke		8.3	8.8	14.1	30.3	30.6	38.0	215.2	213.6	301.9
In-line/Parallel – per meter stroke	kgmm <sup>2</sup> /m	41.3	37.6	41.5	97.7	92.4	106.4	527.7	470.0	585.4
<b>Accuracy: Repeatability (ISO230-2)</b>										
In-line						±0.03				
Parallel	mm					±0.05				
<b>Efficiency – (incl. friction torques)</b>										
In-line	%					90				
Parallel						81				
<b>Temperature</b>										
Operating						-10 ... +70				
Ambient	°C					-10 ... +40				
Storage						-20 ... +40				
Humidity	%					0 ... 95 % (non-condensing)				
Elevation (Max.)	m					3000				

\* Technical data based on normal conditions and only for single cylinder and load mode. For compound loads, please verify in accordance with normal physical laws and technical standards whether individual ratings should be reduced. Please contact Parker with any questions.

\*\* Refer to Ordering Information for standard strokes available for specified model size and type.

\*\*\*Efficiency factors are included in force constants

<sup>1)</sup> ATEX on request

## ETH Series Performance by Cylinder Size and Screw Lead\*

Cylinder Size		ETH100		ETH125	
Screw Lead Designation		M10	M20	M10 <sup>1)</sup>	M20 <sup>1)</sup>
Screw Lead	mm	10	20	10	20
Screw Diameter	mm	50		63	
Available Strokes**	mm	200 – 2000		200 – 2000	
<b>Max. Speed at Designated Stroke:</b>					
200 – 400 mm		400	800	417	833
500 mm		400	747	417	807
600 mm		333	622	395	684
800 mm		241	457	290	514
1000 mm	mm/s	185	354	224	405
1200 mm		148	284	180	329
1400 mm		122	235	148	275
1600 mm		102	198	125	234
2000 mm		76	148	94	170
Max. Acceleration	m/s <sup>2</sup>	8	10	8	10
<b>Max. Axial Traction/Thrust Force –</b>					
In-Line	N	54,800	56,000	88,700	114,000
Parallel			50,800		81,400
(@ “n” rpm	n < 100				
Motor Speed)	100 < n < 300	N	54,800	43,200	76,300
	n > 300				61,000
Axial Force – 2500 km Service Life	N	18,410	27,100	27,100	49,600
<b>Max. Transmissible Torque –</b>					
In-Line	Nm	100	200	150	400
Parallel			200		320
(@ “n” rpm	n < 100				
Motor Speed)	100 < n < 300	Nm	108	170	290
	n > 300				240
Force Constant*** –					
In-Line	N/Nm	565	283	565	283
Parallel		509	254	509	254
Max Torque – No Load	Nm				
Weight – (including cylinder rod)		Please consult factory.			
Base Unit with Zero Stroke	kg				
Additional Stroke	kg/m				
Weight – (cylinder rod only)					
Base Unit with Zero Stroke	kg				
Additional Stroke	kg/m				
<b>Moments of Inertia</b>					
In-line – without stroke	kgmm <sup>2</sup>	2240	2620	12,960	13,400
Parallel – without stroke		5860	6240	17,050	17,990
In-line/Parallel – per meter stroke	kgmm <sup>2</sup> /m	4270	4710	10,070	10,490
<b>Accuracy: Repeatability (ISO230-2)</b>					
In-line				±0.03	
Parallel	mm			±0.05	
<b>Efficiency – (incl. friction torques)</b>					
In-line	%			90	
Parallel				81	
<b>Temperature</b>					
Operating				-10 ... +70	
Ambient	°C			-10 ... +40	
Storage				-20 ... +40	
Humidity	%	0 ... 95 % (non-condensing)			
Elevation (Max.)	m	3000			

\* Technical data based on normal conditions and only for single cylinder and load mode. For compound loads, please verify in accordance with normal physical laws and technical standards whether individual ratings should be reduced. Please contact Parker with any questions.

\*\* Refer to Ordering Information (page 52) for standard strokes available for specified model size and type.

\*\*\*Efficiency factors are included in force constants

<sup>1)</sup> ATEX on request

# The XFC Series

## Extreme Force Roller Screw Driven Electric Cylinders

### Design Features

- Pre-engineered package
- Performance matched components
- Environmental protection
- Laser certified precision
- All steel construction with standard metric hydraulic type tie rod construction for durability, stiffness, and rigidity
- Elastomeric seals throughout with no gaskets for complete sealing
- Opposed preloaded angular contact bearings for bi-directional force capability
- Roller screw drive system for increased life, load, and shock loading capabilities
- Inline and parallel gear drive configurations for full transfer of thrust force
- Parker Stealth family advanced planetary gearheads direct mount to cylinder for standard reduction options from 3:1 to 10:1 with 100:1 available
- Parker MPP Series brushless servo motors for complete Parker system solution with 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 mechanical efficiency up to 90%
- Strokes up to 2000mm
- Extreme thrust force up to 356,000 N / 80,000 lbs
- Repeatability up to  $\pm 0.03\text{mm}$
- Speeds up to 1016 mm/s
- Six metric profile sizes: 075, 090, 115, 140, 165, 190
- Anti-rotate option

	075	090	115	140	165	190
Maximum Travel (mm)	1,150	1,700	2,000	2,000	2,000	2,000
Maximum Payload (N)	40,000	68,000	108,000	160,000	240,000	356,000
Maximum Acceleration (m/sec <sup>2</sup> )	1,016	712	548	444	712	568

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 electromechanical 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.

## 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!**

# SPECIFICATIONS

## SPECIFICATIONS



### Performance

XFC Frame Size		075	090	115	140	165	190
<b>Continuous Thrust</b>	kN	20	34	54	80	120	178
	(lbs)	(4,500)	(7,500)	(12,000)	(17,500)	(26,500)	(40,000)
<b>Maximum Thrust</b>	kN	40	68	108	160	240	356
	(lbs)	(9,000)	(15,000)	(24,000)	(35,000)	(53,000)	(80,000)
<b>Maximum Acceleration</b>	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)
<b>Maximum Stroke <sup>1)</sup></b>	mm	1150	1700	2,000	2,000	2,000	2,000
	(in)	(55.12)	(66.93)	(78.75)	(78.75)	(78.75)	(78.75)
<b>Recommended Maximum Stroke Length of Unsupported Cylinder <sup>2)</sup></b>	mm	750	750	750	1,000	1,000	1,250
	(in)	(29.53)	(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
<b>Accuracy</b>	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)
<b>Repeatability</b>	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)
<b>Backlash</b>	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 Maximum Speed charts for speed/stroke chart

### Cylinder Temperature Rating\*

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

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