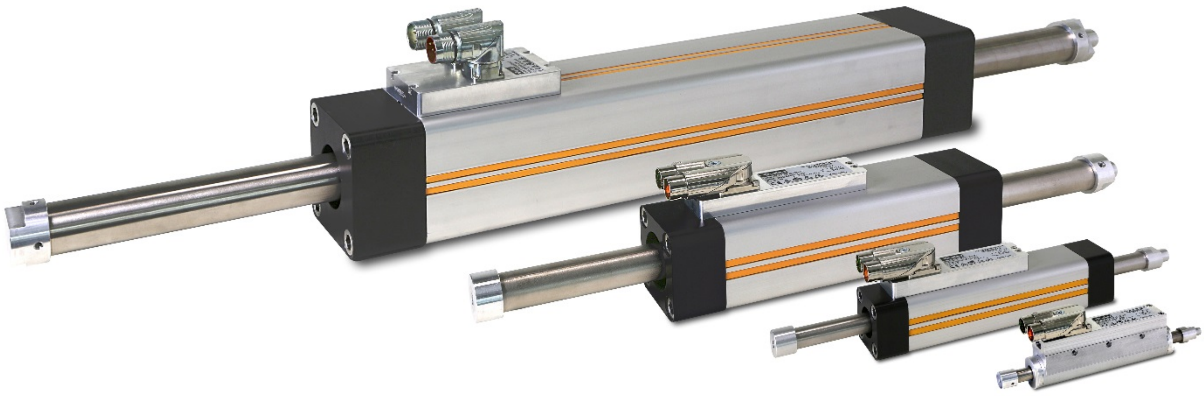
Electric Tubular Motor

ETT Series

Technical Manual

Rev. 2



Compliance with «CE» directives

The ETT tubular servomotors Series are in accordance with the following Directives:

- **2006/95/EC** Low voltage Directive (LVD)
- **2004/108/CE** EMC Directive

Have been designed, manufactured and tested to the followin specifications:

- CEI EN61000-4-2:1996 + A1 (99) + A2 (01)
- CEI EN61000-4-3:2007
- CEI EN61000-4-4:2006 + EC (08) + A1 (10)
- CEI EN61000-4-6:2009
- CEI EN61000-4-8:1997 + A1 (01)
- CEI EN55011:2009
- CEI EN61000-6-2:2006
- CEI EN61000-6-4:2007
- CISPR 16-1:1999

Compliance with these standards requires servo motors to be mounted in accordance with the recommendations given in this user manual.

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Table of Content

1. INTRODUCTION

1.1. Purpose and intended audience

This manual contains information that must be observed to select, install, operate and maintain PARKER ETT servomotors.

Installation, operation and maintenance of the equipment should be carried out by qualified personnel. A qualified person is someone who is technically competent and familiar with all safety information and established safety practices; with the installation process, operation and maintenance of this equipment; and with all the hazards involved.

Reading and understanding the information described in this document is mandatory before carrying out any operation on the motors. If any malfunction or technical problem occurs, that has not been dealt with in this manual, please contact PARKER for technical assistance. In case of missing information or doubts regarding the installation procedures, safety instructions or any other issue tackled in this manual, please contact PARKER as well.

PARKER's responsibility is limited to its servomotors and does not encompass the whole user's system. Data provided in this manual are for product description only and may not be guaranteed, unless expressly mentioned in a contract.

DANGER: PARKER declines responsibility for any industrial accident or material damage that may arise, if the procedures and safety instructions described in this manual are not scrupulously followed.

1.2. Safety

1.2.1. Principle

To operate safely, this equipment must be transported, stored, handled, installed and serviced correctly. Following the safety instructions described in each section of this document is mandatory. Servo motors usage must also comply with all applicable standards, national directives and factory instructions in force.

DANGER: Non-compliance with safety instructions, legal and technical regulations in force may lead to physical injuries or death, as well as damages to the property and the environment.

1.2.2. General Safety Rules

	**Forbidden for persons with heart pace makers** Persons with heart pace makers are not allowed to handle or work with this product. Keep the necessary safety distance.
	**Beware of the magnetic field** The magnetic rod does contain strong magnets and exerts a strong pull on ferromagnetic objects. Non-compliance with the safety instructions may result in damages to computer drives and credit cards.
	**Generality** DANGER: The installation, commission and operation must be performed by qualified personnel, in conjunction with this documentation. The qualified personnel must know the safety and local regulations. They must be authorized to install, commission and operate in accordance with established practices and standards.
	**Electrical hazard** Servo drives may contain non-insulated live AC or DC components. Respect the drives commissioning manual. Users are advised to guard against access to live parts before installing the equipment. Some parts of the motor or installation elements can be subjected to dangerous voltages, when the motor is driven by the inverter , when the motor rotor is manually rotated, when the motor is driven by its load, when the motor is at standstill or stopped. For measurements use only a meter to IEC 61010 (CAT III or higher). Always begin using the highest range. CAT I and CAT II meters must not be used on this product. Allow at least 5 minutes for the drive's capacitors to discharge to safe voltage levels (<50 V). Use the specified meter capable of measuring up to 1000 V dc & ac rms to confirm that less than 50 V is present between all power terminals and between power terminals and earth. Check the drive recommendations. The motor must be permanently connected to an appropriate safety earth. To prevent any accidental contact with live components, it is necessary to check that cables are not damaged, stripped or not in contact with a rotating part of the machine. The work place must be clean, dry. General recommendations : - Check the wiring circuit - Lock the electrical cabinets - Use standardized equipment

	**Mechanical hazard** Servomotors can accelerate in milliseconds. Running the motor can lead to other sections of the machine moving dangerously. Moving parts must be screened off to prevent operators coming into contact with them. The working procedure must allow the operator to keep well clear of the danger area.
	**Burning Hazard** Always bear in mind that some parts of the surface of the motor can reach temperatures exceeding 100 °C.
	**Heavy object** Heavy objects should not be lifted by a single person.
	**Beware of crush hazard/hand injuries** The forcer may move unexpectedly. Always isolate all sources of electrical supply before working on the equipment. General hazard. Follow the advice given.

2. PRODUCT DESCRIPTION

2.1. Overview

The ETT servomotors Series from PARKER is an innovative direct drive solution designed for industrial applications. The electric tubular motor ETT is a direct thrust linear motor actuator, ideally suited for all kind of linear handling and pick & place applications.

Advantages

- Four lengths and five sizes according to pneumatic ISO flange norm (DIN ISO 15552:2005-12) for simplified mechanical integration
- Reduced mechanical complexity delivers a high energy efficiency and reduces maintenance
- High Force range up to 295 N$^{(*)}$ continuous and 2083 N$^{(*)}$ of peak force makes the ETT ideal for a wide range of applications
- High thermal efficiency improves reliability and increases mechanical life

2.2. Applications

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

2.3. General Technical Data

	ETT025	ETT032	ETT050	ETT080
Motor type	Tubular permanent-magnet synchronous motor			
Magnets material	Neodymium Iron Boron – (NdFeB)			
Number of poles	2			
Type of construction	DIN ISO 15552:2005-12			
Degree of protection	IP67			
Cooling	Natural cooling			
Rated voltage	230 VAC			230 / 400 VAC
Insulation of the stator winding	Class F according to IEC 60034-1 with potting			
Altitude	Up to 1000 m (IEC 60034-1)(for higher altitude see §3.1.1 for derating)			
Ambient temperature	0° C to +40 °C (IEC 60034-1)			
Storage temperature	-25… +70 °C			
Connection	Connectors			
Marking	CE			
Sensor	1 Vpp SinCos encoder feedback			
Thermal protection	KTY (PTC or PT1000 in option)			
Remark	Customizations are possible on request			

2.4. Product Code

2.4.1. Complete ETT Part Number Codes

ETT	025	S1	1S	M	N	0030	C	

Frame size
- **025**
- **032**
- **050**
- **080**

Winding type
- **S1** Serial, Stack Lenght 1 - not available for size 80
- **S2** Serial, Stack Lenght 2
- **S3** Serial, Stack Lenght 3
- **S4** Serial, Stack Lenght 4 - only for size 80
- **S5** Serial, Stack Lenght 5 - only for size 80

Connection & Feedback type
- **CS**: SinCos feedback – Connectors

Front / Rear "Rod End Mounting"
- **M**: Male Thread / Cap End
  (M5 for ETT25, M6 for ETT32, M8 for ETT50, M10 for ETT080)
- **F**: Female Thread / Cap End
  (M5 for ETT25, M6 for ETT32, M8 for ETT50, M10 for ETT080)
- **N**: Male Thread / Male Thread
  (M5 for ETT25, M6 for ETT32, M8 for ETT50, M10 for ETT080)
- **G**: Female Thread / Female Thread
  (M5 for ETT25, M6 for ETT32, M8 for ETT50, M10 for ETT080)

Fix Field – N -

Stroke (See table of stroke / length)

Protection Class IP
- **C**: IP67 Standard
- **R**: IP67 with Sealing rings – Attention stroke decrease, force decrease

Optional Customized

Note: All combinations are not possible – Contact Parker for checking.

2.4.2. Rod Part Number Codes

<table>
<tr><td>ETT-R</td><td>025</td><td>M</td><td>0040</td><td></td></tr>
<tr><td colspan="2">Frame size
- 025
- 032
- 050
- 080</td><td></td><td></td><td></td></tr>
<tr><td colspan="3">Front / Rear “Rod End Mounting”
- M: Male Thread / Cap End
(M5 for ETT25, M6 for ETT32, M8 for ETT50, M10 for ETT080)
- F: Female Thread / Cap End
(M5 for ETT25, M6 for ETT32, M8 for ETT50, M10 for ETT080)
- N: Male Thread / Male Thread
(M5 for ETT25, M6 for ETT32, M8 for ETT50, M10 for ETT080)
- G: Female Thread / Female Thread
(M5 for ETT25, M6 for ETT32, M8 for ETT50, M10 for ETT080)</td><td></td><td></td></tr>
<tr><td colspan="4">Length of ROD (See table of stroke / length)</td><td></td></tr>
<tr><td colspan="5">Optional Customized</td></tr>
</table>

2.4.3. Coil Part Number Codes

ETT	*025*	*S1*	*1S*	*N*	*C*	
Frame size - **025** - **032** - **050** - **080**						
Winding type - **S1** Serial, Stack Lenght 1 - not available for size 80 - **S2** Serial, Stack Lenght 2 - **S3** Serial, Stack Lenght 3 - **S4** Serial, Stack Lenght 4 - only for size 80 - **S5** Serial, Stack Lenght 5 - only for size 80						
Connection & Feedback type - **CS**: SinCos feedback – Connectors						
Fix Field – N -						
Protection Class IP - **C**: IP67 Standard - **R**: IP67 with Sealing rings – Attention stroke decrease, force decrease						
Optional Customized						

2.4.4. Table of Stroke / Lenght of Rod

2.4.4.1. ETT025

Part Number Codification	ROD "F" Lenght [mm]	ROD "F" Weight [kg]	ROD "N" Lenght [mm]	ROD "N" Weight [kg]	ROD "M" Lenght [mm]	ROD "M" Weight [kg]	ROD "G" Lenght [mm]	ROD "G" Weight [kg]	Stroke S1 [mm]	Stroke S2 [mm]	Stroke S3 [mm]
205	204	0.216	216	0.216	206	0.216	212	0.217	20	20	20
215	214	0.23	226	0.23	216	0.23	222	0.231	30	30	30
245	244	0.271	256	0.271	246	0.271	252	0.272	60	60	60
275	274	0.311	286	0.311	276	0.311	282	0.312	90	90	90
305	304	0.352	316	0.352	306	0.352	312	0.353	120	120	120
335	334	0.393	346	0.393	336	0.393	342	0.394	150	150	150
365	364	0.434	376	0.434	366	0.434	372	0.435	180	180	180
395	394	0.475	406	0.475	396	0.475	402	0.476	210	210	210
425	424	0.515	436	0.515	426	0.515	432	0.516	240	240	240
455	454	0.556	466	0.556	456	0.556	462	0.557	270	270	270
485	484	0.597	496	0.597	486	0.597	492	0.598	300	300	300
515	514	0.638	526	0.638	516	0.638	522	0.639	330	330	330
545	544	0.679	556	0.679	546	0.679	552	0.68	360	360	360
Coil Weight (kg):									0.5	0.5	0.6

* Needs specific mechanical mounting
Special length available under request
With sealing ring option the stroke is less, please contact our customer service
With coil movement solution please remove the bush bearing

2.4.4.2. ETT032

Part Number Codification	ROD "F" Lenght [mm]	ROD "F" Weight [kg]	ROD "N" Lenght [mm]	ROD "N" Weight [kg]	ROD "M" Lenght [mm]	ROD "M" Weight [kg]	ROD "G" Lenght [mm]	ROD "G" Weight [kg]	Stroke S1 [mm]	Stroke S2 [mm]	Stroke S3 [mm]
221	227	0.185	239	0.184	228	0.184	237	0.186	30		
251	257	0.227	269	0.226	258	0.226	267	0.228	60	30	
281	287	0.268	299	0.267	288	0.267	297	0.269	90	60	30
311	317	0.31	329	0.309	318	0.309	327	0.311	120	90	60
341	347	0.352	359	0.351	348	0.351	357	0.353	150	120	90
371	377	0.394	389	0.393	378	0.393	387	0.395	180	150	120
401	407	0.436	419	0.435	408	0.435	417	0.437	210	180	150
431	437	0.478	449	0.477	438	0.477	447	0.479	240	210	180
461	467	0.519	479	0.518	468	0.518	477	0.52	270	240	210
491	497	0.561	509	0.56	498	0.56	507	0.562	300	270	240
521	527	0.603	539	0.602	528	0.602	537	0.604	330	300	270
551	557	0.645	569	0.644	558	0.644	567	0.646	360	330	300
581	587	0.687	599	0.686	588	0.686	597	0.688	390	360	330
611	617	0.729	629	0.728	618	0.728	627	0.73	420	390	360
641	647	0.771	659	0.77	648	0.77	657	0.772	450	420	390
671	677	0.812	689	0.811	678	0.811	687	0.813	480	450	420
701	707	0.854	719	0.853	708	0.853	717	0.855	510	480	450
731	737	0.896	749	0.895	738	0.895	747	0.897	540	510	480
761	767	0.938	779	0.937	768	0.937	777	0.939	570	540	510
791	797	0.98	809	0.979	798	0.979	807	0.981	600	570	540
821	827	1.022	839	1.021	828	1.021	837	1.023	630	600	570
851	857	1.063	869	1.062	858	1.062	867	1.064	660	630	600
Coil Weight (kg)									0.89	1.01	1.16

* Needs specific mechanical mounting
Special length available under request
With sealing ring option the stroke is less, please contact our customer service
With coil movement solution please remove the bush bearing

2.4.4.3. ETT050

Part Number Codification	ROD "F" Lenght [mm]	ROD "F" Weight [kg]	ROD "N" Lenght [mm]	ROD "N" Weight [kg]	ROD "M" Lenght [mm]	ROD "M" Weight [kg]	ROD "G" Lenght [mm]	ROD "G" Weight [kg]	Stroke S1 [mm]	Stroke S2 [mm]	Stroke S3 [mm]
254	254	0.759	274	0.758	259	0.758	264	0.76	30		
284	284	0.866	304	0.865	289	0.865	294	0.867	60	30	
314	314	0.973	334	0.972	319	0.972	324	0.974	90	60	
344	344	1.08	364	1.079	349	1.079	354	1.081	120	90	
374	374	1.187	394	1.186	379	1.186	384	1.188	150	120	
404	404	1.294	424	1.293	409	1.293	414	1.295	180	150	
434	434	1.401	454	1.4	439	1.4	444	1.402	210	180	30
464	464	1.508	484	1.507	469	1.507	474	1.509	240	210	60
494	494	1.614	514	1.613	499	1.613	504	1.615	270	240	90
524	524	1.721	544	1.72	529	1.72	534	1.722	300	270	120
554	554	1.828	574	1.827	559	1.827	564	1.829	330	300	150
584	584	1.935	604	1.934	589	1.934	594	1.936	360	330	180
614	614	2.042	634	2.041	619	2.041	624	2.043	390	360	210
644	644	2.149	664	2.148	649	2.148	654	2.15	420	390	240
674	674	2.256	694	2.255	679	2.255	684	2.257	450	420	270
704	704	2.363	724	2.362	709	2.362	714	2.364	480	450	300
734	734	2.47	754	2.469	739	2.469	744	2.471	510	480	330
764	764	2.576	784	2.575	769	2.575	774	2.577	540	510	360
794	794	2.683	814	2.682	799	2.682	804	2.684	570	540	390
824	824	2.79	844	2.789	829	2.789	834	2.791	600	570	420
854	854	2.897	874	2.896	859	2.896	864	2.898	630	600	450
884	884	3.004	904	3.003	889	3.003	894	3.005	660	630	480
914	914	3.111	934	3.11	919	3.11	924	3.112	690	660	510
944	944	3.218	964	3.217	949	3.217	954	3.219	720	690	540
								Coil Weight (kg)	1.54	1.765	3.005

* Needs specific mechanical mounting
Special length available under request
With sealing ring option the stroke is less, please contact our customer service
With coil movement solution please remove the bush bearing

2.4.4.4. ETT080

Part Number Codificati on	ROD "F"		ROD "N"		ROD "M"		ROD "G"		Stroke			
	Leng ht [mm]	Weig ht [kg]	Leng ht [mm]	Weig ht [kg]	Leng ht [mm]	Weig ht [kg]	Leng ht [mm]	Weig ht [kg]	S2 [m m]	S3 [m m]	S4 [m m]	S5 [m m]
338	338	1.99	362	1.99	350	2.00	354	2.00	46			
368	368	2.20	392	2.20	380	2.22	384	2.22	76	46		
398	398	2.42	422	2.42	410	2.43	414	2.43	106	76		
428	428	2.63	452	2.63	440	2.64	444	2.64	136	106		
458	458	2.84	482	2.84	470	2.85	474	2.85	166	136		
488	488	3.05	512	3.05	500	3.07	504	3.07	196	166	46	
518	518	3.27	542	3.27	530	3.28	534	3.28	226	196	76	
548	548	3.48	572	3.48	560	3.49	564	3.49	256	226	106	
578	578	3.69	602	3.69	590	3.71	594	3.71	286	256	136	
608	608	3.90	632	3.90	620	3.92	624	3.92	316	286	166	40
638	638	4.12	662	4.12	650	4.13	654	4.13	346	316	196	70
668	668	4.33	692	4.33	680	4.34	684	4.34	376	346	226	100
698	698	4.54	722	4.54	710	4.56	714	4.56	406	376	256	130
728	728	4.75	752	4.75	740	4.77	744	4.77	436	406	286	160
758	758	4.97	782	4.97	770	4.98	774	4.98	466	436	316	190
788	788	5.18	812	5.18	800	5.19	804	5.19	496	466	346	220
818	818	5.39	842	5.39	830	5.41	834	5.41	526	496	376	250
848	848	5.60	872	5.60	860	5.62	864	5.62	556	526	406	280
878	878	5.82	902	5.82	890	5.83	894	5.83	586	556	436	310
908	908	6.03	932	6.03	920	6.04	924	6.04	616	586	466	340
938	938	6.24	962	6.24	950	6.26	954	6.26	646	616	496	370
968	968	6.45	992	6.45	980	6.47	984	6.47	676	646	526	400
998	998	6.67	1022	6.67	1010	6.68	1014	6.68	706	676	556	430
1028	1028	6.88	1052	6.88	1040	6.89	1044	6.89	736	706	586	460
Weight of Coil									4.4	5	7	9.55

* Needs specific mechanical mounting
Special length available under request
With sealing ring option the stroke is less, please contact our customer service
With coil movement solution please remove the bush bearing

3. TECHNICAL DATA

3.1. Motor selection

3.1.1. Altitude derating

From 0 to 1000 m : no derating
1000 to 4000 m: force derating of 10% for each step of 1000 m for air cooled

3.1.2. Temperature derating

3.1.2.1. Natural cooled motor

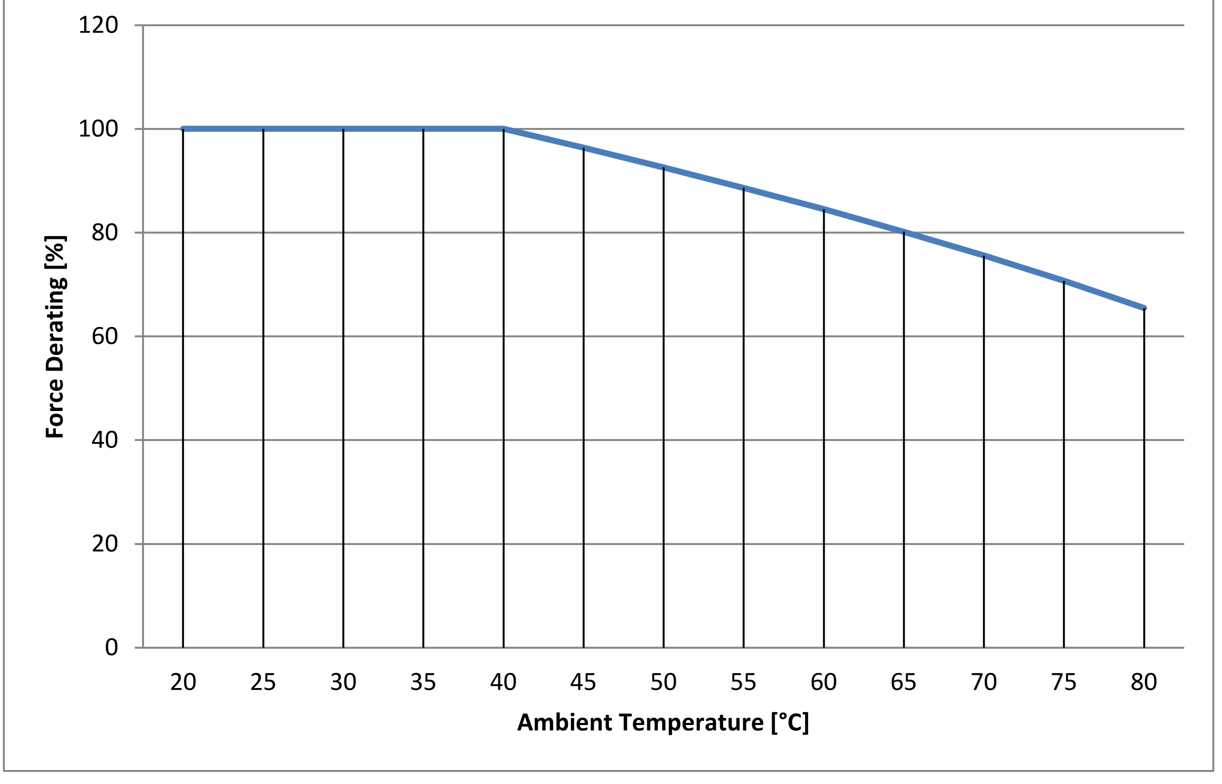
The maximum ambient temperature for operation with natural cooling is 40 °C. It is possible to increase the ambient temperature above 40 °C, with a force reduction. The following formula provides an indication of the torque derating at low speed. Refer to PARKER technical support to confirm the exact values

At low speed the force derating is given by the following formula for an ambient temperature > 40°C.

$$Force\_derating[\%] = 100 * \sqrt{\frac{(110°C - Ambient\_temperature°C)}{70°C}}$$

⚠	At high speed, the calculation is more complex, and the derating is much more important. Please refer to PARKER to a precise calculation of force derating according to the ambient temperature at high speed for a specific motor.

Illustration: Only for example with a low speed



3.1.3. Thermal equivalent force (rms force)

The selection of the right motor can be made through the calculation of the rms force ***F_{rms}*** (i.e. root mean squared force - sometimes called equivalent force).
This calculation does not take into account the thermal time constant. It can be used only if the overload time is much shorter than the copper thermal time constant.
The rms force ***F_{rms}*** reflects the heating of the motor during its duty cycle.
Let us consider:
- the period of the cycle ***T*** *[s],*
- the successive samples of movements ***i*** each one characterized by the maximal force ***F_i*** *[Nm]* reached during the duration ***Δt_i*** *[s]*.

So, the rms force ***F_{rms}*** can be calculated using the following basic formula:

$$F_{rms} = \sqrt{\frac{1}{T} * \sum_{i=1}^{n} F_i^2 \Delta t_i}$$

Example:
For a cycle of 2s at 0 N and 2s at 10N and a period of 4 s, the rms force is

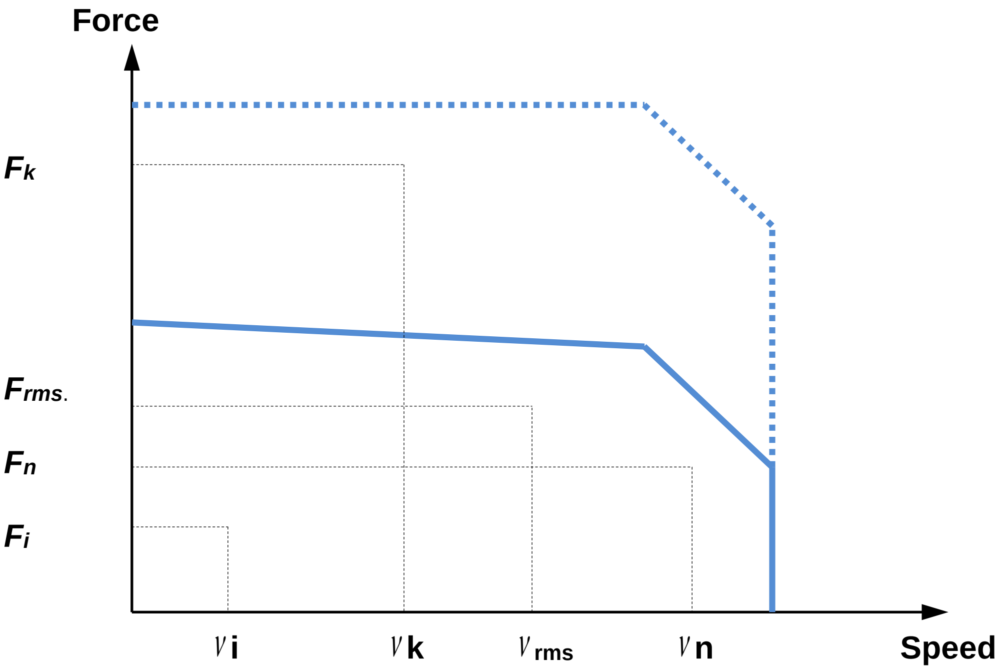
$$F_{rms} = \sqrt{\frac{1}{4} * 10^2 * 2} = 7{,}07N$$

Selection of the motor:
The motor adapted to the duty cycle has to provide the rms force ***F_{rms}*** at the rms speed(*) without extra heating. This means that the permanent Force ***F_n*** available at the average speed presents a sufficient margin with regards to the rms force ***F_{rms}***.

$$v_{rms} = \sqrt{\frac{1}{T} * \sum_{i=1}^{n} v_i^2 \Delta t_i}$$

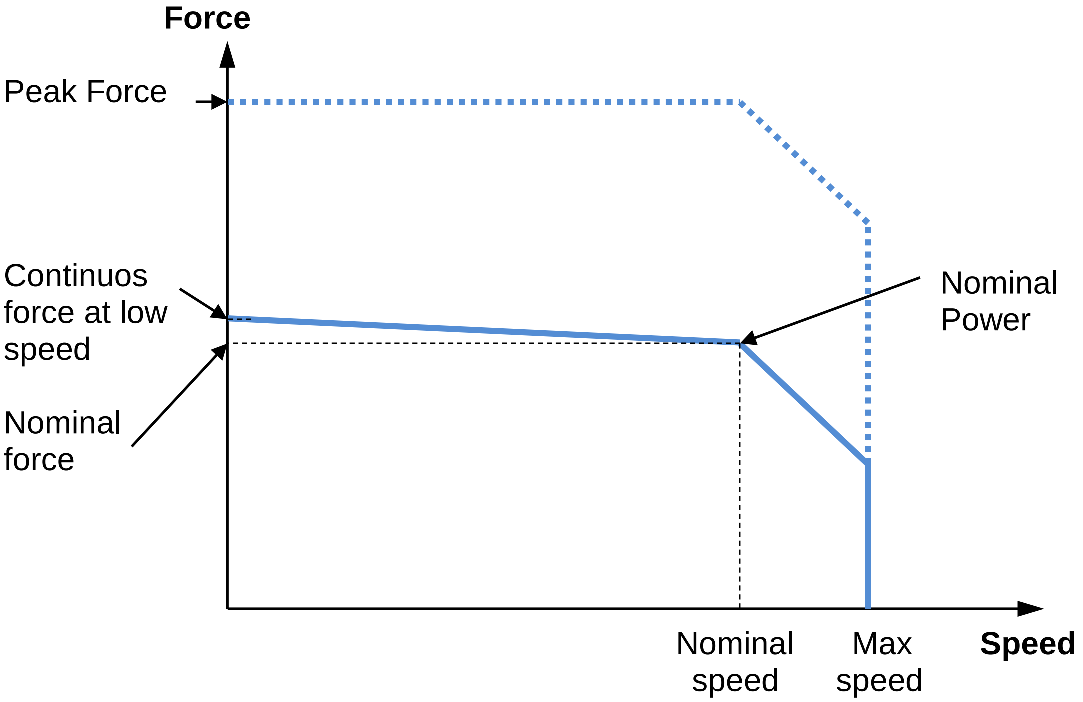
(*) rms speed is calculated thanks to the same formula as that used for the rms force.
The mean speed cannot be used (in general mean speed is equal to zero).
Only use the rms speed.

Furthermore, each Mi and speed associated v_i of the duty cycle has to be located in the operational area of the torque vs speed curve.


Force
Fk
Frms.
Fn
Fi
Vi
Vk
Vrms
Vn
Speed

3.2. ETT Characteristics: Force, speed, current, power…

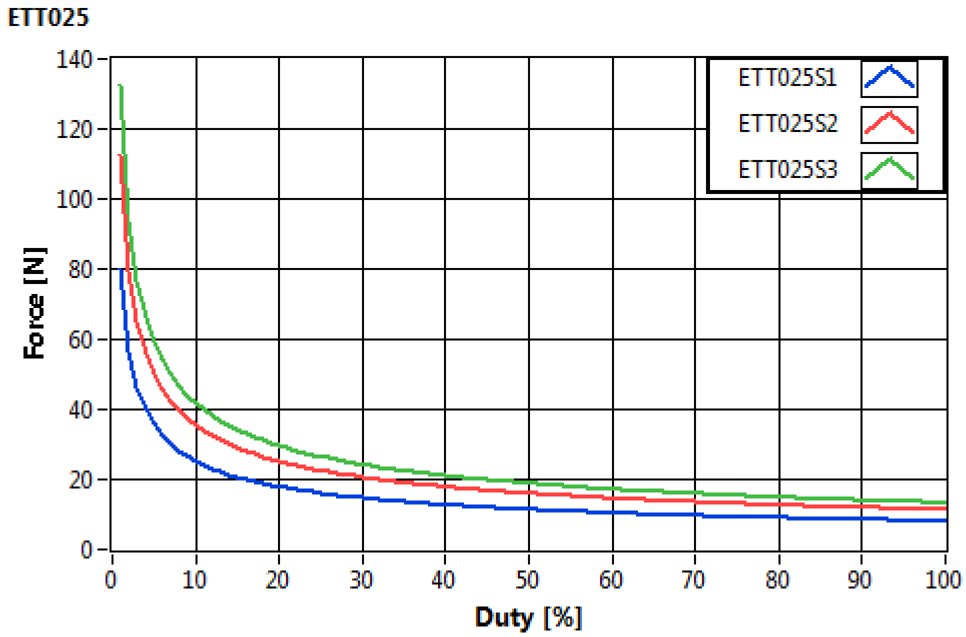
The force vs speed graph below shows the key Force, Speed and Power components listed in the specifications.



	ETT025			ETT032			ETT050			ETT080			
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S2	S3	S4	S5
Peak Force S3 1% (3s)	80	113	131	134	179	239	337	511	1056	970	1205	2130	2947
Peak Force S3 2% (6s)	56	80	93	95	126	169	238	361	746	686	852	1506	2084
Peak Force S3 3% (9s)	46	65	76	78	103	138	195	295	609	560	696	1230	1701
Peak Force S3 5% (15s)	36	50	59	60	80	107	151	228	472	434	539	952	1318
Continous Force S1	8	11	13	13	18	24	34	51	106	97	120	213	295

3.2.1. ETT025 Electric Specifications

Force in fuction of the type of duty cycle



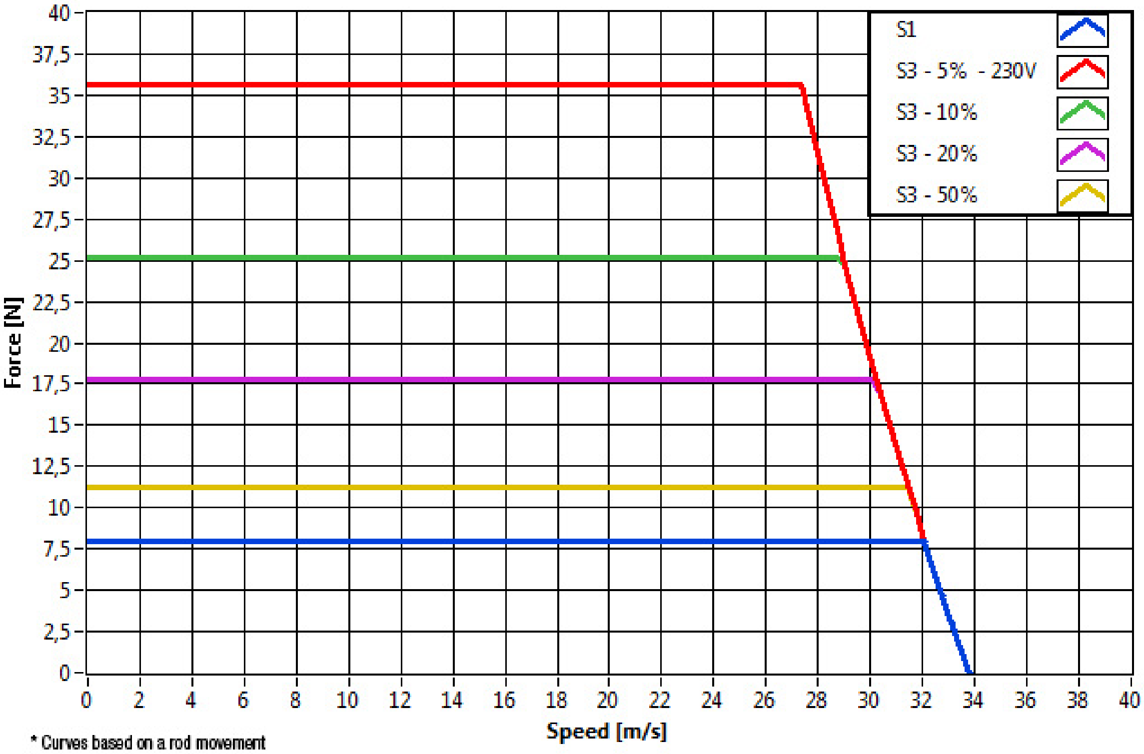
*data reffered to ambient temperature of 25°C and 110°C dT

3.2.1.1. ETT025S1

	Servo Linear Tubular Motor **ETT025S1** Electronic Drive **DRIVE 1 / 2 Arms**				
					CE certified
	Without heatsink plate		Unit		
F_n	Continuos Stall Force [2]	7.97	N	**Cooling Type:**	
I_n	Continuos Stall Current [2]	0.68	A_{rms}	Natural Air cooling	
$F_{PK5\%}$	Peak Force - S3 5% [2]	35.62	N		
$F_{PK10\%}$	Peak Force - S3 10% [2]	25.19	N		
$F_{PK20\%}$	Peak Force - S3 20% [2]	17.81	N		
$F_{PK20\%}$	Peak Force - S3 50% [2]	11.26	N		
$I_{PK5\%}$	Peak Current -S3 5% [2]	3.02	A_{rms}		
$I_{PK10\%}$	Peak Current -S3 10% [2]	2.13	A_{rms}		
$I_{PK20\%}$	Peak Current -S3 20% [2]	1.51	A_{rms}	**Environment:**	
$I_{PK50\%}$	Peak Current -S3 50% [2]	0.95	A_{rms}	Ambient Temperature:	40°C MAX
	With heatsink plate 25 x 25 x 2.5 cm [5) 6)]			Altitude:	< 1000 m
F_{n2}	Continuos Stall Force [2]	n.a.	N	Thermal Class:	F
I_{n2}	Continuos Stall Current [2]	n.a.	A_{rms}	(according to IEC 60034-1)	
K_F	Force constant (sine commutation) [8]	11.80	N/Arms	Number of poles:	2
K_e	Back EMF constant (phase to phase) [8]	9.63	$V/_{m/s}$	Pole pitch:	60mm
K_{eRMS}	Back EMF constant (phase to phase,rms) [8]	6.81	$V_{rms}/_{m/s}$		
Rb	Resistance @ 25 °C (phase to phase)	17.17	Ohm		
Rb_{HOT}	Resistance @ 100 °C (phase to phase)	23.92	Ohm	**Efficency:**	
L	Inductance @ 1 kHz (phase to phase)	5.42	mH	at rated force, speed 2m/s:	48.66%
	Electrical time constant	0.316	ms		
	Motor Constant	1.94	N/sqrt(W)		
UR	Typical supply voltage of the servo drive	230.00	VAC		
U	Max. DC bus voltage	325.27	VDC		
a_{PK}	Peak Acceleration [3) 6)]	154.87	m/s²		
v_{PK}	Maximum Speed [4) 6)]	4.35	m/s		
	Maximum phase temperature	135	°C		
	Thermal time constant	1193	s		
	Power dissipation at 25 °C ambient temperature	16.81	W		
	Thermal resistance Rth (phase-housing)	2.65	°C/W		
	Thermal resistance Rth (housing-environment)	3.88	°C/W		
	With heatsink plate 25 x 25 x 2.5 cm [7]				
	Power dissipation at 25 °C ambient temperature	n.a.	W		
	Thermal resistance Rth (housing-environment)	n.a.	°C/W		

(1) S=series motor phases - (2) at an ambient temperature of 40 °C - (3) based on a 30 mm stroke, without payload - (4) Based on triangular move over 360mm stroke without payload and without taking in account voltage limits - (5) Values specified are for machine integration with a heat-sink - (6) The specifications and data may be subject to change depending of the load - (7) Values specified are for machine integration with a heat-sink - (8) Manufacturing data ±10%
* NOT been considered the limitations imposed by trajectory and mass of the ROD
** NOT been considered the effect due to eddy current brake.

ETT025S1



* Curves based on a rod movement
** Curves based on a system without load and without trajectory limits.

3.2.1.2. ETT025S2

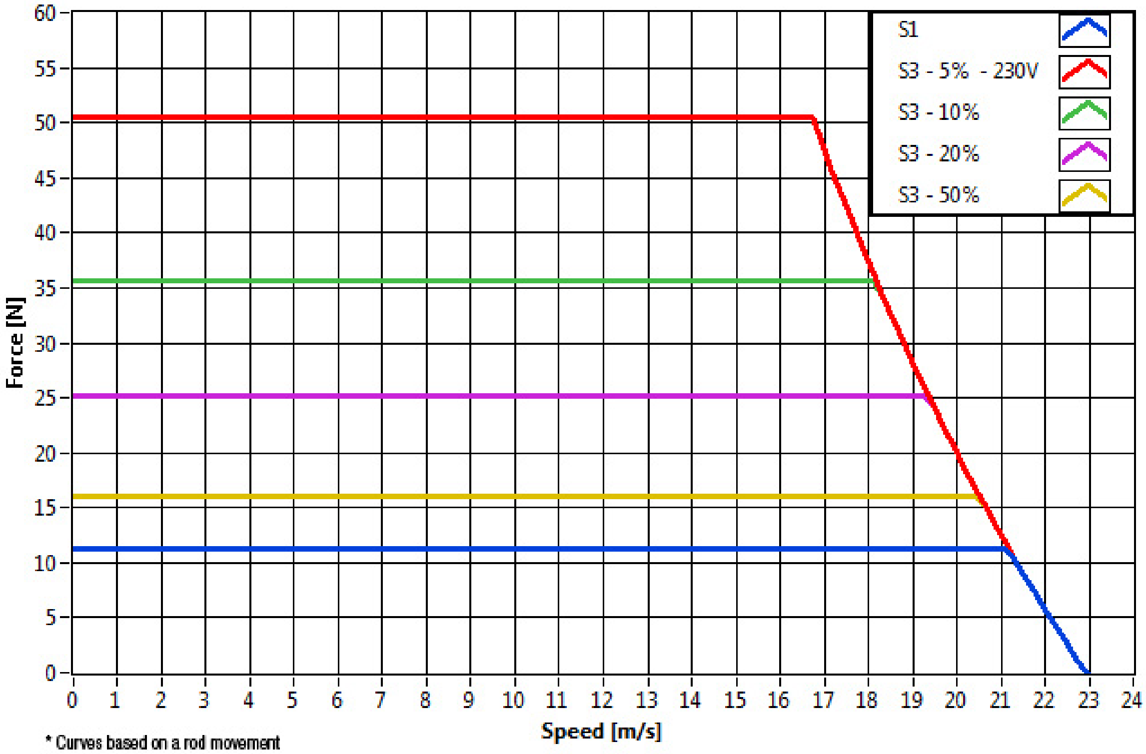
Servo Linear Tubular Motor
ETT025S2
Electronic Drive
DRIVE 1 / 2 Arms

	Without heatsink plate		Unit
F_n	Continuos Stall Force [2)]	11.29	N
I_n	Continuos Stall Current [2)]	0.65	A_{rms}
$F_{PK5\%}$	Peak Force - S3 5% [2)]	50.49	N
$F_{PK10\%}$	Peak Force - S3 10% [2)]	35.70	N
$F_{PK20\%}$	Peak Force - S3 20% [2)]	25.25	N
$F_{PK20\%}$	Peak Force - S3 50% [2)]	15.97	N
$I_{PK5\%}$	Peak Current -S3 5% [2)]	2.91	A_{rms}
$I_{PK10\%}$	Peak Current -S3 10% [2)]	2.06	A_{rms}
$I_{PK20\%}$	Peak Current -S3 20% [2)]	1.45	A_{rms}
$I_{PK50\%}$	Peak Current -S3 50% [2)]	0.92	A_{rms}
	With heatsink plate 25 x 25 x 2.5 cm [5) 6)]		
F_{n2}	Continuos Stall Force [2)]	13.90	N
I_{n2}	Continuos Stall Current [2)]	0.80	A_{rms}
K_F	Force constant (sine commutation) [8)]	17.37	N/Arms
K_e	Back EMF constant (phase to phase) [8)]	14.18	$V/_{m/s}$
K_{eRMS}	Back EMF constant (phase to phase,rms) [8)]	10.03	$V_{rms}/_{m/s}$
Rb	Resistance @ 25 °C (phase to phase)	25.06	Ohm
Rb_{HOT}	Resistance @ 100 °C (phase to phase)	34.91	Ohm
L	Inductance @ 1 kHz (phase to phase)	8	mH
	Electrical time constant	0.315	ms
	Motor Constant	2.37	N/sqrt(W)
UR	Typical supply voltage of the servo drive	230.00	VAC
U	Max. DC bus voltage	325.27	VDC
a_{PK}	Peak Acceleration [3) 6)]	219.53	m/s²
v_{PK}	Maximum Speed [4) 6)]	5.17	m/s
	Maximum phase temperature	135	°C
	Thermal time constant	1130	s
	Power dissipation at 25 °C ambient temperature	22.75	W
	Thermal resistance Rth (phase-housing)	1.5	°C/W
	Thermal resistance Rth (housing-environment)	3.4	°C/W
	With heatsink plate 25 x 25 x 2.5 cm [7)]		
	Power dissipation at 25 °C ambient temperature	34.46	W
	Thermal resistance Rth (housing-environment)	1.81	°C/W

	CE certified
Cooling Type:	
Natural Air cooling	
Environment:	
Ambient Temperature:	40°C MAX
Altitude:	< 1000 m
Thermal Class:	F
(according to IEC 60034-1)	
Number of poles:	2
Pole pitch:	60mm
Efficency:	
at rated force, speed 2m/s:	49.82%

(1) S=series motor phases - (2) at an ambient temperature of 40 °C - (3) based on a 30 mm stroke, without payload - (4) Based on triangular move over 360mm stroke without payload and without taking in account voltage limits - (5) Values specified are for machine integration with a heat-sink - (6) The specifications and data may be subject to change depending of the load - (7) Values specified are for machine integration with a heat-sink - (8) Manufacturing data ±10%
* NOT been considered the limitations imposed by trajectory and mass of the ROD
** NOT been considered the effect due to eddy current brake.

ETT025S2



* Curves based on a rod movement
** Curves based on a system without load and without trajectory limits.

3.2.1.3. ETT025S3

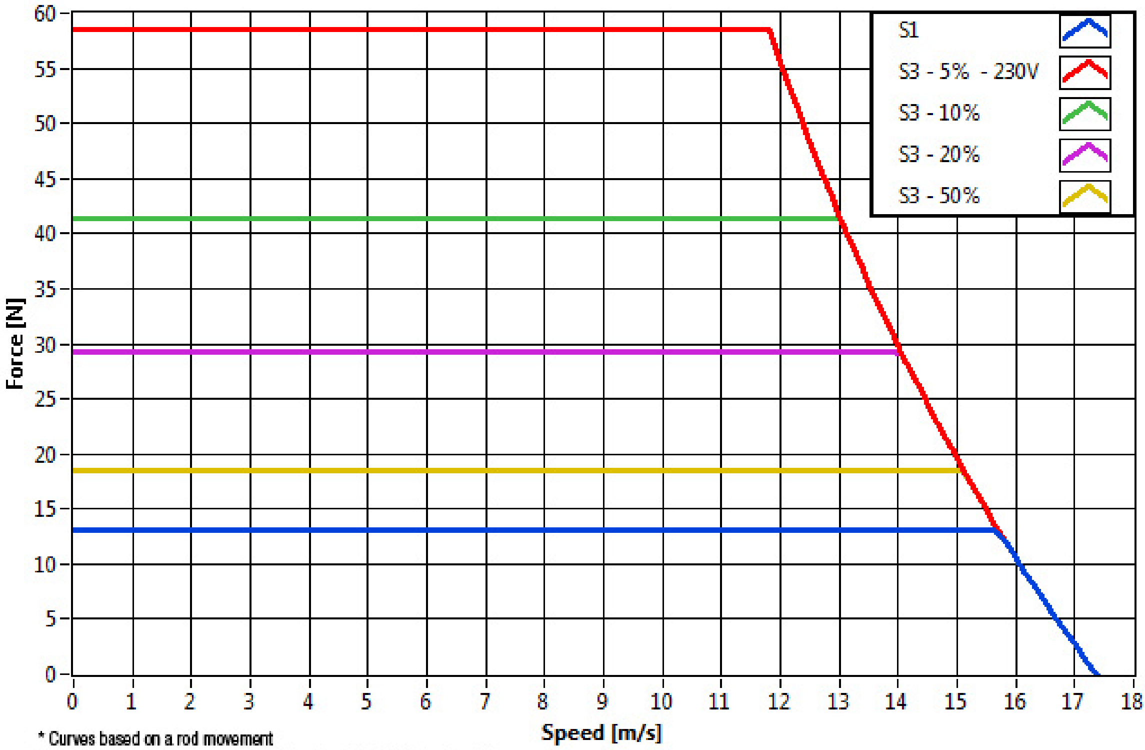
Servo Linear Tubular Motor
ETT025S3
Electronic Drive
DRIVE 1 / 2 Arms

	Without heatsink plate		Unit
F_n	Continuos Stall Force [2]	13.08	N
I_n	Continuos Stall Current [2]	0.57	A_{rms}
$F_{PK5\%}$	Peak Force - S3 5% [2]	58.50	N
$F_{PK10\%}$	Peak Force - S3 10% [2]	41.37	N
$F_{PK20\%}$	Peak Force - S3 20% [2]	29.25	N
$F_{PK20\%}$	Peak Force - S3 50% [2]	18.50	N
$I_{PK5\%}$	Peak Current -S3 5% [2]	2.55	A_{rms}
$I_{PK10\%}$	Peak Current -S3 10% [2]	1.80	A_{rms}
$I_{PK20\%}$	Peak Current -S3 20% [2]	1.27	A_{rms}
$I_{PK50\%}$	Peak Current -S3 50% [2]	0.81	A_{rms}
	With heatsink plate 25 x 25 x 2.5 cm [5] [6]		
F_{n2}	Continuos Stall Force [2]	16.29	N
I_{n2}	Continuos Stall Current [2]	0.71	A_{rms}
K_F	Force constant (sine commutation) [8]	22.95	N/Arms
K_e	Back EMF constant (phase to phase) [8]	18.74	$V/_{m/s}$
K_{eRMS}	Back EMF constant (phase to phase,rms) [8]	13.25	$V_{rms}/_{m/s}$
Rb	Resistance @ 25 °C (phase to phase)	33.89	Ohm
Rb_{HOT}	Resistance @ 100 °C (phase to phase)	47.21	Ohm
L	Inductance @ 1 kHz (phase to phase)	10.46	mH
	Electrical time constant	0.309	ms
	Motor Constant	2.69	N/sqrt(W)
UR	Typical supply voltage of the servo drive	230.00	VAC
U	Max. DC bus voltage	325.27	VDC
a_{PK}	Peak Acceleration [3] [6]	254.36	m/s²
v_{PK}	Maximum Speed [4] [6]	5.57	m/s
	Maximum phase temperature	135	°C
	Thermal time constant	1464	s
	Power dissipation at 25 °C ambient temperature	23.66	W
	Thermal resistance Rth $_{(phase-housing)}$	1.04	°C/W
	Thermal resistance Rth $_{(housing-environment)}$	3.51	°C/W
	With heatsink plate 25 x 25 x 2.5 cm [7]		
	Power dissipation at 25 °C ambient temperature	36.7	W
	Thermal resistance Rth $_{(housing-environment)}$	1.92	°C/W

	CE certified
Cooling Type:	
Natural Air cooling	
Environment:	
Ambient Temperature:	40°C MAX
Altitude:	< 1000 m
Thermal Class:	F
(according to IEC 60034-1)	
Number of poles:	2
Pole pitch:	60mm
Efficency:	
at rated force, speed 2m/s:	52.52%

(1) S=series motor phases - (2) at an ambient temperature of 40 °C - (3) based on a 30 mm stroke, without payload - (4) Based on triangular move over 360mm stroke without payload and without taking in account voltage limits - (5) Values specified are for machine integration with a heat-sink - (6) The specifications and data may be subject to change depending of the load - (7) Values specified are for machine integration with a heat-sink - (8) Manufacturing data ±10%
* NOT been considered the limitations imposed by trajectory and mass of the ROD
** NOT been considered the effect due to eddy current brake.

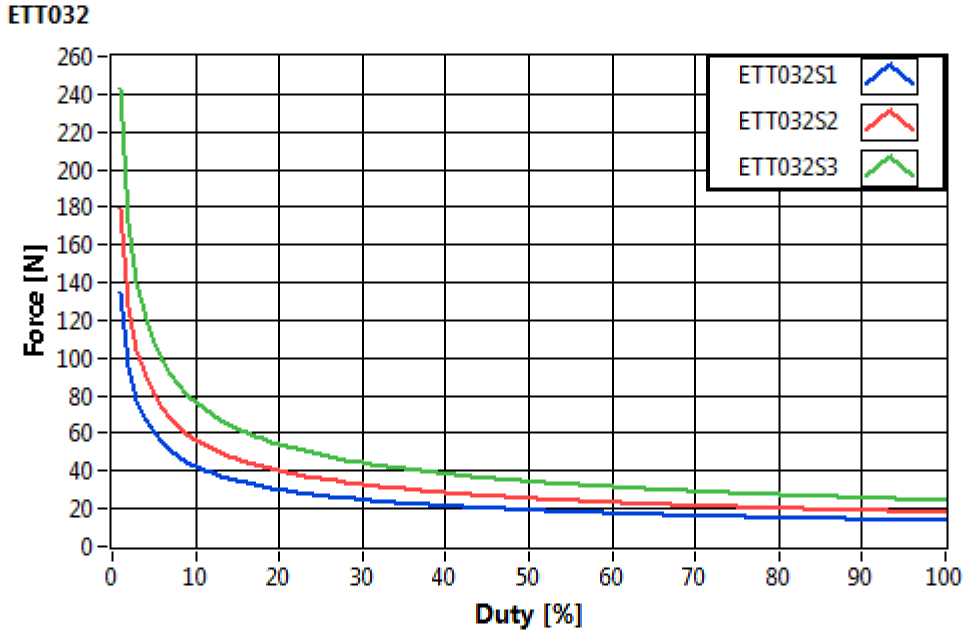
ETT025S3



* Curves based on a rod movement
** Curves based on a system without load and without trajectory limits.

3.2.2. ETT032 Electric Specifications

Force in fuction of the type of duty cycle



*data reffered to ambient temperature of 25°C and 110°C dT

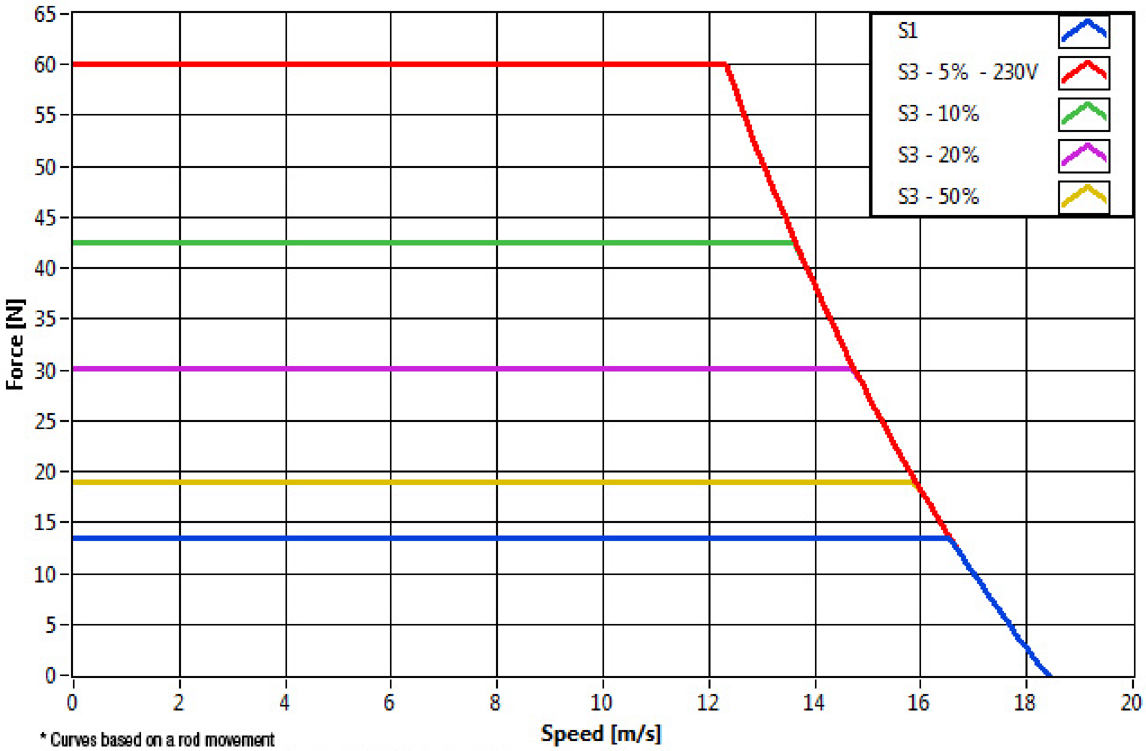
3.2.2.1. ETT032S1

Servo Linear Tubular Motor
ETT032S1
Electronic Drive
DRIVE 1 / 2 Arms

					CE certified	
	Without heatsink plate		Unit			
F_n	Continuos Stall Force [2]	13.44	N		**Cooling Type:**	
I_n	Continuos Stall Current [2]	0.62	A_{rms}		Natural Air cooling	
$F_{PK5\%}$	Peak Force - S3 5% [2]	60.08	N			
$F_{PK10\%}$	Peak Force - S3 10% [2]	42.49	N			
$F_{PK20\%}$	Peak Force - S3 20% [2]	30.04	N			
$F_{PK20\%}$	Peak Force - S3 50% [2]	19.00	N			
$I_{PK5\%}$	Peak Current -S3 5% [2]	2.77	A_{rms}			
$I_{PK10\%}$	Peak Current -S3 10% [2]	1.96	A_{rms}			
$I_{PK20\%}$	Peak Current -S3 20% [2]	1.39	A_{rms}		**Environment:**	
$I_{PK50\%}$	Peak Current -S3 50% [2]	0.88	A_{rms}		Ambient Temperature:	40°C MAX
	With heatsink plate 25 x 25 x 2.5 cm [5) 6)]				Altitude:	< 1000 m
F_{n2}	Continuos Stall Force [2]	14.52	N		Thermal Class:	F
I_{n2}	Continuos Stall Current [2]	0.67	A_{rms}		(according to IEC 60034-1)	
K_F	Force constant (sine commutation) [8]	21.67	N/Arms		Number of poles:	2
K_e	Back EMF constant (phase to phase) [8]	17.69	$V/_{m/s}$		Pole pitch:	60mm
K_{eRMS}	Back EMF constant (phase to phase,rms) [8]	12.51	$V_{rms}/_{m/s}$			
Rb	Resistance @ 25 °C (phase to phase)	31.46	Ohm			
Rb_{HOT}	Resistance @ 100 °C (phase to phase)	43.82	Ohm		**Efficency:**	
L	Inductance @ 1 kHz (phase to phase)	14.57	mH		at rated force, speed 2m/s:	50.84%
	Electrical time constant	0.463	ms			
	Motor Constant	2.64	N/sqrt(W)			
UR	Typical supply voltage of the servo drive	230.00	VAC			
U	Max. DC bus voltage	325.27	VDC			
a_{PK}	Peak Acceleration [3) 6)]	224.20	m/s²			
v_{PK}	Maximum Speed [4) 6)]	5.45	m/s			
	Maximum phase temperature	135	°C			
	Thermal time constant	1133	s			
	Power dissipation at 25 °C ambient temperature	25.98	W			
	Thermal resistance Rth $_{(phase-housing)}$	2.15	°C/W			
	Thermal resistance Rth $_{(housing-environment)}$	2.09	°C/W			
	With heatsink plate 25 x 25 x 2.5 cm [7]					
	Power dissipation at 25 °C ambient temperature	30.34	W			
	Thermal resistance Rth $_{(housing-environment)}$	1.75	°C/W			

(1) S=series motor phases - (2) at an ambient temperature of 40 °C - (3) based on a 30 mm stroke, without payload - (4) Based on triangular move over 360mm stroke without payload and without taking in account voltage limits - (5) Values specified are for machine integration with a heat-sink - (6) The specifications and data may be subject to change depending of the load - (7) Values specified are for machine integration with a heat-sink - (8) Manufacturing data ±10%
* NOT been considered the limitations imposed by trajectory and mass of the ROD
** NOT been considered the effect due to eddy current brake.

ETT032S1



* Curves based on a rod movement
** Curves based on a system without load and without trajectory limits.

3.2.2.2. ETT032S2

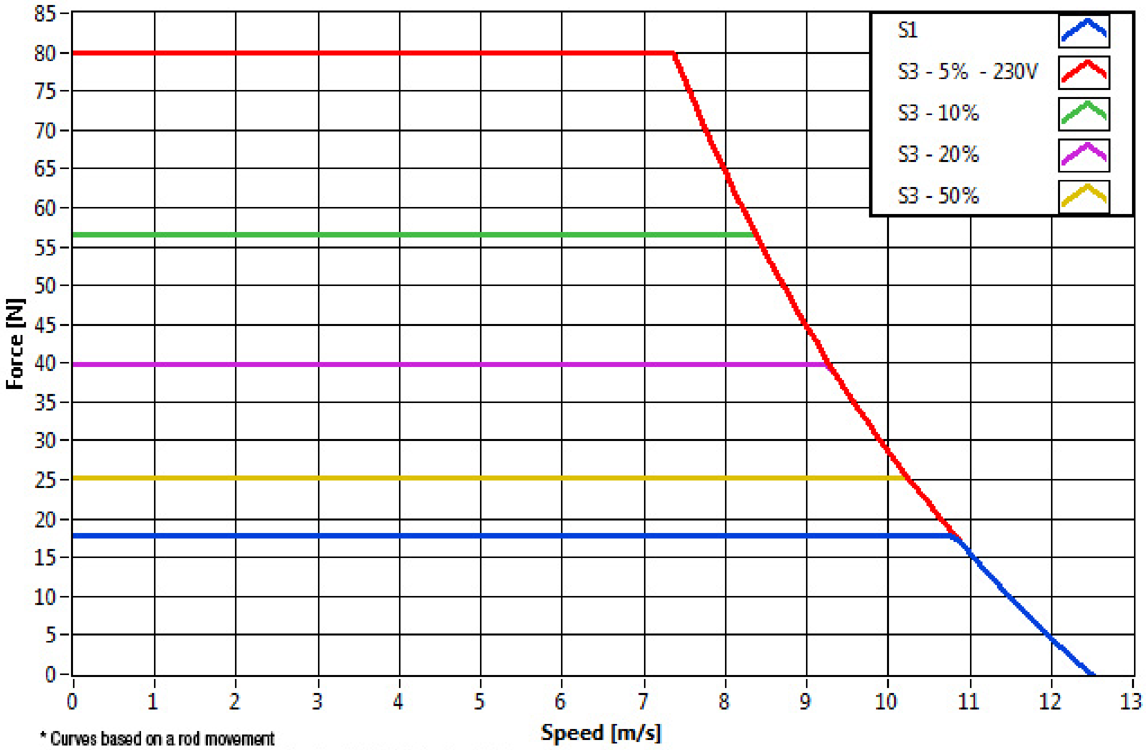
Servo Linear Tubular Motor
ETT032S2
Electronic Drive
DRIVE 1 / 2 Arms

Symbol	Description	Value	Unit
	Without heatsink plate		Unit
F_n	Continuos Stall Force [2)]	17.86	N
I_n	Continuos Stall Current [2)]	0.56	A_{rms}
$F_{PK5\%}$	Peak Force - S3 5% [2)]	79.87	N
$F_{PK10\%}$	Peak Force - S3 10% [2)]	56.47	N
$F_{PK20\%}$	Peak Force - S3 20% [2)]	39.93	N
$F_{PK20\%}$	Peak Force - S3 50% [2)]	25.26	N
$I_{PK5\%}$	Peak Current -S3 5% [2)]	2.50	A_{rms}
$I_{PK10\%}$	Peak Current -S3 10% [2)]	1.77	A_{rms}
$I_{PK20\%}$	Peak Current -S3 20% [2)]	1.25	A_{rms}
$I_{PK50\%}$	Peak Current -S3 50% [2)]	0.79	A_{rms}
	With heatsink plate 25 x 25 x 2.5 cm [5) 6)]		
F_{n2}	Continuos Stall Force [2)]	22.00	N
I_{n2}	Continuos Stall Current [2)]	0.69	A_{rms}
K_F	Force constant (sine commutation) [8)]	31.89	N/Arms
K_e	Back EMF constant (phase to phase) [8)]	26.04	$V/_{m/s}$
K_{eRMS}	Back EMF constant (phase to phase,rms) [8)]	18.41	$V_{rms}/_{m/s}$
Rb	Resistance @ 25 °C (phase to phase)	43.84	Ohm
Rb_{HOT}	Resistance @ 100 °C (phase to phase)	61.07	Ohm
L	Inductance @ 1 kHz (phase to phase)	21.75	mH
	Electrical time constant	0.496	ms
	Motor Constant	3.29	N/sqrt(W)
UR	Typical supply voltage of the servo drive	230.00	VAC
U	Max. DC bus voltage	325.27	VDC
a_{PK}	Peak Acceleration [3) 6)]	257.63	m/s²
v_{PK}	Maximum Speed [4) 6)]	6.11	m/s
	Maximum phase temperature	135	°C
	Thermal time constant	1112	s
	Power dissipation at 25 °C ambient temperature	29.54	W
	Thermal resistance Rth (phase-housing)	1.87	°C/W
	Thermal resistance Rth (housing-environment)	1.85	°C/W
	With heatsink plate 25 x 25 x 2.5 cm [7)]		
	Power dissipation at 25 °C ambient temperature	44.84	W
	Thermal resistance Rth (housing-environment)	1.17	°C/W

	CE certified
Cooling Type:	
Natural Air cooling	
Environment:	
Ambient Temperature:	40°C MAX
Altitude:	< 1000 m
Thermal Class:	F
(according to IEC 60034-1)	
Number of poles:	2
Pole pitch:	60mm
Efficency:	
at rated force, speed 2m/s:	54.73%

(1) S=series motor phases - (2) at an ambient temperature of 40 °C - (3) based on a 30 mm stroke, without payload - (4) Based on triangular move over 360mm stroke without payload and without taking in account voltage limits - (5) Values specified are for machine integration with a heat-sink - (6) The specifications and data may be subject to change depending of the load - (7) Values specified are for machine integration with a heat-sink - (8) Manufacturing data ±10%
* NOT been considered the limitations imposed by trajectory and mass of the ROD
** NOT been considered the effect due to eddy current brake.

ETT032S2



* Curves based on a rod movement
** Curves based on a system without load and without trajectory limits.

3.2.2.3. ETT032S3

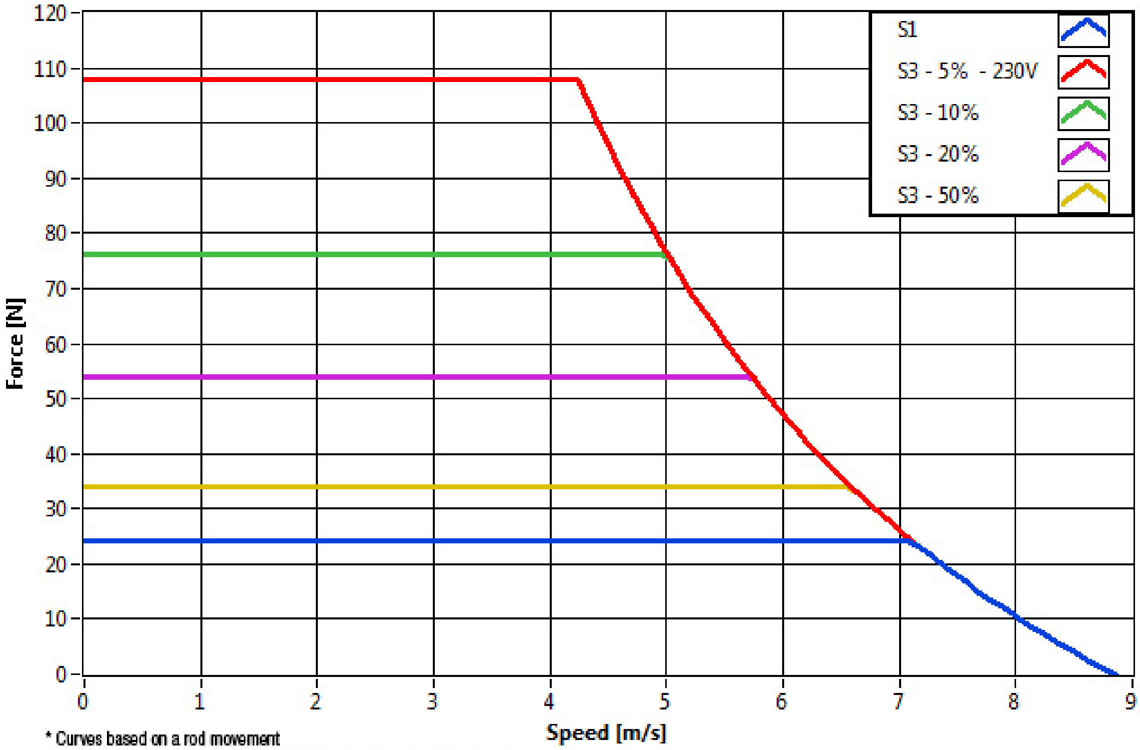
Servo Linear Tubular Motor
ETT032S3
Electronic Drive
DRIVE 1 / 2 Arms

	Without heatsink plate		Unit
F_n	Continuos Stall Force [2)]	23.88	N
I_n	Continuos Stall Current [2)]	0.53	A_{rms}
$F_{PK5\%}$	Peak Force - S3 5% [2)]	106.78	N
$F_{PK10\%}$	Peak Force - S3 10% [2)]	75.50	N
$F_{PK20\%}$	Peak Force - S3 20% [2)]	53.39	N
$F_{PK20\%}$	Peak Force - S3 50% [2)]	33.77	N
$I_{PK5\%}$	Peak Current -S3 5% [2)]	2.37	A_{rms}
$I_{PK10\%}$	Peak Current -S3 10% [2)]	1.68	A_{rms}
$I_{PK20\%}$	Peak Current -S3 20% [2)]	1.19	A_{rms}
$I_{PK50\%}$	Peak Current -S3 50% [2)]	0.75	A_{rms}
	With heatsink plate 25 x 25 x 2.5 cm [5) 6)]		
F_{n2}	Continuos Stall Force [2)]	29.73	N
I_{n2}	Continuos Stall Current [2)]	0.66	A_{rms}
K_F	Force constant (sine commutation) [8)]	45.05	N/Arms
K_e	Back EMF constant (phase to phase) [8)]	36.78	$V/_{m/s}$
K_{eRMS}	Back EMF constant (phase to phase,rms) [8)]	26.01	$V_{rms}/_{m/s}$
Rb	Resistance @ 25 °C (phase to phase)	58.50	Ohm
Rb_{HOT}	Resistance @ 100 °C (phase to phase)	81.49	Ohm
L	Inductance @ 1 kHz (phase to phase)	28.94	mH
	Electrical time constant	0.495	ms
	Motor Constant	3.98	N/sqrt(W)
UR	Typical supply voltage of the servo drive	230.00	VAC
U	Max. DC bus voltage	325.27	VDC
a_{PK}	Peak Acceleration [3) 6)]	307.08	m/s²
v_{PK}	Maximum Speed [4) 6)]	6.91	m/s
	Maximum phase temperature	135	°C
	Thermal time constant	1565	s
	Power dissipation at 25 °C ambient temperature	35.97	W
	Thermal resistance Rth $_{(housing-environment)}$	1.56	°C/W
	With heatsink plate 25 x 25 x 2.5 cm [7)]		
	Power dissipation at 25 °C ambient temperature	54.75	W
	Thermal resistance Rth $_{(phase-housing)}$	1.01	°C/W
	Thermal resistance Rth $_{(housing-environment)}$	0.98	°C/W

CE certified	
Cooling Type:	
Natural Air cooling	
Environment:	
Ambient Temperature:	40°C MAX
Altitude:	< 1000 m
Thermal Class:	F
(according to IEC 60034-1)	
Number of poles:	2
Pole pitch:	60mm
Efficency:	
at rated force, speed 2m/s:	57.26%

(1) S=series motor phases - (2) at an ambient temperature of 40 °C - (3) based on a 30 mm stroke, without payload - (4) Based on triangular move over 360mm stroke without payload and without taking in account voltage limits - (5) Values specified are for machine integration with a heat-sink - (6) The specifications and data may be subject to change depending of the load - (7) Values specified are for machine integration with a heat-sink - (8) Manufacturing data ±10%
* NOT been considered the limitations imposed by trajectory and mass of the ROD
** NOT been considered the effect due to eddy current brake.

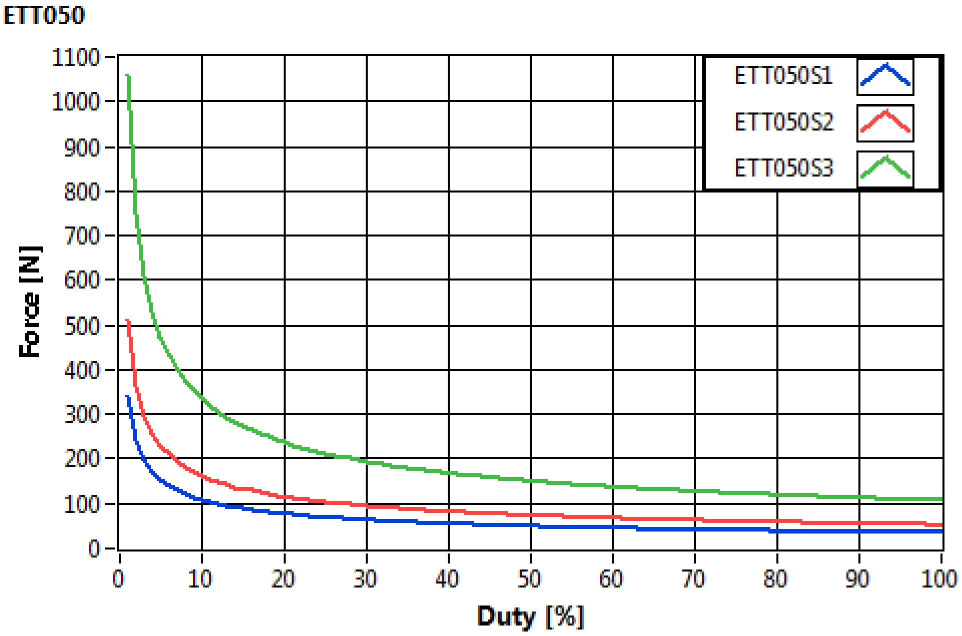
ETT032S3



* Curves based on a rod movement
** Curves based on a system without load and without trajectory limits.

3.2.3. ETT050 Electric Specifications

Force in fuction of the type of duty cycle



*data reffered to ambient temperature of 25°C and 110°C dT

3.2.3.1. ETT050S1

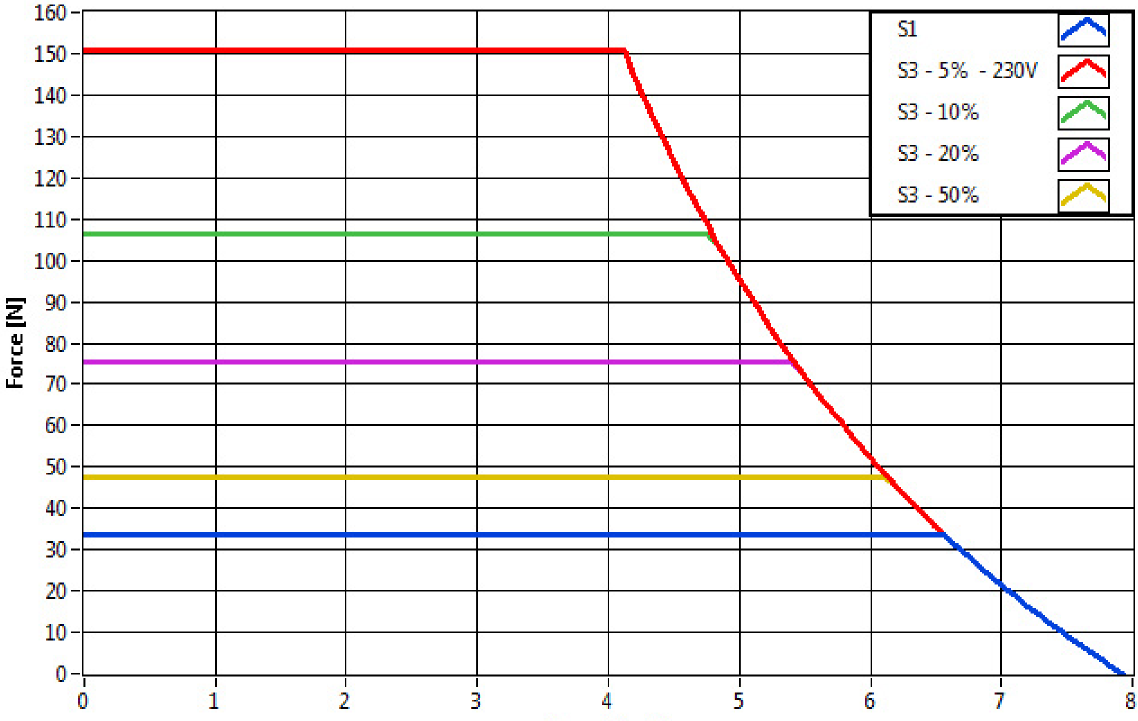
Servo Linear Tubular Motor
ETT050S1
Electronic Drive
DRIVE 1 / 2 Arms

	Without heatsink plate		Unit
F_n	Continuos Stall Force [2]	33.70	N
I_n	Continuos Stall Current [2]	0.67	A_{rms}
$F_{PK5\%}$	Peak Force - S3 5% [2]	150.72	N
$F_{PK10\%}$	Peak Force - S3 10% [2]	106.57	N
$F_{PK20\%}$	Peak Force - S3 20% [2]	75.36	N
$F_{PK20\%}$	Peak Force - S3 50% [2]	47.66	N
$I_{PK5\%}$	Peak Current -S3 5% [2]	3.00	A_{rms}
$I_{PK10\%}$	Peak Current -S3 10% [2]	2.12	A_{rms}
$I_{PK20\%}$	Peak Current -S3 20% [2]	1.50	A_{rms}
$I_{PK50\%}$	Peak Current -S3 50% [2]	0.95	A_{rms}
	With heatsink plate 25 x 25 x 2.5 cm [5) 6)]		
F_{n2}	Continuos Stall Force [2]	39.23	N
I_{n2}	Continuos Stall Current [2]	0.78	A_{rms}
K_F	Force constant (sine commutation) [8]	50.30	N/Arms
K_e	Back EMF constant (phase to phase) [8]	41.07	$V/_{m/s}$
K_{eRMS}	Back EMF constant (phase to phase,rms) [8]	29.04	$V_{rms}/_{m/s}$
Rb	Resistance @ 25 °C (phase to phase)	42.41	Ohm
Rb_{HOT}	Resistance @ 100 °C (phase to phase)	59.08	Ohm
L	Inductance @ 1 kHz (phase to phase)	23.55	mH
	Electrical time constant	0.555	ms
	Motor Constant	5.27	N/sqrt(W)
UR	Typical supply voltage of the servo drive	230.00	VAC
U	Max. DC bus voltage	325.27	VDC
a_{PK}	Peak Acceleration [3) 6)]	198.57	m/s²
v_{PK}	Maximum Speed [4) 6)]	5.30	m/s
	Maximum phase temperature	135	°C
	Thermal time constant	1441	s
	Power dissipation at 25 °C ambient temperature	40.9	W
	Thermal resistance Rth $_{(phase-housing)}$	1.13	°C/W
	Thermal resistance Rth $_{(housing-environment)}$	1.53	°C/W
	With heatsink plate 25 x 25 x 2.5 cm [7]		
	Power dissipation at 25 °C ambient temperature	55.43	W
	Thermal resistance Rth $_{(housing-environment)}$	0.9	°C/W

CE certified	
Cooling Type:	
Natural Air cooling	
Environment:	
Ambient Temperature:	40°C MAX
Altitude:	< 1000 m
Thermal Class:	F
(according to IEC 60034-1)	
Number of poles:	2
Pole pitch:	60mm
Efficency:	
at rated force, speed 2m/s:	62.23%

(1) S=series motor phases - (2) at an ambient temperature of 40 °C - (3) based on a 30 mm stroke, without payload - (4) Based on triangular move over 360mm stroke without payload and without taking in account voltage limits - (5) Values specified are for machine integration with a heat-sink - (6) The specifications and data may be subject to change depending of the load - (7) Values specified are for machine integration with a heat-sink - (8) Manufacturing data ±10%
* NOT been considered the limitations imposed by trajectory and mass of the ROD
** NOT been considered the effect due to eddy current brake.

ETT050S1



* Curves based on a rod movement
** Curves based on a system without load and without trajectory limits.

3.2.3.2. ETT050S2

Servo Linear Tubular Motor
ETT050S2
Electronic Drive
DRIVE 1 / 2 Arms

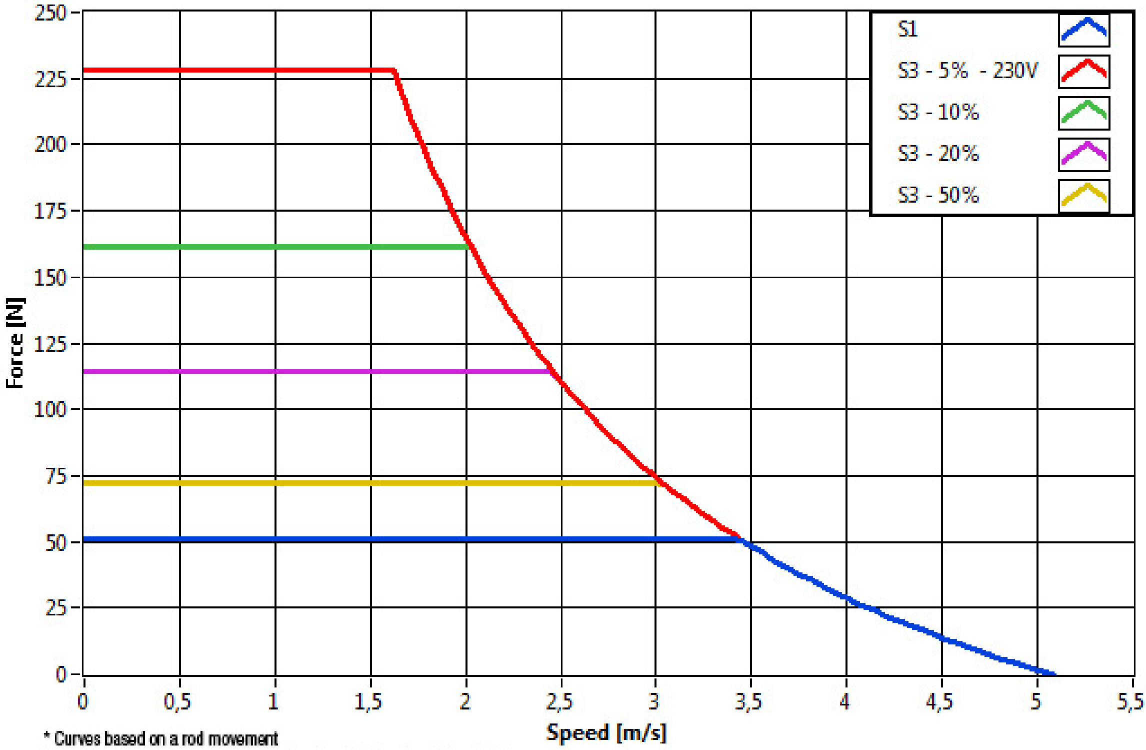
CE certified

	Without heatsink plate		Unit
F_n	Continuos Stall Force [2)]	51.06	N
I_n	Continuos Stall Current [2)]	0.65	A_{rms}
$F_{PK5\%}$	Peak Force - S3 5% [2)]	228.34	N
$F_{PK10\%}$	Peak Force - S3 10% [2)]	161.46	N
$F_{PK20\%}$	Peak Force - S3 20% [2)]	114.17	N
$F_{PK20\%}$	Peak Force - S3 50% [2)]	72.21	N
$I_{PK5\%}$	Peak Current -S3 5% [2)]	2.91	A_{rms}
$I_{PK10\%}$	Peak Current -S3 10% [2)]	2.06	A_{rms}
$I_{PK20\%}$	Peak Current -S3 20% [2)]	1.45	A_{rms}
$I_{PK50\%}$	Peak Current -S3 50% [2)]	0.92	A_{rms}
	With heatsink plate 25 x 25 x 2.5 cm [5) 6)]		
F_{n2}	Continuos Stall Force [2)]	58.91	N
I_{n2}	Continuos Stall Current [2)]	0.75	A_{rms}
K_F	Force constant (sine commutation) [8)]	78.55	N/Arms
K_e	Back EMF constant (phase to phase) [8)]	64.13	$V/_{m/s}$
K_{eRMS}	Back EMF constant (phase to phase,rms) [8)]	45.35	$V_{rms}/_{m/s}$
Rb	Resistance @ 25 °C (phase to phase)	62.70	Ohm
Rb_{HOT}	Resistance @ 100 °C (phase to phase)	87.34	Ohm
L	Inductance @ 1 kHz (phase to phase)	34.70	mH
	Electrical time constant	0.553	ms
	Motor Constant	6.77	N/sqrt(W)
UR	Typical supply voltage of the servo drive	230.00	VAC
U	Max. DC bus voltage	325.27	VDC
a_{PK}	Peak Acceleration [3) 6)]	263.67	m/s²
v_{PK}	Maximum Speed [4) 6)]	6.34	m/s
	Maximum phase temperature	135	°C
	Thermal time constant	1395	s
	Power dissipation at 25 °C ambient temperature	56.91	W
	Thermal resistance Rth $_{(phase-housing)}$	0.89	°C/W
	Thermal resistance Rth $_{(housing-environment)}$	1.04	°C/W
	With heatsink plate 25 x 25 x 2.5 cm [7)]		
	Power dissipation at 25 °C ambient temperature	75.77	W
	Thermal resistance Rth $_{(housing-environment)}$	0.8	°C/W

Cooling Type:	
Natural Air cooling	
Environment:	
Ambient Temperature:	40°C MAX
Altitude:	< 1000 m
Thermal Class:	F
(according to IEC 60034-1)	
Number of poles:	2
Pole pitch:	60mm
Efficency:	
at rated force, speed 2m/s:	64.21%

(1) S=series motor phases - (2) at an ambient temperature of 40 °C - (3) based on a 30 mm stroke, without payload - (4) Based on triangular move over 360mm stroke without payload and without taking in account voltage limits - (5) Values specified are for machine integration with a heat-sink - (6) The specifications and data may be subject to change depending of the load - (7) Values specified are for machine integration with a heat-sink - (8) Manufacturing data ±10%
* NOT been considered the limitations imposed by trajectory and mass of the ROD
** NOT been considered the effect due to eddy current brake.

ETT050S2



* Curves based on a rod movement
** Curves based on a system without load and without trajectory limits.

3.2.3.3. ETT050S3

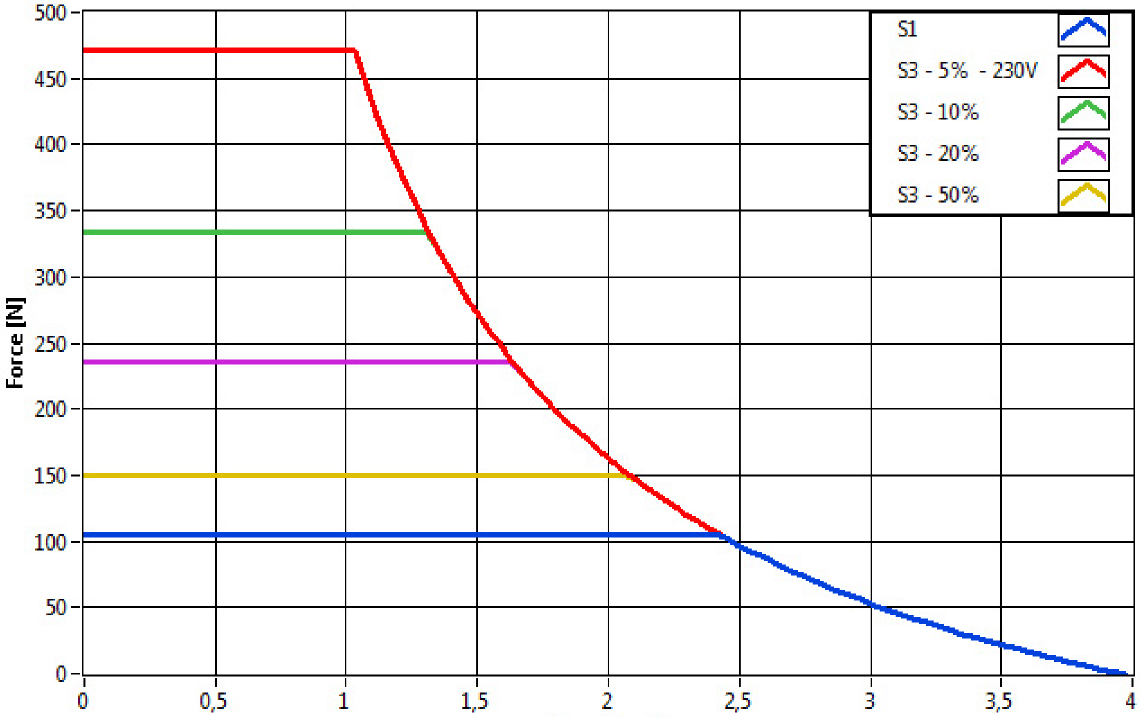
Servo Linear Tubular Motor
ETT050S3
Electronic Drive
DRIVE 2.5 / 5 Arms

	Without heatsink plate		Unit
F_n	Continuos Stall Force [2]	105.56	N
I_n	Continuos Stall Current [2]	1.05	A_{rms}
$F_{PK5\%}$	Peak Force - S3 5% [2]	472.06	N
$F_{PK10\%}$	Peak Force - S3 10% [2]	333.80	N
$F_{PK20\%}$	Peak Force - S3 20% [2]	236.03	N
$F_{PK20\%}$	Peak Force - S3 50% [2]	149.28	N
$I_{PK5\%}$	Peak Current -S3 5% [2]	4.70	A_{rms}
$I_{PK10\%}$	Peak Current -S3 10% [2]	3.32	A_{rms}
$I_{PK20\%}$	Peak Current -S3 20% [2]	2.35	A_{rms}
$I_{PK50\%}$	Peak Current -S3 50% [2]	1.48	A_{rms}
	With heatsink plate 25 x 25 x 2.5 cm [5) 6)]		
F_{n2}	Continuos Stall Force [2]	117.62	N
I_{n2}	Continuos Stall Current [2]	1.17	A_{rms}
K_F	Force constant (sine commutation) [8]	100.53	N/Arms
K_e	Back EMF constant (phase to phase) [8]	82.08	$V/_{m/s}$
K_{eRMS}	Back EMF constant (phase to phase,rms) [8]	58.04	$V_{rms}/_{m/s}$
Rb	Resistance @ 25 °C (phase to phase)	41.85	Ohm
Rb_{HOT}	Resistance @ 100 °C (phase to phase)	58.30	Ohm
L	Inductance @ 1 kHz (phase to phase)	22.70	mH
	Electrical time constant	0.542	ms
	Motor Constant	10.60	N/sqrt(W)
UR	Typical supply voltage of the servo drive	230.00	VAC
U	Max. DC bus voltage	325.27	VDC
a_{PK}	Peak Acceleration [3) 6)]	336.95	m/s²
v_{PK}	Maximum Speed [4) 6)]	8.12	m/s
	Maximum phase temperature	135	°C
	Thermal time constant	2103	s
	Power dissipation at 25 °C ambient temperature	99.13	W
	Thermal resistance Rth $_{(phase-housing)}$	0.47	°C/W
	Thermal resistance Rth $_{(housing-environment)}$	0.64	°C/W
	With heatsink plate 25 x 25 x 2.5 cm [7]		
	Power dissipation at 25 °C ambient temperature	123.08	W
	Thermal resistance Rth $_{(housing-environment)}$	0.59	°C/W

CE certified	
Cooling Type:	
Natural Air cooling	
Environment:	
Ambient Temperature:	40°C MAX
Altitude:	< 1000 m
Thermal Class:	F
(according to IEC 60034-1)	
Number of poles:	2
Pole pitch:	60mm
Efficency:	
at rated force, speed 2m/s:	68.05%

(1) S=series motor phases - (2) at an ambient temperature of 40 °C - (3) based on a 30 mm stroke, without payload - (4) Based on triangular move over 360mm stroke without payload and without taking in account voltage limits - (5) Values specified are for machine integration with a heat-sink - (6) The specifications and data may be subject to change depending of the load - (7) Values specified are for machine integration with a heat-sink - (8) Manufacturing data ±10%
* NOT been considered the limitations imposed by trajectory and mass of the ROD
** NOT been considered the effect due to eddy current brake.

ETT050S3

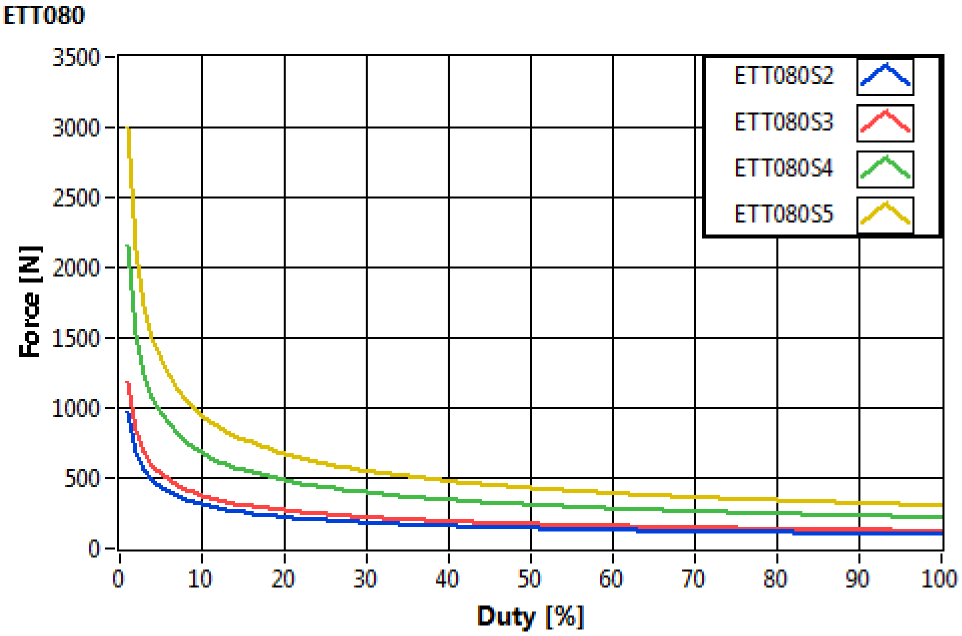


* Curves based on a rod movement

** Curves based on a system without load and without trajectory limits.

3.2.4. ETT080 Electric Specifications

Force in fuction of the type of duty cycle



*data reffered to ambient temperature of 25°C and 110°C dT

3.2.4.1. ETT080S2

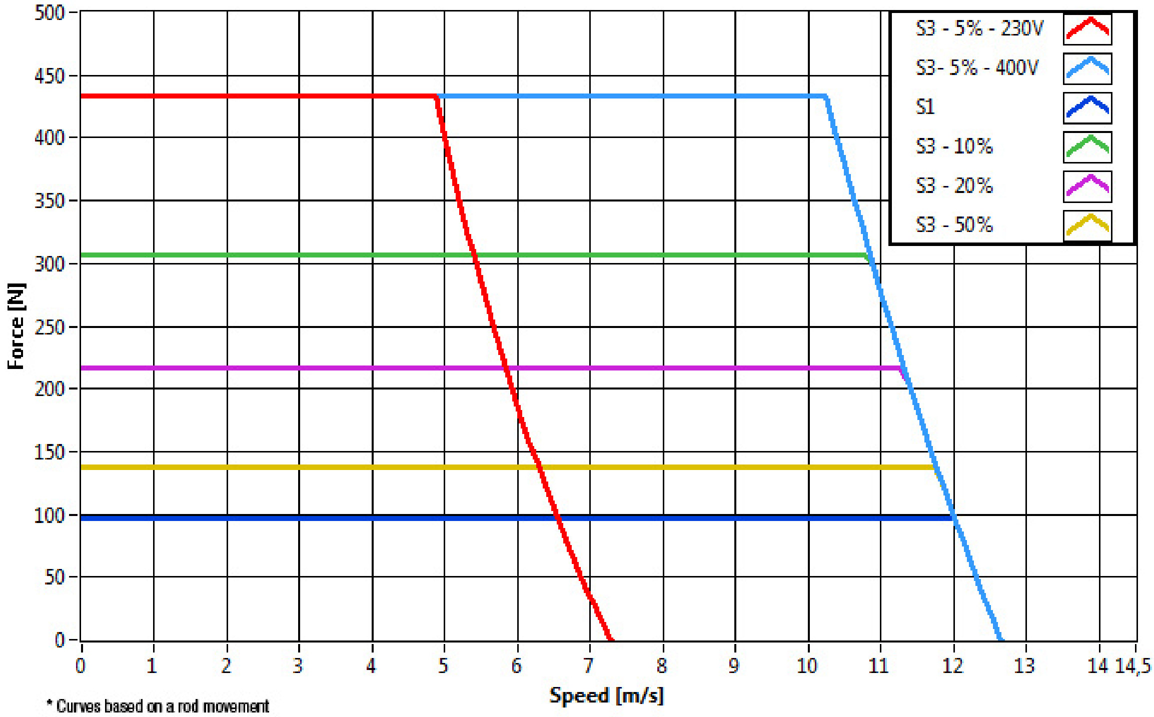
Servo Linear Tubular Motor
ETT080S2
Electronic Drive
DRIVE 5 / 10 Arms

	Without heatsink plate		Unit
F_n	Continuos Stall Force [2]	97.00	N
I_n	Continuos Stall Current [2]	1.77	A_{rms}
$F_{PK5\%}$	Peak Force - S3 5% [2]	433.78	N
$F_{PK10\%}$	Peak Force - S3 10% [2]	306.73	N
$F_{PK20\%}$	Peak Force - S3 20% [2]	216.89	N
$F_{PK20\%}$	Peak Force - S3 50% [2]	137.17	N
$I_{PK5\%}$	Peak Current -S3 5% [2]	7.92	A_{rms}
$I_{PK10\%}$	Peak Current -S3 10% [2]	5.60	A_{rms}
$I_{PK20\%}$	Peak Current -S3 20% [2]	3.96	A_{rms}
$I_{PK50\%}$	Peak Current -S3 50% [2]	2.50	A_{rms}
	With heatsink plate 25 x 25 x 2.5 cm [5) 6)]		
F_{n2}	Continuos Stall Force [2]	103.02	N
I_{n2}	Continuos Stall Current [2]	1.88	A_{rms}
K_F	Force constant (sine commutation) [8]	54.80	N/Arms
K_e	Back EMF constant (phase to phase) [8]	44.75	$V/_{m/s}$
K_{eRMS}	Back EMF constant (phase to phase,rms) [8]	31.64	$V_{rms}/_{m/s}$
Rb	Resistance @ 25 °C (phase to phase)	11.14	Ohm
Rb_{HOT}	Resistance @ 100 °C (phase to phase)	15.52	Ohm
L	Inductance @ 1 kHz (phase to phase)	12.80	mH
	Electrical time constant	1.149	ms
	Motor Constant	11.20	N/sqrt(W)
UR	Typical supply voltage of the servo drive	400.00	VAC
U	Max. DC bus voltage	565.69	VDC
a_{PK}	Peak Acceleration [3) 6)]	237.56	m/s²
v_{PK}	Maximum Speed [4) 6)]	6.13	m/s
	Maximum phase temperature	135	°C
	Thermal time constant	1190	s
	Power dissipation at 25 °C ambient temperature	74.98	W
	Thermal resistance Rth $_{(phase-housing)}$	0.78	°C/W
	Thermal resistance Rth $_{(housing-environment)}$	0.69	°C/W
	With heatsink plate 25 x 25 x 2.5 cm [7]		
	Power dissipation at 25 °C ambient temperature	84.59	W
	Thermal resistance Rth $_{(housing-environment)}$	0.52	°C/W

CE certified	
Cooling Type:	
Natural Air cooling	
Environment:	
Ambient Temperature:	40°C MAX
Altitude:	< 1000 m
Thermal Class:	F
(according to IEC 60034-1)	
Number of poles:	2
Pole pitch:	60mm
Efficency:	
at rated force, speed 2m/s:	72.12%

(1) S=series motor phases - (2) at an ambient temperature of 40 °C - (3) based on a 30 mm stroke, without payload - (4) Based on triangular move over 360mm stroke without payload and without taking in account voltage limits - (5) Values specified are for machine integration with a heat-sink - (6) The specifications and data may be subject to change depending of the load - (7) Values specified are for machine integration with a heat-sink - (8) Manufacturing data ±10%
* NOT been considered the limitations imposed by trajectory and mass of the ROD
** NOT been considered the effect due to eddy current brake.

ETT080S2



* Curves based on a rod movement
** Curves based on a system without load and without trajectory limits.

3.2.4.2. ETT080S3

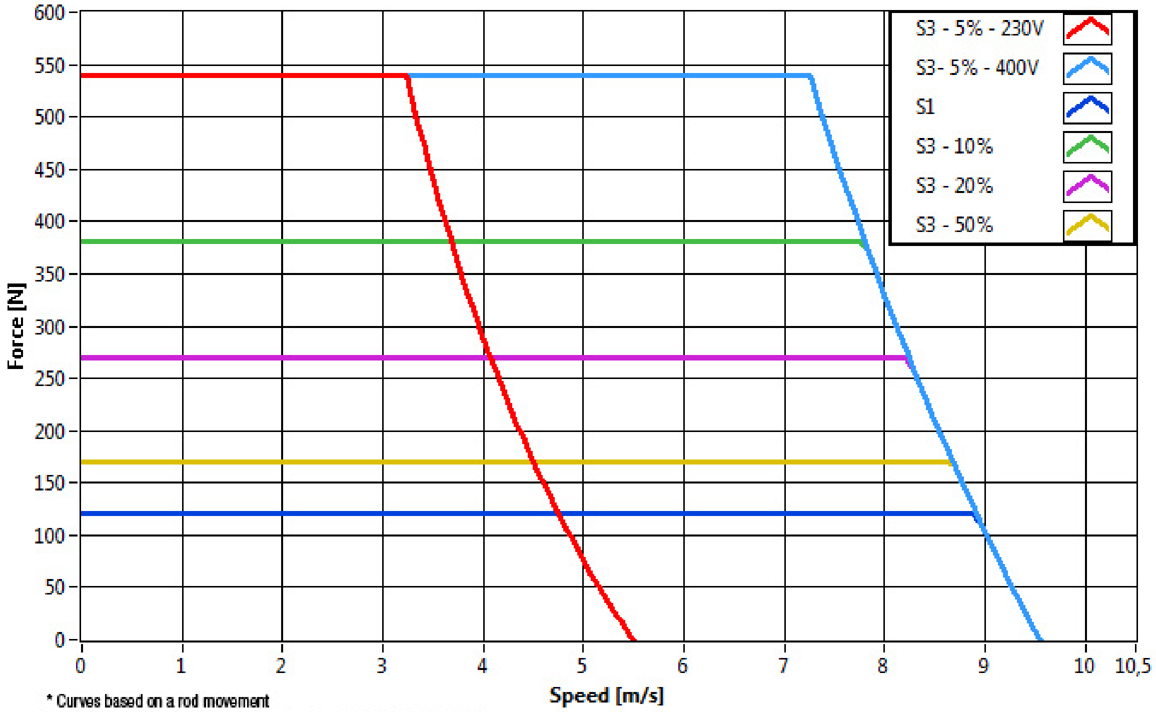
Servo Linear Tubular Motor
ETT080S3
Electronic Drive
DRIVE 5 / 10 Arms

	Without heatsink plate		Unit
F_n	Continuos Stall Force [2]	120.47	N
I_n	Continuos Stall Current [2]	1.66	A_{rms}
$F_{PK5\%}$	Peak Force - S3 5% [2]	538.74	N
$F_{PK10\%}$	Peak Force - S3 10% [2]	380.95	N
$F_{PK20\%}$	Peak Force - S3 20% [2]	269.37	N
$F_{PK20\%}$	Peak Force - S3 50% [2]	170.36	N
$I_{PK5\%}$	Peak Current -S3 5% [2]	7.42	A_{rms}
$I_{PK10\%}$	Peak Current -S3 10% [2]	5.25	A_{rms}
$I_{PK20\%}$	Peak Current -S3 20% [2]	3.71	A_{rms}
$I_{PK50\%}$	Peak Current -S3 50% [2]	2.35	A_{rms}
	With heatsink plate 25 x 25 x 2.5 cm [5) 6)]		
F_{n2}	Continuos Stall Force [2]	128.45	N
I_{n2}	Continuos Stall Current [2]	1.77	A_{rms}
K_F	Force constant (sine commutation) [8]	72.57	N/Arms
K_e	Back EMF constant (phase to phase) [8]	59.26	$V/_{m/s}$
K_{eRMS}	Back EMF constant (phase to phase,rms) [8]	41.90	$V_{rms}/_{m/s}$
Rb	Resistance @ 25 °C (phase to phase)	14.81	Ohm
Rb_{HOT}	Resistance @ 100 °C (phase to phase)	20.63	Ohm
L	Inductance @ 1 kHz (phase to phase)	17.06	mH
	Electrical time constant	1.152	ms
	Motor Constant	12.87	N/sqrt(W)
UR	Typical supply voltage of the servo drive	400.00	VAC
U	Max. DC bus voltage	565.69	VDC
a_{PK}	Peak Acceleration [3) 6)]	264.35	m/s²
v_{PK}	Maximum Speed [4) 6)]	6.66	m/s
	Maximum phase temperature	135	°C
	Thermal time constant	1440	s
	Power dissipation at 25 °C ambient temperature	87.68	W
	Thermal resistance Rth $_{(phase-housing)}$	0.61	°C/W
	Thermal resistance Rth $_{(housing-environment)}$	0.70	°C/W
	With heatsink plate 25 x 25 x 2.5 cm [7]		
	Power dissipation at 25 °C ambient temperature	99.68	W
	Thermal resistance Rth $_{(housing-environment)}$	0.49	°C/W

CE certified	
Cooling Type:	
Natural Air cooling	
Environment:	
Ambient Temperature:	40°C MAX
Altitude:	< 1000 m
Thermal Class:	F
(according to IEC 60034-1)	
Number of poles:	2
Pole pitch:	60mm
Efficency:	
at rated force, speed 2m/s:	73.32%

(1) S=series motor phases - (2) at an ambient temperature of 40 °C - (3) based on a 30 mm stroke, without payload - (4) Based on triangular move over 360mm stroke without payload and without taking in account voltage limits - (5) Values specified are for machine integration with a heat-sink - (6) The specifications and data may be subject to change depending of the load - (7) Values specified are for machine integration with a heat-sink - (8) Manufacturing data ±10%
* NOT been considered the limitations imposed by trajectory and mass of the ROD
** NOT been considered the effect due to eddy current brake.

ETT080S3



* Curves based on a rod movement
** Curves based on a system without load and without trajectory limits.

3.2.4.3. ETT080S4

Servo Linear Tubular Motor
ETT080S4
Electronic Drive
DRIVE 5 / 10 Arms

	Without heatsink plate		Unit
F_n	Continuos Stall Force 2)	212.98	N
I_n	Continuos Stall Current 2)	2.90	A_{rms}
$F_{PK5\%}$	Peak Force - S3 5% 2)	952.46	N
$F_{PK10\%}$	Peak Force - S3 10% 2)	673.49	N
$F_{PK20\%}$	Peak Force - S3 20% 2)	476.23	N
$F_{PK20\%}$	Peak Force - S3 50% 2)	301.19	N
$I_{PK5\%}$	Peak Current -S3 5% 2)	12.97	A_{rms}
$I_{PK10\%}$	Peak Current -S3 10% 2)	9.17	A_{rms}
$I_{PK20\%}$	Peak Current -S3 20% 2)	6.48	A_{rms}
$I_{PK50\%}$	Peak Current -S3 50% 2)	4.10	A_{rms}
	With heatsink plate 25 x 25 x 2.5 cm 5) 6)		
F_{n2}	Continuos Stall Force 2)	223.99	N
I_{n2}	Continuos Stall Current 2)	3.05	A_{rms}
K_F	Force constant (sine commutation) 8)	73.44	N/Arms
K_e	Back EMF constant (phase to phase) 8)	59.96	$V/_{m/s}$
K_{eRMS}	Back EMF constant (phase to phase,rms) 8)	42.40	$V_{rms}/_{m/s}$
Rb	Resistance @ 25 °C (phase to phase)	7.65	Ohm
Rb_{HOT}	Resistance @ 100 °C (phase to phase)	10.66	Ohm
L	Inductance @ 1 kHz (phase to phase)	7.50	mH
	Electrical time constant	0.980	ms
	Motor Constant	18.12	N/sqrt(W)
UR	Typical supply voltage of the servo drive	400.00	VAC
U	Max. DC bus voltage	565.69	VDC
a_{PK}	Peak Acceleration 3) 6)	329.68	m/s²
v_{PK}	Maximum Speed 4) 6)	8.10	m/s
	Maximum phase temperature	135	°C
	Thermal time constant	2951	s
	Power dissipation at 25 °C ambient temperature	138.22	W
	Thermal resistance Rth $_{(phase-housing)}$	0.31	°C/W
	Thermal resistance Rth $_{(housing-environment)}$	0.47	°C/W
	With heatsink plate 25 x 25 x 2.5 cm 7)		
	Power dissipation at 25 °C ambient temperature	152.89	W
	Thermal resistance Rth $_{(housing-environment)}$	0.43	°C/W

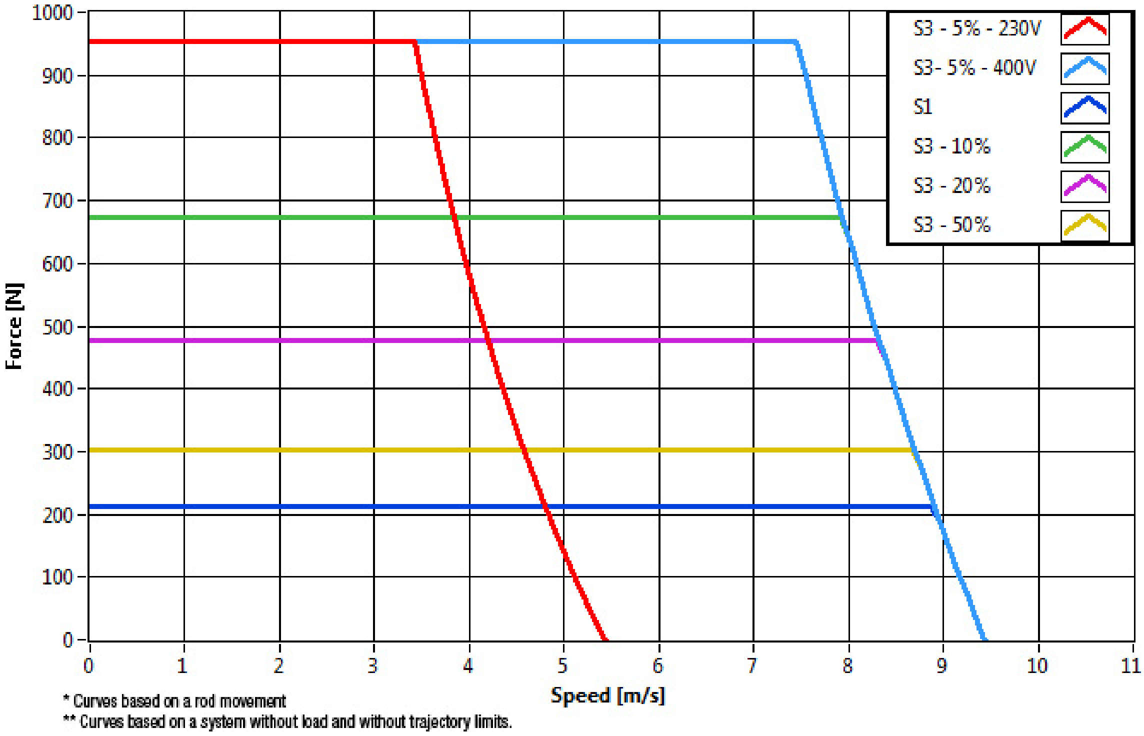
CE certified	
Cooling Type:	
Natural Air cooling	
Environment:	
Ambient Temperature:	40°C MAX
Altitude:	< 1000 m
Thermal Class:	F
(according to IEC 60034-1)	
Number of poles:	2
Pole pitch:	60mm
Efficency:	
at rated force, speed 2m/s:	75.50%

(1) S=series motor phases - (2) at an ambient temperature of 40 °C - (3) based on a 30 mm stroke, without payload - (4) Based on triangular move over 360mm stroke without payload and without taking in account voltage limits - (5) Values specified are for machine integration with a heat-sink - (6) The specifications and data may be subject to change depending of the load - (7) Values specified are for machine integration with a heat-sink - (8) Manufacturing data ±10%

* NOT been considered the limitations imposed by trajectory and mass of the ROD

** NOT been considered the effect due to eddy current brake.

ETT080S4


Force [N]
1000
900
800
700
600
500
400
300
200
100
0
0
1
2
3
4
5
6
7
8
9
10
11
Speed [m/s]
S3 - 5% - 230V
S3- 5% - 400V
S1
S3 - 10%
S3 - 20%
S3 - 50%
* Curves based on a rod movement
** Curves based on a system without load and without trajectory limits.

3.2.4.4. ETT080S5

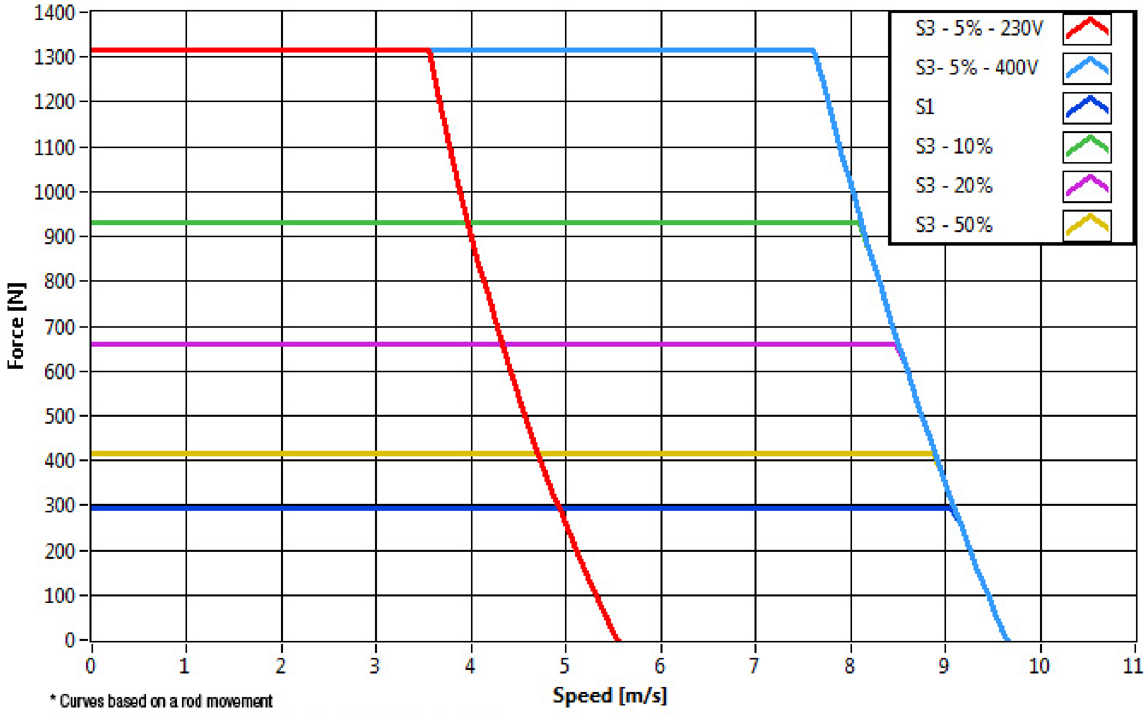
Servo Linear Tubular Motor
ETT080S5
Electronic Drive
DRIVE 5 / 10 Arms

	Without heatsink plate		Unit
F_n	Continuos Stall Force [2]	294.71	N
I_n	Continuos Stall Current [2]	4.10	A_{rms}
$F_{PK5\%}$	Peak Force - S3 5% [2]	1317.97	N
$F_{PK10\%}$	Peak Force - S3 10% [2]	931.95	N
$F_{PK20\%}$	Peak Force - S3 20% [2]	658.99	N
$F_{PK20\%}$	Peak Force - S3 50% [2]	416.78	N
$I_{PK5\%}$	Peak Current -S3 5% [2]	18.34	A_{rms}
$I_{PK10\%}$	Peak Current -S3 10% [2]	12.97	A_{rms}
$I_{PK20\%}$	Peak Current -S3 20% [2]	9.17	A_{rms}
$I_{PK50\%}$	Peak Current -S3 50% [2]	5.80	A_{rms}
	With heatsink plate 25 x 25 x 2.5 cm [5) 6)]		
F_{n2}	Continuos Stall Force [2]	316.27	N
I_{n2}	Continuos Stall Current [2]	4.40	A_{rms}
K_F	Force constant (sine commutation) [8]	71.88	N/Arms
K_e	Back EMF constant (phase to phase) [8]	58.69	$V/_{m/s}$
K_{eRMS}	Back EMF constant (phase to phase,rms) [8]	41.50	$V_{rms}/_{m/s}$
Rb	Resistance @ 25 °C (phase to phase)	5.25	Ohm
Rb_{HOT}	Resistance @ 100 °C (phase to phase)	7.31	Ohm
L	Inductance @ 1 kHz (phase to phase)	5.51	mH
	Electrical time constant	1.050	ms
	Motor Constant	21.40	N/sqrt(W)
UR	Typical supply voltage of the servo drive	400.00	VAC
U	Max. DC bus voltage	565.69	VDC
a_{PK}	Peak Acceleration [3) 6)]	352.49	m/s²
v_{PK}	Maximum Speed [4) 6)]	8.84	m/s
	Maximum phase temperature	135	°C
	Thermal time constant	2412	s
	Power dissipation at 25 °C ambient temperature	189.61	W
	Thermal resistance Rth (phase-housing)	0.24	°C/W
	Thermal resistance Rth (housing-environment)	0.32	°C/W
	With heatsink plate 25 x 25 x 2.5 cm [7]		
	Power dissipation at 25 °C ambient temperature	218.37	W
	Thermal resistance Rth (housing-environment)	0.27	°C/W

CE certified	
Cooling Type:	
Natural Air cooling	
Environment:	
Ambient Temperature:	40°C MAX
Altitude:	< 1000 m
Thermal Class:	F
(according to IEC 60034-1)	
Number of poles:	2
Pole pitch:	60mm
Efficency:	
at rated force, speed 2m/s:	75.66%

(1) S=series motor phases - (2) at an ambient temperature of 40 °C - (3) based on a 30 mm stroke, without payload - (4) Based on triangular move over 360mm stroke without payload and without taking in account voltage limits - (5) Values specified are for machine integration with a heat-sink - (6) The specifications and data may be subject to change depending of the load - (7) Values specified are for machine integration with a heat-sink - (8) Manufacturing data ±10%
* NOT been considered the limitations imposed by trajectory and mass of the ROD
** NOT been considered the effect due to eddy current brake.

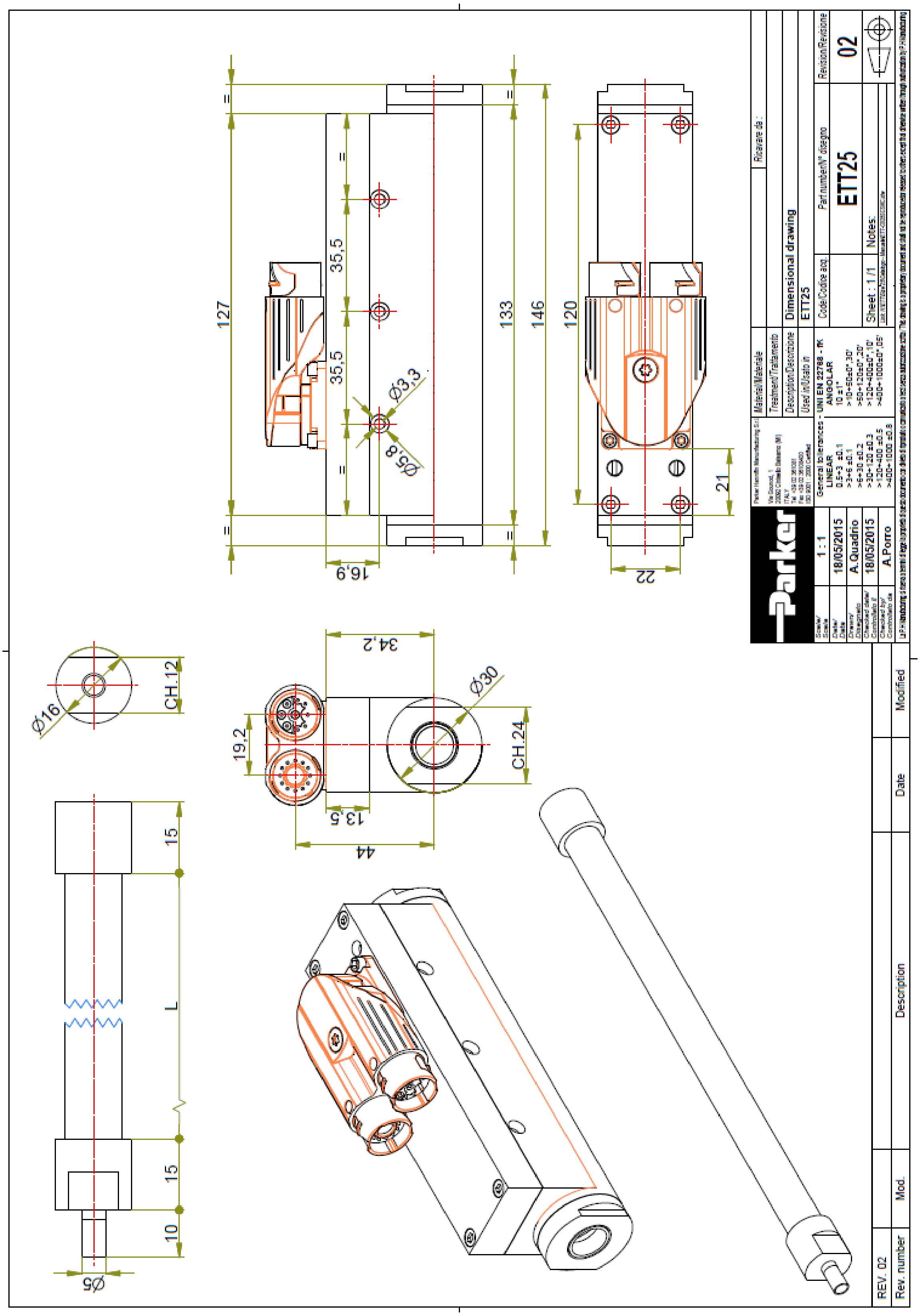
ETT080S5



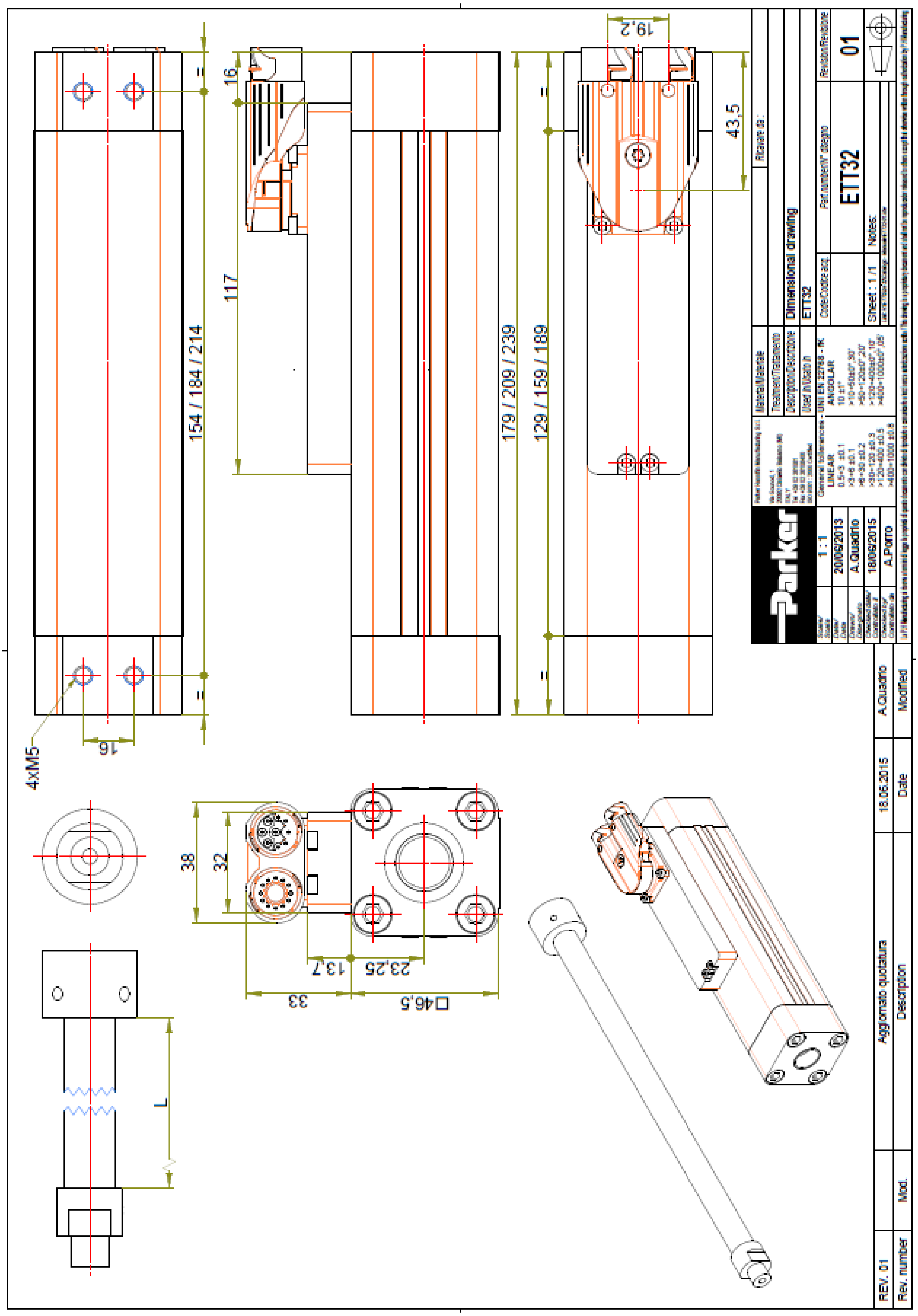
* Curves based on a rod movement
** Curves based on a system without load and without trajectory limits.

3.3. Dimension drawings

3.3.1. ETT025

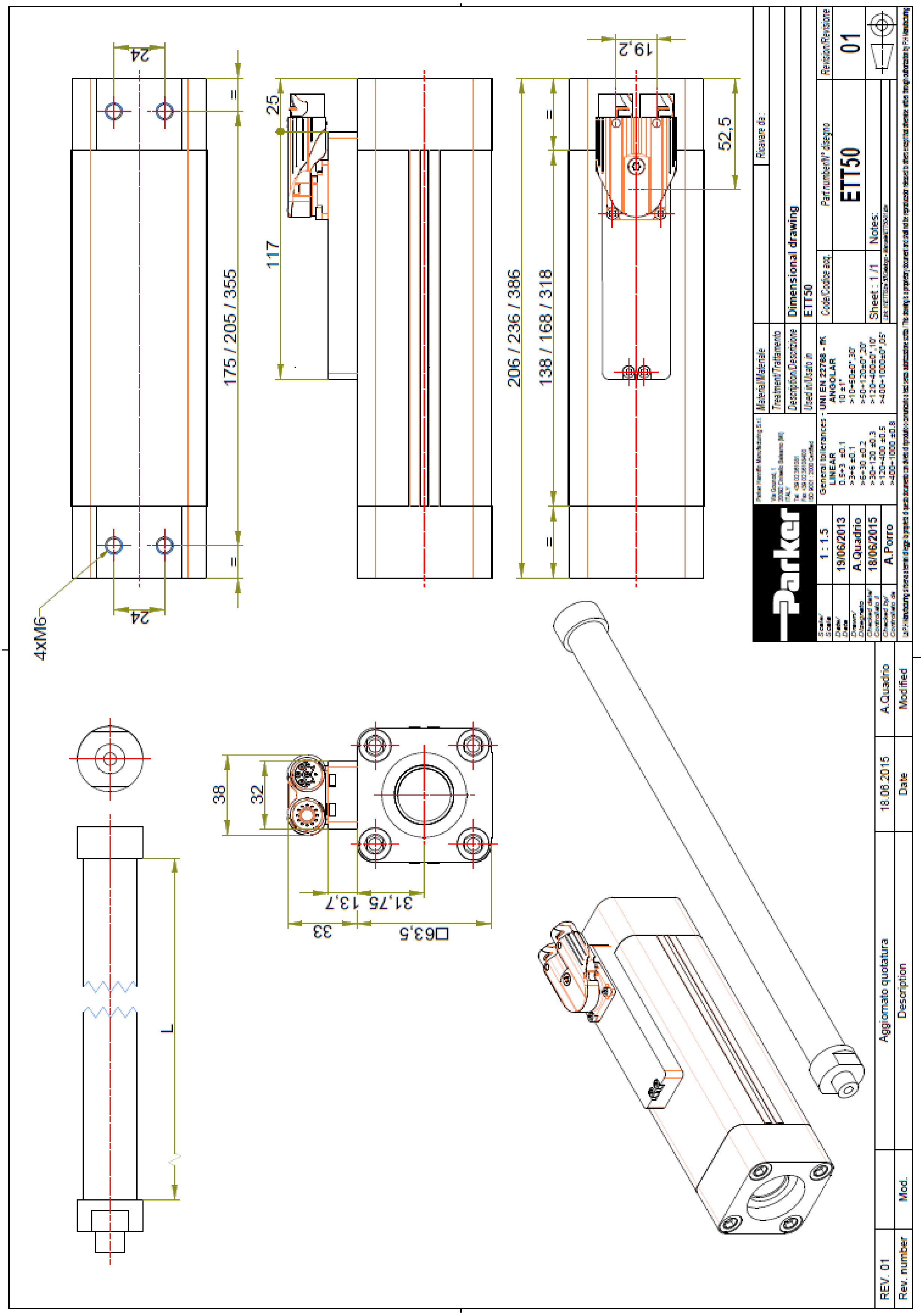


3.3.2. ETT032

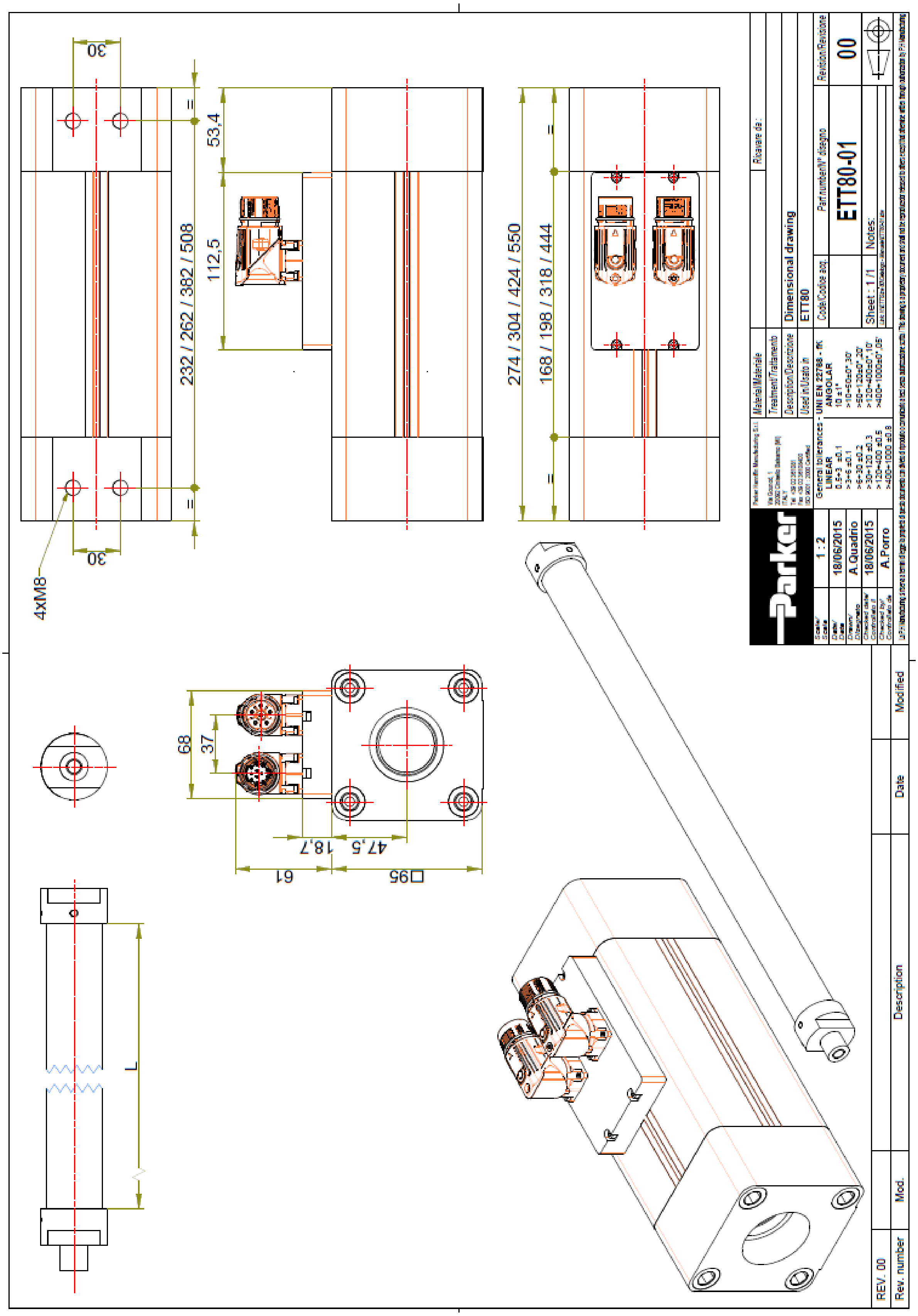


154 / 184 / 214
117
16
179 / 209 / 239
129 / 159 / 189
43,5
19,2
4xM5
38
32
13,7
23,25
33
□46,5
L
Dimensional drawing
ETT32
01
1 : 1
20/06/2013
A.Quadrio
18/06/2015
A.Porro
Sheet : 1 / 1
REV. 01
Aggiornato quotatura
18.06.2015
Rev. number
Mod.
Description
Date
Modified

3.3.3. ETT050


24
25
117
175 / 205 / 355
206 / 236 / 386
138 / 168 / 318
19,2
52,5
4xM6
38
32
33
□63,5
31,75
13,7
L
Dimensional drawing
ETT50
Revision/Revisione
01
Sheet : 1/1
Notes:
1 : 1.5
19/06/2013
A.Quadrio
18/06/2015
A.Porro
General tolerances - UNI EN 22768 - fK
LINEAR
ANGOLAR
REV. 01
Rev. number
Mod.
Aggiornato quotatura
Description
18.06.2015
Date
A.Quadrio
Modified

3.3.4. ETT080


30
4xM8
232 / 262 / 382 / 508
53,4
112,5
274 / 304 / 424 / 550
168 / 198 / 318 / 444
68
37
18,7
47,5
61
□95
L
Dimensional drawing
ETT80
ETT80-01
1 : 2
18/06/2015
A.Quadrio
A.Porro
Sheet : 1/1
00
Parker

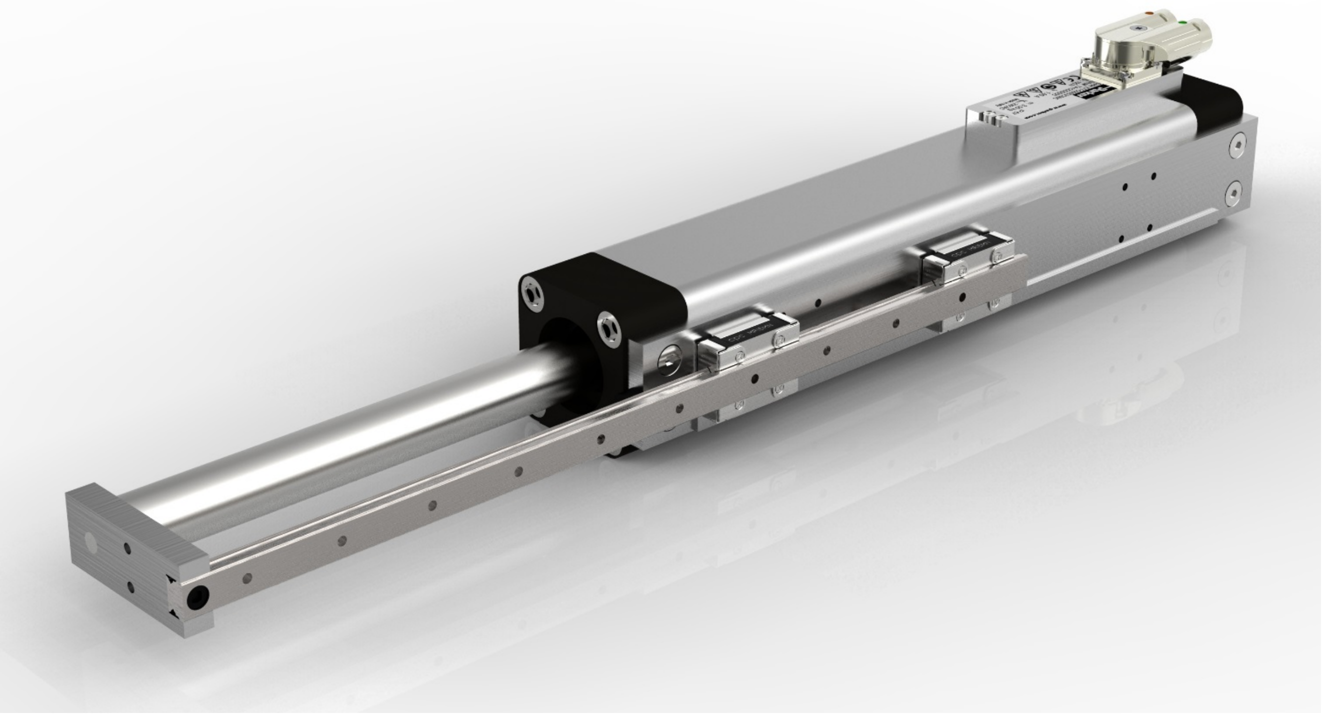
3.4. Motor Mounting

3.4.1. Motor mounting

3.4.1.1. Mobile ROD with stroke less of 200 mm

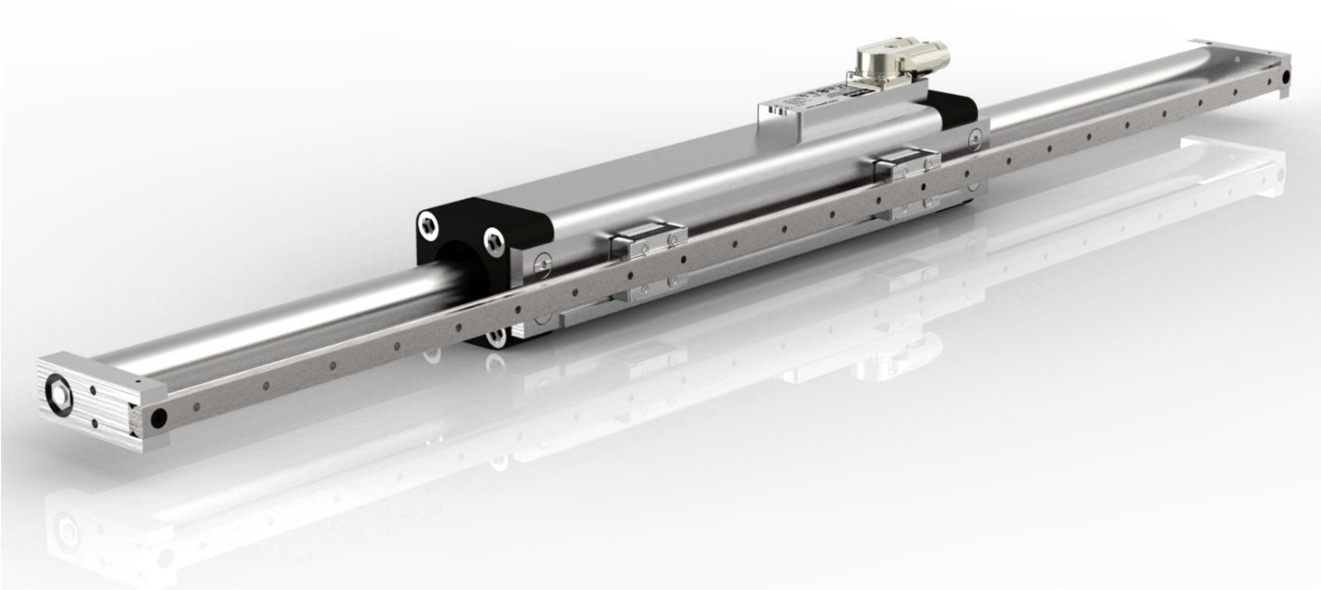
As the system is based on polymer plain bearings, the motor shaft can only sustain limited radial loads. Hence, coupling the shaft with the payload by spherical bearings, articulated joints or equivalent parts is recommended in order to only transmit the linear thrust and to compensate for any radial misalignment.
Note: Do not lubricate the shaft: polymer bearings are self-lubricating - additional lubricant would decrease their performance.

3.4.1.2. Mobile ROD with stroke more of 200 mm and small payloads



This solution is used like an anti-rotation system; the payload applicable on the ROD of the motor needs to be supported by a mechanical system.
There is a de-rating in the range of 5% on the performance of the ETT motor coming from the guide system (dependent on the stroke). It is possible to apply on this system solution a pneumatic brake; for more information please contact PARKER.

3.4.1.3. Moving coil



A solution like this allows the motor to be used like a Coil movement solution; bush bearing of motor does not allow use with a long stroke.
It is necessary to consider the max. life cycle of the guide system during the choice of the solution and also the deflection coming from the combination of payload and stroke.

Both the solutions are normally supplied like a complete system, but it is possible to buy each component of the guide system following the structure code of the tables show below.

RAIL		
Series	ETT-LR	PRODUCT FAMILY - Parker Electro Thrust Tubular Motor - Rail Option
Rail Type	1	Type NB
	2	Type CPC
ETT Motor Size	025	n.a.
	032	Designed for motor size 032 - 9mm size
	050	Designed for motor size 050 - 15mm size
	080	t.b.d.
Lenght	xxxx	*See Table of ROD/RAIL Lenght

SLIDE GUIDE		
Series	ETT-LC	PRODUCT FAMILY - Parker Electro Thrust Tubular Motor - Slide Guide Option
Rail Type	1	Type NB
	2	Type CPC
ETT Motor Size	025	n.a.
	032	Designed for motor size 032 - 9mm size
	050	Designed for motor size 050 - 15mm size
	080	t.b.d.

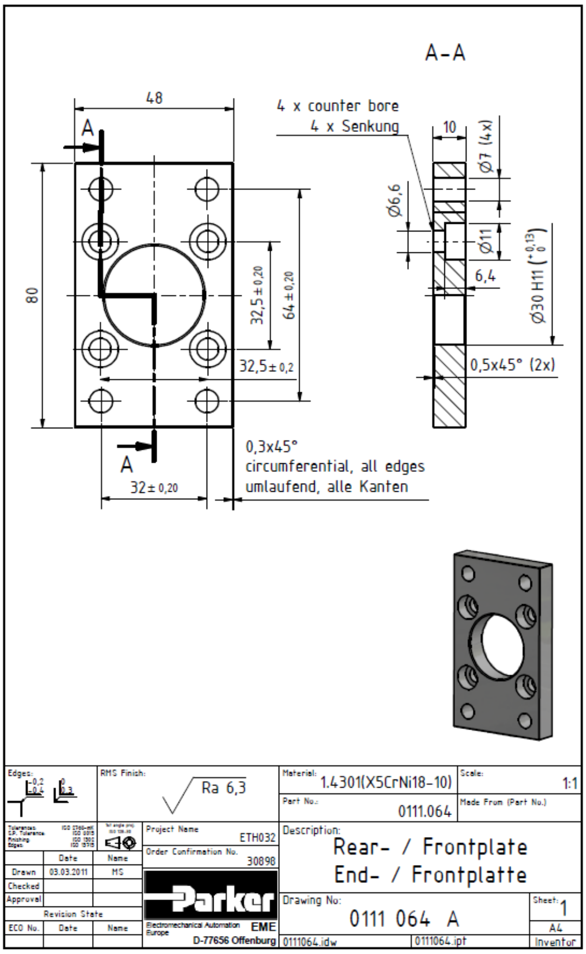
FLANGE		
Series	ETT-LF	PRODUCT FAMILY - Parker Electro Thrust Tubular Motor - Flange Option
Side of Flange	F	Front Flange
	R	Rear Flange
ETT Motor Size	025	n.a.
	032	Designed for motor size 032 - 9mm size
	050	Designed for motor size 050 - 15mm size
	080	t.b.d.

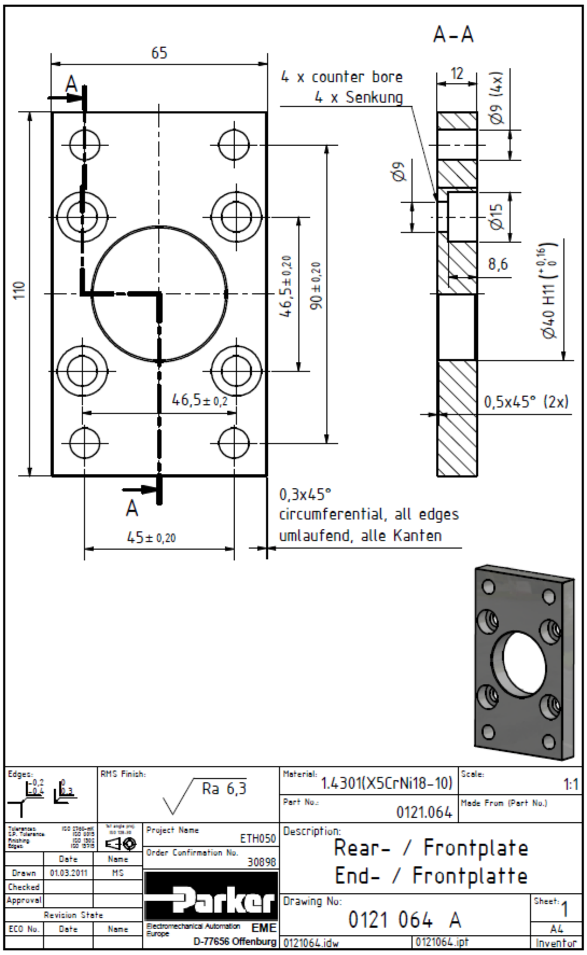
SUPPORT FOR SLIDE GUIDE		
Series	ETT-LA	PRODUCT FAMILY - Parker Electro Thrust Tubular Motor - Metal support for slide guide Option
ETT Motor Size	025	n.a.
	032	Designed for motor size 032 - 9mm size
	050	Designed for motor size 050 - 15mm size
	080	t.b.d.
Lenght	S1	Winding: Serial, Stack Lenght 1 - not available for size 80
	S2	Winding: Serial, Stack Lenght 2
	S3	Winding: Serial, Stack Lenght 3
	S4	Winding: Serial, Stack Lenght 4 - only size 80
	S5	Winding: Serial, Stack Lenght 5 - only size 80

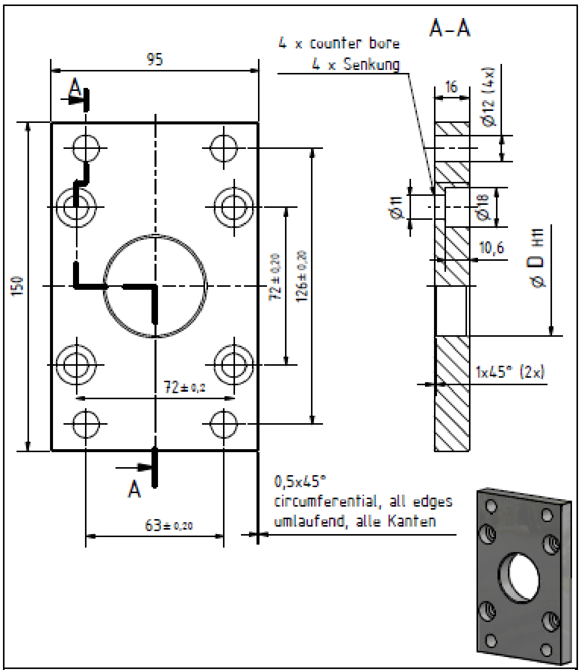
3.4.2. Accessories for mounting

3.4.2.1. Rear and Front Plate

Code 0112.918 for ETT032 (1Pc)
Code 0122.918 for ETT050 (1Pc)
Code 0132.918 for ETT080 (1Pc)



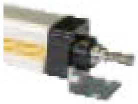




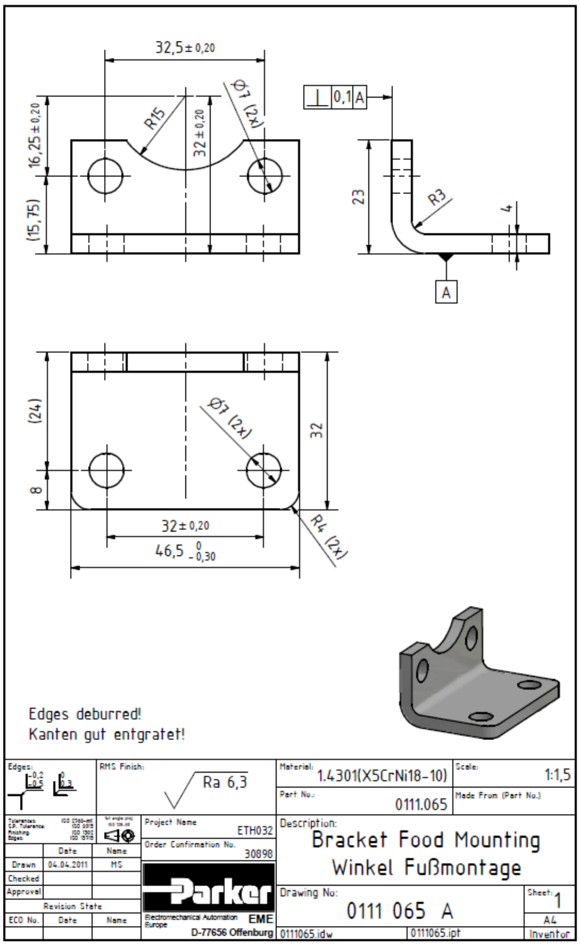
Variants / Varianten		
Part Number / Artikelnummer	Description / Benennung	Dim D / Maß D [mm]
0131.064-01	Rear End Plate	45
0131.064-02	Front End Plate	60

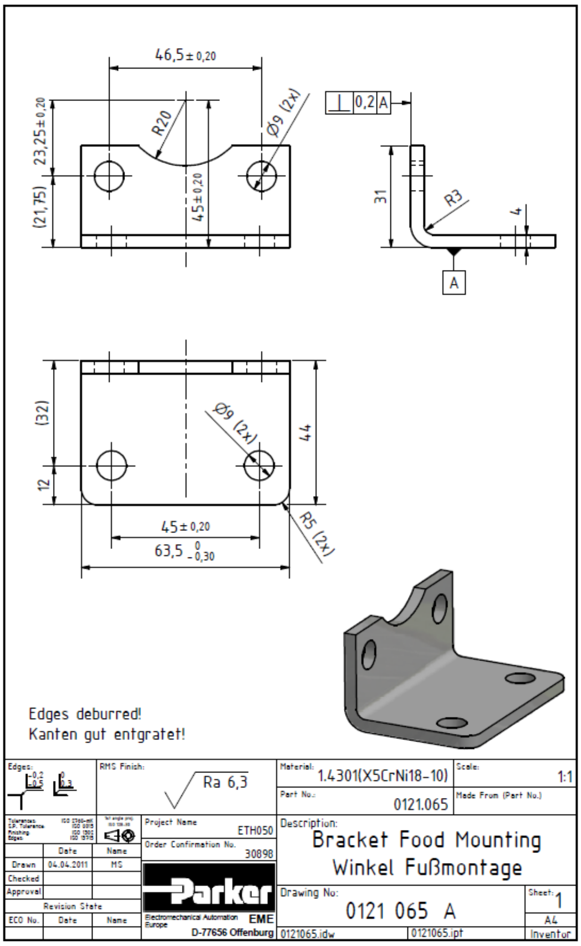
Edges:	RMS Finish: Ra 6,3	Material: 1.4301(X5CrNi18-10)	Scale: 1:1
		Part No.: 0131.064-XX	Made From (Part No.)
Project Name: ETH080	Order Confirmation No.: 30898	Description: Rear- / Frontplate End- / Frontplatte	
Drawn: 01.03.2011, MS	Parker Electromechanical Automation Europe EME, D-77656 Offenburg	Drawing No.: 0131 064-XX A	Sheet: 1, A4
Checked		0131064-XX.idw	0131064-01.ipt
Approval	Revision State: ECO No., Date, Name		Inventor

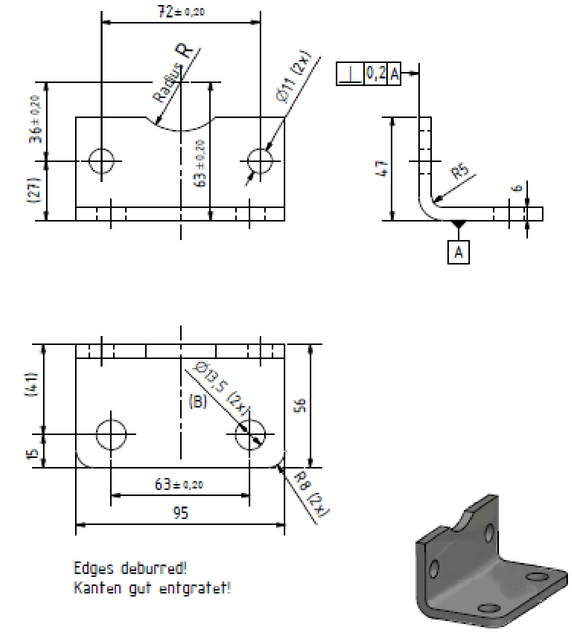
3.4.2.2. Stainless Brackets



Code 0112.916 for ETT032 (2Pcs)
Code 0122.916 for ETT050 (2Pcs)
Code 0132.916 for ETT080 (2Pcs)





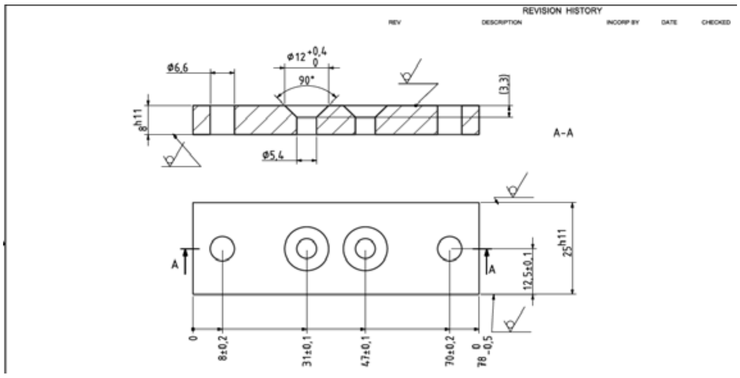


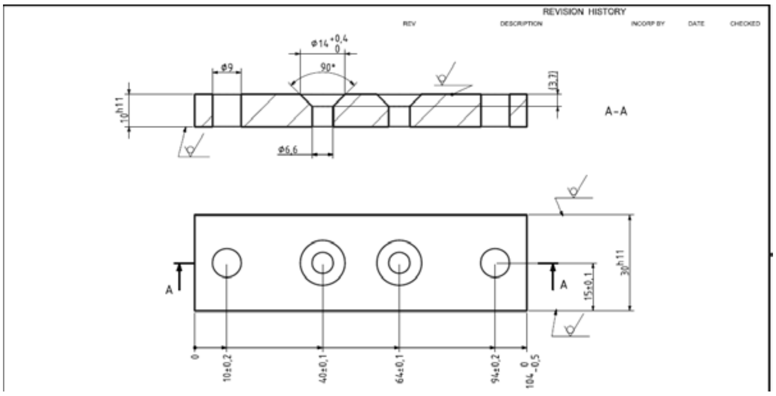
Variants / Varianten		
Part Number / Artikelnummer	Benennung / Description	Radius R [mm]
0131.065-01	Rear Food Mount Bracket	22,5
0131.065-02	Front Food Mount Bracket	30,0

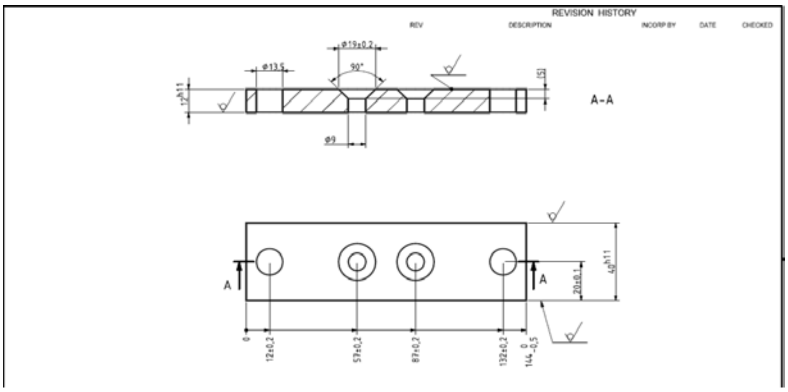
Edges:	RMS Finish: Ra 6,3	Material: 1.4301(X5CrNi18-10)	Scale: 1:1,5
		Part No.: 0131.065-01	Made From (Part No.)
Project Name: ETH080	Order Confirmation No.	Description: Bracket Food Mounting Winkel Fußmontage	
Drawn: 01.03.2011, MS	Checked: 13.08.2012, Kullick	Drawing No.: 0131 065-XX B	Sheet 1, A4
Revision State: ECO No. 12/106, Date 13.08.2012, Name ZeiB	Parker Electromechanical Automation Europe EME, D-77656 Offenburg	0131065-XX.idw	0131065-01.ipt, Inventor

3.4.2.3. Mounting Flanges

Code 0112.917E for ETT032 (1Pc)
Code 0122.917E for ETT050 (1Pc)
Code 0132.917E for ETT080 (1Pc)



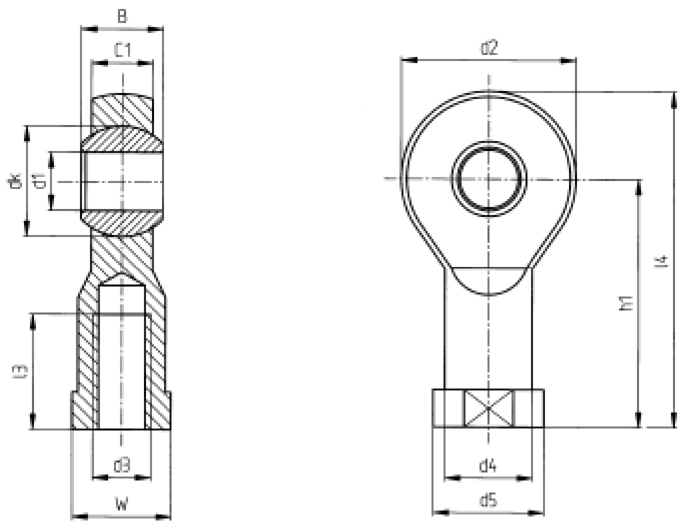




3.4.2.4. Spherical Rod eye

Plastic - igus®
Code KBRM-05 for ETT025
Code KBRM-06 for ETT032
Code KBRM-08 for ETT050
Code KBRM-10 for ETT080

Part Number	*Max. static axial tensile load*		*Max. transverse load*		*Minimum screw-in depth of thread [mm]*	*Max. tightening torque [Nm]*	*Max. tightening torque through spherical ball [Nm]*	*Weight [g]*
	Short Term [N]	*Long Term [N]*	*Short Term [N]*	*Long Term [N]*				
KBRM-05	1000	500	250	125	7	1	5	3.4
KBRM-06	1400	700	400	200	8	1.5	10	4.7
KBRM-08	2100	1050	700	350	11	5	12	8.6
KBRM-10	3100	1550	800	400	13	15	20	14.6

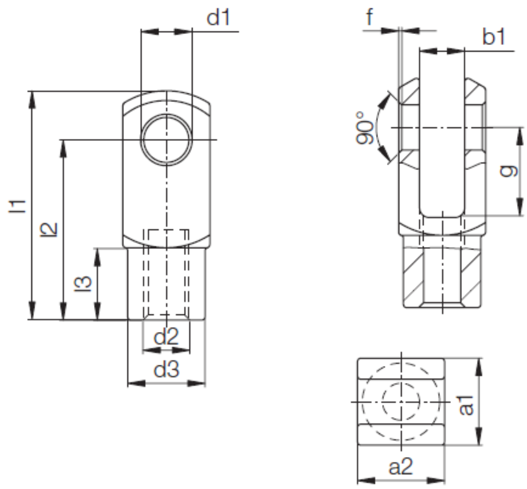


Part Number	*D1*	*D2*	*D3*	*D4*	*D5*	*C1*	*B*	*H1*	*I3*	*I4*	*W*	*Max. Oscillation angle*
KBRM-05	5	18	M05	9	12	6	8	27	10	36	SW09	30°
KBRM-06	6	20	M06	10	13	7	9	30	12	40	SW11	29°
KBRM-08	8	24	M08	13	16	9	12	36	16	48	SW14	25°
KBRM-10	10	30	M10	15	19	10.5	14	43	20	58	SW17	25°

3.4.2.5. Rod Clevis

Plastic - igus®
Code GERM-05 for ETT025
Code GERM -06 for ETT032
Code GERM -08 for ETT050
Code GERM -10 for ETT080

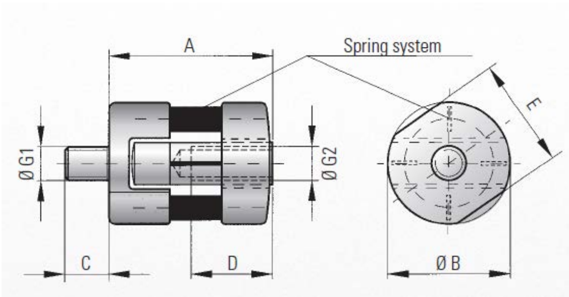
Part Number	*Max. static axial tensile load*		*Maximum transverse load*		*Max. tightening torque [Nm]*	*Weight [g]*
	Short Term [N]	*Long Term [N]*	*Short Term [N]*	*Long Term [N]*		
GERM-05	1200	600	250	125	0.5	2.7
GERM-06	1400	700	300	150	1.5	2.5
GERM-08	2700	1350	650	325	5	6.3
GERM-10	4700	2350	800	400	15	13.2



Part Number	*d1*	*g*	*a1*	*a2*	*b1*	*d2*	*d3*	*f*	*l1*	*l2*	*l3*
GERM-05	5	12	12	12	6	M05	10	0.5	31	24	9
GERM-06	6	12	12	12	6	M06	10	0.5	31	24	9
GERM-08	8	16	16	16	8	M08	14	0.5	42	32	12
GERM-10	10	20	20	20	10	M10	18		52	40	15

3.4.2.6. Alignment Coupler

Alignment Coupler R + W®
Code LK-70 for ETT025
Code LK-150 for ETT032
Code LK-300 for ETT050
Code LK-500 for ETT080



Properties :

- Zero backlash in axial direction
- Compensates angular misalignments up to 1.5° and lateral misalignments up to 0.7mm
- Low mass & weight

Material :

Coupling components are made of high-strength aluminium. Spring elements are made of special spring steel.

Temperature range :

-30 to + 120°C

Brief overloads :

Acceptable up to 1.5 times the rated value

Model LK		Series			
		70	150	300	500
Pressure Force [N]	F	70	150	300	500
Overall length [mm]	A	24	33	41.5	52
Outer Diameter [mm]	B	18	22	30	42
Outer diameter of thread [mm]	$G_{1/2}$	M5	M6	M8	M10
Max. tightening torque thread [Nm]		4	7	18	30
Thread lenght [mm]	C	6.5	8	10	13
	D	10	12	16	20
key width [mm]	E	16	20	27	38
weight approx. [g]		11	23	57	135
Lateral restoring force [N]	max values	10	18	48	96
Lateral mov. [mm]		0.5	0.5	0.5	0.7
Angular mov. [Degree]		1.5	1.5	1.5	1.5

3.5. Cooling

In compliance with the IEC 60034-1 standards:

3.5.1. Natural cooled motor

The ambient air temperature shall not be less than **0 °C** and more than **40 °C.**

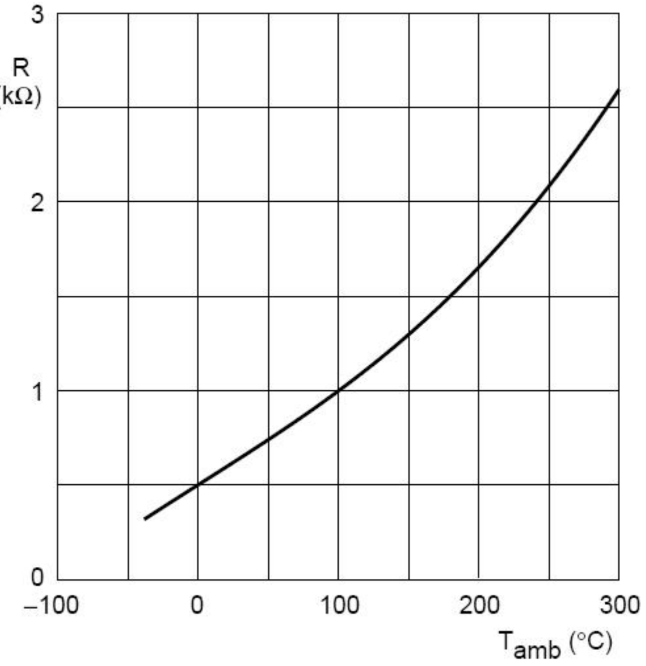
3.6. Thermal Protection

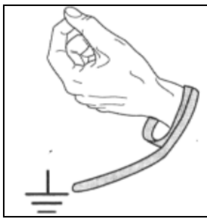
A KTY temperature sensor is built into the stator winding.
The thermal sensors, due to their thermal inertia, are unable to follow very fast winding temperature variations. They acheive their thermal steady state after a few minutes.

3.6.1. Temperature measurement with KTY sensors:

Motor temperature can be continuously monitored by the drive using a KTY 84-130 thermal sensor built in to the stator winding. KTY sensors are semiconductor sensors that change their resistance according to an approximately linear characteristic. The required temperature limits for alarm and tripping can be set in the drive.

The graph below shows KTY sensor resistance vs temperature, for a measuring current of 2 mA:



	Warning: The KTY sensor is sensitive to electrostatic discharge. So, always wear an antistatic wrist strap during KTY handling.

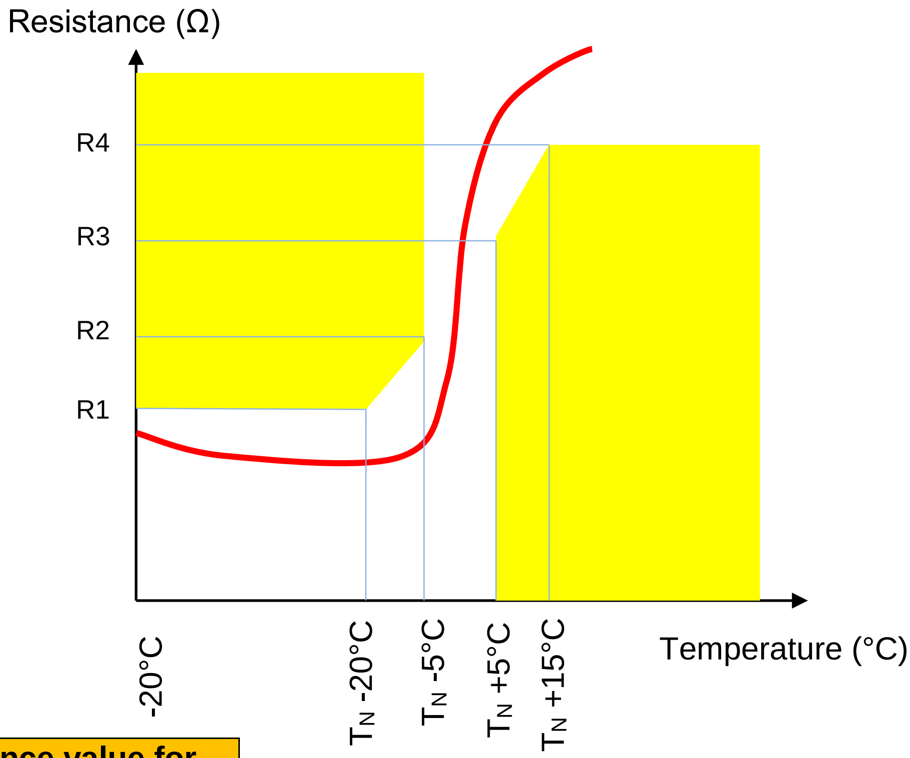
Warning: The KTY sensor is polarized. Do not invert the wires.

Warning: The KTY sensor is sensitive. Do not check resistance with an Ohmmeter or any measuring or testing device.

3.6.2. Alarm tripping with PTC thermistors :

One thermal probe (PTC thermistors) fitted in the ETT tubular motor winding trip the electronic system at **150° ± 5° C** for class F version. When the rated tripping temperature is reached, the PTC thermistor undergoes a step change in resistance. This means that a limit can be easily and reliably detected by the drive.

The graph and tab below shows PTC sensor resistance as a function of temperature (T_N is nominal temperature)



Temperature	Resistance value for ETT motors
-20°C up to T_N-20°C	R1≤500Ω
TNF-5°C	R2≤1100Ω
TNF+5°C	R3≥2660Ω
TNF+15°C	R4≥8000Ω

3.7. Power Electrical Connections

3.7.1. Wires sizes

	In every country, you must respect all the local electrical installation regulations and standards.

	Cable selection depends on the cable construction, so refer to the cable technical documentation to choose wire sizes

	Some drives have cable limitations or recommendations; please refer to the drive technical documentation for any further information.

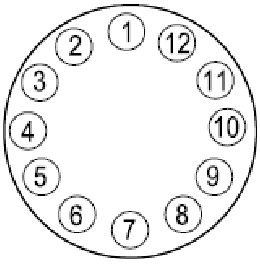
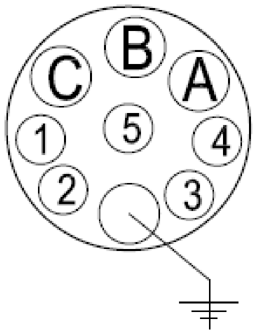
Cable selection

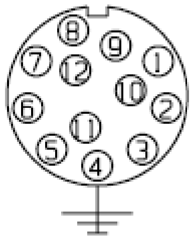
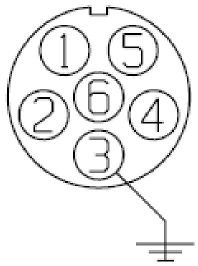
	At standstill, the current must be limited at 80% of the low speed current I_o and the cable has to support peak current for a long period. So, if the motor works at standstill, the current to select wire size is $\sqrt{2} \times 0.8\ Io \cong \mathbf{1{,}13 \times I_o}$.

Motor cable length
For motors with low inductance values or low resistance winding values, the respective cable inductance, and/or resistance, particularly in the case of large cable lengths can greatly reduce the maximum speed of the motor.
Please contact PARKER for further information.

	<u>Caution:</u> It might be necessary to fit a filter at the servo-drive output if the length of the cable exceeds 25 m. Consult us.

3.7.2. Mains supply connection diagrams - Connector

ETT025 – 032 - 050			
			
Feedback Connection		***Power Connection***	
Pin Number	Connection	Pin Number	Connection
1	Cos –	A	U
2	Cos +	B	W
3	N.C.	C	V
4	KTY84 -	PE	PE
5	KTY84 +	1	N.C.
6	N.C.	2	N.C.
7	Sin -	3	N.C.
8	Sin +	4	N.C.
9	N.C.	5	N.C.
10	+5V		
11	N.C.		
12	GND		

ETT080			
			
Feedback Connection		***Power Connection***	
Pin Number	Connection	Pin Number	Connection
1	Sin –	1	U
2	Sin +	2	V
3	N.C.	3	PE
4	GND	4	N.C.
5	N.C.	5	N.C.
6	N.C.	6	W
7	GND		
8	KTY84 +		
9	KTY84 -		
10	+5V		
11	Cos +		
12	Cos -		

3.7.3. Mains supply connection diagrams – Flying leads

ETT025			
Feedback Connection		***Power Connection***	
Color	Connection	Color / Pin	Connection
Orange	Cos –	1	U
Grey	Cos +	2	W
Blue	KTY84 -	3	V
Violet	KTY84 +	PE	PE
Green	Sin -		
Yellow	Sin +		
Red	+5V		
Black	GND		

3.8. Feedback system

The position sensor outputs analog, differential sine and cosine signals for providing position feedback. Shown below are the relationships between motor phase back EMF and position sensor outputs for one direction of motion (as shown by arrows). It should be noted that +SIN or -SIN is always in phase with motor phase U. For the motion shown, -SIN is in phase with motor phase U. For motion in the opposing direction +SIN is in phase with motor phase U.

	ETT025	ETT032	ETT050	ETT080	Unit
Pole pitch	60 NN	60	60	60	mm
Output current	50	50	50	50	mA
Supply voltage	5 ± 0.25	5 ± 0.25	5 ± 0.25	5 ± 0.25	VDC
Supply current (output current =0)	40 ± 10%	40 ± 10%	40 ± 10%	40 ± 10%	mA
Repeatability (2) up to	50	50	50	50	µm

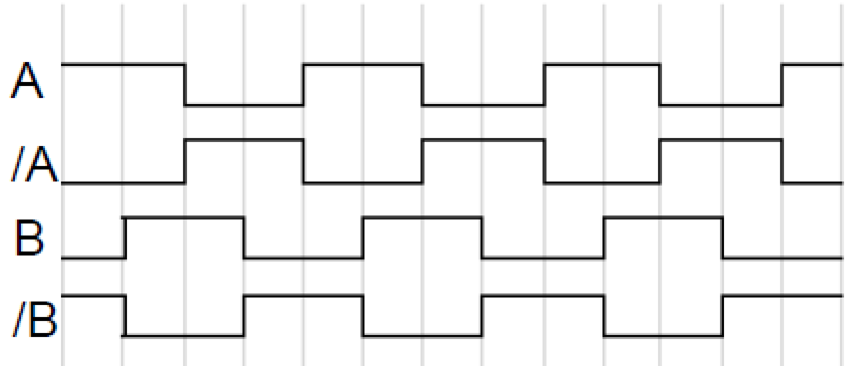
(2) Under constant operating conditions. Self-heating of the thrust rod by the motor will cause expansion in the thrust rod. In high duty applications (corresponding to an internal motor temperature of 80 °C) a 1 m thrust rod will expand typically by 250 µm.

3.8.1. Internal feedback option

Other types of position sensor are available; BISS, Incremental A/B can be used

3.8.1.1. Incremental TTL

The internal incremental position sensor outputs have TTL line drive signals, A and B, /A and /B without track of Zero. The resolution is programmable directly in factory and the default value is 2048i.



* channel A and B are phase shifted of 90°

	ETT025	ETT032	ETT050	ETT080	Unit
Pole pitch (between N and N)	60	60	60	60	mm
Output signals	A,/A, B, /B				
Supply voltage	5 ± 0.25				VDC
Supply current (output current =0)	100 ± 10%				mA
Repeatability (2) up to	50				µm
Resolution (with 2048i)	29.3				µm
System Accuracy	+/- 0.5				mm
Error of linearity	<1%				
Max resolution (default 2048)	8192				i

(2) Under constant operating conditions. Self-heating of the thrust rod by the motor will cause expansion in the thrust rod. In high duty applications (corresponding to an internal motor temperature of 80 °C) a 1 m thrust rod will expand typically by 250 µm.

3.8.1.2. BISS-C

The BISS-C serial protocol has the option of an electronic label inside, to simplify the start-up of the system.

	ETT025	ETT032	ETT050	ETT080	Unit
Pole pitch (between N and N)	60	60	60	60	mm
Output signals	BISS-C Serial				
Supply voltage	5 ± 0.25				VDC
Supply current (output current =0)	100 ± 10%				mA
Repeatability (2) up to	50				µm
System Accuracy	+/- 0.5				mm
Error of linearity	<1%				
Max resolution (default 24)	24				bit

(2) Under constant operating conditions. Self-heating of the thrust rod by the motor will cause expansion in the thrust rod. In high duty applications (corresponding to an internal motor temperature of 80 °C) a 1 m thrust rod will expand typically by 250 µm.

3.8.2. External position sensor

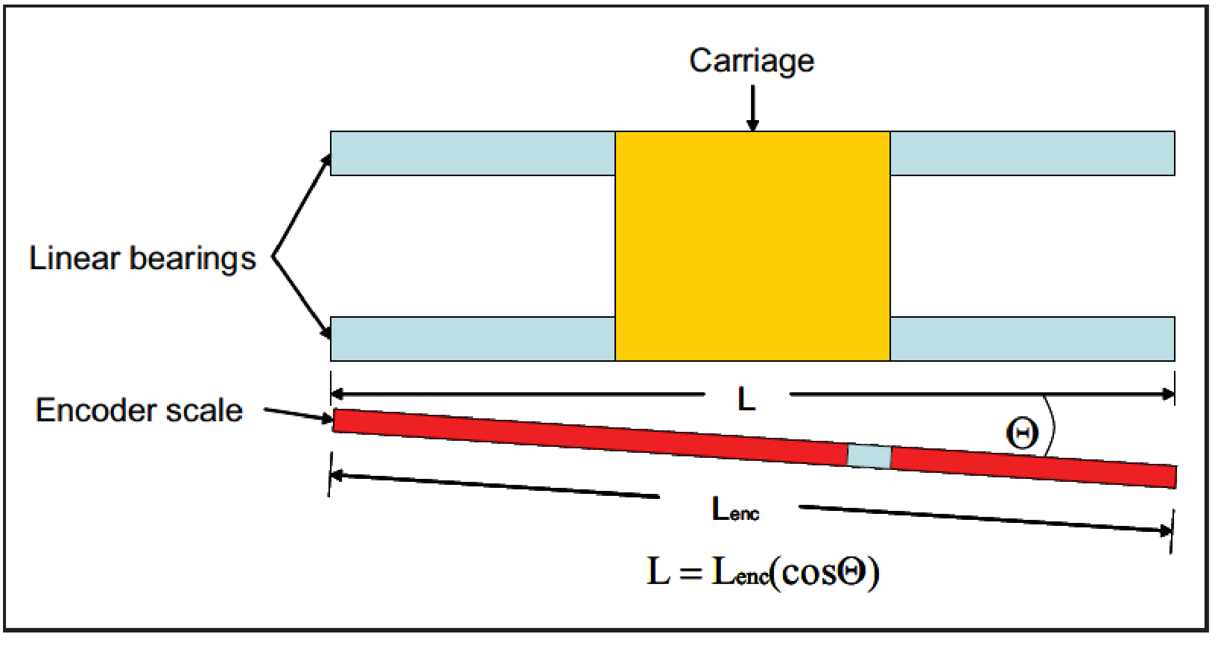
There are a variety of methods to provide linear positional feedback to the motion controller. There are analog transducers, rack-and-pinion style potentiometers, and laser interferometers, to name a few. Each has its own level of accuracy and cost. But far and away the most popular feedback device for linear motor positioning systems is the linear encoder.

Most linear encoders provide an incremental pulse train that provides discrete “counts” back to the motion controller as the encoder “read head” moves along a “linear scale.” Typically, the read head is mounted close to the load and the linear scale is applied to the positioner base. There are two popular styles of linear encoders – optical and magnetic.

Optical encoders use reflected light scanning techniques to provide feedback with extremely high resolution and accuracy. Optical encoders are capable of providing feedback in the nanometer resolutions. Magnetic encoders use inductive scanning techniques to offer significantly more economical feedback, but have considerably lower accuracy and resolution.
Magnetic encoders can typically offer resolution down between the 1 to 5 micron range.
A third variation of linear encoder is the Sine encoder. The Sine encoder produces analog sine and cosine signals instead of discrete pulses. Many modern motion controllers have the ability to interpolate these analog signals into extremely fine resolutions. For example, the Compax3 controller can interpolate a 1 Vpp signal into 14 bits, i.e., the sine/cosine signal period is divided into 16,384 counts. A typical pitch period of a Sine encoder is 1mm, thus the resolution can be interpolated down to 62 nm in the controller.

All of these encoders provide incremental positioning information. Hence, it is necessary to establish a home position any time positional information is lost by the controller, i.e., power down. In some applications it is necessary to have absolute feedback where the actual position of the motor is known immediately and no homing sequence is required. Some encoder manufacturers are now making absolute linear encoders that transfer data using a synchronous serial interface (SSI).

When using linear encoders it is critically important to properly mount the scanner (read) head. Inadequate mounting may cause mechanical resonance effects and errors in the measured position caused by vibration of the sensor head. In this case, the achievable bandwidth of the control loop – and hence, the maximum positioning stiffness – is reduced considerably. In some cases, large gaps of positional information are lost entirely, rendering the system totally inaccurate.
If the linear scale is not aligned straight with the guide bearings, accuracy can be affected in the form of “cosine errors.” (see the follow picture) shows a representation of how linear encoder scale misalignment can cause cosine errors.
The actual distance traveled will be L, where L=Lenc(cosΘ). The size of the error will be error = Lenc(1 – cosΘ). Thus, it is important to pay attention to the mounting of the read head as well as providing robust attachment and accurate alignment of the linear scale.



External linear feedback is available in the following options:

3.8.2.1. Magnetic Sensor MSK5000 – Incremental Output

Incremental, digital interface, resolution 1µm

- Max. resolution up to 1 µm
- Repeat accuracy ±0.01 mm
- Status LED display
- Works with magnetic band MB500
- Reading distance up to 2 mm

Mechanical Data

System accuracy	±(0.025 + 0.01 x L) mm, L in m
Repeat accuracy	max. ±0.01 mm
Sensor/band reading distance	0.1 … 2 mm 0.1 … 1.5 mm
Travel speed	depends on resolution and pulse interval
Housing	plastic black
Sensor cable	PUR
Max. measuring length	infinite

Electrical Data

Operating voltage range/supply voltage	6.5 V DC ... 30 V DC reverse-polarity protection on UB 4.75 V DC ... 6 V DC no reverse-polarity protection on UB
Operating power consumption (no load)	≤ 75 mA
Output circuit	PP LD (RS422)
Output signals	A, /A, B, /B, Option: I, /I or R, /R
Pulse width of reference signal	1 or 4 increments
Resolution	0.001, 0.005, 0.01, 0.025, 0.05, 0.1 mm

Ambient Data

Working temperature range	–10 °C ... +70 °C
Storage temperature range	–30 °C ... +80 °C, without package
Relative air humidity / condensation	100 %, condensation allowed

3.8.2.2. Absolute Exposed Linear Encoders EnDat® model LIC2100

The LIC exposed linear encoders permit absolute position measurement both over large paths of traverse up to 3m and at high traversing speed.

Performance

Resolution	0.1 µm
Accuracy Grade	±15 µm
Measuring length	120,320,520,770,1020,1220,1520,2020,2420,3020 mm
traversing speed	< 6000 m/min

Interfaces

Absolute position Values	EnDat 2.2

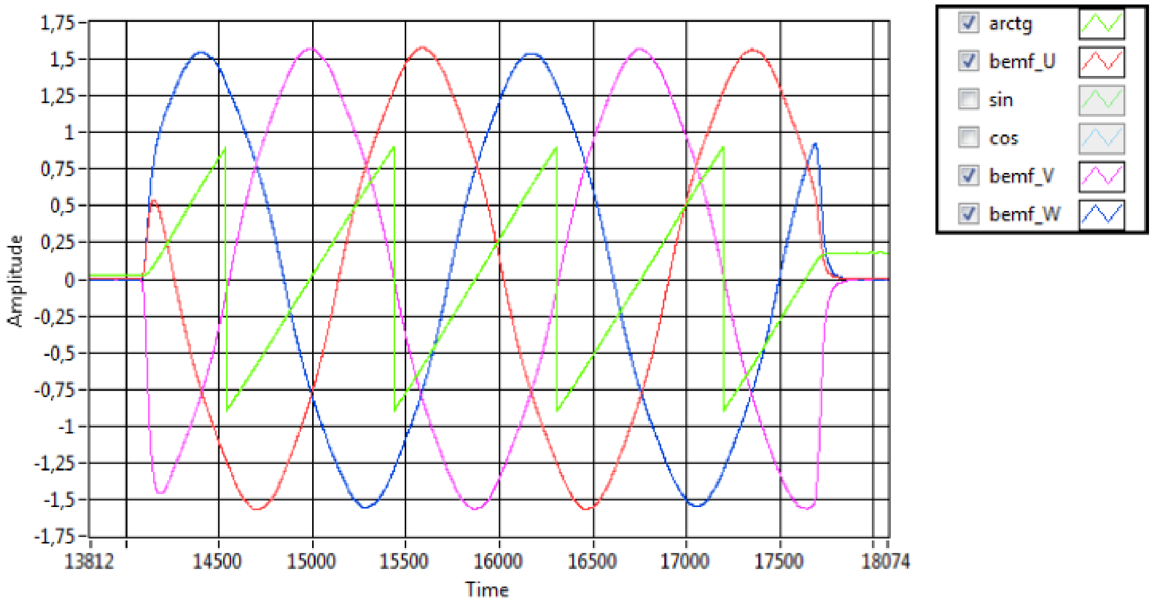
Electrical Data

Power Supply	3.6 to 14 V DC
Power consumption	< 1000 mW @ 14V
Electrical Connection	cable 1 m or 3 m

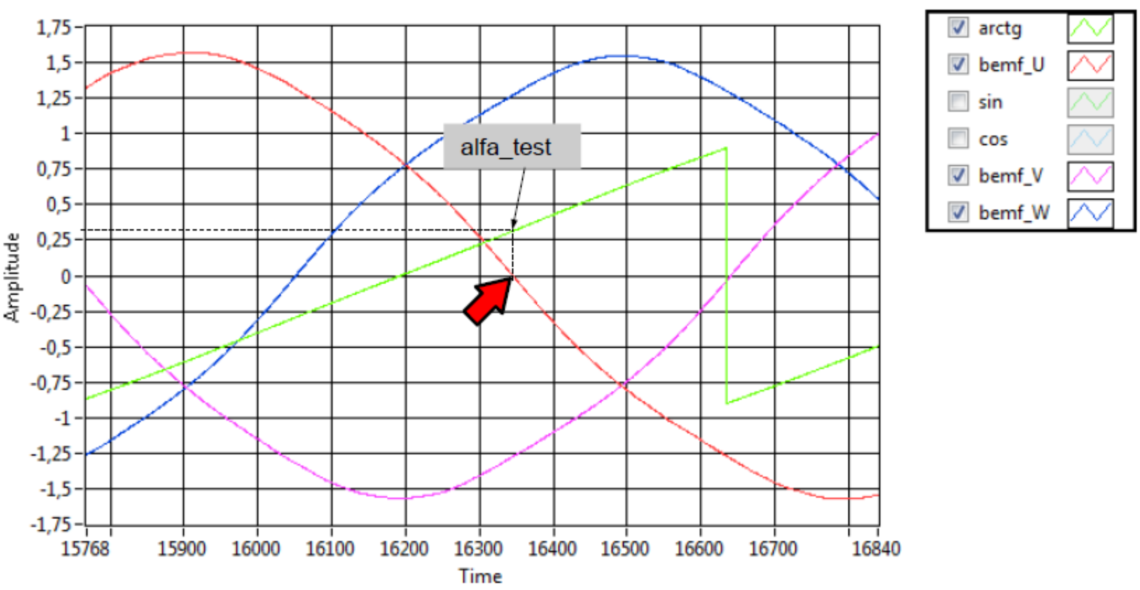
Ambient Data

Operating temperature	0 °C to 70 °C
Protection	IP67

3.8.3. Commutation offset and BEMF



We acquire by test system the waveforms for U, V, W, sine and cosine. For sine and cosine we collect the signals of integrated encoder.
From sin and cos we calculate α=arctg(sin/cos) that provides the entire set of electrical angle values along the whole stroke (green line on the figure above).
In order to determine the commutation offset, we select the value of α corresponding to zero crossing of phase U (i.e., where phase U BEMF from positive become negative, red arrow on figure below).
There is a fixed relationship between our commutation offset and that required by drives.
For example for Parker SLVD: α_slvd = α_test + 180°.
In the table below there are the estimated values for the ETT commutation offset.

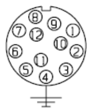
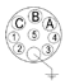


MODEL	alfa_TEST	alfa_SLVD	Pr30_SLVD	COMPAX3	commutation angle variance
ETT025S1 ETT025S2 ETT025S3	82,2	112,2	20595	292,2	+/- 6°
ETT032S1 ETT032S2 ETT032S3	156,4	186,4	-31420	6,4	+/- 6°
ETT050S1 ETT050S2 ETT050S3	108,1	138,1	25309	318,1	+/- 6°

3.9. Accessories

3.9.1. Connectors

ETT motors are supplied without female connectors; please see the follow table for the connectors part number.

Feedback Connector		
For ETT025-032-050		
	Parker Part Number	CONRESYF
For ETT080		
	Parker Part Number	CONRES82F
Power Connector Size 25-50		
For ETT025-032-050		
	Parker Part Number	CONMOT82F
For ETT080		
	Parker Part Number	CONMOT82F

3.9.2. Cables

To connect ETT motors in the connector version to a PARKER drive : SLVDN, Compax3, 638 or ARIES you can use a complete cable with a part number from the table below.

3.9.2.1. Signal and Power cable

ETTCAP	X	003	PM	-	Y1	SL	-	00

	Signal Cable Type
ETTCAP	Power cable for ETT
	Length (3 digits)
	Example 003=3 m, 005=5 m, 010=10 m, etc..
PM	**Application type (2 digits)**
	Motor Connector (2 digits)
Y1	Interconnectron Y-TECH Connector (ETT25-32-50)
I1	Interconnectron M23 receptable (ETT080)
	Drive Type (2 digits)
SL	SLVDN – 638 - Aries Drive
C3	C3 Drive
IP	IPA Drive
	Option (2 digits)
00	No Special

ETTCAS	X	003	PM	-	Y1	SL	-	00

	Signal Cable Type
ETTCAS	Signal Cable for ETT – COS
	Length (3 digits)
	Example 003=3 m, 005=5 m, 010=10 m, etc..
PM	**Application type (2 digits)**
	Motor Connector (2 digits)
Y1	Interconnectron Y-TECH Connector (ETT25-32-50)
I1	Interconnectron M23 receptable (ETT080)
	Drive Type (2 digits)
SL	SLVDN Drive
C3	C3 Drive
63	63x Drive
IP	IPA Drive
	Option (2 digits)
00	No Special

Example:
Power Cable ETTCAPx002PM-Y1SL-00 cable for ETT and SLVDN length 3 m
Signal Cable ETTCASx002PM-Y1SL-00 cable for ETT and SLVDN length 3 m

All cables are available with the follow lengths:
1 m - 3 m – 5 m – 7 m – 10 m – 15 m - 20 m.

3.9.2.2. Cables Datasheet

Motor connection power cable	
Type	ETT-CAP
Cable design	
Conductor material	Stranded copper
Core structure	(3 + T) x 1.5 mmq
Core insulation	TEO-Flexene®
Outer sheath	Polyurethane
Colour sheath	Orange RAL2003
Technical data	
Rated voltage	Power: 600/1000 V
Dielectric strength	Power: 4000 V
Insulation resistance	Power: > 2500 MOhm x km
Minimum bending radius	7.5 x diam. unsupported chain
10 x diam. long travel	
Max. speed	240 m/min.
Max. acceleration	20 m/sec²
Cycles	10000000
Opearating temperature	-30 + 80 °C
Outer diameter	8.5 mm

Motor connection signal cable	
Type	ETT-CAS
Cable design	
Conductor material	Stranded copper
Core structure	[3x(2x0.14 SK)+2x(0.50 SK)] SK
Core insulation	TPE-E
Outer sheath	Polyurethane
Colour sheath	Green RAL6018
Technical data	
Rated voltage	30 V
Dielectric strength	1500 V
Insulation resistance	> 10 MOhm x km
Minimum bending radius	90 mm
Max. speed	240 m/min.
Max. acceleration	20 m/sec²
Cycles	5000000
Opearating temperature	-30 + 80 °C
Outer diameter	8.4 mm

3.9.3. Sealing rings

On ETT motors is possible to haveon the sealing ring ;these protect bearing positions against contaminants, spray water and excessive loss of grease and increase the period of maintenance interval.

With the sealing rings some features of ETT change, in details we have :
- lubrication the rod with grease type RHEOSIL 500 F
- speed will be limited up to 3m/s max
- temperature range -30°C .. +100°C
- decrease the stroke of the rod
- rotating movement are not allowed
- needs to keep clean the rod.

4. COMMISSIONING, USE AND MAINTENANCE

4.1. Instructions for commissioning, use and maintenance

4.1.1. Equipment delivery

All servo motors are strictly controlled during manufacturing, before shipping.
Upon receit, it is necessary to verify the motor condition and confirm it has not been damaged in transit.

	Warning: In case of damaged material during transit, the recipient must **immediately** notify the carrier through a registered mail within 24 h..
	Forbidden for persons with heart pace makers Persons with heart pace makers are not allowed to handle or work with this product. Keep the necessary safety distance.
	Beware of the magnetic field The magnetic rod does contain strong magnets and exerts a strong pull on ferromagnetic objects. Non-compliance with the safety instructions may result in damages to computer drives and credit cards.

- Check the packaging for damages.
- Remove the packaging.
  Do not discard the packaging; it is strongly recommended to use the original packaging material for return deliveries.
- Depending on the storage location, metal surfaces may have a temperature of 0°C or below. Please provide appropriate worker protection (e.g. protective gloves).
- Please ensure that the consignment does correspond to your order.
- Check the product for damages. Do never use a device which seems damaged.
- Please read the installation manual carefully before installing or commissioning the device.

4.1.2. Handling

	**Heavy object** Heavy objects should not be lifted by a single person.

4.1.3. Storage

Before being mounted, the motor has to be stored in a dry place, without rapid or important temperature variations in order to avoid condensation.
During storage, the ambient temperature must be kept between -20 and +60 °C.
If the servo motor has to be stored for a long time, verify that the rod, feet and the flange are coated with corrosion proof product.

4.2. Installation

4.2.1. Mounting

The ETT comprises the primary element with an integrated polymer sliding bearing and the magnet rod.

The integral bearing provides guidance for the movement of the magnet rod. It is not intended to compensate lateral forces. If lateral forces are likely to occur in your application, you must provide for an additional bearing.

The magnet rod of the ETT has an external thread on one end and on the opposite end an internal thread. This permits the use of a wide range of ETT accessories, and Industry standard DIN/ISO6431 components. A locking ring at each end of the magnet rod fixes it within the primary element. The locking rings are not designed as limit stops and are not suitable to protect against exceeding the travel path. It is the responsibility of the user to prevent the magnet rod from being pushed out of the primary element.

4.2.2. Preparation

Once the motor is installed, it must be possible to access the wiring, and read the manufacturer’s plate. Air must be able to circulate around the motor for cooling purposes.
Clean the shaft using a cloth soaked in white spirit or alcohol. Ensure that the cleaning solution does not get on to the bush bearings.
The motor must be in a horizontal position during cleaning or running.

	Caution: Do not step on the motor, the connector or cables.
	Caution: Always bear in mind that some parts of the surface of the motor can reach temperatures exceeding 100 °C.

4.3. Electrical connections

	Danger: Check that the power to the electrical cabinet is off prior to making any connections.
	Caution: The wiring must comply with the drive commissioning manual and with recommended cables.
	Danger: The motor must be earthed by connecting to an unpainted section of the motor.
	Caution: After 15 days, check all tightening torques on cable connections.

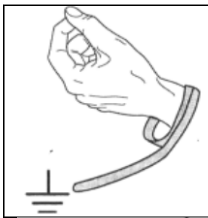
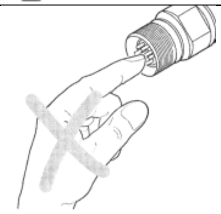
4.3.1. Cable connection

Please, read **§3.7 "Electrical connection"** for information about cable connection
A lot of information is already available in the drive documentation.

4.3.2. Encoder cable handling

	Danger: before any intervention the drive must be stopped in accordance with the procedure.

	Caution: It is forbidden to disconnect the Encoder cable under voltage (high risk of damage and sensor destruction).

	Warning: Always wear an antistatic wrist strap during encoder handling.
	Warning: Do not touch encoder contacts (risk of damage due to electrostatic discharges ESD.

4.4. Maintenance Operations

4.4.1. Summary maintenance operations

	**Generality** DANGER: The installation, commission and maintenance operations must be performed by qualified personnel, in conjunction with this documentation. The qualified personnel must know the safety (C18510 authorization, standard VDE 0105 or IEC 0364) and local regulations. They must be authorized to install, commission and operate in accordance with established practices and standards. Please contact PARKER for technical assistance.

	Danger: before any intervention the motor must be disconnected from the power supply. Due to the permanent magnets, a voltage is generated at the terminals when the motor shaft is moved

Depending on the type of application you must inspect the motor and lubrication of the rod according to the follow table:
For a standard application:

Operation	Periodicity
Clean the motor (cleaning fluids without solvents, kerosene or similar)	Comissioning and Every year
Motor inspection (vibration changes, temperature changes, tightening torques on all scews)	Comissioning and Every 3 months
Lubrication	Comissioning and Every 3 months

4.5. Troubleshooting

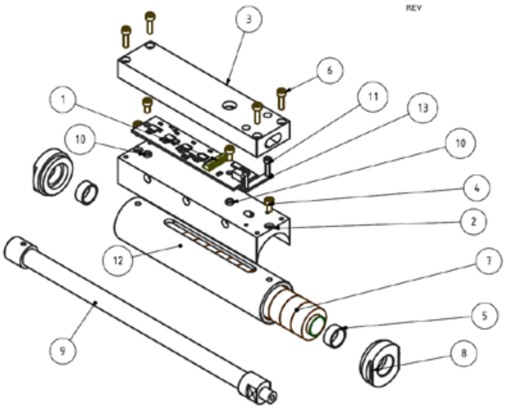
Check, if the problem you face is listed in the table below. If you cannot solve the problem with the aid of this table, please contact our service department.

Error	possible cause	Action
Primary element / magnet rod does not move and does not develop any force	Drive without supply voltage. Motor phases not connected. Overtemperature sensor not connected. Switched-off by overtemperature.	Connect supply voltage for drive. Check: Connections of the motor phases to drive. Check: Connections of the overtemperature sensor to drive. Allow primary element to cool off.
Primary element / magnet rod does not move but develops holding force or is energized	One or several motor phases not correctly connected or not connected at all. One or several sensor connections faulty or not connected at all. Primary element / magnet rod blocked mechanically.	Check: Connections of the motor phases to drive. Check: Connections of the position sensor to drive. Check: if primary element / magnet rod can be moved easily.
Primary element / magnet rod does move jerkily	Wrong motor pole pitch set or wrong Offset between position sensor and EMF.	Check: Setup of drive or controller.
Primary element / magnet rod moves in the wrong direction	One or several sensor connections or motor phases faulty or not connected at all.	Check: Correct connection of position sensor and motor phases.

Please Note: Use the original packaging material for return shipments.

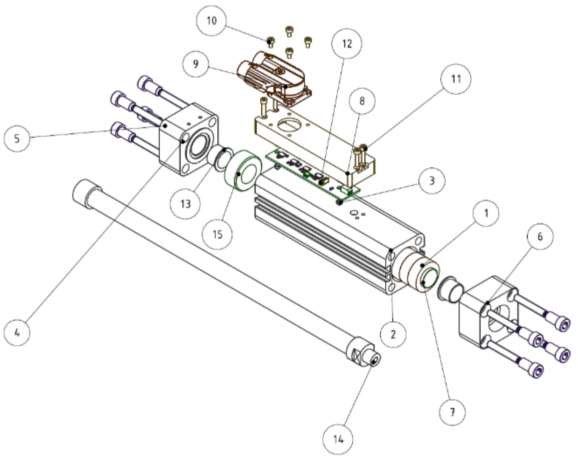
4.6. Spare Part list

4.6.1. ETT025



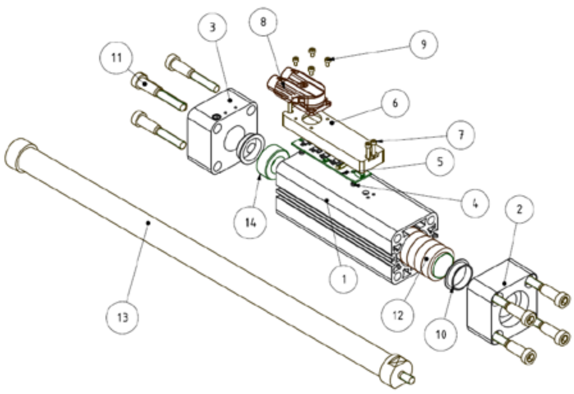
N°	Description	Order Code
1	Electronic Board Feedback	N.A.
2	Metal plate support for electronic	N.A.
3	Metal cover	N.A.
4	Screw	N.A.
5	IGUS Bush Bearing	
6	Screw	N.A.
7	Coil	N.A.
8	Tube closer	
9	ROD	See Catalogue
10	Magnet Sensors	N.A.
11	Screw	N.A.
12	Case	N.A.

4.6.2. ETT032



N°	Description	Order Code
1	Coils	N.A.
2	Extruder	N.A.
3	O-ring	N.A.
4	Plastic plate rear	
5	Screw	0111.007-02
6	Plastic plate front	
7	Vetronite	N.A.
8	Metal box	N.A.
9	Y-Tech connectors	CAVOETT3000521
10	M3 screw	N.A.
11	M3 screw	N.A.
12	Electronic feedback board	N.A.
13	IGUS bush bearing	
14	Female end rod	See catalogue
15	Block bearing	N.A.

4.6.3. ETT050



N°	Description	Order Code
1	Extruder	N.A.
2	Plastic plate front	
3	Plastic plate rear	
4	O-ring	N.A.
5	Electronic feedback board	N.A.
6	Metal box	N.A.
7	M3 screw	N.A.
8	Y-Tech connectors	CAVOETT3000521
9	M3 screw	N.A.
10	IGUS bush bearing	N.A.
11	Screw	0111.007-02
12	Coils	N.A.
13	ROD	See catalogue
14	Block bearing	N.A.

Revision History

4.7. Table of revisions

Date	Description	Author
30/06/2013	First release	AP
31/03/2014	New datasheet structure – New data – New graph	AP
31/04/2014	New datasheet for ETT025S3	AP
15/06/2015	New size 80 with accessories, cables, connectors	AP