

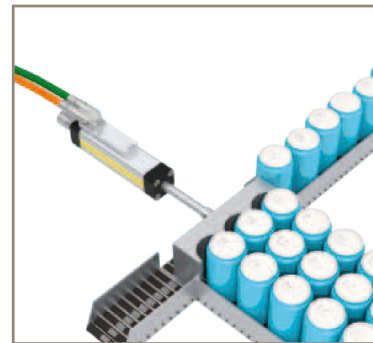


aerospace  
climate control  
**electromechanical**  
filtration  
fluid & gas handling  
hydraulics  
pneumatics  
process control  
sealing & shielding



## ETT - Electric Tubular Motor

Linear Handling and Pick & Place Applications



ENGINEERING YOUR SUCCESS.



**WARNING – USER RESPONSIBILITY**

**FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.**

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# Parker Hannifin

## The global leader in motion and control technologies

### A world class player on a local stage

#### Global Product Design

Parker Hannifin has more than 40 years experience in the design and manufacturing of drives, controls, motors and mechanical products. With dedicated global product development teams, Parker draws on industry-leading technological leadership and experience from engineering teams in Europe, North America and Asia.

#### Local Application Expertise

Parker has local engineering resources committed to adapting and applying our current products and technologies to best fit our customers' needs.

#### Manufacturing to Meet Our Customers' Needs

Parker is committed to meeting the increasing service demands that our customers require to succeed in the global industrial market. Parker's manufacturing teams seek continuous improvement through the implementation of lean manufacturing methods throughout the process. We measure ourselves on meeting our customers' expectations of quality and delivery, not just our own. In order to meet these expectations, Parker operates and continues to invest in our manufacturing facilities in Europe, North America and Asia.

#### Electromechanical Worldwide Manufacturing Locations

##### Europe

Littlehampton, United Kingdom  
Dijon, France  
Offenburg, Germany  
Filderstadt, Germany  
Milan, Italy

##### Asia

Wuxi, China  
Chennai, India

##### North America

Rohnert Park, California  
Irwin, Pennsylvania  
Charlotte, North Carolina  
New Ulm, Minnesota



Offenburg, Germany

#### Local Manufacturing and Support in Europe

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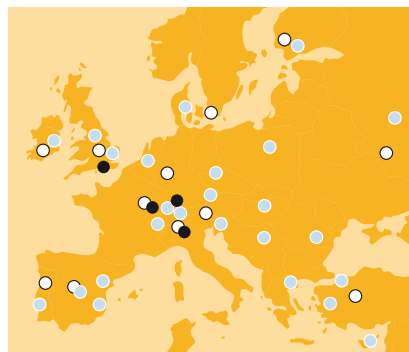
For contact information, please refer to the Sales Offices on the back cover of this document or visit [www.parker.com](http://www.parker.com)



Milan, Italy



Littlehampton, UK



- Electromechanical Manufacturing
- Parker Sales Offices
- Distributors



Dijon, France



# Electric Tubular Motor - ETT

## Overview

### Description

ETT is a direct thrust linear motor actuator, ideally suited for all kinds of linear handling and pick & place applications. It is a cost-effective and energy-efficient alternative to pneumatic cylinders in applications that demand greater flexibility and control.

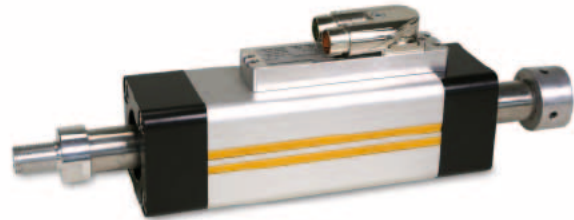
The ETT's linear motion is directly generated without the need for mechanical transmission elements like ball screws, toothed belts and gearboxes. The tubular motor has two main components; the rod (shaft) and the stator with integrated feedback (body). The shaft is made of a stainless steel tube with built in neodymium magnets, that thanks to their high performance, are able to deliver impressive thrust values up to 474 N. The main body comprises the stator winding, the feedback electronics and high performance bearings. A major benefit of the ETT design is that long and/or heavy duty cycles are possible without the need of additional cooling. The IP67 protection class allows the ETT tubular motor to be used in harsh environmental conditions.

### Features

- Ultra dynamic linear motion and position control capabilities
- Ideally suited for pneumatic substitution where greater position control capabilities are required
- Three lengths and three sizes meeting the requirements of the pneumatic ISO flange standard (DIN ISO 15552:2005-12) for simplified mechanical integration
- Swivelling electrical connectors and extensive accessory options allow flexible mounting
- Reduced mechanical complexity delivers high energy efficiency and reduces maintenance
- AISI304 stainless steel shaft allows it's use in "clean" environments
- High thermal efficiency improves reliability and increases mechanical life
- Wide choice of rod end mounting options, including swivel rod eye, increases flexibility

### Application

- Food, Pharmaceutical & Beverage
- Packaging Machines
- Material Handling
- Factory Automation



### Technical Characteristics - Overview

<b>Motor type</b>	Linear tubular servo motor
<b>Rod</b>	AISI304 (stainless steel)
<b>Rated force</b>	8...118 N
<b>Peak force</b>	32...474 N
<b>Speed range</b>	up to 5.8 m/s
<b>Acceleration range</b>	up to 340 m/s <sup>2</sup>
<b>Mounting</b>	Screw fixed
<b>Shaft end</b>	With screw fix external thread (standard) Other (option)
<b>Cooling</b>	Natural ventilation
<b>Protection level (IEC60034-5)</b>	IP67
<b>Feedback sensor</b>	1 Vpp Sine/Cosine encoder
<b>Thermal protection</b>	KTY
<b>Marking</b>	CE
<b>Voltage supply</b>	230 VAC other voltage on request
<b>Temperature class</b>	Class F
<b>Connections</b>	Connectors for ETT032/050
<b>Bi-directional accuracy</b>	±0.05 mm

# Technical Characteristics

## Technical Data

### ETT032

ETT032		ETT032S1	ETT032S2	ETT032S3
	Unit			
<b>Power supply 230 VAC</b>				
Effective stroke	[mm]	30...660	30...630	30...600
Rated force	[N]	13.18	17.90	22.54
Peak force for 10 s <sup>1)</sup>	[N]	52.72	71.60	90.14
Peak force for 1 s <sup>1)</sup>	[N]	105.45	143.20	180.28
Maximum speed <sup>2)</sup>	[m/s]	3.72	4.23	4.48
Peak acceleration <sup>3)</sup>	[m/s <sup>2</sup> ]	138.75	179.00	200.32
Coil length	[mm]	179	209	239
Rod length	[mm]	221...851		
Rod weight	[kg]	0.389...1.63		
Rod diameter	[mm]	16		
Pole pitch	[mm]	60		
Force constant	[N/A]	21.26	31.96	42.52
Back EMF	[V/(m/s)]	17.69	26.04	35.37
Back EMF (ph-ph,rms)	[V <sub>rms</sub> /(m/s)]	12.51	18.41	25.01
Phase resistance	[ohm]	31.46	43.84	59.71
Phase inductance	[mH]	14.57	21.75	29.20
Position repeatability	[mm]	±0.05		

<sup>1)</sup> Data valid at an ambient temperature of 40 °C

<sup>2)</sup> Based on triangular move over maximum stroke with nominal payload

<sup>3)</sup> Based on a 50 mm stroke, without payload

These ratings are valid for Parker Hannifin drives. Other drives might not achieve the same ratings

**ETT050**

ETT050		ETT050S1	ETT050S2	ETT050S3
	Unit			
<b>Power supply 230 VAC</b>				
Effective stroke	[mm]	30...720	30...690	30...540
Rated force	[N]	33.17	45.94	118.55
Peak force for 10 s <sup>1)</sup>	[N]	132.66	183.77	474.18
Peak force for 1 s <sup>1)</sup>	[N]	265.32	367.54	948.36
Maximum speed <sup>2)</sup>	[m/s]	3.84	4.31	4.87
Peak acceleration <sup>3)</sup>	[m/s <sup>2</sup> ]	147.73	185.62	237.09
Coil length	[mm]	206	236	386
Rod length	[mm]	254...944		
Rod weight	[kg]	0.56...2.12		
Rod diameter	[mm]	25		
Pole pitch	[mm]	60		
Force constant	[N/A]	49.50	70.68	112.90
Back EMF	[V/(m/s)]	40.36	64.32	89.36
Back EMF (ph-ph,rms)	[V <sub>rms</sub> /(m/s)]	28.54	45.48	63.19
Phase resistance	[ohm]	42.45	62.97	41.75
Phase inductance	[mH]	23.80	35.20	22.42
Position repeatability	[mm]	±0.05		

<sup>1)</sup> Data valid at an ambient temperature of 40 °C

<sup>2)</sup> Based on triangular move over maximum stroke with nominal payload

<sup>3)</sup> Based on a 50 mm stroke, without payload

**Standards and Conformance**

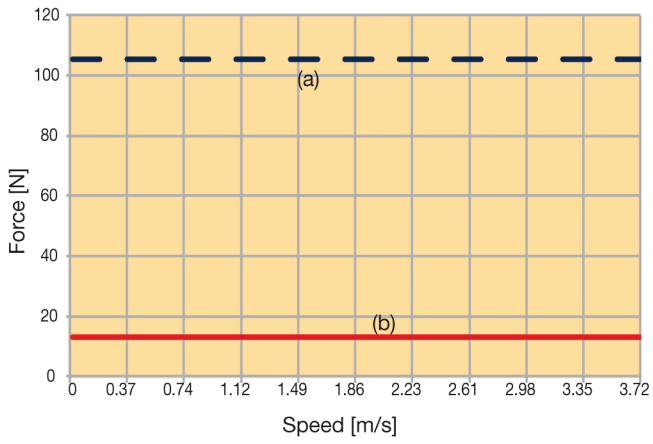
<b>Low Voltage Directive</b>	<ul style="list-style-type: none"> <li>• 2006/95/EC</li> </ul>
<b>EMC Directive</b>	<ul style="list-style-type: none"> <li>• 2004/108/EC</li> </ul>
<b>Generic standard - Emission standard for industrial environments</b>	<ul style="list-style-type: none"> <li>• CEI EN 61000-6-4:2007</li> </ul>
<b>Generic standard - Immunity for industrial environments</b>	<ul style="list-style-type: none"> <li>• CEI EN 61000-6-2:2006</li> </ul>

Marked 

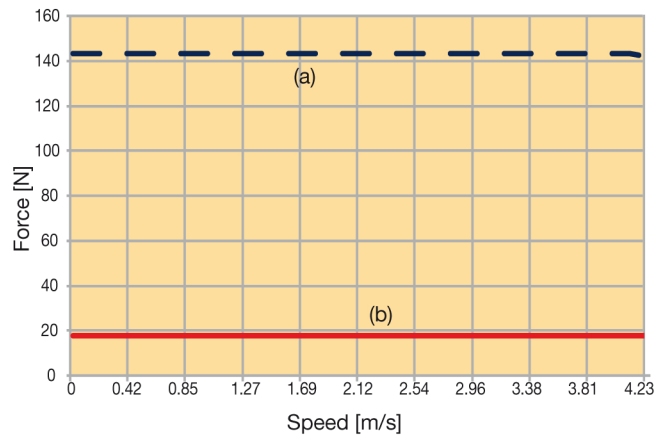
These ratings are valid for Parker Hannifin drives. Other drives might not achieve the same ratings

Speed Force Curves <sup>1)</sup>

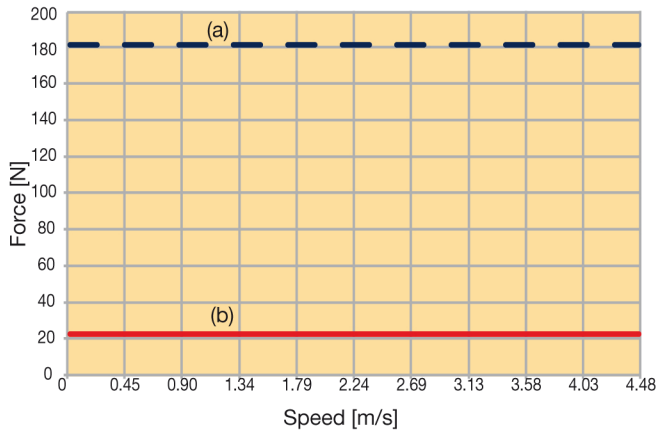
**ETT032S1**



**ETT032S2**



**ETT032S3**



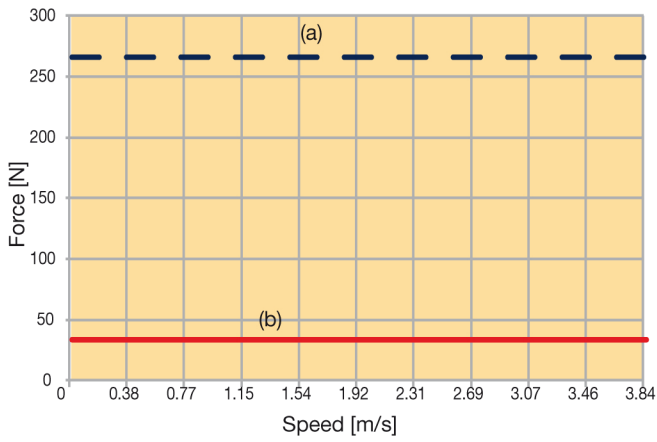
■ ■ (a) Peak Force for 1 s @40 °C

■ (b) Continuous Force @100 °C

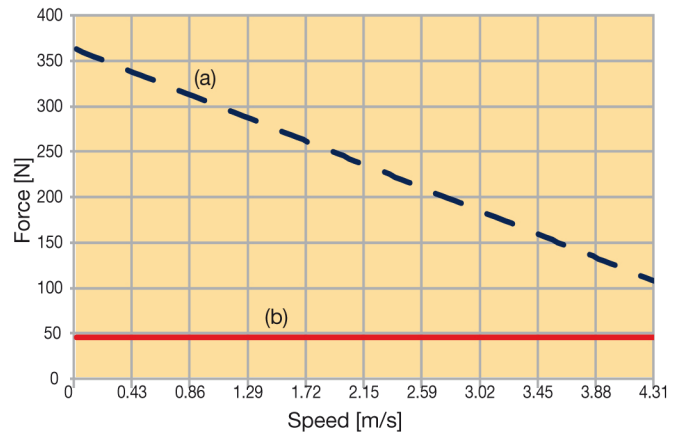
<sup>1)</sup> Based on triangular move over maximum stroke without payload

## Speed Force Curves <sup>1)</sup>

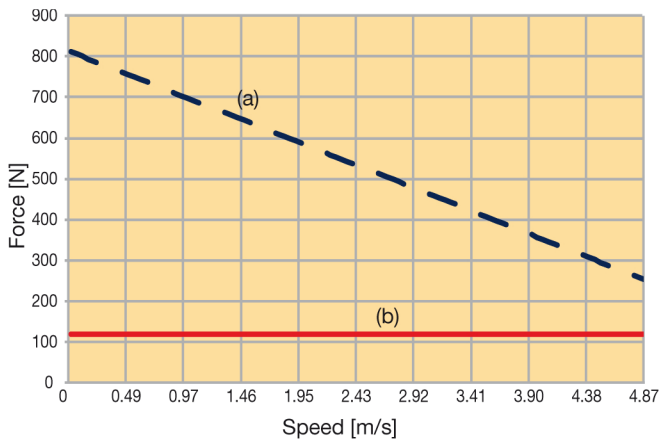
**ETT050S1**



**ETT050S2**



**ETT050S3**



<sup>1)</sup> Based on triangular move over maximum stroke without payload

- (a) Peak Force for 1 s @ 40 °C
- (b) Continuous Force @ 100 °C

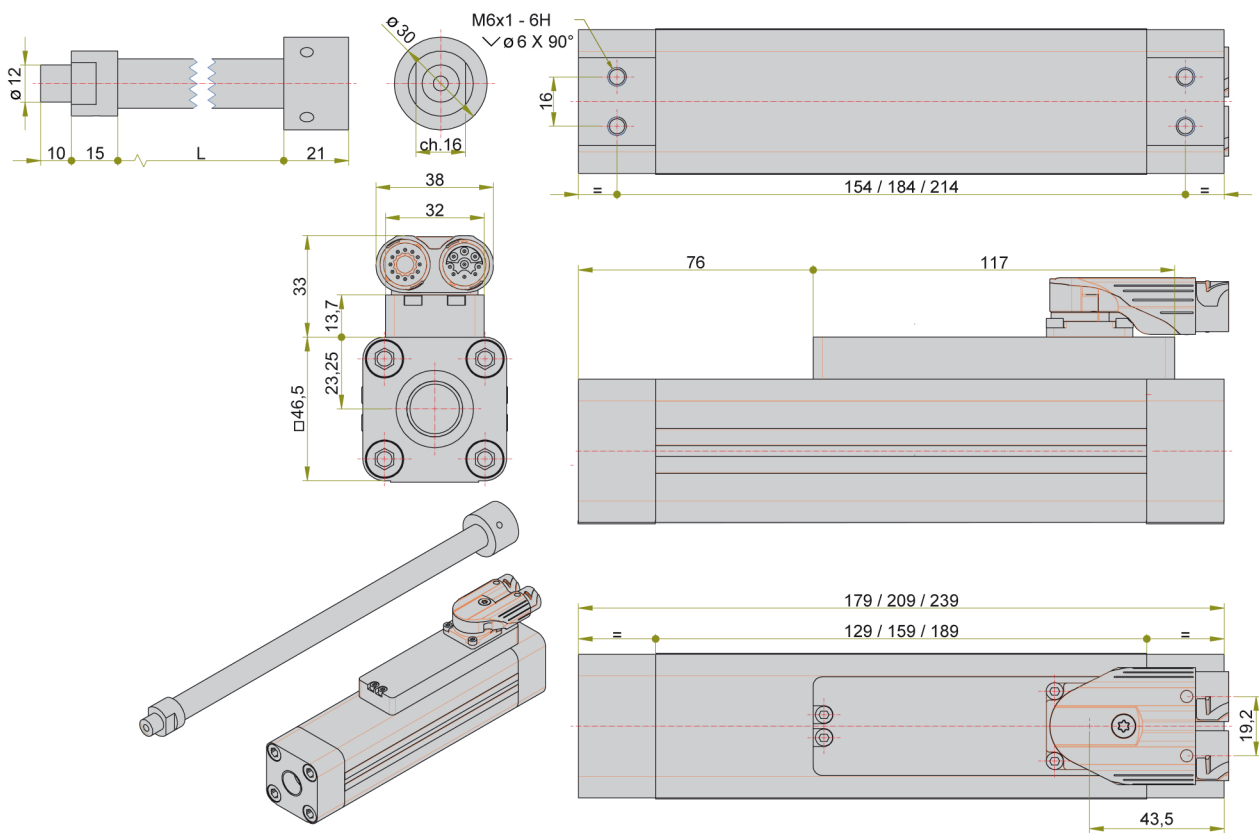
## Associated Drives

Parker can also offer suitable servo drives with a variety of different technology functions and communication options for use with the ETT series.

ETT Type	Continuous current [A]	Compax3
ETT032S1	0.62	C3S025V2...
ETT032S2	0.56	
ETT032S3	0.53	
ETT050S1	0.67	
ETT050S2	0.65	
ETT050S3	1.05	

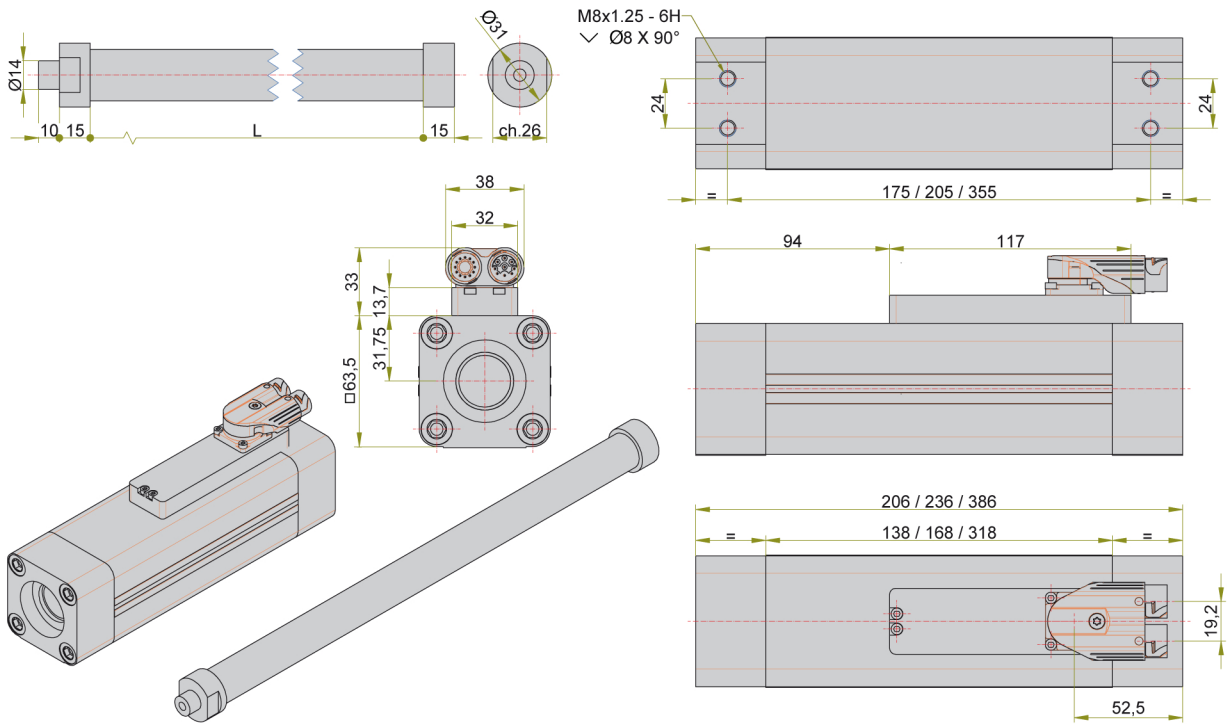
## Dimensions

### ETT032



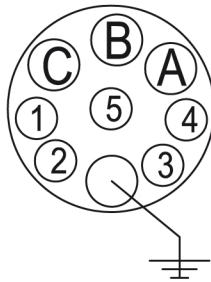


**ETT050**

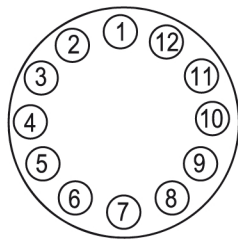


**Layout and Connectors ETT032 & ETT050**

**Power connector**



**Feedback connector**



Pin	Description
A	U
B	W
C	V
PE	PE
1	nc
2	nc
3	nc
4	nc
5	nc

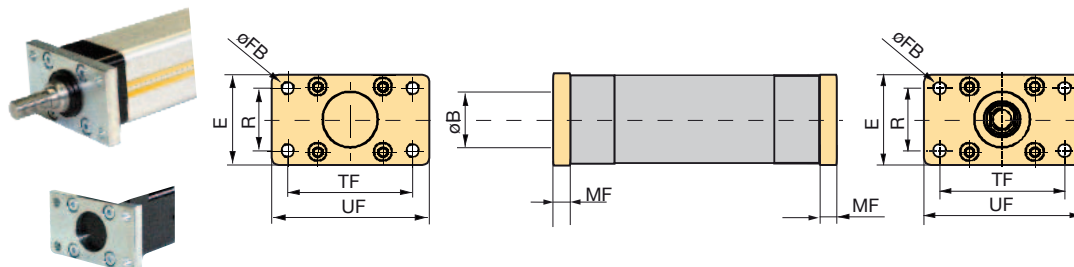
Pin	Description
1	cos -
2	cos +
3	nc
4	KTY84 -
5	KTY84 +
6	nc
7	sin -
8	sin +
9	nc
10	+5 V
11	nc
12	GND

ETT025 available with flying leads only

## Accessories and Options

### Mounting Methods

#### Front and Rear Plate



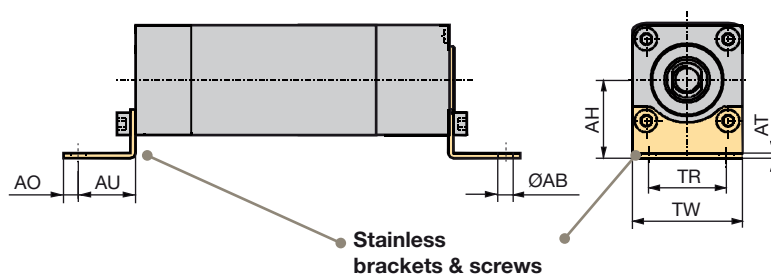
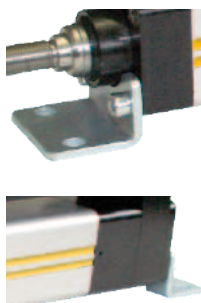
#### Front and rear plate dimensions

	Order no. (1 piece)	UF	E	TF	øFB	R	MF	øB
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
<b>ETT032</b>	0112.918	80	48	64	7	32	10	30
<b>ETT050</b>	0122.918	110	65	90	9	45	12	40

Spare parts delivery is including screws for mounting.

Please note that front and rear plate as spare parts must be ordered separately.

#### Mounting Brackets

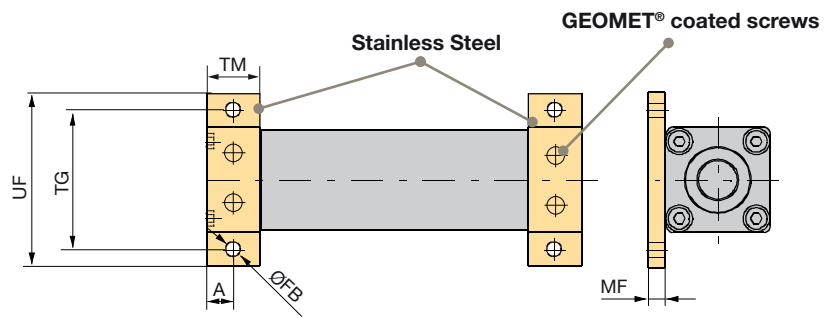
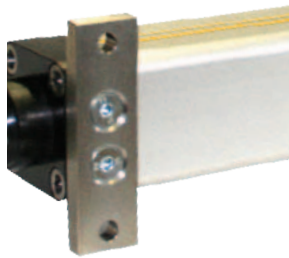


	Order no. Front & Terminal bracket	AH	AT	TR	øAB (H14)	AO	AU	TW
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
<b>ETT032</b>	0112.916	32	4	32	7	8	24	46.5
<b>ETT050</b>	0122.916	44	4	45	9	12	32	63.5

Spare parts delivery is including screws for mounting.

\* For protection classes, we recommend GEOMET® coated screws (thin layer corrosion protection).

## Mounting Flanges



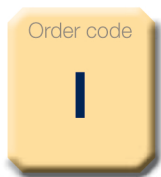
	Order no. (2 piece)	TG	UG	ØFB	TM	MF	A
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
<b>ETT032</b>	0112.917	62	78	6.6	25	8	12.5
<b>ETT050</b>	0122.917	84	104	9	30	10	15

Spare parts delivery is including screws for mounting.

\* For protection classes, we recommend GEOMET® coated screws (thin layer corrosion protection).

## Cylinder Rod Version

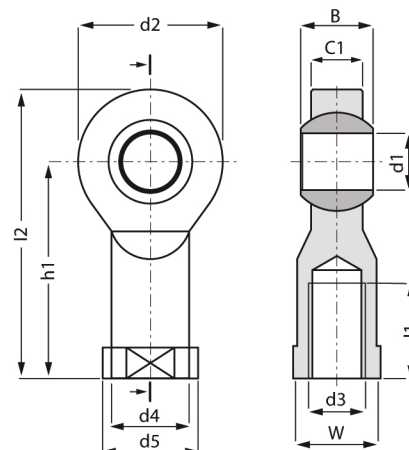
### Plastic Swivel Rod Eye



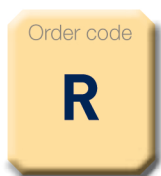
manufactured by igus®

KBRM	-06	-08
	ETT032	ETT050
d1 E10	6	8
d2	20	24
d3	M6	M8
d4	10.0	13.0
d5	13.0	16.0
C1	7.0	9.0
B without MH*	9	12
B with MH*	9.2	12.2
h1	30	36
l1	12	16
l2	40	48
W	SW11	SW14
Pitch	29°	25°

\* MH: metal insert



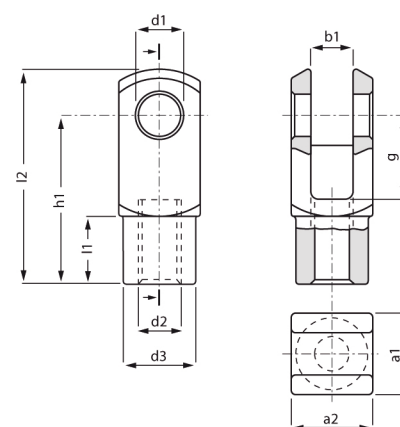
### Plastic Rod Clevis



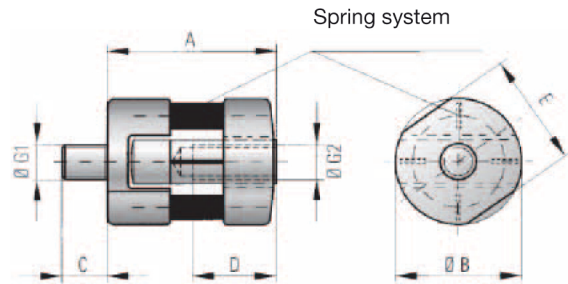
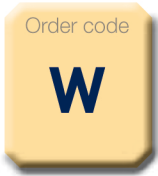
manufactured by igus®

GERM	-06	-08
	ETT032	ETT050
d1 H9	6	8
g h11	12	16
a1 +0.3 / -0.16	12	16
a2 +0.3 / -0.16	12	16
b1 B13	6	8
d2 6H*	M6	M8
d3 +0.3 / -0.3	10.0	14.0
l2 +0.5 / -0.5	31.0	42.0
h1 +0.3 / -0.3	24.0	32.0
l1 +0.2 / -0.2	9.0	12.0

\* Thread tolerance



## Alignment Coupler



manufactured by R+W®

LK	-150	-300
	<b>ETT032</b>	<b>ETT050</b>
Pressure force [N]	150	300
A	33	41.5
B	22	30
G1/2	M6	M8
G1/2* [Nm]	7	18
C	8	10
D	12	16
E	20	27
Mass	23	57
Lateral restoring force <sup>(max)</sup> (N)	18	48
lateral <sup>(max)</sup> [mm]	0.5	0.5
angular <sup>(max)</sup>	1.5°	1.5°

\* Max. tightening torque thread

## Feedback

### Internal position sensor

The standard position sensor is an analogue Sine/Cosine 1 Vpp signal. The table shows the different position feedback:

<b>Sine /Cosine</b>	Standard feedback
---------------------	-------------------

# Order Code

## ETT Electric Tubular Motor (Complete Unit)

	1	2	3	4	5	6	7	8	9
Order example	ETT	032	S1	CS	M	N	...	C	

<b>1 Type</b>	<b>ETT</b> Electric Tubular Motor
<b>2 Size</b>	<b>032</b> ISO 6432 - Bore 32 mm <b>050</b> ISO 6432 - Bore 50 mm
<b>3 Winding</b>	<b>S1</b> Serial, Stack Length 1 <b>S2</b> Serial, Stack Length 2 <b>S3</b> Serial, Stack Length 3
<b>4 Connection and Feedback Type</b>	<b>CS</b> Intercontec Connector (Springtec EEDA101NN00000002000) - Feedback Analogue SinCos 1 Vpp -
<b>5 Rod End Mounting - Front / Rear</b>	<b>M</b> Male Thread / Cap End (M6 for ETT032, M8 for ETT050) <b>F</b> Female Thread / Cap End (M6 for ETT032, M8 for ETT050) <b>N</b> Male Thread / Male Thread (M6 for ETT032, M8 for ETT050) <b>G</b> Female Thread / Female Thread (M6 for ETT032, M8 for ETT050) <b>W</b> Linear Coupling / Cap End LK150 for ETT032, LK300 for ETT050 <b>I</b> Plastic Swivel Rod Eye <b>R</b> Plastic Rod Clevis <b>X</b> Special (Customized version - Please contact Parker)
<b>6 Fixed Field</b>	<b>N</b> Fixed field
<b>7 Stroke*</b>	<b>30</b> 30 mm ... .. ... .. <b>720</b> 720 mm
<b>8 Protection Class</b>	<b>C</b> IP67
<b>9 Customized Options</b>	Blank for standard motors

\* Please see values in table "ETT - Length of Rod / Table of Stroke" (page 18)

## ETT - Motor and Signal Cable

	1	2	3	4	5	6	7
Order example	ETT-CAP	X	003	PM	-	Y1	SL - 00

<b>1 Cable Type</b>	<b>ETT-CAP</b> Power cable for ETT <b>ETT-CAS</b> Signal cable for ETT - COS
<b>2 Fixed Field</b>	<b>X</b> Fixed field
<b>3 Cable Length</b>	<b>001</b> 1 m <b>003</b> 3 m <b>010</b> 10 m <b>015</b> 15 m <b>020</b> 20 m
<b>4 Application Type</b>	<b>PM</b> High flex cable
<b>5 Connector</b>	<b>Y1</b> Intercontec Connector <b>X</b> Special Execution
<b>6 Drive Type</b>	<b>C3</b> Compax3
<b>7 Option</b>	<b>00</b> No special option Special customer drawing



### ETT Electric Tubular Motor (Rod only)

	1	2	3	4	5
Order example	<b>ETT-R</b>	<b>032</b>	<b>M</b>	<b>...</b>	

<b>1 Type</b>	<b>ETT-R</b> Electric Tubular Motor - Rod only
<b>2 Size</b>	<b>032</b> ISO 6432 - size 32 <b>050</b> ISO 6432 - size 50
<b>3 Rod End Mounting - Front / Rear</b>	<b>M</b> Male Thread / Cap End (M6 for ETT032, M8 for ETT050) <b>F</b> Female Thread / Cap End (M6 for ETT032, M8 for ETT050) <b>N</b> Male Thread / Male Thread (M6 for ETT032, M8 for ETT050) <b>G</b> Female Thread / Female Thread (M6 for ETT032, M8 for ETT050) <b>W</b> Linear Coupling / Cap End LK150 for ETT032, LK300 for ETT050 <b>I</b> Plastic Swivel Rod Eye <b>R</b> Plastic Rod Clevis <b>X</b> Special (Customized version - Please contact Parker)
<b>4 Length*</b>	<b>215</b> 215 mm ... ... <b>944</b> 944 mm
<b>5 Customized Options</b>	Blank for standard motors

\* Please see values in table "ETT - Length of Rod / Table of Stroke" (page 18)

### ETT Electric Tubular Motor (Coil only)

	1	2	3	4	5	6	7
Order example	<b>ETT-C</b>	<b>032</b>	<b>S1</b>	<b>CS</b>	<b>N</b>	<b>C</b>	

<b>1 Type</b>	<b>ETT-C</b> Electric Tubular Motor - Coil only
<b>2 Size</b>	<b>032</b> ISO 6432 - Bore 32 mm <b>050</b> ISO 6432 - Bore 50 mm
<b>3 Winding</b>	<b>S1</b> Serial, Stack Length 1 <b>S2</b> Serial, Stack Length 2 <b>S3</b> Serial, Stack Length 3
<b>4 Connection and Feedback Type</b>	<b>CS</b> Intercontec Connector (Springtec EEDA101NN00000002000) - Feedback Analogue SinCos 1 Vpp -
<b>5 Fixed Field</b>	<b>N</b> Fixed Field
<b>6 Protection Class</b>	<b>C</b> IP67
<b>7 Customized Options</b>	Blank for standard motors

If the ETT has to be stored for a long time, verify that the rod, feet and the flange are coated with corrosion proof product.

### ETT - Length of Rod / Table of Stroke

#### ETT032

Length of Rod [mm]	Stroke		
	Stack Length		
	S1 [mm]	S2 [mm]	S3 [mm]
221	30	0	0
251	60	30	0
281	90	60	30
311	120	90	60
341	150	120	90
371	180	150	120
401	210	180	150
431	240	210	180
461	270	240	210
491	300	270	240
521	330	300	270
551	360	330	300
581	390	360	330
611	420	390	360
641	450	420	390
671	480	450	420
701	510	480	450
731*	540	510	480
761*	570	540	510
791*	600	570	540
821*	630	600	570
851*	660	630	600

#### ETT050

Length of Rod [mm]	Stroke		
	Stack Length		
	S1 [mm]	S2 [mm]	S3 [mm]
254	30	0	0
284	60	30	0
314	90	60	0
344	120	90	0
374	150	120	0
404	180	150	0
434	210	180	30
464	240	210	60
494	270	240	90
524	300	270	120
554	330	300	150
584	360	330	180
614	390	360	210
644	420	390	240
674	450	420	270
704	480	450	300
734	510	480	330
764	540	510	360
794	570	540	390
824	600	570	420
854	630	600	450
884*	660	630	480
914*	690	660	510
944*	720	690	540

\* Needs specific mechanical mounting. Special length available on request



# Parker's Motion & Control Technologies

At Parker, we're guided by a relentless drive to help our customers become more productive and achieve higher levels of profitability by engineering the best systems for their requirements. It means looking at customer applications from many angles to find new ways to create value. Whatever the motion and control technology need, Parker has the experience, breadth of product and global reach to consistently deliver. No company knows more about motion and control technology than Parker. For further info call 00800 27 27 5374



## Aerospace

### Key Markets

Aftermarket services  
Commercial transports  
Engines  
General & business aviation  
Helicopters  
Launch vehicles  
Military aircraft  
Missiles  
Power generation  
Regional transports  
Unmanned aerial vehicles

### Key Products

Control systems & actuation products  
Engine systems & components  
Fluid conveyance systems & components  
Fluid metering, delivery & atomization devices  
Fuel systems & components  
Fuel tank inerting systems  
Hydraulic systems & components  
Thermal management  
Wheels & brakes



## Climate Control

### Key Markets

Agriculture  
Air conditioning  
Construction Machinery  
Food & beverage  
Industrial machinery  
Life sciences  
Oil & gas  
Precision cooling  
Process  
Refrigeration  
Transportation

### Key Products

Accumulators  
Advanced actuators  
CO<sub>2</sub> controls  
Electronic controllers  
Filter driers  
Hand shut-off valves  
Heat exchangers  
Hose & fittings  
Pressure regulating valves  
Refrigerant distributors  
Safety relief valves  
Smart pumps  
Solenoid valves  
Thermostatic expansion valves



## Electromechanical

### Key Markets

Aerospace  
Factory automation  
Life science & medical  
Machine tools  
Packaging machinery  
Paper machinery  
Plastics machinery & converting  
Primary metals  
Semiconductor & electronics  
Textile  
Wire & cable

### Key Products

AC/DC drives & systems  
Electric actuators, gantry robots & slides  
Electrohydraulic actuation systems  
Electromechanical actuation systems  
Human machine interface  
Linear motors  
Stepper motors, servo motors, drives & controls  
Structural extrusions



## Filtration

### Key Markets

Aerospace  
Food & beverage  
Industrial plant & equipment  
Life sciences  
Marine  
Mobile equipment  
Oil & gas  
Power generation & renewable energy  
Process  
Transportation  
Water Purification

### Key Products

Analytical gas generators  
Compressed air filters & dryers  
Engine air, coolant, fuel & oil filtration systems  
Fluid condition monitoring systems  
Hydraulic & lubrication filters  
Hydrogen, nitrogen & zero air generators  
Instrumentation filters  
Membrane & fiber filters  
Microfiltration  
Sterile air filtration  
Water desalination & purification filters & systems



## Fluid & Gas Handling

### Key Markets

Aerial lift  
Agriculture  
Bulk chemical handling  
Construction machinery  
Food & beverage  
Fuel & gas delivery  
Industrial machinery  
Life sciences  
Marine  
Mining  
Mobile  
Oil & gas  
Renewable energy  
Transportation

### Key Products

Check valves  
Connectors for low pressure fluid conveyance  
Deep sea umbilicals  
Diagnostic equipment  
Hose couplings  
Industrial hose  
Mooring systems & power cables  
PTFE hose & tubing  
Quick couplings  
Rubber & thermoplastic hose  
Tube fittings & adapters  
Tubing & plastic fittings



## Hydraulics

### Key Markets

Aerial lift  
Agriculture  
Alternative energy  
Construction machinery  
Forestry  
Industrial machinery  
Machine tools  
Marine  
Material handling  
Mining  
Oil & gas  
Power generation  
Refuse vehicles  
Renewable energy  
Truck hydraulics  
Turf equipment

### Key Products

Accumulators  
Cartridge valves  
Electrohydraulic actuators  
Human machine interfaces  
Hybrid drives  
Hydraulic cylinders  
Hydraulic motors & pumps  
Hydraulic systems  
Hydraulic valves & controls  
Hydrostatic steering  
Integrated hydraulic circuits  
Power take-offs  
Power units  
Rotary actuators  
Sensors



## Pneumatics

### Key Markets

Aerospace  
Conveyor & material handling  
Factory automation  
Life science & medical  
Machine tools  
Packaging machinery  
Transportation & automotive

### Key Products

Air preparation  
Brass fittings & valves  
Manifolds  
Pneumatic accessories  
Pneumatic actuators & grippers  
Pneumatic valves & controls  
Quick disconnects  
Rotary actuators  
Rubber & thermoplastic hose & couplings  
Structural extrusions  
Thermoplastic tubing & fittings  
Vacuum generators, cups & sensors



## Process Control

### Key Markets

Alternative fuels  
Biopharmaceuticals  
Chemical & refining  
Food & beverage  
Marine & shipbuilding  
Medical & dental  
Microelectronics  
Nuclear Power  
Offshore oil exploration  
Oil & gas  
Pharmaceuticals  
Power generation  
Pulp & paper  
Steel  
Water/wastewater

### Key Products

Analytical Instruments  
Analytical sample conditioning products & systems  
Chemical injection fittings & valves  
Fluoropolymer chemical delivery fittings, valves & pumps  
High purity gas delivery fittings, valves, regulators & digital flow controllers  
Industrial mass flow meters/controllers  
Permanent no-weld tube fittings  
Precision industrial regulators & flow controllers  
Process control double block & bleeds  
Process control fittings, valves, regulators & manifold valves



## Sealing & Shielding

### Key Markets

Aerospace  
Chemical processing  
Consumer  
Fluid power  
General industrial  
Information technology  
Life sciences  
Microelectronics  
Military  
Oil & gas  
Power generation  
Renewable energy  
Telecommunications  
Transportation

### Key Products

Dynamic seals  
Elastomeric o-rings  
Electro-medical instrument design & assembly  
EMI shielding  
Extruded & precision-cut, fabricated elastomeric seals  
High temperature metal seals  
Homogeneous & inserted elastomeric shapes  
Medical device fabrication & assembly  
Metal & plastic retained composite seals  
Shielded optical windows  
Silicone tubing & extrusions  
Thermal management  
Vibration dampening

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### US Product Information Centre

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