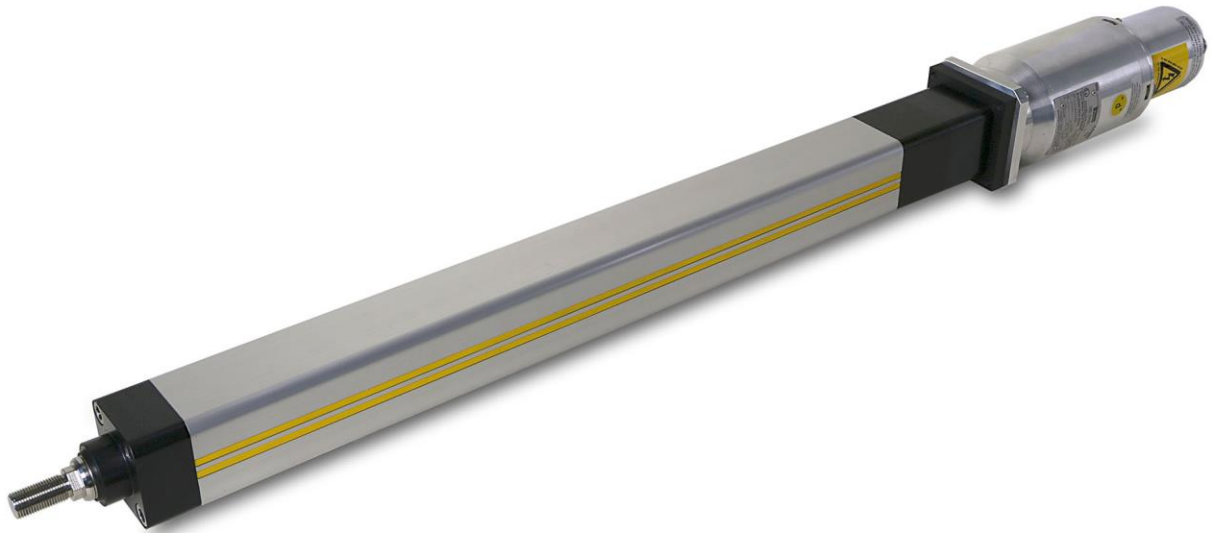


ETH ATEX: Basic conditions for the use



ETH Electro Cylinder with ATEX Parker High Force Electro Thrust Cylinder



192-550006N5
ETH ATEX
2022-06

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non-warranty clause

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

Further information:

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

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1. Introduction

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This paper is intended to verify in advance the intended use of the ETH electro cylinder in explosive atmospheres and to define the ATEX application data required for the ATEX certification procedure with

- ◆ the standard Force Velocity Diagrams
- or
- ◆ which are required via the application

specific temperature measurement.

The operating / mounting instructions (192-550003) must be taken into account and applied when mounting, setting up and maintaining the device.

1.1 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. <i>Declaration No.:</i>	DoI001-R 3.0
Firma / <i>Manufacturer:</i> Bevollmächtigter / <i>Authorized person:</i>	Parker Hannifin GmbH & Co KG Jürgen Killius
Anschrift <i>Address:</i>	Robert-Bosch-Straße 22 77656 Offenburg Deutschland
Produkt <i>Product:</i>	ETH: Parker High Force Electro Thrust Cylinder
Serien- / Typenbezeichnung <i>Model / Type:</i>	ETH032; ETH050; ETH080; ETH100; ETH125
Seriennummer <i>Serial No.:</i>	ETH032 bis -125: Ab 35410387-0001 ETH032 till -125: As of 35410387-0001
Baujahr <i>Year of manufacture:</i>	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 / <i>Standard</i>	Titel / <i>Title</i>	Ausgabe / <i>Edition</i>
DIN EN ISO 12100:2011	Sicherheit von Maschinen – Allgemeine Gestaltungsleitsätze, Risikobeurteilung und Risikominimierung <i>Safety of Machinery – General principles for design, risk assessment and risk reduction</i>	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*

Parker Hannifin GmbH
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USt-IdNr.: DE 122 802 922
Steuernummer: 5349 5747 1543

Commerzbank Offenburg
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Geschäftsführung:
Dr. Gerd Scheffel, Günter Schränk, Ellen Raahede, Kees Vernaart
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1.2 ATEX declaration of conformity



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EU KONFORMITÄTSERKLÄRUNG EU DECLARATION OF CONFORMITY

ACCORDING TO EU DIRECTIVE 2014/34/EU CONCERNING EQUIPMENT AND PROTECTIVE SYSTEMS INTENDED FOR USE IN POTENTIALLY EXPLOSIVE ATMOSPHERES

Dokumenten Nr. / Declaration No.: **DoC014-R 3.1**

Firma / Manufacturer: **Parker Hannifin GmbH**
Bevollmächtigter / Authorized person: **Jürgen Killius**

Anschrift / Address: **Robert-Bosch-Straße 22, 77656 Offenburg, Deutschland**

Produkt / Gerät: / Product / Equipment: **ETH: Parker High Force Electro Thrust Cylinder**

Baugrößen / Frame sizes: **ETH032; ETH050; ETH080; ETH100; ETH125**

Ausführungen: **Alle im Bestellschlüssel aufgeführten Optionen**
Options: **All options which are specified in the order code**

Der oben genannte Hersteller / Bevollmächtigte erklärt, dass das Produkt den folgenden grundlegenden Anforderungen der Richtlinie 2014/34/EU entspricht:
The above mentioned Manufacturer / authorized person declare that the product is complying with the following essential requirements of the directive 2014/34/EU:

Kennzeichnung: **ETH032 & ETH050:**  **II 2G Ex h IIC T4 Gb**

Designation: **ETH080 & ETH100 & ETH125:**  **II 2G Ex h IIB T4 Gb**

Das Konformitätsbewertungsverfahren wurde in Anlehnung an die Richtlinie 2014/34/EU (ATEX) durchgeführt. Die entsprechenden Unterlagen sind bei folgender benannten Stelle (Nr. 2004) hinterlegt:
The conformity assessment procedure has been carried out in accordance with Directive 2014/34/EU (ATEX). The relevant documents are deposited at the notified body (No. 2004):

Bureau Veritas Consumer Products Services Germany, Businesspark A96, 86842 Türkheim, Germany

Normen / Standards: Ausgabe / Edition	Titel / Title
EN 1127-1:2019	Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology
EN ISO 80079-36:2016	Non-electrical equipment for use in potentially explosive atmospheres - Part 36: Basic method and requirements
EN ISO 80079-37:2016	Non-electrical equipment intended for use in potentially explosive atmospheres - Part 37: Protection by constructional safety 'c'

Weitere einschlägige Bestimmungen: Maschinenrichtlinie 2006/42/EG
More relevant purposes: Machinery directive 2006/42/EC

Der in der Betriebsanleitung beschriebenen bestimmungsgemäßen Verwendung und den Sicherheits-, Installations- und Bedienungshinweisen muss Folge geleistet werden.
The intended use must be secured. 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.

Änderungen an den genannten Geräten sind nicht zulässig.
Modifications on the named equipment are not permitted.

Werden die genannten Geräte in eine übergeordnete Maschine eingebaut, so müssen die durch den Einbau entstehenden neuen Risiken durch den Hersteller der neuen Maschine beurteilt werden.
If the above-named products are installed in a higher-ranking machine, the new risks arising from their installation must be assessed by the manufacturer of the new machine.

Offenburg, 01.06.2022

Jürgen Killius, Operations Manager

Parker Hannifin GmbH
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Dr.-Ing. Hans-Jürgen Haas, Kirsten Stenvers, Achim Kohler, Andreas Paulsen
Vorsitzender des Aufsichtsrates: Dr.-Ing. Gerd Scheffel

1.3 Introduction to ATEX

In this chapter you can read about:

Explosive atmospheres.....	7
Harmonized European ATEX Standard	7
Zone classification / device categories	8
Type of explosion protection	8
Explosion subgroup	9
Temperature classes	9
ATEX and machinery directive.....	9

ATEX = “ATmosphère EXplosible”

Introduction to the European ATEX directive

1.3.1. Explosive atmospheres

Directive 2014/34/EC defines an explosive atmosphere as a mixture of:

- a) flammable substances - gases, vapors, mists or dusts
- b) and air
- c) under defined atmospheric conditions
- d) in which, after ignition has occurred, combustion spreads to the entire unburned mixture

(NOTE: dust may not burn entirely after ignition).

A “potentially explosive atmosphere” is an atmosphere which could become explosive due to local and operational conditions. Devices concerned by directive 2014/34/EC are defined as designed for the use in potentially explosive atmospheres.

1.3.2. Harmonized European ATEX Standard

The EC accepted two harmonized directives for health and safety.

Requirements for machinery and equipment

Directive 2014/34/EC (ATEX 95a) defines the minimum safety requirements in EU member states for products used in potentially explosive atmospheres.

Requirements for OEM / user

ATEX directive 99/92/EC (ATEX 137) sets out the minimum requirements for improving the health and safety protection of workers potentially at risk from explosive atmospheres with regard to workplace, working conditions and the handling of products and materials. This directive classifies the workplace into zones and defines criteria for categorizing the products within the zones.

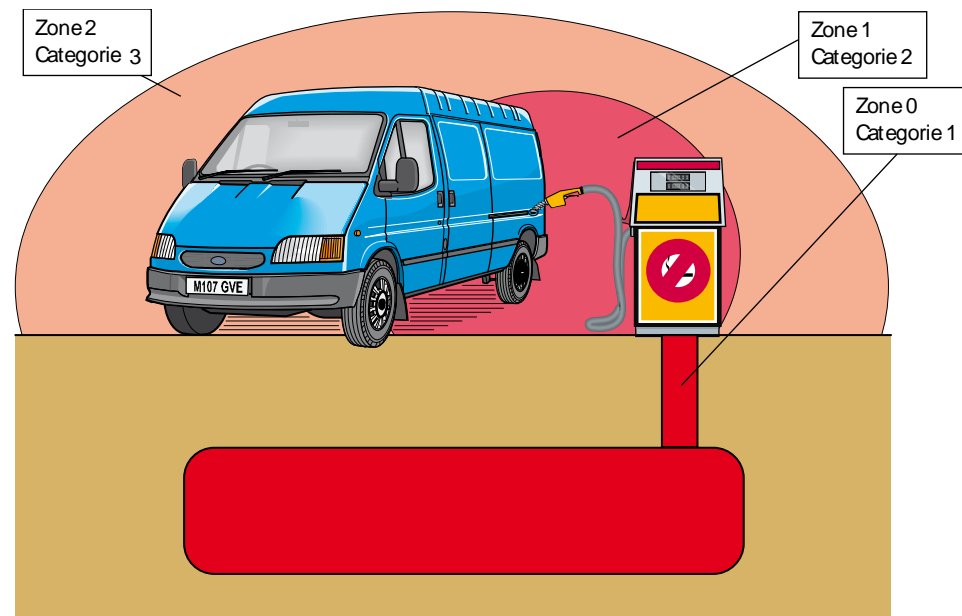
1.3.3. Zone classification / device categories

The table below describes the zones of an installation, where potentially explosive atmospheres may occur. The proprietor must analyze and assess the area, where explosive gas/dust mixes may occur and, if necessary, subdivide them into individual zones. This zone classification permits to select suitable machinery and equipment which can be used in this area.

User			Suitable machinery and devices		
Gas zone	Dust zone	Presence of potentially explosive atmospheres	Equipment Group *	Equipment Category	Area of application (not mining)
0		Permanently, often, for a long period approx. > 1000 h / year	II	1G	Gases, mist, vapor
	20			1D	Dust
1		occasionally approx. 10 ... 1000 h / year	II	2G	Gases, mist, vapor
	21			2D	Dust
2		rarely, for a short period, in the event of an error approx. < 10 h / year	II	3G	Gases, mist, vapor
	22			3D	Dust

* Equipment for use in areas (except underground in mining) which might be dangerous due to an explosive atmosphere.

Example:



1.3.4. Type of explosion protection

In addition to category and device class, which are the minimum required information, the device or component designation gives additional information with reference to the type of protection and explosion group for gases and mists. The type of explosion protection defines which method or measures is/are used for explosion protection in given equipment or individual components.

For non electric equipment, the following types of explosion protection are possible:

Type of explosion protection	Designation	Applied standard
Pressurized encapsulation	d	EN 13463-3
Pressurized enclosure	p	EN 13463-7
Intrinsic safety	g	EN 13463-4
Gas retardant enclosure	h	EN 13463-2 (except category 1)
Constructional safety	c Ex h	EN 13463-5 ISO 80079-37 ¹⁾
Ignition source monitoring	b Ex h	EN 13463-6 ISO 80079-37 ¹⁾
Liquid immersion	k Ex h	EN 13463-8 ISO 80079-37 ¹⁾

¹ The ISO standard 80079-37 replaces the standard series DIN EN 13463 Parts 1,5,6 and 8.

1.3.5. Explosion subgroup

The explosion group is an indicator for the inflammability (explosive potential) of gases (explosive atmospheres). The requirements for the equipment increase from IIA to IIC.

Explosion subgroup	Examples for gases
IIA	Propane, acetone, ammonia, gasoline, benzene, diesel fuel, heavy fuel, methane, methanol, propane
IIB	Ethylene, ethyl alcohol, hydrogen sulphide
IIC	Hydrogen, carbon disulphide, acetylene

Gas explosion subgroups of the Parker ETH electro cylinder (see page 10).

1.3.6. Temperature classes

Classification of flammable gases and vapors depending on their ignition temperature:

Class	Maximum permitted material surface temperature [°C]
D1	450
T2	300
T3	200
T4	135
T5	100
T6	85

For flammable substances, the temperature class and the maximum permitted surface temperature of the equipment are of essential importance.

1.3.7. ATEX and machinery directive

The ATEX directive is in effect since July 1st. 2003 and replaces the individual laws of the respective countries with reference to explosive atmospheres. While previously only referring to electrical devices, the directive now does also comprise mechanical, hydraulic and pneumatic devices.

With reference to the machinery directive 2006/42/EC it must be taken into consideration, that a number of external requirements stated in the ATEX directive 2014/34/EC refers to dangers occurring in explosive atmospheres, whereas the machinery directive does only list requirements for explosion protection. Hence, the ATEX directive 2014/34/EC is superior to the machinery directive with reference to explosion protection in potentially explosive atmospheres. The requirements of the machinery directive are however valid for all other dangers when operating machines.

1.4 ETH ATEX marking

Parker ETH - Electro Cylinder with the ATEX supplement are certified for use in explosive gas atmospheres (device group II, category 2G).

An ETH Electro Cylinder with the ATEX supplement complies with the requirements of the EC directive 2014/34/EC. Below you can find an explanation of the features and areas of usage resulting from the ATEX marking:



ETH032 & ETH050: II 2G Ex h IIC T4 Gb

- II Equipment group II, all areas, except underground (mining)
- 2G Zone 1, 2, gas explosion category 2G, 3G
- Ex h constructional safety in accordance with ISO 80079-37
- IIC suitable for explosive areas IIA, IIB and IIC.
Typical gases: Hydrogen
Ignition energy: >45 μJoule
- T4 Temperature class 4
Ignition temperature of flammable substances > 135°C
- Gb Equipment protection level (EPL) according to IEC 60079-0
Gb: device with high protection level



ETH080; ETH100, ETH125: II 2G Ex h IIB T4 Gb

- II Equipment group II, all areas, except underground (mining)
- 2G Zone 1, 2, gas explosion category 2G, 3G
- Ex h constructional safety in accordance with ISO 80079-37
- IIB suitable for explosion region IIA and IIB.
Typical gases: Ethylene
Ignition energy: >160 μJoule
- T4 Temperature class 4
Ignition temperature of flammable substances > 135°C
- Gb Equipment protection level (EPL) according to IEC 60079-0
Gb: device with high protection level

Classification

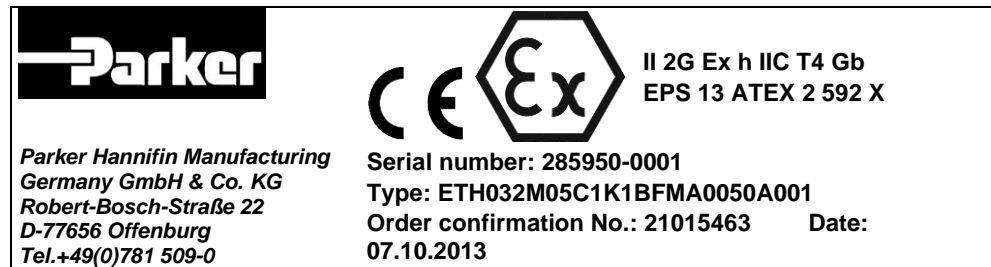
Equipment group	Equipment Categories	Protection class	Explosion group	Temperature class	Equipment protection level	ETH frame size
II	2G	Ex h	IIC	T4	Gb	ETH032 ETH050
			IIB			ETH080 ETH100 ETH125

Equipment group		Equipment Category	Area	Protection level EPL	Level of safety	Inflammable Substances	Protection class	Explosion group	Temperature class
I Mines (Underground / mining)	II Surfaces (all areas, except underground / mining)	1G	Area 0, 1, 2	Ga	very high	Gas	d	IIA	T1 < 450 °C
		2G	Area 1, 2	Gb	high		p	IIB	T2 < 300 °C
		3G	Zone 2	Gc	normal		g	IIC	T3 < 200 °C
		1D	Area 20, 21, 22	As	very high	Dust	h		T4 < 135 °C
		2D	Area 21, 22	Db	high		Ex h		T5 < 100 °C
		3D	Area 22	Dc	normal				T6 < 85 °C

ETH ATEX can be used in these areas.

1.5 Type identification plate

Type specification plate (example)



Type specification plate explanation

Left: Manufacturer address

Right: CE, Ex, ... ATEX marked
Serial number Unambiguous identification number
Type: Order Code:

ETH032M05C1K1BFMA0050A001

①

②

① "A" = ATEX cylinder

② "000" Standard ATEX Cylinder, tested with the
= force- velocity diagrams

"001" ATEX application identification number 1, ...
= (A-No. with unambiguous allocation to
ATEX application data)

Order Customer Order Number

confirmati
on No.:

Date: Delivery date

1.6 Applications in accordance with the Regulations

The incomplete machine can only be set in operation if it is sure that the machine in which the incomplete machine shall be mounted is conform to the 2006/42/EG machine directives.

Without further measures the product is not suitable for safety-oriented tasks. The linear actuator must only be used in areas that are not accessible to persons during operation.

If the linear actuator is used in areas accessible to people, it must be installed in such a manner that no one can be endangered during operation.

The described safety, installation and operating instructions must be adhered to.

General functioning consists in converting a rotational movement in a linear movement without slip within the product related load limits according to the information in the catalogue http://www.Parker.com/Literature/Electromechanical/Europe/Literature/190_550017_ETH_katalog.pdf,

http://www.Parker.com/Literature/Electromechanical/Europe/Literature/192_550017_ETH_Catalog.pdf.

Its applications are in industry and trade.

The linear actuator is used for: Positioning, transporting, feeding, removing, pallet handling, loading, unloading, processing and manipulating as well as testing work pieces or tools. Since the component can be used in a very wide range of applications, the user is responsible for its use in specific applications.

ATEX specific requirements

Strict adherence to the intended use of ATEX certified cylinders is the absolute prerequisite for their use in explosive atmospheres.

While using the ETH cylinder as intended, the ignition temperature will not be exceeded in any part of the ETH cylinder. The ETH cylinder is heated by the thermal effect of the motor or the gearbox as well as by the frictional heat generated by the spindle nut and the bearings, the latter however only if the cylinder is in motion. The relevant heating occurs with high force, travel speed and cycle time of the spindle nut. Therefore, the thermal behavior of the ETH cylinder must be taken into consideration when dimensioning a drive application. The application and therefore the temperature behavior must be checked on the basis of force - velocity - diagrams (see page 28). An application specific measurement (see page 34) and certification is also possible for critical applications or for further optimization. Please observe the Project notes (see page 23) as well as the document "ETH ATEX: Basic conditions for the use".

http://solutions.parker.com/eth_support

Besides the heating behavior of the cylinder, the following boundary conditions must be respected when using the cylinder in explosive atmospheres:

- ◆ The ETH is especially designed for the use in explosive atmospheres in accordance with the specifications of the ATEX directive 2014/34/EU.
- ◆ The operation of the electro cylinder is only permitted within the application data checked via force velocity diagrams (see page 28) or application specific measurement (see page 34).

Furthermore, it applies for the intended use:

- ◆ The ETH can be used in defined explosive atmospheres (see page 10).
- ◆ The shortened lubrication intervals applicable for ATEX are mandatory.
- ◆ In short-stroke applications (stroke shorter than 2.5 times the screw lead), the specified lubricating runs must be performed as described in the operating/mounting instructions.
- ◆ The cylinders must be replaced after 90 % of the attainable service life.
- ◆ The permitted maximum lateral force on the thrust rod = 0.
- ◆ No additional thermal effect due to a mechanical connection of the thrust rod with a workpiece fixture or such, which might lead to a heating of the screw nut.
- ◆ The product is designed for professional use and is not intended for private use.
- ◆ Operational safety of the ETH is only guaranteed with intended use.
- ◆ When installing the ETH ATEX please make sure that the ambient temperature of 40 °C is not exceeded (enough convection, ...).
- ◆ The heat input by the drive (motor, gearhead) shall not exceed 135 °C. We recommend to use a motor or gearhead with temperature class T4 or higher.

1.6.1. Applications not in accordance with the intended use

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

1.7 Operator's obligations

Legal requirements for the operator are directive 99/92/EC (ATEX 137) as well as the implementation of the industrial safety regulation, which is supported by the technical rules BG 104, BG 134 and TRBS 2152 and others.

The most important topics for explosion protection on the operator side are:

- ◆ Grading and classification of explosive areas
- ◆ Criteria for the selection of devices and protective systems
- ◆ Explosion protection document (with risk assessment, measures taken, zone classification, requirements for equipment, plant must be designed, operated and maintained safely)
- ◆ Minimum requirements for increased safety and health protection of the employees, who might be in danger due to explosive atmospheres

Furthermore, the following responsibilities of the operator apply for the use of the ETH ATEX cylinder:

- ◆ Making sure that the intended use is observed
- ◆ The operator of the entire system must ensure that the ETH is mounted by authorized and qualified personnel only. Authorized personnel means trained specialized employees of the customer, the manufacturer or of a service partner, who work in accordance with the specifications for explosion protection.
- ◆ Regular instruction of the operating personnel
- ◆ Taking dangers of ignition resulting from the installation of equipment into a system into consideration.
- ◆ Do NOT try to make unauthorized repairs. In this case, please do contact Parker.

1.8 For Safety Use

1.8.1. General hazards

General Hazards on Non-Compliance with the Safety Instructions

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

Electronic, moving and rotating components can

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

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

1.8.2. Identifying Residual Dangers and Hazardous Areas

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

The following safety signal words are used:

DANGER

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

WARNING

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

CAUTION

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

NOTICE

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

1.8.3. Working safely

NOTICE

The information (such as instructions and notes) contained in this manual must be heeded for all work involved in installing, commissioning, setting up, operating, changing operating conditions and modes, servicing, inspecting and repairing the unit.

The manual must be available close to the linear module during the performance of all tasks.

It is impermissible to operate the liner module if it is not in perfectly functional condition.

DANGER

Operating personnel

The following jobs must only be performed by appropriately trained and authorized personnel:


- ◆ Installation and set-up tasks on the linear actuator
- ◆ Attaching safety limit switches (initiators)
- ◆ Connecting the drive and testing the motion direction

 DANGER Instructions for Special Hazards

The linear module must be fixed or supported in accordance with the indications in this manual.

The operator must ensure that operation of the linear module does not cause any danger.

If the linear module moves in hazardous areas, these areas must be safeguarded with safety transmitter switches.

1.8.4. Safety Instructions for the Company Using the System** WARNING** Supervisors must also become familiar with the entire chapter entitled "Safety" and handling required on the linear actuator.


Supervisors must ensure that installation and operating personnel have read and understand the chapter entitled "Safety" and the description of how to work with the machine, and that they observe the instructions.

The manual must be available close to the linear module during the performance of all tasks.

It is impermissible to operate the liner module if it is not in perfectly functional condition.

Depending on the application, the operating company must provide for a suitable separating safety fence. Access to the motion range during operation must be prevented.

The user must make sure that the work area is protected by appropriate safety devices.

1.8.5. Safety Instructions for Operating Personnel** WARNING** Any work step that has a negative effect on the operating safety of the linear motor module must be omitted.

Operating and supervisory personnel are required to check the linear actuator or machine at least once per shift for externally visible damage or defects. Changes that have occurred (including the operating behavior) that could have a negative effect on the operating safety must be reported immediately.


Components and accessories are designed especially for this product. When purchasing spare and 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.

1.8.6. ATEX specific safety instructions**1.8.6.1 ATEX specific safety instructions**** DANGER** If the operating instructions and the technical specifications are not respected, the declaration of conformity expires in accordance to the ATEX directive 2014/34/EG.

1.8.6.2 General safety instructions - ATEX



The operator of the entire system must ensure that the ETH is mounted by authorized and qualified personnel only. Authorized personnel means trained specialized employees of the customer, the manufacturer or of a service partner, who work in accordance with the specifications for explosion protection. The linear actuators may not be modified with respect to the design or safety-related features without the written approval of Parker Hannifin Manufacturing Germany GmbH & Co. KG. Any unauthorized modification in this respect will exclude any liability on the part of Parker Hannifin Manufacturing Germany GmbH & Co. KG.

- ◆ It is strictly forbidden to dismount or disable safety and protection devices.
- ◆ In addition, the following rules and regulations apply as a matter of course:
 - ◆ the applicable regulations for health and safety at work,
 - ◆ generally accepted rules for the safe operation of machinery,
 - ◆ the EC Directives and
 - ◆ any special regulations of the respective country/state.

1.8.7. Product specific safety instructions



Danger of explosion when working in explosive atmospheres!

- ◆ If the system where the cylinder is to be mounted is surrounded by an explosive atmosphere, it may ignite during work.
Do always respect the local installation regulations.

Danger of explosion due to spark formation!

- ◆ Electrostatic charge of the cylinder may lead to sparks and cause danger of explosion in explosion protection zones.
Avoid electrostatic charge.
The cylinder must be grounded and be a part of the grounding concept. Ground cylinder via the motor and the cylinder mounting (machine frame).

Mechanical charges cause sparks and danger of explosion.

- ◆ Never expose the cylinder to powers of impact during transport, mounting and operation.
- ◆ Some thrust rod ends and mounting methods permit oscillating rotational and pivoting movements of the cylinder. If these elements are used:
Make sure, that circumferential speeds at the friction surfaces do not exceed 1 m/s.
- ◆ Never twist or bend the cylinder or fix it under stress.
- ◆ Avoid incorrect load mounting at the thrust rod end, see chapter 4: Commissioning.

Furthermore, it applies for the intended use:

- ◆ The ETH can be used in defined explosive atmospheres (see page 10).
- ◆ The shortened lubrication intervals applicable for ATEX are mandatory.
- ◆ In short-stroke applications (stroke shorter than 2.5 times the screw lead), the specified lubricating runs must be performed as described in the operating/mounting instructions.
- ◆ The cylinders must be replaced after 90 % of the attainable service life.
- ◆ The permitted maximum lateral force on the thrust rod = 0.
- ◆ No additional thermal effect due to a mechanical connection of the thrust rod with a workpiece fixture or such, which might lead to a heating of the screw nut.
- ◆ The product is designed for professional use and is not intended for private use.
- ◆ Operational safety of the ETH is only guaranteed with intended use.
- ◆ When installing the ETH ATEX please make sure that the ambient temperature of 40 °C is not exceeded (enough convection, ...).
- ◆ The heat input by the drive (motor, gearhead) shall not exceed 135 °C. We recommend to use a motor or gearhead with temperature class T4 or higher.

 DANGER

Only Ex certified devices (e.g. motors, gearboxes, limit sensor or force sensors) which adhere to potentially explosive environments are allowed to be mounted on the ETH ATEX. In the case of ETH ATEX this would be equipment category 2G (for Area1), explosion area IIB resp. IIC and temperature class T4. The rule for this is always the lowest ATEX Classification of the EX devices used.

 DANGER

If the customer installs and operates the ETH ATEX with e.g. motor, gearbox, sensors, etc., the user must ensure that no new sources of ignition are created by assembling and operating the ETH ATEX with other EX devices. Please observe the proper use of the individual EX devices.

NOTICE

Depending on the data operating the ETH ATEX and the ambient temperature, the surface of the electro cylinder can heat up to maximum 80°C due to its inside losses. Please consider this when dimensioning the drive options (motors resp. motor-gearhead combination).

1.9 Terms of guarantee / warranty

These operating instructions are subject to changes including changes in technical details with respect to the information and figures contained herein.

Parker Hannifin Manufacturing Germany GmbH & Co. KG grants no quality or durability guarantees nor any guarantees as to the suitability for specific purposes. Such guarantees must be expressly agreed upon in writing

Public statements, recommendations or advertising do not in any way represent quality specifications.

The warranty rights of the user imply that he reports any fault immediately and describes it precisely in his notice of defects. Parker Hannifin Manufacturing Germany GmbH & Co. KG is not responsible under any circumstances for damage to the product itself or any consequential damage caused by the product resulting from improper handling of the product. If Parker-Hannifin Manufacturing Germany GmbH & Co. KG is responsible for a defect, Parker-Hannifin Manufacturing Germany GmbH & Co. KG shall be authorized, at its discretion, to undertake improvements or deliver replacements.

In compliance with ISO 9000, all products are equipped with a type plate and a note of care that are bound to the device. The type plate must not be removed or damaged under any circumstances.

Parker Hannifin Manufacturing Germany GmbH & Co. KG shall not be held liable, regardless of any legal basis, except for cases of intent or gross negligence; injuries to life, body or health; or defects of malicious nondisclosure or whose absence was expressly guaranteed in writing.

Furthermore, if there is compulsory liability under the Product Liability legislation for personal injury and property damage to privately used objects, in the event of negligent breach of significant contractual obligations, Parker Hannifin Manufacturing Germany GmbH & Co. KG shall also be liable for cases of ordinary negligence; however, this is limited to damages that are contractually typical and foreseeable.

Further claims are hereby excluded.

The warranty shall lapse in the event of non-compliance with these operating instructions, the relevant statutory provisions and other information provided by the supplier.

In particular, we are not responsible for failures caused by modifications made by the customer or other parties. In such cases, the normal repair costs will be calculated. These costs will likewise be calculated for a check of the unit if no fault can be determined on the unit.

This regulation also applies during the warranty period.

No claims exist as to the availability of previous versions or to the retrofitting capacity of the units delivered to adapt them to the respectively current model version.

User conversions and changes are not Permitted

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

1.10 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.

DANGER

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

Installation of the cylinder

CAUTION

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".

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.

Internal end stops

CAUTION

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

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

2. Maintenance

In this chapter you can read about:

.....	20
Maintenance schedule.....	20
Lubricating intervals and amount of lubricant for ATEX ETH- Electro Cylinder.....	21
Toothed belt	21

Maintenance measures ETH

The ballscrew drive must be relubricated within given intervals.

The lubrication intervals depend on the operating conditions (nominal size, 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.**

2.1 Maintenance schedule

WHEN	WHAT	ACTION
After commissioning	Spindle	The cylinder is furnished completely lubricated. If the cylinder was held on stock at your premises for more than 1 year, it must be relubricated before commissioning. see lubricating intervals and amount of lubricant
Depending on the mileage, see table Lubricating intervals and amount of lubricant	Leas screw	Relubricating the screw. see lubricating intervals and amount of lubricant
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
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: <ul style="list-style-type: none"> ◆ 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.

2.2 Lubricating intervals and amount of lubricant for ATEX ETH- Electro Cylinder

	Spindle	Interval	Amount of lubricant
ETH032	M05	80 km	1.3 cm ³
	M10	160 km	1.6 cm ³
ETH050	M05	80 km	1.6 cm ³
	M10	160 km	1.9 cm ³
ETH080	M05	80 km	3.1 cm ³
	M10	160 km	4.4 cm ³
ETH100	M10	80 km	14 cm ³
	M20	160 km	17 cm ³
ETH125	M10	60 km	20 cm ³
	M20	120 km	48 cm ³

Lubricant



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).

2.3 Toothed belt

In this chapter you can read about:

Checking the toothed belt	21
Toothed belt exchange	21

2.3.1. 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.

2.3.2. Toothed belt exchange

Under good operating conditions, the toothed belt may run for 6000 hours of operation. After this time, the belt must be exchanged.

Good operating conditions are:

- ◆ no negative environmental influences
- ◆ perfect alignment of the shafts
- ◆ approved and correct geometry of the pulleys
- ◆ correct mounting
- ◆ permitted transmissible drive torques are respected.

3. Supply repair

In the event of a damage or a mechanical defect, the entire unit must be returned for repair (Parker Hannifin (see 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.

4. Planning of the ETH Electro Cylinder for EX-Environment

Procedure for project development of the ETH Electro Cylinder for explosive environment

	Responsibility/ Cooperation	Procedure	Documents
1.	Operator	Check der Basic conditions for ATEX Please check by means of this document whether the basic conditions for the use of the ETH Electro Cylinder in explosive environment are possible.	ETH ATEX: Basic conditions for the use, chapter 1 to 3 Part No.: 192-550006
2.	Operator	Planning of the ETH - Electro Cylinder Please plan and design the ETH - Electro Cylinder for your application by means of the ETH product catalogue	ETH Product Catalogue Part No.: 192-550003
3.	Operator	Check the heating of the ETH Electro Cylinder Determine your ATEX application data and check by means of the Force Velocity Diagram (see page 28) (ETH032, ETH050 and ETH080 only) if the heating of the selected ETH Electro Cylinder is within the accepted range of the required data application (if so, continue with 5.) For ETH100 and ETH125 an application specific approval is necessary (continue with 4.2)	ETH ATEX: Basic conditions for the use, chapter 5 Part No.: 192-550006
4.	Operator	Adaption of the ETH Electro Cylinder or of the application data In case the heating of the selected ETH with the required application data is outside the permitted area you can continue as follows:	
4.1	Operator	- Select larger ETH Electro Cylinder (size of cylinder, Pitch), - Reduce the application data (Force, Speed or Duty cycle) or	
4.2	Parker / User	- Ask for a application specific release (see page 34)	
5.	Operator	Ordering the ETH Electro Cylinder with ATEX Option If the heating of the ETH Electro Cylinder is within the permissible are of the F-v-Diagram (a) or if an application specific release (b) from Parker Hannifin is necessary, the selected ETH can be used within the ATEX application described. a) standard ATEX Cylinder, A No.: 000 b) application specific ATEX release, A-No.:xxx	

5. Check ATEX permissibility by means of the application data

In this chapter you can read about:

ETH ATEX Certification by means of force velocity diagrams24
 ETH ATEX Certification by measuring the internal heat generation under application conditions34

5.1 ETH ATEX Certification by means of force velocity diagrams

In this chapter you can read about:

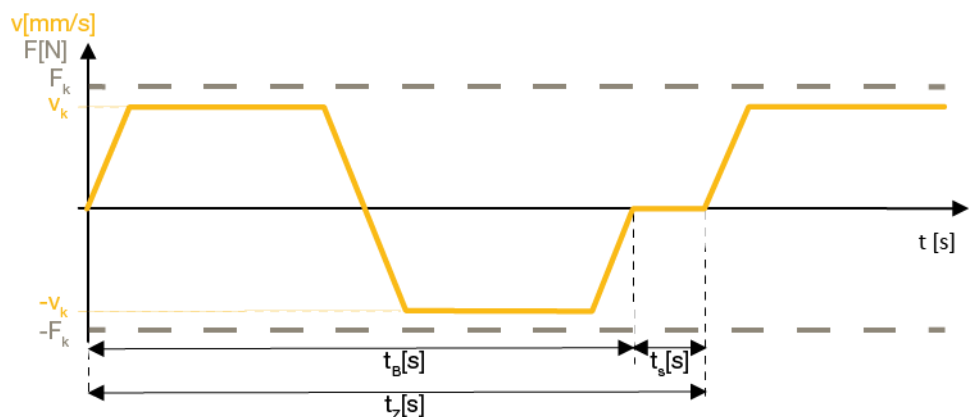
Standard cycle.....24
 Working with the force velocity diagrams26
 Force velocity diagrams (F-v-diagrams).....28

5.1.1. Standard cycle

In order to check the application on the basis of standard force - velocity - diagrams it is necessary to map the present application data in a standard cycle. For this standard cycle with its benchmark the force velocity diagrams are valid.

5.1.1.1 Definition of the standard cycle

We define a cycle with constantly acting force and a travel profile with constant speed for both directions as standard cycle.



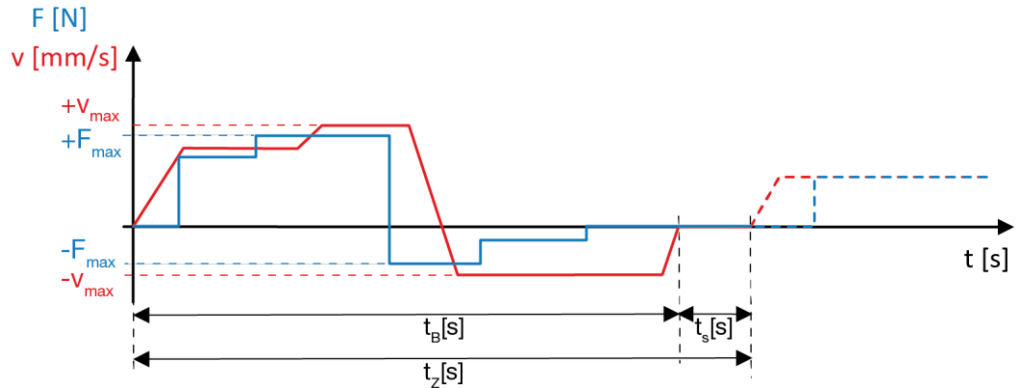
- F_k Constant maximum axial traction/ compressive force (-F_k, F_k)
- v_k Constant maximum travel speed (-v_k, v_k)
- t_B Travel time
- t_S Stall Time
- t_Z Cycle time, then the next cycles follow.

Furthermore the duty cycle (DC for Duty Cycle) is defined as follows:

$$DC = \frac{t_B}{t_B + t_S} * 100 \% = \frac{t_B}{t_Z}$$

5.1.1.2 Application examples

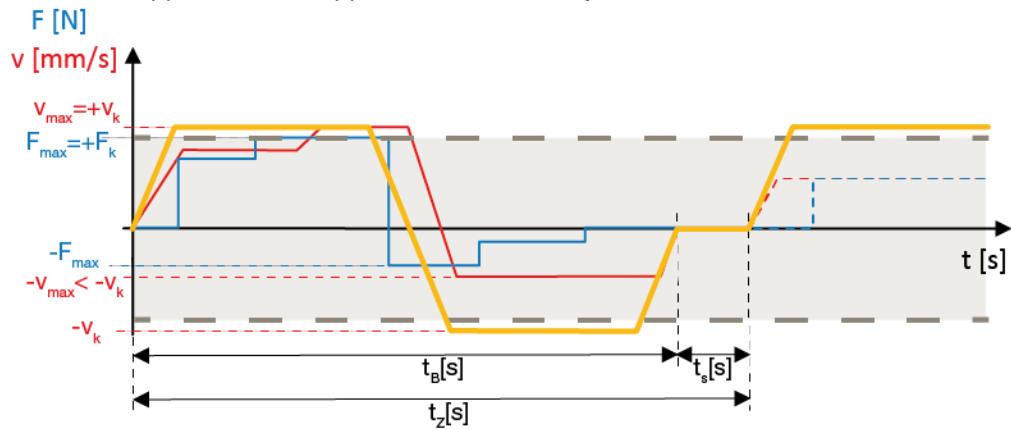
By means of an example we will show how you can determine the characteristic values of the standard cycle.



- F_{max} Maximum axial traction/ compressive force of the application
Maximum value out of $|-F_{max}|, F_{max}$
- v_{max} Maximum travel speed of the application
Maximum value out of $|-v_{max}|, v_{max}$
- t_B Travel time
- t_s Stall Time
- t_z Cycle time, then the next same cycle follows

5.1.1.3 Standard cycle for application example

Now the application is mapped on a standard cycle.



- F_k Constant maximum axial traction/ compressive force ($-F_k, F_k$)
- v_k Constant maximum travel speed ($-v_k, v_k$)
- t_B Travel time
- t_s Stall Time
- t_z Cycle time, then the next cycles follow.
- F_{max} Maximum axial traction/ compressive force of the application
Maximum value out of $|-F_{max}|, F_{max}$
- v_{max} Maximum travel speed of the application
Maximum value out of $|-v_{max}|, v_{max}$

For the defined values of the standard cycle (F_{max}, v_{max} and DC) we must check the ATEX approval by means of the force velocity diagrams (see page 28). Please proceed as stated below.

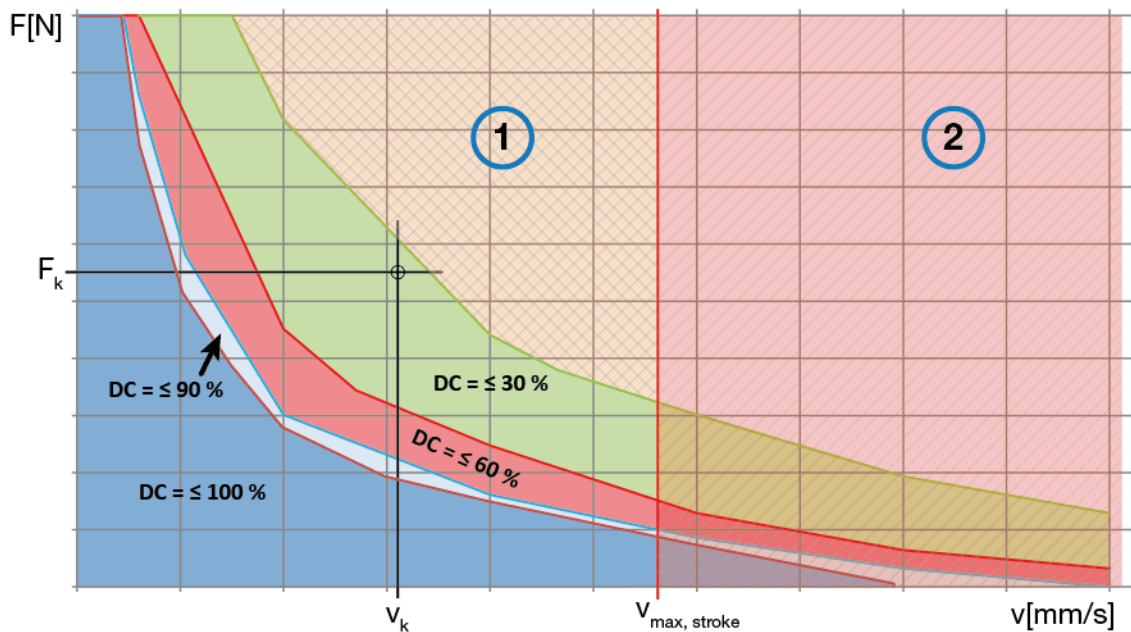
5.1.2. Working with the force velocity diagrams

The diagrams show speed via force. In the diagrams are 4 acceptable areas for different duty cycles (DC: Duty Cycle). They vary according to their motor mounting.

For parallel motor mounting, duty cycle must be reduced by 10 % due to the heat emission.

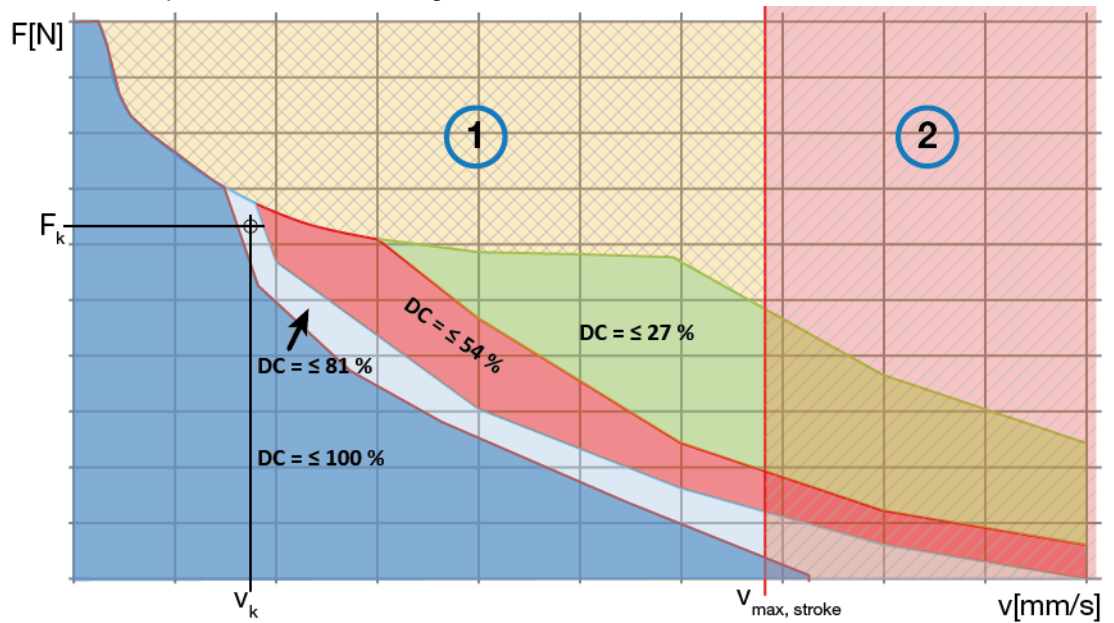
Please fill in the values of the standard cycle (F_{max} , v_{max}) into the corresponding force velocity diagrams (depending on the ETH frame size, parallel or inline motor mounting, screw lead) and verify whether the required duty cycle (DC) is acceptable. The maximum possible velocity ($v_{max,stroke}$) must be considered because of the stroke length.

In the example shown with F_k and v_k a duty cycle of maximum DC = 30 % is allowed.



- 1 Non-permissible area - limited by warming
- 2 Non-permissible area - limited by maximum permitted velocity dependent upon stroke
- $v_{max, stroke}$ Maximum permitted speed dependent upon stroke (please refer to the technical data of the ETH catalogue).

With parallel motor mounting the force is limited by the speed dependent, maximum transmittable torque. This can be seen on the following diagram typical for parallel motor mounting.



- 1 Non-permissible area - limited by warming
 - 2 Non-permissible area - limited by maximum permitted velocity dependent upon stroke
 - $v_{max, stroke}$ Maximum permitted speed dependent upon stroke (please refer to the technical data of the ETH catalogue).
- In the example shown with F_k and v_k a duty cycle of maximum $DC=81\%$ is allowed.



The operation with application data within the hatched areas is not allowed!

5.1.3. Force velocity diagrams (F-v-diagrams)

In this chapter you can read about:

F-v Diagram ETH032 ATEX M05/M10 inline-motor mounting option.....	29
F-v Diagram ETH032 ATEX M05 parallel motor mounting option.....	29
F-v Diagram ETH032 ATEX M10 parallel motor mounting option.....	30
F-v Diagram ETH050 ATEX M05/M10 Inline motor mounting option.....	30
F-v Diagramm ETH050 ATEX M05 Parallel motor mounting option	31
F-v Diagramm ETH050 ATEX M10 PParallel motor mounting option	31
F-v Diagram ETH080 ATEX M05/M10 Inline motor mounting option.....	32
F-v Diagramm ETH080 ATEX M05 Parallel motor mounting option	32
F-v Diagramm ETH080 ATEX M10 Parallel motor mounting option	33



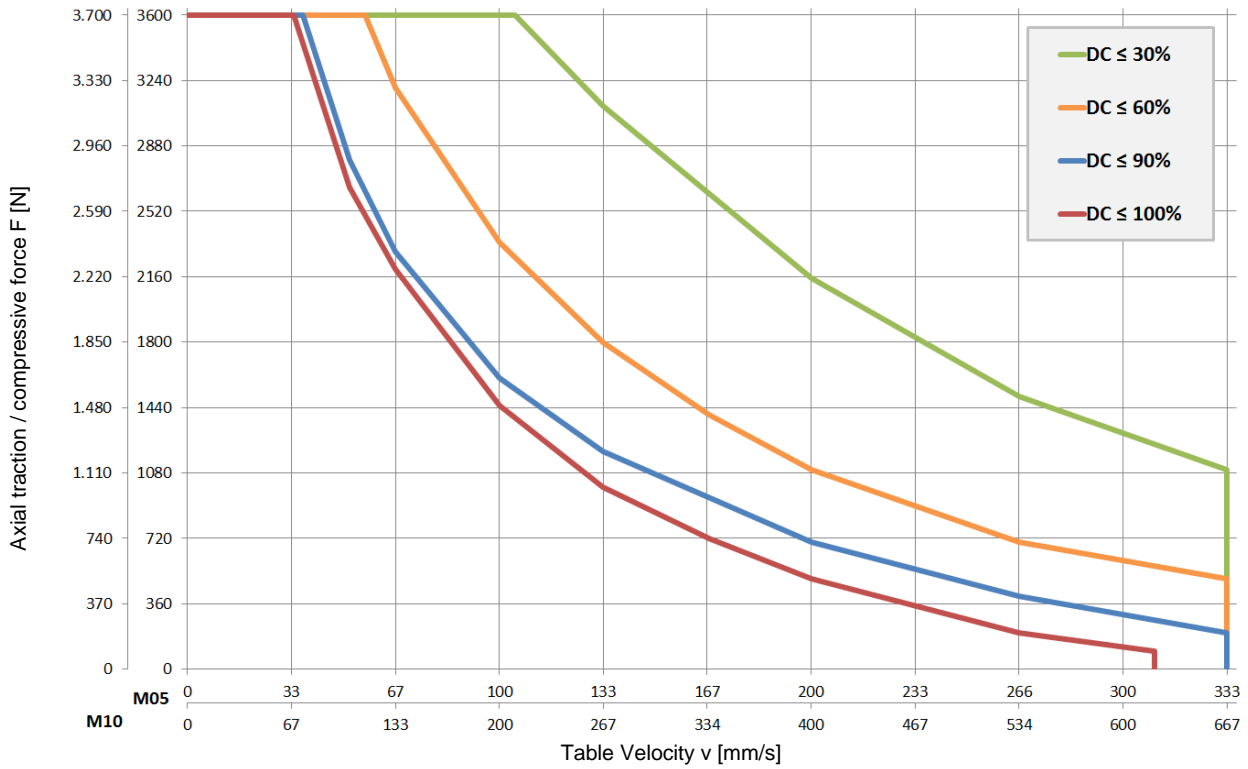
The operation of the ETH ATEX cylinder is only permitted within the areas authorized by F-v-diagrams.

Danger of explosion when exceeding the authorized areas or at non-observance of the conditions for the validity of the F-v-diagrams!

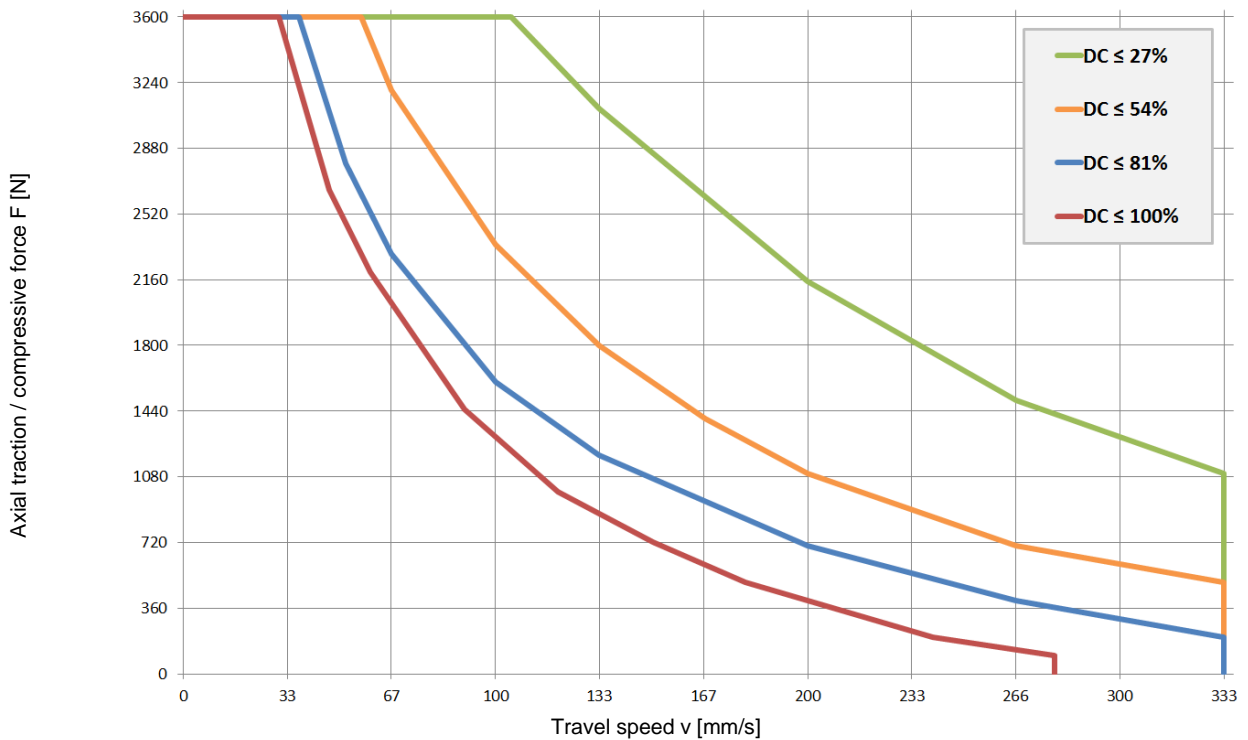
Prerequisites for the validity of the Force Velocity Diagrams:

- ◆ Ambient temperature between -10 °C und 40 °C.
- ◆ No impairment of the lubrication, for example by external particles.
- ◆ The lubrication intervals stated in the ETH ATEX operating/mounting instructions (192-550003
http://www.parker.com/Literature/Electromechanical%20Europe/user%20guides/192_550003_ETH_ATEX_Betriebsanleitung.pdf,
http://www.parker.com/Literature/Electromechanical%20Europe/user%20guides/192_550003_ETH_ATEX_Operating_instructions.pdf) are mandatory and must be respected under all circumstances.
- ◆ In short-stroke applications (stroke shorter than 2.5 times the screw lead), the specified lubricating runs must be performed as described in the ETH ATEX operating/mounting instructions (192-550003
http://www.parker.com/Literature/Electromechanical%20Europe/user%20guides/192_550003_ETH_ATEX_Betriebsanleitung.pdf,
http://www.parker.com/Literature/Electromechanical%20Europe/user%20guides/192_550003_ETH_ATEX_Operating_instructions.pdf).
- ◆ The cylinders must be replaced after 90 % of the attainable service life.
- ◆ The permitted maximum side load on the piston rod = 0.
- ◆ No additional thermal effect due to a mechanical connection of the piston rod with a work piece fixture or such, which might lead to a heating of the screw nut.
- ◆ Please consider the stroke dependent maximum velocity of the ETH.
- ◆ When installing the ETX ATEX please make sure that the ambient temperature of 40 °C is not exceeded (enough convection, ...).
- ◆ The heat input by the drive (motor, gearhead) shall not exceed 135 °C. We recommend to use a motor or gearhead with temperature class T4 or higher.
- ◆

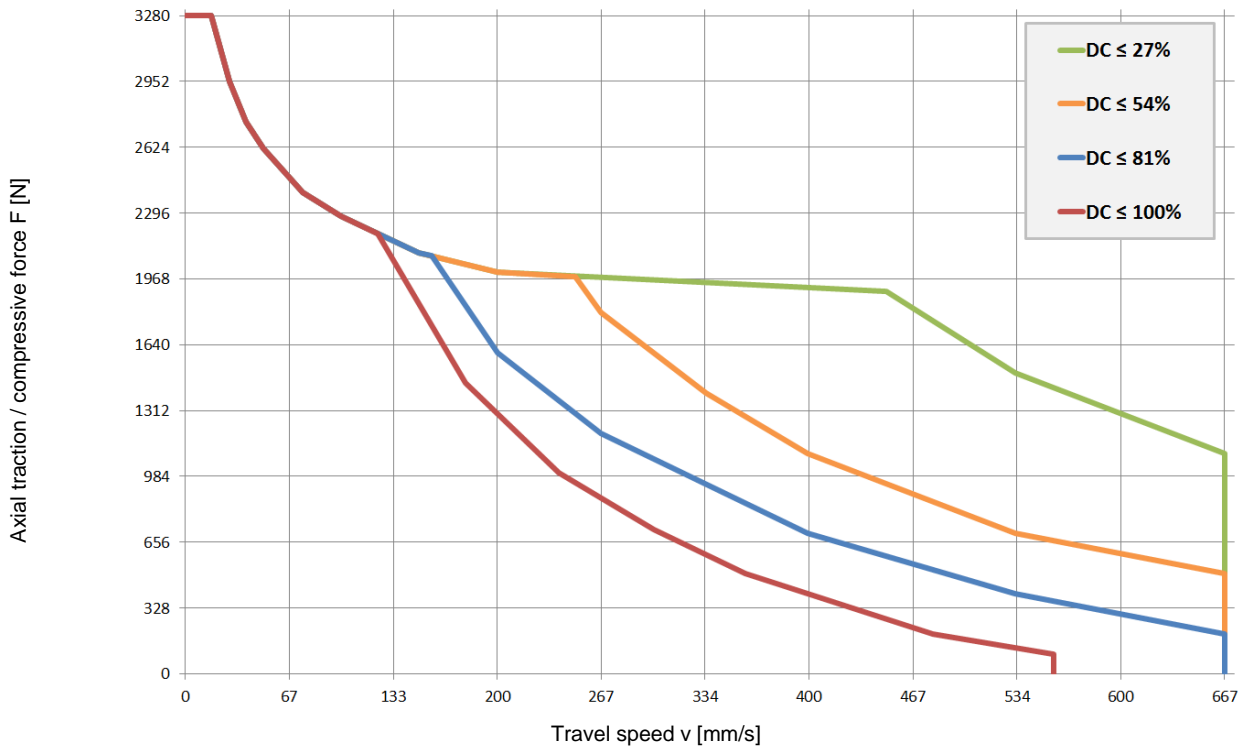
5.1.3.1 F-v Diagram ETH032 ATEX M05/M10 inline-motor mounting option



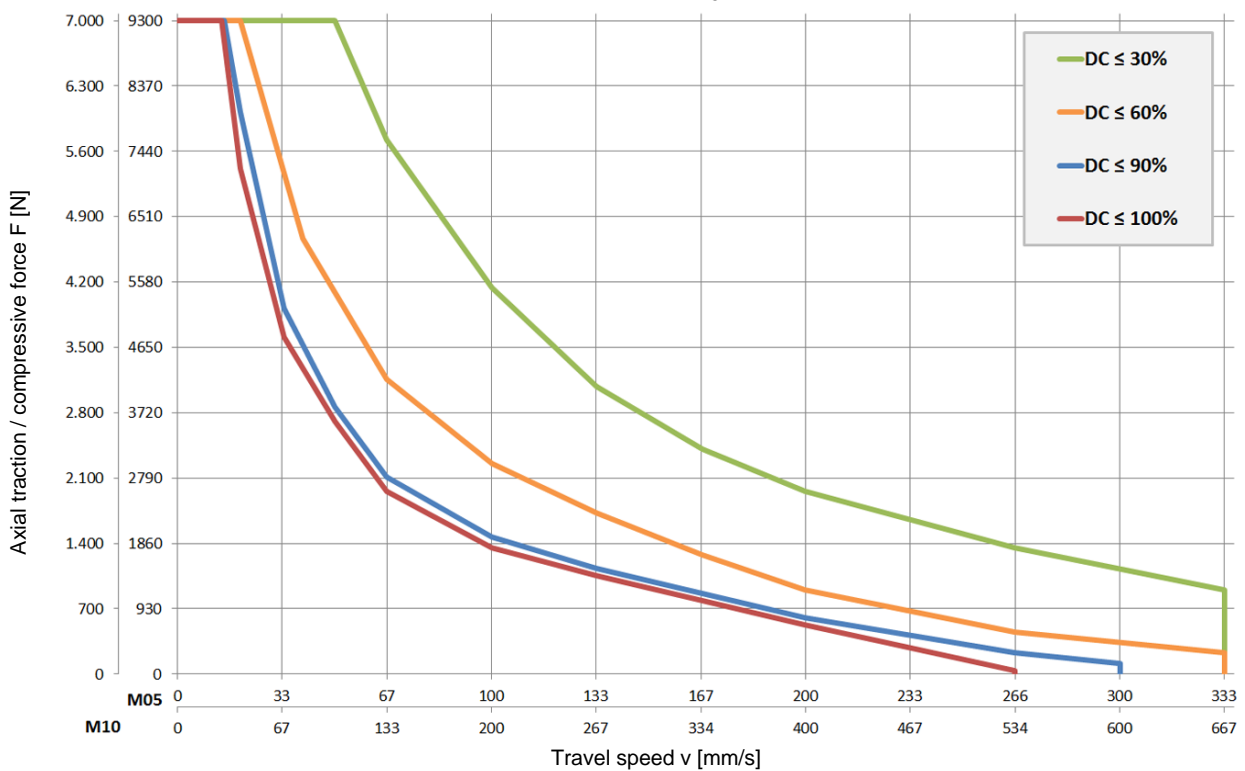
5.1.3.2 F-v Diagram ETH032 ATEX M05 parallel motor mounting option



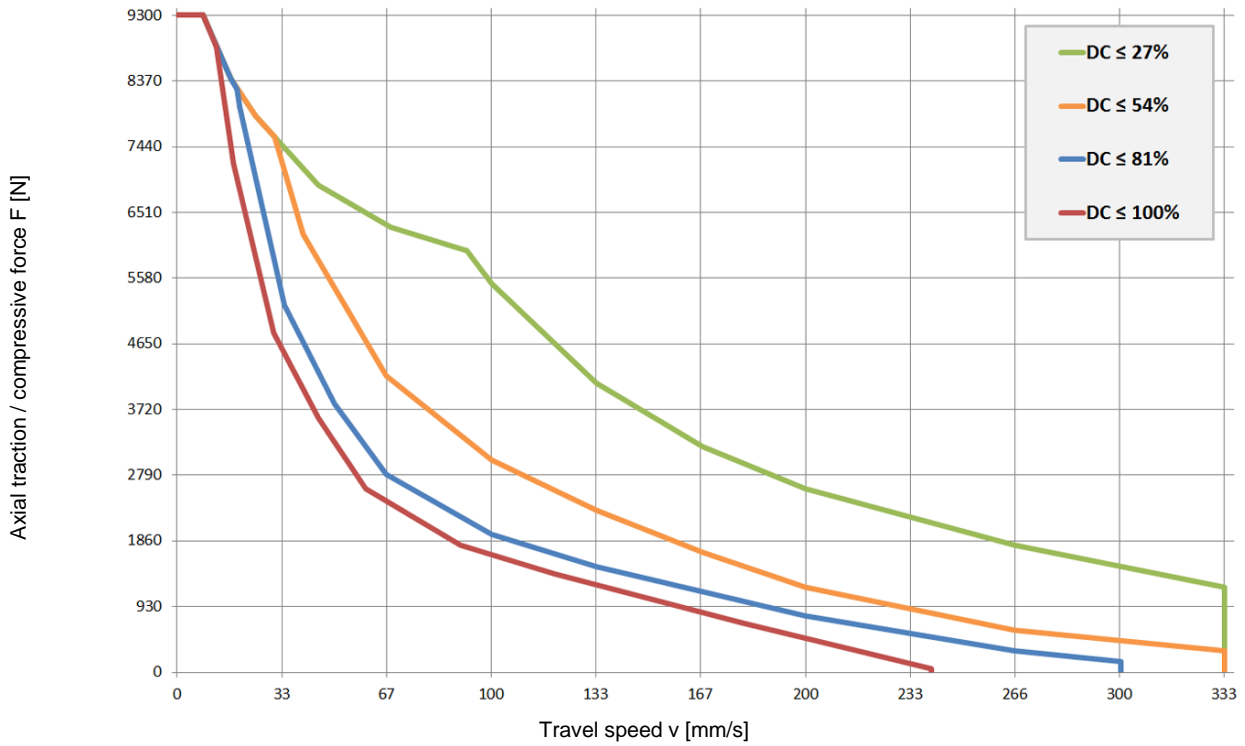
5.1.3.3 F-v Diagram ETH032 ATEX M10 parallel motor mounting option



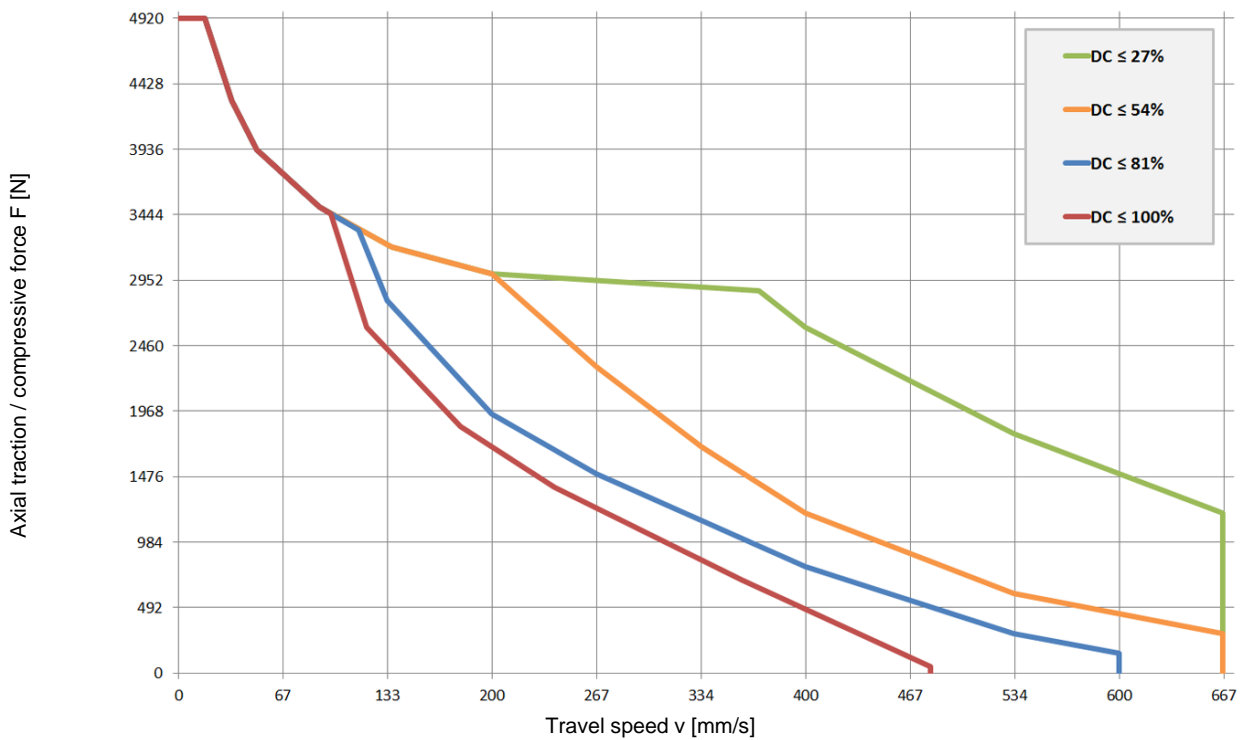
5.1.3.4 F-v Diagram ETH050 ATEX M05/M10 Inline motor mounting option



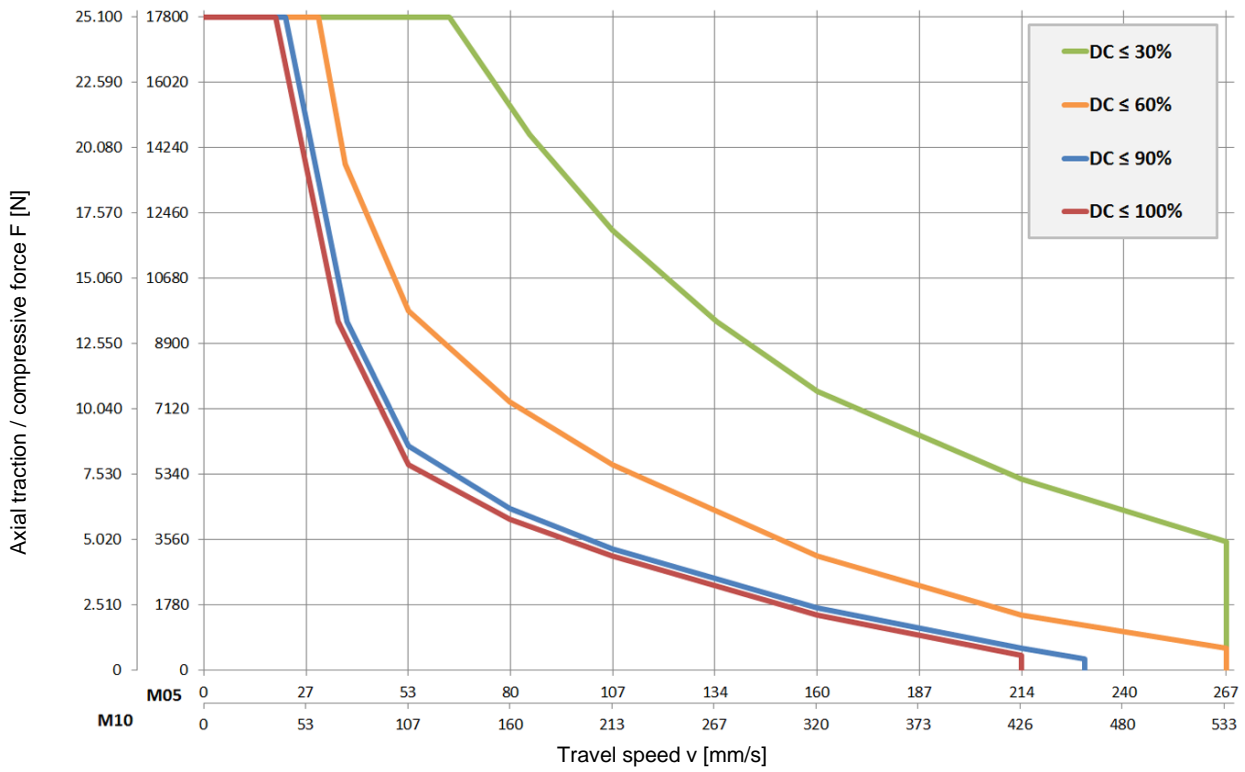
5.1.3.5 F-v Diagramm ETH050 ATEX M05 Parallel motor mounting option



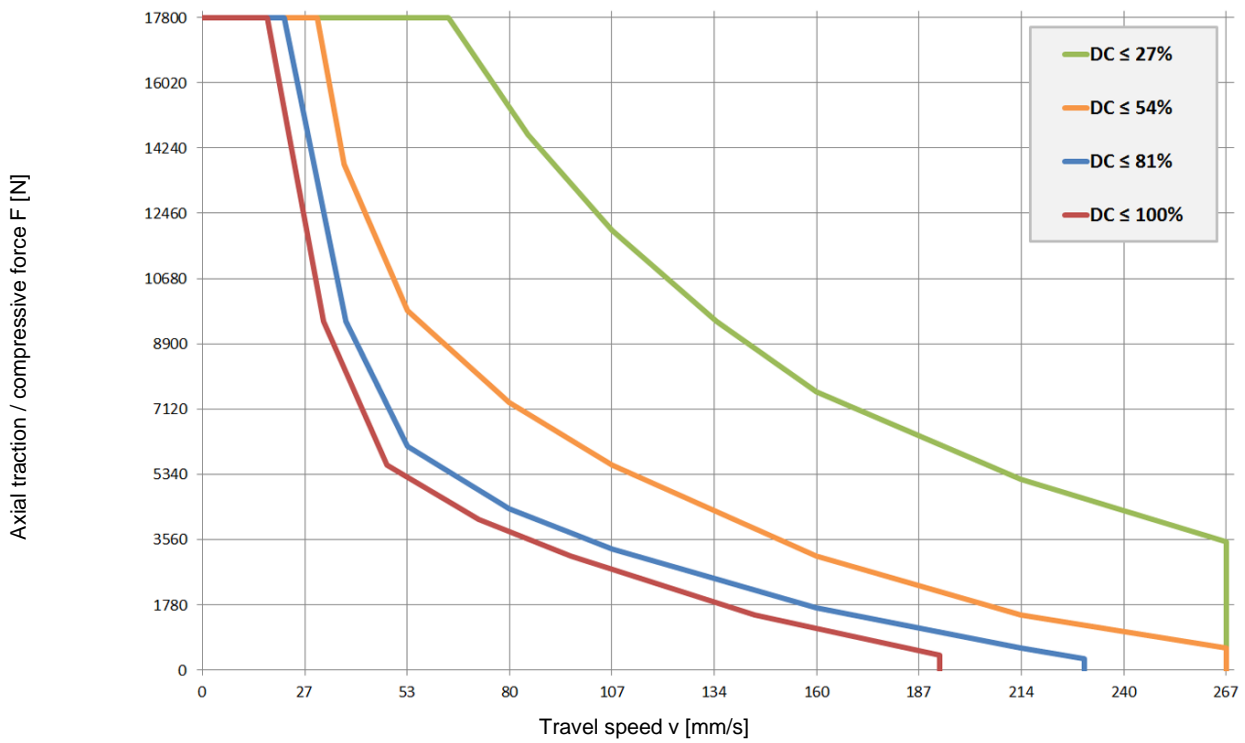
5.1.3.6 F-v Diagramm ETH050 ATEX M10 PParallel motor mounting option



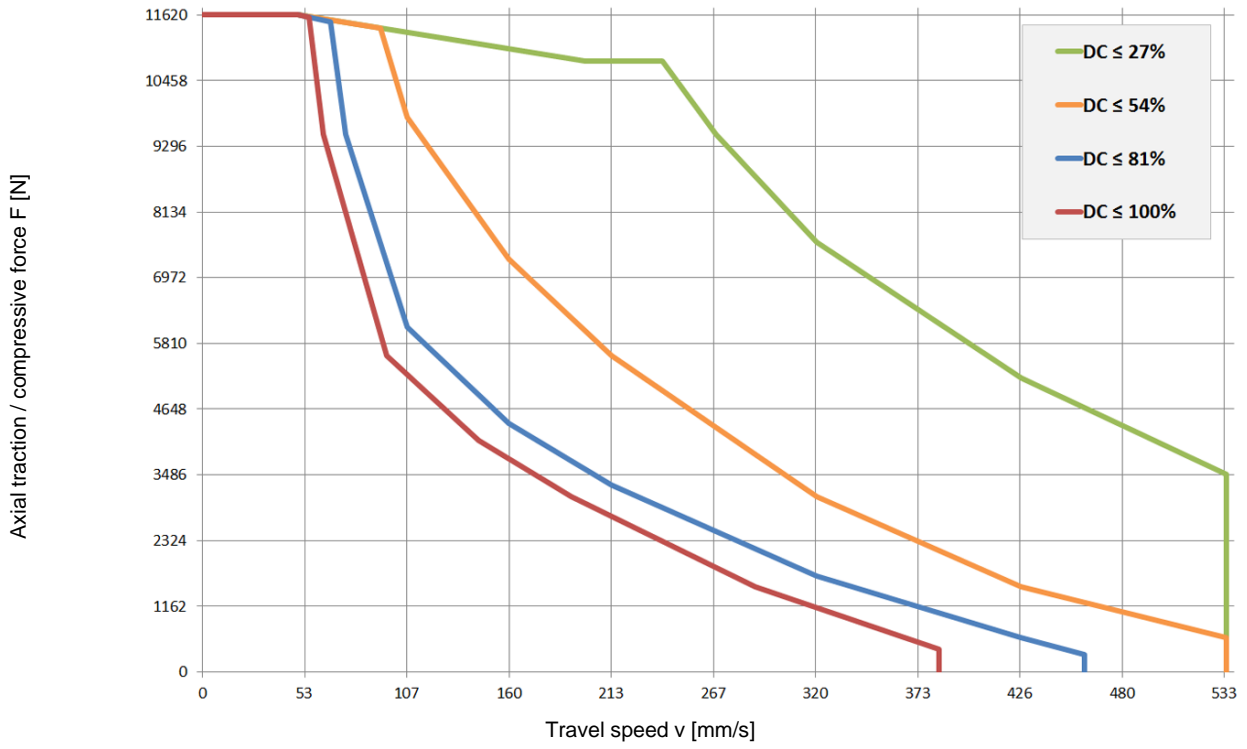
5.1.3.7 F-v Diagram ETH080 ATEX M05/M10 Inline motor mounting option



5.1.3.8 F-v Diagramm ETH080 ATEX M05 Parallel motor mounting option



5.1.3.9 F-v Diagramm ETH080 ATEX M10 Parallel motor mounting option



5.2 ETH ATEX Certification by measuring the internal heat generation under application conditions

5.2.1. ETH ATEX - application data

ATEX certification by application specific measurement is always for specific ATEX application data.

Therefore, we need your precise application data in advance.

Procedure of application specific certification ETH ATEX

	Responsibility / Cooperation	Procedure	Documents / Notes
1.	User / Parker	<p><u>Verifying the intended use</u></p> <p>Once you have determined in Procedure for project development (see page 23) in chapter 4.2 that an application specific release is necessary please use the following procedure:</p>	
2.	User / Parker	<p><u>Identifying the ATEX application data:</u></p> <ul style="list-style-type: none"> ◆ ETH Order code ◆ Application specific force¹ time diagram or force stroke diagram² (axial thrust force at the cylinder piston rod) ◆ Application specific position time diagram or as movement³ (jerk, acceleration, speed, stroke) ◆ Maximum ambient temperature <p>In general it must be taken into consideration, that the maximum ambient temperature of the ETH cylinder is the temperature which can act upon any spot of the cylinder surface when the piston rod is extended.</p> <p>In addition, it applies for the measurement:</p> <ul style="list-style-type: none"> ◆ Linear interpolation of F(x) or F(t) between interpolation points. ◆ For x(t), no interpolation between interpolation points. 	ATEX application data
3.	Parker	<p><u>Measurement of the internal heat generation</u></p> <p>We set up your cycle in the lab and measure the maximum temperature occurring at the screw nut. This is the spot where the cylinder is most susceptible to heating up.</p>	ATEX application data

¹ Axiale Vorschubkraft an der Zylinderkolbenstange

² Darstellung in einer Stützpunktabelle (Papier / elektronisch)

³ Darstellung in einer Stützpunktabelle (Papier / elektronisch)

	Responsibility / Cooperation	Procedure	Documents / Notes
4.	Parker / User	<p><u>Evaluation of the measurement results / measures</u></p> <p>Application can be released If the permitted internal heat generation is met, the application specific ETH ATEX certification can be granted (continue with 5.)</p> <p>Application can not be released If the internal heat generation is too high, modifications are required. The required modifications are defined in cooperation with Parker. (continue with 2.)</p>	ATEX application data
5.	Parker	<p><u>ATEX release</u></p> <p>ATEX Certification for the submitted ATEX application data and the specific ETH cylinder defined by the order code Allocation of an unambiguous A number (part of the order code) for the ATEX application data verified. Via the A number included in the order code and the designation for ATEX cylinders (17th digit in the order code = "A"), the ETH ATEX cylinder is unambiguously defined and can be ordered accordingly.</p>	ATEX test protocol with A number ATEX Application data with reference to the order code (see page 11) of the ETH cylinder


DANGER
Caution!

ATEX certification is exclusively valid for the submitted ATEX application data and the specific ETH cylinder unambiguously defined by the order code.

Operation of the ETH is therefore only permitted if the submitted ATEX application data are met!

Reduced performance data are possible. For instance:

- ◆ lower force
- ◆ lower speed / acceleration / reduced jerk
- ◆ reduced ambient temperature
- ◆ extended standstill / breaks

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