Mounting instructions

ETH Manual - Installation, Commissioning, Maintenance and Repair

ETH Electro Cylinder
Parker High Force Electro Thrust Cylinder

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Mounting
instructions
2020-01

Production site:

Parker Hannifin Manufacturing Germany GmbH & Co. KG
Electromechanical & Drives Division Europe [EMDE]
Robert-Bosch-Strasse 22
77656 Offenburg, Deutschland)
Tel.: + 49 (0781) 509-0
fax + 49 (0781) 509-98176
Internet: www.parker.com/eme http://www.parker.com/eme
Email address: sales.automation@parker.com mailto:EM-Motion@parker.com

Italy:
Parker Hannifin Manufacturing Srl
Electromechanical & Drives Division [EME]
Via C. Gounod, 1
20092 Cinisello Balsamo (Milano), Italy
Phone: + 39 (0)2 361081
Fax: + 39 (0)2 36108400
Internet: www.parker.com/eme http://www.parker.com/eme
E-mail: parker.italy@parker.com mailto:parker.italy@parker.com

Non-warranty clause

We checked the contents of this publication for compliance with the associated hardware and software. We can, however, not exclude discrepancies and do therefore not accept any liability for the exact compliance. The information in this publication is regularly checked, necessary corrections will be part of the subsequent publications.
German Master created.

Additional/ current information:

Our product on the internet: http://solutions.parker.com/eth_support

About this manual

This manual contains notes and safety instructions, information about commissioning, service and maintenance.
For information on project development (technical data, dimensions, accessories, options, dimensioning aids and order code) please refer to ETH catalogue.

Inhalt

1. Introduction

In this chapter you can read about:

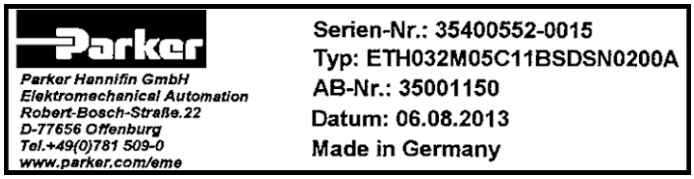
1.1 Device assignment

This manual applies for the following devices:

Electro Thrust Cylinder sizes:

- ETH032
- ETH050
- ETH080
- ETH100
- ETH125

1.2 Type identification plate



Type specification plate (example)

Type specification plate explanation

Left:		Manufacturer address
Right:	Serial number	Unambiguous identification number
	Type:	Order Code
	Order confirmation No.:	Customer Order Number
	Date:	Delivery date

1.3 Mounting explanation

Parker Hannifin Manufacturing Germany GmbH & Co KG

Robert-Bosch-Straße 22
D-77656 Offenburg

Tel.: +49 (0) 781-509-0
Fax.: +49 (0) 781-509-98176

www.parker.com/eme

EINBAUERKLÄRUNG

DECLARATION OF INCORPORATION

ACCORDING TO EC DIRECTIVE 2006/42/EC (ANNEX II, PART 1, SECTION B) FOR PARTLY COMPLETED MACHINERIES

Dokumenten Nr. *Declaration No.:*	**DoI001-R 3.0**
Firma / *Manufacturer:* Bevollmächtigter / *Authorized person:*	**Parker Hannifin GmbH & Co KG** **Jürgen Killius**
Anschrift *Address:*	**Robert-Bosch-Straße 22** **77656 Offenburg** **Deutschland**
Produkt *Product:*	***ETH: Parker High Force Electro Thrust Cylinder***
Serien- / Typenbezeichnung *Model / Type:*	**ETH032; ETH050; ETH080; ETH100; ETH125**
Seriennummer *Serial No.:*	ETH032 bis -125: **Ab 35410387-0001** *ETH032 till -125:* ***As of 35410387-0001***
Baujahr *Year of manufacture:*	ETH032 bis -125: **Ab Juli 2014** *ETH032 till -125:* ***As of July 2014***

Der oben genannte Hersteller / Bevollmächtigte erklärt, dass das Produkt den folgenden grundlegenden Anforderungen der Richtlinie Maschinen (2006/42/EG) entspricht:
The above mentioned Manufacturer / authorized person declare that the product is complying with the following essential requirements of the machinery directive 2006/42/EC:
Anhang I, Artikel / *Annex I, Article*: 1.1.1. 1.1.2, 1.1.3, 1.1.5, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.4.1, 1.5.4, 1.5.8 & 1.6.1.

Norm / *Standard*	Titel / *Title*	Ausgabe / *Edition*
DIN EN ISO 12100:2011	Sicherheit von Maschinen – Allgemeine Gestaltungsleitsätze, Risikobeurteilung und Risikominimierung *Safety of Machinery – General principles for design, risk assessment and risk reduction*	2011-03

Den im Produkthandbuch beschriebenen Sicherheits-, Installations- und Bedienungshinweisen muss Folge geleistet werden.
These products must be installed and operated with reference to the instructions in the Product Manual.
All instructions, warnings and safety information of the Product Manual must be adhered to.

Die unvollständige Maschine darf erst dann in Betrieb genommen werden, wenn festgestellt wurde, dass die Maschine, in die die unvollständige Maschine eingebaut werden soll, den Bestimmungen der Richtlinie Maschine 2006/42/EG entspricht.
The partly completed machinery must not be put into service until the final machinery, into which it is to be incorporated, has been declared in conformity with the provisions of directive 2006/42/EC on machinery.

Die zur Maschine gehörenden speziellen technischen Unterlagen nach Anhang VII Teil B wurden erstellt.
The machinery related special technical documentation according annex VII B has been created.

Der Hersteller verpflichtet sich, die speziellen Unterlagen zur unvollständigen Maschine einzelstaatlichen Stellen auf Verlangen elektronisch zu übermitteln. Die gewerblichen Schutzrechte des Herstellers der unvollständigen Maschine bleiben hiervon unberührt.
The manufacturer commits to transmit, in response to a reasoned request by the market surveillance authorities, relevant documents on the partly completed machinery electronically by our documentation department.
The intellectual rights of the manufacturer of the incomplete machine are not affected.

Offenburg, 23.5.2014
Jürgen Killius, *Operations Manager* ppa. _____

1.4 Applications in accordance with the Regulations

The incomplete machine can only be set in operation if it is sure that the machine in which the incomplete machine shall be mounted is conform to the 2006/42/EG machine directives.
Without further measures the product is not suitable for safety-oriented tasks. The linear actualor must only be used in areas that are not accessible to persons during operation.
If the linear actuator is used in areas accessible to people, it must be installed in such a manner that no one can be endangered during operation.
The described safety, installation and operating instructions must be adhered to.
General functioning consists in converting a rotational movement in a linear movement without slip within the product related load limits.
Can be found in the catalogue http://solutions.parker.com/eth_support.
Its applications are in industry and trade.
The linear actuator is used for: Positioning, transporting, feeding, removing, pallet handling, loading, unloading, processing and manipulating as well as testing work pieces or tools. Since the component can be used in a very wide range of applications, the user is responsible for its use in specific applications.

1.4.1. Applications not in accordance with the intended use

For risks of applications not in accordance with the intended use, the user shall bear the sole responsibility. Parker Hannifin does not accept any liability for damages caused by applications not in accordance with the intended use of the product.

1.5 For Safety Use

1.5.1. General hazards

General Hazards on Non-Compliance with the Safety Instructions

The subsystem has been designed in accordance with state-of-the-art technical developments and is operationally reliable. If it is not operated by qualified or at least trained personnel or if it is operated improperly or not in accordance with the operating instructions, however, the unit may bear the risk of hazards.
Electronic, moving and rotating components can

- cause danger for life and limb of the operator or third persons and / or
- cause material damage

.

If the linear actuator is installed in a machine plant, the safety requirements noted in the operating instructions for that machine must be combined with those described in this manual.

1.5.2. Identifying Residual Dangers and Hazardous Areas

If there are still residual dangers present to persons or property from the linear actuator in spite of operating it in a safe manner, the user must make reference to these residual dangers through signs and written rules requiring appropriate procedures.

The following safety signal words are used:

⚠DANGER Indicates that an imminent hazardous situation may lead to death or serious bodily harm if not prevented using appropriate safety measures.

⚠WARNING Indicates a potentially hazardous situation which, if not avoided using appropriate safety measures, could result in serious or minor injury.

⚠CAUTION Indicates a potentially hazardous situation which, if not avoided using appropriate safety measures, may result in minor injury or material damage.

NOTICE Provides important information about the product, how to handle the product or about the part of the manual to which particular attention must be paid.

1.5.3. Working safely

NOTICE The information (such as instructions and notes) contained in this manual must be heeded for all work involved in installing, commissioning, setting up, operating, changing operating conditions and modes, servicing, inspecting and repairing the unit.
The manual must be available close to the linear module during the performance of all tasks.
It is impermissible to operate the liner module if it is not in perfectly functional condition.

Operating personnel

Only qualified expert personnel is permitted to perform works on the linear actuator. All the applicable regulations and provisions must be heeded (IEC, EN, national accident prevention regulations etc.).
Qualified persons as the term is used in this manual are persons who:

- persons who, by virtue to their training, experience and instruction, and their knowledge of pertinent norms, specifications, accident prevention regulations and operational relationships, have been authorized by the officer responsible for the safety of the system to perform the required task and in the process are capable of recognizing potential hazards and avoiding them (definition of skilled persons in accordance with VDE015 or IEC364)
- Persons who have a knowledge of first-aid techniques and the local emergency rescue services.
- Persons who have read and will observe the safety instructions.

⚠DANGER

Instructions for Special Hazards

The linear module must be fixed or supported in accordance with the indications in this manual.
The operator must ensure that operation of the linear module does not cause any danger.
If the linear module moves in hazardous areas, these areas must be safeguarded with safety transmitter switches.

1.5.4. Safety Instructions for the Company Using the System

⚠WARNING Supervisors must also become familiar with the entire chapter entitled "Safety" and handling required on the linear actuator.
Supervisors must ensure that installation and operating personnel have read and understand the chapter entitled "Safety" and the description of how to work with the machine, and that they observe the instructions.
The manual must be available close to the linear module during the performance of all tasks.
It is impermissible to operate the liner module if it is not in perfectly functional condition.
Depending on the application, the operating company must provide for a suitable separating safety fence. Access to the motion range during operation must be prevented.
The user must make sure that the work area is protected by appropriate safety devices.

1.5.5. Safety Instructions for Operating Personnel

⚠WARNING Any work step that has a negative effect on the operating safety of the linear motor module must be omitted.
Operating and supervisory personnel are required to check the linear actuator or machine at least once per shift for externally visible damage or defects. Changes that have occurred (including the operating behavior) that could have a negative effect on the operating safety must be reported immediately.
Components and accessories are designed especially for this product. When purchasing spare and wear parts, use only original Parker parts. We explicitly draw your attention to the fact that we are unable to check or release spare parts or accessories that were not provided by us. Installing and/or using such products may cause negative changes in the required design properties in some circumstances, which in turn could negatively effect the active and/or passive operating safety of the product.
The manufacturer is unable to accept any liability for damage caused by using non-original parts and accessories.
Depending on the operating conditions (rotation speed, load, etc.) increased surface temperature in the area of the drive may occur. When touching it during operation slight injuries from burning may occur. Don't touch the product during operation. At maintenance, service and repair always take care that the product is cooled off before starting work.
Safety and protection devices are strictly NOT to be removed or bypassed or set out of order.
Applicable requirements and national accident prevention regulations must always be observed when installing and operating our linear motor module.

1.6 Packaging, storage, transport

First check

- Check the packaging for damages.
- Remove all items from 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.

Packaging material

⚠WARNING The packaging material is inflammable, if it is disposed off improperly by burning, lethal fumes may develop.

Transport

Make sure to transport the linear module always in a safe manner and with the aid of suitable lifting equipment (Means of transport).

Storage

The linear module must be stored evenly and without any mechanical load.
The stated storage temperature must be adhered to.
For a storage period longer than 1 year, the linear module must be relubricated before commissioning.

Disposal

We recommend to dispose off the respective materials in accordance with the respectively valid environmental laws. The following Table states the materials suitable for recycling and the materials which have to be disposed of separately.

Material	suitable for recycling	Disposal
Metal	yes	no
Plastic materials	yes	no

1.6.1. Special notes on transport

When using ropes, make certain they are not twisted or knotted. If you are using more than one rope, all the ropes should be equally taut.
When transporting the cylinder with a forklift, establish an equilibrium and secure the load if necessary.

⚠WARNING Never step under overhead loads danger of being injured!
Use only transport equipment with sufficient lifting capacity. Take care of structural safety when using lifting equipment!
Moving parts must always be secured against slipping or moving.

Maximum weight of the ETH Electro Thrust Cylinder with Parker drive

ETH032	ETH050	ETH080	ETH100	ETH125
20 kg	40 kg	100 kg	220 kg	490 kg

The weights mentioned are max. values. They contain the max. stroke, the heaviest options and the largest drives.

The following threads on the cylinder can be used to fix transport or mounting appliances (e.g. eye bolts):

Motor inline: ETH032 ... ETH080

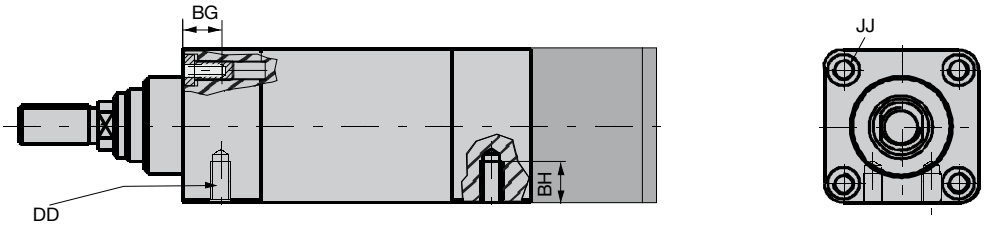


Figure 1: Motor inline: ETH032... ETH080

Motor parallel: ETH032 ... ETH080

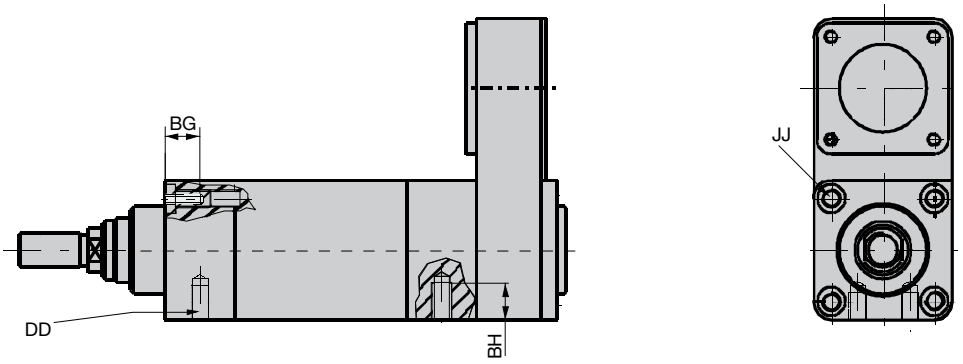


Figure 2: Motor parallell: ETH032... ETH080

	Unit	ETH032	ETH050	ETH080
DD (1)	mm	M6x1.0	M8x1.25	M12x1.75
YY	mm	M6x1.0	M8x1.25	M10x1.5
BH	mm	9	12.7	18.5
BG	mm	16	25	26

(1) Thread "DD" available with mounting method "F".

Note the following points:

- Please make sure that at least two eye bolts are used and that the load on all eye bolts is evenly distributed.
- Full load of the eye bolts in a maximum angle of 45° (see Figure 4).
- Don't use lateral traction (see Figure 5).
- Before use the eyes bolts must be checked that they are firmly seated and not damaged.
- The eye bolts are level and grid with the surface.
- Deformed eye bolts should not be used and screwed anymore.
- Supplied eye bolts are not made of stainless material and must therefore be removed after installation of IP65 or VA-option.
- In case the cylinder is dismounted from the machine at a later time, new eye bolts must be used due to safety reasons!

Figure 3: eye bolt

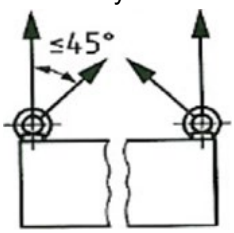


Figure 4: maximum angle of eye bolt

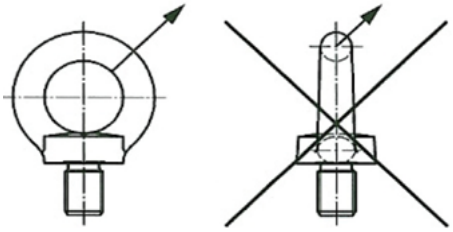


Figure 5: eye bolt without rope pull

Motor inline: ETH100&125

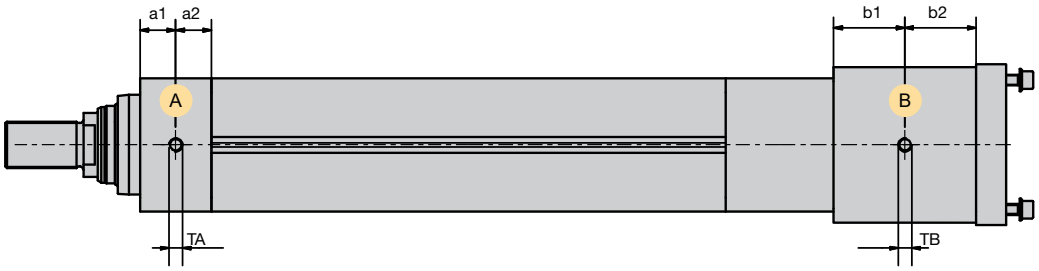


Figure 6: Transport instructions ETH100&125 inline

Area A: Front cap
Area B: Inline coupling housing
Thread TA and TB: on all four sides

⚠WARNING From frame size ETH 100 on, the provided M12 threads ((see Figure 6 and Figure 7) must be used together with M12 external thread eye bolts in accordance with DIN 580.

Motor parallel: ETH100&125

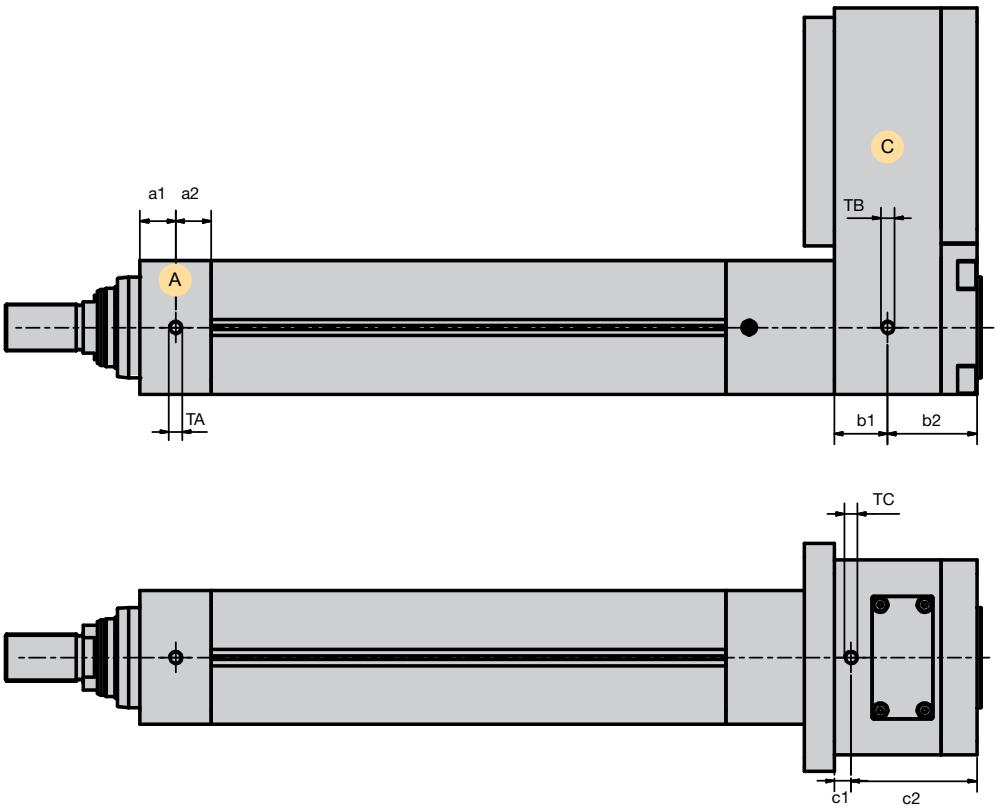


Figure 7: Transport instructions ETH100&125 parallel

Area A: Front cap
Area C: Parallel housing
Thread TA: on all four sides
Thread TB: also on the opposite side, but not on the underside

	Unit	ETH100		ETH125	
		inline	parallel	inline	parallel
a1	mm	32	32	55	55
a2	mm	32	32	50	50
b1	mm	64	48	72	61.5
b2	mm	64	80	72.5	101.5
c1	mm	--	15	--	24
c2	mm	--	113	--	139
TA	mm	M12x12	M12x12	M12x18	M12x18
TB	mm	M12x12	M12x15	M12x22	M12x25
TC	mm	--	M12x18	--	M12x25

1.7 Terms of guarantee / warranty

These operating instructions are subject to changes including changes in technical details with respect to the information and Figures contained herein.
Parker Hannifin Manufacturing Germany GmbH & Co. KG grants no quality or durability guarantees nor any guarantees as to the suitability for specific purposes. Such guarantees must be expressly agreed upon in writing
Public statements, recommendations or advertising do not in any way represent quality specifications.
The warranty rights of the user imply that he reports any fault immediately and describes it precisely in his notice of defects. Parker Hannifin Manufacturing Germany GmbH & Co. KG is not responsible under any circumstances for damage to the product itself or any consequential damage caused by the product resulting from improper handling of the product. If Parker-Hannifin Manufacturing Germany GmbH & Co. KG is responsible for a defect, Parker-Hannifin Manufacturing Germany GmbH & Co. KG shall be authorized, at its discretion, to undertake improvements or deliver replacements.
In compliance with ISO 9000, all products are equipped with a type plate and a note of care that are bound to the device. The type plate must not be removed or damaged under any circumstances.
Parker Hannifin Manufacturing Germany GmbH & Co. KG shall not be held liable, regardless of any legal basis, except for cases of intent or gross negligence; injuries to life, body or health; or defects of malicious nondisclosure or whose absence was expressly guaranteed in writing.
Furthermore, if there is compulsory liability under the Product Liability legislation for personal injury and property damage to privately used objects, in the event of negligent breach of significant contractual obligations, Parker Hannifin Manufacturing Germany GmbH & Co. KG shall also be liable for cases of ordinary negligence; however, this is limited to damages that are contractually typical and foreseeable. Further claims are hereby excluded.
The warranty shall lapse in the event of non-compliance with these operating instructions, the relevant statutory provisions and other information provided by the supplier.
In particular, we are not responsible for failures caused by modifications made by the customer or other parties. In such cases, the normal repair costs will be calculated. These costs will likewise be calculated for a check of the unit if no fault can be determined on the unit.
This regulation also applies during the warranty period.
No claims exist as to the availability of previous versions or to the retrofitting capacity of the units delivered to adapt them to the respectively current model version.

User conversions and changes are not Permitted

The linear actuator must not be changed in its design or in terms of safety without our approval. Any change as defined here made by the user excludes any liability on our part.

1.8 Conditions of utilization

General introductory notes

With the electro cylinder you bought a product which was manufactured and tested before delivery with the utmost care.
Please take your time to read the following notes which you ought to follow closely during setup and operation.
The operation of the electro cylinder is only permitted within the limit values stated in this manual.
Unless, all claims under the warranty will become void and a reduced service life or even damages must be expected.
Please compare the operating data with the stated limit values especially with reference to:

- Stroke length and setting of the limit switches, those must be set so that there is a sufficient safety travel at both ends of the travel stroke

NOTICE Even if the limit switches were already mounted at our premises, they must be adapted according to suitable values before operation!

- Thrust and traction force in the effective direction
- Lateral force (e.g. as a component of the effective force, but also due to own weight on horizontal mounting, especially with parallel motor mounting and long travel strokes)
- Speed
- Acceleration
- Environmental conditions (e.g. temperature, contamination)
- Please do take possible pulses caused by moved masses into consideration for the operating data. (Even small abrupt loads can cause damage, especially if they occur rather often at the same place.)

The limit values for the thrust and traction force, lateral force, speed and acceleration are partly influenced by several factors and can change depending on:

- The size of the electro cylinder
- Screw lead
- Direct or parallel drive via toothed belt transmission
- Mounting method
- Mounting orientation vertical or horizontal resp. inclined
- Travel Stroke

Note on cylinder mounting

⚠DANGER Do always use all available mounting possibilities and respect the requirements listed in chapter "Screw tightening torques for the mounting of the ETH cylinder by the customer". (see page 15)

If the motor used with the electro cylinder should be able to exceed individual limit values of the cylinder, the respective values for the motor must be limited in the control by appropriate parameterization. The parameterization should even be reduced down to the values necessary for operation.
This would, for example provide a hint to a possible damage or to preventive maintenance if wear-induced extensive friction of the machine or cylinder would trigger an error message of the controller.

⚠CAUTION The internal end stops of the electro cylinder may under no circumstances be accessed during operation. The internal end positions may only be accessed by the cylinder in setup mode and only for determining the end positions resp. for relubrication with a low force of a few N (torque limitation if possible below 10 %) and very slowly (max. 2 % of the nominal speed).

The lifetime of the electro cylinder depends strongly on the degree of power exploitation and on impermissible operating states occurring - even if only for a short time.

⚠CAUTION Depending on the operating conditions (rotation speed, load, etc.) increased surface temperature in the area of the drive may occur. When touching it during operation slight injuries from burning may occur. Don't touch the product during operation. At maintenance, service and repair always take care that the product is cooled off before starting work.

2. Commissioning

In this chapter you can read about:

Read safety instructions (see page 6) before taking into operation!
If no Parker drive is provided, attach your motor-gearbox combination according to the instructions in chapter motor and gearbox assembly (see page 22).
Also observe the notes in the assembly instructions for the motor/gear unit combination used.
The technical data of the individual components must always be respected.

⚠DANGER Depending on the application, the operating company must provide for a suitable separating safety fence. The access to the motion area of the ballscrew and piston rod should be prevented during operation.

NOTICE The sound may vary from cylinder to cylinder. It depends on the motor/gearbox, different drive options or on the production series due to different production lots. Different sounds do not provide any hint as to the lifetime of the cylinder.

⚠CAUTION Depending on the operating conditions (rotation speed, load, etc.) increased surface temperature in the area of the drive may occur. When touching it during operation slight injuries from burning may occur. Don't touch the product during operation.

NOTICE When installing the HLR linear axes in your system, make sure that the deflection stations and the carriage are accessible for maintenance purposes! Greasing option see ETH catalogue (solutions.parker.com/ETH_support).

2.1 Mounting

In this chapter you can read about:

⚠WARNING Before carrying out any assembling work make sure the piston rod cannot move. Therefore, de-energize the respective drives. The internal ballscrew drive is not self-locking! Always take care, especially in vertical position of the ETH cylinder that the piston rod must be secured against moving out

⚠WARNING Do only use the appropriate mounting parts offered in the Parker product catalogue for the respective mounting methods. These mounting parts are especially designed for the ETH.

⚠CAUTION Please note:
The cylinder housing must be mounted without tension or contortion.
The cylinder housing must be precisely aligned to the load direction of motion.
Occurring lateral forces on the cylinder must be taken into consideration.

2.1.1. Mounting with mounting threads on the cylinder

The easiest and most economic method of mounting is using the available mounting threads on the cylinder body (mouning option F, dimensions: see ETH catalogue). Make sure that the mounting surface is level and that the cylinder is mounted without tension and contortion. This method of mounting is only possible, if the lower side of the mounting surface is accessible.

NOTICE ETH100&125 does **not have** a mounting thread at the bottom of the cylinder.

NOTICE For cylinders in IP version, the cylinder is enclosed in a protective coating with possibly not constant layer thickness. Therefore, it can happen that when using the front or rear mounting surfaces (only for parallel motor mounting) the alignment of the cylinder deviates from the ideal 90° position.

2.1.2. Mounting with mounting accessories

Mounting methods: please refer to ETH catalogue.
Dimensions: please refer to ETH catalogue.
Permissible lateral force: please refer to the ETH support side in the ETH catalogue.

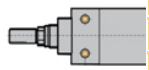
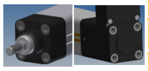
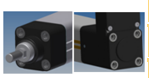
2.1.2.1 Cylinder mounting with mounting plates or foot mounting brackets

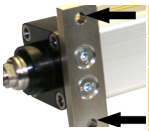
If the underside of the mounting surface is not accessible, mounting plates or foot mounting brackets are available as accessories.
The rear mounting plate (mounting type H) cannot be fixed with inline motor configuration.
If you fix the cylinder only at the rear end (e.g. also with a rear clevis) please respect the effective direction of the known forces. Critical are above all lateral forces in horizontal or vertical direction.

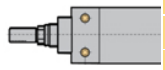
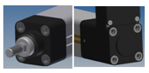
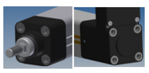
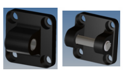
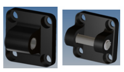
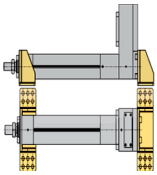
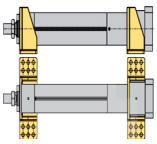
2.1.2.2 Screw tightening torques for the mounting of the customer's ETH cylinder

In order to simplify the calculation of the mounting screws for fixing the cylinder in your application, the following table gives an overview of the required screw quality resp. the required tightening torque (including additional boundary conditions), under the assumption that 100 % of the permissible axial force are required. Additionally, take care that no other loads act on the screws.

⚠WARNING If these specifications are not adhered to, the screw joint might fail.
The failure of screw joint may lead to severe injuries.

Mounting type		ETH032			ETH050			ETH080			
		M05	M10	M16	M05	M10	M20	M05	M10	M32	
Option F*		M6 - 12.9			M8 - 12.9			M12 - 12.9			Screw
		15.5[3]			47[3]			160[3]	160[3,4]	160[3]	Screw tightening torque[1] [Nm]
		6			8			12			Minimum screw-in depth [mm]
Option F		M6 - A2-70			M8 - A2-70			M10 - A2-70			Screw
		7.5			16			34			Screw tightening torque[1] [Nm]
		9			9			16			Minimum screw-in depth [mm]
Option F		M6 - 8.8			M8 - 8.8			M10 - 8.8			Screw
		9			19			39			Screw tightening torque[1] [Nm]
		9			9			16			Minimum screw-in depth [mm]
Option E Option C		M6 - A2-70			M8 - A2-70			M10 - A2-70			Screw
		8			16			34			Screw tightening torque[1] [Nm]
		8			12			15			Minimum screw-in depth[2] [mm]
Option E Option C		M6 - 8.8			M8 - 8.8			M10 - 8.8			Screw
		8			16			34			Screw tightening torque[1] [Nm]
		8			12			15			Minimum screw-in depth[2] [mm]

Mounting type		ETH032			ETH050			ETH080			
		M05	M10	M16	M05	M10	M20	M05	M10	M32	
Option H Option J Option N		M6 - A2-70			M8 - A2-70			M10 - A2-70			Screw
		7			16			31			Screw tightening torque[1] [Nm]
		8			11			14			Minimum screw-in depth[2] [mm]
Option H Option J Option N		M6 - 8.8			M8 - 8.8			M10 - 8.8			Screw
		7.5			18			35			Screw tightening torque[1] [Nm]
		9			12			15			Minimum screw-in depth[2] [mm]
Option B*		M6 - 12.9			M8 - 12.9			M12 - 12.9			Screw
		16.5			47			160[3]	160[3,4]	160[3]	Screw tightening torque[1] [Nm]
		12			12			25			Minimum screw-in depth[2] [mm]
Option G*		M6 - 12.9			M8 - 12.9			M12 - 12.9			Screw
		16.5			47			160[3]	160[3,4]	160[3]	Screw tightening torque[1] [Nm]
		12			12			25			Minimum screw-in depth[2] [mm]
Option R (5		M6 - 8.8			M8 - 8.8			M10 - 8.8			Screw
		9			19			39			Screw tightening torque[1] [Nm]
		9			9			16			Minimum screw-in depth[2] [mm]

Mounting type		ETH100	ETH125	
		M10/M20	M10/M20	
Option F*		not possible	not possible	Screw
		not possible	not possible	Screw tightening torque[1] [Nm]
		not possible	not possible	Minimum screw-in depth [mm]
Option F		M16 – 8.8	M20 – 8.8	Screw
		80	180	Screw tightening torque[1] [Nm]
		15	25	Minimum screw-in depth [mm]
Option F		M16 – A2-70	M20 – A2-70	Screw
		80	180	Screw tightening torque[1] [Nm]
		15	25	Minimum screw-in depth [mm]
Option E Option C		M16 – 8.8	M20 – 8.8	Screw
		80	180	Screw tightening torque[1] [Nm]
		15	25	Minimum screw-in depth[2] [mm]
Option E Option C		M16 – A2-70	M20 – A2-70	Screw
		80	180	Screw tightening torque[1] [Nm]
		15	25	Minimum screw-in depth[2] [mm]
Option H Option J Option N		M16 – 8.8	M20 – 8.8	Screw
		80	180	Screw tightening torque[1] [Nm]
		15	25	Minimum screw-in depth[2] [mm]
Option H Option J Option N		M16 – A2-70	M20 – A2-70	Screw
		80	180	Screw tightening torque[1] [Nm]
		15	25	Minimum screw-in depth[2] [mm]
Option B*		M16 – 10.9	M20 – 8.8	Screw
		270	330	Screw tightening torque[1] [Nm]
		20	25	Minimum screw-in depth[2] [mm]
Option G*		M16 – 10.9	M20 – 8.8	Screw
		270	330	Screw tightening torque[1] [Nm]
		20	25	Minimum screw-in depth[2] [mm]

* For protection classes "B" and "C", we recommend for instance a GEOMET® coated screw (thin layer corrosion protection), which must be in strength class 12.9. For the ETH100&125, no GEOMET coated screw is required. (as the bracket is not available in stainless steel).
[1] torque controlled tightening
[2] when screwing into S235 JRG1 grade steel
[3] provide suitable washer under the screw head
[4] Safety factor against slipping is 1.6 in this case. Otherwise, at least 1.8
[5] for power transmission from rod guide to your application please use the dowel pins

For all mounting options the following applies:

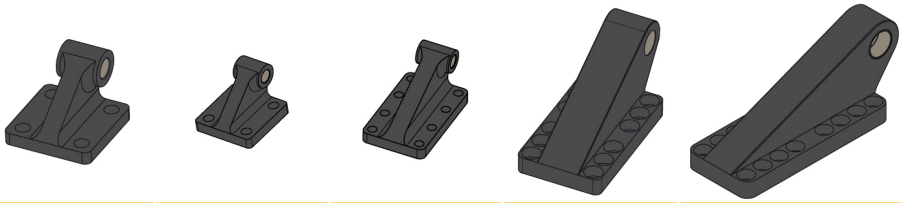
- Joint area must be dry and free of grease
- We recommend to secure the screws with a liquid bolt retaining compound (e.g. Loctite 242)

⚠WARNING With mounting option F, H and J, do not mount the cylinder horizontally on one side as in this case the bolted connections are improperly high burdened due to pitching torques and cross forces. In this case always support the cylinder!

With ETH032-080 the mounting thread F* on the underside of the cylinder can be used as support.
With ETH100&125 the transporting thread (see page 9) can be used as support. For this a screw M12x1.25, quality 8.8 must be used. Furthermore, a minimum screw-in depth of 15 mm must be adhered to. Tighten screw with tightening torque 30 Nm.

2.1.2.3 Accessory mounting - bearing block

Tightening torques for the bearing block to be provided by the customer.

ETH032	ETH050	ETH080	ETH100	ETH125	
					
0112.039	0122.039	0132.039	0142.039	0152.039	Part number
M8-12.9	M10-12.9	M12-12.9	M16 – 8.8	M20 – 8.8	Screw
37	66	83	200	320	Screw tightening torque (1) [Nm]
15	21	27	20	25	Minimum screw-in depth (2) [mm]

(1) torque controlled tightening
(2) when screwing into S235 JRG1 grade steel

Boundary conditions:

- Provide suitable washer under the screw head
- Joint area must be dry and free of grease
- We recommend to secure the screws with a liquid bolt retaining compound (e.g. Loctite 242)

2.1.2.4 Mounting the rod guide (option R)

The rod guide is only available for fram sizes ETH032 ... ETH080!

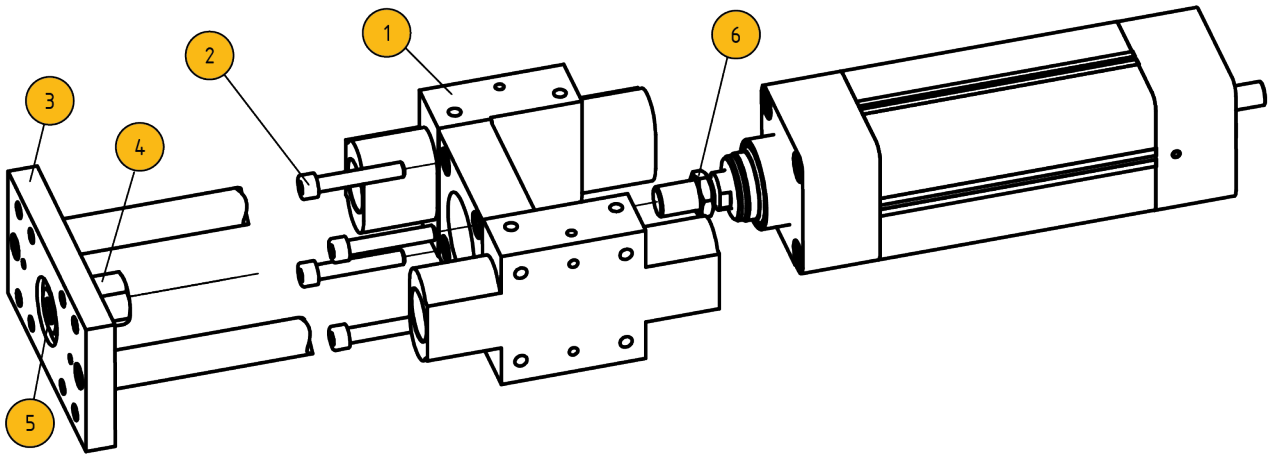


Figure 8: Mounting the rod guide

Place the cylinder on a suitable installation surface.
For the following steps, the piston rod of the cylinder must be retracted.

- Unwrap the rod guide and remove the transportation lock between the rod guide module ((see Figure 8 Pos.1) and the front plate (see Figure 8 Pos. 3).

⚠WARNING The rod guide is smooth running and can easily slide out of the rod guide module depending on its position. Hold the rod guide horizontally.

- Pull out the front plate with the guide rods from the rod guide module and set them aside.
- Slide the rod guide module (see Figure 8 Pos. 1) onto the centering collar of the ETH cylinder.
  Please note: with the relubrication option in the centre of the profile, the lubrication opening in the profile can be concealed by the guide rods.
- Screw together the rod guide module with the screws supplied (see Figure 8 Pos. 2) and the required tightening torque. For tightening torques see chapter 2.1.2.2 screw tightening torques for the mounting of the ETH cylinder on the customer's sde, option F.
- Loosen the screw (see Figure 8 Pos. 5) thus the lock nut (see Figure 8 Pos. 4) can move freely.
- Slide the front panel with the guide rods back into the rod guide module.
- Turn the lock nut on the piston rod of the ETH cylinder and lock it with the hexagon nut (see Figure 8 Pos. 6).
- Clamp the lock nut with the front panel by tightening the screw (see Figure 8 Pos. 5) with the required tightening torque. To avoid damaging the cylinder, the lock nut must be used to hold the cylinder in place.Tightening torques: ETH032 = 6,5 Nm, ETH050 = 16 Nm, ETH080 = 29 Nm.

For power transmission from the rod guide module to your application please use dowel pins.
We recommend to secure the screws with a liquid bolt retaining compound (e.g. Loctite242)

2.1.3. Mounting of the payload

2.1.3.1 Side Load

Please respect the maximum permissible side loads depending on the vertical or horizontal mounting position.
Permissible lateral force: please refer to the ETH support side in the ETH catalogue.

2.1.3.2 Mounting of the payload

⚠CAUTION

The piston rod of the ETH cylinder is equipped with an internal anti-rotation device. When fixing the load on the thrust rod end, do always apply counter pressure on the respective flat, (KV (SW), see ETH catalogue) with an appropriate tool!Otherwise, the internal anti-rotation protection might be damaged.

Figure 9: Mounting of the payload

Connect the payload always with the end of the thrust rod so that occurring lateral forces are minimized. Please observe the admissible lateral forces to the cylinder rod If the payload is separately guided, even minimal deviations between this guiding system and the cylinder length axis can generate high lateral forces and reduce the service life of the electro cylinder considerably.

The possibilities to avoid this problem:

- Use a flexible coupling at the thrust rod end.
  This coupling can compensate up to 3 mm axial offset and up to 10° angular offset.
- Use other thrust rod connection elements (accessories), which are able to compensate certain deviations such as rod clevis or spherical rod eye
- Use a flexible cylinder fixing device (accessories) such as rear clevis or center trunnion.

⚠WARNING

Do only use the rod ends supplied by Parker.
Only use the nut delivered with the rod end option M as counter screw.
The connection provided from the customer is always screwed in the thread of option M.

"Cylinder Rod Version": please refer to ETH catalogue
http://www.Parker.com/Literature/Electromechanical Europe/Literature/190_550017_ETH_katalog.pdf.

2.1.3.3 Mounting of force sensors

NOTICE

For mounting the force sensor please observe the attached operating instructions respective for the force sensors!

2.2 Electrical installation

2.2.1. Direction of the motor during extension of the cylinder

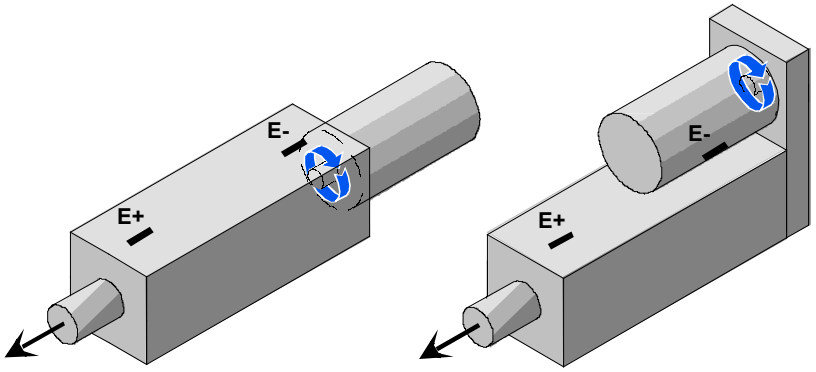


Figure 10: Turning direction of the motor during extension of the cylinder

NOTICE With parallel drive (see Figure 10) of proximity swithc), the turning direction of the motor is reversed in comparison with the direct drive configuration!

2.2.2. Sensors

All electro cylinders feature a permanent magnet in the spindle nut. It activates the sensors which are mounted in the special mounting grooves on one side of the cylinder.

NOTICE Depending on the design of the proximity switches, the proximity switches protrude up to 1 mm from the mounting groove of the cylinder.

Proximity swichtes and limit switches: please refer to im ETH Catalogue http://solutions.parker.com/eth_support.

2.2.2.1 Mounting of proximity switches

- Proximity switches can be inserted into all grooves on the ETH electro cylinder.
- If no sensors are mounted by the manufacturer (on customer request), please remove the groove protection covers. Use a sharp screwdriver to lever the ends of the covers off the grooves. Pull the entire covers out manually.
- Install the sensors. The proximity switches can be inserted into the grooves from above. The cable ends should lead into the motor direction. Push the proximity switches to their approximate positions in the grooves of the cylinder body. Tighten the fixing screws on the proximity switches slightly.
- If limit switches are used as end limits (see page 21) or are pre-assembled at the factory (at customer request), do set them.
- You can use the formerly removed protective covers in order to fix the sensor cables. Please cut the covers to the desired length. A pair of scissors may be used. At the point where the cables are led out, shorten the respective tape 5 to 10 mm additionally (see Figure 12).
- Insert the cables into the grooves of the plastic covers and push the cover into the groove together with the cable.
- Please observe the Operating Instructions of the manufacturer when commissioning the sensors.
- Connect the proximity switches to the controller.

Proximity switches mounting example: 2 end limits with machine zero

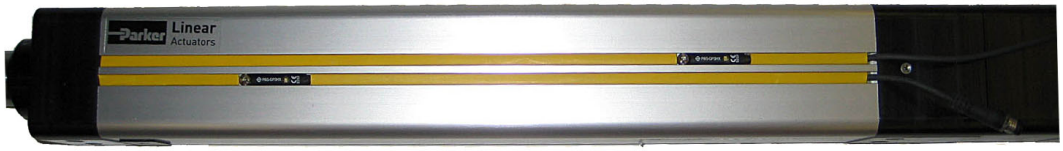


Figure 11: Grooves for proximity switches

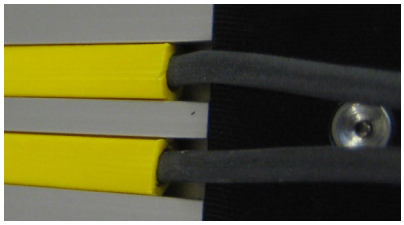


Figure 12: Grooves for proximity switches, details

2.2.3. Setting the end limits

⚠WARNING

The steps described below can be best executed with energized drive. Therefore, they may only be performed by trained and authorized personnel.
Do only travel at very low speed (<10 mm/s) and reduce the drive torque to a minimum.
Ensure that there are no persons in the hazardous area.

The setting of the end limits depends on the application.

NOTICE

No proximity switch is to be mounted in the area of the central lubrication port (option).

The following activation positions at the mechanical end limits result from the initiators recommended in the catalog.
The given positions "A" and "B" are estimated recommendations and may vary.
The final adjustment of the initiator position, even in the case of initiators mounted at the factory (on customer request), must be checked and corrected if necessary during commissioning.

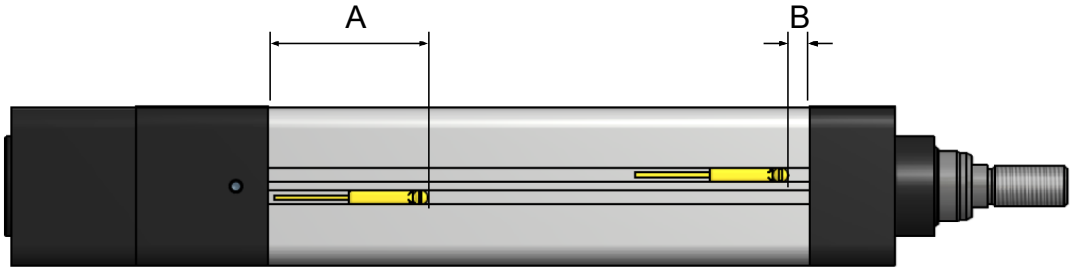


Figure 13: Position of sensors at the mechanical limits

Position of sensors at the mechanical limits

ETH	Pitch	A [mm]	B [mm]
032	M05	68	0
	M10	77	0
	M16	81	0
050	M05	71	0
	M10	77	0
	M20	89	0
080	M05	85	0
	M10	103	0
	M32	133	0
100	M10	162	0
	M20	200	0
125	M10	186	6
	M20	274	6

⚠CAUTION Please add the respective safety travels to the mentioned values!
Stroke, Usable Stroke and Safety Travel: see ETH catalogue .

Adjusting the machine reference initiator

The correct position for the home switch (machine zero switch) depends on the application.
It is recommended to set the machine zero at or near the end of the travel. This saves time, as it minimizes the chance that the machine zero is searched for in the wrong direction. In some cases it is possible to use one of the limit switches as machine zero. This method provides however a reduced precision, as the resulting position can normally not be and-linked with the encoder index pulse.

2.3 Motor/ gear assembly/ disassembly

Notes on motor wiring

⚠DANGER Improper wiring may lead to severe injuries or death.
A wiring must always be made from a skilled electrician.
Before carrying out any installation work de-energize the motor.
Observe the safety instructions in the operating instructions of the motor used.

⚠WARNING The internal ballscrew is not self-locking!
Always take care, especially in vertical position of the ETH cylinder that the piston rod must be safeguarded!

In case of non respect severe injuries may occur.

In this chapter you can read about:

2.3.1. Motor / gear assembly with inline motor configuration

ETH032 ... ETH080

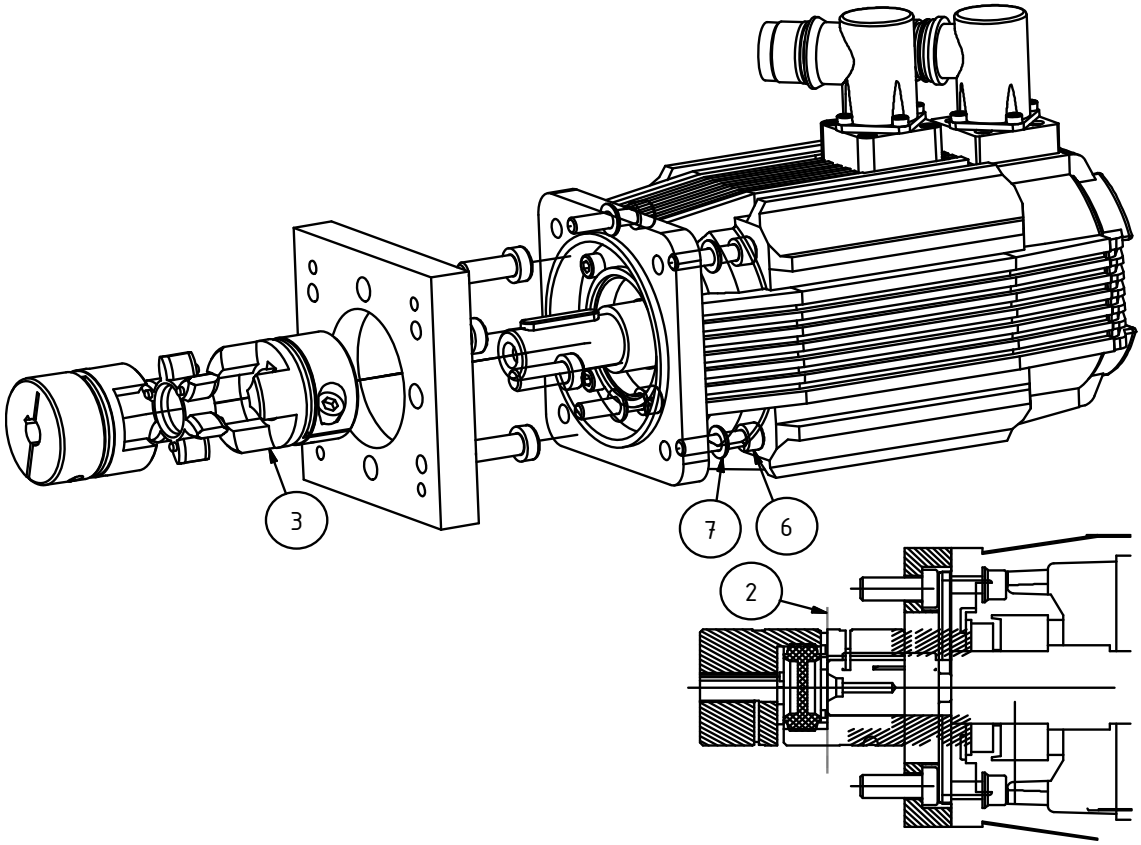


Figure 14: Motor /gear assembly ETH032 ... ETH080 inline

ETH100&125

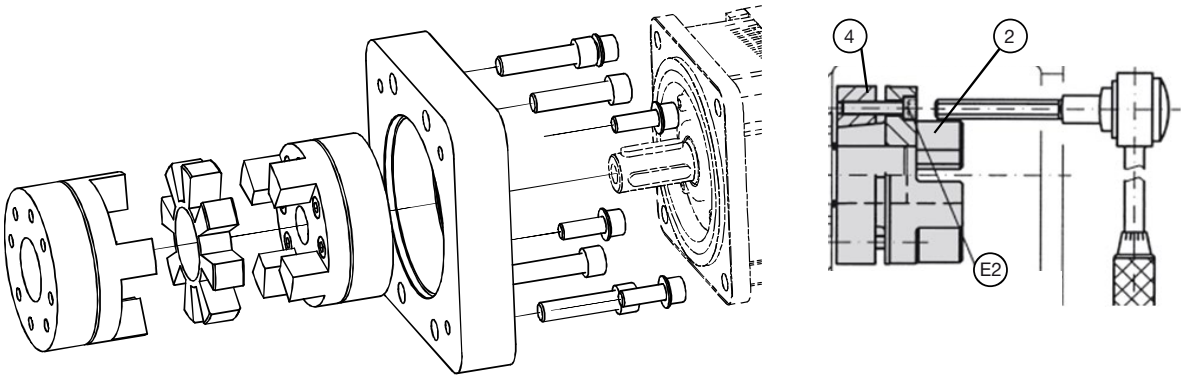


Figure 15: Motor /gear assembly ETH100 ... ETH125 inline

Dismantle motor / gearbox

- Remove motor connector.
- If you use a gearbox, we recommend to dismantle the motor from the gearbox first for reasons of weight.
- Loosen screws (see Figure 14 Pos. 6).
- Remove motor / gearbox including mounted coupling half with caution.

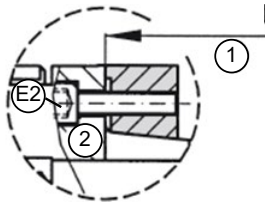


Figure 16: Coupling fixed stop ETH100 & 125

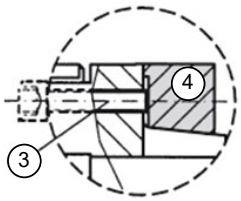


Figure 17: Clamp collar ETH100 & 125

- Loosen clamping screw of the coupling half on the motor/ gear shaft:
  - ETH032, ETH050, ETH080:
    Loosen radial clamping screw of the coupling half (see Figure 14 Pos. 3).
  - ETH100&125:
    Loosen all clamping screws (see Figure 16 & Figure 15 pos. E2) carefully (approx. 3 mm) and screw two of the screws into the open threaded holes. Now tighten screws evenly until the clamp collar (please refer to Figure 17 Pos. 4) is released from the coupling hub (please refer to Figure 16 Pos. 2) and can be freely moved.
- Remove coupling half from the motor / gear shaft.

Motor / gear assembly

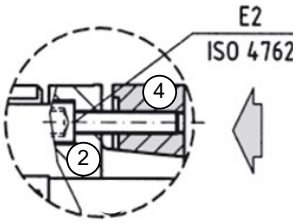


Figure 18: Coupling fixed stop gap ETH100 & 125

- Loosen clamping screws of coupling halves for the motor/ gear shaft.
  ETH100&125: Clamp collar (see Figure 18 Pos.4) and clutch hub (see Figure 18 Pos. 2) must be loosened.
- Slip the coupling half onto the motor / gearbox shaft and align to be flush with the shaft if not stated otherwise by Parker (see Figure 18 Pos. 2).

ATTENTION!
Shafts and bores of the hubs must be free of burrs, dirt and grease.

- ETH032, ETH050, ETH080:
  tighten radial clamping screw with tightening torque (see Table 1).
- ETH100&125:
  Tighten the fixing screws (please refer to Figure 18 Pos. E2) crosswise with a torque wrench in 3 turns with 1/3, 2/3 and full tightening torque (please refer to Table 1) until the final tightening torque is attained and the clamp collar touches the coupling half. The dead stop (please refer to Figure 19 Pos. 1) on the coupling half (please refer to Figure 19 Pos. 2) prevents too high pretension of the conical clamp collar and ensures high rotational accuracy.

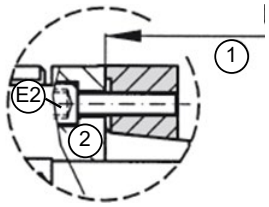


Figure 19: Coupling fixed stop 2 ETH100 & 125

- The second coupling half and the elastomer ring of the coupling are mounted on the ETH cylinder at the factory. If not, fit the elastomer ring onto one of the coupling halves.

Joining with the Elastomer crown requires an axial mounting force. This force can be reduced by cleaning and lightly greasing the spider element and the contact surfaces.

ATTENTION!
Oils and greases containing molybdenum disulfide or other high pressure additives as well as sliding grease paste may not be used.

- Place motor/gearbox on the mounted flange, so that the coupling halves intermesh.

⚠CAUTION

Secure motor/gearbox against dropping.
Eye bolts must be used with suitable lifting devices for motors and gearboxes with eyes bolts.

- Equip screw with washer and tighten (please refer to Figure 14 Pos. 6, Pos. 7).

Tightening torques for motor/gearbox assembly *

ETH	Coupling size/model	Tightening torque
032	GS12 (outer diameter: 25 mm)	1.4 Nm
050	GS14 (Outer diameter: 30 mm)	1.4 Nm
080	GS19 (Outer diameter: 40 mm)	10.5 Nm
100	EK6-300, screws ISO4762 M6	12 Nm
125	EK6-450, screws ISO4762 M8	35 Nm

Table 1: Tightening torques for motor/gearbox assembly

* All clamping screws of the coupling halves must be secured (medium strength) by a screw lock.

2.3.2. Motor / gearbox mounting with parallel motor configuration

In this chapter you can read about:

NOTICE With parallel motor configuration, increased running noises are possible due to the belt until it has run in.

2.3.2.1 Parallel mounting ETH032 ... ETH080 standard

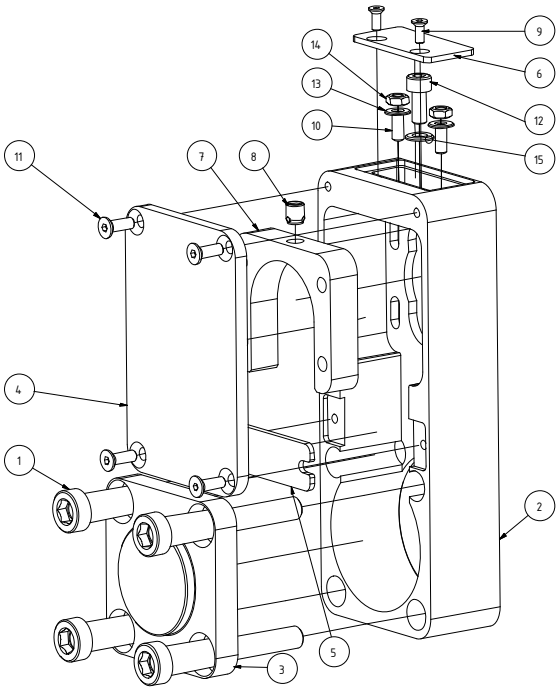


Figure 20: Parallel housing

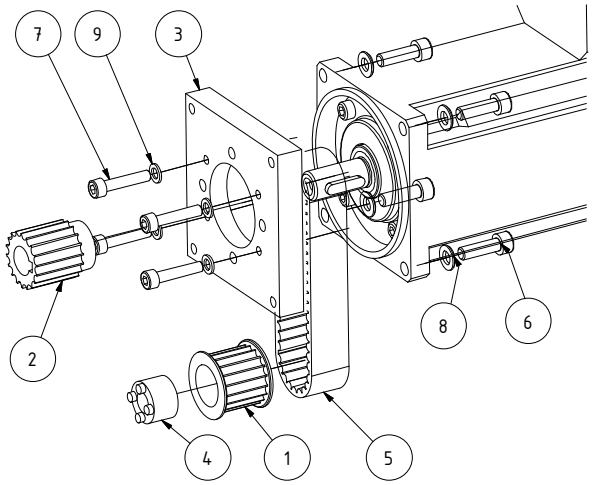


Figure 21: Motor mounting option

Motor mounting option (not valid for mounting Parker EX motors)

Motor / gear dismantling ETH032 ... ETH080 (not validforall motor mounting options)

- Remove connectors from motor.

⚠WARNING The internal ballscrew is not self-locking!
Always take care, especially in vertical position of the ETH cylinder that the piston rod must be safeguarded!

- Dismantle lid (please refer to Figure 20 Pos.6 und Pos.4).

ATTENTION! Keep all screws and lids for later mounting.

- Release toothed belt tension:
  - Slightly loosen 4 screws (please refer to Figure 22 Pos.7), by 1 to 2 turns (for detailed view, please refer to Figure 20 and Figure 21.
    ATTENTION! Do not remove the screws entirely!
  - Loosen tightening screw (please refer to Figure 20 Pos.12) until the drive unit is not lowered any further.
- Remove 4 screws completely (please refer to Figure 21 Pos. 7). First at the bottom, then at the top.

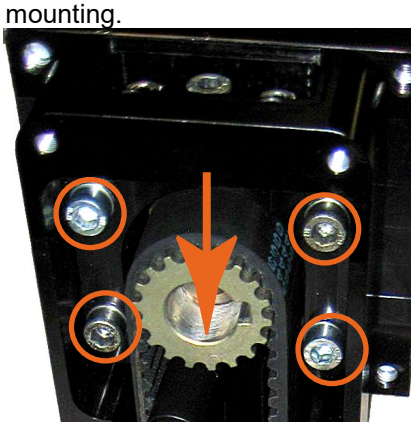


Figure 22: Release toothed belt tension

⚠CAUTION Make sure not to insert your fingers between motor / gearbox and electro cylinder!
We recommend to place a support pad between motor and cylinder profile.

- Remove drive unit with mounted toothed pulley from the parallel housing with caution.
  ATTENTION! Make sure that the toothed belt is not stuck in the parallel housing.
- Dismantle motor / gearbox flange (please refer to Figure 21 Pos.3) by loosening the screws (please refer to Figure 21 Pos.6).
- Measure and note depth "A" from toothed pulley to motor / gearbox shaft before dismounting the toothed pulley (please refer to Figure 23A).
- Remove threaded pin(s) from the toothed pulley.
- Pull off toothed pulley with the aid of a pull-off tool.

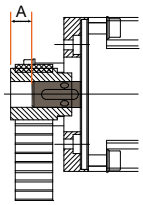


Figure 23: Depth gauge A

Motor / gearbox mounting (ETH032 ... ETH080) (not valid for mounting Parker EX motors)

- Fit toothed pulley and set dimension “A”.(please refer to Figure 23. Dimension “A” is provided by Parker. If the drive was exchanged, please set the dimension “A” noted before.
- Screw in the toothed pulley threaded pin(s) and secure (medium strength) by screw lock.
- Mount motor / gearbox flange (please refer to Figure 21 Pos.3) with the screws (please refer to Figure 21 Pos.6 & Pos.8).
- Insert drive unit with mounted toothed pulley into the parallel housing with caution. We recommend to place a support pad between motor and cylinder profile.
  ATTENTION! Please make sure that the toothed belt is correctly geared in the pulley toothing.
- Screw in 4 screws (please refer to Figure 21 Pos.7) until the motor flange fits. Do not yet tighten.

⚠CAUTION Make sure not to insert your fingers between motor / gearbox and electro cylinder!
We recommend to place a support pad between motor and cylinder profile.

- Setting the toothed belt pretension:
  - For the same toothed belt (see page 31).
  - For a new toothed belt (see page 31)
- Mount lid (please refer to Figure 20 Pos.6 and Pos. 4).

2.3.2.2 Parallel mounting ETH032 ... ETH080 with Ex - Motor

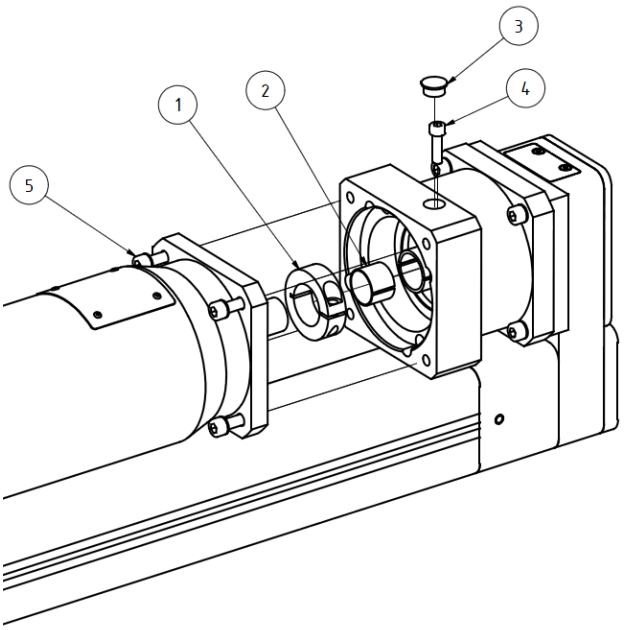


Figure 24: Disassembly of an Ex-Motors

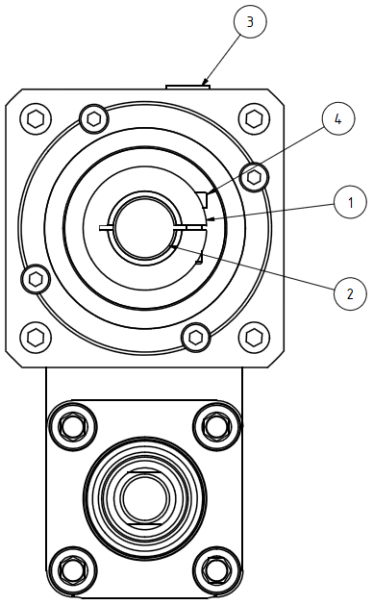


Figure 25: Flange view: Disassembly of a EX motor

Dismantle EX-motor ETH032 ... ETH080

The ETH032, 050 and 080 Electro cylinders for parallel mounting of the EX motor (ETH032 motor flange option K1B, ETH050 motor flange option K1D, ETH080 motor flange option K1J) are furnished with tensioned belt. When dismantling the motor, the belt must NOT be detensioned.

- Remove connectors from motor

⚠WARNING The internal ballscrew is not self-locking!
Always take care, especially in vertical position of the ETH cylinder that the piston rod must be safeguarded!
Secure motor/gearbox against dropping.
Eye bolts must be used with suitable lifting devices for motors and gearboxes with eyes bolts.

- Remove cover plate (please refer to Figure 24 Pos. 3) and loosen clamp screws (please refer to Figure 24 Pos. 4)
- Loosen motor fixing screws (please refer to Figure 24 Pos. 5)
- Remove motor from the hollow shaft. ATTENTION! Secure motor against dropping!

Mounting the EX-motor (ETH032... ETH080

The ETH032, 050 and 080 Electro cylinders for parallel mounting of the EX motor (ETH032 motor flange option K1B, ETH050 motor flange option K1D, ETH080 motor flange option K1J) are furnished with tensioned belt. When dismantling the motor, the belt must NOT be detensioned.

- Clean contact surfaces of motor, motor shaft, motor flange, hollow shaft bore, clamping ring (please refer to Figure 24 Pos. 1)) and spacer sleeve (please refer to Figure 24 Pos. 2).
- Push the spacer sleeve (please refer to Figure 24 Pos. 2) in the hollow shaft bore up to its stop.
- Put the clamping ring (please refer to Figure 24 Pos. 1) onto the hollow saft and shift it up to the stop.
- Align the slot of the clamping ring (please refer to Figure 24 Pos. 1) and the spacer sleeve (please refer to Figure 25 Pos. 2) to the slot of the hollow shaft.
- Align the hollow shaft so that the clamping screw (please refer to Figure 25 Pos. 4) stands over the opening of the flange. 4).
- Place cylinder upright, with the hollow shaft bore on top.
- Push the motor vertically, with the motor shaft down, into the hollow shaft up to the stop. Please take care that the motor connectors are on the right side.

NOTICE For the next steps, leave ETH cylinder and motor in this position.

- Insert and tighten motor fixing screws slightly (please refer to Figure 24 Pos. 5).
- Insert and tighten clamping screws slightly (please refer to Figure 24 Pos. 4).
- Tighten motor fixing screws.
- Tighten clamping screw (please refer to Figure 24 Pos. 4) with the respective tightening torque.
- Close the opening in the motor flange with the lid (please refer to Figure 24 Pos. 3)

Tightening torques clamping screw:

	Clamping screw	Tightening torque
ETH032	M4x16	3.5 Nm
ETH050	M5x20	7.2 Nm
ETH080	M6x26	11.8 Nm

2.3.2.3 Parallel mount ETH100 & 125

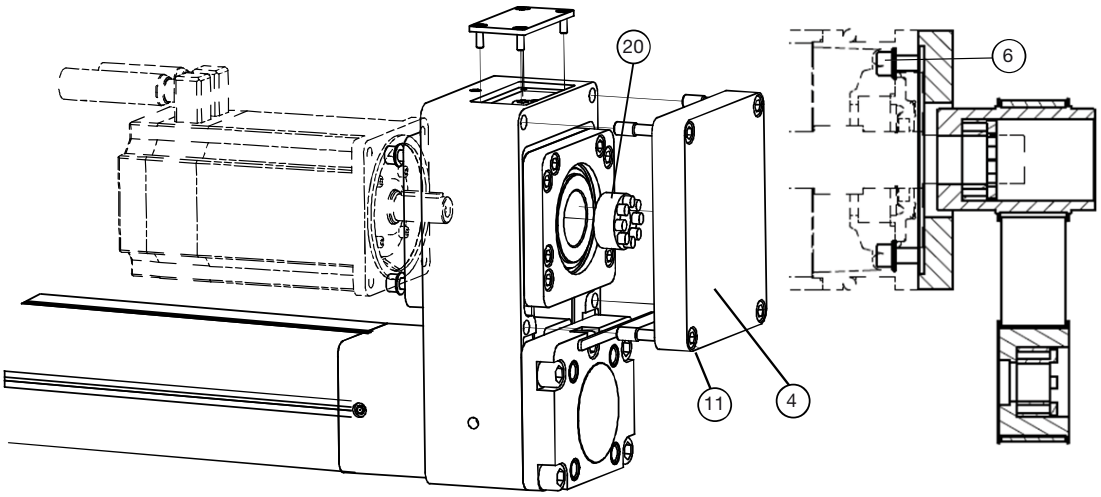


Figure 26: ETH1xx: Motor/ gear assembly parallel

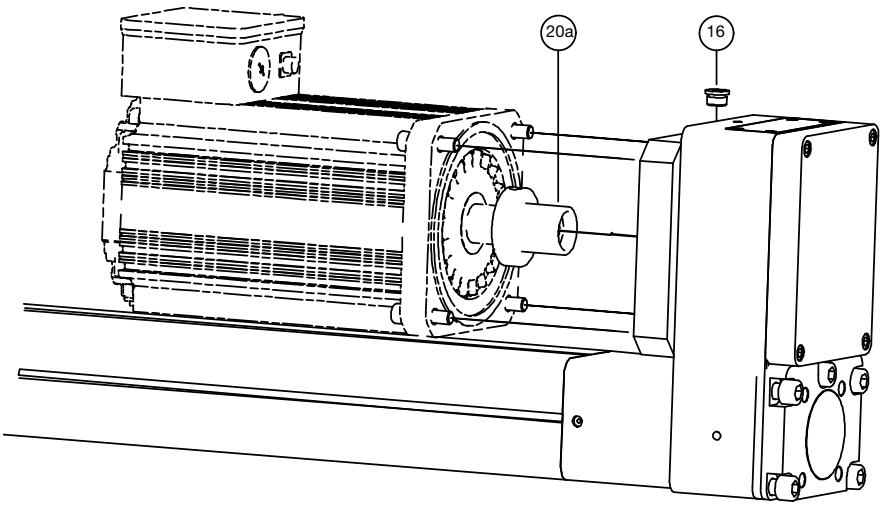


Figure 27: ETH1xx: Motor/ gear assembly parallel with K1M option

Motor / gearbox disassembly (ETH100&125)

The ETH100&125 electro cylinder is furnished with tensioned belt.
When dismantling the gearbox / motor, the belt must NOT be detensioned.

- Remove connectors from motor

⚠WARNING

The internal ballscrew is not self-locking!
Always take care, especially in vertical position of the ETH cylinder that the piston rod must be safeguarded!
Secure motor/gearbox against dropping.
Eye bolts must be used with suitable lifting devices for motors and gearboxes with eyes bolts.

- Dismantle lid (please refer to Figure 26 Pos.4) and screws (please refer to Figure 26 Pos.11).
- Loosen all tensioning screws of the clamping bushing (see Figure 26) approx. 3 mm.
  with K1M drive option: loosen tensioning element (please refer to Figure 27Pos.20a) via flange sided mounting hole. For this, first loosen the lock screw (please refer to Figure 27 16) and then the adjusting screw of the tensioning element.
- Loosen motor fixing screws (please refer to Figure 26 Pos.6).

- The clamping unit should (after loosening the tensioning screws) be loose. If not, knock slightly on the loosened screws with a hammer in order to push back the rear taper ring (not with K1M drive option).
- Remove motor / gearbox from the hollow shaft.

ATTENTION! Secure motor/gearbox against dropping!

- Remove clamping unit (please refer to Figure 26 Pos.20a & Figure 27 Pos 20a).

Motor / gearbox mounting (ETH100&125)

The ETH100&125 electro cylinder is furnished with tensioned belt.
When mounting the gearbox / motor, the belt must NOT be detensioned or retensioned.

- Dismantle lid (please refer to Figure 26 Pos.4) and screws (please refer to Figure 26 Pos.11).
- Loosen all tensioning screws of the clamping bushing (see Figure 26 Pos. 20) (approx. 3mm) and remove them from the hollow shaft.
  With K1M drive option: loosen tensioning element (please refer to Figure 27 Pos.20a) via flange sided mounting hole, do not remove tension unit. For this, first loosen the lock screw (please refer to Figure 27 Pos. 16) and then the adjusting screw of the tensioning element.
- Clean contact surfaces of motor / gearbox shaft and hollow shaft bore.
  Shaft and bores must be free of burrs, dirt and grease.
- Insert motor / gearbox into hollow shaft.
  with K1M drive option: insert tensioning element ((please refer to Figure 27 Pos.20) in the hollow shaft on the motor side and push up to the exterior stop.
  Adjust tensioning element so that the adjusting screw can be tightened via flange sided mounting holes.

⚠WARNING

The internal ballscrew is not self-locking!
Always take care, especially in vertical position of the ETH cylinder that the piston rod must be safeguarded!
Secure motor/gearbox against dropping.
Eye bolts must be used with suitable lifting devices for motors and gearboxes with eyes bolts.

- Insert and tighten motor fixing screws slightly.
- Insert tension bushing (please refer to Figure 26 Pos.20) into hollow shaft and slide it up to the inner stop (not with K1M drive option).
- Tighten screws crosswise until the inner ring touches the shaft and the outer ring touches the hub (not with K1M drive option).
- Tighten motor fixing screws.
- Afterwards tighten tensioning screws of the clamping bushing (please refer to Figure 26 Pos.20, please refer to Figure 27 Pos.20a) crosswise step by step (in three turns with 1/3, 2/3 and full tightening torque), until the screw tightening torque (please refer to Table 2) is reached.
  You can apply counter pressure with the aid of a hook wrench, which can be inserted into the bores on the toothed pulley.
- Mount lid (please refer to Figure 26 Pos.4) and screws (please refer to Figure 26 Pos.11).

Tightening torque of motor flange/clamping bushing

	Motor flange option	Screw tightening torques Clamping bushing (Pos. 20)
ETH100	K1H, K1J, K1K, K1L, P1C, P1D, P1J	Hexagon socket SW: 5 mm M6, 15 Nm
ETH125	K1L, P1C, P1D, P1K	Hexagon socket SW: 5 mm M6, 15 Nm
	K1M	Hexagon socket SW: 8 mm M16, 21 Nm

Table 2: Tigthening torques for motor flange / clamping sleeve

2.3.2.4 Re-apply toothed belt pre-tension

ETH032 ... ETH080

If the motor / gearbox is exchanged and the toothed belt is still in good condition, the pre-tension can be reset without measuring device.

- Remove the upper cover, please refer to Figure 20 Pos 6
  - First check whether the toothed belt with its toothing is located in the upper and lower pulley.
  - The screws (please refer to Figure 28 Pos.7) must be srewed in withouth torque so that the drive unit can be lifted upwards
    Recommendation: Screw in the screws completely and then loosen again about half a turn.
  - Tighten central toothed belt tensioning screw (please refer toFigure 20 Pos.12).
    The drive unit must lift when tightening the screw. Lift the unit until it touches the 2 internal stops (please refer to Figure 20 Pos. 10). This is made by tightening the central tightening screw.

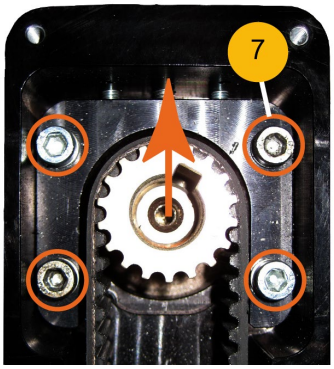


Figure 28: Screws for fixation of drive unit ETH032...ETH080

- Tighten 4 screws (please refer to Figure 28 Pos.7) with the given tightening torque (please refer to Table 3).
- Refix both lids (please refer to Figure 20 Pos.4 & 6) with the respective screws (please refer to Figure 20 Pos.11 & 9).

ETH100&125

The ETH100&125 electro cylinder is furnished with tensioned belt. When dismantling the gearbox / motor, the belt must **NOT** be detensioned. Therefore, this chapter is usually not valid for the ETH100&125.

Screw tightening torques belt tensioning option

ETH032	ETH050	ETH080	ETH100	ETH125
3 Nm	5 Nm	20 Nm	70 Nm	115 Nm

Table 3: Screw tightening torques belt tensioning option

2.3.2.5 Resetting the toothed belt pre-tension

After installing a new toothed belt, the toothed belt pre-tension must be readjusted.

- Make sure that the screws
  ETH032…ETH080: see Figure 28, Pos 7
  ETH100 & ETH125; see Figure 29, Pos7 are provided with a medium strength screw lock (e.g. type Wiko 02K43) and are fully screwed in. Only screw in screws without torque: Recommendation: Screw in the screws completely and then loosen again about half a turn.
- ETH032…ETH080: For this sizes, the motor/ gearbox is already mounted.
- ETH100 & ETH125: For this sizes, the motor/ gearbox can be installed after belt tensioning. Furthermore, it mus be take care the the lower bearing cover is already mounted (see Figure 39 Pos 3, screws Pos 1 with medium strength screw locking, eg type Wiko 02K43).

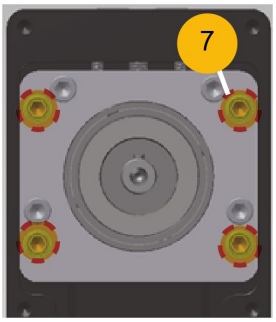


Figure 29: Screws for fixation of drive unit ETH100 & ETH125

- Check, if the belt toothing is geared into the upper and lower toothed pulley.
- The screws (please refer to Figure 28 Pos.7 ETH100&125; see Figure 29, Pos7) must be screwed in without torque, so that the drive unit can be lifted upwards.
- Loosen both lock nuts (please refer to Figure 20 Pos.14; ETH100&125) (do not remove entirely).
- Unscrew both threaded pins (please refer to Figure 20 Pos.10; ETH100&125) until they are almost level with the inside of the parallel housing.
- Tighten central toothed belt tensioning screw (please refer to Figure 20 Pos.12) until the toothed belt is noticeably pretensioned.
- Measure toothed belt tension with a suitable device. We recommend: Gates: "Sonic 507c" or Hilger&Kern: "Trummeter"
- Thighten tension screw slightly and measure again. Repeat this procedure until the required toothed belt pretension (see page 42) is set.

⚠CAUTION Only a correctly set toothed belt pretension ensures fail-safe operation of the cylinder.

- Screw in both threaded pins (please refer to Figure 20 Pos.10) until they touch the inner bracket. Tighten pins slightly.
- ETH100 & ETH125 Motor/gearing installation: Now the motor/ gearbox (see page 29) must be installed. In this case, the screws, Figure 29, Pos7 still have to be loosened easily. After the motor/gear assembly and before the gradual final tightening of the clamping bushing (see Figure 26Pos 20; Figure 27Pos 20a) the four screws, see Figure 29 Pos7, must be fully tightened (screw tightening torques see Table 3).
- ETH032…ETH080: Completely tighten the four screws (please refer to Figure 28 Pos.7. screw tightening torques and Table 3.)
- Reassemble the vocer ETH032…ETH080: please see Figure 20 Pos 4 & 6 with screws Pos 11 & 9 ETH100 & ETH125: please see Figure 39 Pos 4 & 6 screws Pos 11 & 9.

2.3.3. IP65 motor mount

For the IP65 option, we generally recommend to have the motor mounted by Parker. If the motor is not mounted by Parker, please respect the following instructions to achieve the best possible sealing effect.

NOTICE Before you start installing the motor with IP65, first read the corresponding chapter in motor / gearbox assembly (see page 22) and observe the safety and installation instructions.

2.3.3.1 Motor mounting for IP65 inline

The cylinder is furnished with mounted coupling housing and motor flange. Before mounting the motor to the flange, it must be sealed as follows.

- Apply silicone sealing compound to the motor flange pilot (e.g. Sista Silicone F109 Universal).
- Screw motor to motor flange (see chapter “Motor and gear assembly” (see page 22)).
- Note the additional mounting steps (see chapter “Motor and gear assembly” (see page 22)).

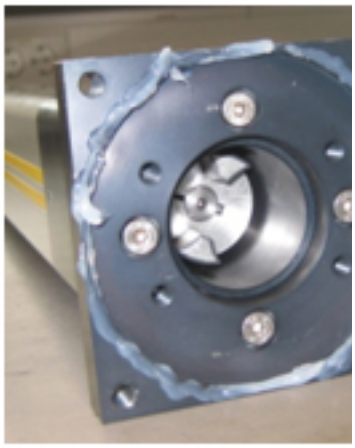


Figure 30: Flange prepared for IP65

2.3.3.2 IP65 motor mount parallel

The cylinder is furnished with mounted parallel housing. The housing as well as the motor flange which is fixed to the housing, must be sealed.

ETH032…080:

- Mounting the toothed pulley (enclosed) on the motor shaft; see chapter motor/ gear assembly eth032..080 (see page 22).
- Apply silicone sealing compound to the motor flange pilot (e.g. Sista Silicone F109 Universal).
- Screw motor to motor flange (enclosed) see chapter Motor/ gear assembly ETH032..080 (see page 22).
- Apply silicone sealing compound around bores of the parallel housing
- Mount motor with motor flange to parallel housing; see chapter Motor/ gear assembly ETH032..080 (see page 22).
- Tension toothed belt; see chapter re-apply toothed belt tension or readjust toothed belt tension .
- Place seal (furnished with the cylinder).
- Place lid (furnished with the cylinder).
- Fix lid and seal to parallel housing

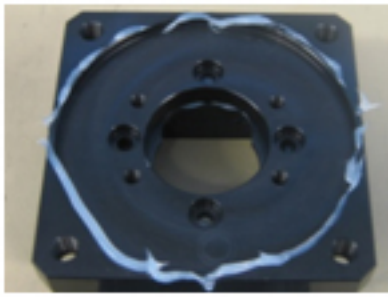


Figure 31: Flange prepared for IP65

Figure 32: Parallel housing ETH32..80 prepared for IP65

ETH100&125:

- ETH100&125 are delivered with motor flange mounted and belt tensioned. There is a paper seal between motor flange and parallel housing, no need to seal with silicone
- Remove clamping bush (enclosed) from the

hollow shaft; see chapter Motor/ gear assembly ETH100&125 (see page 29).

- Apply silicone sealing compound to the motor flange pilot (e.g. Sista Silicone F109 Universal).
- Mount the motor on the parallel housing and tighten the clamping bush; see chapter Motor/ gear assembly ETH100&125 (see page 29).
- Place seal (furnished with the cylinder).
- Place lid (furnished with the cylinder).
- Fix lid and seal to parallel housing

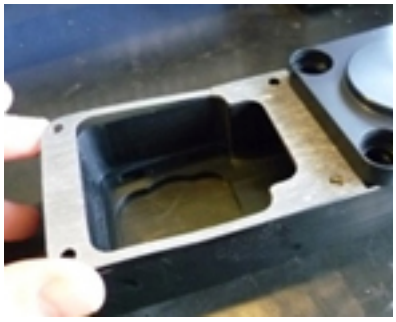


Figure 33: Place seal

Figure 34: Place lid

3. Maintenance and service

In this chapter you can read about:

NOTICE Before maintenance and servicing, please read the chapter Safety instructions!

Before maintenance work, disconnect the drives concerned or the entire system from the power supply and secure them against being switched on again with a padlock. If the unit needs to be operable for specific repair works, you have to be especially cautious. Please make sure that there are no persons in the hazardous area - if needs be, secure this area by additional enclosures or barriers against access.

⚠DANGER If set-up, repair or maintenance works require that safety installations be dismounted, these must be reinstalled immediately after the respective works have been completed. The unit must be shut down before any of the safety installations are dismounted.

⚠CAUTION Depending on the operating conditions (rotation speed, load, etc.) increased surface temperature in the area of the drive may occur. When touching it during operation slight injuries from burning may occur. Don't touch the product during operation. At maintenance, service and repair always take care that the product is cooled off before starting work.

3.1 Lubrication note

NOTICE In order to ensure the function and service life of the ETH cylinder, the internal ball screw drive must be regularly supplied with sufficient lubricant, see chapter Lubrication intervals and relubrication quantity (see page 36).

Note

3.2 Maintenance schedule

WHEN	WHAT	ACTION
After commissioning	Spindle	The cylinder is furnished completely lubricated. If the cylinder was held on stock at your premises for more than 1 year, it must be relubricated before commissioning. see lubricating intervals and amount of lubricant (see page 36)
After reaching the lubrication interval or at least once a year	Spindle	Relubricating the spindle and visual inspection for external damages of the actuator. See lubricating intervals and amount of lubricant (see page 36)
Annually	Electro Cylinder	Visual inspection for external damages of the actuator. If externally caused damages are visible on the thrust rod or on the profile, please contact Parker.
Annually	Fixings provided by the customer	Check screw tightening torque. see mounting tightening torques ETH (see page 15)
Annually, or every 6000 hours of operation	Toothed belt (with parallel configuration)	In general, the high performance toothed belts used in the ETH are maintenance free. Visual inspection of the timing belt is however required. Please check the toothed belt for the following aspects: ◆ Wear at the teeth ◆ Cracks in the tooth root surface ◆ Fractures in the belt back If you find signs of wear, the toothed belt must be exchanged (see page 39).

3.3 Lubricating intervals and amount of lubricant

The lubrication intervals depend on the operating conditions (series, pitch, speed, acceleration, loads, etc.) and the ambient conditions (e.g. temperature). Ambient influences such as high loads, impacts and vibrations shorten the lubrication intervals. In the event of small loads and if the application is impact and vibration free, the lubrication intervals can be increased.

NOTICE For short-stroke applications (motion cycle less than 2.5x spindle pitch), a lubrication run must be performed after a maximum of 10000 motion cycles.

NOTICE Under normal operating conditions, the given lubrication intervals apply. If the total travel per year is shorter than the given intervals, the cylinder must be relubricated at least once per year. Lubrication is always required if the cylinder will not be used for a longer period of time or when operation is interrupted!

Normal operating conditions:

- Medium Speed: 0.5 x v_{max}
- Application factor f_w=1.0
- No impacts and vibrations
- Load ration F_m/F_{max}: 20 %

The given lubrication intervals apply.

	Lead screw	Interval	Amount of lubricant
ETH032	M05	240 km	1.3 cm^3
	M10	480 km	1.6 cm^3
	M16	760 km	2.1 cm^3
ETH050	M05	240 km	1.6 cm^3
	M10	480 km	1.9 cm^3
	M20	960 km	2.7 cm^3
ETH080	M05	240 km	3.1 cm^3
	M10	480 km	4.4 cm^3
	M32	1530 km	7.8 cm^3
ETH100	M10	280 km	14 cm^3
	M20	570 km	17 cm^3
ETH125	M10	280 km	20 cm^3
	M20	570 km	48 cm^3

Different operating conditions will shorten the lubrication intervals.
You will find information about short stroke applications in the catalogue. Please contact Parker for details.

Lubricant

NOTICE Do only use "Klüber NBU15" lubricating grease for standard cylinders!

For applications in food related areas, "Klübersynth UH1 64-62" grease is used (customized version).

Grease gun

To relubricate the ball screw drive, use a grease gun suitable for the grease nipple. We recommend a one-hand lubrication press with nozzle attachment type D1a4 (DIN3405). Both are optionally available:
nozzle attachment type D1a4 (DIN3405) - part No.: 180-006043
One-hand lubrication press with nozzle attachment type D1a4 (DIN3405) - part No.: 180-006072

3.3.1. Relubrication via central lubrication port (standard)

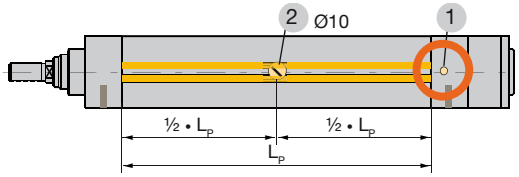


Figure 35: Relubrication via central lubrication port (standard)

1: Central lubrication (standard)
2: Central lubrication (Option)

Make sure that all external stops are removed.
Repeat the following process three times:

- Retreat Electro Cylinder completely so that it touches the rear stop.
- Move the cylinder by 0.5 mm into the internal buffer.

⚠CAUTION Ensure by means of control/controller that the internal buffer is not passed by more than 0.5 mm!

- This is the lubricating position.
- Place the pipe orthogonally onto the lubricating nipple and press.
- Use 1/3 of the defined amount of lubricant (see page 36).

NOTICE The amount of lubricant applied can be defined by the number of pump strokes. Pump the stated amount of grease onto a balance, while counting the pump strokes.

- For optimum distribution of the lubricant, a lubrication run must be performed after each lubrication procedure. To do this, move the screw nut once over the entire working stroke. For short-stroke applications (motion cycle < 2.5 spindle rotation) see lubrication run lengths for short-stroke applications in the ETH catalogue.

3.3.2. Relubrication via central lubrication port (option)

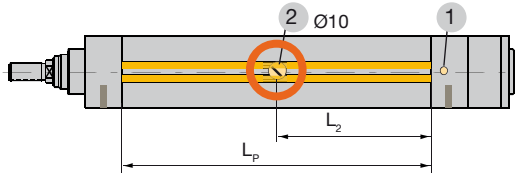


Figure 36: Relubrication via central lubrication port (option)

1: Central lubrication (standard)
2: Central lubrication (Option)

Lubrication port position

Depending on the cylinder size and the selected stroke, the relubrication hole is located in the mid of the profile or in the mid of the stroke.
Stroke ≥ Stroke limit: $L_2 = L_p/2$
Stroke < Stroke limit: L_2 = stroke / 2 + Offset

	Pitch	Stroke limit [mm]	Offset [mm]
ETH032	M05	50	15
	M10		
	M16		
ETH050	M05	60	15
	M10		
	M20		
ETH080	M05	100	20
	M10		
	M32		
ETH100	M10	160	22
	M20		
ETH125	M10	240	25
	M20		

Start-up position of relubrication port

Assumption: Position = 0 at the rear buffer (lead screw completely retracted)

		Position of center lubrication option [mm]	
	Pitch	Stroke ≤ stroke limit [mm]	Stroke > Stroke limit
ETH032	M05	½ x stroke + 18	1/2 x stroke
	M10	½ x stroke + 22.5	
	M16	½ x stroke + 24.5	
ETH050	M05	½ x stroke + 18.5	
	M10	½ x stroke + 21.5	
	M20	½ x stroke + 27.5	
ETH080	M05	½ x stroke + 24.5	
	M10	½ x stroke + 33.5	
	M32	½ x stroke + 48.5	
ETH100	M10	½ x stroke + 59	
	M20	½ x stroke + 78	
ETH125	M10	½ x stroke + 71	
	M20	½ x stroke + 115	

The mentioned distances from the rear stop (on the motor side) to the central lubrication port in the profile are only reference values.

- Loosen lubrication port screw.

Repeat the following process three times:

- Move the cylinder slowly to its lubricating position until the lubricating port becomes visible.
- With frame sizes ETH032, ETH050 and ETH080 the lubrication ports have a diameter of 2.5 mm.
  With frame sizes ETH100 and ETH125 the lubrication nipple is integrated.
  For all sizes you need a beaked nozzle for your grease gun (Part No.: 180-006043).
- Insert the nozzle into the hole in the cylinder profile and place it orthogonally onto the lubricating port.
- Use 1/3 of the defined amount of lubricant (see page 36).

NOTICE

The amount of lubricant applied can be defined by the number of pump strokes. Pump the stated amount of grease onto a balance, while counting the pump strokes.

- For optimum distribution of the lubricant, a lubrication run must be performed after each lubrication procedure. To do this, move the screw nut once over the entire working stroke. For short-stroke applications (motion cycle < 2.5 spindle rotation) see lubrication run lengths for short-stroke applications in the ETH catalogue.

3.4 Toothed belt

3.4.1. Checking the toothed belt

In general, the high-performance toothed belts used in the ETH are maintenance free.
Visual inspection of the timing belt is however required. Please check the toothed belt for the following aspects:

- Wear at the teeth
- Cracks in the tooth root surface
- Fractures in the belt back

If you find signs of wear, the toothed belt must be exchanged (see page 39).
For visual inspection, you must only remove the (upper) lid with the four screws (see Figure 37 & Figure 39 Pos.4+11).
ATTENTION! Do not remove the screws of Pos.11 entirely.

⚠WARNING Do not forget to refix the lid after the inspection!

3.4.2. Exchanging the toothed belt (ETH032 ... 080

(valid for all mounting options)

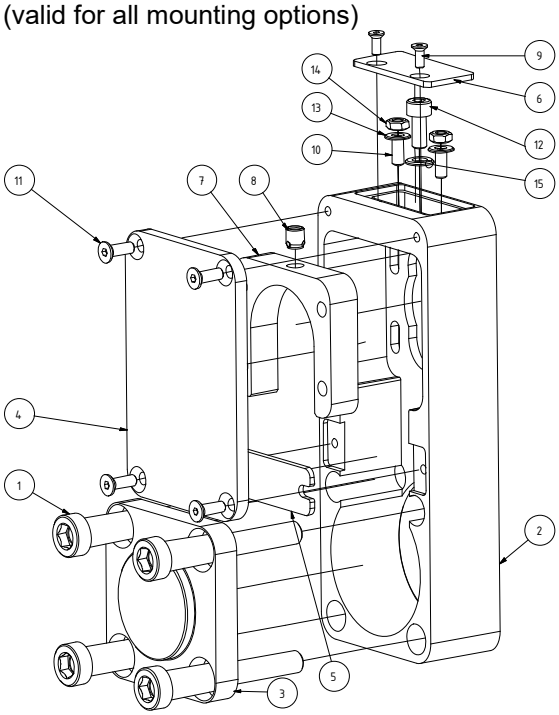


Figure 37: Parallel housing (2)

(not valid fro mounting Parker EX motors)

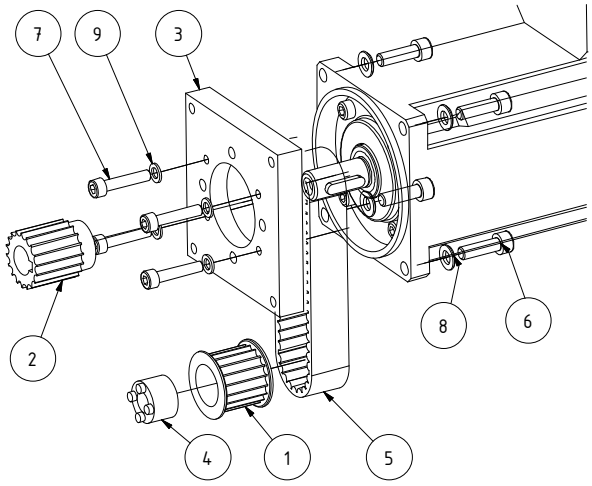


Figure 38: Motor mounting option ETH032..080 (2)

- Dismantle the motor (see page 25)
- Loosen and remove 4 screws (please refer to Figure 37 Pos.1).
- Remove cover (please refer to Figure 37 Pos.3).
- Remove bar (please refer to Figure 37 Pos.5).
- Remove used toothed belt
- Clean the inside of the parallel housing (see Figure 37 pos.2) and the previously removed components.
- Insert new toothed belt
  ATTENTION! Please make sure that the toothed belt is correctly geared in the pulley toothing.
- Insert bar (please refer to Figure 37 Pos.5).
- Replace cover (please refer to Figure 37 Pos.3).

- Apply screw lock "Wiko 02K43 medium" to 4 screws (please refer to Figure 37 Pos.1) and tighten slightly.
- Align gearbox (please refer to Figure 37 Pos.2) with the electro cylinder.
- Tighten 4 screws (please refer to Figure 37 Pos.1) with the given tightening torque.

ETH032	ETH050	ETH080
9 Nm	20 Nm	40 Nm

- Mounting the motor (see page 25)
- Setting the toothed belt pretension:
  - For the same toothed belt. Re-apply toothed belt tension (see page 31)
  - For a new toothed belt: Resetting the toothed belt pre-tension (see page 31)
- Mount lid (please refer to Figure 37 Pos.6) with screws (please refer to Figure 37 Pos.9).
- Mount lid (please refer to Figure 37 Pos.4) with screws (please refer to Figure 37 Pos.11).

3.4.3. Exchanging the toothed belt (ETH100&125)

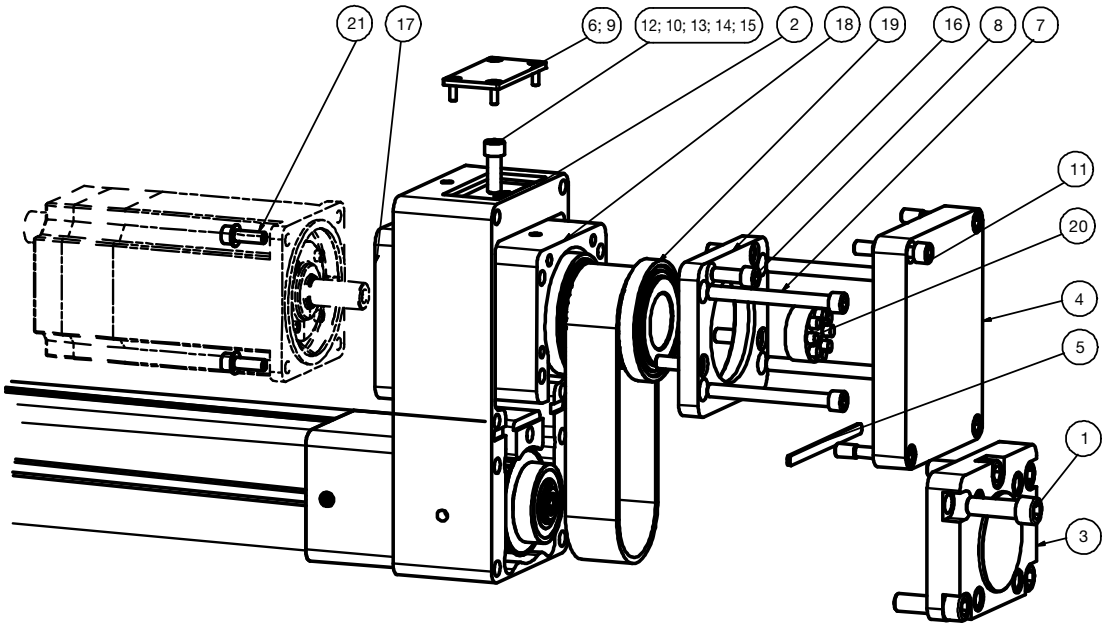


Figure 39: Exchange toothed belt ETH100&125

- Dismantle the motor (see page 22)

⚠DANGER The internal ballscrew is not self-locking!
Always take care, especially in vertical position of the ETH cylinder that the piston rod must be safeguarded!

- Toothed belt detensioning
  - Unscrew the 4 screws) Figure 39 Pos. 7). Set aside the screws and motor flange (Figure 39 pos. 17).
  - **ATTENTION!** Secure motor flange against dropping!
  - Loosen central toothed belt tensioning screw (please refer to Figure 39 Pos.12) . The drive unit must lower slightly when the tensioning screw is loosened.

⚠CAUTION Secure upper bearing unit (Figure 39 Pos. 18) against dropping. Danger of crushing: Do not place your hands or fingers between upper bearing unit and parallel housing.

- Unscrew and set aside the tensionining screw (Figure 39 pos. 12).
- Loosen 5 screws (please refer to Figure 39 Pos.1) and remove lid (please refer to Figure 39 Pos.3). If the lid can not be removed easily (please refer to Figure 39 Pos.3), try to remove it with a slightly pivoting movement.
- Remove middle bar (please refer to Figure 39 Pos.5) with seal.
- Remove upper bearing unit with toothed belt (please refer to Figure 39 Pos.18).
- Unscrew 4 screws (Figure 39 pos. 8) from the bearing unit and set aside.
- Remove the bearing flange (Figure 39 pos. 16) from the bearing unit (see illustration 39 pos. 18) by means of the existing impression threads and two screws M6x30 (not included in the scope of delivery). Screw in the screws to the stop and then screw in both screws alternately by 1/2 turn each.
- Remove hollow shaft with the two bearings (please refer to Figure 39 Pos.19) from the bearing unit(please refer to Figure 39 Pos.18).
- Take out used toothed belt.
- Clean the inside of the parallel housing (see illustration 39 pos.2) and the previously removed components.

Mounting in reverse order:

- Insert new toothed belt

⚠CAUTION Please make sure that the toothed belt is correctly geared in the pulley toothing.

⚠CAUTION Do only use the toothed belt specified by Parker.
Do only use the toothed belts with mentioned part number.

- To insert the hollow shaft (Figure 39 pos. 19) with the two bearings into the bearing unit (Figure 39 pos. 18) and mount the bearing flange (Figure 39 pos. 16) use a hand press and carefully press the parts into each other.
- Screw screws (Figure 39 Pos.8) into the bearing unit.

⚠WARNING Provide screws with screw lock and observe screw tightening torque.

Tightening torques: Toothed belt change ETH100&125

	Position	Screw tightening torques	Screw locking compound
ETH100	Pos.1	110 Nm	Loctite 242 / Wiko02K43
	Pos.7	70 Nm	Loctite 242 / Wiko02K43
	Pos.8	70 Nm	Loctite 242 / Wiko02K43
ETH125	Pos.1	250 Nm	Loctite 242 / Wiko02K43
	Pos.7	115 Nm	Loctite 242 / Wiko02K43
	Pos.8	115 Nm	Loctite 242 / Wiko02K43

- Adjust the toothed belt pre-tension with the tension screw (Figure 39 pos.12):
  - For the same toothed belt. Re-apply toothed belt pre-tension (see page 31).
  - For a new toothed belt: Resetting the toothed belt pre-tension (see page 31)
- Mounting the motor (see page 22)

3.5 Belt / belt tensions

	ETH032	ETH050	ETH080	ETH100	ETH125[1)]	ETH125[2)]
Part No.	0111.913	0121.913	0131.913	0141.913-02	0151.913	
Belt pre-tension	210 N ±7 N	230 N ±7 N	450 N ± 14 N	3500 N ±19 N	4900 N ±36 N	4400 N ± 130 N
Trum Frequency	438 Hz ± 14 Hz	306 Hz ± 10 Hz	236 Hz ± 8 Hz	370 Hz ±2 Hz	272 Hz ±2 Hz	284 Hz ± 9 Hz
Belt mass	0.060 kg/m	0.080 kg/m	0.120 kg/m	0.2065 kg/m	0.33 kg/m	0.2725 kg/m
Belt width	15 mm	20 mm	30 mm	50 mm	62 mm	60 mm
Center distance	67.5 mm	87.5 mm	130 mm	176 mm	224mm	224mm

[1)] Toothed belt inside is black
[2)] Toothed belt inside is yellow (installed till beginning of 2016)

4. Supply repair

In the event of a damage or a mechanical defect, the entire unit must be returned for repair (Parker Hannifin (see page 1)). The repair must be made by trained Parker personnel.

User conversions and changes are not Permitted

The linear actuator must not be changed in its design or in terms of safety without our approval. Any change as defined here made by the user excludes any liability on our part.

5. Index

Parker Worldwide

Europe, Middle East, Africa

AE – United Arab Emirates, Dubai
Tel: +971 4 8127100
parker.me@parker.com

AT – Austria, St. Florian
Tel: +43 (0)7224 66201
parker.austria@parker.com

AZ – Azerbaijan, Baku
Tel: +994 50 2233 458
parker.azerbaijan@parker.com

BE/NL/LU – Benelux, Hendrik Ido Ambacht
Tel: +31 (0)541 585 000
parker.nl@parker.com

BG – Bulgaria, Sofia
Tel: +359 2 980 1344
parker.bulgaria@parker.com

BY – Belarus, Minsk
Tel: +48 (0)22 573 24 00
parker.poland@parker.com

CH – Switzerland, Etoy
Tel: +41 (0)21 821 87 00
parker.switzerland@parker.com

CZ – Czech Republic, Klecany
Tel: +420 284 083 111
parker.czechrepublic@parker.com

DE – Germany, Kaarst
Tel: +49 (0)2131 4016 0
parker.germany@parker.com

DK – Denmark, Ballerup
Tel: +45 43 56 04 00
parker.denmark@parker.com

ES – Spain, Madrid
Tel: +34 902 330 001
parker.spain@parker.com

FI – Finland, Vantaa
Tel: +358 (0)20 753 2500
parker.finland@parker.com

FR – France, Contamine s/Arve
Tel: +33 (0)4 50 25 80 25
parker.france@parker.com

GR – Greece, Piraeus
Tel: +30 210 933 6450
parker.greece@parker.com

HU – Hungary, Budaörs
Tel: +36 23 885 470
parker.hungary@parker.com

IE – Ireland, Dublin
Tel: +353 (0)1 466 6370
parker.ireland@parker.com

IL – Israel
Tel: +39 02 45 19 21
parker.israel@parker.com

IT – Italy, Corsico (MI)
Tel: +39 02 45 19 21
parker.italy@parker.com

KZ – Kazakhstan, Almaty
Tel: +7 7273 561 000
parker.easteurope@parker.com

NO – Norway, Asker
Tel: +47 66 75 34 00
parker.norway@parker.com

PL – Poland, Warsaw
Tel: +48 (0)22 573 24 00
parker.poland@parker.com

PT – Portugal
Tel: +351 22 999 7360
parker.portugal@parker.com

RO – Romania, Bucharest
Tel: +40 21 252 1382
parker.romania@parker.com

RU – Russia, Moscow
Tel: +7 495 645-2156
parker.russia@parker.com

SE – Sweden, Borås
Tel: +46 (0)8 59 79 50 00
parker.sweden@parker.com

SK – Slovakia, Banská Bystrica
Tel: +421 484 162 252
parker.slovakia@parker.com

SL – Slovenia, Novo Mesto
Tel: +386 7 337 6650
parker.slovenia@parker.com

TR – Turkey, Istanbul
Tel: +90 216 4997081
parker.turkey@parker.com

UA – Ukraine, Kiev
Tel: +48 (0)22 573 24 00
parker.poland@parker.com

UK – United Kingdom, Warwick
Tel: +44 (0)1926 317 878
parker.uk@parker.com

ZA – South Africa, Kempton Park
Tel: +27 (0)11 961 0700
parker.southafrica@parker.com

North America

CA – Canada, Milton, Ontario
Tel: +1 905 693 3000

US – USA, Cleveland
Tel: +1 216 896 3000

Asia Pacific

AU – Australia, Castle Hill
Tel: +61 (0)2-9634 7777

CN – China, Shanghai
Tel: +86 21 2899 5000

HK – Hong Kong
Tel: +852 2428 8008

IN – India, Mumbai
Tel: +91 22 6513 7081-85

JP – Japan, Tokyo
Tel: +81 (0)3 6408 3901

KR – South Korea, Seoul
Tel: +82 2 559 0400

MY – Malaysia, Shah Alam
Tel: +60 3 7849 0800

NZ – New Zealand, Mt Wellington
Tel: +64 9 574 1744

SG – Singapore
Tel: +65 6887 6300

TH – Thailand, Bangkok
Tel: +662 186 7000

TW – Taiwan, Taipei
Tel: +886 2 2298 8987

South America

AR – Argentina, Buenos Aires
Tel: +54 3327 44 4129

BR – Brazil, Sao Jose dos Campos
Tel: +55 800 727 5374

CL – Chile, Santiago
Tel: +56 2 623 1216

MX – Mexico, Toluca
Tel: +52 72 2275 4200

EMEA Product Information Centre
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