Mounting Instructions

ETH Manual - Installation, Commissioning, Maintenance and Repair

ETH - Electro Cylinder
Parker High Force Electro Thrust Cylinder

192-550002N5 ETH - Mounting Instructions
August 2014

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Nonwarranty clause

We checked the contents of this publication for compliance with the associated hard 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.

Further information:

Our product on the internet: http://www.parker.com/eme/eth

About this manual

This instruction consists of 2 parts:

1. Manual with general notes, setups for commissioning, maintenance and repair
2. Catalogue with technical data, dimensions, accessories, options, dimensioning aids and order code

Contents

Table of Contents of the Catalog:

High Force Electro Thrust Cylinder - ETH

1. Introduction

In this chapter you can read about:

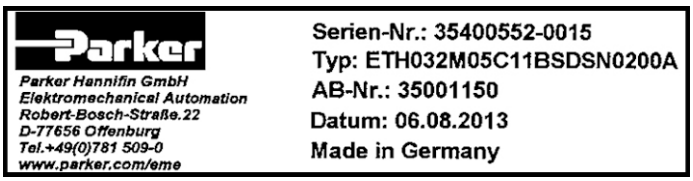
1.1 Device assignment

This manual is valid for the following devices:

Electro cylinder for motors and gearboxes:

- ETH032
- ETH050
- ETH080
- ETH100
- ETH125

1.2 Type specification 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

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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 Safety instructions

1.4.1. 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

- represent a 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.

1.4.2. Intended use

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 motor module 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.
The general functioning mode consists in converting a rotational movement in a linear movement without slip within the product related load limits according to the information in the catalogue.
Its applications are in industry and trade.
The linear actuator has a number of uses including: 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.

1.4.3. 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.

1.4.4. Working safely

Heed the Instructions

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.

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.

1.4.5. Safety Instructions for the Company Using the System

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.

1.4.6. Safety Instructions for Operating Personnel

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 wearing parts, use only original Parker parts. We note here explicitly 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.
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.
The manufacturer is unable to accept any liability for damage caused by using non-original parts and accessories.
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.

1.5 Packaging, storage, transport

First check

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

Packaging material

⚠WARNING The packaging material is inflammable, if it is disposed of 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.
Details: see in the catalog section (following the mounting instructions).

Disposal

We recommend to dispose of 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

1.5.1. Special notes on transport

Special notes on transport

Use only transport equipment with sufficient lifting capacity. 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 a condition of 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.

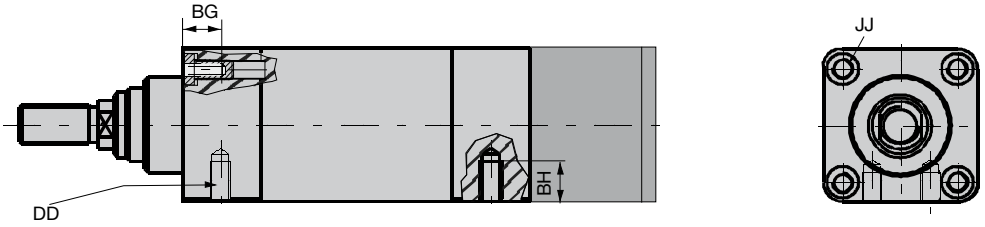
Maximum weight of the ETH Electro Thrust Cylinder with Parker drive

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

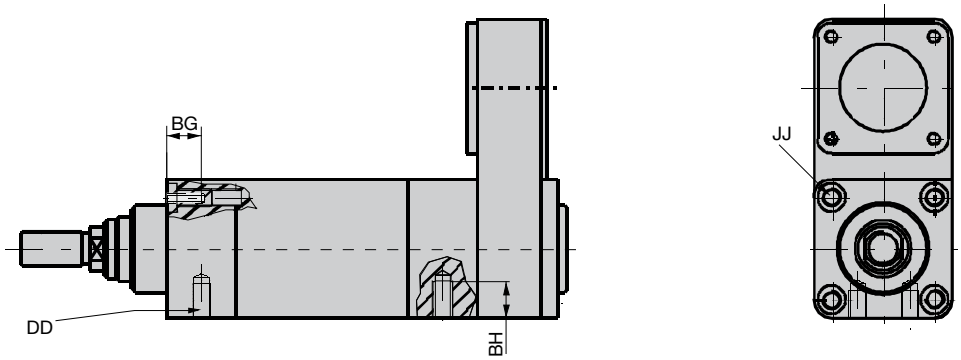
The weights mentioned are max. values. They contain the max. stroke, the heaviest options and the largest drives.

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

Motor inline: ETH032 ... ETH080



Motor parallel: 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 1).
- Don't use lateral traction (see Figure 2).
- 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!

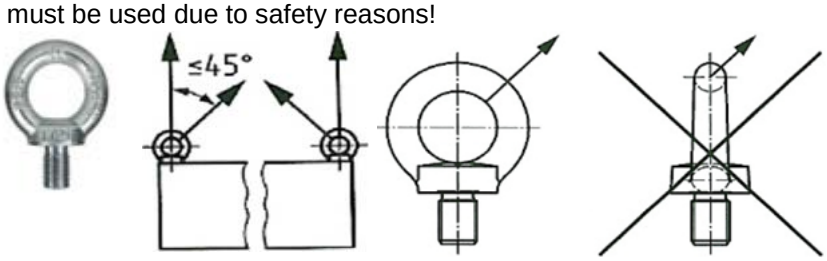


Figure 1 Figure 2

Motor inline: ETH100&125

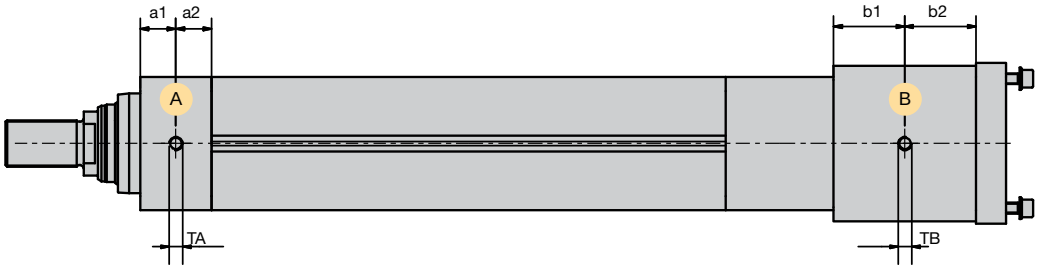


Figure 1 Transport instructions ETH100&125
Area A: Front cap
Area B: Inline coupling housing
Thread TA and TB: on all four sides

⚠WARNING From frame size ETH 100 on, the provided M12 threads (see Figure 1 und Figure 2 transport instructions ETH100&125) must be used together with M12 external thread eye bolts in accordance with DIN 580.

Motor parallel: ETH100&125

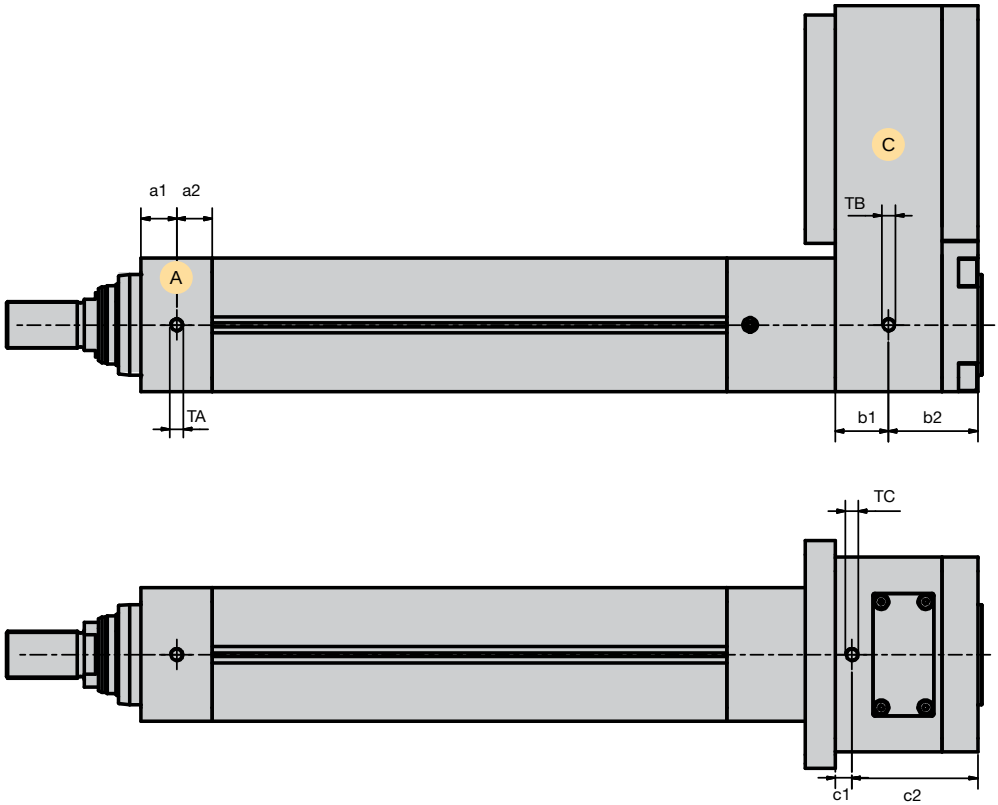


Figure 2 Transport instructions ETH100&125
Area A: Front cap
Area C: Parallel housing
Thread TA: on all four sides
Thread TB: also on the opposite side, but not on the underside

	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

1.6 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 operator's warranty rights require that the operator immediately report any defects and precisely describe said defects in the complaint. 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 that is connected 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.
Failure to adhere to these operating instructions or the relevant statutory provisions as well as any other information from the supplier shall invalidate the warranty.
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.

1.7 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 on page 19)

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 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. Set-up

In this chapter you can read about:

Read **safety instructions** (see on page 8) before taking into operation!
The product is furnished completely mounted and mechanically ready-to-operate.
If no Parker drive is provided, attach your motor-gearbox combination according to the instructions of the respective supplier.
The technical data must be respected.
Technical data: See in the catalog section (following the mounting instructions).

⚠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 Before commissoning **Safety instructions** (see on page 8) must be read!
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.

2.1 Mounting

⚠WARNING Do only use the appropriate mounting parts offered in the Parker product catalog 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. 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.
Dimensions: see in the catalog section (following the mounting instructions).

2.1.2. Mounting with mounting accessories

Mounting methods: see in the catalog section (following the mounting instructions).
Dimensions: see in the catalog section (following the mounting instructions).
Permissible side load: See in the catalog section (following the mounting instructions).

2.1.2.1 Cylinder mounting with mounting plates or foot mounting brackets

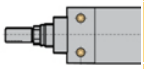
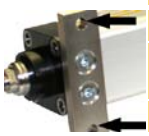
If the underside of the mounting surface is not accessible, mounting plates or foot mounting brackets are available as accessories.
The rear mounting plate cannot be fixed with inline motor configuration.
If you fix the cylinder only at the rear end (e.g. also with a rear clevis) please respect the effective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

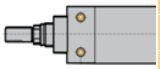
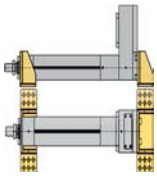
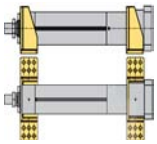
2.1.2.2 Screw tightening torques for the mounting of the ETH cylinder by the customer

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). The data apply 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.

		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			15			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
		7.5			16			34			Screw tightening torque (1) [Nm]
		8			11			14			Minimum screw-in depth (2) [mm]
Option E Option C		M6 - 8.8			M8 - 8.8			M10 - 8.8			Screw
		8.5			19			37			Screw tightening torque (1) [Nm]
		9			12			15			Minimum screw-in depth (2) [mm]
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]

		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

For all mounting options 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 don't 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 on page 11) 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 considered. Tighten screw with tightening torque 30 Nm.

2.1.2.3 Accessory mounting - bearing block

When mounting the bearing blocks, customers should respect the following tightening torques.

ETH032	ETH050	ETH080	
			
0112.039	0122.039	0132.039	Part number
M8-12.9	M10-12.9	M12-12.9	Screw
37	66	83	Screw tightening torque (1) [Nm]
15	21	27	Minimum screw-in depth (2) [mm]

ETH100	ETH125	
		
0142.039	0152.039	Part number
M16 – 8.8	M20 – 8.8	Screw
200	320	Screw tightening torque (1) [Nm]
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 of force sensors

NOTICE

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

2.1.2.5 Mounting - Fixing of accessories - Rear clevis with force sensor

Customer's screw tightening torques for the force sensor with rear clevis.

ETH	Pitch	Part number	Screw A2-70	Screw tightening torque (1) [Nm]	Minimum screw-in depth (2) [mm]	Deflection angle α [°]
032	M05	0112.034-01	M6x20	8.1	9	3.5
	M10	0112.034-01				
	M16	0112.034-02				
050	M05	0122.034-01	M8x20	20	12	4
	M10	0122.034-02				
	M20	0112.034-03				
080	M05	0132.034-01	M10x25	38.5	15	4
	M10	0132.034-02				
	M32	0132.034-03				
100	M10/M20	0142.034-01	M16x50	130	14	4
125	M10/M20	0152.034-01	M20x60	270	18	4

(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)

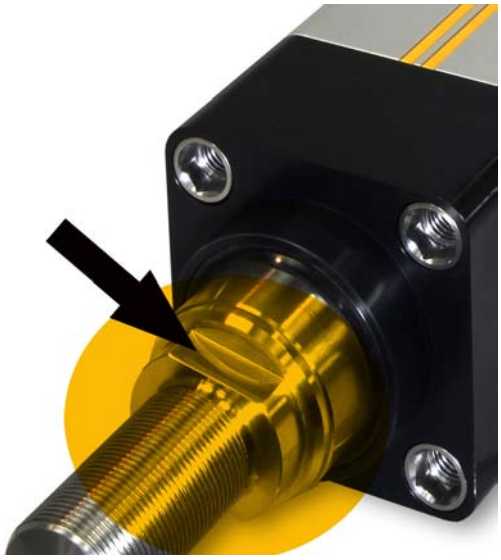
2.1.3. Mounting notes

2.1.3.1 Side Load

Please respect the maximum permissible side loads depending on the vertical or horizontal mounting position.
Permissible side load: See in the catalog section (following the mounting instructions).

2.1.3.2 Mounting of the payload

When mounting the payload, please make sure that no torque is applied to the thrust rod. Use the flat on the thrust rod to apply counter pressure, see indication "SW" "Thrust rod version": see in the catalog section (following the mounting instructions).



⚠CAUTION When fixing the load on the thrust rod end, do always apply counter pressure on the respective flat, KV (SW) with an appropriate tool!
Otherwise, the internal anti-rotation protection might be damaged.
KV (SW) Dimensions: see in the catalog section (following the mounting instructions).

Connect the payload always with the end of the thrust rod so that occurring lateral forces are minimized. 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.

"Thrust rod version": see in the catalog section (following the mounting instructions).

2.2 Electric installation

2.2.1. Direction of the motor during extension of the cylinder

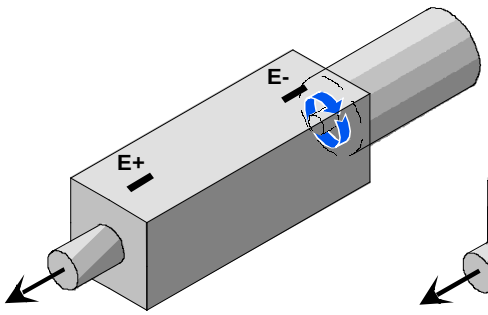


Figure 1

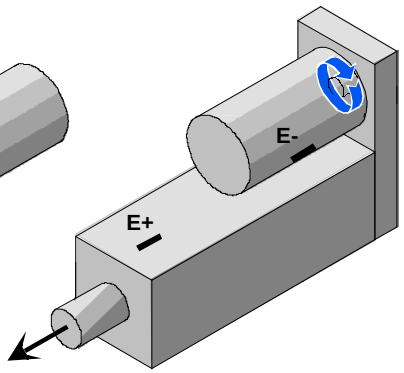


Figure 2

NOTICE With parallel drive (Figure 2), 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 limit switches which are mounted in the special mounting grooves on one side of the cylinder.
Sensors and limit switches: see in the catalog section (following the mounting instructions).

2.2.3. Sensor mounting

- Sensors 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 sensors can be inserted into the grooves from above. The cable ends should lead into the motor direction. Push the sensors to their approximate positions in the grooves of the cylinder body. Tighten the fixing screws on the limit switches slightly and lead the cable along the profile groove.
- If **sensors are used as end limits** (see on page 24), 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. Please cut off an additional 5 to 10 mm, where the cables are to be lead out of the profile (see Figure 4).
- Insert the cables into the grooves of the plastic covers and push the cover into the groove together with the cable.
- Connect the sensors to the controller.
  Sensors and limit switches: see in the catalog section (following the mounting instructions).

Sensor mounting example: 2 end limits with machine zero

Figure 3

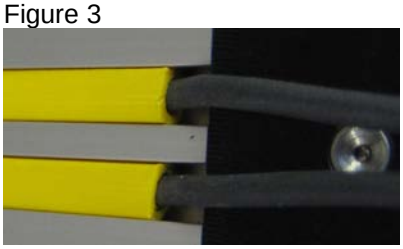


Figure 4

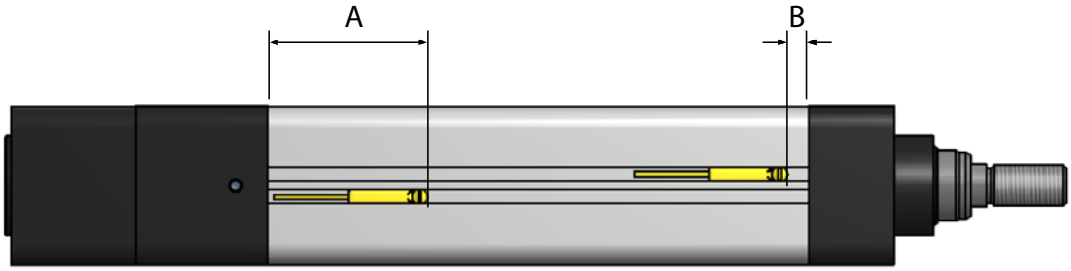
2.2.4. Setting the end limits

⚠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 sensor 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. We therefore recommend to adjust the final sensor position during the initial start up.



Position of initiators 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	192	0
	M20	280	0

⚠CAUTION Please add the respective safety travels to the mentioned values!
Stroke, usable stroke and safety travel: see in the catalog section (following the mounting instructions).

Sensors and limit switches: see in the catalog section (following the mounting instructions).

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 and feedback mounting

In this chapter you can read about:

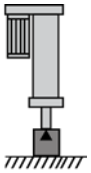
Notes on motor wiring

In order to adhere to the EMC directive, it is necessary to mount the motor if ever possible unchanged. If you require a longer cable, the entire line should be replaced with the same or a similar cable.
If you mount a connector on the new cable, please make sure that the 360° motor cable shielding is maintained and that there is no connection to earth via the connector housing.

⚠DANGER Improper wiring may lead to severe injuries or death.
A wiring must always be made from a skilled electrician.

The motor must be grounded with a separate PE protective lead (green/yellow, cross-section at least 2.5 mm^2).
This cable must be connected to the available motor-ground connector or - if there is non available - with a mounting screw. In the latter case, the coloring under the head of the screw must be removed.

⚠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.

2.3.1. Motor / gearbox mounting with inline motor configuration

ETH032 ... ETH080

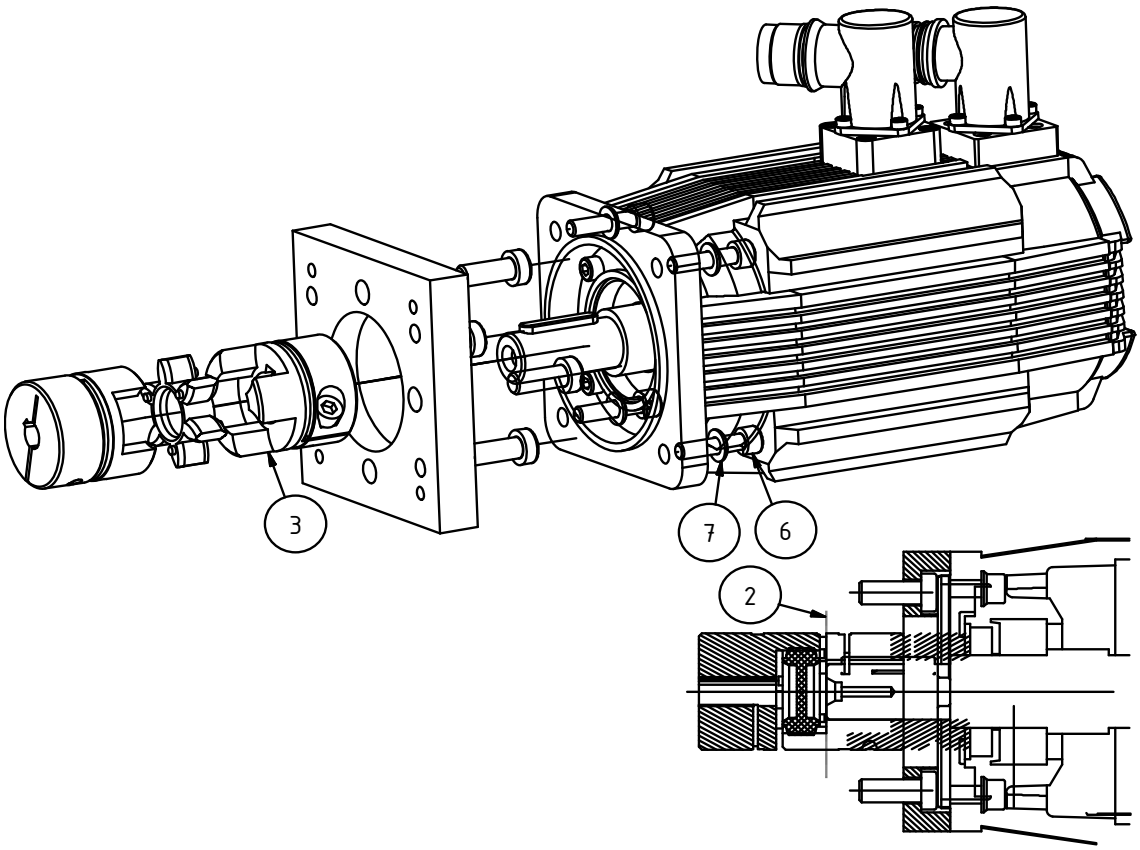


Figure 1

ETH100&125

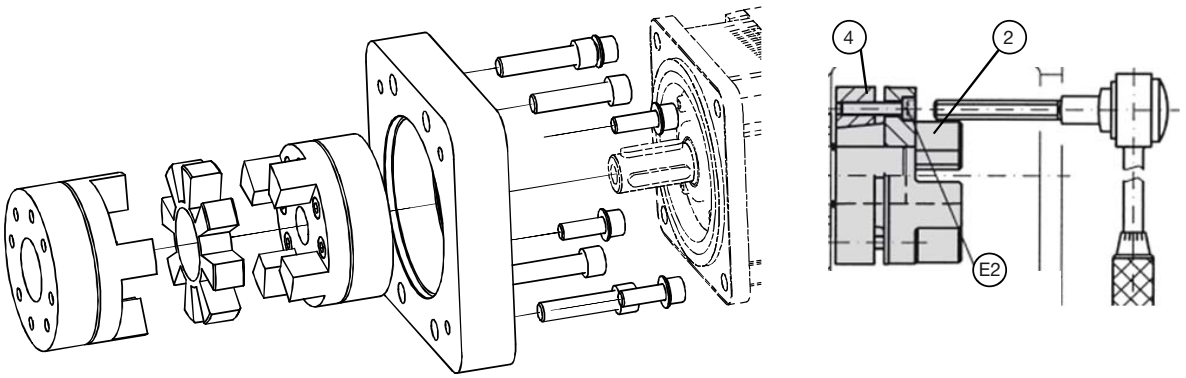


Figure 2

Motor / gearbox dismantling

- Remove motor connector.
- If you use a gearbox, we recommend to dismount the motor from the gearbox first for reasons of weight.
- Remove screws (Figure 1 Pos.6).
- Remove motor / gearbox including mounted coupling half with caution.
- Loosen clamping screw(s):
  - ETH032, ETH050, ETH080:
    loosen radial clamping screw of the coupling half.

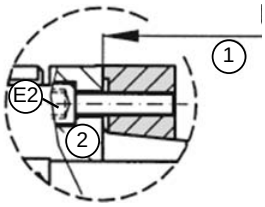


Figure 3

  - ETH100&125:
    loosen all clamping screws (Figure 3, Pos.E2) equally (approx. 3 mm) and screw in two of the screws in the open tapped holes. Now tighten screws evenly until the clamp collar (Figure 4, Pos.4) is released from the coupling hub (Figure 3, Pos.2) and can be freely moved.
- Remove coupling half from the motor / gearbox shaft.

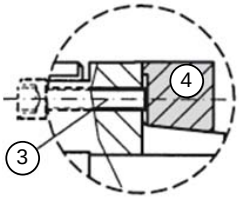


Figure 4

Motor / gearbox mounting

- Please make sure that the clamping screw(s) of the coupling half is/are released and that the clamp collar (Figure 5, Pos.4) and the coupling hub (Figure 5 Pos.2) are pulled apart.
- Slip the coupling half onto the motor / gearbox shaft and align to be flush with the shaft.

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).
- ETH100&125:
  Tighten the fixing screws Figure 5, Pos.E2) crosswise with a torque wrench in 3 turns with 1/3, 2/3 and full tightening torque until the final tightening torque (see table) is attained and the clamp collar touches the coupling half. The dead stop (Figure 6, Pos.1) on the coupling half (Figure 6, Pos.2) prevents too high pretension of the conical clamp collar and ensures high rotational accuracy.

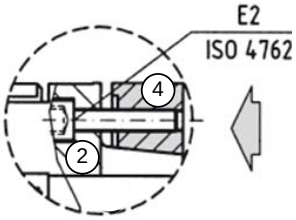


Figure 5

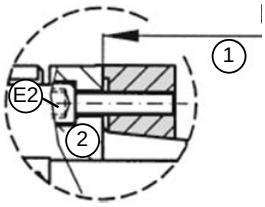


Figure 6

- Place spider element of the coupling

Joining with the spider element 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.

- 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 (Figure 1 Pos.6, Pos.7).

Tightening torques for motor/gearbox mounting (ETH)

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

2.3.2. Motor / gearbox mounting with parallel motor configuration

ETH032 ... ETH080

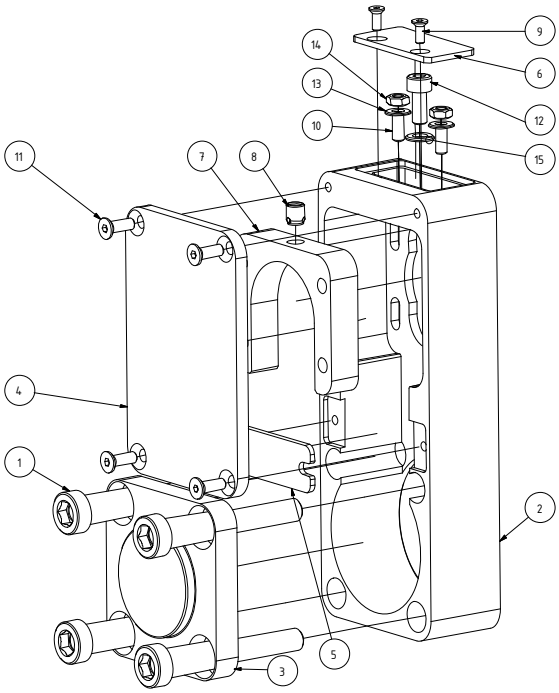


Figure 1 parallel housing

ETH032 ... ETH080

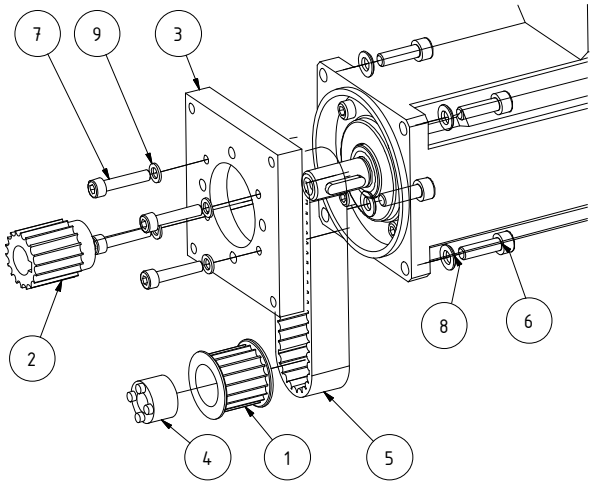


Figure 2 parallel drive

Motor / gearbox dismantling (ETH032 ... ETH080)

- Remove connectors from motor.
- Remove lid (Figure 1 Pos.6) and screws Figure 1 Pos.9).
- Remove lid (Figure 1 Pos.4) and screws (Figure 1 Pos.11).

ATTENTION! Keep all screws and lids for later mounting.

- Release toothed belt tension:
  - Slightly loosen 4 screws ((Figure 2 Pos.7) by 1 or 2 turns. see Figure 3).
    ATTENTION! Do not remove the screws entirely!
  - Loosen central toothed belt tensioning screw (Figure 1 Pos.12).
    The drive unit must lower slightly when the tensioning screw is loosened.
  - Loosen tightening screw (Figure 1 Pos.12) until the drive unit is not lowered any further.

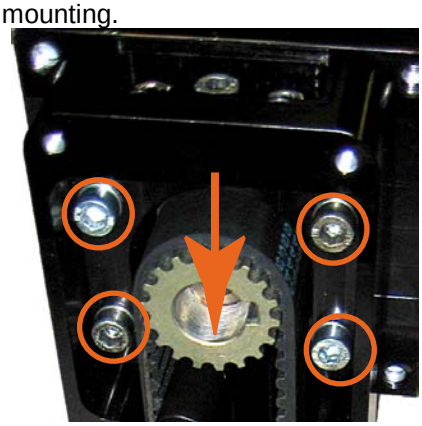


Figure 3

- 4 screws (Figure 2 Pos.7) remove screws completely. First at the bottom, then at the top.

⚠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!

⚠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.
- Dismount motor / gearbox flange (Figure 2 Pos.3) by loosening the screws (Figure 2 Pos.6).
- Measure and note depth “A” from toothed pulley to motor / gearbox shaft before dismounting the toothed pulley (see Figure 4).
- Remove threaded pin(s) from the toothed pulley.
- Pull off toothed pulley with the aid of a pull-off tool.

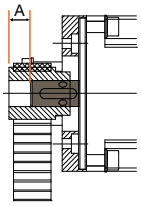


Figure 4

Motor / gearbox mounting (ETH032 ... ETH080)

- Fit toothed pulley and set dimension “A”.
  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).
- Mount motor / gearbox flange (Figure 2 Pos.3) with the screws (Figure 2 Pos.6 and 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 Figure 2 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 pre-tension:
  - For **the same toothed belt** (see on page 34).
  - For **a new toothed belt** (see on page 35)
- Mount lid (Figure 1 Pos.6) with screws (Figure 1 Pos.9).
- Mount lid (Figure 1 Pos.4) with screws (Figure 1 Pos.11).

ETH100&125

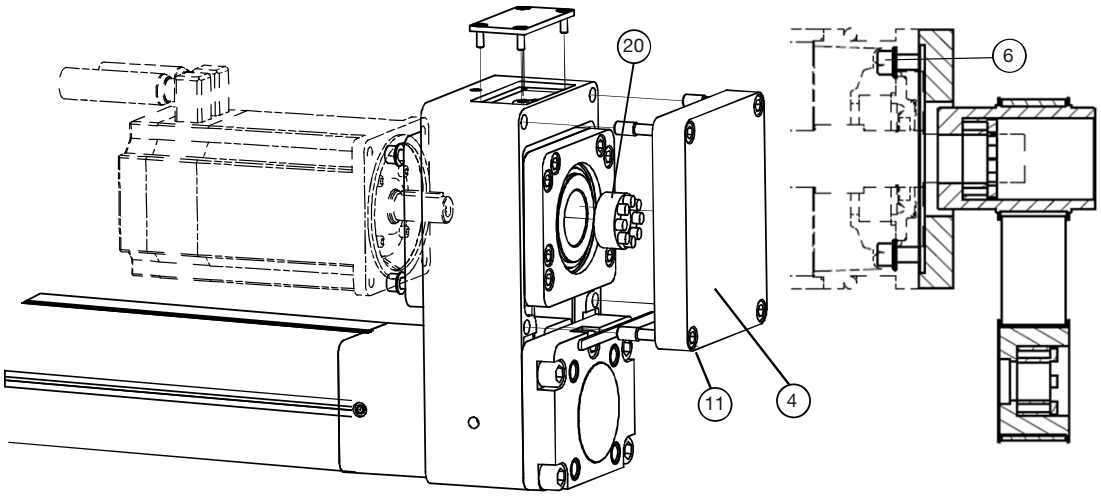


Figure 5 parallel housing

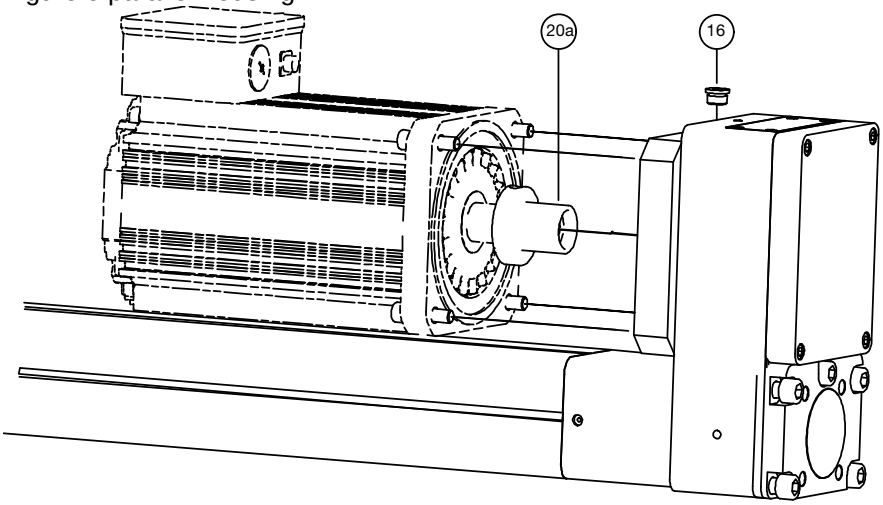


Figure 5a parallel housing

Motor / gearbox mounting (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
- Remove lid (Figure 5 Pos.4) and screws (Figure 5 Pos.11).
- Loosen all tensioning screws of the clamping bushing (Figure 5 Pos.20) (approx. 3 mm).
  with K1M drive option: Loosen tensioning element (Figure 5a Pos.20a) via flange sided mounting hole. For this, first loosen the lock screw (Figure 5a Pos.16) and then the adjusting screw of the tensioning element.

⚠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.

- Loosen motor fixing screws (Figure 5 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 (Figure 3 Pos.20, Figure 5a 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.

- Remove lid (Figure 5 Pos.4) and screws (Figure 5 Pos.11).
- 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 clamping element (Figure 5a Pos.20a) in the hollow shaft on the motor side and push up to the exterior stop. Adjust clamping element thus 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 clamping bushing (Figure 5 Pos.20) into hollow shaft and push 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 (Figure 5 Pos.20, Figure 5a Pos20a) crosswise step by step (in three turns with 1/3, 2/3 and full tightening torque), until the screw tightening torque (see table) 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 (Figure 5 Pos.4) and screws (Figure 5 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

2.3.2.1 Re-apply toothed belt pre-tension (reinsert the same toothed belt)

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.

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.

- First check, if the belt toothing is geared into the upper and lower toothed pulley.
- The screws (Figure 2 Pos.7) must be inserted (but not tightened), so that the drive unit can be lifted.
- Tighten central toothed belt tensioning screw (Figure 1 Pos.12).
  The drive unit must lift when tightening the screw. Lift the unit until it touches the 2 internal stops (Figure 1 Pos.10). This is made by tightening the central tightening screw.

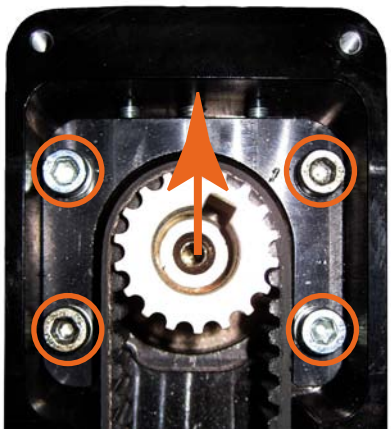


Figure 6

- Tighten 4 screws (Figure 2 Pos.7) with the given tightening torque.
- Refix both lids (Figure 1 Pos.4 & 6) with the respective screws (Figure 1 Pos.11 & 9).

Screw tightening torques belt tensioning option

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

2.3.2.2 Resetting the toothed belt pre-tension (new toothed belt)

For a new toothed belt, we recommend to re-set the toothed belt pretension:

- Check, if the belt toothing is geared into the upper and lower toothed pulley.
- The screws (Figure 2 Pos.7) must be inserted (but not tightened), so that the drive unit can be lifted.
- Loosen both lock nuts (Figure 1 Pos.14) (do not remove entirely).
- Unscrew both threaded pins (Figure 1 Pos.10) until they are almost level with the inside of the parallel housing.
- Tighten central toothed belt tensioning screw (Figure 1 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"
- Tighten screw lightly and repeat measurement.
- Repeat this procedure until the required **toothed belt pretension** (see on page 35, see on page 45) is set.

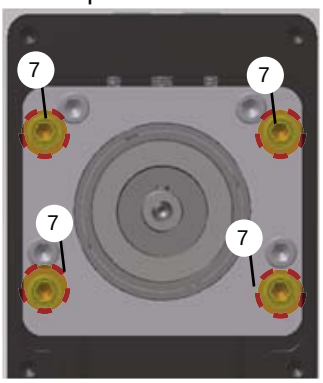


Figure 7 ETH1xx

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

- Screw in both threaded pins (Figure 1 Pos.10) until they touch the inner bracket. Tighten pins slightly.
- Retighten lock nuts (Figure 1 Pos.14).
- Tighten 4 screws (Figure 2 Pos.7) with the given tightening torque.
- Refix both lids (Figure 1 Pos.4 & 6) with the respective screws Figure 1 Pos.11 & 9).

Screw tightening torques belt tensioning option

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

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.

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.

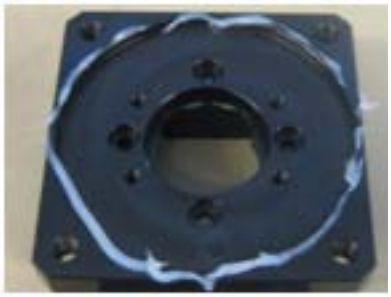
- Apply silicone sealing compound to the motor flange pilot (e.g. Sista Silicone F109 Universal).
- Screw motor to motor flange (see chapter **"Motor and gearbox mounting"** (see on page 26)).
- Note the additional mounting steps (see chapter **"Motor and gearbox mounting"** (see on page 26)).

Figure 1 IP-flange

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.

- Apply silicone sealing compound to the motor flange pilot (e.g. Sista Silicone F109 Universal).



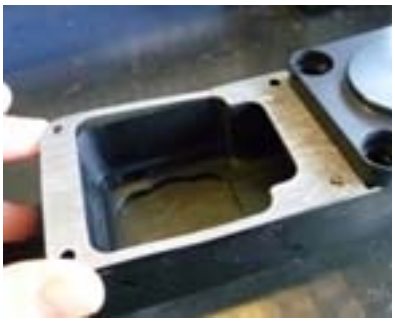
- Screw motor to motor flange (delivered with the cylinder),
  (see chapter **"Motor and gearbox mounting"** (see on page 26)).

- Apply silicone sealing compound around bores of the parallel housing

- Mount motor with motor flange to parallel housing
  (see chapter **"Motor and gearbox mounting"** (see on page 26)).

- Tension toothed belt
  (see **"Exchange or tension toothed belt"** (see on page 35, see on page 45)).

- Place seal (furnished with the cylinder).



- Place lid (furnished with the cylinder).

- Fix lid and seal to parallel housing

- Note the additional mounting steps
  (see chapter **"Motor and gearbox mounting"** (see on page 26)).

3. Maintenance and service

In this chapter you can read about:

NOTICE Read **safety instructions** (see on page 8) before taking into operation!

Before performing any maintenance work, turn the power switch to the '0' setting and secure it with a padlock against manipulation. 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 Maintenance schedule

WHEN	WHAT	ACTION
After commissioning	Screw	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 on page 39)
Depending on the mileage, see table Lubricating intervals and amount of lubricant **(see on page 39)**	Screw	Relubricating the screw. see **lubricating intervals and amount of lubricant** (see on page 39)
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 on page 19)
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 on page 42).

3.2 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 short-stroke applications, a lubrication run must be performed after max. 10 000 movement cycles. In the event of small loads and if the application is impact and vibration free, the lubrication intervals can be increased.
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! The lubricant used is supplied by Klüber, it is available worldwide.

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.

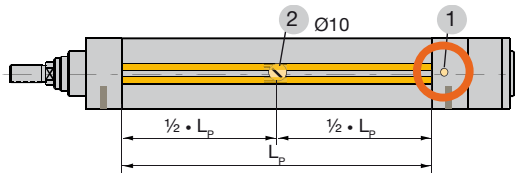
Lubricant

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).

After relubrication, a lubricating run must be performed to ensure even distribution of the lubricating agent.
Please make sure that the entire length is traveled in both directions at a speed of approx. 20 mm/s.
After this, the cylinder is ready for put back into operation.

3.2.1. Greasing via central lubrication port (standard)



1: Central lubrication (standard)

2: Central lubrication (Option)

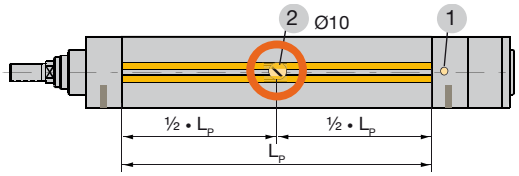
Make sure that all external stops are removed.

- Retreat thrust rod completely so that it touches the rear stop.
- Pass internal buffer by 0.5 mm.

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

- This is the lubricating position.
- Use a suitable pipe for the funnel type lubricating nipple, Type D1a4 DIN3405: Beaked nozzle.
- Place the pipe orthogonally onto the lubricating nipple and press.
- Use the **defined amount of lubricant** (see on page 39).
- 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.

3.2.2. Relubrication via central lubrication port (option)



1: Central lubrication (standard)

2: Central lubrication (Option)

The distances of the rear stop (on the motor side), mentioned in the following table, for center greasing bore in the profile are only approximate values.
CAUTION! The positions are not valid for short lift cylinder (stroke<Dimension P).
Dimension P: see in the catalog section (following the mounting instructions).

Start-up position at lubrication port

	Pitch	Position center lubrication option [mm]
ETH032	**M05**	½ x stroke + 18
	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

- Loosen lubrication port screw.
- Move the cylinder slowly to the lubricating position until the lubricating port becomes visible.
- With frame sizes ETH032m ETH050 and ETH080 the lubricating 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.
- Use a stable pipe (no hose).
- Insert the nozzle into the hole in the cylinder profile and place it orthogonally onto the lubricating port.
- Use the **defined amount of lubricant** (see on page 39).
- 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.

3.3 Toothed belt

3.3.1. 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 on page 42).
For visual inspection, you must only remove the (upper) lid with the four screws (Figure 1, Pos.4+11).
ATTENTION! Do not remove the screws of Pos.11 entirely.

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

3.3.2. Exchanging the toothed belt (ETH032 ... 080)

ETH032 ... ETH080

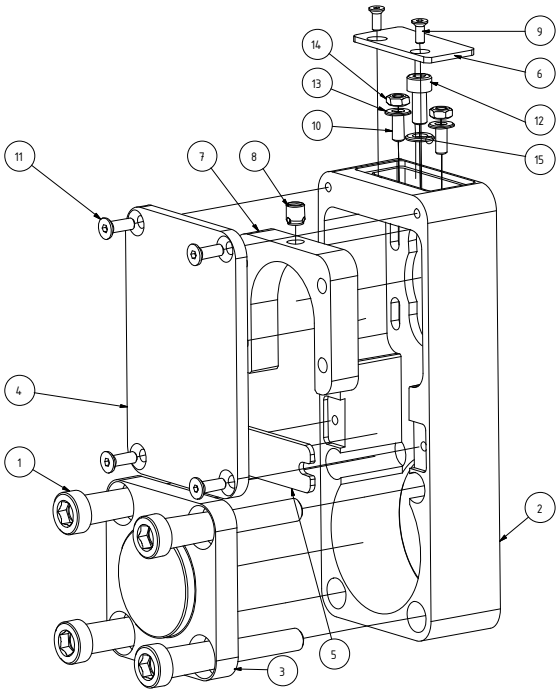


Figure 1 parallel housing

ETH032 ... ETH080

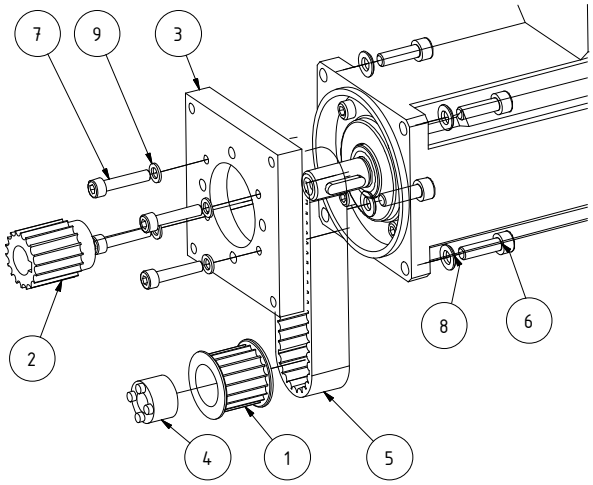


Figure 2 parallel drive

- **Dismantling the motor** (see on page 26)
- Loosen and remove 4 screws (Figure 1 Pos.1).
- Remove lid (Figure 1 Pos.3).
- Remove bar (Figure 1 Pos.5).
- Remove old toothed belt and insert new belt.
  ATTENTION! Please make sure that the toothed belt is correctly geared in the pulley toothing.
- Insert bar (Figure 1 Pos.5).
- Fit lid (Figure 1 Pos.3).
- Apply screw adhesive "Wiko 02K43 medium" to 4 screws (Figure 1 Pos.1) and tighten slightly.
- Align housing (Figure 1 Pos.2) with the electro cylinder.
- Tighten 4 screws (Figure 1 Pos.1) with the given tightening torque.

ETH032	ETH050	ETH080
9 Nm	20 Nm	40 Nm

- **Mounting the motor** (see on page 26)
- Setting the toothed belt pre-tension:
  - For **the same toothed belt** (see on page 34).
  - For **a new toothed belt** (see on page 35)
- Mount lid (Figure 1 Pos.6) with screws (Figure 1 Pos.9).
- Mount lid (Figure 1 Pos.4) with screws (Figure 1 Pos.11).

3.3.3. Exchanging the toothed belt (ETH100&125)

ETH100&125

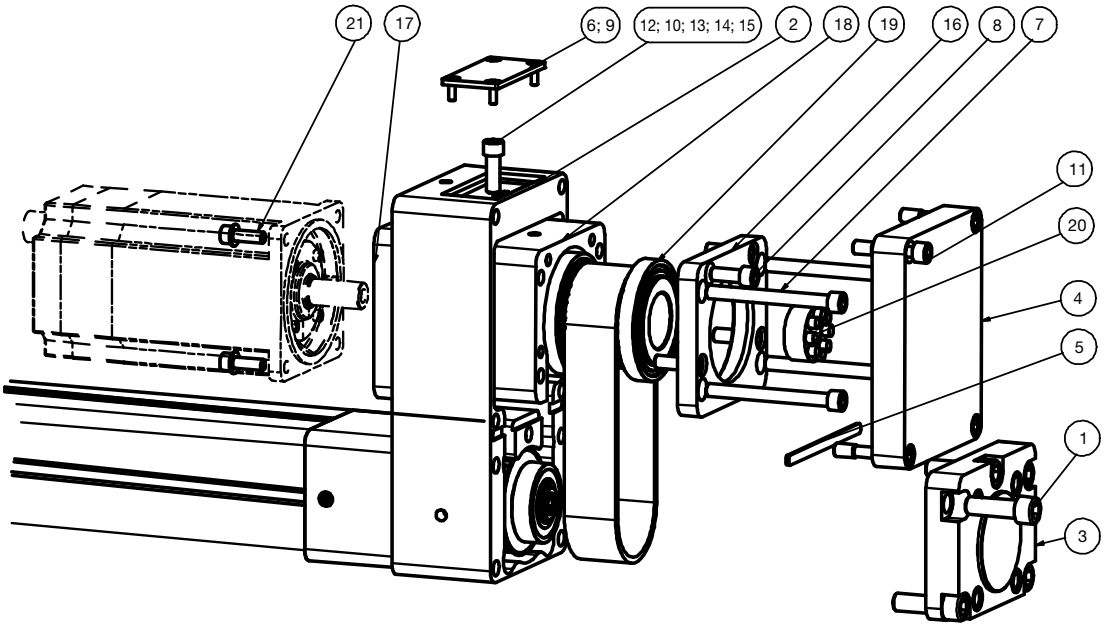


Figure 3 Exchanging the toothed belt (ETH100&125)

- **Dismantling the motor** (see on page 26)

⚠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
  - Slightly loosen 4 screws ((Figure 3 Pos.7) by 1 or 2 turns.
    ATTENTION! Do not remove the screws entirely!
  - Loosen central toothed belt tensioning screw (Figure 3 Pos.12). The drive unit must lower slightly when the tensioning screw is loosened.
  - Loosen tightening screw (Figure 3 Pos.12) until the drive unit is not lowered any further.
- Loosen 5 screws (Figure 3 Pos.1) and remove lid (Figure 3 Pos.3). If the lid cannot be removed easily, try to remove it with a slightly pivoting movement.
- Remove middle bar (Figure 3 Pos.5) with seal.
- Loosen 4 screws (Figure 3 Pos.8)of the upper bearing flange (Figure 3 Pos.16) (don't remove them completely).
- Loosen 4 screws (Figure 3 Pos.7) and remove motor flange (Figure 3 Pos.17).

⚠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.

- Loosen and remove completely central toothed belt tensioning screw (Figure 3 Pos.12)
- **ATTENTION!** Secure upper bearing unit (Figure 3 Pos.18) against falling.
- **CAUTION!** Danger of crushing: Do not place your hands or fingers between upper bearing unit and parallel housing.
- Remove upper bearing unit (Figure 3 Pos.18) with toothed belt.
- Loosen four screws (Figure 3 Pos.8) of the upper bearing flange (Figure 3 Pos.16) and remove bearing flange from bearing (Figure 3 Pos.19).
- Remove hollow shaft with the two bearings (Figure 3 Pos.19) from the bearing housing (Figure 3 Pos.18).
- Now, the toothed belt can be removed and the new belt can be inserted.

⚠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.

- Mounting in reverse order.
- (Figure 3 Pos.2,3 and 4) must be sealed with Atomsit.
- Re-seal middle bar (Figure 3 Pos.5) with the seal or with Atomsit.

⚠WARNING Please respect the screw tightening torques.

- **Setting the toothed belt pre-tension** (see on page 35)

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

3.4 Belt / belt tensions

	ETH032	ETH050	ETH080	ETH100	ETH125
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	3300 N ± 100 N	4400 N ± 130 N
Trum Frequency	438 Hz ± 14 Hz	306 Hz ± 10 Hz	236 Hz ± 8 Hz	359 Hz ± 11 Hz	284 Hz ± 9 Hz
Belt mass	0.060 kg/m	0.080 kg/m	0.120 kg/m	0.2065 kg/m	0.2725 kg/m
Belt width	15 mm	20 mm	30 mm	50 mm	60 mm
Center distance	67.5 mm	87.5 mm	130 mm	130mm	224mm

4. Repair

In the event of a damage or a mechanical defect, the entire unit must be returned for repair (**Parker Hannifin** (see on page 2)). The repair must be made by trained Parker personnel.

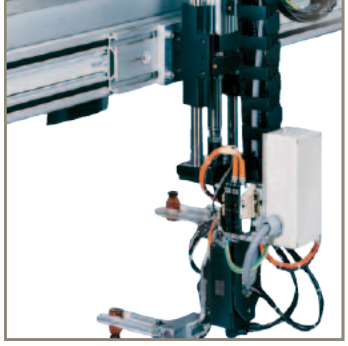
User Conversions and Changes are Not Permitted

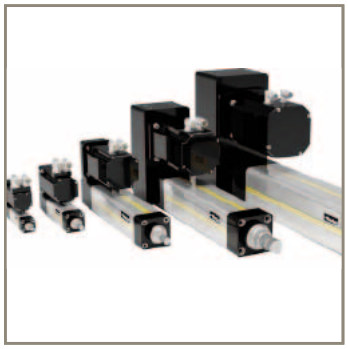
The linear actuator must not be changed in its design or in terms of safety without our approval. Any change as defined here made by the user excludes any liability on our part.

5. Index

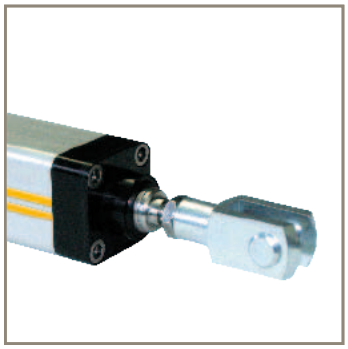
6. Further information

Our product on the internet: http://www.parker.com/eme/eth



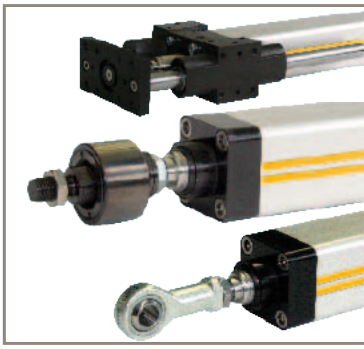


aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



ETH Electro Cylinder

Parker High Force Electro Thrust Cylinder



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- The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.
- To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

High Force Electro Thrust Cylinder - ETH

Parker Hannifin

The global leader in motion and control technologies

A world class player on a local stage

Global Product Design

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

Local Application Expertise

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

Manufacturing to Meet Our Customers' Needs

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

Electromechanical Worldwide Manufacturing Locations

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

Asia
Wuxi, China
Chennai, India

North America
Rohnert Park, California
Irwin, Pennsylvania
Charlotte, North Carolina
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Offenburg, Germany

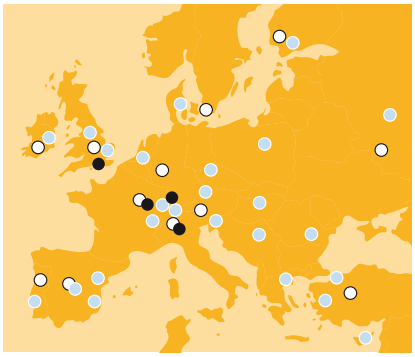
Local Manufacturing and Support in Europe

Parker provides sales assistance and local technical support through a network of dedicated sales teams and authorized technical distributors throughout Europe.

For contact information, please refer to the Sales Offices on the back cover of this document or visit www.parker.com

Milan, Italy

Littlehampton, UK



Electromechanical Manufacturing
Parker Sales Offices
Distributors

Dijon, France

High Force Electro Thrust Cylinder - ETH

Overview

Description

The ETH electro cylinder closes the gap between pneumatic and hydraulic actuators; it is suitable to replace those in many applications and simultaneously increase the reliability of the production process. Taking the costs for air and oil into consideration, you will find that in most cases an electromechanical system such as the ETH electro cylinder offers the more economical solution. Combined with a wide choice of accessories, it offers many possibilities in a wide variety of fields.

Typical areas of application

- Material handling and feed systems
  - wood and plastic working industry
  - vertical actuators for loading machine tools
  - in the textile industry for tensioning / gripping textile fabrics
  - in the automotive industry for transporting and feeding components
- Testing equipment and laboratory applications
- Valve and flap actuation
- Pressing
- Packaging machinery
- Process automation in the food and beverage industry

Features

- Unrivaled power density - high forces and small frame sizes
- Cabling can be concealed in the profile
- Accessories with integrated force sensors help to allot and even to control forces precisely
- Optimized for safe handling and simple cleaning
- High service life
- Reduced maintenance costs thanks to lubricating access in the cylinder flange
- Easy replacement due to pneumatic ISO flange norm (DIN ISO 15552:2005-12) conformity
- Integrated anti-rotation device
- Reduced noise emission
- All from one source
  We offer the complete drive train: Drive controllers, motors and gearboxes to match the Electro Cylinder

Technical Characteristics - Overview

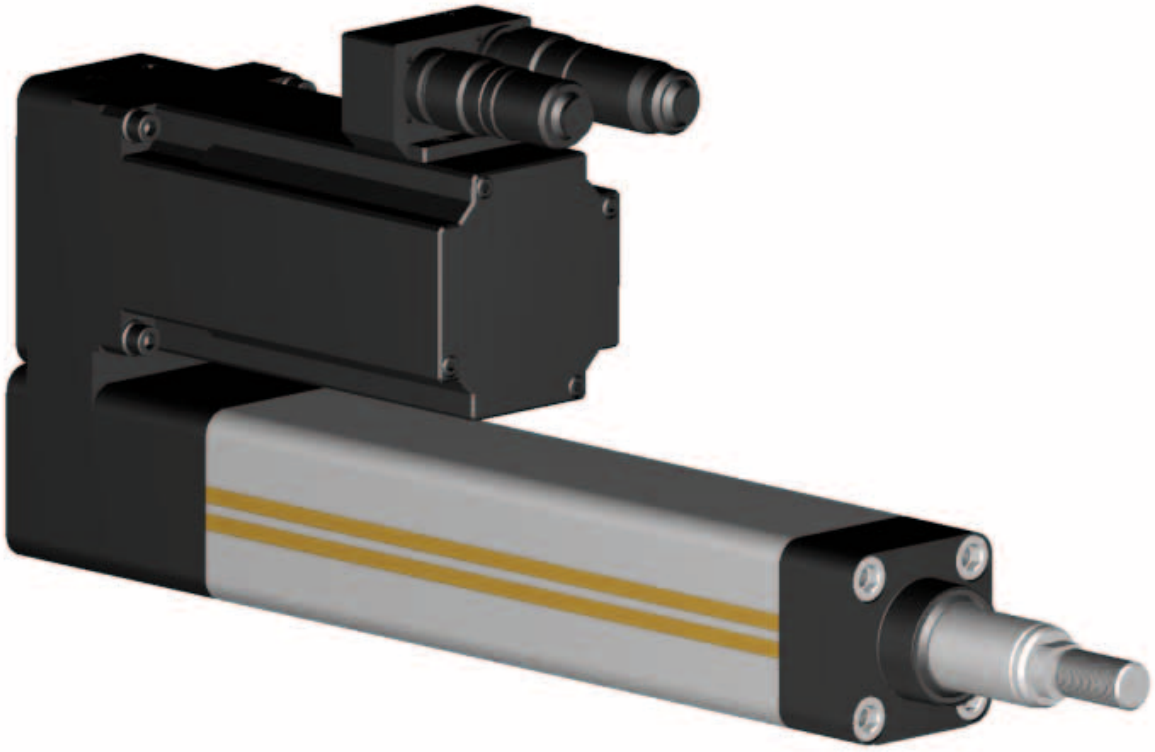
Type	ETH Electro Cylinder
Frame sizes	ETH032 / ETH050 / ETH080 / ETH100 / ETH125
Screw lead	5, 10, 16, 20, 32 mm
Stroke	up to 2000 mm
Traction/thrust force	up to 114000 N
Speed	up to 1.7 m/s
Acceleration	up to 15 m/s²
Equivalent dynamic axial force at a lifetime of 2500 km	up to 49600 N
Efficiency	up to 90 %
Repeatability	up to ± 0.03 mm
Protection classes	IP54 IP54 with stainless screws IP65
Drive	Inline: Axial drive or parallel drive with high performance toothed belt
Directives	2011/65/EC: Conform to RoHS ✓ RoHS
	94/9/EC: ATEX Ex Equipment group II Category 2 Please contact Parker for details
Classification	II 2G Ex c IIC T4 EPS 13 ATEX 2 592 X (ETH032 / ETH050)
	II 2G Ex c IIB T4 EPS 13 ATEX 2 592 X (ETH080 / ETH100)

We also offer customized solutions:

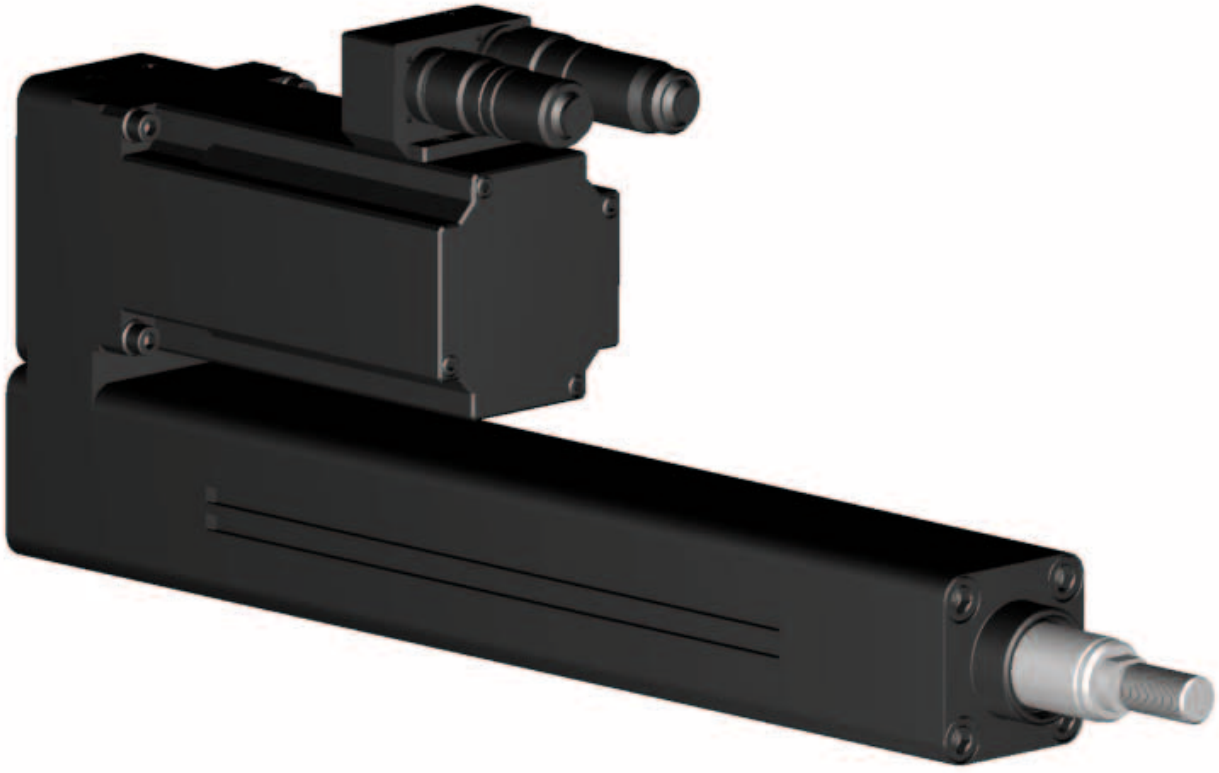
If your application requires a special version of the ETH cylinder, please contact your local Parker Sales Office.

- Oil splash lubrication
- Customized mountings and rod ends
- Mounting of customer motors
- Preparation of the cylinder for use under aggressive environmental conditions
- Overlong thrust rod
- Polished thrust rod
- Thrust rod hard-chrome plated
- .....

Parker High Force Electro Thrust Cylinder



ETH IP54 (Standard)



ETH IP65

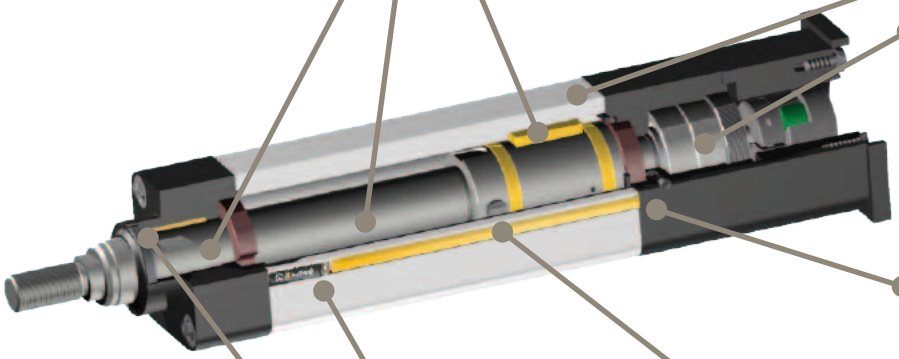
Product Design

Ballscrew
A high-quality precision class 7 ballscrew in accordance with ISO 3408 is used. The ball bearings between screw and nut ensure a low frictional resistance. This ensures an especially smooth operation over the entire speed range, high service life and excellent efficiency.

Screw support bearing (front end)
The front screw support bearing is supported by a polymer sliding bearing. This eliminates vibration and run-out. The result is quieter, smoother motion with better precision, longer screw life, and increased dynamic performance.

Piston Rod Anti-rotation Guidance
One of the unique design changes in the ETH is a new anti-rotation device. The high quality, maintenance free polymer bushing offers robust guidance preventing the piston rod from twisting as the rod extends and retracts.

Extruded cylinder body
The extrusion design reduces the number of slots or grooves for a cleaner overall design. The only slots are there for sensor mounting and are easily covered to eliminate any area for debris to be trapped. The result is a cleaner, more environmentally friendly design.



Screw Support Bearing (motor end)
A double stacked set of angular contact bearings allows for high thrust forces in both the extend and retract directions. The result is a design with high force density and minimal clearance when changing directions of motion.

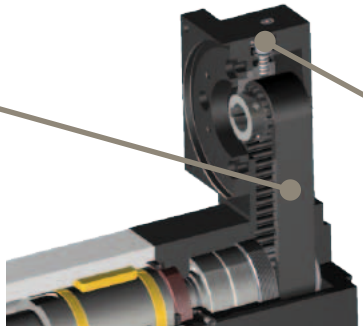
Easy Lubrication Port
The integrated lubrication fitting allows quick, simple and easy access to regrease the ball screw. In the event the rear is inaccessible the port can be located in the center of the extrusion (optional) The result is reduced down time for product maintenance yielding a higher ROI and a longer product life.

Piston Rod Support Bearing & Protection
The extra long cylinder rod bearing allows high lateral load forces. A wiper ring prevents the ingress of external contamination under normal conditions. In the event of fine dust, a high amount of dirt as well as muds and liquids, special sealing is required, which is available on request.

Sensors
The sensors are directly integrated into the profile; avoiding projecting edges. Cabling is neatly hidden under the yellow cover (fitting sensors available as accessories).

Permanent magnet
All electro cylinders are equipped with several permanent magnets integrated into the screw nut. The permanent magnets actuate the sensors, which can be mounted in the longitudinal grooves of the cylinder body.

Toothed belt transmission
The slip and wear free toothed belt transmission for parallel drive cylinders (motor mounted parallel to the cylinder) features a high efficiency and a transmission ratio of 1:1.



Belt tensioning device
A sophisticated belt tensioning device for parallel motor mounting allows the toothed belt to be pre tensioned precisely.

Technical Characteristics

Cylinder size type		Unit	ETH032			ETH050			ETH080		
			M05	M10	M16[4]	M05	M10	M20[3]	M05	M10	M32[4]
Screw lead		[mm]	5	10	16	5	10	20	5	10	32
Screw diameter		[mm]		16			20			32	
Travels, speeds and accelerations											
Available strokes [1) 2)]		[mm]	continuous from 50-1000 & standard strokes			continuous from 50-1200 & standard strokes			continuous from 50-1600 & standard strokes		
Max. permissible speed at stroke =											
50-400 mm		[mm/s]	333	667	1067	333	667	1333	267	533	1707
600 mm		[mm/s]	286	540	855	333	666	1318	267	533	1707
800 mm		[mm/s]	196	373	592	238	462	917	267	533	1707
1000 mm		[mm/s]	146	277	440	177	345	684	264	501	1561
1200 mm		[mm/s]	-	-	-	139	270	536	207	394	1233
1400 mm		[mm/s]	-	-	-	-	-	-	168	320	1006
1600 mm		[mm/s]	-	-	-	-	-	-	140	267	841
Max. Acceleration		[m/s^2]	4	8	12	4	8	15	4	8	15
Forces											
Max. axial traction/thrust force motor inline		[N]	3600	3700	2400	9300	7000	4400	17800	25100	10600
Max. axial traction/thrust force depending on the motor speed n Motor parallel	n < 100 min^{-1}	[N]		3280	2050		4920	2460		11620	3630
	100 < n < 300 min^{-1}	[N]		2620	1640	7870	3930	1960			
	n > 300 min^{-1}	[N]		1820	1140	5480	2740	1370		10720	3350
Equivalent dynamic axial force at a lifetime of 2500 km		[N]	1130	1700	1610	2910	3250	2740	3140	7500	6050
Max. transmissible torque / force constant											
Max. transmissible torque inline motor		[Nm]	3.2	6.5	6.8	8.2	12.4	15.6	15.7	44.4	60.0
Max. transmissible torque depending on the motor speed n Motor parallel	n < 100 min^{-1}	[Nm]	3.5	6.4		9.1	9.3		17.5	22.8	
	100 < n < 300 min^{-1}	[Nm]	3.5	5.2		7.7	7.7		17.5	22.8	
	n > 300 min^{-1}	[Nm]	3.5	3.6		5.4	5.4		17.5	21.1	
Force constant motor inline [5)]		[N/Nm]	1131	565	353	1131	565	283	1131	565	177
Force constant motor parallel [5)]		[N/Nm]	1018	509	318	1018	509	254	1018	509	159
Mass											
Mass of base unit with zero stroke (incl. Cylinder rod)		[kg]	1.2	1.2	1.3	2.2	2.3	2.5	6.9	7.6	8.7
Mass of additional stroke (incl. Cylinder rod)		[kg/m]		4.8			8.6			18.7	
Weight of cylinder rod with zero stroke		[kg]		0.06			0.15			0.59	
Weight of cylinder rod - additional length		[kg/m]		0.99			1.85			4.93	
Mass moments of inertia											
Motor parallel without stroke		[kgmm^2]	8.3	8.8	14.1	30.3	30.6	38.0	215.2	213.6	301.9
Motor inline without stroke		[kgmm^2]	7.1	7.6	12.9	25.3	25.7	33.1	166.2	164.5	252.9
Parallel/inline motor per meter		[kgmm^2/m]	41.3	37.6	41.5	97.7	92.4	106.4	527.7	470.0	585.4
Accuracy: Bidirectional Repeatability (ISO230-2)											
Motor inline		[mm]	±0.03								
Motor parallel		[mm]	±0.05								
Efficiency											
Motor inline	the efficiency includes all friction torques	[%]	90								
Motor parallel		[%]	81								
Ambient conditions											
Operating Temperature		[°C]	-10...+70								
Ambient temperature		[°C]	-10...+40								
Storage temperature		[°C]	-20...+40								
Humidity		[%]	0...95 % (non-condensing)								
Location height range		[m]	max. 3000								

1) "Order Code" (page 52), 2) Intermediate stroke lengths may be interpolated.
3) ATEX on request
4) ATEX not available, 5) The efficiency factors are included in the force constants.

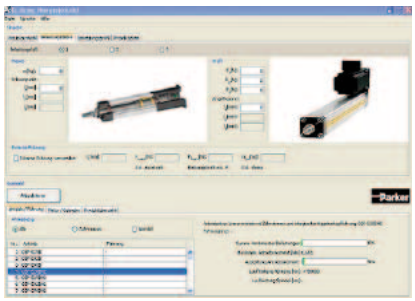
Cylinder size type		Unit	ETH100		ETH125[3]	
			M10	M20	M10	M20
Screw lead		[mm]	10	20	10	20
Screw diameter		[mm]	50		63	
Travels, speeds and accelerations						
Available strokes [1] [2]		[mm]	continuous from 100-2000 & standard strokes		continuous from 100-2000 & standard strokes	
Max. permissible speed at stroke =						
100-400 mm		[mm/s]	400	800	417	833
500 mm		[mm/s]	400	747	417	807
600 mm		[mm/s]	333	622	395	684
800 mm		[mm/s]	241	457	290	514
1000 mm		[mm/s]	185	354	224	405
1200 mm		[mm/s]	148	284	180	329
1400 mm		[mm/s]	122	235	148	275
1600 mm		[mm/s]	102	198	125	234
2000 mm		[mm/s]	76	148	94	170
Max. Acceleration		[m/s^2]	8	10	8	10
Forces						
Max. axial traction/thrust force motor inline		[N]	54800	56000	88700	114000
Max. axial traction/thrust force depending on the motor speed n Motor parallel	n < 100 min^{-1}	[N]		50800	76300	81400
	100 < n < 300 min^{-1}	[N]		43200		73700
	n > 300 min^{-1}	[N]		35600		61000
Equivalent dynamic axial force at a lifetime of 2500 km		[N]	18410	27100	27140	49600
Max. transmissible torque / force constant						
Max. transmissible torque inline motor		[Nm]	100	200	150	400
Max. transmissible torque depending on the motor speed n Motor parallel	n < 100 min^{-1}	[Nm]	108	200		320
	100 < n < 300 min^{-1}	[Nm]		170		290
	n > 300 min^{-1}	[Nm]		140		240
Force constant motor inline [5]		[N/Nm]	565	283	565	283
Force constant motor parallel [5]		[N/Nm]	509	254	509	254
Weight						
Mass of base unit with zero stroke (incl. Cylinder rod)		[kg]	21	23	56	64
Mass of additional stroke (incl. Cylinder rod)		[kg/m]	39		62	
Weight of cylinder rod with zero stroke		[kg]	1.2		2.9	
Weight of cylinder rod - additional length		[kg/m]	7.8		14.4	
Mass moments of inertia						
Motor parallel without stroke		[kgmm^2]	5860	6240	17050	17990
Motor inline without stroke		[kgmm^2]	2240	2620	12960	13400
Parallel/inline motor per meter		[kgmm^2/m]	4270	4710	10070	10490
Accuracy: Bidirectional Repeatability (ISO230-2)						
Motor inline		[mm]	±0.03			
Motor parallel		[mm]	±0.05			
Efficiency						
Motor inline	the efficiency includes all friction torques	[%]	90			
Motor parallel		[%]	81			
Ambient conditions						
Operating Temperature		[°C]	-10...+70			
Ambient temperature		[°C]	-10...+40			
Storage temperature		[°C]	-20...+40			
Humidity		[%]	0...95 % (non-condensing)			
Location height range		[m]	max. 3000			

[1] "Order Code" (page 52), [2] Intermediate stroke lengths may be interpolated.
[3] ATEX on request, [5] The efficiency factors are included in the force constants.

Technical Data apply under normal conditions and only for the individual operating and load modes. In the case of compound loads, it is necessary to verify in accordance with normal physical laws and technical standards whether individual ratings should be reduced. In case of doubt please contact Parker.

Step by Step Selection Process

The following sizing steps help you to find the suitable electro cylinder.
Select an electro cylinder using estimated application data. Calculate the actually required application data following the dimensioning steps described below.
If your application's requirements exceed a maximum value, please choose a larger electro cylinder and recheck the maximum values. Perhaps, a smaller electro cylinder can also meet the requirements.

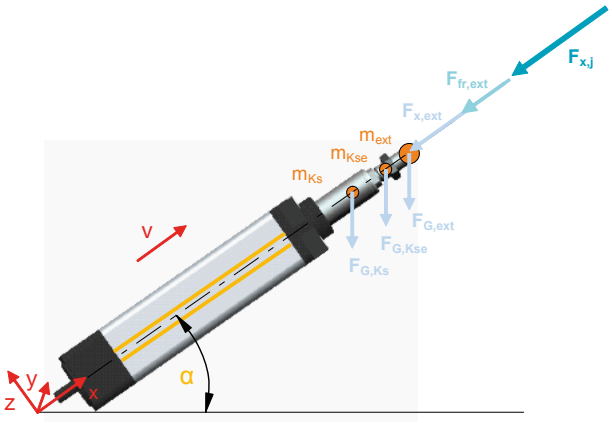


Automated dimensioning with the help of the "EL Sizing Tool"
A dimensioning tool simplifies the dimensioning process. Download under:
www.parker.com/eme/eth

Step	Application data	Selection	With the aid of ...
1	Accuracy, ambient conditions	Check the basic conditions for the use of the ETH in your application.	"Technical Characteristics" (page 8)
2	Required space	Check the space available in your application and choose the motor mounting option: inline or parallel.	"Dimensions" (page 21)
3	Axial forces	Calculation of the axial forces in the individual segments of the application cycle.	"Calculating Required Axial Force" (page 11)
4	Maximum force required	Determination of the maximum required axial force (traction and thrust force)	Determination of the maximum required axial force (page 12)
		Selection of the cylinder via the maximum axial traction/ thrust force (please use the characteristics of your desired motor mounting option: inline or parallel).	"Technical Characteristics" (page 8)
5	Maximum speed	Selection of the screw lead for the desired cylinder.	"Technical Characteristics" (page 8)
6	Maximum Acceleration	Please check if the maximum acceleration is sufficient.	"Technical Characteristics" (page 8)
7	Select stroke	Selection of the desired stroke: Determine required stroke from usable stroke and safety travels select the desired stroke from the list of standard strokes or, if the desired stroke is not listed: Define the length of the usable stroke in steps of one mm. Caution! Please respect the minimum and the maximum possible stroke	"Stroke, Usable Stroke and Safety Travel" (page 19) "Order Code" (page 52) "Technical Characteristics" (page 8)
8	Permissible thrust force taking the buckling risk into consideration	Check the maximum thrust force depending on the stroke and the mounting variant. Maybe your application can also be realized with a different mounting variant allowing to attain the maximum thrust force.	"Permissible Side Load" (page 17)
9	Service life	Determining the service life with the aid of an equivalent axial force, the operational environment (application factor) and the service life diagrams.	"Lifetime" (page 13)
10	Permissible side load	Determine the lateral forces of your application and compare them to the permissible lateral forces (depending on the stroke).	Side load (page 17) Diagrams (page 17)
11	Relubricating cycle	Please check, if the required relubricating cycle is suitable for your production environment.	"Relubrication" (page 20)
12	Motor / gearbox	Calculation of the necessary torque to generate the required force at the ETH. Selection of a suitable motor.	"Motor and Gearbox Selection" (page 25)
13	Motor mounting flange	Selection of a suitable motor mounting flange.	"Motor Mounting Options" (page 22)
14	Mounting type	Selection of the electro cylinder mounting method.	"Mounting Methods" (page 26)
15	Cylinder rods	Selection of the cylinder rod end for load mounting.	"Cylinder Rod Version" (page 32)

Calculating Required Axial Force

Formulas 1 & 2 below give the mathematical equation for calculating the thrust required to extend or retract the piston rod.
With the aid of the axial forces, it is possible to check if the electro cylinder is able to provide the required forces and if the maximum buckling load is respected. The axial forces are also used as the calculation basis for the service life.



Service loading

Formula symbols (Formula 1-2)

$F_{x,a,j}$	=	Axial forces during extension in N
$F_{x,e,j}$	=	Axial forces during retraction in N
$F_{x,ext}$	=	External axial force in N
$F_{G,ext}$	=	Weight force caused by an additional mass in N
$F_{G,Kse}$	=	Weight force caused by the cylinder rod end in N
$F_{G,Ks}$	=	Weight force caused by the cylinder rod in N
m_{ext}	=	Additional mass in kg
m_{Kse}	=	Mass of the cylinder rod end in kg (see "Cylinder Rod Version" page 32)
$m_{Ks,0}$	=	Mass of the cylinder rod at zero stroke in kg (see table "Technical Data" page 8)
$m_{KS,stroke}$	=	Mass of the cylinder rod per mm of stroke in kg (see table "Technical Data" page 8)
Stroke	=	Selected stroke in m
$a_{K,j}$	=	Acceleration at the cylinder rod in m/s²
α	=	Alignment angle in °
$F_{x,max}$	=	Maximum permissible axial force in N
$F_{fr,ext}$	=	External friction force in N

Index "j" for the individual segments of the application cycle

Calculation of axial forces

Determine the axial forces occurring during each individual segment of the application cycle.

Cylinder rod extending:

$$F_{x,a,j} = F_{x,ext} + F_{fr,ext} + (m_{ext} + m_{Kse} + m_{Ks,0} + m_{Ks,Stroke} \bullet Stroke) \bullet (a_{K,j} + \sin\alpha \bullet 9.81 \frac{m}{s^2})$$

Formula 1

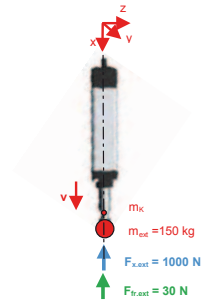
Cylinder rod retracting:

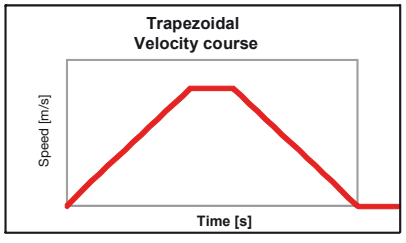
$$F_{x,e,j} = F_{x,ext} - F_{fr,ext} + (m_{ext} + m_{Kse} + m_{Ks,0} + m_{Ks,Stroke} \bullet Stroke) \bullet (-a_{K,j} + \sin\alpha \bullet 9.81 \frac{m}{s^2})$$

Formula 2

Sample calculation:

Vertical mounting
- ETH050
- Stroke = 500 mm = 0.5 m
- Pitch = 5 mm
- Rod End: External thread
- Trapezoidal velocity course
- Acceleration a_K = 4 m/s²
- m_{ext} = 150 kg
- $F_{x,ext}$ = 1000 N
- m_{Kse} = 0.15 kg
- $m_{Ks,0}$ = 0.15 kg
- $m_{Ks,Stroke}$ = 1.85 kg/m
- Alignment angle α = -90°
- External friction force = 30 N





Time [s]

Thrust rod moving forth: Mass is moved downwards

Load case: Acceleration

$$F_{x,a,1} = 1000N + 30N + \left(150kg + 0{,}15kg + 0{,}15kg + 1{,}85\frac{kg}{m} \cdot 0{,}5m\right) \cdot \left(4\frac{m}{s^2} + \sin(-90°) \cdot 9{,}81\frac{m}{s^2}\right) = 151N$$

Load case: Constant Velocity

$$F_{x,a,2} = 1000N + 30N + \left(150kg + 0{,}15kg + 0{,}15kg + 1{,}85\frac{kg}{m} \cdot 0{,}5m\right) \cdot \left(0\frac{m}{s^2} + \sin(-90°) \cdot 9{,}81\frac{m}{s^2}\right) = -454N$$

Load case: Deceleration

$$F_{x,a,3} = 1000N + 30N + \left(150kg + 0{,}15kg + 0{,}15kg + 1{,}85\frac{kg}{m} \cdot 0{,}5m\right) \cdot \left(-4\frac{m}{s^2} + \sin(-90°) \cdot 9{,}81\frac{m}{s^2}\right) = -1058N$$

Thrust rod moving back: Mass is moved upwards

Load case: Acceleration

$$F_{x,e,4} = 1000N - 30N + \left(150kg + 0{,}15kg + 0{,}15kg + 1{,}85\frac{kg}{m} \cdot 0{,}5m\right) \cdot \left(-4\frac{m}{s^2} + \sin(-90°) \cdot 9{,}81\frac{m}{s^2}\right) = -1118N$$

Load case: Constant Velocity

$$F_{x,e,5} = 1000N - 30N + \left(150kg + 0{,}15kg + 0{,}15kg + 1{,}85\frac{kg}{m} \cdot 0{,}5m\right) \cdot \left(0\frac{m}{s^2} + \sin(-90°) \cdot 9{,}81\frac{m}{s^2}\right) = -514N$$

Load case: Deceleration

$$F_{x,e,6} = 1000N - 30N + \left(150kg + 0{,}15kg + 0{,}15kg + 1{,}85\frac{kg}{m} \cdot 0{,}5m\right) \cdot \left(4\frac{m}{s^2} + \sin(-90°) \cdot 9{,}81\frac{m}{s^2}\right) = 91N$$

Selection of the Size and Screw Lead

Required maximum axial force

Determine the maximum axial force (page 11) that the electro cylinder must provide.

Preselection of the electro cylinder

Using the calculated force required, compare the actual electro cylinder specifications (page 8) to determine which profile size will produce enough force.
Once you have determined a profile size, determine that the unit will physically fit in the space allowed by the application (including parallel or inline motor mounts).

Required maximum velocity

The maximum velocity of the electro cylinder depends on the stroke.
With the profile size selected, refer to the critical speed information (page 8) to determine which screw lead works best for the application at the needed stroke length.
When the precise stroke is defined, the velocity must again be verified.

Required maximum acceleration

The maximum acceleration depends on the screw lead and serves as an additional selection criterion for the suitable electro cylinder. It is listed in the "Technical Data" (page 8).

ETH - Electro Thrust Cylinder for ATEX Environment

Parker Hannifin has extended its well known ETH - High Force Electro Thrust Cylinder for the use in explosive atmospheres (ATEX). The new ETH ATEX offers all advantages of the well know ETH Electro Thrust Cylinder and offers even in explosive atmospheres precise motion, positioning, setting and actuating.
The ETH ATEX range is ATEX certified for device group II, category 2 in explosive gas atmospheres.
In conjunction with the ATEX certified EX series servomotors, Parker Hannifin offers a complete drive package for such applications.

Target Market / Applications

A ATEX environment contains a mixture of air and flammable substances such as gas, vapor or fluids which are potentially explosive under atmospheric conditions. ATEX certificated devices are essential for the use under this conditions.

Typical applications:

- Oil & Gas Industry
- Chemical and pharmaceutical industries
- Food processing (distillery)
- Printing & Plastic Industry
- Energy (Generation of Bio gas, gas turbines)
- Automotive industry (Paint finish)
- Waste processing plants

How to proceed when projecting a ATEX Cylinder

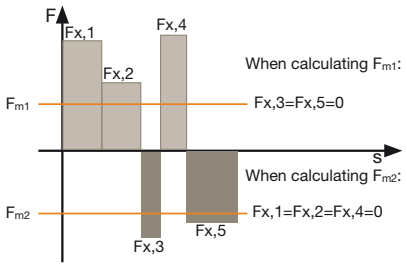
- Project an ETH - Electro Thrust Cylinder by means of this catalogue
- Check by means of the document "ETH ATEX frame conditions for applications" [192-550006] whether the selected ETH - Electro Thrust Cylinder corresponds to all ATEX demands in your application.
- In case the conditions cannot be fulfilled, please choose a larger electro cylinder and recheck the application data (e.g. changed cycle times).
- A application specific release by measuring the self-heating with your application data in our company is possible (see "ETH ATEX frame conditions for applications" [192-550006].

Service Life

Nominal service life[1, 2]

The nominal service life of the electro cylinder can be determined with the aid of the diagrams page 14.
The forces calculated for each individual segment of the application cycle must be summarized into an equivalent axial force Fm "Calculating Required Axial Force" (page 11). If axial forces with different signs apply, two equivalent axial forces must be calculated:

- F_{m1} for all positive forces. The negative forces will convert to zero.
- F_{m2} for all negative forces. The positive forces will convert to zero.



Calculation

$$F_{m1,2} = \sqrt[3]{\frac{1}{s_{total}} (F^3_{x,1} \bullet s_1 + F^3_{x,2} \bullet s_2 + F^3_{x,3} \bullet s_3 + ...)}$$

Formula 3

With the equivalent axial forces, the nominal service life L in km can be read off the diagrams on page 14.

With **load on both sides**, the nominal service life is:

$$L = (L_1^{-1.11} + L_2^{-1.11})^{-0.9}$$

Formula 3.1

Actual service life

The actual service life can only be approximated due to a variety of different effects. The nominal service life L calculation does, for instance, not take insufficient lubrication, impacts and vibrations or critical side loads into consideration. These effects can however be estimated with the aid of the application factor fw.

The actual service life is calculated as follows:

$$L_{fw} = \frac{L}{f_w^3}$$

Formula 4

Application factor f_w

Movement cycle	Shocks/vibrations			
	none	light	medium	heavy
More than 2.5 screw rotations	**1.0**	**1.2**	**1.4**	**1.7**
1.0 to 2.5 screw rotations[3] (short stroke applications)	1.8	2.1	2.5	3.0

[3]After max. 10000 movement cycles, a lubrication run must be performed (see lubrication run intervals for short stroke applications).

Boundary conditions for application factor f_w:

- Externally guided electro cylinders
- Accelerations <10 m/s²

If your application factor is <1.5, please contact Parker.
The same applies for detailed calculations or for special boundary conditions.

Lubrication run lengths for short stroke applications

Lengths of lubrication runs [mm]	ETH032			ETH050			ETH080			ETH100		ETH125	
	M05	M10	M16	M05	M10	M20	M05	M10	M32	M10	M20	M10	M20
	>45	>54	>58	>40	>46	>58	>47	>65	>95	>102	>140	>122	>210

Abbreviations used (formula 3-4)

F_m	=	Equivalent axial force in N
$F_{x,j}$	=	Resulting axial force in N (see formula 1 & formula 2, page 11
s_j	=	Travel given a defined force $F_{x,a,j}$ in mm
s_{total}	=	Total travel in mm
L	=	Nominal service life in km (see "Service Life" diagrams page 14
L_{fw}	=	Service life respecting the application factor in km
f_w	=	Application factor (see table "Application factor" page 13

Index "j" for the individual segments of the application cycle

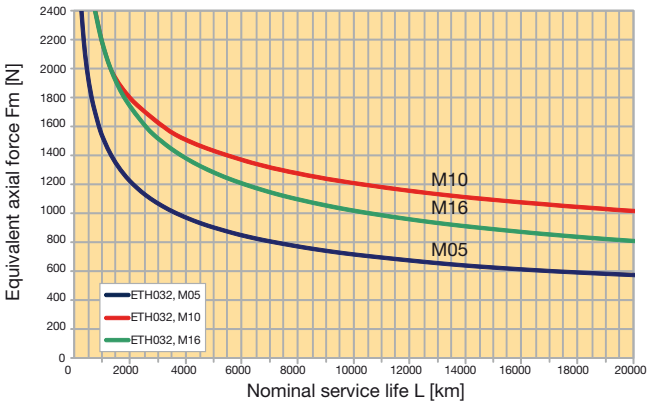
If you need the service life as the number of possible cycles, just divide the service life in kilometers by twice the stroke traveled. i.e. Standstill times are not taken into consideration when determining the equivalent axial force (F_m), as s_j=0. Caution, do always consider the stroke as well as the return stroke.

[1]The nominal service life is the service life reached by 90 % of a sufficient number of similar electro cylinders until the first signs of material fatigue occur.
[2] ATEX cylinders feature a reduced the service life. Please note the brochure on "intended use" (192-550004).

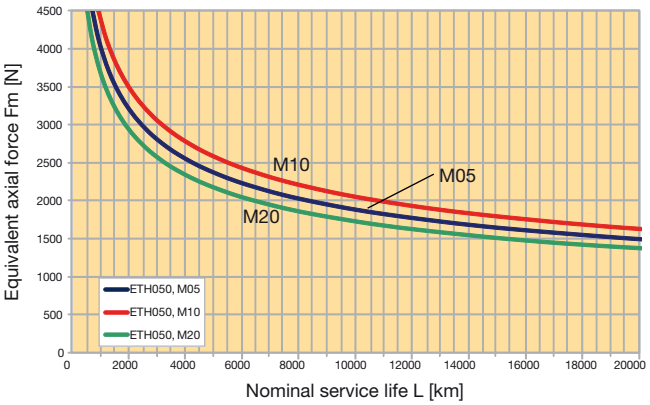
Diagrams [2]

The given values apply when adhering to the recommended lubrication intervals (see relubrication). The diagrams were established in accordance with DIN ISO 3408-5

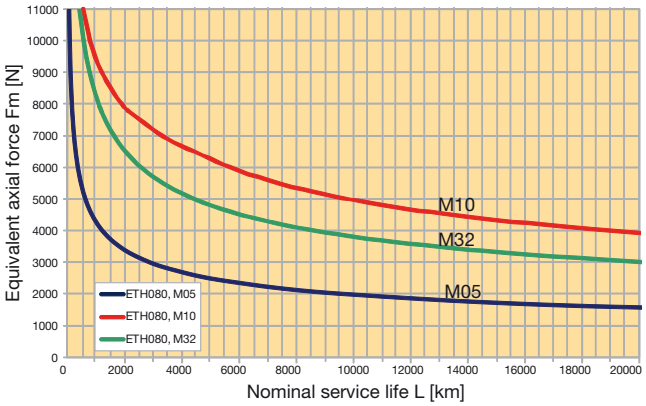
ETH032



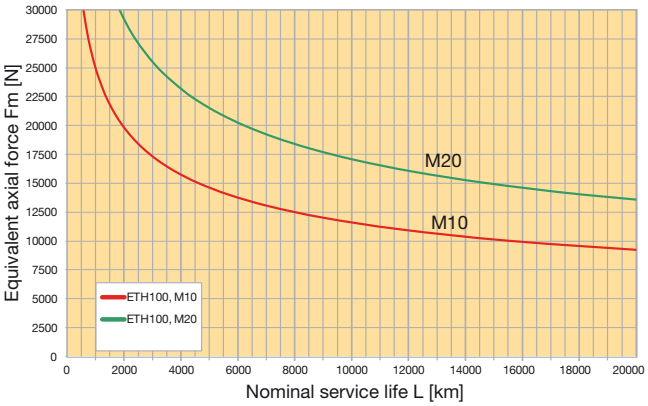
ETH050



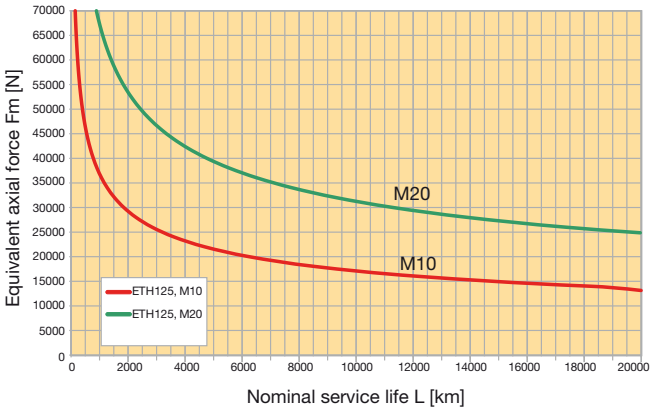
ETH080



ETH100



ETH125



Prerequisites for nominal service life

- Bearing and screw temperature between 20 °C and 40 °C.
- No impairment of the lubrication, for example by external particles.
- Relubrication in accordance with the specifications.
- The given values for thrust force, speed and acceleration must be adhered to at any rate.
- No approaching the mechanical end stops (external or internal), no other abrupt loads, as the given maximum force of the cylinder may never be exceeded.
- No external side loads
- Application factor fw = 1. In order to calculate the real service life and the corresponding application factor, please refer to chapter "Service Life" see page 13
- No high exploitation of several power features at a time (for example maximum speed or thrust force).
- No regulating oscillation at standstill.

[2] ATEX cylinders feature a reduced the service life. Please note the brochure on "intended use" (192-550004).

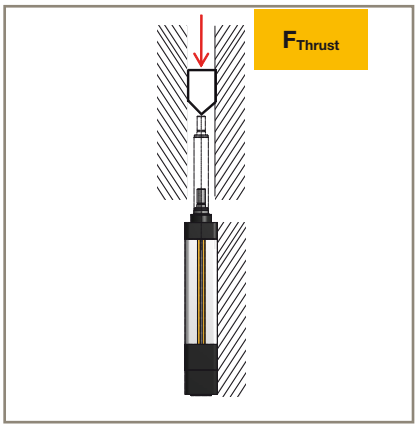
Permissible Axial Thrust Forces

Limited by the risk of buckling, depending on the stroke and the mounting method; traction forces do not pose any buckling risk.
Please check if the maximum axial force ((page 11)) is possible with the planned mounting method and for the desired stroke

Diagrams

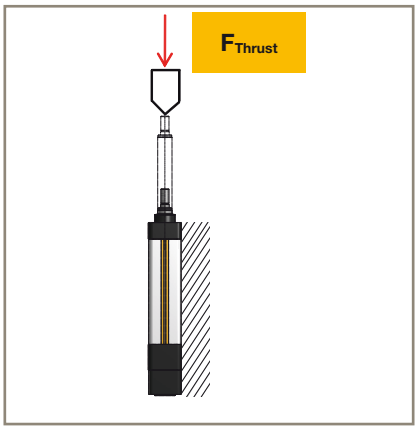
Case 1

Cylinders fixed with mounting flanges, foot mounting or mounting plates.
Cylinder always fixed at the front end as well.
Thrust rod with axial guiding.



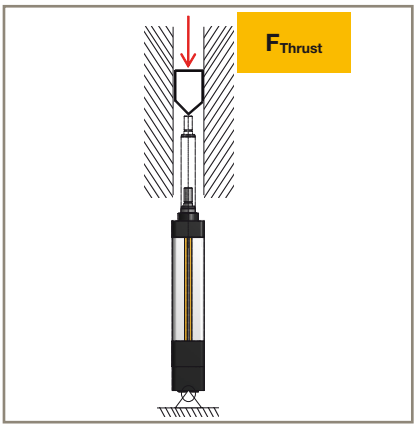
Case 2

Cylinders fixed with mounting flanges, foot mounting or mounting plates.
Cylinder always fixed at the front end as well.
Thrust rod without axial guiding. External force applied axially with respect to cylinder axis.

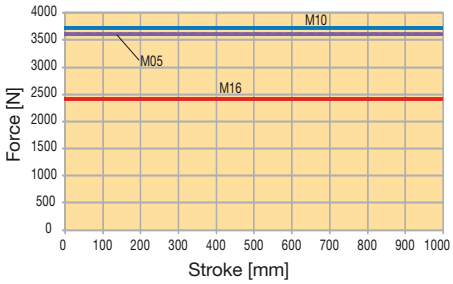


Case 3

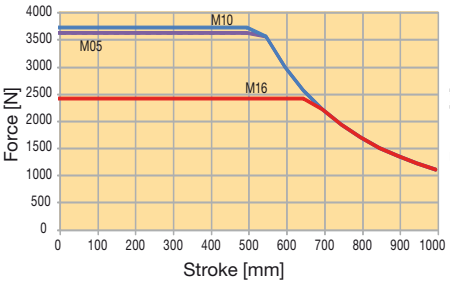
Cylinder mounted with center trunnion, rear clevis or any other rear fixing material (e.g. rear mounting plate).
Thrust rod with axial guiding.



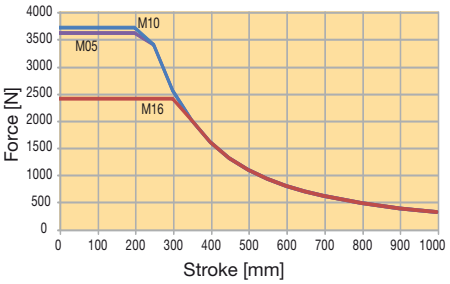
ETH032 - Case 1



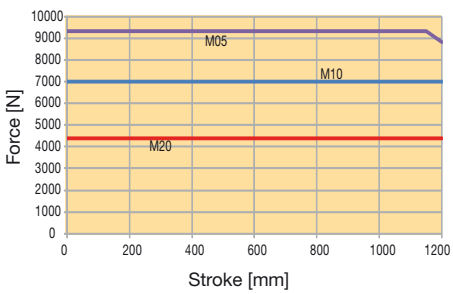
ETH032 - Case 2



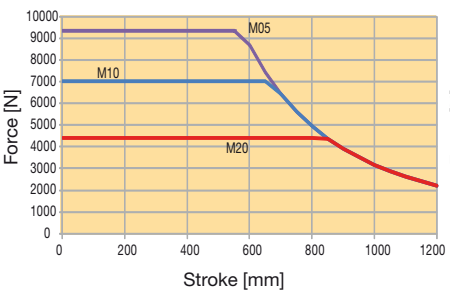
ETH032 - Case 3



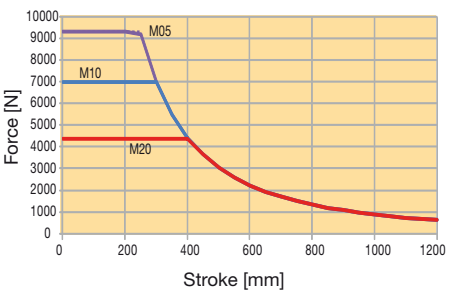
ETH050 - Case 1



ETH050 - Case 2

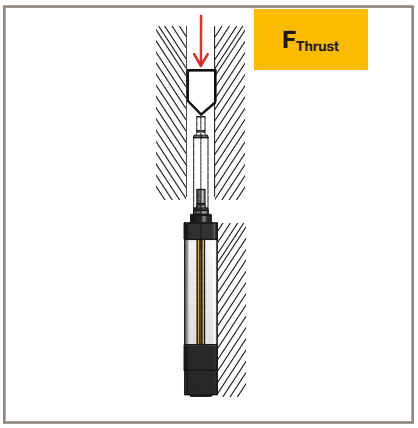


ETH050 - Case 3



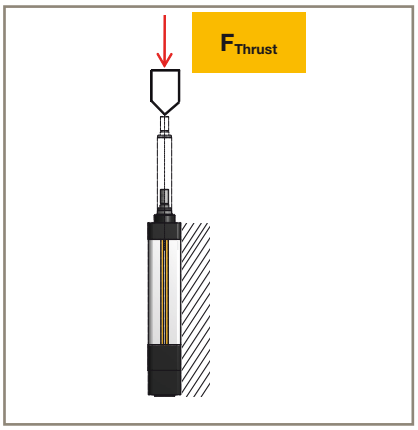
Case 1

Cylinders fixed with mounting flanges, foot mounting or mounting plates.
Cylinder always fixed at the front end as well.
Thrust rod with axial guiding.



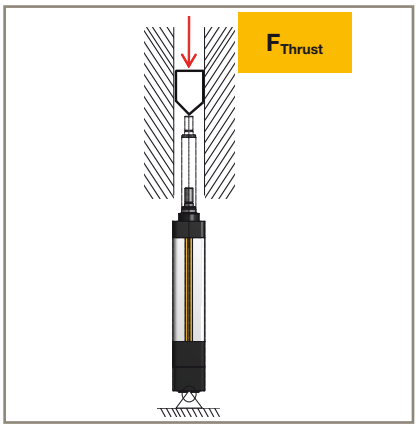
Case 2

Cylinders fixed with mounting flanges, foot mounting or mounting plates.
Cylinder always fixed at the front end as well.
Thrust rod without axial guiding. External force applied axially with respect to cylinder axis.

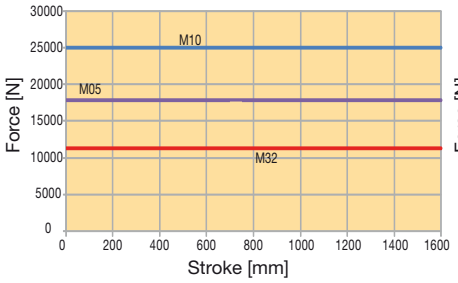


Case 3

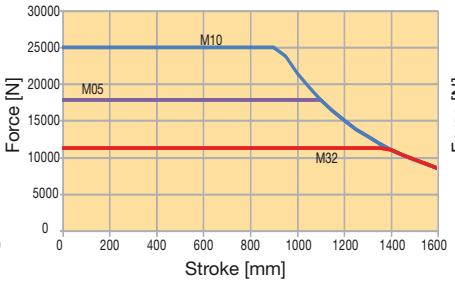
Cylinder mounted with center trunnion, rear clevis or any other rear fixing material (e.g. rear mounting plate).
Thrust rod with axial guiding.



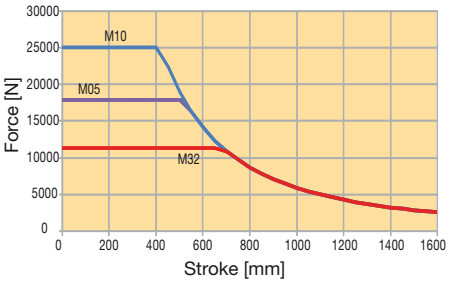
ETH080 - Case 1



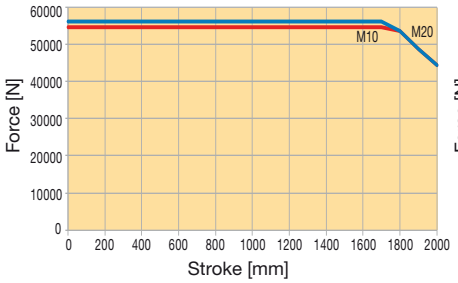
ETH080 - Case 2



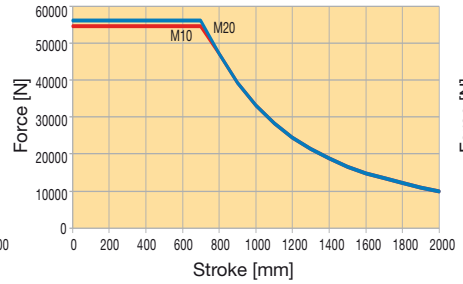
ETH080 - Case 3



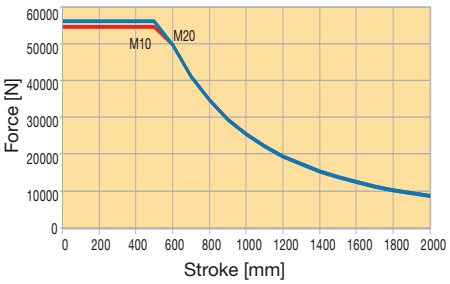
ETH100 - Case 1



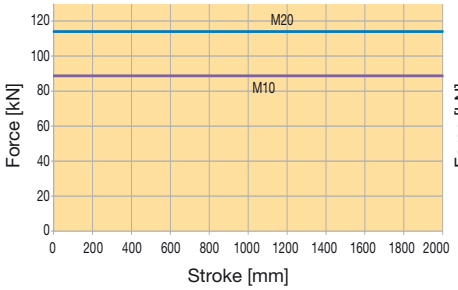
ETH100 - Case 2



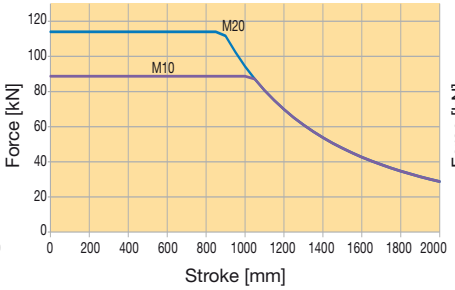
ETH100 - Case 3



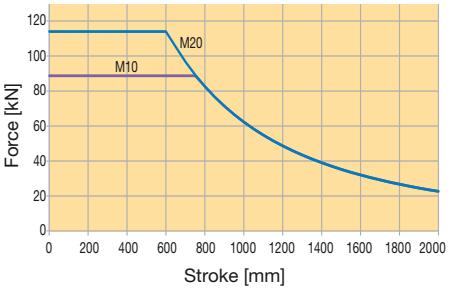
ETH125 - Case 1



ETH125 - Case 2



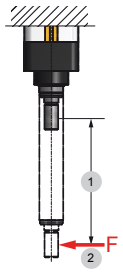
ETH125 - Case 3



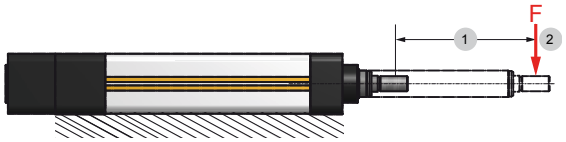
Permissible Side Load [1)]

The electro cylinder features a generously dimensioned cylinder rod and screw nut bearing in the form of high-quality plastic sliding elements to absorb the side load. Please note that electro cylinders with a longer stroke permit a higher lateral force at the same extension length. It may therefore be useful to choose a longer stroke than required for the application in order to increase the permissible lateral force.
If the permissible lateral forces are exceeded or if the maximum axial force occurs at the same time, the optional outrigger bearing (option R) must be used.

Permissible lateral forces in vertical mounting position

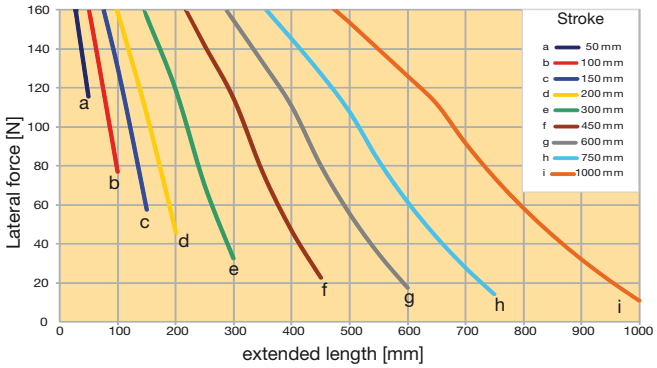


Permissible lateral forces in horizontal mounting position

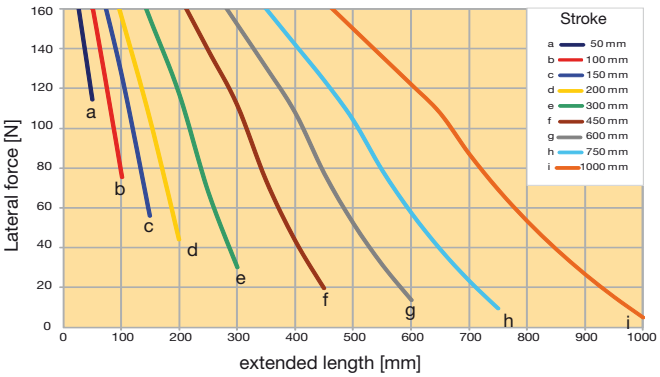


1: Extended length
2: Force application - at the middle of the cylinder rod thread

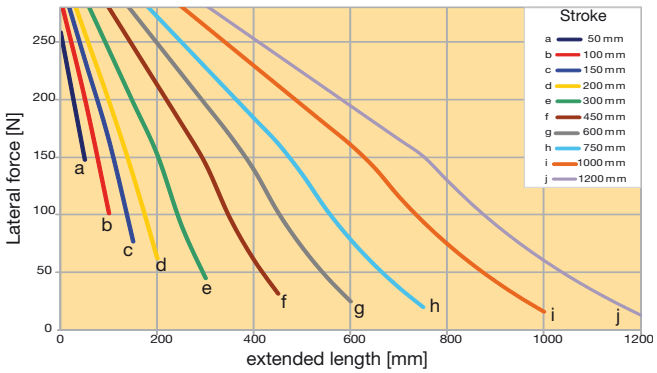
ETH032



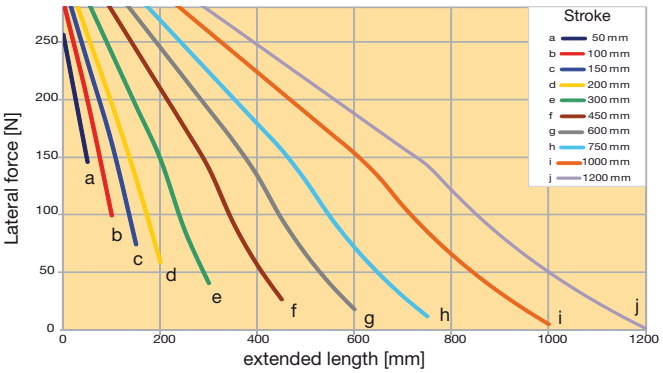
ETH032



ETH050



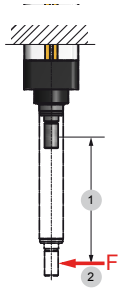
ETH050



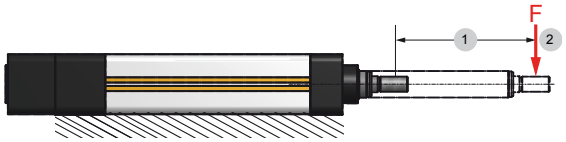
The diagrams apply for an ambient temperature of 20 °C, for all housing orientations and a medium travel speed of 0.5 m/s, (ETH032, ETH050, ETH080) or 0.25 m/s (ETH100, ETH125).

[1)] For ATEX cylinders, side loads are not permitted!

Permissible lateral forces in vertical mounting position

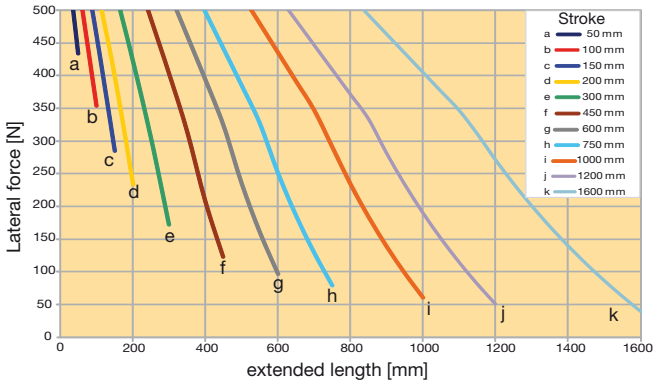


Permissible lateral forces in horizontal mounting position

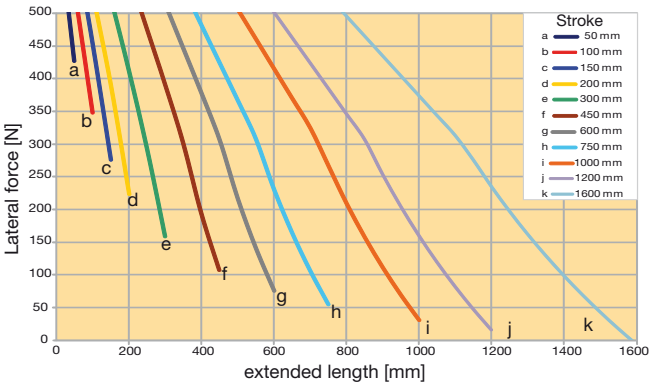


1: Extended length
2: Force application - at the middle of the cylinder rod thread

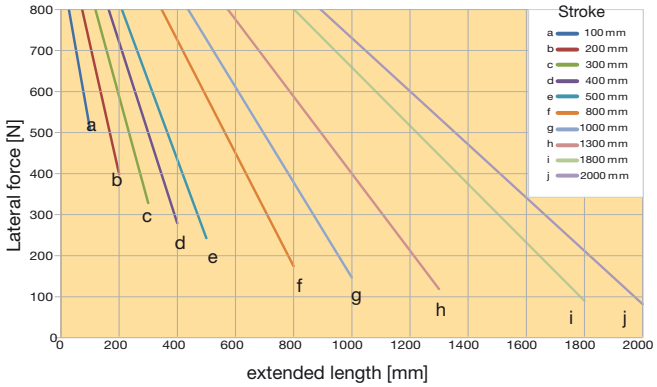
ETH080



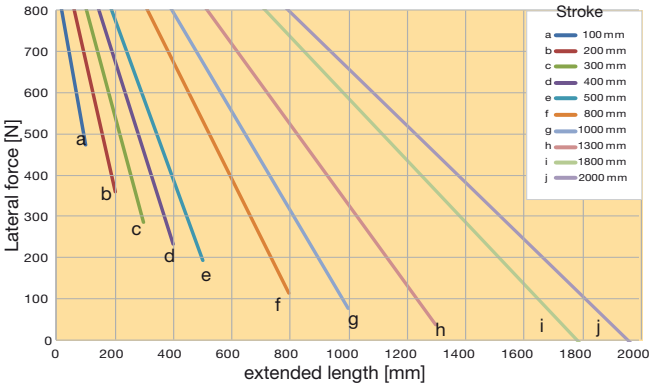
ETH080



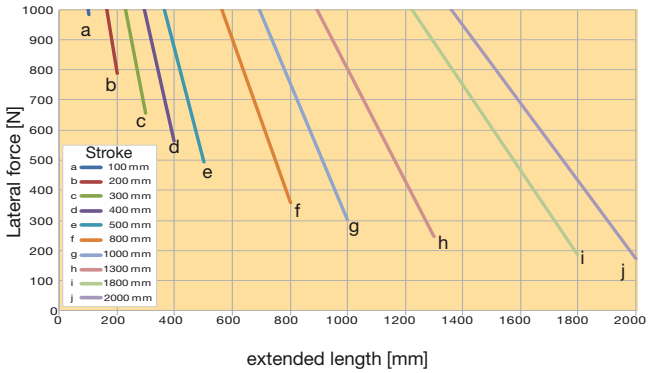
ETH100



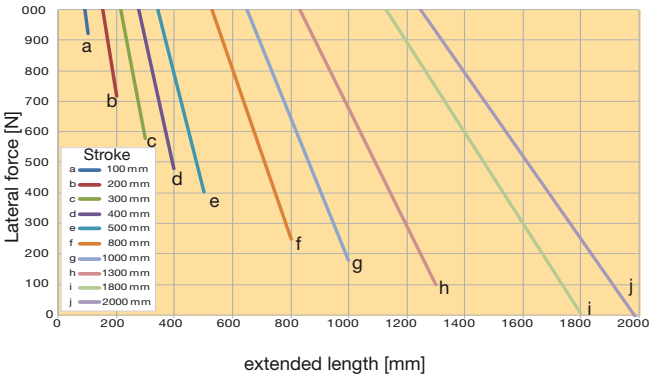
ETH100



ETH125



ETH125



The diagrams apply for an ambient temperature of 20 °C, for all housing orientations and a medium travel speed of 0.5 m/s, (ETH032, ETH050, ETH080) or 0.25 m/s (ETH100, ETH125).

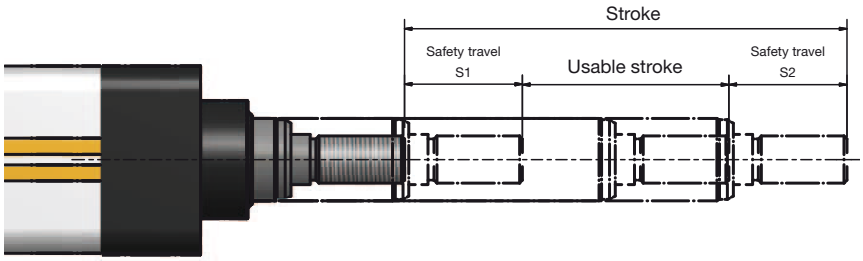
[1] For ATEX cylinders, side loads are not permitted!

Stroke, Usable Stroke and Safety Travel

Calculation

Stroke:

The stroke to be indicated in the order code is the mechanically maximal possible stroke between the internal end stops.



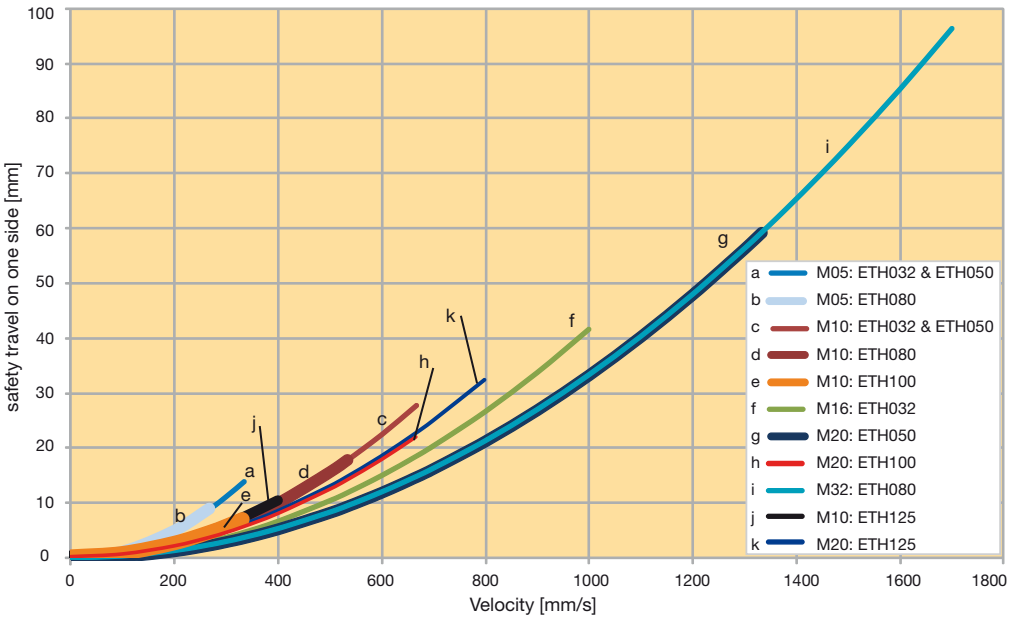
Usable stroke:

The usable stroke is the distance which you need to move in your application. It is always shorter than the stroke.

Safety travel (S1 & S2):

The safety travels are required to slow down the cylinder after it has passed a limit switch, Emergency stop in order to avoid contact with the mechanical limit stops.
Depending on the screw lead and the maximum speed, the following diagram recommends a minimum safety travel, which is sufficient for most applications according to experience.
With demanding applications (great masses and high dynamic), the safety travel has to be calculated and enlarged accordingly (dimensioning on demand).

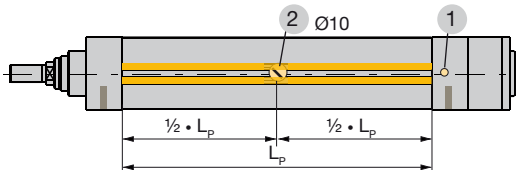
Diagram



Information: The safety travel taken from the diagram applies for one side. I.e. the diagram value must be multiplied by factor 2 in order to get the total safety travel. The diagram is based on the maximum screw acceleration / deceleration

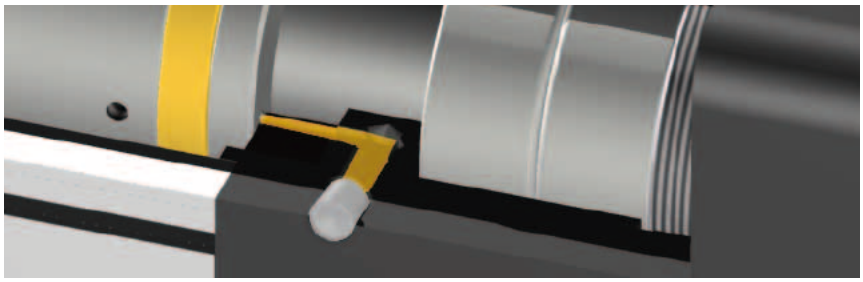
Relubrication

All frame sizes include a standard Easy lubrication port for lubricating the screw nut (designation "1" in the order code page 52).



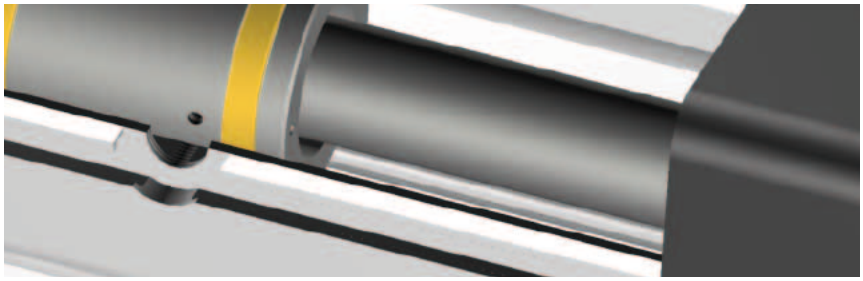
1: Central lubrication (standard)
2: Optional lubrication (possible on all 4 sides).
L_P: Length of profile

Option 1: Central lubrication (standard)



Relubrication is simple with the easy access port. Users simply perform a controlled retract of the cylinder approaching the end stop under slow speed and grease the cylinder. Central relubrification orientation is always envisaged in a 3 o'clock position.

Option 2...5: Middle lubrication via an opening in the profile

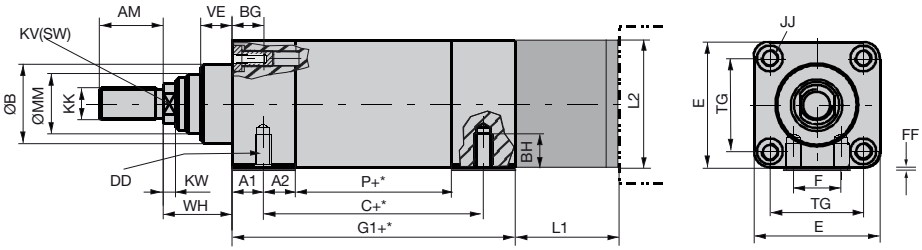


If a space constraint does not allow easy access to the standard lubrication port, other options in the part number configuration allow for a port at the center of the extrusion. Free access to this bore even after integration of the cylinder into a system can be ensured by choosing the corresponding profile orientation (see order code page 52). The bore is located exactly in the middle of the aluminum profile.

Dimensions

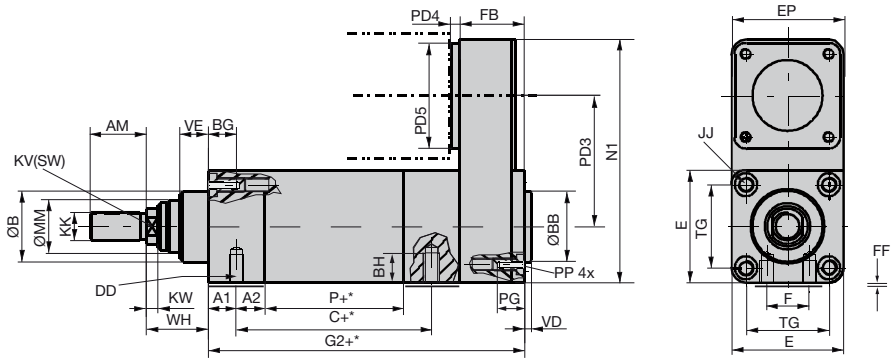
Electro Cylinder

prepared for inline motor mounting



Electro Cylinder

prepared for parallel motor mounting



+* =Measure + length of desired stroke

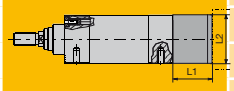
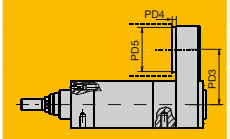
Dimensions Standard (IP-Version)

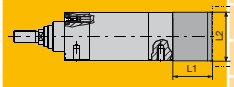
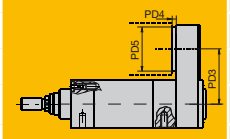
Cylinder size	Unit	ETH032			ETH050			ETH080			ETH100		ETH125	
Screw lead		M05	M10	M16	M05	M10	M20	M05	M10	M32	M10	M20	M10	M20
C	[mm]	93.6 (93.6)	102.6 (102.6)	106.6 (106.6)	99.5 (100.5)	105.5 (106.5)	117.5 (118.5)	141.5 (142.5)	159.5 (160.5)	189.5 (190.5)	- [2]		- [2]	
G1	[mm]	133 (180.5)	142 (189.5)	146 (193.5)	154 (198.5)	160 (204.5)	172 (216.5)	197 (259.5)	215 (277.5)	245 (307.5)	323 (349.5)	361 (387.5)	461 (487.5)	549 (575.5)
G2	[mm]	180.5 (228.5)	189.5 (237.5)	193.5 (241.5)	194 (239)	200 (245)	212 (257)	257 (320)	275 (338)	305 (368)	451 (478.0)	489 (516.0)	624 (651.0)	712 (739.0)
P	[mm]	66	75	79	67	73	85	89	107	137	162	200	192	280
A1	[mm]	14 (60)			15.5 (58.5)			21 (82)			- [2]		- [2]	
A2	[mm]	17			18.5			32			- [2]		-[2]	
AM	[mm]	22			32			40			70		96	
BG (=BN+BS)	[mm]	16			25			26			32		44	
BN Usable length of thread	[mm]	11			20			20			22		33	
BS Depth of width across flat (without thread)	[mm]	5			5			6			10		11	
BH	[mm]	9			12.7			18.5			- [2]		-[2]	
DD mount thread [1]	[mm]	M6x1.0			M8x1.25			M12x1.75			- [2]		-[2]	
E	[mm]	46.5			63.5			95			120		150	
EP		46.5			63.5			95			175		220	
F	[mm]	16			24			30			- [2]		-[2]	
FF	[mm]	0.5			0.5			1.0			0		0	
JJ	[mm]	M6x1.0			M8x1.25			M10x1.5			M16x2		M20x2.5	
PP	[mm]	M16x2			M6x1.0			M8x1.25			M10x1.5		M20x2.5	
PG (Thread depth on the PA housing)	[mm]	25			BG (=BN+BS)			BG (=BN+BS)			BG (=BN+BS)		35	
KK	[mm]	M10x1.25			M16x1.5			M20x1.5			M42x2		M48x2	
KV	[mm]	10			17			22			46		55	
ØMM h9	[mm]	22			28			45			70		85	
TG	[mm]	32.5			46.5			72			89		105	
KW	[mm]	5			6.5			10			10		10	
N1	[mm]	126			160			233.5			347		450	
FB	[mm]	47.5 (48)			40 (40.5)			60 (60.5)			128 (128.5)		163 (163.5)	
VD	[mm]	4			4			4			4		5	
ØBB	[mm]	30 d11			40 d11			45 d11			90 d9		110 d8	
VE	[mm]	12			16			20			20		20	
WH	[mm]	26			37			46			51		53	
ØB	[mm]	30 d11			40 d11			60 d11			90 d8		110 d8	

(1) Thread "DD" is only mandatory for mounting method "F".
2) ETH100, ETH125 does not have a mounting thread on the underside.

Motor Mounting Options

Dimensions [mm]

				Motor Dimensions				Motor mounting options		
ETH032	inline	Code	Motor / gearbox	Pilot	Bolt circle	∅ Shaft	Shaft length	L1	L2	
		K1A	SMH60-B8/9	40	63	9	20	60.0	60.0	
		K1A	MH56-B5/9	40	63	9	20			
		K1B	SMH60-B5/11	60	75	11	23	60.0	70.0	
		K1B	MH70-B5/11	60	75	11	23			
		K1B	NX3, EX3	60	75	11	23			
		K1C	SMH82-B8/14	80	100	14	30	67.0	82.0	
		P1A	PS60	50	70	16	40	77.0	63.5	
		P1G	PE3	40	52	14	35	72.0	63.5	
	parallel	Code	Motor / gearbox	Pilot	Bolt circle	∅ Shaft	Shaft length	PD3	PD4	PD5
		K1A	SMH60-B8/9	40	63	9	20	67.5	9.0	60.0
		K1A	MH56-B5/9	40	63	9	20			
		K1B	SMH60-B5/11	60	75	11	23		9.0	70.0
		K1B	MH70-B5/11	60	75	11	23			
		K1B	NX3, EX3	60	75	11	23			
		K1C	SMH82-B8/14	80	100	14	30		14.0	82.0
		P1A	PS60	50	70	16	40		22.0	63.5
		P1G	PE3	40	52	14	35		16.0	63.5

				Motor dimensions				Motor mounting options		
ETH050	inline	Code	Motor / gearbox	Pilot	Bolt circle	∅ Shaft	Shaft length	L1	L2	
		K1B	SMH60-B5/11	60	75	11	23	59	70	
		K1B	MH70-B5/11	60	75	11	23	59	70	
		K1B	NX3, EX3	60	75	11	23	59	70	
		K1C	SMH82-B8/14	80	100	14	30	63	82	
		K1E	SMH82-B5/19	95	115	19	40	84	100	
		K1E	SMH100-B5/19	95	115	19	40	84	100	
		K1E	MH105-B5/19	95	115	19	40	84	105	
		K1D	MH105-B9/19	80	100	19	40	84	105	
		K1D	SMH82-B8/19	80	100	19	40	84	82	
		K1D	NX4, EX4	80	100	19	40	84	82	
		P1A	PS60	50	70	16	40	74	63.5	
		P1G	PE3	40	52	14	35	69	63.5	
	parallel	Code	Motor / gearbox	Pilot	Bolt circle	∅ Shaft	Shaft length	PD3	PD4	PD5
		K1B	SMH60-B5/11	60	75	11	23	87.5	9	70
		K1B	MH70-B5/11	60	75	11	23		9	70
		K1B	NX3, EX3	60	75	11	23		9	70
		K1C	SMH82-B8/14	80	100	14	30		13	82
		K1F	SMH100-B5/14 [1)]	95	115	14	30		13	100
		P1A	PS60	50	70	16	40		24	63.5
		P1G	PE3	40	52	14	35		16	63.5

[1)] Order Code SMH100-B5/14: " SMH100_ _ _ _ET... " (the motor shaft diameter is replaced by the term "ET")
(not in the motors catalog) only with feedback: Resolver, A7

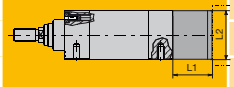
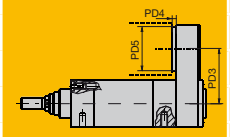
Motors always with key groove on the output shaft. Additional motor mounting options on request.

Details on the Internet:

Motors
www.parker.com/eme/smh
www.parker.com/eme/mh
www.parker.com/eme/nx
www.parker.com/eme/ex

Gearboxes
www.parker.com/eme/gear

Dimensions [mm]

				Motor Dimensions				Motor mounting options		
ETH080	inline	Code	Motor / gearbox	Pilot	Bolt circle	∅ Shaft	Shaft length	L1	L2	
		K1E	SMH82-B5/19	95	115	19	40	94.5	100	
		K1E	SMH100-B5/19	95	115	19	40	94.5	100	
		K1E	MH105-B5/19	95	115	19	40	94.5	100	
		K1D	MH105-B9/19	80	100	19	40	94.5	96	
		K1D	SMH82-B8/19	80	100	19	40	94.5	96	
		K1D	NX4, EX4	80	100	19	40	94.5	96	
		K1K	MH145-B5/24	130	165	24	50	104.5	145	
		K1K	SMH142-B5/24	130	165	24	50	104.5	145	
		K1J	MH105-B6/24	110	130	24	50	104.5	116	
		K1J	SMH115-B7/24	110	130	24	50	104.5	116	
		K1J	NX6, EX6	110	130	24	50	104.5	116	
		P1B	PS90	80	100	22	52	106.5	95	
		P1H	PE4	80	100	20	40	94.5	95	
	parallel	Code	Motor / gearbox	Pilot	Bolt circle	∅ Shaft	Shaft length	PD3	PD4	PD5
		K1E	SMH82-B5/19	95	115	19	40		15	100
		K1E	SMH100-B5/19	95	115	19	40		15	100
		K1E	MH105-B5/19	95	115	19	40		15	100
		K1D	MH105-B9/19	80	100	19	40		15	96
		K1D	SMH82-B8/19	80	100	19	40		15	96
		K1D	NX4, EX4	80	100	19	40		15	96
		K1K	MH145-B5/24	130	165	24	50	130	15	145
		K1K	SMH142-B5/24	130	165	24	50		15	145
		K1J	MH105-B6/24	110	130	24	50		15	116
		K1J	SMH115-B7/24	110	130	24	50		15	116
		K1J	NX6, EX6	110	130	24	50		15	116
		P1B	PS90	80	100	22	52		30	95
		P1H	PE4	80	100	20	40		12	95

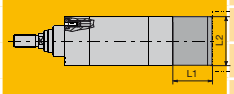
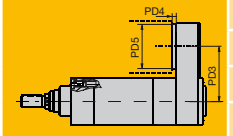
Motors always with key groove on the output shaft. Additional motor mounting options on request.

Details on the Internet:

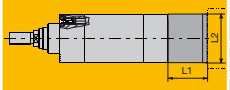
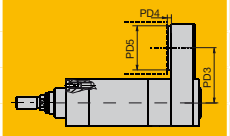
Motors
www.parker.com/eme/smh
www.parker.com/eme/mh
www.parker.com/eme/nx
www.parker.com/eme/ex

Gearboxes
www.parker.com/eme/gear

Dimensions [mm]

				Motor Dimensions				Motor mounting options		
ETH100	inline	Code	Motor / gearbox	Pilot	Bolt circle	∅ Shaft	Shaft length	L1	L2	
		K1H	SMH100-B5/24	95	115	24	50	155	140	
		K1H	MH105-B5/24	95	115	24	50	155	140	
		K1J	SMH115-B7/24, NX6, EX6	110	130	24	50	155	140	
		K1K	SMH142-B5/24	130	165	24	50	155	145	
		K1K	MH145-B5/24	130	165	24	50	155	145	
		K1L	MH205-B5/38	180	215	38	80	185	205	
		K1L	SMH170-B5/38	180	215	38	80	185	205	
		P1C	PS115	110	130	32	68	175	140	
		P1D	PS142	130	165	40	102	207	142	
		P1J	PE5	110	130	25	55	160	140	
	parallel	Code	Motor / gearbox	Pilot	Bolt circle	∅ Shaft	Shaft length	PD3	PD4	PD5
		K1H	SMH100-B5/24	95	115	24	50	176	23	155
		K1H	MH105-B5/24	95	115	24	50		23	155
		K1J	SMH115-B7/24, NX6, EX6	110	130	24	50		23	155
		K1K	SMH142-B5/24	130	165	24	50		22	155
		K1K	MH145-B5/24	130	165	24	50		22	155
		K1L	MH205-B5/38	180	215	38	80		27	205
		K1L	SMH170-B5/38	180	215	38	80		27	205
		P1C	PS115	110	130	32	68		38	155
		P1D	PS142	130	165	40	102		45	155
		P1J	PE5	110	130	25	55		23	155

Motors always with key groove on the output shaft. Additional motor mounting options on request.

				Motor Dimensions				Motor mounting options		
ETH125	inline	Code	Motor / gearbox	Pilot	Bolt circle	∅ Shaft	Shaft length	L1	L2	
		K1L	SMH170	180	215	38	80	209.5	205	
		K1L	MH205	180	215	38	80	209.5	205	
		K1M	MH265	250	300	48	110	239.5	264	
		P1C	PS115	110	130	32	68	197.5	170	
		P1D	PS142	130	165	40	102	231.5	170	
		P1K	PE7	120	140	40	97	226.5	205	
	parallel	Code	Motor / gearbox	Pilot	Bolt circle	∅ Shaft	Shaft length	PD3	PD4	PD5
		K1L	SMH170	180	215	38	80	224	25	205
		K1L	MH205	180	215	38	80		25	205
		K1M	MH265	250	300	48	110		45	264
		P1C	PS115	110	130	32	68		32	185
		P1D	PS142	130	165	40	102		45	185
		P1K	PE7	120	140	40	97		42	205

Additional motor mounting options on request.

Details on the Internet:

Motors
www.parker.com/eme/smh
www.parker.com/eme/mh
www.parker.com/eme/nx
www.parker.com/eme/ex

Gearboxes
www.parker.com/eme/gear

Motor and Gearbox Selection

Drive torque calculation

The torques to be produced by the motor result from the acceleration, the load and the friction torque. The drive torques must be calculated for all segments of the application cycle (represented by index "j")

Calculation of the **acceleration torque** with respect to the rotary moments of inertia:

$$M_{B,j} = \left((J_{i/p,0} + J_{i/p,Stroke} \bullet \text{Stroke}) \bullet \frac{1}{\eta_{ETH}} \bullet \frac{1}{i_G^2 \bullet \eta_G} + J_G + J_M \right) \bullet 10^{-3} \bullet \frac{6.28 \bullet a_{K,j}}{P_h}$$

only with gearbox

Formula 5

The acceleration forces due to the translatory moved masses are taken into consideration in the calculation of the axial forces on (page 11).

The **load torques** result from the occurring axial forces:

$$M_{L,j} = \frac{F_{x,a\,/\,e,j}}{\text{Thrust force factor}} \bullet \frac{1}{i_G \bullet \eta_G}$$

only with gearbox

Formula 6

The motor must therefore generate the following drive torques:

$$M_{M,j} = M_{B,j} + M_{L,j}$$

Formula 7

The **effective torque** can be deduced from the drive torques for all segments of the application cycle (formula 7):

$$M_{eff} = \sqrt[2]{\frac{1}{t_{total}} \bullet (M_{M1}^2 \bullet t_1 + M_{M2}^2 \bullet t_2 + ...)}$$

Formula 8

Motor dimensioning

- The nominal torque of the motor must exceed the calculated effective torque (formula 8).
- The peak torque of the motor must exceed the maximum occurring drive torque (formula 7).

With the aid of the "motor mounting options" chart you can check if the respective motor is mechanically compatible to the corresponding electro cylinder.

Abbreviations used (formula 5-8)

$M_{B,j}$	= Variable acceleration torque in Nm
$J_{i/p,0}$	= Red. rot. mass moment of inertia at zero stroke for inline/parallel motor configuration in kgmm² see "Technical Data" page 8
$J_{i/p,\,Stroke}$	= Red. rot. mass moment of inertia per mm of stroke for inline/parallel motor configuration in kgmm² see "Technical Data" page 8
Stroke	= Selected stroke in mm
η_{ETH}	= Efficiency of the electro cylinder 0.9 (inline drive configuration) 0.81 (parallel motor)
i_G	= Gearbox ratio
η_G	= Efficiency of the gearbox (see gearbox manufacturer specifications)
J_M	= Motor mass moment of inertia in kgmm² (see motor manufacturer specifications)
J_G	Gearbox mass moment of inertia in kgmm² (see gearbox manufacturer specifications)
$a_{K,j}$	= Acceleration at the cylinder rod in m/s²
P_h	= Screw pitch in mm
$M_{L,j}$	= Load torque in Nm
$F_{x,a/e,j}$	= Loads in x direction in N (see page 11
$M_{M,j}$	= Drive torque in Nm
M_{eff}	= Effective value - motor in Nm
t_{total}	= Total cycle time in s
t_j	= Amount of time in the cycle in s

Force constant: "Technical Characteristics" see page 8.
Index "j" for the individual segments of the application cycle

Mounting Methods

Please respect the notes in the ETH Manual (19x-550002) on the permissible screws and tightening torques.

Standard

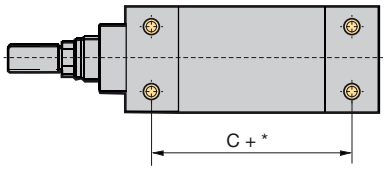
Order code **F**

ETH032-ETH125

Example for parallel motor configuration

Mounting via thread on the cylinder front or end side with parallel motor configuration (ETH032-ETH125).
("Dimensions" see page 21)

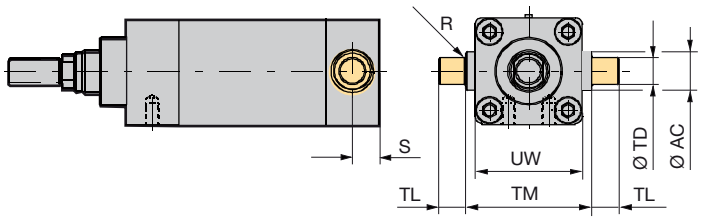
ETH032-ETH080



Mounting with 4 mounting threads on the underside of the profile.
(ETH032-ETH080).
("Dimensions" see page 21)

Center Trunnion Mounting

Order code **D**



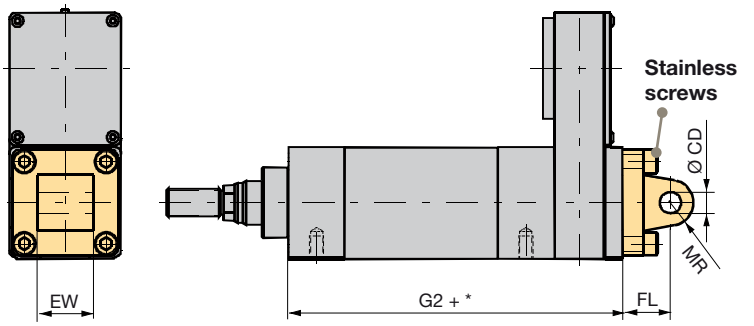
	UW	ØTD (h8)	R	TL	TM	ØAC	S
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
ETH032	46.5	12	1	12	50	18	25.5
ETH050	63.5	16	1	16	75	25	39
ETH080	95.3	25	2	25	110	35	34.5
ETH100	120	40	4	40	140	70	57
ETH125	150	50	10	52	160	90	100

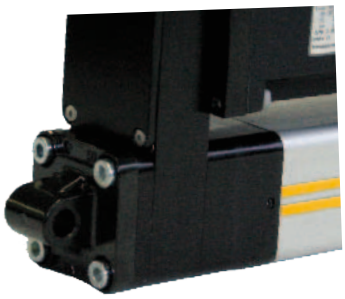
+* = Measure + Length of desired stroke ("Dimensions" see page 21).
Note: For relubrication option "1" (central lubrication port) please see mounting method with option "D" center trunnion always on 6 o'clock!

Rear Eye Mounting

Order code

E





	Order no.	EW	ØCD	MR	FL ±0.2
		[mm]	[mm]	[mm]	[mm]
ETH032	0112.033	26	10 $^{+0.058}_{-0.010}$	11	22
ETH050	0122.033	32	12 $^{+0.058}_{-0.010}$	13	27
ETH080	0132.033	50	16 $^{+0.058}_{-0.010}$	17	36
ETH100	0142.033	60	30 $^{+0.085}_{-0.010}$	35	80
ETH125	0152.033	70	50 $^{+0.110}_{-0.010}$	45	115

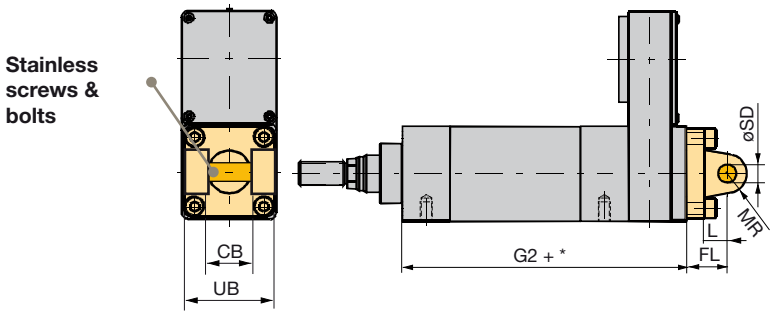
+* = Measure + Length of desired stroke ("Dimensions" see page 21).
Listed in the order code of the cylinder; the order number applies only for ordering spare parts.
Spare parts delivery is including screws for cylinder mounting.

Rear Clevis

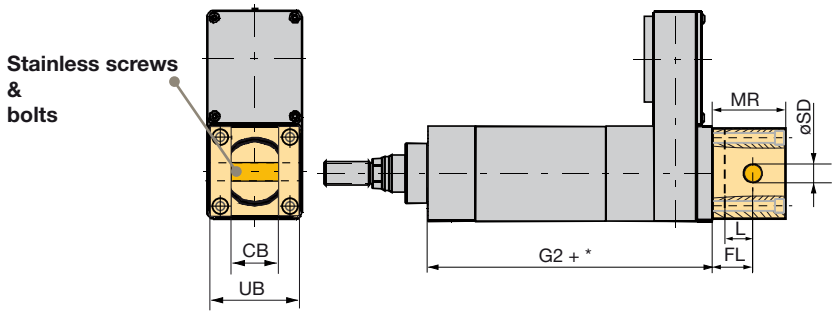
Order code

C

ETH032-ETH080



ETH100 & ETH125



	Order no.	UB	CB	ØSD	MR	L	FL ±0.2
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
ETH032	0112.031	46.5	26	10 h9	9.5	13	22
ETH050	0122.031	63.5	32	12 h9	12.5	16	27
ETH080	0132.031	95	50	16 h9	17.5	22	36
ETH100	0142.031	120	60.5	30 f7	100	40	65
ETH125	0152.031	150	70.5	50 f7	145	55	90

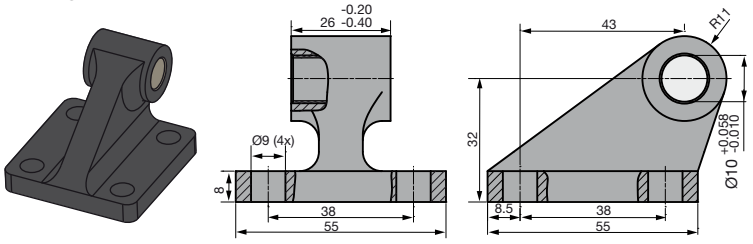
+* = Measure + length of desired stroke ("Dimensions" see page 21).
Listed in the order code of the cylinder; the order number applies only for ordering spare parts. Spare parts delivery is including screws for cylinder mounting.

Bearing Block

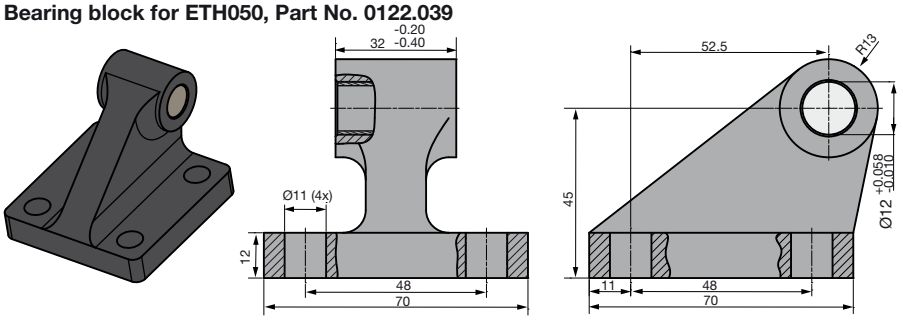
Counter piece of rear clevis. Please order separately with order no., if required

Dimensions [mm]

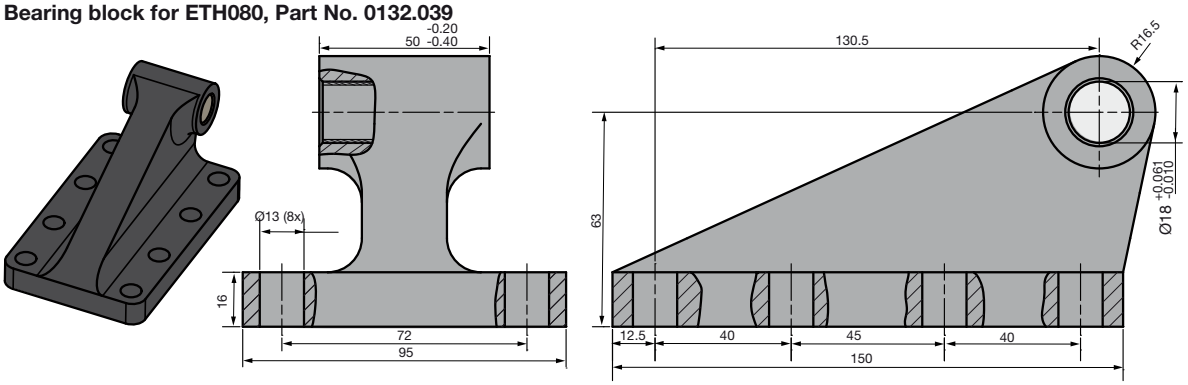
Bearing block for ETH032, Part No. 0112.039



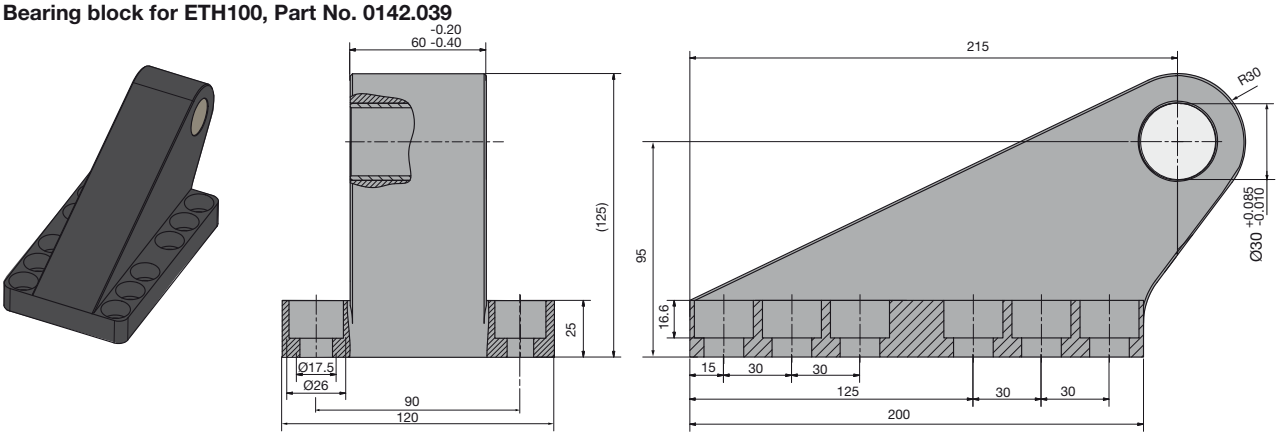
Bearing block for ETH050, Part No. 0122.039



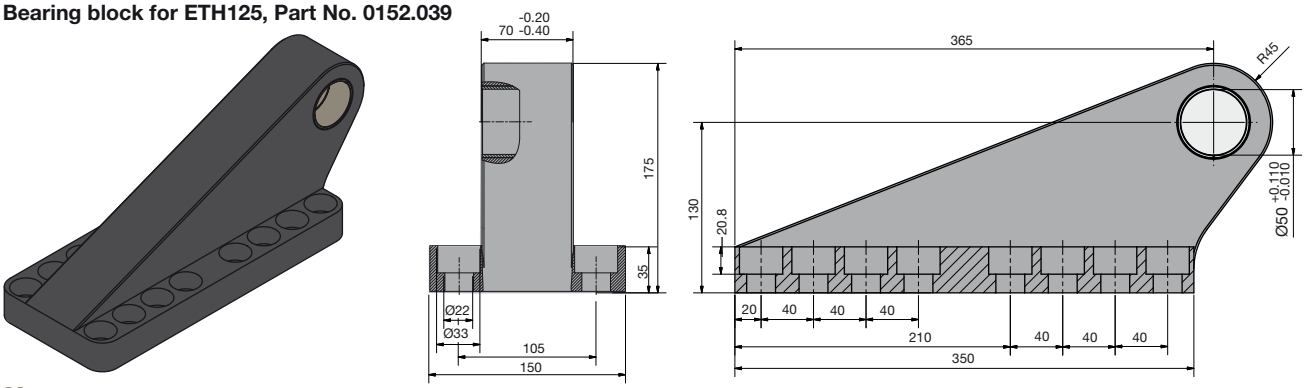
Bearing block for ETH080, Part No. 0132.039



Bearing block for ETH100, Part No. 0142.039

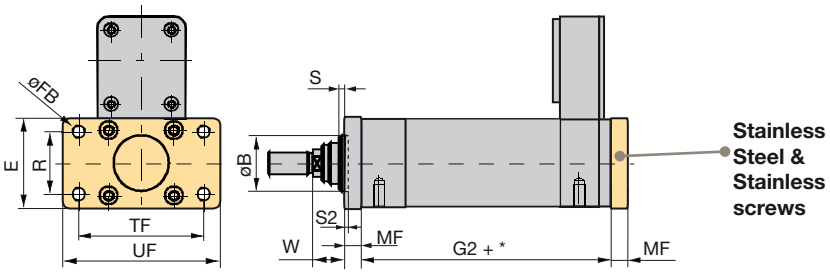


Bearing block for ETH125, Part No. 0152.039



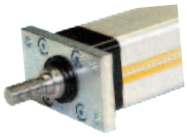
Rear Plate

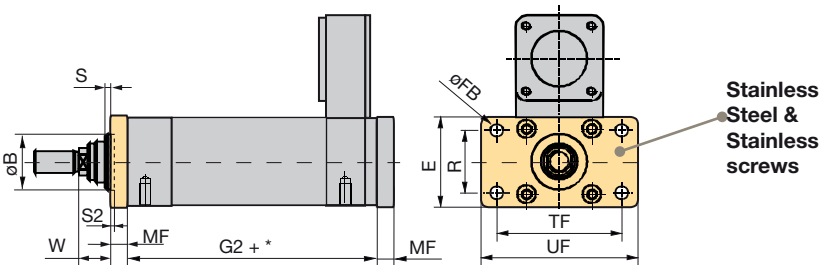
Order code **H**



Front Plate

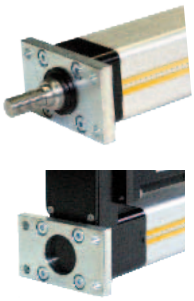
Order code **J**

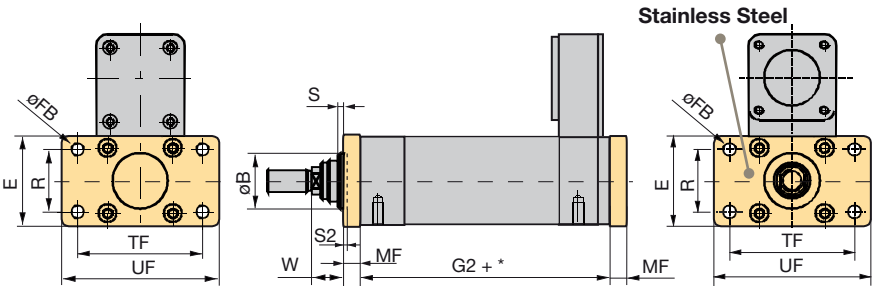




Front and Rear Plate

Order code **N**





End plate (H) and front plate (J) dimensions

	Order no. (1 piece)	UF	E	TF	ØFB	R	W	MF	ØB Rear Plate	ØB Front plate	S	S2
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
ETH032	0112.918	80	48	64	7	32	16	10	30		2	-
ETH050	0122.918	110	65	90	9	45	25	12	40		4	-
ETH080	0132.918 (Rear Plate) 0132.919 (Front plate)	150	95	126	12	63	30	16	45	60	4	-
ETH100	0142.918	258	120	220	17.5	80	26	25	90		-	5
ETH125	0152.918	320	150	270	21.5	100	13	40	110		-	20

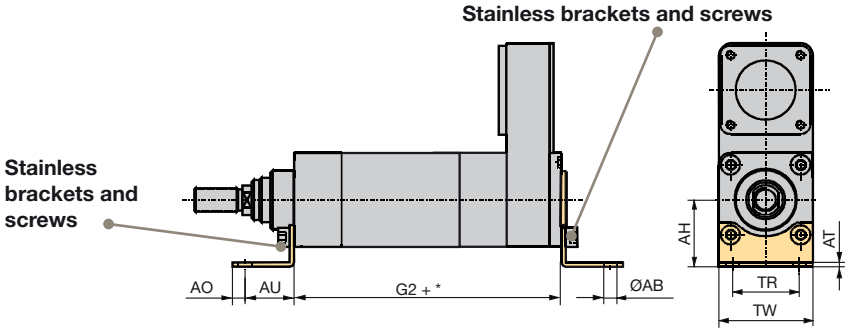
+* = Measure + Length of desired stroke ("Dimensions" see page 21).
Listed in the order code of the cylinder; the order number applies only for ordering spare parts.
Please note that front and rear plate as spare parts must be ordered separately.
Spare parts delivery is including screws for cylinder mounting.
Stainless components only available for ETH032-ETH100.

Foot Mounting

Order code

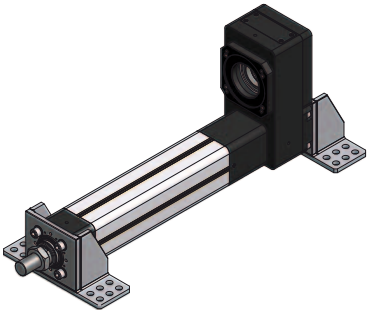
B

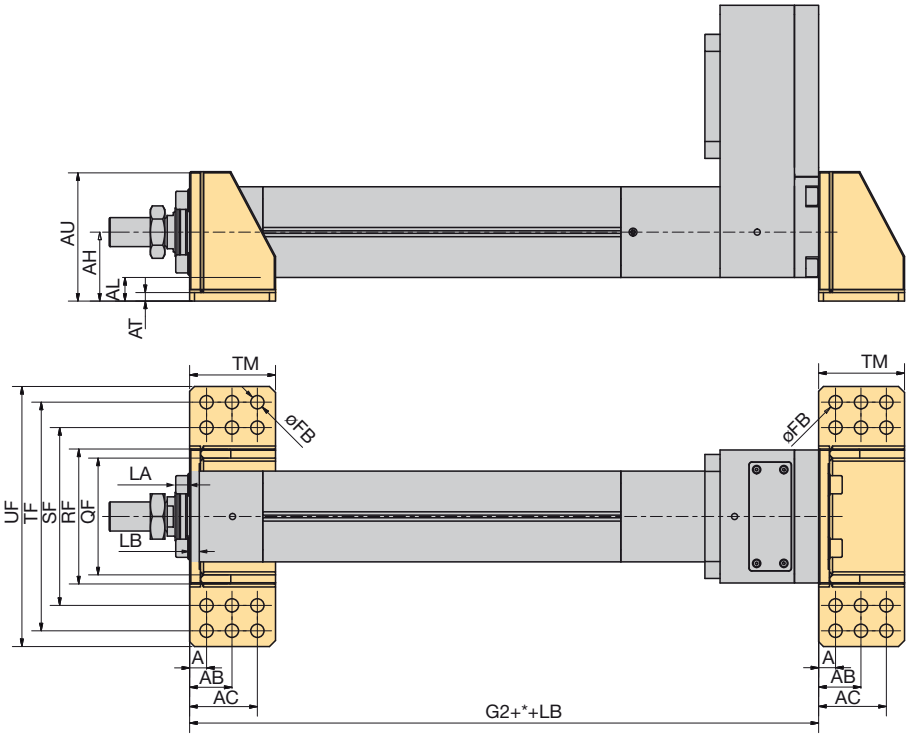
ETH032-ETH080



	Order no. Front & Terminal bracket	AH	AT	TR	ØAB (H14)	AO	AU	TW
		[mm]						
ETH032	0112.916	32	4	32	7	8	24	46.5
ETH050	0122.916	45	4	45	9	12	32	63.5
ETH080	0132.916	63	6	63	13.5	15	41	95

ETH100 & ETH125





	Order no. Front & Terminal bracket	AU	AH	AL	AT	UF	TF	SF	RF	QF	LA	LB	ØFB	TM	A	AB	AC
		[mm]															
ETH100	0142.916	164	94	34	14	290	-	246	200	170	19	13	17.5	99	16.5	49.5	81.5
ETH125	0152.916	214	114	39	14	430	378	294	223	193	23	16	22	142	28	70	112

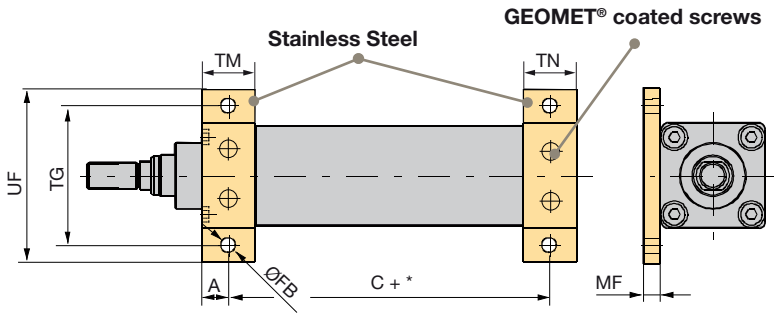
+* = Measure + Length of desired stroke ("Dimensions" see page 21).
Listed in the order code of the cylinder; the order number applies only for ordering spare parts. Spare parts delivery is including screws for cylinder mounting.
Stainless components only available for ETH032-ETH080.

* For protection classes "B" and "C", we recommend GEOMET® coated screws (thin layer corrosion protection).

Mounting Flanges

Order code

G

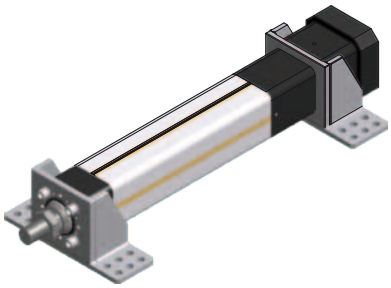


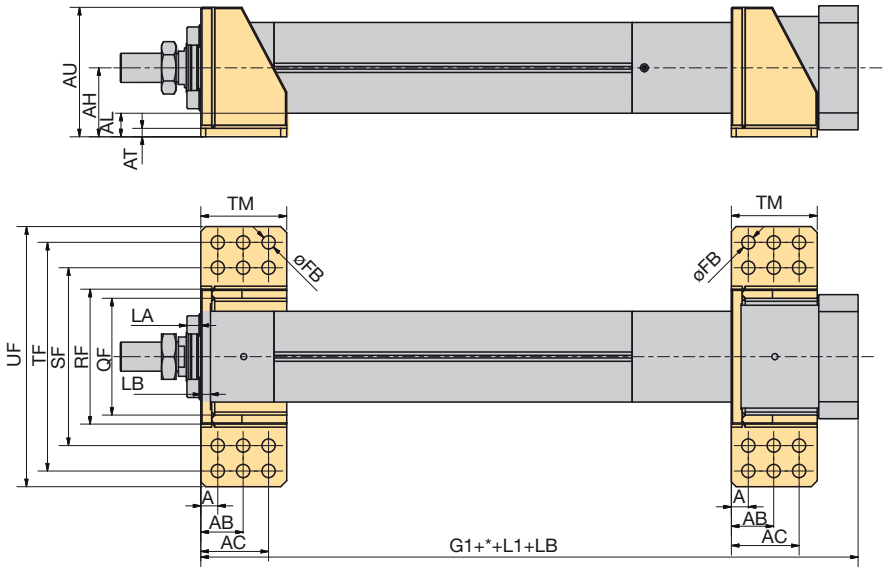
ETH032-ETH080

Mounting Flanges

	Order no. (2 pieces)	TG	UF	ØFB	TM	MF	A	AB	TN	B	BB	BC
		[mm]										
ETH032	0112.917	62	78	6.6	25	8	12.5	-	25	-	-	-
ETH050	0122.917	84	104	9	30	10	15	-	30	-	-	-
ETH080	0132.917	120	144	13.5	40	12	20	-	40	-	-	-

ETH100 & ETH125





	Order no.	AU	AH	AL	AT	UF	TF	SF	RF	QF	LA	LB	ØFB	TM	A	AB	AC
		[mm]															
ETH100	- [1]	164	94	34	14	290	-	246	200	170	19	13	17.5	99	16.5	49.5	81.5
ETH125	- [1]	214	114	39	14	430	378	294	223	193	23	16	22	142	28	70	112

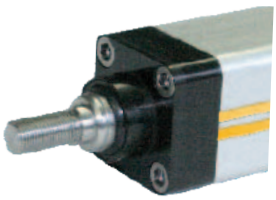
+* = Measure + Length of desired stroke ("Dimensions" see page 21).
Listed in the order code of the cylinder; the order number applies only for ordering spare parts (of ETH032-ETH080 only). Spare parts delivery is including screws for cylinder mounting.
Stainless components only available for ETH032-ETH080.
[1] Subsequent conversion can only be made in our factory.

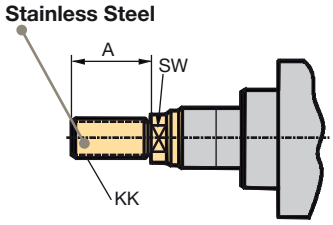
* For protection classes "B" and "C", we recommend GEOMET® coated screws (thin layer corrosion protection).

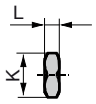
Cylinder Rod Version

External thread

Order code **M**







External Thread (upon delivery)				
	Weight	A	KK	SW[1]
	[kg]	[mm]	[mm]	[mm]
ETH032	0.06	22	M10x1.25	10
ETH050	0.15	32	M16x1.5	17
ETH080	0.48	40	M20x1.5	22
ETH100	2.4	70	M42x2	46
ETH125	3.7	96	M48x2	55

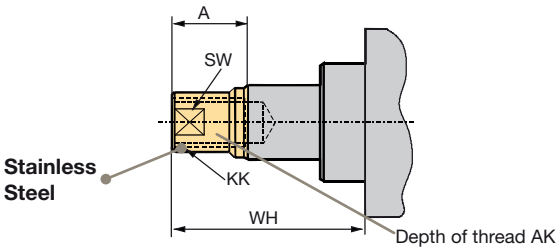
[1] SW: Width across flat (position of the flat is not fixed)

Nut				
	Weight	M	L	K[1]
	[kg]	[mm]	[mm]	[mm]
ETH032	0.01	M10x1.5	5	17
ETH050	0.02	M16x1.5	8	24
ETH080	0.04	M20x1.5	10	30
ETH100	0.27	M42x2	16	65
ETH125	0.60	M48x2	24	75

[1] K: Width across flat
The nut is included in the delivery.

Internal Thread

Order code **F**



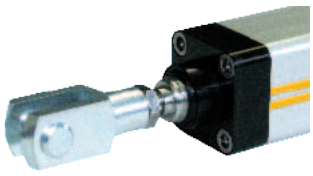
Order code **K**

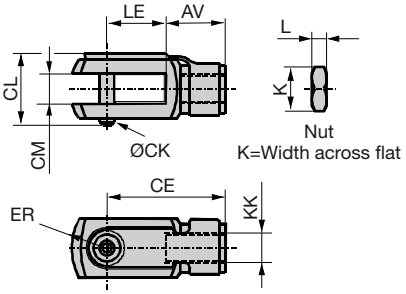
Internal Thread							
	Weight	A	KK (Option F)	KK (Option K)	AK	WH	SW[1]
	[kg]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
ETH032	0.04	14	M10x1.25		20	32	12
ETH050	0.14	24	M16x1.5		25	50	20
ETH080	0.42	29	M20x1.5		35	59	26
ETH100	2.2	60	M42x2	M45x3	50	92	60
ETH125	4.3	90	M48x2	M45x3	60	123	70

[1] SW: Width across flat (position of the flat is not fixed)

Rod Clevis

Order code **C**





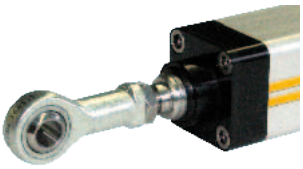
	Order no.		Weight	KK	CL	CM		LE	CE	AV	ER	ØCK (h11/E9)	K	L
	Standard	Stainless												
			[kg]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
ETH032	4309	P1S-4JRD	0.09	M10x1.25	26.0	10.2	+0.13 -0.05	20	40	20	14	10	17	5
ETH050	4312	P1S-4MRD	0.34	M16x1.5	39.0	16.2	+0.13 -0.05	32	64	32	22	16	24	8
ETH080	4314	P1S-4PRD	0.69	M20x1.5	52.5	20.1	+0.02 -0.0	40	80	40	30	20	30	10

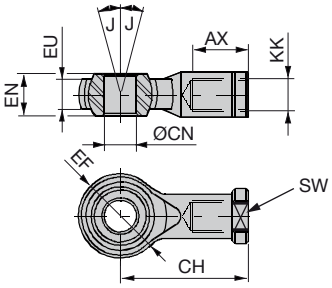
Listed in the order code of the cylinder; the order number applies only for ordering spare parts. Prerequisite is a cylinder rod with external thread. Available for ETH032-ETH080.

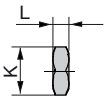
Spherical Rod Eye

Order code

S







Nut
K=Width across flat

	Order no.		Weight	KK	SW[1]	ØCN	EN	EU	AX	CH	ØEF	J	K	L
	Standard	Stainless												
			[kg]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[°]	[mm]	[mm]
ETH032	4078-10	P1S-4JRT	0.07	M10x1.25	17	10 H9	14	10.5	20	43	28	13	17	5
ETH050	4078-16	P1S-4MRT	0.23	M16x1.5	22	16 H9	21	15.0	28	64	42	15	24	8
ETH080	4078-20	P1S-4PRT	0.41	M20x1.5	32	20 H9	25	18.0	33	77	50	14	30	10
ETH100	0142.920-01	0142.920-02	2.8	M42x2	60	40 H7	49	7	60	142	90	16	65	15
ETH125	0152.920-01	not available	5.0	M48x2	65	50 H7	60	45	65	160	116	14	75	24

Listed in the order code of the cylinder; the order number applies only for ordering spare parts. Prerequisite is a cylinder rod with external thread.
[1] SW: Width across flat (position of the flat is not fixed)

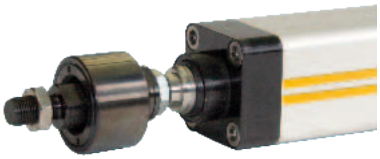
Alignment Coupler

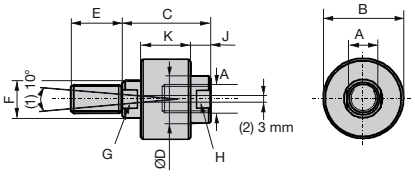
Order code

L

For mounting at the extremity of the cylinder rod

- Balances misalignments
- Enlarges the mounting tolerance
- Simplifies the cylinder mounting
- Increases the service life of the cylinder guidings
- Compensates the offset between components and relieves the guiding from lateral force influences
- The traction/thrust force bearing capacity remains





(1): Angle offset
(2): Axial offset
E: Hole dimension for depth

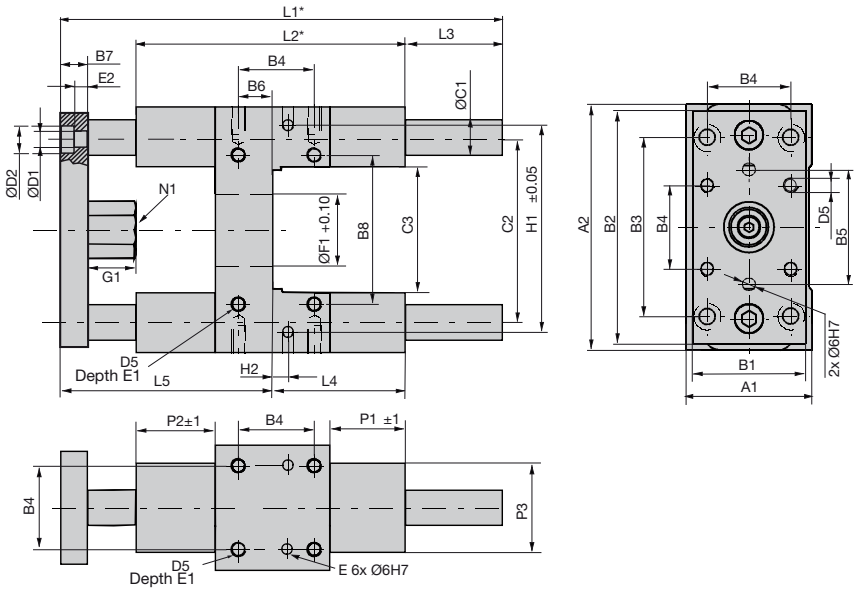
	Part No.	Weight	A	B	C	ØD	E	F	G	H	J	K
		[kg]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
ETH032	LC32-1010	0.26	M10x1.25	40	51	19	19	16	13	16	13	26
ETH050	LC50-1616	0.64	M16x1.5	54	59	32	29	25	22	29	14	33
ETH080	LC80-2020	1.30	M20x1.5	54	59	32	29	25	22	29	14	33
ETH100	-[1]	4.5	M39x2[2]	101.6	111.1	57.2	57.2	44.5	38	49	22.2	69.9
ETH125	0152.921	9.0	M48x2	127	142.9	76.2	76.2	57.2	49.3	67	35	85.8

Listed in the order code of the cylinder; the order number applies only for ordering spare parts. Prerequisite is a cylinder rod with external thread.
Only available in protection option A (IP54 with galvanized screws).
[1] Subsequent conversion from rod end can only be made in our factory.
[2] Attention: Thread M39x2 differs from the standard (M42x2).

Outrigger Bearing

Order code **R**

Order code **T** [2]



Function of outrigger bearing:

- Additional stability and precision
- Anti-rotation device for higher torques
- Absorption of lateral forces

Versions

Option R:
Outrigger bearing with ball bushings
(available only in protection class option A, "Order Code" see page 52)

- Main casting extruded aluminum
- 2 hardened steel guiding rods, surface hard-chrome plated
- Linear ball bearings

Option T: [2]
Outrigger bearing with slide bushings
(for all protection options, standard with options B & C, "Order Code" see page 52)

- Main casting extruded aluminum
- 2 guiding rods stainless steel
- Sliding guides

When sizing the drive train of an ETH electro cylinder with outrigger bearing and sliding bushings, increased friction losses in the sliding bushings must be taken into consideration

Note:
[1] xxxx corresponds to the customized stroke. For information about this value please contact Parker.

+* = Measure + Length of desired stroke ("Dimensions" see page 21).

available for ETH032-ETH080.
For the ETH080, the standard pneumatic outrigger bearing modules cannot be used.

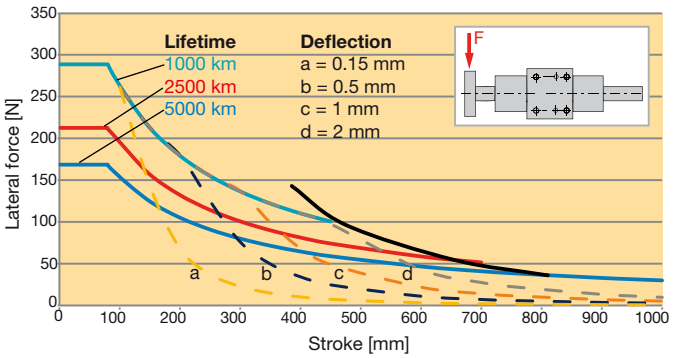
[2] not for ATEX

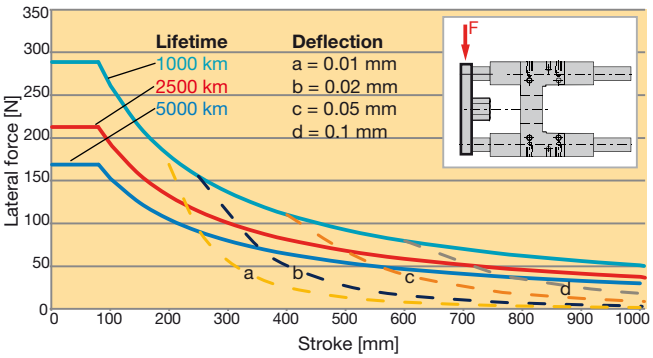
	Unit	ETH032	ETH050	ETH080
Part-No. - Option R [1]		0112.040-xxxx	0122.040-xxxx	0132.040-xxxx
Part.-No. - Option T [1]		0112.041-xxxx	0122.041-xxxx	0132.041-xxxx
A1	[mm]	50	70	105
A2	[mm]	97	137	189
B1	[mm]	45	63	100
B2	[mm]	90	130	180
B3	[mm]	78	100	130
B4	[mm]	32.5	46.5	72
B5	[mm]	50	72	106
B6	[mm]	4	19	21
B7	[mm]	12	15	20
B8	[mm]	61	85	130
ØC1	[mm]	12	20	25
C2	[mm]	73.5	103.5	147
C3	[mm]	50	70	105
ØD1	[mm]	6.6	9	11
ØD2	[mm]	11	14	17
D5	[mm]	M6	M8	M10
E (Depth)	[mm]	10	10	10
E1 (Depth)	[mm]	12	16	20
E2 (Depth)	[mm]	7	9	11
ØF1	[mm]	30	40	60
G1	[mm]	17	27	32
H1	[mm]	81	119	166
H2	[mm]	11.7	4.2	15
L1+*	[mm]	150	192	247
L2	[mm]	120	150	200
L3+*	[mm]	15	24	24
L4	[mm]	71	79	113
L5	[mm]	64	89	110
N1	[mm]	17	24	30
P1	[mm]	36	42	50
P2	[mm]	31	44	52
P3	[mm]	40	50	70
Total mass with zero stroke	[kg]	0.97	2.56	6.53
Moving mass zero stroke	[kg]	0.60	1.84	4.36
Additional mass	[kg/m]	1.78	4.93	7.71

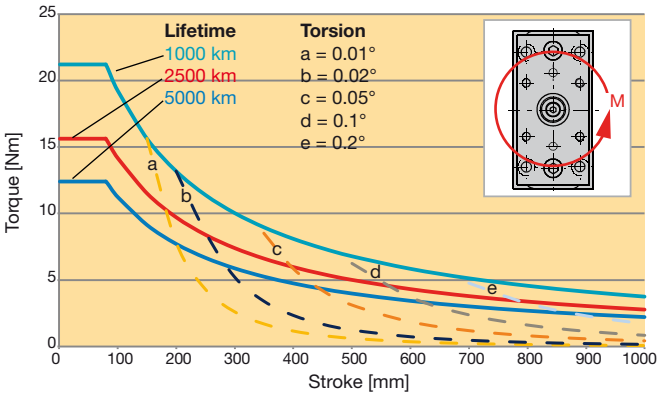
Permitted load / lifetime / deformation of the parallel guiding

Outrigger bearing with ball bushings (Option R)

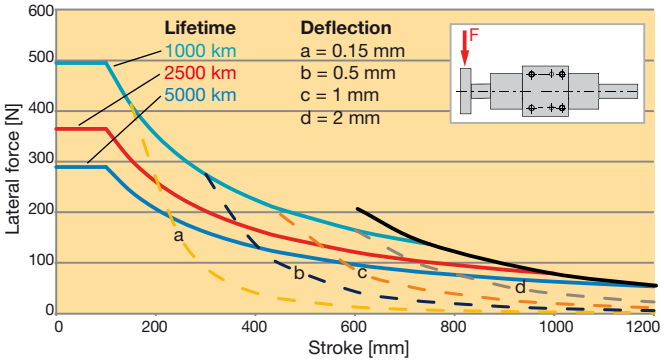
ETH032

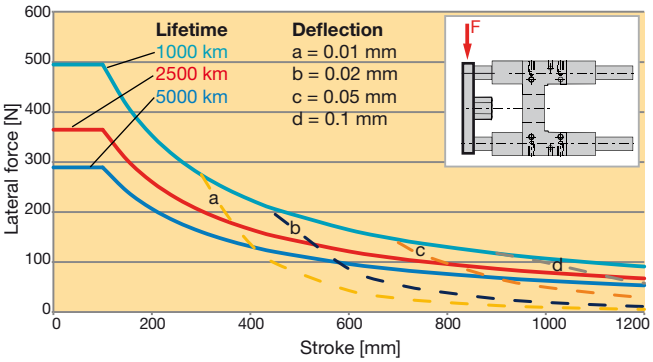


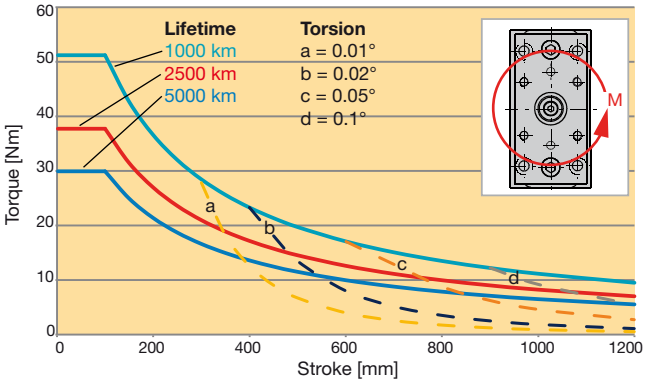




ETH050



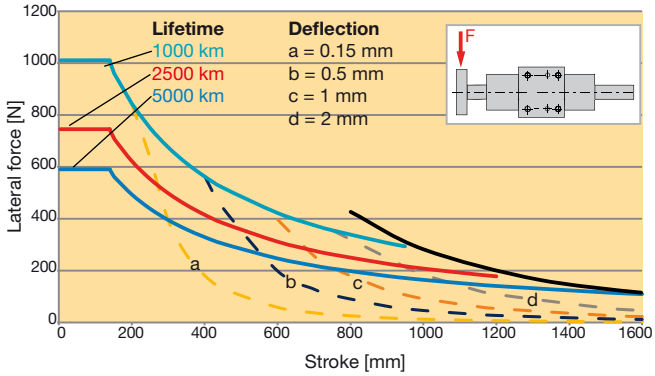


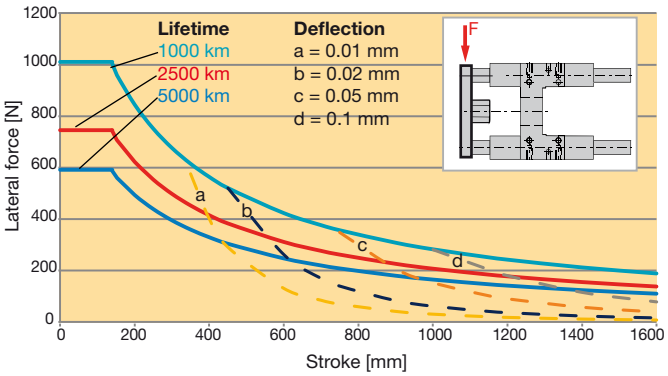


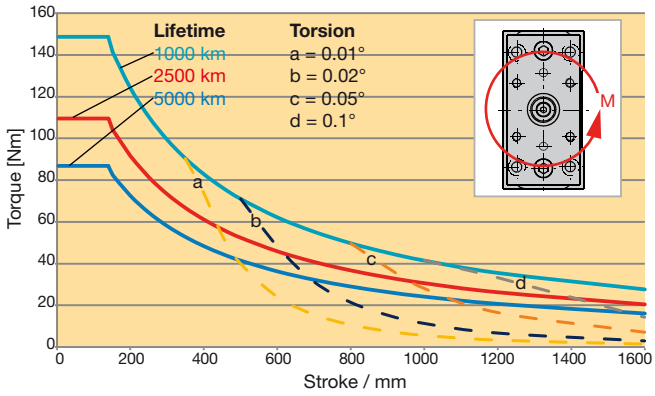
The diagrams apply for a medium travel speed of 0.5 m/s, an ambient temperature of 20 °C.

Outrigger bearing with ball bushings (Option R)

ETH080

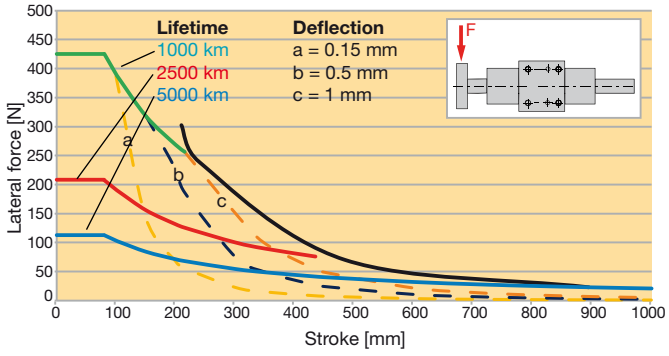


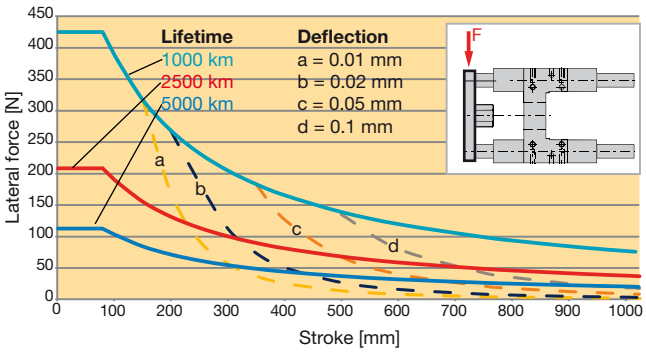


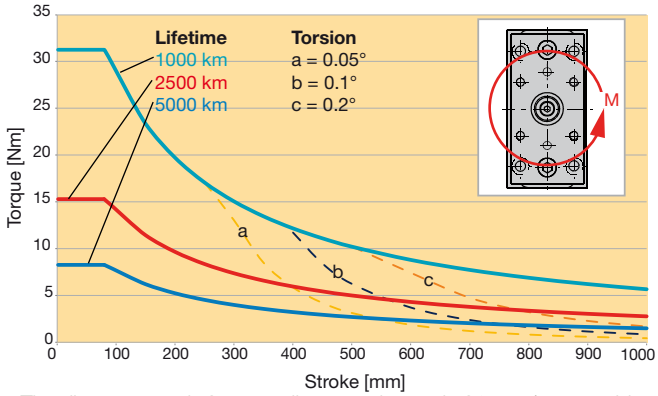


Outrigger Bearing with sliding guide (option T)

ETH032



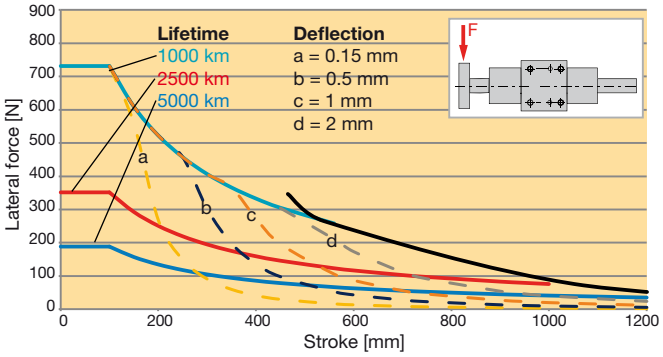


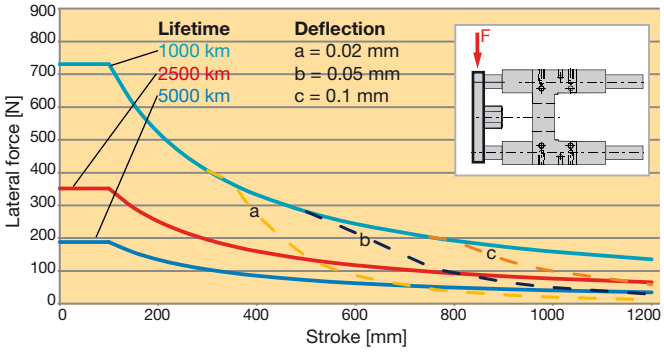


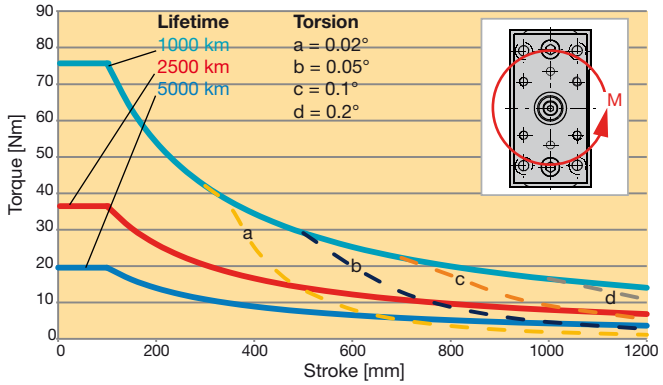
The diagrams apply for a medium travel speed of 0.5 m/s, an ambient temperature of 20 °C.

Outrigger Bearing with sliding guide (option T)

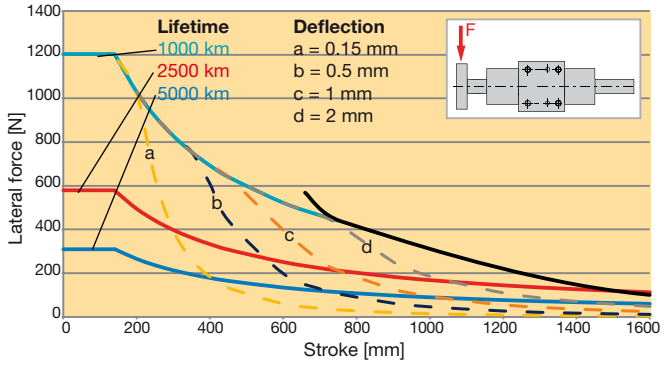
ETH050

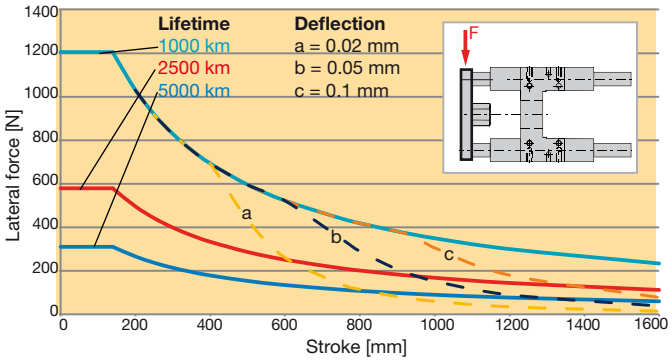


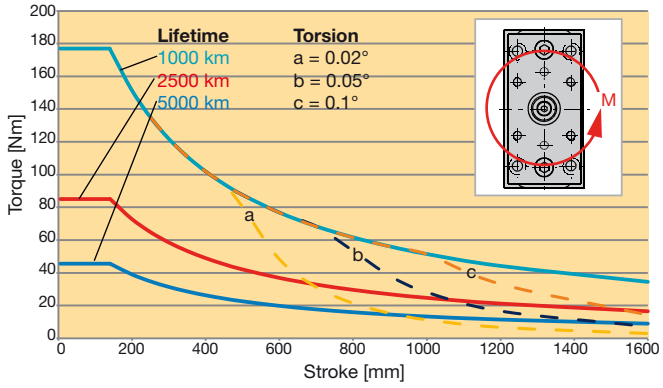




ETH080





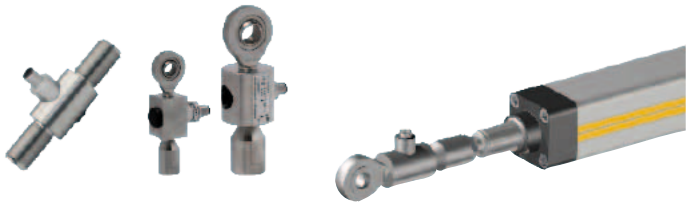


The diagrams apply for a medium travel speed of 0.5 m/s, an ambient temperature of 20 °C.

Accessories

Force sensors[1] - Joint head with integrated force sensor with optional joint head

Swivel heads are important construction components with respect to rotary, pivoting and tilting movements. Force measurements are more and more frequently required in those applications.
The force transducers are suitable for direct mounting on the cylinder rod. They can, for example, be used to measure contact forces or overloads. Thanks to the thin film technology, the swivel head force transducers are very robust and long time stable. An integrated amplifier emits an output signal of 4...20 mA.
The sensors correspond to the EN 61326 standard for electromagnetic compatibility (EMC) and are sized to pick up traction/ thrust forces.



Features

- Measuring range: Traction/thrust forces up to ±114 kN
- Thin film implants (instead of conventional bonded foil strain gauges)
- Corrosion resistant stainless steel version
- Integrated amplifier
- Small temperature drift
- High long term stability
- High shock and vibration resistance
- For dynamic or static measurements
- Good repeatability
- Simple mounting

Connection of the force sensors to Compax3 with Option M21 is possible.

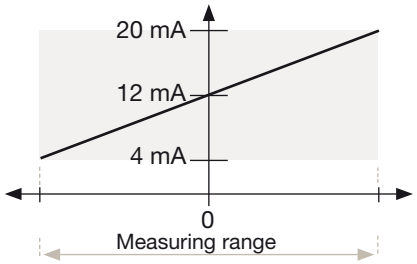
Technical Features

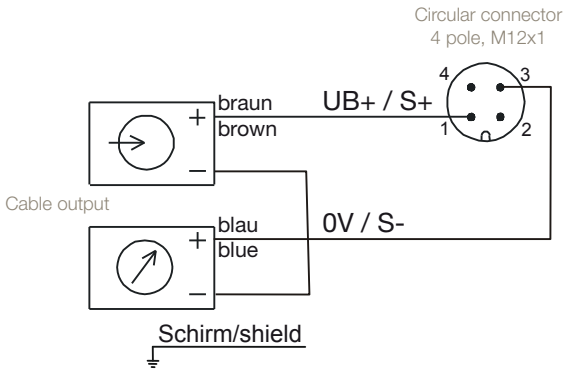
		Joint head with integrated force sensor									With External Thread		
	Unit	ETH032			ETH050			ETH080			ETH100	ETH125	
		M05	M10	M16	M05	M10	M20	M05	M10	M32	M10/M20	M10	M20
Accuracy	[%]	0.2									1		
Material	-	Stainless steel									Stainless steel		
Protection class	-	IP67									IP67		
Measuring range	[kN]	±3.7	±3.7	±2.4	±9.3	±7.0	±4.4	±17.8	±25.1	±10.6	±56.0	±88.7	±114.0
Accuracy	[N]	14.8	14.8	9.6	37.2	28.0	17.6	71.2	100.4	42.4	1120	1774	2280
Part No.	-	0111.916		0111.917	0121.916	0121.917	0121.918	0131.916	0131.917	0131.918	0141.916	0141.917	0141.918

For ETH032-ETH080: Only possible with cylinder rod end "M" (external thread).
For ETH100, ETH125: Only possible with cylinder rod end "K".
A subsequent conversion from another rod end to M or K is generally **NOT** possible.

Electrical connection

Power supply UB = 10...30 VDC
Analog output 4...20 mA (two-wire technology)



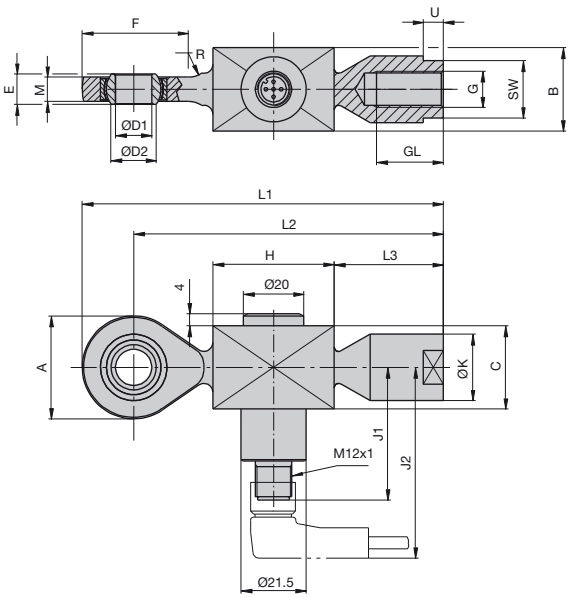


Part No.	Cable for force sensor
080-900446	Force sensor cable (PUR), straight connector, M12 with flying leads, 2 m
080-900447	Force sensor cable (PUR), straight connector, M12 with flying leads, 5 m
080-900456	Force sensor cable (PUR), angle connector, M12 with flying leads, 2 m
080-900457	Force sensor cable (PUR), angle connector, M12 with flying leads, 5 m

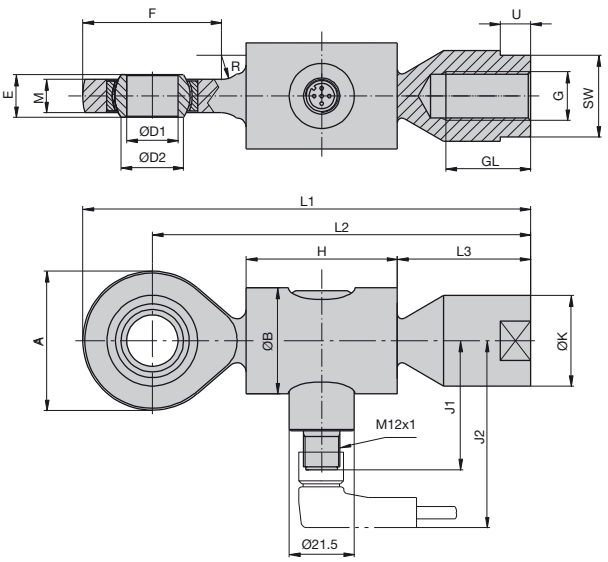
[1]ATEX on request

Dimensions [mm]

Version for ETH032



Version for ETH050 & ETH080



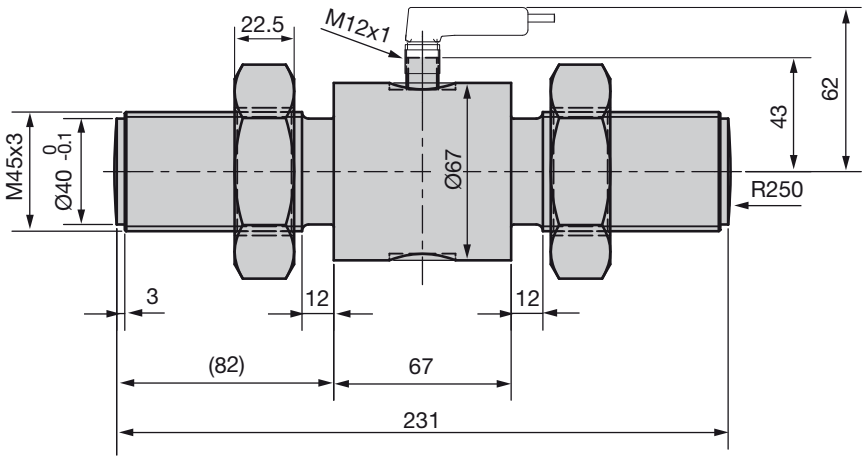
Dimensions [mm]

Dimensions

	A	B	ØB	C	ØD1	ØD2 0.008	E	F	G	GL	H	J1	J2	ØK	L1	L2	L3	M	SW[1)]	U
for ETH032	34	27	-	27	12	15	10	35	M10x1.25	21	40	44	63	22	119	102	36	8	19	8
for ETH050	46	-	35	-	17	20.7	14	46	M16x1.5	28	50	43	62	30	148	125	44	11	27	12
for ETH080	53	-	54	-	20	24.2	16	54	M20x1.5	33	54	44	63	35	171	144.5	54	13	32	13

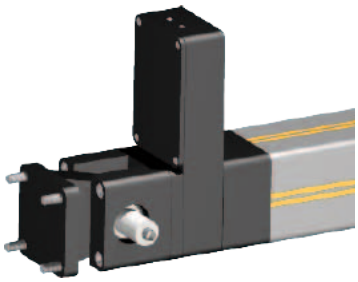
[1)] SW: Width across flat

Version for ETH100 & ETH125



Force sensors [1] - Rear clevis with force sensor

In some force measurement applications, a force sensor on the cylinder rod is not possible or will affect the application's scope. For this case, we developed a special variant of the ETH cylinder, where the force sensor is integrated into the rear end of the cylinder. The advantage is that the sensor cable does not move with the rod.
All force sensors are configured as traction/thrust sensors.
Analog standard output signals 4...20 mA are available. The sensors correspond to the EN 61326 standard for electromagnetic compatibility (EMC).



Features

- Measuring range: Traction/thrust forces up to ±81.4 kN
- Thin film implants (instead of conventional bonded foil strain gauges)
- Corrosion resistant stainless steel version
- Integrated amplifier
- Small temperature drift
- High long term stability
- High shock and vibration resistance
- For dynamic or static measurements
- Good repeatability
- Simple mounting

Connection of the force sensors to Compax3 with Option M21 is possible.

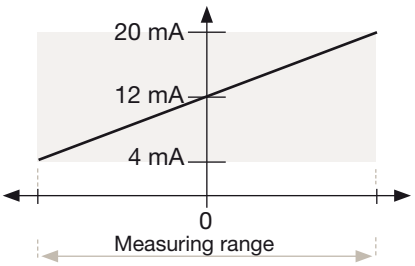
Technical Features

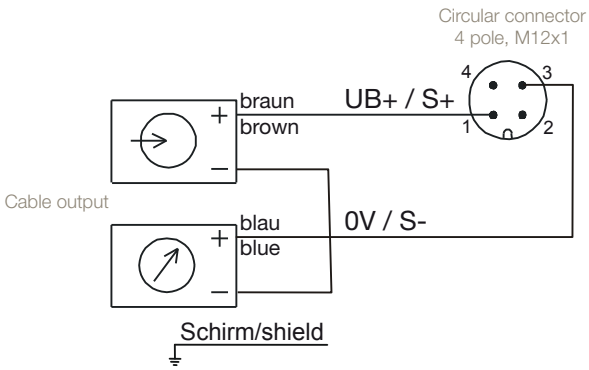
Rear clevis with force sensor for ETH...												
	Unit	ETH032			ETH050			ETH080			ETH100	ETH125
		M05	M10	M16	M05	M10	M20	M05	M10	M32	M10/M20	M10/M20
Accuracy	[%]	1									2	
Material	-	Stainless steel									Stainless steel	
Protection class	-	IP67									IP67	
Measuring range	[kN]	±3.7	±3.7	±2.4	±9.3	±7.0	±4.4	±17.8	±25.1	±10.6	±54.8	±81.4
Accuracy	[N]	74.0	74.0	48.0	186.0	140.0	88.0	356.0	502.0	212.0	2192	3256
Part No.	-	0112.034-01		0112.034-02	0122.034-01	0122.034-02	0122.034-03	0132.034-01	0132.034-02	0132.034-03	0142.034-01	0152.034-01

Only for parallel configuration and cylinders with "F" mounting option (mounting thread on the cylinder body)

Electrical connection

Power supply UB = 10...30 VDC
Analog output 4...20 mA (two-wire technology)

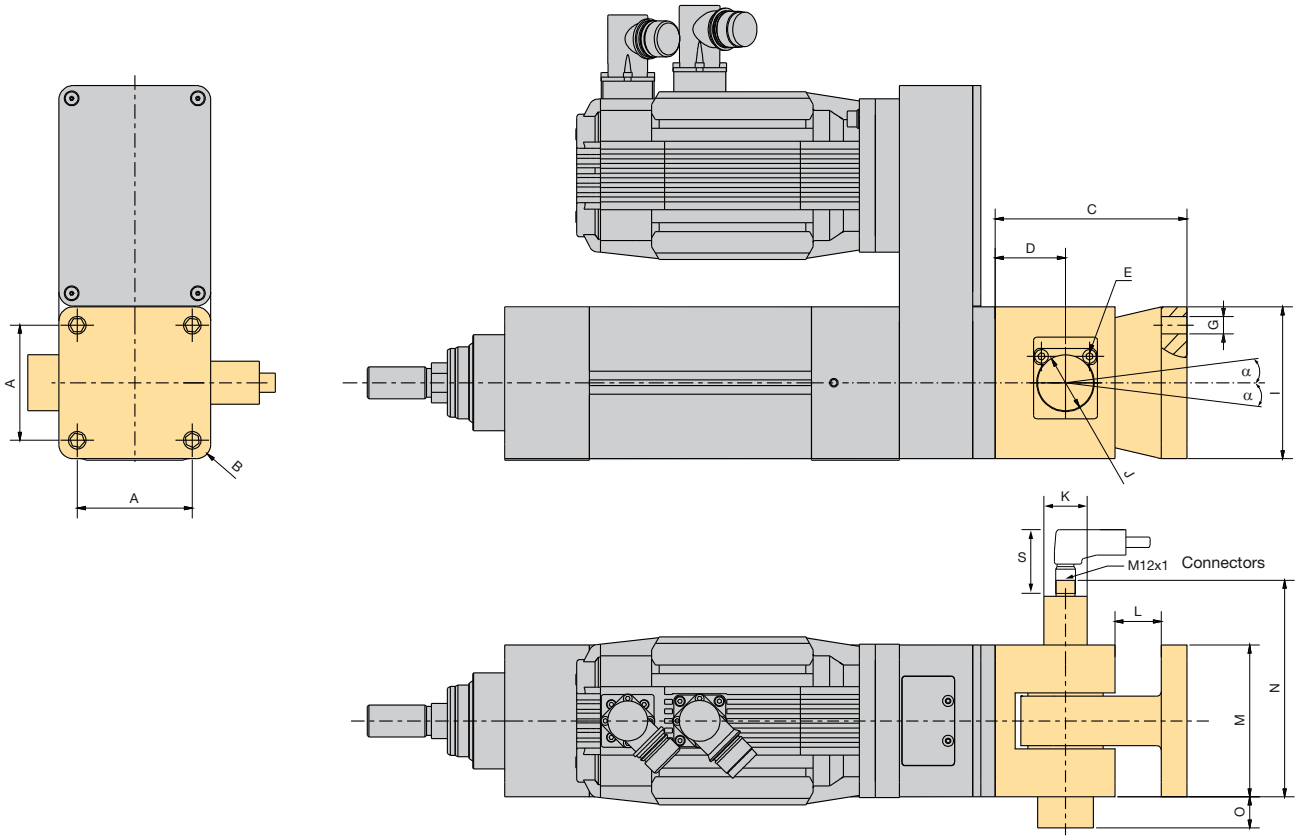




Part No.	Cable for force sensor
080-900446	Force sensor cable (PUR), straight connector, M12 with flying leads, 2 m
080-900447	Force sensor cable (PUR), straight connector, M12 with flying leads, 5 m
080-900456	Force sensor cable (PUR), angle connector, M12 with flying leads, 2 m
080-900457	Force sensor cable (PUR), angle connector, M12 with flying leads, 5 m

[1] ATEX on request

Version with fixing flange for ETH cylinder



Dimensions [mm]

Dimensions

	A	B	C	D	E[1)]	G	I	ØJ	ØK	L	M	N	O	S	α
for ETH032	32.5	R7	72	27	SW3	6.6	46.5	20	27	12	46.5	98.25	6.75	19	±3.5°
for ETH050	46.5	R8.5	89	32	SW3	9	63.5	25	27	17	63.5	111.75	3.25	19	±4°
for ETH080	72	R9	123	47	SW4	11	95	35	27	29	95	135.5	0	19	±4°
for ETH100	89	R12.5	166	70	SW6	17	120	50	27	30	120	160.8	4.2	19	±4°
for ETH125	105	R20	196	75	SW6	22	150	50	27	40	150	175.8	0	19	±4°

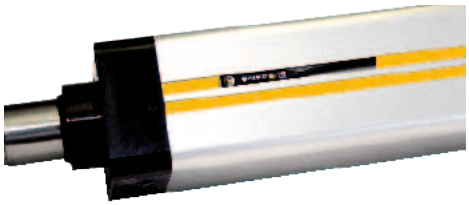
[1)] SW: Width across flat
α: max. permissible deflection angle with reference to center axis

Please respect the notes in the ETH Manual (19x-550002) on the permissible screws and tightening torques.

Initiators / Limit Switches [1)]

Sensors

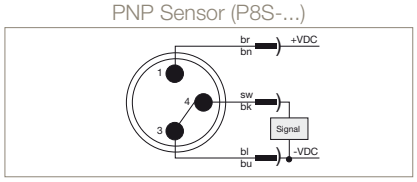
The position sensors can be mounted in the longitudinal grooves of the cylinder body and are directly immersible in the profile; projecting edges are thus avoided. The initiator cable is hidden under the yellow cover. The permanent magnet integrated into the screw nut actuates the initiators. Fitting sensors available as accessories.



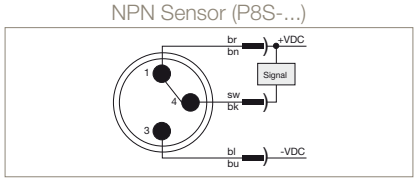
ETH032, ETH050 2 grooves each on 2 opposite sides.
ETH080, ETH100 2 grooves each on all sides.

The following initiator types are available for the ETH cylinder series:

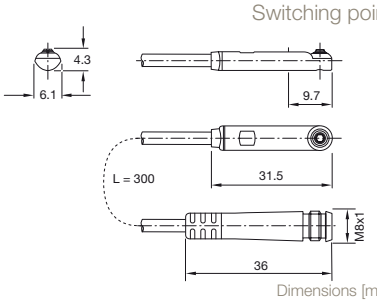
PNP Sensor (P8S-...)



NPN Sensor (P8S-...)



Switching point



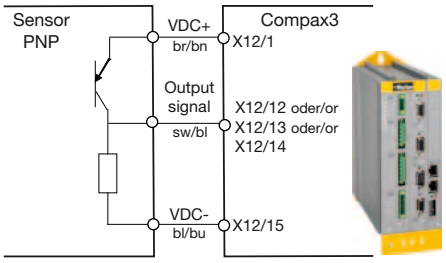
Dimensions [mm]

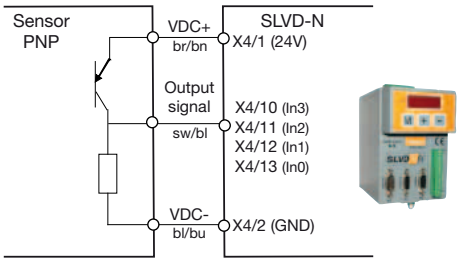
Info: Do only use PNP types for ETH with Compax3.

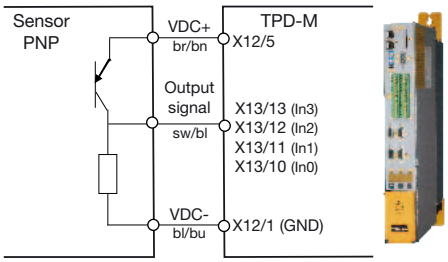
Magnetic cylinder sensors

Type	Function	LED	Logic	Cable	Continuous current	Current consumption	Supply voltage	Switching frequency	compatible with Compax3, SLVD-N, TPD-M
P8S-GPFLX	N.O.	yes	PNP	3 m	max. 100 mA	max. 10 mA	10-30 VDC	1 kHz	yes
P8S-GNFLX			NPN						No
P8S-GPSHX			PNP	0.3 m cable with M8 connector					yes
P8S-GNSHX			NPN						No
P8S-GQFLX	N.C.		PNP	3 m					yes
P8S-GMFLX			NPN						No
P8S-GQSHX			PNP	0.3 m cable with M8 connector					yes
P8S-GMSHX			NPN						No

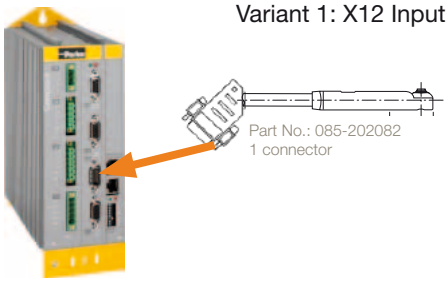
ETH with Compax3, SLVD-N, TPD-M



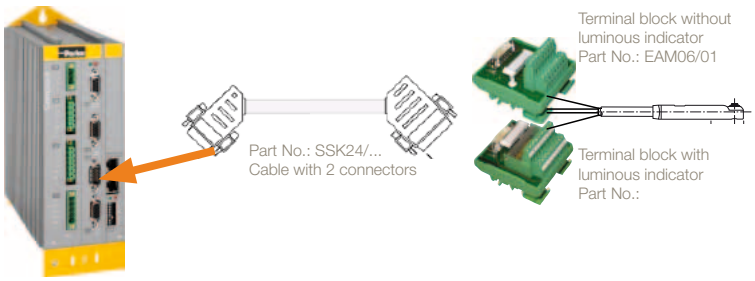




Variant 1: X12 Input - direct



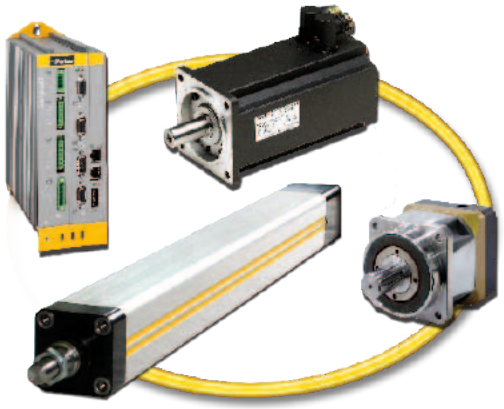
Variant 2: X12 Input - via digital I/Os



[1)]ATEX on request

Drive Train Selection [1)]

Example for Sizing with Predefined Drive Trains



In order to simplify the dimensioning process for a complete drive train, We have prepared an overview of predefined electro cylinders, gearboxes, motors and servo drives, which can be found on the following pages.
With a few parameters, you can directly find the order code for the required components.
Note the boundary conditions!

The following application parameters are required:

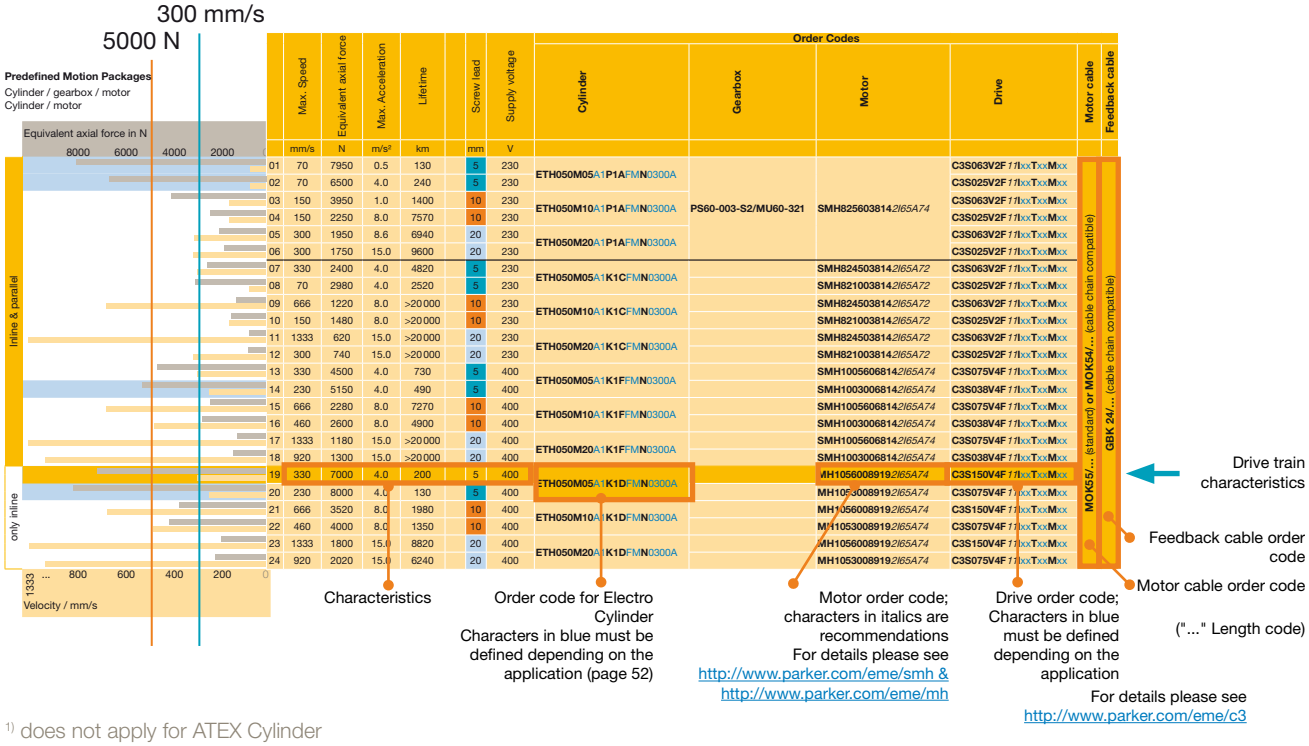
- The equivalent axial force.
  (Calculation page 13 formula 3 with the forces determined as described on page 11).
- The maximum speed.

Working with the drive train table

- Select the drive trains providing the required axial force (e.g. by drawing a vertical line).
- Then select from this choice the drive trains, that are able to travel at the required speed (e.g. by drawing a second vertical line).
- The suitable drive train can then be selected from the remaining choice, if necessary by comparing additional characteristics.

Please check if all given characteristics (such as max. acceleration, supply voltage etc.) are suitable for your application.

Example:
Required data
Equivalent axial force: 5000 N
Speed: 300 mm/s



[1)] does not apply for ATEX Cylinder

Predefined Motion Packages ETH032 [1)]

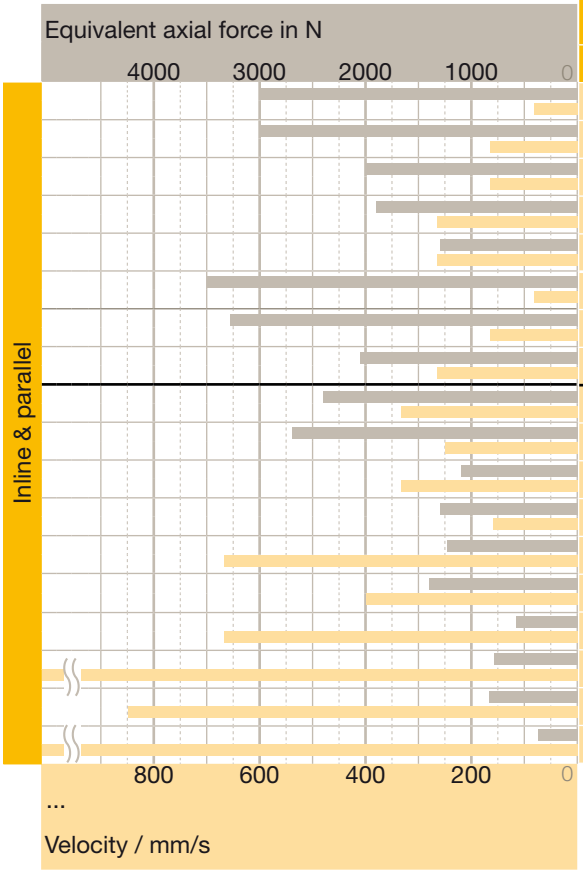
with Compax3, SLVD-N, TPD-M

In order to simplify the representation, we assumed boundary conditions which must be adhered to without exception in your application, otherwise the product combinations suggested here might not work. In this case, the application must be dimensioned conventionally.

[1)] does not apply for ATEX Cylinder

Predefined Motion Packages

Cylinder / gearbox / motor / drive controller / cable



	Max. Speed	Equivalent axial force	Max. Acceleration	Lifetime	Screw lead	Supply voltage	Cylinder
	mm/s	N	m/s²	km	mm	V	
01	83	3000	1	135	5	230	**ETH032M05**A1**P1A**FM**N**0200A
02	165	3000	6	270	10	230	**ETH032M10**A1**P1A**FM**N**0200A
03	165	2000	8	1300	10	230	
04	265	1900	8	1540	16	230	**ETH032M16**A1**P1A**FM**N**0200A
05	265	1300	12	4800	16	230	
06	83	3500	4	75	5	400	**ETH032M05**A1**P1A**FM**N**0200A
07	165	3280	8	190	10	400	**ETH032M10**A1**P1A**FM**N**0200A
08	265	2050	12	1225	16	400	**ETH032M16**A1**P1A**FM**N**0200A
09	333	2400	4	265	5	230	**ETH032M05**A1**K1C**FM**N**0200A
10	250	2700	4	185	5	230	
11	333	1100	4	2740	5	230	**ETH032M05**A1**K1B**FM**N**0200A
12	160	1300	4	1660	5	230	
13	667	1230	8	9300	10	230	**ETH032M10**A1**K1C**FM**N**0200A
14	400	1400	8	5500	10	230	
15	667	580	8	>20 000	10	230	**ETH032M10**A1**K1B**FM**N**0200A
16	1067	790	12	>20 000	16	230	**ETH032M16**A1**K1C**FM**N**0200A
17	850	840	12	17 780	16	230	
18	1067	370	12	>20 000	16	230	**ETH032M16**A1**K1B**FM**N**0200A

Basic Application Assumptions:

- Stroke from 50 to 400 mm
- Horizontal movement
- The characteristics of the individual components are not to be exceeded
  - with parallel motor: respect transmissible torque depending on the motor speed n
  - permissible axial thrust forces must be respected
  - Ambient conditions
  - ...
- Linear acceleration
- Maximum acceleration given = deceleration times
- Application factor = 1.0
- The calculation is based on the assumption: without standstill time (i.e. if there are standstill times in the application, only the power reserve is increased)
- 40 °C ambient temperature, with gearbox 20 °C ambient temperature
- up to 1000 m above sea level

Order Codes								
Gearbox	Motor	Drive Compax3	Motor Cable	Feedback cable	Drive SLVD-N / TPD-M	Motor Cable	Feedback cable
PS60-003-S2/MU60-001	**SMH60601,4511***2I65G4***4**	**C3S025V2F***11***IxxTxxMxx**	**MOK55/...** (standard) **or MOK54/...** (cable chain compatible)	**GBK 24/...** (cable chain compatible)	**SLVD2N...**	**CAVOMOT...**	**CAVORES...**
PS60-003-S2/MU60-321	**SMH826003814***2I65A7***4**	**C3S025V2F***11***IxxTxxMxx**			**SLVD2N...**		
PS60-003-S2/MU60-001	**SMH60601,4511***2I65G4***4**	**C3S015V4F***11***IxxTxxMxx**			**TPDM020202....**		
PS60-003-S2/MU60-321	**SMH826003814***2I65A7***4**	**C3S038V4F***11***IxxTxxMxx**			**TPDM05...**		
without gearbox	**SMH824503814***2I65A7***2**	**C3S063V2F***11***IxxTxxMxx**			**SLVD5N...**		
	SMH826003814*2I65A7***4**						
	SMH60451,4511*2I65G4***2**	**C3S025V2F***11***IxxTxxMxx**			**SLVD2N...**		
	SMH60601,4511*2I65G4***4**						
	SMH824503814*2I65A7***2**	**C3S063V2F***11***IxxTxxMxx**			**SLVD5N...**		
	SMH826003814*2I65A7***4**						
	SMH60451,4511*2I65G4***2**	**C3S025V2F***11***IxxTxxMxx**			**SLVD2N...**		
	SMH824503814*2I65A7***2**	**C3S063V2F***11***IxxTxxMxx**			**SLVD5N...**		
	SMH826003814*2I65A7***4**						
	SMH60451,4511*2I65G4***2**	**C3S025V2F***11***IxxTxxMxx**			**SLVD2N...**		

Order codes:
bold: **mandatory so that the package is combinable**
italics: *recommended/standard*
blue: must be selected depending on the application
Hint: The examples shown here are meant to help with the dimensioning process. As many parameters interact in this kind of drive package, the examples make no claim to be complete.

Predefined Motion Packages ETH050 [1)]

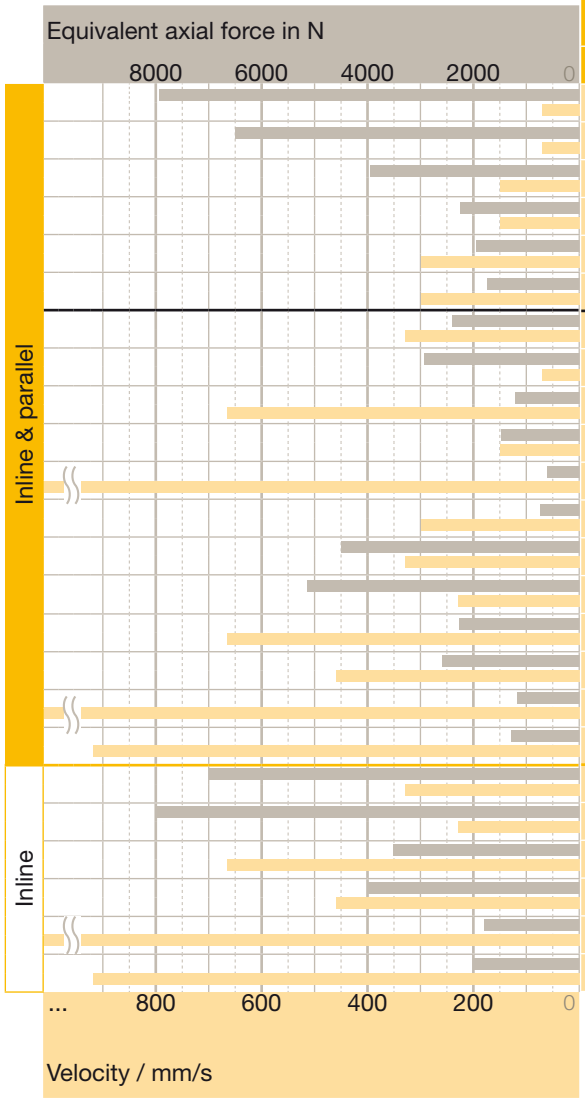
with Compax3, SLVD-N, TPD-M

In order to simplify the representation, we assumed boundary conditions which must be adhered to without exception in your application, otherwise the product combinations suggested here might not work. In this case, the application must be dimensioned conventionally.

[1)] does not apply for ATEX Cylinder

Predefined Motion Packages

Cylinder / gearbox / motor / drive controller / cable



	Max. Speed	Equivalent axial force	Max. Acceleration	Lifetime	Screw lead	Supply voltage	Cylinder
	mm/s	N	m/s²	km	mm	V	
01	70	7950	0.5	130	5	230	**ETH050M05**A1**P1A**FM**N**0300A
02	70	6500	4.0	240	5	230	
03	150	3950	1.0	1400	10	230	**ETH050M10**A1**P1A**FM**N**0300A
04	150	2250	8.0	7570	10	230	
05	300	1950	8.6	6940	20	230	**ETH050M20**A1**P1A**FM**N**0300A
06	300	1750	15.0	9600	20	230	
07	330	2400	4.0	4820	5	230	**ETH050M05**A1**K1C**FM**N**0300A
08	70	2950	4.0	2520	5	230	
09	666	1220	8.0	>20000	10	230	**ETH050M10**A1**K1C**FM**N**0300A
10	150	1480	8.0	>20000	10	230	
11	1333	620	15.0	>20000	20	230	**ETH050M20**A1**K1C**FM**N**0300A
12	300	740	15.0	>20000	20	230	
13	330	4500	4.0	730	5	400	**ETH050M05**A1**K1F**FM**N**0300A
14	230	5150	4.0	490	5	400	
15	666	2280	8.0	7270	10	400	**ETH050M10**A1**K1F**FM**N**0300A
16	460	2600	8.0	4900	10	400	
17	1333	1180	15.0	>20000	20	400	**ETH050M20**A1**K1F**FM**N**0300A
18	920	1300	15.0	>20000	20	400	
19	330	7000	4.0	200	5	400	**ETH050M05**A1**K1D**FM**N**0300A
20	230	8000	4.0	130	5	400	
21	666	3520	8.0	1980	10	400	**ETH050M10**A1**K1D**FM**N**0300A
22	460	4000	8.0	1350	10	400	
23	1333	1800	15.0	8820	20	400	**ETH050M20**A1**K1D**FM**N**0300A
24	920	2020	15.0	6240	20	400	

Basic Application Assumptions:

- Stroke from 50 to 600 mm
- Horizontal movement
- The characteristics of the individual components are not to be exceeded
  - with parallel motor: respect transmissible torque depending on the motor speed n
  - permissible axial thrust forces must be respected
  - Ambient conditions
  - ...
- Linear acceleration
- Maximum acceleration given = deceleration times
- Application factor = 1.0
- The calculation is based on the assumption: without standstill time (i.e. if there are standstill times in the application, only the power reserve is increased)
- 40 °C ambient temperature, with gearbox 20 °C ambient temperature
- up to 1000 m above sea level

Order Codes

Gearbox	Motor	Drive Compax3	Motor Cable	Feedback cable	Drive SLVD-N / TPD-M	Motor Cable	Feedback cable
PS60-003-S2/MU60-321	**SMH825603814***2I65A7***4**	**C3S063V2F***11***I**xx**T**xx**M**xx	**MOK55/...** (standard) **or MOK54/...** (cable chain compatible)	**GBK 24/...** (cable chain compatible)	**SLVD5N...**	**CAVOMOT...**	**CAVORES...**
		C3S025V2F*11***I**xx**T**xx**M**xx			**SLVD2N...**		
		C3S063V2F*11***I**xx**T**xx**M**xx			**SLVD5N...**		
		C3S025V2F*11***I**xx**T**xx**M**xx			**SLVD2N...**		
		C3S063V2F*11***I**xx**T**xx**M**xx			**SLVD5N...**		
		C3S025V2F*11***I**xx**T**xx**M**xx			**SLVD2N...**		
without gearbox	**SMH824503814***2I65A7***2**	**C3S063V2F***11***I**xx**T**xx**M**xx			**SLVD5N...**		
	SMH821003814*2I65A7***2**	**C3S025V2F***11***I**xx**T**xx**M**xx			**SLVD2N...**		
	SMH824503814*2I65A7***2**	**C3S063V2F***11***I**xx**T**xx**M**xx			**SLVD5N...**		
	SMH821003814*2I65A7***2**	**C3S025V2F***11***I**xx**T**xx**M**xx			**SLVD2N...**		
	SMH824503814*2I65A7***2**	**C3S063V2F***11***I**xx**T**xx**M**xx			**SLVD5N...**		
	SMH821003814*2I65A7***2**	**C3S025V2F***11***I**xx**T**xx**M**xx			**SLVD2N...**		
	SMH10056065ET*2I65A7***4**	**C3S075V4F***11***I**xx**T**xx**M**xx			**TPDM05...**		
	SMH10030065ET*2I65A7***4**	**C3S038V4F***11***I**xx**T**xx**M**xx			**TPDM05...**		
	SMH10056065ET*2I65A7***4**	**C3S075V4F***11***I**xx**T**xx**M**xx			**TPDM05...**		
	SMH10030065ET*2I65A7***4**	**C3S038V4F***11***I**xx**T**xx**M**xx			**TPDM05...**		
	SMH10056065ET*2I65A7***4**	**C3S075V4F***11***I**xx**T**xx**M**xx			**TPDM05...**		
	SMH10030065ET*2I65A7***4**	**C3S038V4F***11***I**xx**T**xx**M**xx			**TPDM05...**		
without gearbox	**MH1056008919***2I65A7***4**	**C3S150V4F***11***I**xx**T**xx**M**xx			**TPDM10...**		
	MH1053008919*2I65A7***4**	**C3S075V4F***11***I**xx**T**xx**M**xx			**TPDM05...**		
	MH1056008919*2I65A7***4**	**C3S150V4F***11***I**xx**T**xx**M**xx			**TPDM10...**		
	MH1053008919*2I65A7***4**	**C3S075V4F***11***I**xx**T**xx**M**xx			**TPDM05...**		
	MH1056008919*2I65A7***4**	**C3S150V4F***11***I**xx**T**xx**M**xx			**TPDM10...**		
	MH1053008919*2I65A7***4**	**C3S075V4F***11***I**xx**T**xx**M**xx			**TPDM05...**		

Order codes:
bold: **mandatory so that the package is combinable**
italics: *recommended/standard*
blue: must be selected depending on the application
Hint: The examples shown here are meant to help with the dimensioning process. As many parameters interact in this kind of drive package, the examples make no claim to be complete.

Predefined Motion Packages ETH080 [1)]

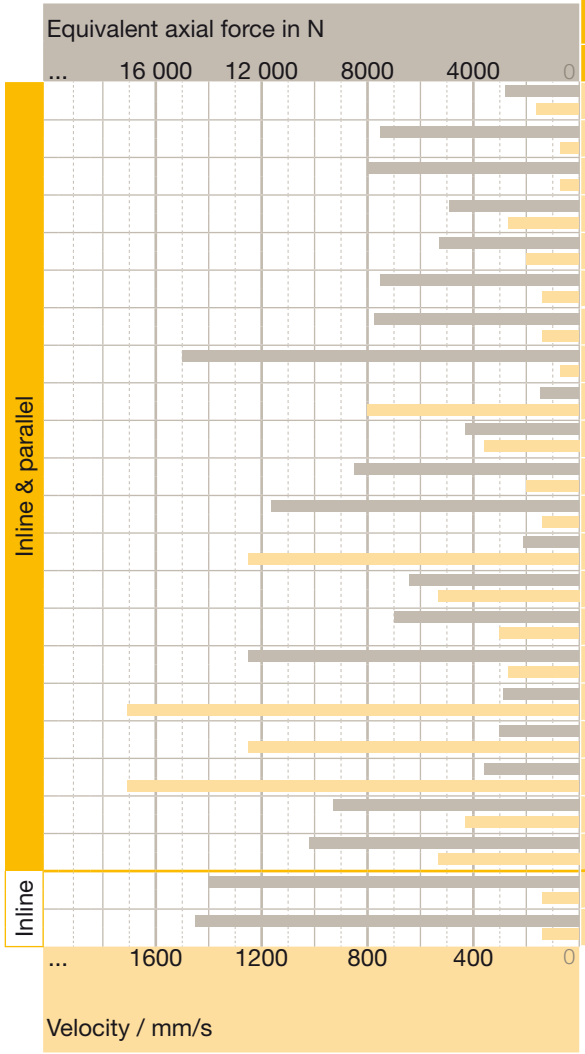
with Compax3, TPD-M

In order to simplify the representation, we assumed boundary conditions which must be adhered to without exception in your application, otherwise the product combinations suggested here might not work. In this case, the application must be dimensioned conventionally.

[1)] does not apply for ATEX Cylinder

Predefined Motion Packages

Cylinder / gearbox / motor / drive controller / cable



	Max. Speed	Equivalent axial force	Max. Acceleration	Lifetime	Screw lead	Supply voltage	Cylinder
	mm/s	N	m/s²	km	mm	V	
01	160	2800	4	3560	5	400	**ETH080M05**A1**K1E**FM**N**0400A
02	70	7500	4	185	5	400	**ETH080M05**A1**P1B**FM**N**0400A
03	70	8000	0.5	155	5	400	
04	267	4900	4	670	5	400	**ETH080M05**A1**K1E**FM**N**0400A
05	200	5300	4	530	5	400	
06	139	7500	5	2200	10	400	**ETH080M10**A1**P1B**FM**N**0400A
07	139	7750	7.7	1950	10	400	
08	70	15 000	0.5	23	5	400	**ETH080M05**A1**P1B**FM**N**0400A
09	800	1450	15	>20 000	32	400	**ETH080M32**A1**K1J**FM**N**0400A
10	360	4300	8	15 540	10	400	**ETH080M10**A1**K1J**FM**N**0400A
11	200	8500	4	130	5	400	**ETH080M05**A1**K1J**FM**N**0400A
12	139	11 620	4.6	400	10	400	**ETH080M10**A1**P1B**FM**N**0400A
13	1250	2100	15	>20 000	32	400	**ETH080M32**A1**K1K**FM**N**0400A
14	533	6400	8	4710	10	400	**ETH080M10**A1**K1K**FM**N**0400A
15	300	7000	8	3100	10	400	**ETH080M10**A1**K1K**FM**N**0400A
16	267	12 500	4	40	5	400	**ETH080M05**A1**K1K**FM**N**0400A
17	1707	2850	15	>20 000	32	400	**ETH080M32**A1**K1K**FM**N**0400A
18	1250	3000	15	>20 000	32	400	**ETH080M32**A1**K1K**FM**N**0400A
19	1707	3600	15	11 920	32	400	**ETH080M32**A1**K1K**FM**N**0400A
20	430	9300	8	900	10	400	**ETH080M10**A1**K1K**FM**N**0400A
21	533	10 200	8	630	10	400	**ETH080M10**A1**K1K**FM**N**0400A
22	139	14 000	1	190	10	400	**ETH080M10**A1**P1B**FM**N**0400A
23	139	14 500	7.7	160	10	400	

Basic Application Assumptions:

- Stroke from 50 to 800 mm
- Horizontal movement
- The characteristics of the individual components are not to be exceeded
  - with parallel motor: respect transmissible torque depending on the motor speed n
  - permissible axial thrust forces must be respected
  - Ambient conditions
  - ...
- Linear acceleration
- Maximum acceleration given = deceleration times
- Application factor = 1.0
- The calculation is based on the assumption: without standstill time (i.e. if there are standstill times in the application, only the power reserve is increased)
- 40 °C ambient temperature, with gearbox 20 °C ambient temperature
- up to 1000 m above sea level

Order Codes								
Gearbox	Motor	Drive Compax3	Motor Cable	Feedback cable		Drive TPD-M	Motor cable	Feedback cable
without gearbox	**SMH823003519***2l65A7***4**	**C3S038V4F***11***IxxTxxMxx**	❶	GBK 24/... (cable chain compatible)		**TPDM05...**	CAVOMOT...	CAVORES...
PS90-003-S2/MU90-085	**SMH825603819***2l65A7***4**	**C3S038V4F***11***IxxTxxMxx**				**TPDM05...**		
	SMH823003819*2l65A7***4**	**C3S038V4F***11***IxxTxxMxx**				**TPDM020202...**		
without gearbox	**SMH1005606519***2l65A7***4**	**C3S075V4F***11***IxxTxxMxx**				**TPDM0808...**		
	SMH1003006519*2l65A7***4**	**C3S038V4F***11***IxxTxxMxx**				**TPDM05...**		
PS90-003-S2/MU90-088	**SMH1003006519***2l65A7***4**	**C3S038V4F***11***IxxTxxMxx**				**TPDM05...**		
	SMH1005606519*2l65A7***4**	**C3S075V4F***11***IxxTxxMxx**				**TPDM0808...**		
	SMH1003006519*2l65A7***4**	**C3S038V4F***11***IxxTxxMxx**				**TPDM05...**		
without gearbox	**SMH1153010724***2l65A7***4**	**C3S075V4F***11***IxxTxxMxx**				**TPDM0808...**		
		C3S075V4F*11***IxxTxxMxx**				**TPDM0808...**		
		C3S075V4F*11***IxxTxxMxx**				**TPDM0808...**		
PS90-003-S2/MU90-345	**SMH1153010819***2l65A7***4**	**C3S075V4F***11***IxxTxxMxx**				**TPDM0808...**		
without gearbox	**SMH1423015524***2l65A7***4**	**C3S150V4F***11***IxxTxxMxx**	❷			**TPDM10...**		
	SMH1425615524*2l65A7***4**	**C3S150V4F***11***IxxTxxMxx**				**TPDM15...**		
	SMH1423015524*2l65A7***4**	**C3S150V4F***11***IxxTxxMxx**				**TPDM10...**		
	SMH1425615524*2l65A7***4**	**C3S150V4F***11***IxxTxxMxx**				**TPDM15...**		
	MH1454522524*3l65A7***4**	**C3S300V4F***11***IxxTxxMxx**	❸			**TPDM30...**		
	MH1453022524*3l65A7***4**	**C3S150V4F***11***IxxTxxMxx**				**TPDM10...**		
	MH1454528524*3l65A7***4**	**C3S300V4F***11***IxxTxxMxx**				**TPDM30...**		
	MH1453022524*2l65A7***4**	**C3S150V4F***11***IxxTxxMxx**				**TPDM15...**		
	MH1454528524*3l65A7***4**	**C3S300V4F***11***IxxTxxMxx**				**TPDM30...**		
PS90-003-S2/MU90-345	**SMH1153010819***2l65A7***4**	**C3S075V4F***11***IxxTxxMxx**	❶			**TPDM0808...**		
	SMH1155610819*2l65A7***4**	**C3S150V4F***11***IxxTxxMxx**				**TPDM15...**		

❶ **MOK55/... (standard) or MOK54/...** (cable chain compatible)
❷ **MOK56/... (standard) or MOK57/...** (cable chain compatible)
❸ **MOK59/... (standard) or MOK64/...** (cable chain compatible)

Order codes:
bold: **mandatory so that the package is combinable**
italics: *recommended/standard*
blue: must be selected depending on the application
Hint: The examples shown here are meant to help with the dimensioning process. As many parameters interact in this kind of drive package, the examples make no claim to be complete.

Predefined Motion Packages ETH100, ETH125 [1)]

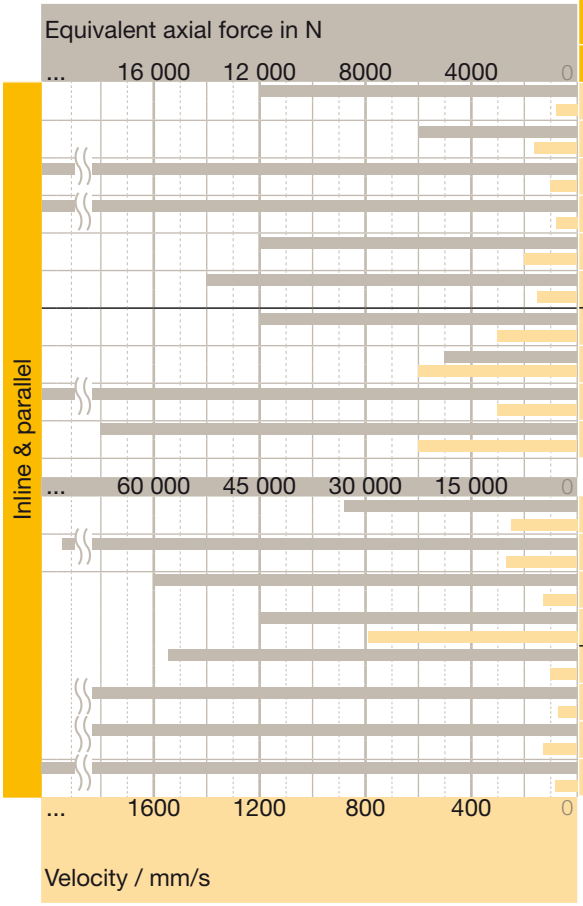
with Compax3, TPD-M

In order to simplify the representation, we assumed boundary conditions which must be adhered to without exception in your application, otherwise the product combinations suggested here might not work. In this case, the application must be dimensioned conventionally.

[1)] does not apply for ATEX Cylinder

Predefined Motion Packages

Cylinder / gearbox / motor / drive controller / cable



	Max. Speed	Equivalent axial force	Max. Acceleration	Lifetime	Screw lead	Supply voltage	Cylinder
	mm/s	N	m/s²	km	mm	V	
01	80	12 000	4	6750	10	400	**ETH100M10**A1**P1C**FM**N**0600A
02	160	6000	4	>20 000	20	400	**ETH100M20**A1**P1C**FM**N**0600A
03	100	23 000	3	900	10	400	**ETH100M10**A1**P1C**FM**N**0600A
04	80	30 000	2	500	10	400	**ETH100M10**A1**P1C**FM**N**0600A
05	200	12 000	4	20 000	20	400	**ETH100M20**A1**P1C**FM**N**0600A
06	150	14 000	8	12500	20	400	**ETH100M20**A1**P1C**FM**N**0600A
07	300	12 000	5	20 000	10	400	**ETH100M10**A1**K1L**FM**N**0600A
08	600	5000	10	>20 000	20	400	**ETH100M20**A1**K1K**FM**N**0600A
09	300	30 000	4	500	10	400	**ETH100M10**A1**K1L**FM**N**0600A
10	600	18 000	4	6000	20	400	**ETH100M20**A1**K1L**FM**N**0600A
01	250	33 000	4	1500	10	400	**ETH125M10**A1**K1L**FM**N**0500A
02	267	73 000	2	100	10	400	**ETH125M10**A1**K1M**FM**N**0500A
03	126	60 000	3	1500	20	400	**ETH125M20**A1**K1M**FM**N**0500A
04	790	45 000	4	3250	20	400	**ETH125M20**A1**K1M**FM**N**0500A
05	100	58 000	2	250	10	400	**ETH125M10**A1**P1K**FM**N**0500A
06	71	70 000	2	100	10	400	**ETH125M10**A1**P1K**FM**N**0500A
07	126	70 000	3	900	20	400	**ETH125M20**A1**P1K**FM**N**0500A
08	84	85 000	1	500	20	400	**ETH125M20**A1**P1K**FM**N**0500A

Basic Application Assumptions:

- Stroke from 100 to 600 mm
- Horizontal movement
- The characteristics of the individual components are not to be exceeded
  - with parallel motor: respect transmissible torque depending on the motor speed n
  - permissible axial thrust forces must be respected
  - Ambient conditions
  - ...
- Linear acceleration
- Maximum acceleration given = deceleration times
- Application factor = 1.0
- The calculation is based on the assumption: without standstill time (i.e. if there are standstill times in the application, only the power reserve is increased)
- 40 °C ambient temperature, with gearbox 20 °C ambient temperature
- up to 1000 m above sea level

Order Codes								
Gearbox	Motor	Drive Compax3	Motor Cable	Feedback cable		Drive TPD-M	Motor cable	Feedback cable
PS115-005-S2/MU115-005	**SMH1005606524***2I65A7***4**	**C3S075V4F***11***IxxTxxMxx**	❶	❻		**TPDM0808…**	CAVOMOT…	CAVORES…
PS115-005-S2/MU115-005	**SMH1003006524***2I65A7***4**	**C3S038V4F***11***IxxTxxMxx**	❶			**TPDM05…**		
PS115-004-S2/MU115-026	**SMH1423015524***2I65A7***4**	**C3S150V4F***11***IxxTxxMxx**	❷			**TPDM15…**		
PS115-005-S2/MU115-026	**SMH1423015524***2I65A7***4**	**C3S150V4F***11***IxxTxxMxx**	❷			**TPDM15…**		
PS115-004-S2/MU115-026	**SMH1423015524***2I65A7***4**	**C3S150V4F***11***IxxTxxMxx**	❷			**TPDM15…**		
PS115-005-S2/MU115-026	**SMH1423015524***2I65A7***4**	**C3S150V4F***11***IxxTxxMxx**	❷			**TPDM15…**		
without gearbox	**SMH1703035538***2I65A7***4**	**C3S150V4F***11***IxxTxxMxx**	❷			**TPDM15…**		
	MH1454528524*2I65A7***4**	**C3S300V4F***11***IxxTxxMxx**	❸			**TPDM30…**		
	MH2053090538*2I65A7***4**	**C3H050V4F***11***IxxTxxMxx**	❹			--		
	MH2053090538*2I65A7***4**	**C3H050V4F***11***IxxTxxMxx**	❹			--		
without gearbox	**MH2053070538***3I65A7***4**	**C3H090V4F***11***IxxTxxMxx**	❺	❻		--		
	MH265301505483*M65***4**	**C3H090V4F***10***IxxTxxMxx**	❺	❼		--		
	MH265302205483*M65***4**	**C3H125V4F***10***IxxTxxMxx**	❺	❼		--		
	MH265302205483*M65***4**	**C3H125V4F***10***IxxTxxMxx**	❺	❼		--		
PE700410M1802153880	**MH2053028538***3I65A7***4**	**C3S300V4F***11***IxxTxxMxx**	❹	❻		--		
PE700510M1802153880	**MH2053028538***3I65A7***4**	**C3S300V4F***11***IxxTxxMxx**	❹	❻		--		
PE700410M1802153880	**MH2053070538***3I65A7***4**	**C3H050V4F***11***IxxTxxMxx**	❺	❻		--		
PE700510M1802153880	**MH2053070538***3I65A7***4**	**C3H050V4F***11***IxxTxxMxx**	❺	❻		--		

❶ **MOK55/… (standard) or MOK54/…** (cable chain compatible)
❷ **MOK56/… (standard) or MOK57/…** (cable chain compatible)
❸ **MOK59/… (standard) or MOK64/…** (cable chain compatible)
❹ **MOK61/…,**
❺ **MOK62/...**
❻ **GBK24/...** (cable chain compatible)
❼ **REK42/… (standard) or REK41/…** (cable chain compatible)

Order codes:
bold: **mandatory so that the package is combinable**
italics: *recommended/standard*
blue: must be selected depending on the application
Hint: The examples shown here are meant to help with the dimensioning process. As many parameters interact in this kind of drive package, the examples make no claim to be complete.

Order Code

	1	2	3	4	5	6	7	8	9	10	11	12
Example	**ETH**	**050**	**M05**	**A**	**1**	**K1A**	**F**	**M**	**N**	**0200**	**A**	**Uxx**

1 Series

ETH	Electro Cylinder

2 Frame size

032	ISO 32
050	ISO 50
080	ISO 80
100	ISO 100
125	ISO 125

3 Screw lead Mxx in mm

M05	for ETH032, ETH050, ETH080
M10	for ETH032, ETH050, ETH080, ETH100, ETH125
M16	for ETH032
M20	for ETH050, ETH100, ETH125
M32	for ETH080

4 Motor mounting position, housing orientation, groove orientation [1]

A		Inline + groove for initiator 3 & 9 o'clock (standard)
B		Inline + groove for initiator 6 & 12 o'clock
C		Parallel 12 o'clock / groove for initiator 3 & 9 o'clock
D		Parallel 12 o'clock / groove for initiator 6 & 12 o'clock
E		Parallel 3 o'clock / groove for initiator 3 & 9 o'clock
F		Parallel 3 o'clock / groove for initiator 6 & 12 o'clock
G		Parallel 6 o'clock / groove for initiator 3 & 9 o'clock
H		Parallel 6 o'clock / groove for initiator 6 & 12 o'clock
J		Parallel 9 o'clock / groove for initiator 3 & 9 o'clock
K		Parallel 9 o'clock / groove for initiator 6 & 12 o'clock

5 Relubrication option [2, 3]

in combination with motor mounting position, housing orientation, groove orientation

1	No additional relubrication hole (standard) (not with 3 o'clock motor mounting)		
	ETH032	**ETH050**	**ETH080/ETH100/ETH125**
	A, B, C, D, G, H, J, K	A, B, C, D, G, H, J, K	A, C, G, J
2	Relubricating hole centered in the profile 12 o'clock		
	ETH032	**ETH050**	**ETH080/ETH100/ETH125**
	A, C, E, G, J	B, D, F, H, K	A, C, E, G, J
3	Relubricating hole centered in the profile 3 o'clock		
	ETH032	**ETH050**	**ETH080/ETH100/ETH125**
	B, D, F, H, K	A, C, E, G, J	A, C, E, G, J
4	Relubricating hole centered in the profile 6 o'clock		
	ETH032	**ETH050**	**ETH080/ETH100/ETH125**
	A, C, E, G, J	B, D, F, H, K	A, C, E, G, J
5	Relubricating hole centered in the profile 9 o'clock		
	ETH032	**ETH050**	**ETH080/ETH100/ETH125**
	B, D, F, H, K	A, C, E, G, J	A, C, E, G, J

6 Motor flange [4]

Motors always with key groove on the output shaft

	ETH032	ETH050	ETH080	ETH100	ETH125	With motor flange for Parker motor:
K1A	•					SMH60-B8/9, MH56-B5/9
K1B	•	•				SMH60-B5/11, MH70-B5/11 or NX3, EX3
K1C	•	•				SMH82-B8/14
K1D			•	•		SMH82-B8/19, MH105-B9/19 (old HJ96 Motor) or NX4, EX4
K1E			•	•		SMH82-B5/19, SMH100-B5/19, MH105-B5/19
K1F		•				SMH100-B5/14 [5]
K1H				•		SMH100-B5/24, MH105-B5/24
K1J				•	•	SMH115-B7/24, MH105-B6/24 or NX6, EX6
K1K			•	•		SMH142-B5/24, MH145-B5/24
K1L				•	•	MH205-B5/38, SMH170-B5/38
K1M					•	MH265-B5/48
						With gearbox flange for Parker gearbox:
P1A	•	•				PS60
P1B			•			PS90
P1C				•	•	PS115
P1D				•	•	PS142
P1G	•	•				PE3
P1H			•			PE4
P1J				•		PE5
P1K					•	PE7
1xx						Special flange one-piece (customized)
2xx						Special flange two-piece (customized)

if you need a flange for a third-party motor, please contact us.

7	Mounting type	
	F	Thread on the cylinder body **(standard)** (ETH100, ETH125 does not have a mounting thread on the underside)
	B	Foot mounting [6), 7)] (For ETH100, ETH125 only available in protection class option A)
	C	Rear Clevis [6)]
	D	Centre trunnion mounting (not with motor mounting positions E, F, J, K), for lubricating option "1", the lubrication port is always in 6 o'clock position
	E	Rear Eye Mounting [6)]
	G	Mounting Flanges [7)] (only with motor mounting positions A, B, C, D) (For ETH100, ETH125 only available in protection class option A)
	H	Rear plate [6)] (For ETH125 only available in protection class option A)
	J	Front plate [7)] (For ETH125 only available in protection class option A)
	N	Rear Plate & Front Plate [6), 7)] (For ETH125 only available in protection class option A)
	X	customized - please contact us

8	Thrust rod	
	M	External thread **(standard)**
	F	Internal Thread
	K	Internal thread (for the reception of the force sensor with external thread) (only for ETH100, ETH125)
	C	Rod clevis [8)] (stainless steel with protection class "B" and "C"; standard with protection class "A")
	S	Spherical Rod Eye (stainless steel with protection class "B" and "C"; standard with protection class "A") (For ETH125 only available in protection class option A)
	R	Parallel guiding with ball bushing [8)] (not with motor mounting positions E, F, J, K) (available only in protection class option A)
	T	Parallel guiding with sliding bushing [8)] (not with motor mounting positions E, F, J, K)
	L	Alignment Coupler (available only in protection class option A)
	X	customized - please contact us

9	Option	
	N	Standard
	A	Designation for ATEX Cylinder [9)]

10	Stroke in mm	ETH032	ETH050	ETH080	ETH100/ ETH125
	0050	•	•		
	0100	•	•	•	•
	0150	•	•	•	•
	0200	•	•	•	•
	0300	•	•	•	•
	0400			•	•
	0600			•	•
	1000	•			•
	1200		•		
	1600			•	•
	XXXX	50...1000	50...1200	50...1600	100...2000
		customized in steps of 1 mm			

11	Protection class	
	A	IP54 with galvanized screws
	B	IP 54 stainless version with VA screws
	C	IP 65 like B + protective lacquer and specially sealed

12	Optional (only customized cylinders)	
	Uxx	Unique Version Here, a number for customized cylinders is assigned, please contact us
	with ATEX Cylinders [9)]	
	000	Standard ATEX Cylinder
	xxx	ATEX release xxx ATEX Applications-Identification No. xxx

1) ETH080-ETH125 features 2 grooves each on all 4 sides (i.e. Code B=A or D=C, F=E, H=G, K=J), therefore codes A, C, E, G, J are possible for ETH080-ETH125.
2) With parallel configuration, the motor may block access to the sensors and the lubrication port.
3) When selecting the relubrication options 2-5, the standard lubrication port is without function.
4) Please check cylinder motor/gearbox combination with the aid of the table ("Motor Mounting Options" see page 22). Order Code SMH100-B5/14: " SMH100␣␣␣␣ET..." (the motor shaft diameter is replaced by the term "ET")(not in the motors catalog) only with feedback: Resolver, A7
6) Not with motor mounting options A & B.
7) Not for thrust rod R, T
8) Not for ETH100, ETH125
9) Please observe the explanations "ETH - Electro Thrust Cylinder for ATEX Environment" see page 12

Software & Tools

- Actuator database
  - A special actuator database is available in the Compax3 ServoManager. You can simply enter the ETH type code for automatic controller parameterization.
- CAD-Configurator
  - Configure your electro cylinder CAD data online.
    www.parker.com/eme/eth
- Dimensioning tool "EL-Sizing"
  - A dimensioning tool simplifies the dimensioning process.
    www.parker.com/eme/eth

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

Key Products

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

Climate Control

Key Markets

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

Key Products

Accumulators
Advanced actuators
CO_2 controls
Electronic controllers
Filter driers
Hand shut-off valves
Heat exchangers
Hose & fittings
Pressure regulating valves
Refrigerant distributors
Safety relief valves
Smart pumps
Solenoid valves
Thermostatic expansion valves

Electromechanical

Key Markets

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

Key Products

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

Filtration

Key Markets

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

Key Products

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

Fluid & Gas Handling

Key Markets

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

Key Products

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

Hydraulics

Key Markets

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

Key Products

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

Pneumatics

Key Markets

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

Key Products

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

Process Control

Key Markets

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

Key Products

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

Sealing & Shielding

Key Markets

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

Key Products

Dynamic seals
Elastomeric o-rings
Electro-medical instrument design & assembly
EMI shielding
Extruded & precision-cut, fabricated elastomeric seals
High temperature metal seals
Homogeneous & inserted elastomeric shapes
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